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NOISE IMPACT STUDY - **Project: 03117.02**

McCormick Pit Noise Study

Part of Lot 12, Concession 2 EHS
Township of Caledon, Region of Peel

Prepared for:

Harrington McAvan Ltd.
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Prepared by:

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PROVINCE OF ONTARIO

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November 13, 2017

Table of Contents

Executive Summary

Blueland Farms Limited has made an application for a Category 1, Class A license under the Aggregate Resources Act for 20.75 hectares on Part of Lot 12, Concession 2 EHS, in the Town of Caledon, Regional Municipality of Peel.

The proposed pit is located on the west side of the Heart Lake Road, approximately 500 metres north of the Escarpment Side Road. There are active aggregate pits to the west of the site. The remainder of the lands surrounding the site are in rural residential and agricultural use.

The proposed McCormick Pit is outlined on the site plans prepared by Harrington McAvan Ltd. dated October, 2017. Aggregate will be extracted from above the water table using front end loaders and transported by conveyor or front end loaders, to a crusher in the northwest corner of the property, then transported by conveyor or front end loaders to Pit Licence 19073 (Caledon Sand & Gravel) for further processing. Material from below the water table will be extracted using a drag line or excavator.

An annual tonnage limit of 750,000 Tonnes is proposed for the Pit. Extraction operations will be restricted to weekdays 07:00-19:00.

To ensure compatibility with the existing acoustic environments at the nearest sensitive receptors, suitable noise limits have been established for the operations in the proposed pit. Noise control measures were designed to ensure that the sound levels from the pit will comply with provincial limits and have been incorporated in the site and operating plans. The recommended noise control measures include:

- Restrictions on the numbers and types of extraction and processing equipment, the noise emissions of the equipment, and the areas of operation.

- Berming and local shielding requirements.

Incorporation of the recommended noise control measures will ensure that the aggregate extraction and processing operations in the McCormick Pit will comply with the Ministry noise guidelines.

Note that this report is an update to previously submitted reports, and supersedes all previous reports.

2 Introduction

Blueland Farms Limited has made an application for a Category 1 Class A license for 20.75 hectares on Part of Lot 12, Concession 2 EHS, in the Town of Caledon, Region of Peel. Noise control has been recognized as one of the basic parameters in designing the proposed operation. Aercoustics Engineering Limited was retained to assist in the design process with responsibility for advising on appropriate noise limits and methodology for compliance.

The existing noise environment was evaluated and the noise criteria for the operations were defined based on the Ministry of Environment and Climate Change (MOECC) and Ministry of Natural Resources and Forestry (MNRF) guidelines. Operational methods, equipment, site plans and scheduling were considered and modified as necessary to achieve compliance with the noise objectives.

The neighbouring pits will be receiving the material shipment from McCormick pit after an initial processing through a crusher and further process the material on their grounds. The McCormick operations will include loaders, dragline, and a primary crusher that will be located in the northwest corner of the property. Existing/background noise from the adjacent operations was considered and evaluated the impact of the proposed operations at the McCormick pit. The volumes will not be changing within McCormick. Therefore, a cumulative assessment will not be needed due to the fact the neighbouring pit will not change in volume of processing.

3 Description of the Site and Surrounding Area

Figure 1 shows the proposed McCormick Pit and surrounding area including the representative residential receptors. The site is located on the west side of Heart Lake Road approximately 500 metres north of the Escarpment Side Road. The surrounding lands vary between flat and rolling terrain. With the exception of the existing pits that border the site to the west, these lands are within the Niagara Escarpment Rural Area and Natural Environment Area.

4 Existing Noise Environment

The representative residences surrounding the site are identified on Figure 1 as R01-R14. All residences with the exception of R05 and R14 have an ambient acoustical environment consistent with the Class 3 classification as defined by the MOECC Publication NPC-300. This is reserved for a rural area with a prevailing acoustical environment that is generally defined by natural sounds with little or no road traffic.

Residences R05 and R14 have an ambient acoustical environment consistent with the Class 2 classification as defined by the MOECC Publication NPC-300. In a Class 2 area, the background sound levels during the daytime (07:00-19:00) are defined by man-made sources and in the evening and nighttime periods, natural sounds are typically dominant.

Residence R5 is located in relatively close proximity to Heart Lake Road where the background sound levels are defined by road traffic. The background sound levels at the residences represented by R14 will be defined by the operations in the adjacent pits.

It should be noted that residence R04 is located within the McCormick Pit extraction limits and will be removed, and has not been shown in the calculations or figures.

5 Criteria For Acceptability of Noise From a Stationary Source

The applicable limits for noise from a stationary source at a sensitive point of reception in a Class 2 area and a Class 3 area are outlined in Table 1. These limits are defined in the MOECC Publication NPC-300.

Table 1: Sound Level Limits for a Stationary Source - One Hour L_{EQ} (dBA)

Time of Day	Class 2	Class 3
07:00-19:00	50	45
19:00-07:00	45	40

* or the background sound level, whichever is higher

The noise from a stationary source at a sensitive point of reception should not exceed these limits in any hour. At the receptors in the area of the McCormick Pit, the ambient acoustical environment is such that the exclusion limits outlined above will be the applicable sound level limits for the pit.

6 Operations

The site plans outline the phasing of extraction, and the sequence and direction of operations in each phase. In general terms, the types of work consist of site preparation, extraction, and site rehabilitation.

Site preparation includes the construction of the berms and visual screens specified on the site plan. Topsoil and overburden will be removed and berms constructed as required. This work will be done primarily with bulldozers, scrapers, trucks, loaders and excavators. Rehabilitation phases will involve similar equipment in establishing the final grading for the site.

The resource located above the water table will be extracted using one or two front end loaders. A drag line or excavator will be used to extract below the water table. All material will be transported by loaders from the working face to the crusher/conveyer site located in the north-west area of the site. The equipment operating at the crusher/conveyer site will just include two rock trucks. There is no trucking access proposed off Heart Lake Road. The annual tonnage limit will be 750,000 Tonnes for the proposed for the McCormick Pit. Extraction is restricted to the weekdays 07:00-19:00.

7 Recommended Noise Controls/Predicted Noise Impact

7.1 Site Preparation/Rehabilitation

During site preparation for the McCormick Pit, equipment working at or near the surface will receive minimal acoustical shielding. A similar scenario may occur during rehabilitation. In order to minimize the noise impact associated with these activities, it is recommended that:

- All equipment should comply with the MOECC guidelines in Publication NPC-115 "*Construction Equipment*" which define the maximum noise levels which construction equipment may omit.
- Site preparation and rehabilitation operations shall be restricted to weekdays 07:00-19:00 and Saturdays from 07:00-15:00.
- Property line berms should be constructed as soon as possible during site preparation so as to provide the surrounding residences with some acoustical shielding of the remaining overburden stripping operations.

By defining a maximum permissible noise emission for construction equipment rather than directly limiting the noise impact at a sensitive point of reception, the MOE is recognizing that construction is a temporary and largely unavoidable source of noise.

7.2 Extraction

In order to ensure that the noise impact from the extraction of aggregate will comply with the guidelines set forth by the MOECC, noise control measures must be incorporated into the operation. The recommended noise controls, outlined in Appendix B, are incorporated into the site and operating plans. The operation shall be consistent with the site and operating plans in terms of:

- Restrictions on the numbers and types of extraction equipment, the noise emissions of the equipment, and the areas of operation.
- The extraction and transport equipment operating in McCormick Pit shall be limited to:
  1. One (1) Dragline (2400 Clark or equivalent)
  2. One (1) Primary Crusher
  3. Two (2) Extraction Loader (CAT 980H or equivalent)
  4. 5 Off-road truck trips/hr (10 passes/hr)

- Berming and local shielding requirements.

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

The noise impact of the proposed extraction operations has been predicted at the representative residences assuming incorporation of the recommended noise control measures. A summary of the noise prediction methodology and sample predictions are contained in Appendix C.

The predicted noise levels are based on the scenarios that are expected to produce maximum noise impact. The majority of the time, the work would be occurring in other areas of the site resulting in lower noise impacts. The predicted worst-case noise impacts from extraction and on-site shipping operations at the representative residences are listed in the following table and compared to the allowable levels based on MOECC guidelines (refer to Table 1).

Conveyers can be used in place of rock trucks to transport the extraction materials from the working face to the licensed site to the west. Conveyers are typically quieter than rock trucks, which were modelled in this report being the worst-case scenario. As such, they do not pose a significant influence to the surrounding receptors.

Table 2: Predicted Worst-Case Pit Noise Levels - One Hour L_{EQ} (dBA)

Residence	07:00-19:00 Extraction & Shipping	
	Predicted	**Allowable**
R01	45	45
R02	43	45
R03	43	45
R05	47	50
R06	42	45
R07	39	45
R08	39	45
R09	35	45
R10	37	45
R11	38	45
R12	37	45
R13	34	45
R14	43	50

At each of the representative residences, the predicted worst-case noise impacts are in compliance with the recommended Ministry of Environment and Climate Change sound level limits.

7.3 Shipping

Since McCormick pit is now proposed to operate as an extension of the Caledon Sand & Gravel pit – that is, the shipping will be through the licensed site to the west, with no trucking access proposed off Heart Lake Road, offsite shipping noise impact will not be considered for this report.

8 Conclusion

Aercoustics Engineering Limited was retained by Blueland Farms Limited to conduct a Noise Impact Study (NIS), as required by the Ministry of the Environment and Climate Change (MOECC) and Ministry of Natural Resources and Forestry (MNRF), to support an application for a Category 1 Class A license for 20.75 hectares on Part of Lot 12, Concession 2 EHS, in the Town of Caledon, Region of Peel.

The addition of a permanent crusher/conveyer site located in the north-west area of the site, with the incorporation of the recommended noise control measures, the aggregate extraction operations in the proposed McCormick Pit will comply with the MNRF and MOECC guidelines for noise from stationary sources.

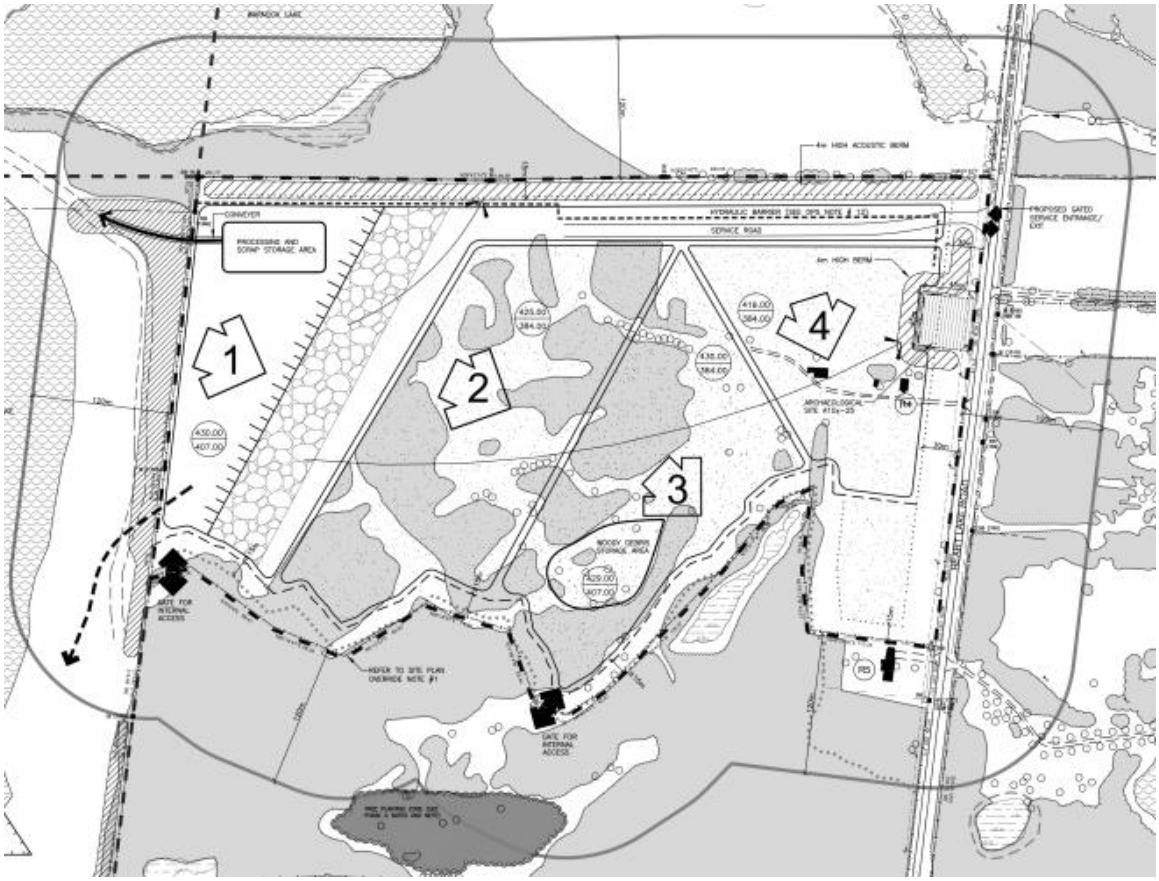


Figure 1: Site Plan

Appendix A

Recommended Noise Control Measures

1. The sound emissions of all construction equipment involved in site preparation and rehabilitation activities shall comply with the sound level limits specified in MOECC publication NPC-115 "*Construction Equipment*".

2. Except where further restrictions apply as outlined below, the extraction and equipment operating in the pit shall be limited to two extraction loaders, one drag line or excavator, two rock trucks, and the conveyors required to transport material from the extraction area(s) to the processing plant to the west of the site.

3. The reference sound emission levels of the equipment shall not exceed:

Equipment	Reference Sound Level (One Hour L_{EQ} @ 30 metres)
Processing Plant (including Crusher and conveyors)	82
extraction loader (each)	74
rock truck (each)	74
drag line or excavator	72

4. Extraction operations shall be restricted to the time period 07:00-19:00. Site preparation and rehabilitation operations shall be restricted to weekdays 07:00-19:00 and Saturdays from 07:00-15:00.

5. Once extraction is taking place in Phase1:

    a. the crusher shall be located at a minimum distance of 160 m from the north extraction limit and 30 m from the west extraction limit. The plant shall remain in this location for the project lifetime as seen in Figure 2.

    b. a 4 m high local acoustic barrier shall be located within 50 m of the crusher, between the plant and Receptors R01 to R06 as seen in Figure 2.

6. Perimeter acoustical berms shall be constructed as indicated on the site plans. The minimum required top-of-berm heights are specified. The phasing of berm construction shall be as indicated on the site plans.

    a. Prior to Phase 1, a berm should be constructed along the entire north perimeter, such that the berm height is at least 4m.

    b. Prior to Phase 4, a berm should be construction along the entire south edge of Phase 4, at an elevation of 422m ASL.

    c. Prior to Phase 4, a berm should be constructed along the east perimeter, such that the berm height is at least 4m.

7. The phasing and direction of extraction shall be as indicated on the site plans.

    a. Within Phase 2, due to the topography of the land, the extraction equipment should operate within 30m of the face such that the equipment is shielded by the extraction face on both the north and east side at all times.

    b. Within Phase 3, due to the topography of the land, the extraction equipment should operate within 30m of the face such that the equipment is shielded by the extraction face on both the north and east side at all times.

    c. Within Phase 4, due to the topography of the land, the extraction equipment should operate within 30m of the face such that the equipment is shielded by the extraction face on the south side at all times.

8. The depth of each lift shall where possible be a minimum of 7 metres. If this requirement cannot be met for the 2nd (or 3rd) lift, the lifts shall be extracted in close succession such that the combined face height is a minimum of 7 metres.

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

Appendix B

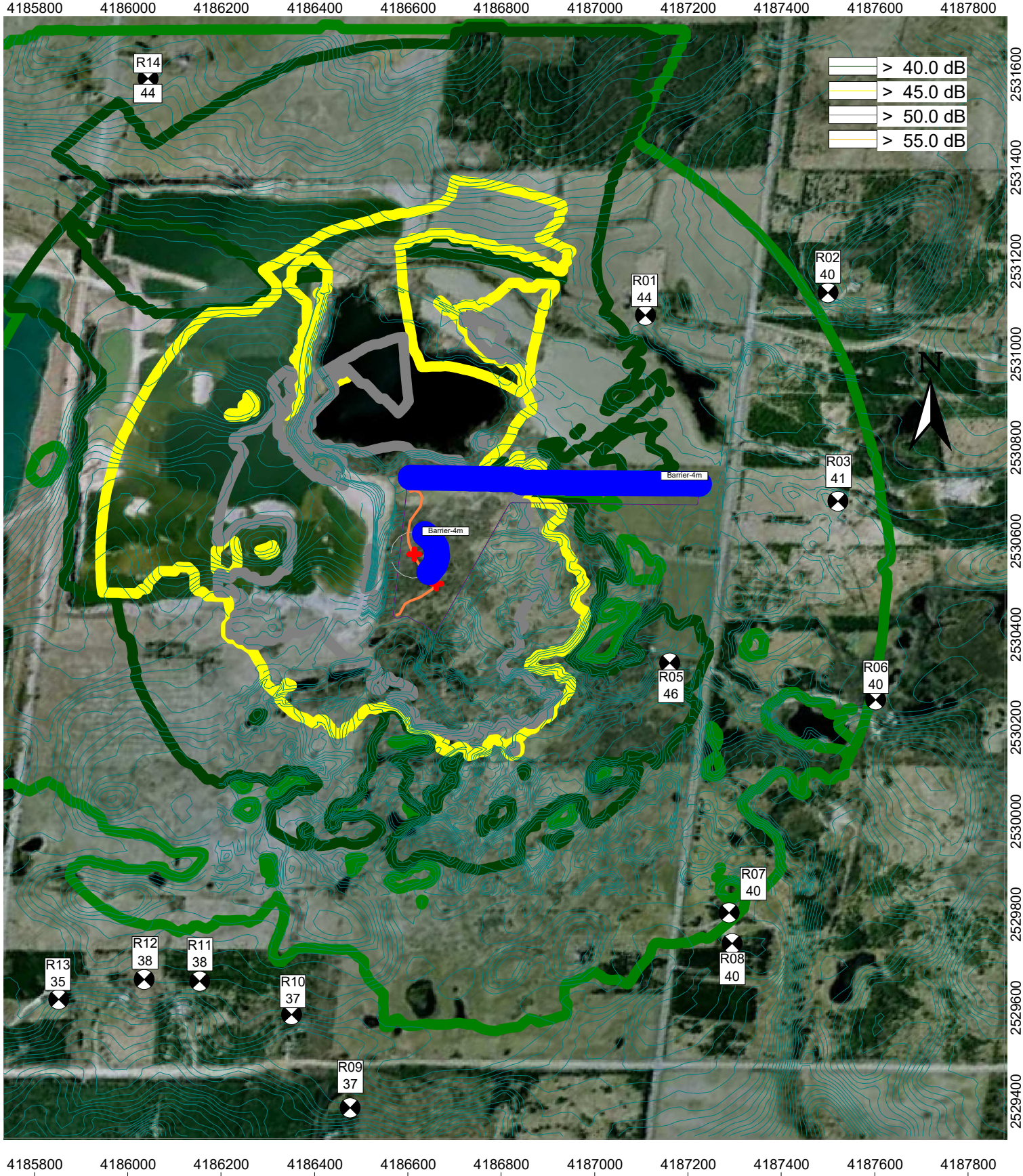
Noise Prediction Methodology

The relevant noise sources were identified and a one-hour L_{EQ} was defined for each. Noise levels for the work cycles were taken as continuous throughout the design hour.

Worst-case scenarios were defined on the basis of maximum noise impact at each of the representative points of reception. Propagation paths were defined in terms of topography, distances and elevations. Noise levels were predicted using the methodology of the International Standard ISO 9613-2 *Acoustics - Attenuation of Sound During Propagation Outdoors.*

Standard point-source distance attenuation was applied to all pit noise sources. Barrier attenuation was calculated using standard diffraction theory. Single barrier attenuation was limited to 20 dB while double barrier attenuation was limited to 25 dB. Attenuation from air absorption and ground effect was included in the predictions. Noise levels were predicted under conditions of downwind propagation. It is under these conditions that the noise impact will typically be at a maximum.

Predictions of extraction and processing noise impact at the sensitive points of reception are included to illustrate the methodology.



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Scale: NTS
Drawn: DEA
Eng: NSW
Date: Sept 28, 2017

The scope of the work outlined in this document is limited to the acoustic, noise, and/or vibration control aspects of the design. Contractors to verify all dimensions

Project Name:

McCormick Pit

AEL Project Number 03117.02

Figure Title:

Noise Contour - Daytime

Figure 2

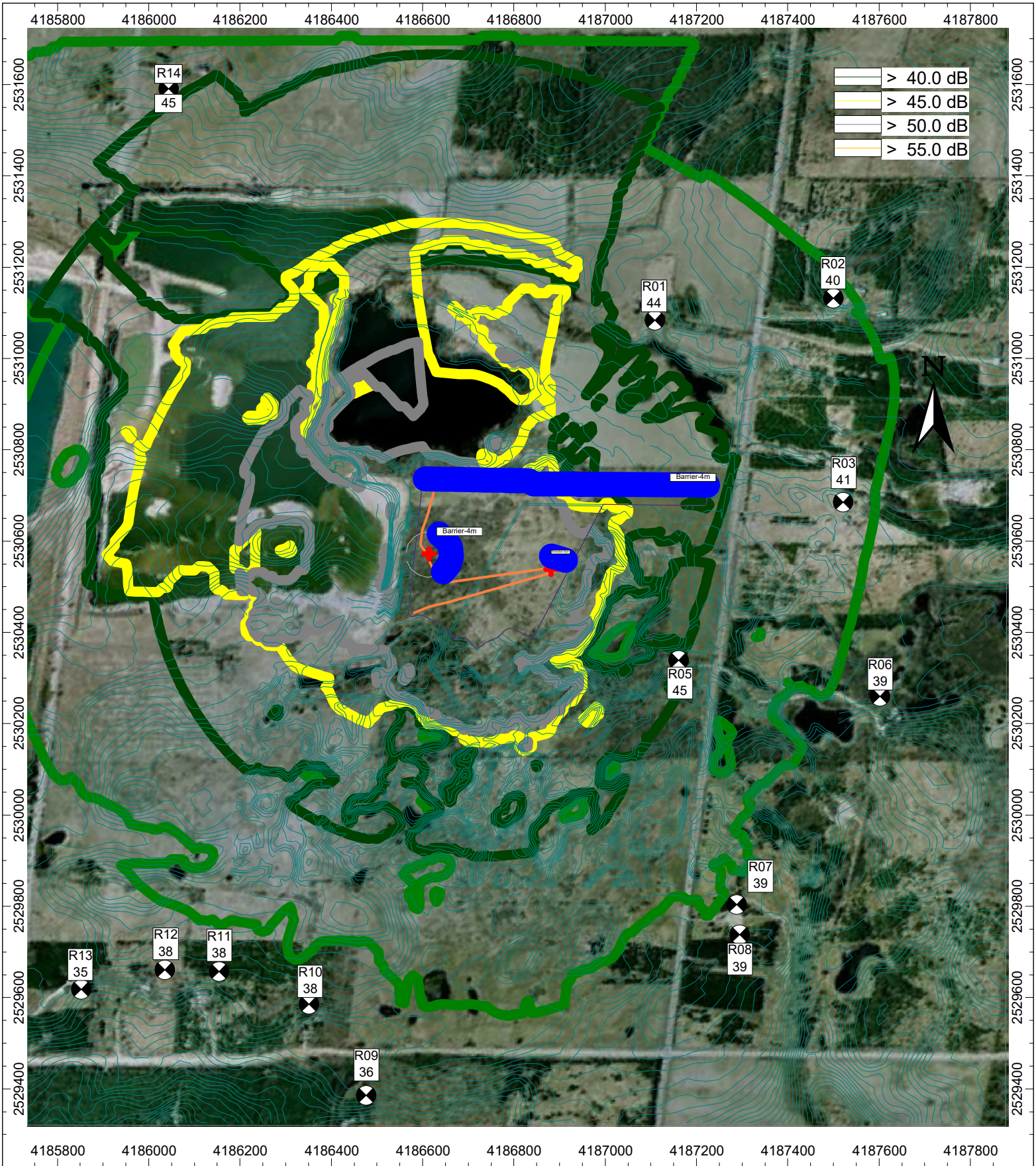

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Figure Title:

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Figure 3

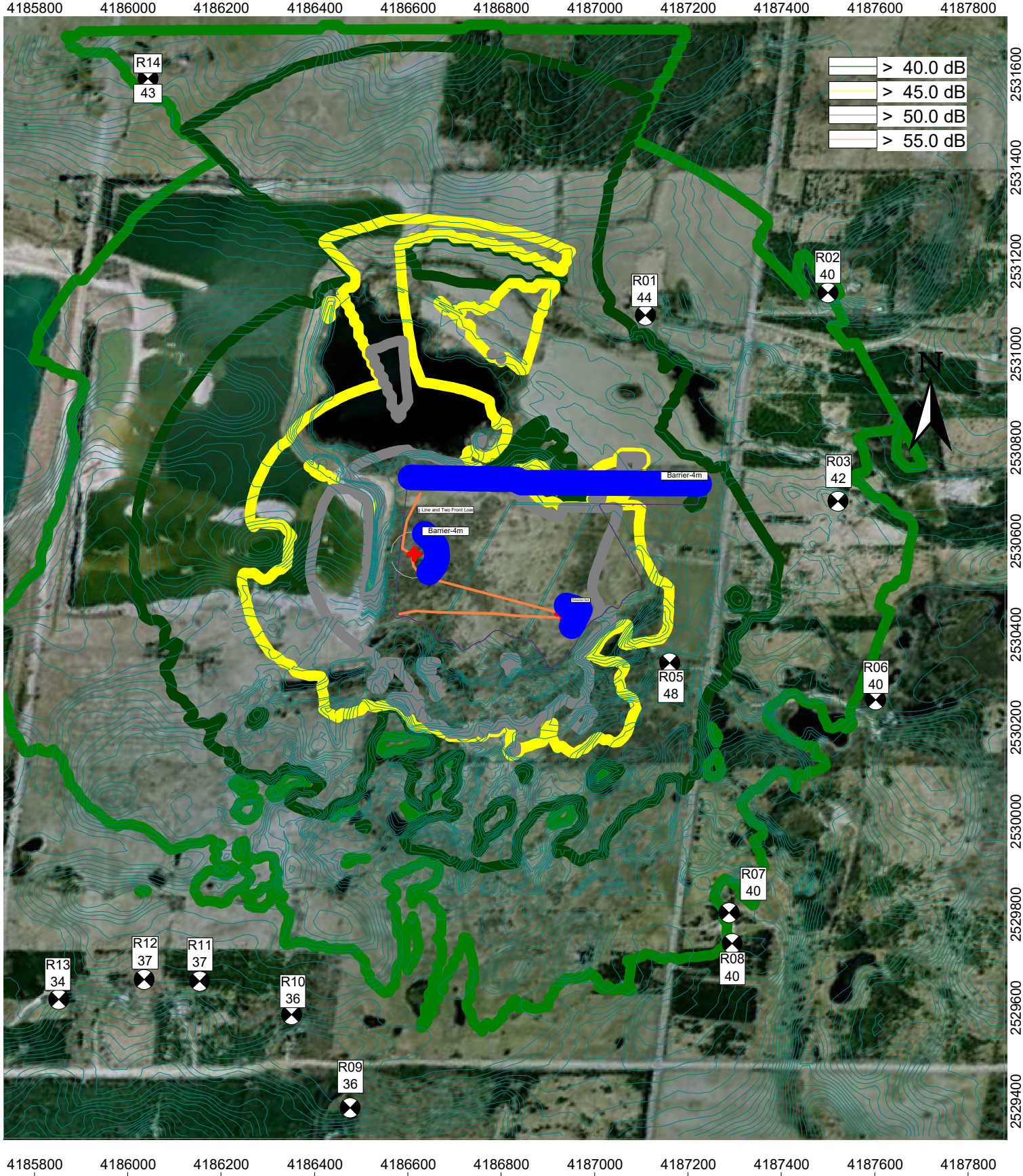

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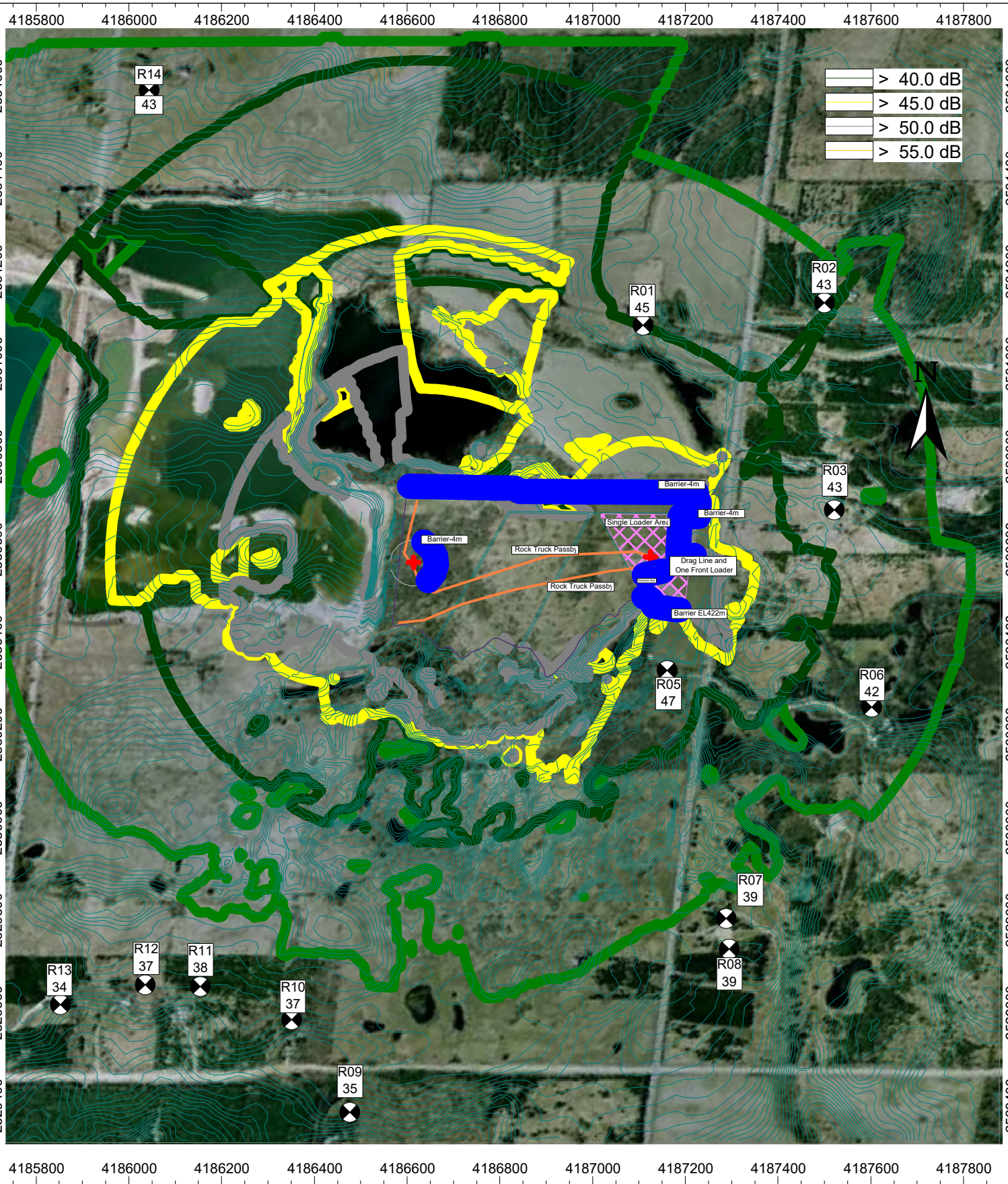
Figure Title:

Noise Contour - Daytime

Figure 4



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Project Name:

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Figure Title:

Noise Contour - Daytime

Figure 5

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Nicholas Sylvestre-Williams M.Eng., P.Eng., INCE

Profile

Nicholas is a partner and owner of Aercoustics Engineering Ltd., an engineering consulting company specializing in acoustics, noise & vibration. He works on land use planning projects and has completed many studies on the noise and vibration impacts for proposed residential & industrial developments, which includes noise from road, rail, shunting, and aircraft traffic and stationary noise sources, including acting as a peer review for various municipalities. He has appeared before the OMB as an expert witness for land-use development issues.

He also works on sound and vibration design for commercial and industrial clients; architectural acoustics including the design of buildings and environmental acoustics including the assessment of noise and vibration from industrial facilities.

Nicholas is a registered Professional Engineer & Designated Consulting Engineer with the Professional Engineers Ontario, and has presented at many national and international conferences on acoustics and has taught acoustic theory and practice for various organizations.

Employment History

2007 – Present	Partner, Aercoustics Engineering Ltd.
2003 – 2007	Project Engineer, Pinchin Environmental

Additional Activities / Committees

2012 - 2014	Vice President – Board of Directors for Air & Waste Management Association – Ontario Section (AMWA-OS)
2009 – Present	Member of Environmental Technical Committee for the Ontario Sand, Stone and Gravel Association (OSSGA)

Professional Registration / Affiliations

Designated Consulting Engineer & Licensed Professional Engineer with the Professional Engineers of Ontario (PEO)

Licensed Professional Engineer with APEGS

Member, Institute of Noise Control Engineers of the United States (INCE)

Member, American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

Member, Air & Waste Management Association (A&WMA)

Education

Masters of Engineering (M.Eng.)	Mechanical Engineering, Ryerson University
Bachelor of Science in Engineering (B.Sc.E.)	Engineering Physics, Queen's University

Courses

1-day course on *"Principles of Environmental Noise Modelling - How sound propagates in the atmosphere,"* AWM&A-OS Conference, Toronto, 2013

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

Publications

"*The Effects of Haul Route Noise*," Inter-Noise Conference, New York, 2012

"*The City of Toronto Construction Bylaw: A Primer*," NOISE-Con Conference, Portland, 2011

"*Case Study in Noise and Vibration Issues Post Construction*," Spring Noise Conference, Banff, 2011

"*The Vibration of a High-rise Building's Columns due to Rhythmic Human Activity*," Inter-NOISE Conference, Lisbon, 2010

"*Vibration Measurements, Assessments and Mitigation for Industries and Residences*," AWMA/CPANS Conference on Environmental Nuisances, Calgary, 2009

"*Acoustic Performance of Arbitrarily Shaped Barriers*," Spring Noise Conference, Banff, 2007

"*Error Bounds, Uncertainties and Confidence Limits of Outdoor Sound Propagation*," CAA Conference, Halifax, 2006.

Professional Activities

Land Use Planning:

Completed over 50 studies on the noise and vibration impacts for proposed residential developments, which includes noise from road, rail, shunting, and aircraft traffic and stationary noise sources in the Region of Waterloo, City of Toronto, Town of Newmarket, City of Brampton, City of Mississauga, City of Ottawa, City of Kingston and other jurisdictions throughout southern Ontario.

Expert witness for Hawk Ridge Homes' Union St. residential development, at the Ontario Municipal Board hearing.

Master Plan / Private-Public Partnership (P3):

Lead acoustician for the master-plan development of the **Toronto 2015 Pan-Am Games**, responsible for developing the Project Specific Output Specifications (PSOS) for the acoustics & vibrations for the Pan-Am Aquatics Centre, Hamilton Stadium, York Stadium and Milton Velodrome.

Lead acoustician for the master-plan development of the Providence Health Care facility in Kingston.

Industrial Noise:

Prepared over 100 Acoustic Assessment Reports (AARs) for industrial, manufacturing facilities, and landfill sites. Many of these included the development of Noise Action Abatement Plans (NAAPs) which outlined appropriate mitigation plans to bring facilities into compliance with provincial noise limits.

Noise impact assessments for Renewable Energy projects include wind farms and solar farms, including noise modelling and noise monitoring of various proposed and existing wind farm projects in Goodrich, Wolfe Island and Port Colborne, in accordance with applicable noise guidelines, bylaws and regulations.

Conducted Acoustic Audits for over 100 facilities throughout Ontario, in accordance with Ministry of the Environment (MOE) guidelines and regulations.

Aggregates

Has completed work in the aggregates industry which involved the preparation and support of over a dozen noise impact studies to determine technical feasibility of aggregate license applications to the Ministry of Natural Resources. This work included preparing the noise impact studies, supporting the findings at public meetings, and performing acoustic audits to confirm compliance with the noise requirements

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Daniel Eduardo Adarve Villanueva B.Eng., E.I.T

Profile

Daniel is an employee of Aercoustics Engineering Limited, an engineering consulting company specializing in acoustics, noise, and vibration. Daniel is an Engineer In Training with the Professional Engineers Ontario.

Employment History

2016 – Present Engineer In Training, Aercoustics Engineering Ltd.

2015 – 2016 Field Test Engineer, P3 Group

Professional Registration / Affiliations

Registered Engineer In Training with the Professional Engineers of Ontario (PEO)

Member of the Ontario Society Of Professional Engineers (OSPE)

Education

Bachelor of Engineering (B.Eng.) Electrical Engineering, Ryerson University

Professional Activities

Environmental Compliance Approvals

Mr. Adarve Villanueva was involved in noise and vibration impact studies for industrial uses. He was involved in preparing Acoustic Assessment Reports for use in applications for Environmental Compliance Approvals. These studies provided conceptual as well as detailed designs of noise mitigation to reduce in-plant noise or noise emission into the environment. In-plant projects generally involved noise surveys, detailed noise/vibration measurements of equipment, data analysis and computer modelling of noise controls to evaluate effectiveness. In some cases, detailed designs and specifications have been provided.

Land Use Planning

In the field of environmental acoustics, Mr. Adarve Villanueva has assisted in completing projects involving noise impact from planned stationary sources as well as noise impact studies for proposed residential developments. These projects included conducting studies for proposed operations and developments and addressing noise concerns for existing operations. In the land use planning process, Mr. Adarve Villanueva has assisted in completing studies which provide assessments of the noise impact on proposed residential, commercial and industrial developments from the local environment which includes noise from road, rail, and aircraft traffic and stationary noise sources such as industrial and commercial uses. Also, vibration measurements and studies were conducted to assess vibration from rail traffic such as trains, streetcars and subways. The studies include recommendations for noise control of the sources, dwelling building components, wall, window, and door constructions to satisfy the Ministry of Environment and Climate Change noise guidelines.

Aggregates

Mr. Adarve Villanueva has done work in the aggregates industry which involved the preparation and support of noise impact studies to determine technical feasibility of aggregate license applications to the Ministry of Natural Resources. This work included preparing the noise impact studies and performing acoustic audits to confirm compliance with the noise requirements.

Renewable Energy

Mr. Adarve Villanueva has performed Transformer Station noise audits.