HGC ENGINEERING

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Noise Feasibility Study for a Category 1 – Class "A" Pit below Water Pike Pit

Part Lot 18, Concession 3
Municipality of Thames Centre
County of Middlesex, Ontario

Prepared for:

Thames Valley Aggregates Inc.
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1 INTRODUCTION AND SUMMARY

HGC Engineering was retained by Thames Valley Aggregate Inc. to undertake an analysis of the potential impact of noise from a proposed gravel pit at neighbouring noise sensitive receptors (residential dwellings) in accordance with the Ministry of Natural Resources and Forestry (MNRF) and the Ministry of the Environment, Conservation and Park (MECP) Guidelines. The proposed gravel pit is located west of Hunt Road and south of the Gore Road (County Road 64) in the Municipality of Thames Centre in the Municipality of Middlesex.

This assessment was conducted in accordance with MNRF and MECP guidelines and considered the potential effects of noise from extraction, processing and transportation sources with regard to neighbouring noise sensitive receptors.

This assessment is also based on a review of the operational plans prepared by Harrington McAvan Ltd dated September 2020 and sound levels taken from our files based on measurements of similar aggregate processing equipment to be used in the pit.

There are noise sensitive receptors located to the northwest and east of the proposed pit. The equipment and activities which are potential sound sources are outlined in Section 4. This assessment is based on a scenario representing the worst-case operations located closest to the receptors. The results of our analysis indicate that the sound levels produced by the operations in the pit under the worst case operational scenario are expected to comply with MECP Guideline limits with the implementation of noise control measures.

2 SITE DESCRIPTION

The existing features plan attached as Figure 1 and aerial plan attached as Figure 2 show the location of the proposed site, the neighbouring residences and nearby roadways.

The proposed gravel pit is located west of Hunt Road and south of the Gore Road (County Road 64) in the Municipality of Middlesex Centre. The proposed licence area is ±21.0 hectares with a maximum annual tonnage of excavation of 500,000 tonnes. There are existing residential and agricultural land uses to the east and north of the site and existing aggregate extraction facilities to the west and south of the site.

3 CRITERIA

3.1 Receptors

The Provincial Standards – Aggregate Resources of Ontario (Category 1 – Class "A" Pit below Water) state: "If extraction and / or processing facilities are located within 150 meters of a sensitive receptor, a noise assessment report is required to determine whether or not provincial guidelines can be satisfied" and "Sensitive receptors include residences or facilities where people sleep (nursing homes, hospitals, trailer parks, camping grounds, etc); schools; day-care centres."

There are two residential homes located within 150 m of the site boundaries to east and west of the site (R1 and R2). R1 is a 2-storey dwelling and R2 is 1-storey dwelling. Any useable locations on the residential property, within 30 m of the building facade and outside the plane of the residential windows are considered to be points of reception. In this case, the worst case point of reception is generally considered to be outside the upper storey windows due to the potentially increased exposure to activities in the pit. The receptor locations are shown on the Figures.

3.2 Noise Criteria

Appropriate sound level limits used in the assessment of sound from aggregate operations are provided in MECP publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", Part C release date October 21, 2013". Under MECP guidelines, the acoustical environment at the sensitive receptor R1 is classified as rural since the residential home is located a considerable distance away from Gore Road. For sensitive receptor R2, the acoustical environment is classified as semi-urban as the background sound is dominated by traffic noise from Gore Road. The gravel pit will operate during daytime hours only. NPC-300 specifies that the sound level limit at any receptors due to the operation of a stationary source is the higher of the background one hour energy equivalent sound level ($L_{EQ\text{-}1Hr}$) or 45 dBA for rural areas and 50 dBA for semi-urban areas during the daytime hours.

To ensure a conservative analysis, since road traffic sound levels may be relatively low during some daytime hours, the minimum daytime sound levels of 45 dBA and 50 dBA are used in the following sections of this report as the criterion by which the potential noise impact of the proposed aggregate extraction and processing operations are assessed.

Compliance with MECP criteria generally results in acceptable levels of sound at residential receptors, although there may be residual audibility during periods of low background sound. 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. The initial operations of building access roadways, stripping top soil, and building localized shielding and perimeter berms, as well as the final operations of rehabilitation and removal of localized shielding and perimeter berms) 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" [3].

4 NOISE ASSESSMENT

4.1 Description of Noise Sources and Aggregate Operations

The following details the future above and below water extraction and processing operations in the pit as indicated on the Operational Plan.

1. The gravel pit will typically operate from 07:00 to 19:00 on Monday to Friday, and from 07:00 to 12:00 on Saturday. No other evening or nighttime operations are anticipated.

2. The entrance to the pit is located in the northeast corner of the site.

3. Above and below water pit operations will begin in the south end of Area 1 and proceed in a northerly direction into Areas 2 and 3.

4. The aggregate excavation, processing and loading equipment consists of a crushing and screening plant with an associated loader, and an excavator. The loader and excavator can operate in each area for extraction at the working face or loading of trucks. An excavator will be used for below water excavation.

5. All operations including excavation, processing, and loading will typically occur on the floor of the pit at an elevation of approximately 271 – 272 mASL.

6. Processing equipment will not be located within 90 m of any boundary of the site that abuts

residential land uses as per "The Provincial Standards – Aggregate Resources of Ontario", Operational Standards for Licences, Section 5.13.

7. The peak number of trucks expected to arrive and depart in a typical busy hour is 20.

MECP guidelines require that a worst case hourly scenario be used in the evaluation. This scenario is discussed below.

4.2 Acoustical Modelling

Predictive modeling was used to assess the potential sound emissions of the worst case gravel pit activities. The prediction model is based on established engineering methods from the MECP and ISO Standard 9613 for the prediction of outdoor sound propagation.

To consider a worst-case operational scenario, the following assumptions were made:

- All extraction, processing, and loading could occur simultaneously at the closest possible location to the receptor;
- All equipment will be located on the pit floor at an elevation of approximately 271-272 mASL.
- 20 haul trucks arrive and depart.

The calculations consider the acoustical effects of distance, foliage, topography and shielding by the excavation face where applicable. The noise reducing effect of foliage is included for the existing woodlot located north of the site. Using the sound level data and the assumptions outlined above and the details contained in the operational plan, the sound levels at the receptors were predicted.

5 RECOMMENDATIONS

Using the predictive model and assumptions described in the previous section, the following noise control requirements were developed for the site and should be included as notes on the Operational Plans:

1. The following table presents the reference sound levels used for the acoustic modeling presented herein. These sound levels were based on site measurements of similar processing equipment to be used in this pit.

Table 2 – Reference Sound Power Levels of Processing Equipment

Equipment	Sound Power Level dBA re: 10^{-12} W
A Crushing and Screening Plant with an associated loader	118
Excavator	108
Trucks	103

If other equipment is proposed for operation in the gravel pit, it shall be confirmed through measurement to produce sound levels consistent with the above referenced sound levels or additional mitigation measures may be required.

2. A minimum 5.0 m high perimeter berm (above existing grade) shall be constructed along the eastern boundary of the pit prior to the commencement of extraction or processing activities in Areas 1 and 2. Once processing and extraction is complete in Area 1 and all activities are moved into Area 2, the berm adjacent to Area 1 shall no longer be required. Prior to prior to the commencement of extraction or processing activities in Area 3, the minimum 5.0 m high perimeter berm (above existing grade) shall be constructed along the eastern boundary of the pit, adjacent to Area 3. The 5.0 m high perimeter berm along Area 2 shall remain after all activities are moved into Area 3.

3. A minimum 8.0 m high acoustical barrier shall be constructed and maintained on the pit floor beside the crushing and screening plant in the direction of R1.

4. The crushing and screening plant shall not be operated within 350 m of R1.

5. The owner of R1 formerly owned the lands to be licensed for aggregate extraction. They have signed an agreement that grants the pit operator relief from implementing the noise mitigation measures as recommended above in Items #2, #3 and #4 with regard to R1.

   Should the ownership of R1 change, a similar agreement will have to be reached with the new owners or the mitigation as recommended above in Items #2, #3 and #4 shall be implemented with respect to R1.

6. A minimum 8.0 m high acoustical barrier shall be constructed and maintained on the pit floor beside the crushing and screening plant in the direction of R2 when operating within Areas 2 and 3.

7. The acoustical barrier mentioned above could be comprised of the pit face, an earth berm, a noise wall, aggregate stockpiles or any other construction with a minimum surface density of 20 kg/m^2.

8. Activities used to prepare the site for excavation, such as the stripping of topsoil and construction of berms, or activities related to the remediation of the site after the extraction is completed are considered to be construction activities. They are regulated under municipal bylaws and NPC-115 "Sound Level Limits for Motorized Construction Equipment".

6 CONCLUSIONS

In summary, HGC Engineering has reviewed the operational plan, prepared an acoustical model of the proposed activities in the pit and conducted an analysis of those operations based on a worst-case operational scenario. Using the modeling assumptions detailed in Section 4, along with incorporation of the noise control recommendations detailed in Section 5 and Figure 3, sound levels were predicted at each of the selected receptors as summarized in Table 3. Sample calculations are provided in Appendix A.

Table 3: Predicted Sound Levels at the Residential Receptors [dBA] During Worst-Case Operational Scenarios (With Noise Mitigation)

Receptor	Daytime Criteria (dBA)	Predicted Sound Level (dBA)
R1	45	45
R2	50	49

The results summarized indicate that the sound emissions from the proposed pit operations, with the noise control measures in place, are expected to comply with MECP guideline limits at the neighbouring noise sensitive receptors under worst case operating scenarios.

7 REFERENCES

1. Ontario Ministry of the Natural Resources and Forestry, *Aggregate Resources of Ontario – Provincial Standards*, 1997.

2. Ontario Ministry of the Environment and Climate Change Publication NPC-300, *Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning*, August 2013.

3. Ontario Ministry of the Environment and Climate Change Publication NPC-115, *Sound Level Limits for Motorized Construction Equipment"*.

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

5. Google Maps Aerial Imagery, Internet application: *maps.google.com*.

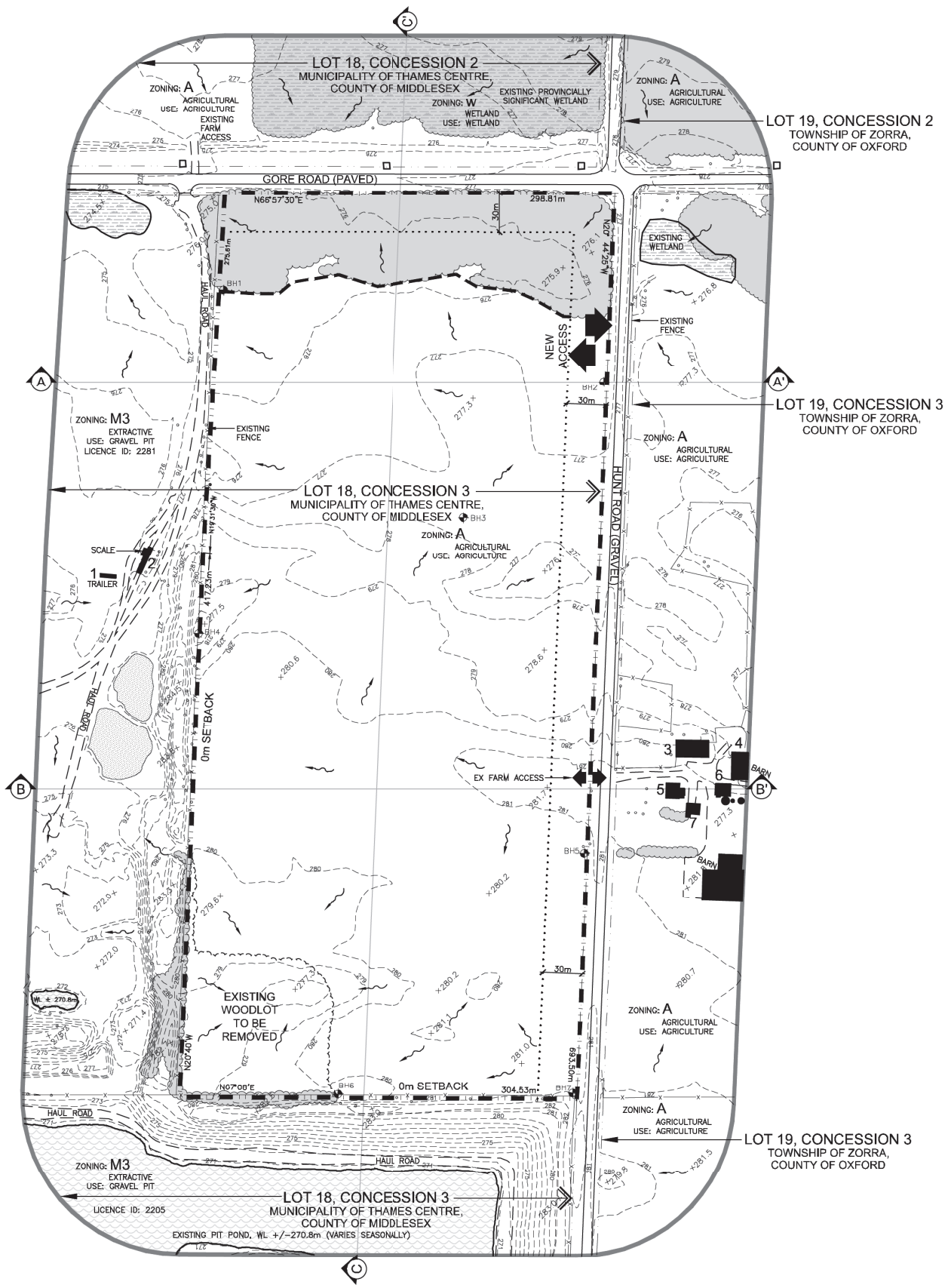

Figure 1: Existing Features Plan

EXISTING FEATURES NOTES

GENERAL SITE PLAN INFORMATION

1. THIS SITE PLAN CONSIST OF 5 DRAWINGS AND MUST BE READ COLLECTIVELY.
2. ALL MEASUREMENTS SHOWN ON THIS SITE PLAN ARE IN METRES.

LICENCE INFORMATION

3. THIS SITE PLAN IS PREPARED FOR SUBMISSION TO THE MINISTRY OF NATURAL RESOURCES AND FORESTRY UNDER THE AGGREGATE RESOURCES ACT FOR A CATEGORY 1 - CLASS 'A' LICENCE, PIT BELOW THE WATER TABLE.
4. APPLICANT:
   THAMES VALLEY AGGREGATES
   174751 17TH LINE
   INGERSOLL, ON
   N5C 3J6
5. TOTAL AREA TO BE LICENCED: 21.0 ha
   TOTAL AREA TO BE EXTRACTED: 16.97 ha
   TOTAL AREA TO REHABILITATED: 16.97 ha

BASE INFORMATION

6. TOPOGRAPHIC INFORMATION WAS OBTAINED FROM FIRST BASE SOLUTIONS UTILIZING 2015 AIR PHOTOGRAPHY. ALL ELEVATIONS ARE GEODETIC AND ABOVE SEA LEVEL (ASL).

   THE SITE WAS FIELD CHECKED BY HARRINGTON MCAVAN LTD., APRIL 18, 2016.
7. THE PROPOSED LICENCE AREA IS ZONED A, GENERAL AGRICULTURE. AN APPLICATION FOR AN AMENDMENT TO THE ZONING BYLAW TO CHANGE THE DESIGNATION TO ME, AGGREGATE INDUSTRIAL HAS BEEN MADE TO THE MUNICIPALITY OF THAMES CENTRE. THE OFFICIAL PLAN DESIGNATES THE MAJORITY OF THIS SITE AS PRIMARY AGGREGATE RESOURCE.

HYDROGEOLOGICAL INFORMATION

8. HYDROGEOLOGICAL INFORMATION INCLUDING GROUNDWATER ELEVATION WAS OBTAINED FROM REPORT BY LDS CONSULTANTS. DATED ———.
9. THE WATER TABLE ELEVATION WITHIN THESE PROPERTIES IS ESTIMATED TO BE BETWEEN ———m ABOVE SEA LEVEL (A.S.L.) BASED ON ABOVE REPORT.

TECHNICAL REPORTS

10. HYDROGEOLOGICAL INFORMATION WAS OBTAINED FROM REPORTY BY LDS CONSULTANTS DATED ———(REFER TO SHEET 3 FOR TECHNICAL RECOMMENDATIONS).
11. NATURAL ENVIRONMENT INFORMATION WAS OBTAINED FROM REPORT BY AWG ENVIRONMENTAL CONSULTING DATED JANUARY 2017 (REFER TO SHEET - FOR TECHNICAL RECOMMENDATIONS).
12. ARCHAEOLOGICAL INFORMATION WAS OBTAINED FROM REPORT BY TIMMINS MARTELLE HERITAGE CONSULTANTS INC. DATED JUNE 2016 (REFER TO SHEET 4 OF 5 FOR TECHNICAL RECOMMENDATIONS).
14. ACOUSTICAL INFORMATION WAS OBTAINED FROM NOISE REPORT BY HGC ENGINEERING DATED JANUARY 2017 (REFER TO SHEET - FOR TECHNICAL RECOMMENDATIONS).

LEGEND

- BOUNDARY OF AREA TO BE LICENCED
- 120m INFORMATION BOUNDARY
- REGULATORY SETBACK LINE
- EXTRACTION LIMIT
- EXISTING FENCE
- EXISTING 5m CONTOUR LINE
- EXISTING 1m CONTOUR LINE
- EXISTING SPOT ELEVATION
- EXISTING VEGETATION
- EXISTING WETLAND
- EXISTING STOCKPILE
- EXISTING BUILDING AND NUMBER
- EXISTING HYDRO POLE
- DIRECTION OF SURFACE WATER DRAINAGE
- TEST PIT LOCATION AND NUMBER (DUG BY APPLICANT ON ———)
- BOREHOLE LOCATION AND NUMBER DRILLED AND MONITORING WELL INSTALLED BY LDS ———
- LOCATION OF SECTION
- EX FIELD ENTRANCE (NO GATES)
- NEW SITE ENTRANCE/ EXIT

BUILDING LIST

No.	
1.	TRAILER
2.	SCALE AND SCALEHOUSE
3.	SHED
4.	BARN
5.	HOUSE
6.	SHED
7.	BARN

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Project Name

Thames Valley Aggregates Inc.

PIKE PIT

LICENCE No.
PART LOT 18, CONCESSION 3
MUNICIPALITY OF THAMES CENTRE (FORMERLY TOWNSHIP OF NORTH DORCHESTER, COUNTY OF MIDDLESEX

Scale 1:2000
0 10 50 80m

North

Stamp: ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS — RICHARD McAVAN — OALA MEMBER

Drawing Status
PRELIMINARY FOR DISCUSSION

Drawn RM | Checked MH | Issue Date SEPT 2020

Drawing Title
EXISTING FEATURES

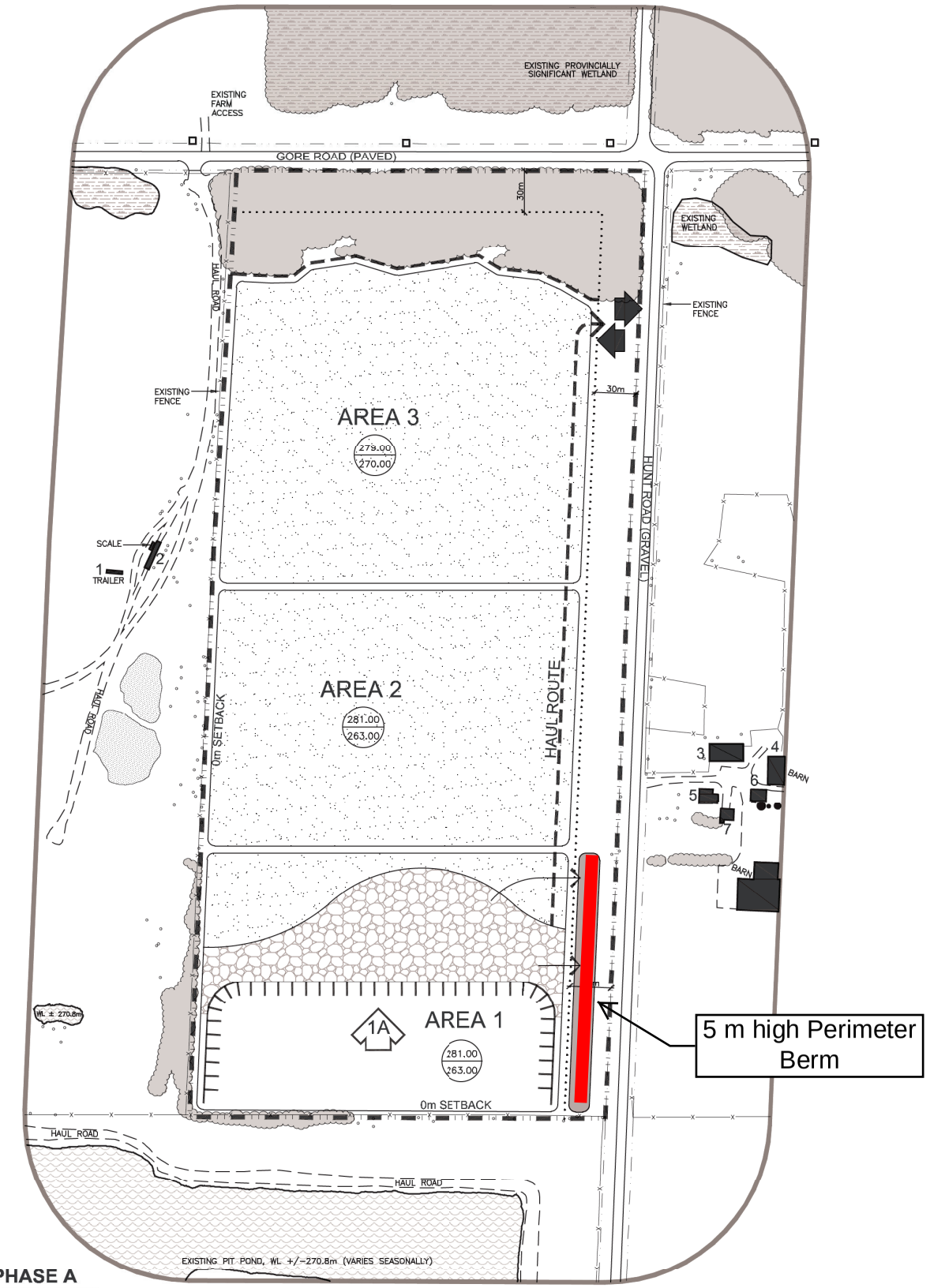
Project Number
20-23

Drawing Number
1 OF 5

FILE NAME: 20-23 CONP 2020-1.DWG
PLOT DATE: SEPTEMBER, 2020

Figure 2: Aerial Photo

PHASE A



PHASE A NOTES

1. ESTABLISH THE ENTRANCE EXIT AND HAUL ROAD INTO THE SITE, ACCORDING TO THE APPROPRIATE MUNICIPAL STANDARDS.
2. PRIOR TO ANY ON SITE OPERATIONS, CONSTRUCT OR UPGRADE THE FENCING ON THE LICENCED BOUNDARIES TO THE STANDARDS OF THE AGGREGATE RESOURCES ACT (1.2m HIGH POST AND WIRE FENCE). ALL FENCING SHALL BE MAINTAINED.
3. PREPARE SITE WITHIN AREA 1 BY REMOVING EXISTING TREES AND SCRUB VEGETATION IN THE AREA TO BE EXTRACTED. SALVAGE LARGER STUMPS AND TREES FOR HABITAT CREATION DURING PROGRESSIVE REHABILITATION.
4. PRIOR TO ANY ON SITE OPERATIONS, STRIP TOPSOIL AND OVERBURDEN SEPARATELY USE THE MATERIALS TO CONSTRUCT ACOUSTICAL BERM ALONG HUNT ROAD.
5. CONSTRUCT THE HALL ROAD THROUGH AREA 1 AND 2.
6. EXTRACTION OF AREA1 WILL PROCEED IN DIRECTION SHOWN.
7. UNDISTURBED PORTIONS OF AREAS 2 AND 3 REMAIN IN AGRICULTURAL USE AND OPEN SPACE.

OPERATIONS NOTES

GENERAL INFORMATION

1. THIS PLAN DEPICTS A SCHEMATIC OPERATIONS AND REHABILITATION SEQUENCE FOR THIS PROPERTY BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION. PHASES SHOWN ARE SCHEMATIC AND MAY SLIGHTLY VARY WITH MATERIAL QUALITY, SITE HYDROLOGY AND HYDROGEOLOGY OR MARKET DEMAND. PHASES DO NOT REPRESENT ANY SPECIFIC OR EQUAL TIME PERIOD.

   EXTRACTION SHALL GENERALLY FOLLOW THE SEQUENCE SHOWN. WHEN PARTIAL REHABILITATION OF A PHASE IS POSSIBLE IT SHALL BE CARRIED OUT. NOT WITHSTANDING THE EXTRACTION AND REHABILITATION PROCESS ABOVE, DEMAND FOR CERTAIN PRODUCTS OR BLENDING OF MATERIALS MAY REQUIRE SOME DEVIATION IN THE EXTRACTION AND REHABILITATION PHASING. ANY MAJOR DEVIATIONS FROM THE OPERATIONS SEQUENCE SHOWN WILL REQUIRE APPROVAL FROM MNRF.

2. REFER TO DRAWING 1 OF 5, EXISTING FEATURES, FOR A DESCRIPTION OF EXISTING VEGETATION AND BUILDINGS WITHIN THE 120 METRE BOUNDARY AND ON SITE.

3. SITE PLAN OVERRIDES ARE LISTED IN THE SITE PLAN OVERRIDE TABLE SHOWN ON THIS PAGE.

EXTRACTION/PROCESSING/HAULING INFORMATION

4. TOTAL AREA TO BE EXTRACTED IS 16.07 HECTARES.

5. MAXIMUM NUMBER OF TONNES OF AGGREGATE TO BE REMOVED FROM THE SITE IN ANY CALENDAR YEAR IS 150,000 TONNES.

   EXTRACTION OF SAND AND GRAVEL ABOVE WATER TABLE WILL TAKE PLACE IN ONE OR XX BENCHES, WITH A MAXIMUM HEIGHT OF ±8 METRES. THE GROUNDWATER TABLE IS ESTIMATED TO BE BETWEEN XXX ASL (SEE REPORT XXXX) THERE WILL BE XXX LIFT BELOW THE WATER TABLE IN AREA 1 TO A DEPTH OF XXXm ASL TO BE EXTRACTED BY EXCAVATOR, BACKHOE OR DRAG LINE. FRONT END LOADERS WILL BE USED TO EXTRACT MATERIAL AND HAUL TRUCKS OR CONVEYORS WILL CARRY MATERIAL TO THE PLANT FOR FURTHER PROCESSING. REFER TO SECTIONS A-A', B-B', AND C-C' ON DRAWING 4 OF 5 FOR FURTHER DETAILS.

   PORTABLE PROCESSING EQUIPMENT, FOR CRUSHING AND SCREENING WILL BE USED ON SITE AND WILL BE LOCATED ON THE PIT FLOOR IN THE PROCESSING AREA OR AREA 1 AT START UP. IN ADDITION TO PROCESSING, SITE ACTIVITIES WILL INCLUDE STRIPPING AND REHABILITATION. OPERATIONAL EQUIPMENT MAY INCLUDE TRUCKS, LOADERS, EXCAVATOR, BACKHOES, BULLDOZERS, SCRAPERS, CONVEYORS AND OTHER RELATED EQUIPMENT. PROCESSING EQUIPMENT, S' KICKERS AND PRODUCT STOCKPILES WILL NOT EXCEED ±15 METRES IN HEIGHT AND WILL BE LOCATED IN THE PROCESSING AREA AND/OR CLOSE TO PIT FACES. MATERIAL FROM OTHER PROPERTIES MAY BE IMPORTED INTO THE SITE FOR BLENDING, CUSTOM PRODUCTS AND/OR RESALE.

6. OFFICE/STORAGE BUILDING AND/OR SCALE/SCALEHOUSE MAY BE CONSTRUCTED IN PROCESSING AREA.

AGGREGATE RECYCLING

7. THERE MAY BE RECYCLING OF MATERIAL (ASPHALT AND CONCRETE) ON THIS SITE. MATERIAL IMPORTED FOR RECYCLING WILL BE STORED IN SEGREGATED STOCKPILES WITHIN THE PROCESSING AREA. RECYCLABLE ASPHALT MATERIALS WILL NOT BE STOCKPILED WITHIN 30m OF ANY WATER BODY OR MAN-MADE POND, OR 2m OF THE SURFACE OF THE ESTABLISHED WATER TABLE. ANY REBAR AND OTHER STRUCTURAL METAL MUST BE REMOVED FROM THE RECYCLED MATERIAL DURING PROCESSING AND PLACED IN A DESIGNATED SCRAP PILE ON SITE WHICH WILL BE REMOVED ON AN ON-GOING BASIS. REMOVAL OF RECYCLED AGGREGATE IS TO BE ONGOING. ONCE THE AGGREGATE ON SITE HAS BEEN DEPLETED THERE WILL BE NO FURTHER IMPORTATION OF RECYCLABLE MATERIALS PERMITTED. ONCE FINAL REHABILITATION HAS BEEN COMPLETED AND APPROVED IN ACCORDANCE WITH THE SITE PLAN, ALL RECYCLING OPERATIONS MUST CEASE.

8. EQUIPMENT, SCRAP AND MACHINERY ASSOCIATED WITH THE EXTRACTION OPERATIONS WILL BE REMOVED UPON COMPLETION OF EXTRACTION.

HYDROGEOLOGICAL INFORMATION

9. THE WATER TABLE ELEVATION VARIES ACROSS THIS LICENCE FROM APPROXIMATELY ±XXX - ± XXXm ABOVE SEA LEVEL (A.S.L.). BASED ON THE HYDROGEOLOGICAL REPORT (SEE ABOVE). REFER TO SECTIONS ON SHEET 4 OF 5.

10. SURFACE DRAINAGE WILL BE DIRECTED TO THE POND, CENTRAL WETLAND, AND/ OR LOW AREAS FOR WATER TO INFILTRATE INTO THE GRANULAR MATERIALS ON THE PIT FLOOR. THERE WILL BE NO OFF-SITE DITCHING/ DISCHARGE.

NOISE MITIGATION INFORMATION

11. HOURS OF OPERATION:

SITE PREPARATION AND REHABILITATION:	07:00-19:00 WEEKDAYS; 07:00 - NOON SATURDAYS
EXCAVATION AND PROCESSING	07:00-19:00 WEEKDAYS; 07:00 - NOON SATURDAYS
SHIPPING:	07:00-19:00 WEEKDAYS; 07:00 - NOON SATURDAYS

AIR QUALITY INFORMATION

12. WATER OR CALCIUM CHLORIDE WILL BE APPLIED TO INTERNAL HAUL ROADS AND PROCESSING AREAS AS OFTEN AS REQUIRED TO MITIGATE DUST.

SITE MANAGEMENT INFORMATION

MAINTENANCE/ PROTECTION OF VEGETATION INFORMATION

13. EXISTING VEGETATION WITHIN THE LICENCED AREA SHALL BE MAINTAINED IN A HEALTHY VIGOROUS GROWING CONDITION UNTIL SEQUENTIAL STRIPPING BEGINS OR UNTIL THE REHABILITATION IS COMPLETE. ANY VEGETATION PLANTED AS PART OF SITE IMPROVEMENTS OR PROGRESSIVE AND FINAL REHABILITATION WILL ALSO BE MAINTAINED IN A HEALTHY, VIGOROUS GROWING CONDITION.

FENCING INFORMATION

14. BOUNDARIES OF THE AREA TO BE LICENCED THAT ARE PRESENTLY FENCED ARE SHOWN ON DRAWING 1 OF 4 EXISTING FEATURES. PRIOR TO ANY STRIPPING OR PREPARATION, FENCING ON THE LICENCED BOUNDARIES WILL BE UPGRADED TO 1.2m HIGH POST AND WIRE TO COMPLY WITH THE AGGREGATE RESOURCES ACT WHERE REQUIRED. ALL FENCING SHALL BE MAINTAINED.

TOPSOIL/SUBSOIL/OVERBURDEN STORAGE INFORMATION

15. TOPSOIL AND OVERBURDEN SHALL BE STRIPPED AND STORED SEPARATELY IN BERMS WHERE SHOWN AND STOCKPILES ON PIT FLOOR CLOSE TO EXTRACTION FACE.

BERM INFORMATION

16. BERMS SHALL BE A MINIMUM OF ±2.5 METRES ABOVE THE EXISTING GRADE, OR AS SPECIFIED IN THE NOISE ASSESSMENT REPORT DATED XXX AND SHOWN ON PLAN. BERMS SHALL NOT EXCEED 2:1. REFER TO TYPICAL BERM CROSS SECTION ON DRAWING 4 OF 5 DETAILS AND SECTIONS. ALL BERMS SHALL BE SEEDED (USING GRASS/ LEGUME MIXTURE, SEE REHABILITATION PLAN) IMMEDIATELY UPON COMPLETION TO MINIMIZE NOISE, DUST AND EROSION.

17. ON COMPLETION OF THE BERMS, EXCESS ON-SITE OVERBURDEN WILL BE USED TO PROGRESSIVELY BACKFILL AND REHABILITATE THE SITE. TOPSOIL CAN BE TEMPORARILY STOCKPILED ON THE PIT FLOOR.

SCRAP STORAGE INFORMATION

18. ALL SCRAP, USED MACHINERY AND STUMPS GENERATED THROUGH THE OPERATIONS WITHIN THIS LICENCE WILL BE STORED IN THE PROCESSING AREA, A MINIMUM OF 30m FROM THE BOUNDARY OF THE SITE AND NOT WITHIN 30m OF ANY BODY OF WATER AND SHALL BE DISPOSED OF ON AN ONGOING BASIS. STUMPS/ WOODY MATERIAL MAY BE CHIPPED AND USED FOR SOIL ENHANCEMENT DURING PROGRESSIVE REHABILITATION. TREES WILL BE HARVESTED AND SOLD AS LUMBER OR UTILIZED FOR FIREWOOD AND OR THEIR BEST USE. UPON COMPLETION OF EXTRACTION, ALL SCRAP EQUIPMENT AND USED MACHINERY SHALL BE REMOVED.

PETROLEUM STORAGE INFORMATION

19 FUEL, OIL, RADIATOR AND HYDRAULIC FLUID, AND OTHER CHEMICALS NEEDED FOR THE MAINTENANCE AND FUNCTIONING OF ON-SITE AGGREGATE PROCESSING EQUIPMENT SHALL BE APPROPRIATELY STORED IN ABOVE-GROUND CONTAINERS AND SHALL MEET THE REQUIREMENTS OF THE GASOLINE HANDLING ACT, AS AMENDED, AND THE GASOLINE HANDLING CODE AND REGULATIONS, AS AMENDED BY THE TECHNICAL STANDARDS AND SAFETY ACT (TSSA) AND LIQUID FUELS HANDLING CODE, AND IN ACCORDANCE WITH THE MINISTRY OF THE ENVIRONMENT, CONSERVATION, AND PARKS CHEMICAL STORAGE GUIDELINES. ALL REFUELING SHALL BE WITHIN A CONTAINMENT PAD. ALL SPILLS TO THE ENVIRONMENT MUST BE REPORTED TO THE SPILLS ACTION CENTRE OF MECP. ANY SPILL SHALL BE REMOVED AND DISPOSED OF AT AN APPROPRIATE MECP APPROVED FACILITY.

IMPORTATION OF FILL INFORMATION

20. IN ORDER TO MAXIMIZE RESOURCE RECOVERY, IMPORTATION OF CLEAN INERT FILL (EG. TOPSOIL AND/OR OVERBURDEN) MAY BE IMPORTED TO FACILITATE 3:1 SIDESLOPE REHABILITATION (ABOVE WATER TABLE SIDESLOPES). ONLY NATIVE ON SITE OVERBURDEN AND/OR OFF-SPEC MATERIALS WILL BE USED FOR BELOW WATER REHABILITATION. ONLY SUFFICIENT MATERIAL TO CREATE FINAL GRADES AS SHOWN MAY BE IMPORTED.

   IMPORTED MATERIAL SHALL MEET THE MINISTRY OF THE ENVIRONMENT, CONSERVATION, AND PARKS PARAMETERS UNDER TABLE "1" OF MECPS "SOIL, GROUND WATER AND SEDIMENT STANDARDS FOR USE UNDER PART XV.1 OF THE ENVIRONMENTAL PROTECTION ACT".

   SAMPLING AND TESTING OF ALL IMPORTED MATERIAL SHALL BE PERFORMED AT SOURCE PRIOR TO THE IMPORTATION OF MATERIAL ONTO THE LICENSED SITE BY A QP UNDER EPA. A QP SHALL ALSO DESIGN FILL MONITORING PROGRAM (PER L3 NOTES). RANDOM SAMPLING OF ALL IMPORTED MATERIAL SHALL BE CONDUCTED AT THE REQUEST OF MNRF.

   THE LICENSEE SHALL KEEP DETAILED RECORDS OF THE AMOUNT OF MATERIAL BROUGHT ON SITE FOR REHABILITATION AND THE TESTING RESULTS OF ALL SAMPLES. ALL RECORDS AND TESTING RESULTS SHALL BE AVAILABLE UPON REQUEST BY MNRF OR MECP.

WASH PLANT INFORMATION

21. SHOULD A WASH PLANT BE REQUIRED WITH A PREDICTED WATER USAGE OF 50,000L/DAY OR MORE, THE PRODUCER SHALL OBTAIN PERMIT TO TAKE WATER FROM MECP AND HAVE IT READY FOR INSPECTION. THE PERMIT TO TAKE WATER (PTTW) WILL BE ACCOMPANIED BY THE APPROPRIATE SUPPORTING DOCUMENTATION.

LEGEND

- BOUNDARY OF AREA TO BE LICENCED
- 120m INFORMATION BOUNDARY
- REGULATORY SETBACK LINE
- EXTRACTION LIMIT
- EXISTING FENCE
- EXISTING VEGETATION
- EXISTING WETLAND
- EXISTING STOCKPILE
- EXTRACTION FACE
- BERM (MIN. HEIGHT AS SHOWN)
- UNDISTURBED AREA
- AREA STRIPPED OF TOPSOIL AND OVERBURDEN
- PROPOSED OPEN WATER
- 1 EXISTING BUILDING AND NUMBER
- HP EXISTING HYDRO POLE
- B' LOCATION OF SECTION
- ENTRANCE/ EXIT
- DIRECTION OF EXTRACTION
- DIRECTION OF TOPSOIL AND OVERBURDEN MOVEMENT
- PRODUCT TRANSPORTATION VIA HAUL ROAD
- R3 LOCATION OF NOISE RECEPTOR
- 286.00 / 286.00 EXISTING ELEVATION / PROPOSED ELEVATION

SITE PLAN OVERRIDE (VARIANCE)

THE FOLLOWING CONDITIONS ILLUSTRATED ON THESE PLANS VARY FROM THE OF THE PROVINCIAL STANDARDS MADE UNDER THE AGGREGATE RESOURCES ACT

ITEM	SECTION
SETBACK IS REDUCED TO 0m ALONG SOUTH AND WEST BOUNDARIES. ADJACENT LANDS LICENSED FOR AGGREGATE EXTRACTION, AS PER AGREEMENT WITH AD JACENT LICENSEE/ LANDOWNER.	5.10.1

Harrington McAvan Ltd
41 Main Street, Unit 102
Unionville, Ontario L3R 2E5
Tel: 905-294-6282 Fax: 905-294-7623
www.harringtonmcavan.com

Project Name

Thames Valley Aggregates Inc.

PIKE PIT

LICENCE No.
PART LOT 18, CONCESSION 3
MUNICIPALITY OF THAMES CENTRE (FORMERLY TOWNSHIP OF NORTH DORCHESTER, COUNTY OF MIDDLESEX

Scale 1:2000 (0 10 50 80m)

North

Stamp: ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS — RICHARD McAVAN — OALA MEMBER

Drawing Status: PRELIMINARY FOR DISCUSSION

Drawn RM | Checked MH | Issue Date SEPT 2020

Drawing Title: OPERATION PLANS PHASE A

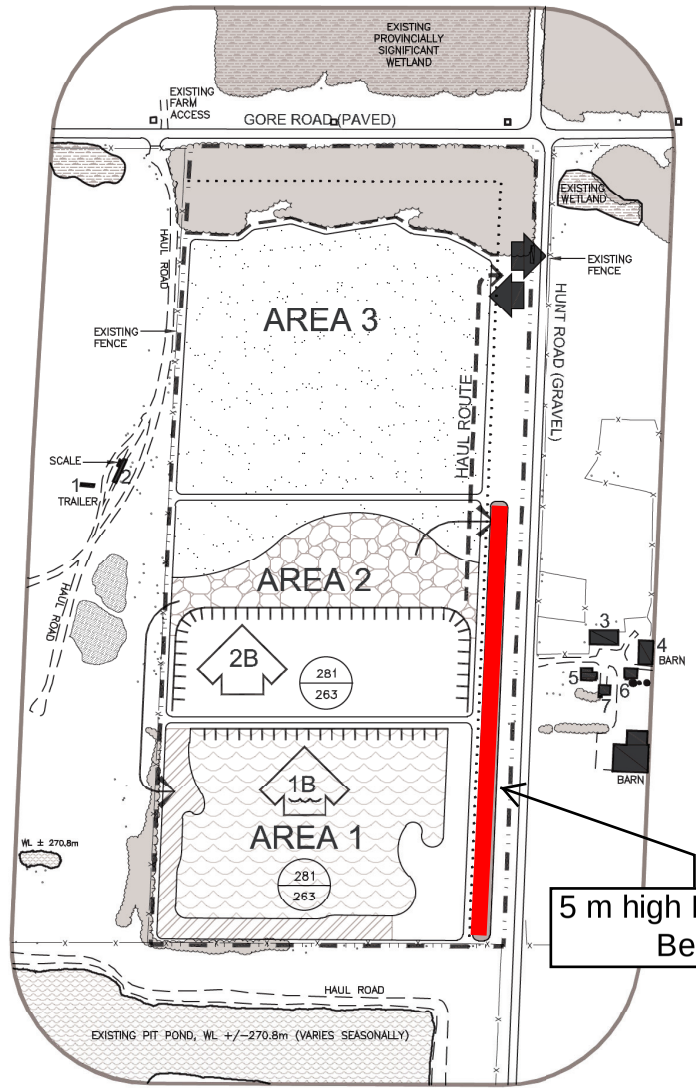
Project Number: 20-23

Drawing Number: 2 OF 5

FILE NAME: 20-23 COMP 2021-2.DWG
PLOT DATE: SEPTEMBER, 2020

Figure 3a - Operation Plans 1

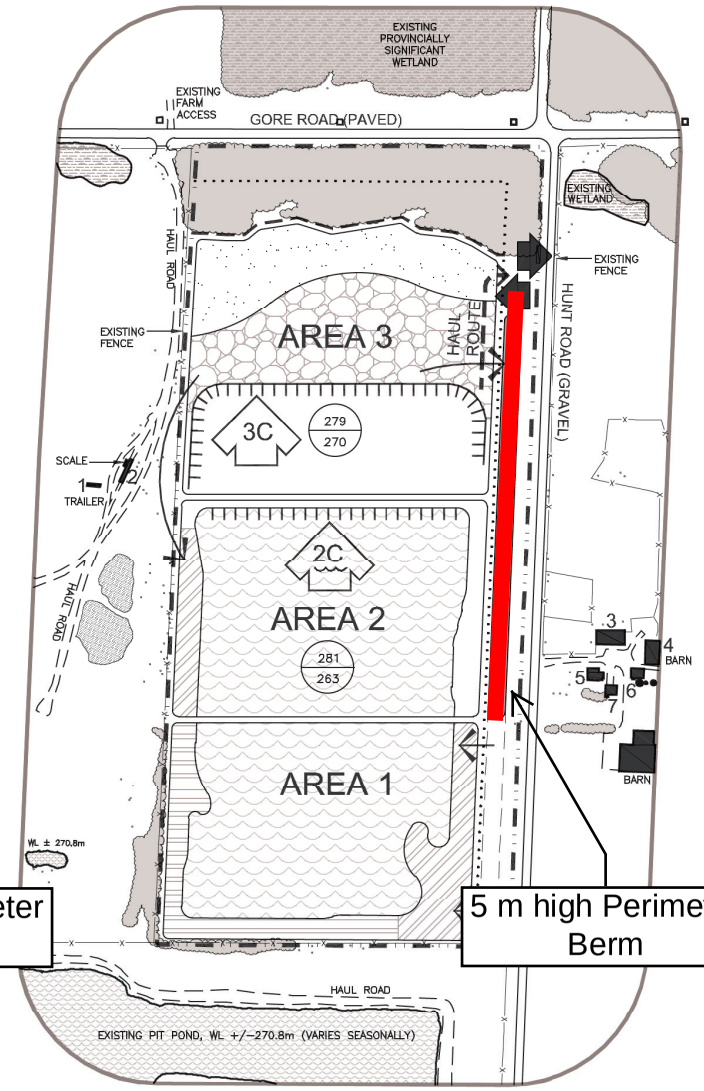
PHASE B



PHASE B

1. STRIP TOPSOIL AND OVERBURDEN SEPARATELY FROM AREA 2 AND USE THE MATERIAL TO EXTEND BERM ALONG HUNT ROAD, AND TO BEGIN PROGRESSIVE REHABILITATION OF THE SOUTHERN AND WESTERN PARTS OF AREA 1.
2. BEGIN ABOVE WATER EXTRACTION OF AREA 2 IN DIRECTION SHOWN. SHIP MATERIAL TO TEMPORARY PLANT SITE (NOT SHOWN, PORTABLE PROCESSING EQUIPMENT TO BE USED).
3. BEGIN BELOW WATER EXTRACTION OF AREA 1 IN DIRECTION SHOWN. SHIP MATERIAL TO TEMPORARY PLANT SITE (NOT SHOWN, PORTABLE PROCESSING EQUIPMENT TO BE USED).
4. UNDISTURBED PORTION OF AREA 2 & 3 TO REMAIN IN AGRICULTURAL USE.
5. MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS CONDITION.

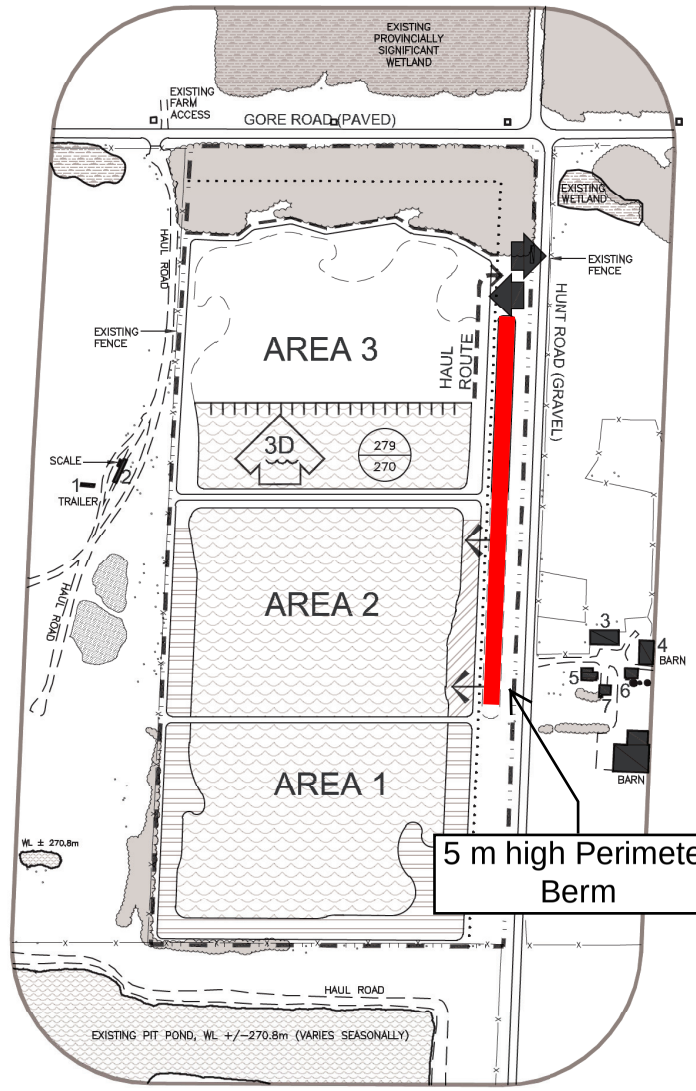
PHASE C



PHASE C

1. STRIP TOPSOIL AND OVERBURDEN SEPARATELY FROM AREA 3 AND USE THE MATERIAL TO EXTEND BERM ALONG HUNT ROAD, AND TO BEGIN PROGRESSIVE REHABILITATION OF THE WESTERN PART OF AREA 2.
2. COMPLETE PROGRESSIVE REHABILITATION OF SOUTHERN AND WESTERN PARTS OF AREA1, THE AREA RETURNS TO POND/ WETLAND AND/ OR NATURAL AREA/ OPEN SPACE/ REFORESTATION AFTER-USE.
3. BEGIN PROGRESSIVE REHABILITATION OF EASTERN PART OF AREA 1 USING TOPSOIL AND OVERBURDEN STOCKPILED IN THE BERM ALONG HUNT ROAD. THE AREA RETURNS TO POND/ WETLAND AND/ OR NATURAL AREA/ OPEN SPACE/ REFORESTATION AFTER-USE.
4. BEGIN ABOVE WATER EXTRACTION OF AREA 3 IN DIRECTION SHOWN. SHIP MATERIAL TO TEMPORARY PLANT SITE (NOT SHOWN, PORTABLE PROCESSING EQUIPMENT TO BE USED).
5. BEGIN BELOW WATER EXTRACTION OF AREA 2 IN DIRECTION SHOWN. SHIP MATERIAL TO TEMPORARY PLANT SITE (NOT SHOWN, PORTABLE PROCESSING EQUIPMENT TO BE USED).
6. MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS CONDITION.

PHASE D



PHASE D

1. COMPLETE PROGRESSIVE REHABILITATION OF AREA1, THE AREA RETURNS TO POND/ WETLAND AND/ OR NATURAL AREA/ OPEN SPACE/ REFORESTATION AFTER-USE.
2. COMPLETE PROGRESSIVE REHABILITATION OF THE WESTERN PART OF AREA2, THE AREA RETURNS TO POND/ WETLAND AND/ OR NATURAL AREA/ OPEN SPACE/ REFORESTATION AFTER-USE.
3. BEGIN PROGRESSIVE REHABILITATION OF EASTERN PART OF AREA 2 USING TOPSOIL AND OVERBURDEN STOCKPILED IN THE BERM ALONG HUNT ROAD. THE AREA RETURNS TO POND/ WETLAND AND/ OR NATURAL AREA/ OPEN SPACE/ REFORESTATION AFTER-USE.
4. BEGIN BELOW WATER EXTRACTION OF AREA 3 IN DIRECTION SHOWN. SHIP MATERIAL TO TEMPORARY PLANT SITE (NOT SHOWN, PORTABLE PROCESSING EQUIPMENT TO BE USED).
5. MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS CONDITION.

PHASE E (NOT SHOWN)

1. BEGIN AND COMPLETE PROGRESSIVE REHABILITATION OF AREA 3 USING TOPSOIL AND OVERBURDEN STOCKPILED IN THE BERM ALONG HUNT ROAD. THE AREA RETURNS TO POND/ WETLAND AND/ OR NATURAL AREA/ OPEN SPACE/ REFORESTATION AFTER-USE.
2. REMOVE ALL EQUIPMENT, STRUCTURES, STOCKPILES AND SCRAP FROM THE SITE AND REHABILITATE ALL HAUL ROADS USING TOPSOIL AND OVERBURDEN STOCKPILED IN REMAINING BERMS.
3. COMPLETE PROGRESSIVE REHABILITATION IN AREA 3. AREA 1 & 2 RETURN TO POND/ WETLAND AND/ OR NATURAL AREA/ OPEN SPACE/ REFORESTATION AFTER-USE.
4. MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS CONDITION.

LEGEND

- BOUNDARY OF AREA TO BE LICENCED
- 120m INFORMATION BOUNDARY
- REGULATORY SETBACK LINE
- EXTRACTION LIMIT
- EXISTING FENCE
- EXISTING VEGETATION
- EXISTING WETLAND
- EXISTING STOCKPILE
- EXTRACTION FACE
- BERM (MIN. HEIGHT AS SHOWN)
- UNDISTURBED AREA
- AREA STRIPPED OF TOPSOIL AND OVERBURDEN
- ONGOING/ PROGRESSIVE REHABILITATION
- ONGOING REHABILITATION
- COMPLETED REHABILITATION
- BELOW WATER EXTRACITON
- 1 EXISTING BUILDING AND NUMBER
- HP EXISTING HYDRO POLE
- ENTRANCE/ EXIT
- DIRECTION OF ABOVE WATER EXTRACTION
- DIRECTION OF BELOW WATER EXTRACTION
- DIRECTION OF TOPSOIL AND OVERBURDEN MOVEMENT
- PRODUCT TRANSPORTATION VIA HAUL ROAD
- R3 LOCATION OF NOISE RECEPTOR
- 795.00 / 785.00 EXISTING ELEVATION / PROPOSED ELEVATION

Harrington McAvan Ltd
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Project Name

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PIKE PIT

LICENCE No.
PART LOT 18, CONCESSION 3
MUNICIPALITY OF THAMES CENTRE (FORMERLY TOWNSHIP OF NORTH DORCHESTER, COUNTY OF MIDDLESEX

Scale 1:3000 (0 10 50 90 120m)	North	Stamp: ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS, RICHARD McAVAN, OALA MEMBER
Drawing Status: PRELIMINARY FOR DISCUSSION		
Drawn RM	Checked MH	Issue Date SEPT 2020
Drawing Title: OPERATION PLANS PHASE B TO E		Project Number 20-23
		Drawing Number 3 OF 5

FILE NAME: 20-23 CONP 2020 - 3.DWG
PLOT DATE: SEPTEMBER, 2020

Figure 3b - Operation Plans 2

APPENDIX A

Sample Calculations

HGC Engineering **Environmental Noise Prediction Summary Sheet**

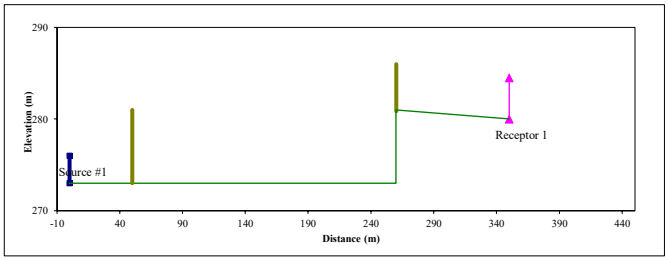
Project Name: Pike Pit
Receptor: Receptor 1, Area 1 - With Mitigation

Source #	Description	Distances S-R	S-SB	S-RB	Elevations S Elev	R Elev	RB Elev	SB Elev	Height S Height	R Height	RB Height	SB Height
Source #1	Crusher, Screeners, Diesel Generator, Conveyor, Loader	350	50	260	273	280	281	273	3	4.5	5	8
Source #2	Excavator	140		50	273	280	281		2	4.5	5	
Source #3	Truck at Entrance	350		260	277	280	281		2	4.5	5	
Source #4	Highway Trucks	140		50	273	280	281		2	4.5	5	

Output Summary

	Description	SPL at Receiver	
Source #1	Crusher, Screeners, Diesel Generator, Conveyor	45	
Source #2	Excavator	34	
Source #3	Truck at Entrance	25	
Source #4	Highway Trucks	24	
		0	
	Total	45	dBA
	Criteria	45	dBA

Barrier for Source #1



For general information purposes only

TOP

	Description	S-R	S-SB	S-RB	S Ele	R Elev	RB Elev	SB Elev	S Height	R Height	RB Height	SB Height
Source #1	Crusher, Screeners, Diesel Generator, Conveyor	350	50	260	273	280	281	273	3	4.5	5	8

Number of Sources	1	
Time Duration	60	(minutes per hour)
Tonality Penalty	0	dB
Measurement Distance	75	m

Frequency	63	125	250	500	1000	2000	4000	8000	dBA
Meas SPL	79.3	72.8	68.9	69.0	65.9	66.9	61.5	55.7	72.5
# Srcs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time Dur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tonality	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Directivity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Air Abs	0.0	-0.1	-0.3	-0.8	-1.4	-2.5	-6.3	-21.1	
Gnd Atten	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Dist Atten	-13.4	-13.4	-13.4	-13.4	-13.4	-13.4	-13.4	-13.4	
Barr. Att.	-6.3	-7.4	-9.0	-11.3	-14.1	-17.0	-20.0	-23.0	
SPL @ Rec	59.6	52.0	46.2	43.5	37.1	34.0	21.8	-1.8	44.9

Barrier Calculations

Is there a source barrier:	Y	Source barrier BRIGHT ZONE:	N	SB Intercept Height	1.21
Is there a receiver barrier:	Y	Receiver barrier BRIGHT ZONE:	N	RB Intercept Height	6.31
		S->RB BRIGHT ZONE:	N	S-RB Intercept Height	1.92
		SB->RB BRIGHT ZONE:	N	SB-RB Intercept Height	2.45

|S->SB|	50.25	|S->RB|	260.19
|SB->R|	300.02	|RB->R|	90.01
|SB->RB|	210.06	|S->R|	350.10

Max Attentuation	-6.30438576	-7.35837462	-9.02766973	-11.3251908	-14.0762553	-17.0311469	-20.03575	-23.04583503
Combined								
PLD	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.2182 1
N	0.079919728	0.15857089	0.31714178	0.63428355	1.26856711	2.53713421	5.07426843	10.14853685
Combined Attentuation	-6.30438576	-7.35837462	-9.02766973	-11.3251908	-14.0762553	-17.0311469	-20.03575	-23.04583503
Source Barrier								
PLD	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17 1
N	0.061020264	0.12107195	0.2421439	0.48428781	0.96857562	1.93715124	3.87430247	7.748604941
Source Barrier Attentuation	-6.020338649	-6.87948413	-8.29999469	-10.3635083	-12.9681899	-15.869635	-18.864634	-21.87404898
Receiver Barrier								
PLD	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10 1
N	0.037190763	0.0737912	0.14758239	0.29516478	0.59032957	1.18065914	2.36131828	4.722636552
Source Barrier Attentuation	-5.641935424	-6.21374911	-7.22210478	-8.82427154	-11.0617903	-13.7778799	-16.721182	-19.72396631

HGC Engineering **Environmental Noise Prediction Summary Sheet**

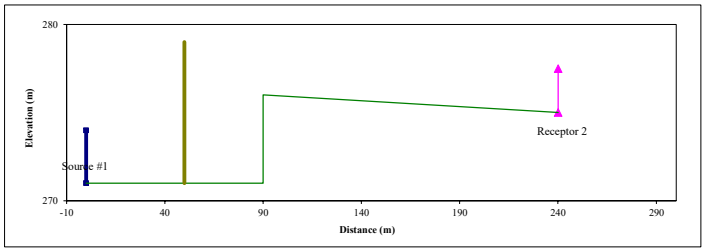
Project Name: Pike Pit
Receptor: Receptor 2, Area 3 - With Mitigation

Source #	Description	Distances S-R	S-SB	S-RB	Elevations S Elev	R Elev	RB Elev	SB Elev	Height S Height	R Height	RB Height	SB Height
Source #1	Crusher, Screeners, Diesel Generator, Conveyor, Loader	240	50	90	271	275	276	271	3	2.5		8
Source #2	Excavator	200		50	271	275	276		2	2.5		
Source #3	Truck at Entrance	450		300	276	275	276		2	2.5		
Source #4	Highway Trucks	200		50	271	275	276		2	2.5		

Output Summary

	Description	SPL at Receiver	
Source #1	Crusher, Screeners, Diesel Generator, Conveyor,	48	
Source #2	Excavator	42	
Source #3	Truck at Entrance	31	
Source #4	Highway Trucks	32	
		0.0	
	Total	49	dBA
	Criteria	50	dBA

Barrier for Source #1



For general information purposes only

TOP

	Description	S-R	S-SB	S-RB	S Ele	R Elev	RB Elev	SB Elev	S Height	R Height	RB Height	SB Height
Source #1	Crusher, Screeners, Diesel Generator, Conveyor,	240	50	90	271	275	276	271	3	2.5	0	8

Number of Sources	1	
Time Duration	60	(minutes per hour)
Tonality Penalty	0	dB
Measurement Distance	75	m

Frequency	63	125	250	500	1000	2000	4000	8000	dBA
Meas SPL	79.3	72.8	68.9	69.0	65.9	66.9	61.5	55.7	72.5
# Srcs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time Dur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tonality	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Directivity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Air Abs	0.0	0.0	-0.2	-0.5	-0.8	-1.5	-3.8	-12.6	
Gnd Atten	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Dist Atten	-10.1	-10.1	-10.1	-10.1	-10.1	-10.1	-10.1	-10.1	
Barr. Att.	-6.4	-7.5	-9.2	-11.5	-14.3	-17.3	-20.3	-23.3	
SPL @ Rec	62.8	55.2	49.4	46.9	40.7	38.1	27.4	9.7	48.4

Barrier Calculations

Is there a source barrier:	Y	Source barrier BRIGHT ZONE:	N	SB Intercept Height	0.73
Is there a receiver barrier:	Y	Receiver barrier BRIGHT ZONE:	N	RB Intercept Height	1.31
		S->RB BRIGHT ZONE:	N	S-RB Intercept Height	1.11
		SB->RB BRIGHT ZONE:	Y	SB-RB Intercept Height	-0.32

|S->SB|	50.25	|S->RB|	90.02
|SB->R|	190.01	|RB->R|	150.01
|SB->RB|	40.11	|S->R|	240.03

Max Attentuation	-6.366348282	-7.460648	-9.17851573	-11.5180342	-14.2925161	-17.2547258	-20.26038963	-23.2705299	
Combined									
PLD	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.2298	1
N	0.084163454	0.166990981	0.333981961	0.667963923	1.335927845	2.671855691	5.343711381	10.68742276	
Combined Attentuation	-6.366348282	-7.460648	-9.17851573	-11.5180342	-14.2925161	-17.2547258	-20.26038963	-23.2705299	
Source Barrier									
PLD	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	1
N	0.084163454	0.166990981	0.333981961	0.667963923	1.335927845	2.671855691	5.343711381	10.68742276	
Source Barrier Attentuation	-6.366348282	-7.460648	-9.17851573	-11.5180342	-14.2925161	-17.2547258	-20.26038963	-23.2705299	
Receiver Barrier									
PLD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
N	0.001538304	0.003052191	0.006104383	0.012208766	0.024417531	0.048835062	0.097670124	0.195340249	
Source Barrier Attentuation	-5.027921408	-5.05527738	-5.11006577	-5.21820646	-5.42894987	-5.82980386	-6.559355598	-7.792101604	

APPENDIX B

Consultant Curriculum Vitae

HGC ENGINEERING

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

Mandy Chan, Senior Engineer PEng.

Education

University of Waterloo, Bachelor of Applied Science, 2006

Professional Memberships

Professional Engineers of Ontario (PEO)
Canadian Acoustical Association (CAA)
Ontario Society of Professional Engineers (OSPE)

Professional History

2014 to Present	Senior Engineer, Associate, HGC Engineering, Mississauga
2010 to 2014	Project Engineer, HGC Engineering, Mississauga
2006 to 2010	Project Consultant, HGC Engineering, Mississauga

Experience

Ms. Chan has been involved in a wide variety of projects related to acoustics, noise and vibration. She has experience with the measurement and analysis of traffic noise and stationary noise sources, architectural acoustic design of learning spaces, office spaces and churches. She has a broad familiarity with Ministry of Environment guidelines regarding noise and vibration and an understanding of Ministry criteria and methods for prediction of noise due to roadway, railway, aircraft traffic, industrial and aggregate facilities. Additionally, Ms. Chan has analysis experience using computer aided modelling and prediction software.

Selected Projects

Banner Pit, *Thamesford, Ontario*
Block 5 Developments, *Brampton, Ontario*
Bremont Homes, *Mississauga, Ontario*
City Centre Condominiums, *Mississauga, Ontario*
Edmonton Clinic, *Edmonton, Alberta*
Greensborough Subdivision, *Markham, Ontario*
Gurney Sands and Gravel, *Brantford, Ontario*
Knox Presbyterian Church, *Waterloo, Ontario*
Inland West Pit, *Warwick, Ontario*
Johnson Bros. Gravel Pits, *Southern Ontario*
Mattamy Homes, *Milton, Ontario*
Liberty Village Condominiums, *Toronto, Ontario*
Linamar Tech Centre, *Guelph, Ontario*
Nelson Granite Quarries, *Kenora, Ontario*
St. Leonard's Boys' Secondary School, *Bermuda*
Tisdale Mining Lands, *Timmins, Ontario*
Waterloo Christian Reformed Church, *Waterloo, Ontario*
Warren Stewart Limestone Quarry, *Cockburn Island, Ontario*
West Village at Stratford, *Stratford, Ontario*

HGC ENGINEERING

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

William J. Gastmeier, Principal, MASc, PEng

Education:

BSc, Honours Physics, University of Waterloo, May 1974.
MASc, Electrical Engineering (Acoustics) University of Waterloo, May 1976.
"Preparing & Presenting Evidence", York University, 1991
"Noise Control in Land Use Planning", Ministry of the Environment, 1987

Memberships:

Designated Consulting Engineer, Province of Ontario
Registered Professional Engineer, Association of Professional Engineers of Ontario (PEO)
Acoustical Society of America (ASA)
Canadian Acoustical Association (CAA), Member, Board of Directors
Canadian Environmental Industries Association (CEIA)

Professional Experience:

1993 to Present
Principal, Howe Gastmeier Chapnik Limited Mississauga, ON

Assess environmental noise and vibration from transportation and industrial sources, mining operations race tracks and gun ranges. Provide expert testimony with regard to noise and vibration in land use planning and land use compatibility. Gained extensive experience with noise control in Land Use Planning including Official Plan and Secondary Plan Amendments and Zone Change Applications across Ontario.

Design architectural acoustics and noise control for council chambers, performance spaces, worship spaces, studios, music rooms, offices, laboratories, museums and public spaces.

Provide third party expert peer review and certification services for clients across North America.

Specify and design noise control measures to ensure compliance with Ministry of the Environment Guidelines and the Occupational Health and Safety Act.

1987 to 1993
Project Coordinator, Vibron Limited, Mississauga, ON, Consulting Engineering Division

Supervised engineering staff in consulting engineering projects in acoustics, noise and vibration. Provided client liason, technical expertise, attended public meetings and hearings.

1981 to 1987
Manager, Unitron Industries, Electroacoustic Design

Hired and supervised staff in the acoustical and electronic design of hearing aids.

Researched the physiology of hearing, hearing loss, psychoacoustics, speech intelligibilty and audiology to design the electroacoustic performance of hearing assistive devices.

1976 to 1978

Project Engineer, Turner Division of Conrac Corporation

Developed a vibration sensor to detect engine knock, designed high intelligibility paging microphones and other new microphone products.

Selected Significant Projects & Studies:

Transportation

- Blue Water Bridge Twinning, Sarnia, Ontario
- Ambassador Bridge Enhancement Project (twinning), Windsor, Ontario
- Highway Widening and Alignments in Sudbury, Port Colborne, Brantford and Thunder Bay
- Winnipeg International Airport
- Layover/Expansion Facilities for Go Transit and CPR
- Golf Links Road Widening, Thunder Bay, 2010
- Pavement Rehabilitation, Highway 140, Port Colborne, 2009
- Highway 11/17, Sault Ste. Marie, 2009
- Ambassador Bridge Twinning, Windsor, 2007 and 2011
- Road Widening/Realignment, RR 35, Sudbury, 2006
- Kingsway Road Widening, Sudbury, 2005
- Fischer Hallman Road Widening, Waterloo, 2003
- Southwest Bypass Extension, Brantford, 2001
- The Kingsway Realignment, Sudbury, 2000
- Blue Water Bridge Twinning, Sarnia, 1995
- Many Noise Impact Studies for Subdivisions (Road, Rail & Air traffic sources) in Ontario

Noise Studies for Expropriation Proceedings:

- Highway 6 South, Puslinch
- Derry Road Mississauga
- Highway 403, Ancaster
- Highway 407, Markham
- Leslie Street, Newmarket

Acoustics

- Lecture and performance theatres, studios and classrooms at McMaster University, Western University, University of Windsor, University of Alberta, University of Waterloo, Upper Canada College, Ryerson University and Fanshawe, Mohawk and Niagara Colleges
- Performance Theatres for Drayton Entertainment in Kitchener and St. Jacobs, Ontario and the Toronto District School Board
- The Carlu (Eaton's Theatre), College Park, Toronto
- Design and Certification of Acoustical Test Facilities across North America

- Acoustical Design of Worship Spaces for many faiths across Canada including 1000+ seat sanctuaries for the Metropolitan Bible Church in Ottawa, Richmond Hill Chinese Community Church and St. Thomas the Apostle Roman Catholic Church in Waterdown.
- Recreational, Library and Civic Facilities in Kitchener, Welland, Ingersoll and Brantford

Land Use Planning and Compatibility

- Transmetro Properties 1500 Unit Residential Development, Scarborough, ON
- Peer Reviews for Toronto, Waterloo Region, Simcoe, Oxford and Wellington Counties
- Hundreds of Road and Rail Traffic Noise and Vibration Impact Studies for new Residential Developments
- Noise Compatibility Studies for Official Plan Amendments and Zone Change Applications for Adjacent Proposed Residential/Industrial Land Uses.

Mines, Pits and Quarries

- Scores of Ministry of Natural Resources applications for licences for pits and quarries across Ontario, above and below water.
- De Beers Diamond Mine, Attawapiskat, Gold Mines in Red Lake, Timmins and Matheson ON
- Vale Inco in Sudbury and Port Colborne.

Power Plants, Pipelines and Utilities

- Combined Cycle Peaking Power Plant, Eastern Power, Missisauga
- Compressor Station Noise Assessments at TransCanada PipeLines Facilities across Canada
- Union Gas Province Wide Certificate of Approval Application and Environmental Noise Management
- Electrical/Steam Cogeneration Facilities, York University and Brock University

Teaching Experience:

1998 to 2010
Lecturer, Dalhousie University, School of Architecture: "Architectural Acoustics Module of ARB 211 Environment"

1988 to 2014
Adjunct Professor, University of Waterloo, Dept of Environmental Studies, School Of Architecture: "Architectural Acoustics, Noise Control, Sound Systems"

1988 to 1990
Lecturer, Ontario Ministry of the Environment: "Noise Control in Land Use Planning"

1982 to 1993
Guest lecturer, Physics Department, University of Waterloo: "Science of Hi-Fidelity"

Expert Testimony:

OMB Hearing, Aggregate License Application, Zoning and OP Amendment, Galway Cavendish, ON, 2014
Provincial Court, Prosecution under the Environmental Protection Act, Race Track, Seguin Twp., 2014
OMB Hearing, Aggregate License, Zone Change Application, Woolwich Township, 2013
OMB Hearing, Aggregate Licence Application, Ashfield- Colborne-Wawanosh, ON, 2011

OMB Hearing, Aggregate Licence Application, Thames Centre ON, 2010
OMB Hearing, Proposed Golf Driving Range, Markham ON, 2010
OMB Hearing, Proposed Commercial Development near a Recycling Facility, Newmarket ON, 2010
OMB Hearing, proposed Quarry, Michipicoten Harbour, Wawa ON, 2009
OMB Hearing, proposed Residential Development near existing Industrial Land Use, Listowel, ON, 2009
OMB Hearing, proposed Mixed Use Development near Industrial Uses, Brampton ON, 2008
OMB Hearing, proposed Power Plant, Mississauga, Ontario, 2007
OMB Hearing, proposed Retirement Complex in Scarborough, 2007
OMB Hearing, compatibility of Residential Development near Feed Mill, Ingersoll, Ontario, 2006
OMB Hearing, proposed gravel pit, Simcoe, Ontario, 2005.
Ontario Superior Court of Justice, matter relating to noise from the St.Thomas Dragway, 2004
OMB Hearing, proposed aviary, Scotland, Ontario, 2004
OMB Hearing, proposed warehousing facility near existing residential neighbourhood, Oakville, 2004
OMB Hearing, proposed gravel pit, Oro-Medonte Township, 2004
OMB Hearing, high-rise residential development near industry and Highway 401, 2002
Provincial Court, Brantford Ontario, Prosecution under the Municipal Noise Bylaw, 2000
OMB Hearing, residential development adjacent to a CPR Classification Yard, Scarborough, 1999
OMB Hearing, Aggregate Extraction Facility, Windy Lake, Ontario, 1998
OMB Hearing, residential development adjacent to railway, Norwood Road, Toronto, 1996
OMB Hearing, proposed rail transfer facility, Shakespeare, Ontario, 1995
OMB Hearing, residential development, Rogers Road, City of Toronto, 1993
Consolidated Board Hearing, residential development in the City of York, 1992
NEC Hearing, Cogeneration Plant, Brock University, St. Catharines, 1992

Patents:

U.S. Patent 4,553,627 "Hearing Aid Wax Guard"

U.S. Patent 4,349,082 "Acoustical Damping Element and Method of Forming Same"

U.S. Patent 4,193,647 "Piezoelectric Ceramic Transducers with uniform Resonant Frequency"

Publications:

"Considerations in the Acoustical Design of Black Box Theatres", Proceedings of Acoustics Week in Canada, Canadian Acoustics, October 2015

"Recent Trends in the Acoustical Design of Institutional Facilities", Proceedings of Acoustics Week in Canada, Canadian Acoustics, September 2014

"Architectural Personality" Perspectives, Fall 2010

"Occupational Noise Exposure in Nightclubs" Proceedings of Acoustics Week in Canada, Canadian Acoustics, September 2010.

"The Consumer Handbook on Hearing Loss and Noise - Chapter 11 - Architectural Strategies to Minimize Noise" Edited by Marshall Chasin, Auricle Ink Publishers, 2010

"Acoustical Performance Criteria and Treatment Protocols for Learning Spaces at a Large Institutional Teaching Facility" Proceedings of Acoustics Week in Canada, Canadian Acoustics, September 2009.

"Hearing Loss in Musicians – Prevention and Management - Chapter 8 - Room and Stage Acoustics for Optimal Listening and Playing" Edited by Marshall Chasin, Plural Publishing Inc., 2009

"Acoustical Performance Criteria, Treatment and Guidelines for Multifunctional School Gymnasia" with Kana A. Ananthaganeshan, Canadian Acoustics, December 2007

"Room Acoustics and Modifications for Performing Artists" Hearing Review, March 2006

"The Use of Environmental Noise Standards and Guidelines in Canada", Canadian Acoustics, Sept. 2005

"ISO-1996 'Acoustics-Description and Measurement of Environmental Noise' Round Robin Testing", Canadian Acoustics, December 2001

"Reverberation in Public School Gymnasia" Canadian Acoustics, December, 1999

"Air Traffic Noise", Ontario Planning Journal, Spring, 1998

"Musicians and the Prevention of Hearing Loss, Chapter 7, Room Acoustics" Edited by Marshall Chasin, Singular Publishing Group, San Diego, 1996

"Applying Sound Intensity Methods In-situ to Measure Exhaust Noise levels and Estimate Silencer Performance" Proceedings of the Alberta Energy & Utilities Board 1996 Conference on Environmental Noise Control Engineering

"The Assessment of Rail Traffic Noise and Vibration in Land Use Planning" Ontario Planning Journal, March /April, 1996

"Acoustical Materials" The Canadian Architect, April, 1995

"Environmental Noise & Vibration Part 2" Ontario Planning Journal, Jan/Feb, 1995

"Noise Control & the Building Envelope" Ontario Building Envelope Council Newsletter, 1995

"Environmental Noise & Vibration Part 1" Ontario Planning Journal, Nov/Dec, 1994.

"Occupational Noise Exposure in the High School Music Practice Room" 1994 Congress of the Canadian Acoustical Association.

"Field Sound Transmission Loss of Demising Walls and Floor/Ceiling Assemblies". Proceedings of the 1992 International Congress on Noise Control Engineering.

"The Control of Bus Noise and Vibration in Mixed Use Urban Construction". Proceedings of the 1992 International Congress on Noise Control Engineering, Toronto,1992, pp.857-860.

"Noise Complaints in Residential Condominiums" Proceedings of Noise Control, 1990.

"Noise Control of Underground Bus Stations - A Case Study" Canadian Acoustical Association Conference, Toronto, 1988.

"The Acoustically Damped Earhook" Hearing Instruments No. 10, October 1981

Standardization and Professional Committees:

Canadian Standards Association Member of Occupational Hearing Technical Committee, 2010 to Present

Canadian Standards Association Member of Technical Committee S251 "Acoustics and Noise Control" 2005 to 2010

Canadian Standards Association "Chair of Environmental Noise Subcommittee of Technical Committee S251 "Acoustics and Noise Control" 2005 to 2010

Canadian Standards Association ISO 9613 / CSA Z107.55 Working Group on Industrial Noise Propagation, 2002 to 2010

Canadian Standards Association - Working Group for the Adoption of "ISO-1996 'Acoustics-Description and Measurement of Environmental Noise', 2000 – 2007

Acoustical Society of America – Member of Noise Control Technical Committee, 1999 – Present

Association of Professional Engineers of Ontario - Committee for the Establishment of Guidelines for Professional Engineers Providing Acoustical Services in Land Use Planning, 1997