

January 20, 2020

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Halton Region
Planning Services
1075 North Service Road W
Oakville, ON, L6M 2G2

Attention: Joe Nethery, MCIP, RPP – Manager, Community Planning

**Re: Revised Technical Peer Review – Blast Impact Analysis – Nelson
Aggregate Burlington Quarry Extension Project**

DST Consulting Engineers Inc., a Division of Englobe (DST) was retained by Halton Region Planning Services (Halton) to carry out peer review of Explotech Engineering Limited (Explotech) report on Blast Impact Analysis (BIA), dated March 24, 2020, prepared for Nelson Aggregate (Nelson) with respect to their Burlington Quarry Extension application, and provide blast consulting services to Halton on required basis for the subject project. This technical peer review was conducted in accordance with report formatting guidelines outlined in the Aggregate Resources Reference Manual provided by Halton Region Official Plan (ROI) (2009) – Section 192.

In preparation for this technical peer review a site visit was conducted on September 25, 2020, to verify references made to the existing site conditions and surrounding properties referenced in the BIA report. In addition, the following information have been reviewed:

- Attached “Blast Impact Analysis, Burlington Quarry Extension, Concession 2, Part Lot 1,2,17 &18, Township of Burlington” prepared by Explotech Engineering Limited, dated April 23, 2020;
- Ministry of the Environment Conservation and Parks (MECP) Model Municipal Noise Control Bylaw (NPC 119);
- Attached “Sun Canadian Pipeline Crossing Requirements, Appendix 2, 2012”;
- Attached Burlington Quarry Extension Site Plan Drawings 1 to 4, dated April 2020, prepared by MHBC; and
- Aggregate Resources Reference Manual, Halton Region Official Plan Guidelines.

1.0 INTRODUCTION

The BIA report under the heading “INTRODUCTION” provides a legal description of the proposed extraction zone under two separate areas identified as the South Extension described as Concession 2, Part Lot 17 and 18 located on the south side of No. 2 Side Road and West Extension described as Concession 2, Part Lot 1 and 2 located east side of Cedar Spring Road in Burlington, Ontario. The BIA further provides an overview of the lands within the proposed site and identifies the historical land use for properties adjacent to the proposed site including description of third-party residential, commercial, and infrastructure that may be impacted by the proposed quarry extension.

The BIA report under the heading “EXISTING CONDITIONS” identifies seventy-eight (78) sensitive receptors with respective standoff distance from the extraction zones comprising of residential dwellings and a Golf Course known as Camisle Golf Course. The civic addresses and the land use of these properties are also identified in the BIA report. Of the seventy-eight sensitive receptors, eleven (11) dwellings are presently owned by the proponent and may be converted to offices, in which case will be eliminated from the list of sensitive receptors. The properties owned by the proponent are amongst the closest to the proposed extraction areas. The BIA identifies Buildings located at 2280 No. 2 Side Road presently owned by the proponent as structures classified as “culturally significant” and will be vacant at the time of extraction, and thus will not be considered as sensitive receptors.

In addition, the BIA report under the heading “SUN CANADIAN HIGH PRESSURE OIL PIPELINE” identifies presence of a high pressure oil pipeline running east-west along the north boundary of the proposed West Extension.

In the BIA report no mention is made regarding presence of any identified water body within the proposed extraction areas or within 500 m stand off distance outside the extraction areas.

The writer confirms that the information regarding the site description in the BIA report was verified during our site visit of September 25, 2020.

The BIA report is referenced in the site plan drawing 1, under item “H. Technical Reports-References, subitem 7”. BIA report recommendations are further referenced in site plan drawing 2, under item “O. Report Recommendations, subitem 2. Blasting”.

2.0 DEVELOPMENT PROPOSAL

The BIA report under the heading “PROPOSED MINERAL EXTRACTION” provides details of the proposed extraction plan entailing existing elevations and proposed quarry floor elevations and total licenced area and extraction areas for both South and West extractions. The proposed extraction plan describes in detail the phases in which mineral will be extracted. Details of mineral extraction in each individual phase, including number of required benches and sinking cuts to conform to the maximum allowable explosive quantity per delay period calculated based on the closest third-party sensitive receptor. According to both BIA report and the site plan drawings, total extraction will be carried out in Six (6) phases with phase 1 divided into two sub-phases, phase 1A and phase 1B. Details for extraction for each individual phase of the Burlington Quarry Extension is provided in TABLE 2 of the BIA report. The existing rock elevations and final quarry floor elevations at each phase of the operation are identified. The proposed rehabilitation plan is also outlined in Drawing 3 of the site plan drawings. It is noted that the version of site plan drawings appended to BIA is missing the “Note” section. The same version of site plan drawings provided to us by Halton includes “Notes” on the drawings.

3.0 POLICY SUMMARY

The BIA report under the heading “BLAST VIBRATION AND OVERPRESSURE LIMITS” identifies and outlines the present governing guidelines and regulations for blast induced vibration and overpressure limits for blasting in mines and quarries in the province of Ontario by the Ontario Ministry of the Environment, Conservation and Parks (MECP). These guidelines and regulations were used as the basis for assessing the impact of blasting on neighbouring third-party properties and sensitive receptors. In addition, the BIA report provides recommendations for a vibration and overpressure/noise monitoring during the blasting operations with a minimum of two digital seismographs installed at the closest sensitive receptors located in front and behind the blast.

The BIA report makes no reference to the requirements of the Halton Aggregate Resources Reference Manual (HARRM) since there is little or no significant reference to blasting in this manual.

4.0 DESCRIPTION OF FEATURES/EXISTING CONDITIONS

As indicated in Section 1.0 of this technical peer review report, the BIA report under heading “EXISTING CONDITIONS” provides a detailed inventory of the existing sensitive receptors, provincial

and municipal roads, commercial properties, utilities, and farmland adjacent to the proposed licensed area that may be impacted by the blast induced vibration and overpressure due to quarrying activities in both the South and West extension lands. The predictive vibration and overpressure level calculations in the BIA report are based on the standoff distances to these receptors.

5.0 POTENTIAL IMPACT

The impact of blasting in the context of production of vibration and overpressure and their effect on neighbouring sensitive receptors located at various standoff distance are considered by the BIA report. The BIA report under the Headings “BLAST MECHANICS AND DERIVATIVES” and “VIBRATION AND OVERPRESSURE THEORY” describes how the detonation of explosives in a blast hole causes fragmentation of rock mass and subsequently and inherently produces both groundborne and airborne vibrations and the means by which they propagate in the ground and air beyond the blast site, and how they decay with distance. The BIA report identifies the number of receptors that may be impacted by the blast induced vibration and overpressure. The BIA report based on predictive calculations also provides recommendations to mitigate occurrence of potential vibration and overpressure exceedance by limiting the quantity of explosives per delay period used at various standoff distances to these receptors. The BIA report identifies a number of these receptors to be owned by the applicant, and hence considers them as non-sensitive receptors for the purpose of predictive vibration and overpressure impact calculations.

The BIA report under the heading “ADDITIONAL CONSIDERATIONS OUTSIDE OF THE BLAST IMPACT ANALYSIS SCOPE” describes the methods by which the impact of expected blast induced vibrations will be controlled and kept within the specific guidelines and regulations applying to the following existing features:

- Sun Canadian High-Pressure Oil Pipeline
- Residential Water Wells

The BIA report provides a detailed assessment of the impact of blasting on the Sun Canadian High-Pressure Oil Pipeline and recommendation on changes in the blast design parameters to protect the pipeline based on the Sun Canadian vibration limit policy. The BIA report identifies that the blasting operations will encroach within 12.8 m of the Sun Canadian right-of-way, and recommends that an independent third party blast consulting engineering firm be retain to conduct vibration monitoring and assist in revising the blast design when the blasting operation approaches a standoff distance of 60

m from the Sun Canadian right-of-way. This is the standard in the industry, and we concur with the BIA report assessment.

The BIA report under the heading “RESIDENTIAL WATER WELLS” discusses the potential effects of vibrations on potable water wells and common misperceptions about water wells being affected by typical quarry blasting. We concur with the BIA report assessment that the current MECP vibration guideline limit of 12.5 mm/s is well below the required level to damage a water well.

In addition, the BIA report provides measures based on a predictive model to minimize the impact of flyrock on properties surrounding the blasting operations. The maximum flyrock throw calculation has been carried out based on blast design parameters proposed by the BIA. Flyrock throw can be predominantly controlled by increase in the collar section of the boreholes and stemming material used. The BIA through extensive calculation has assessed the maximum horizontal flyrock throw and presents the resulting calculations in Table 4 of the report.

6.0 MITIGATION AND MONITORING

In order to mitigate the potential vibration and overpressure on surrounding existing sensitive receptors, the BIA uses a well-known predictive model, namely the Bureau of Mines (BOM) prediction formula or Propagation law. The BIA states that this model has been used by Golder Associates (Golder) to develop a site-specific attenuation formula based on a study carried out at the existing Burlington Quarry in 2006. However, the attenuation curves referred to in the Appendix C of the report are dated 2004. The BIA solely relies on the site-specific attenuation curves established by Golder for the existing Burlington Quarry for their assessment of the impact of blasting on surrounding sensitive receptors in the proposed Burlington Quarry Extension area with no new data added, even though the new data is available.

The BIA report under the heading “REVIEW OF HISTORICAL BURLINGTON QUARRY DATA” states that vibration and overpressure data has been collected in recent years for all blasts conducted at the Nelson Aggregate Burlington Quarry (for 2014 through 2019) and provided to Explotech as part of their analysis. The historical vibration and overpressure data are included in Appendix C of the report. As part of their analysis, the BIA further confirms that the data reveals occurrence of 18 exceedances over the period from 2014 to 2019. List of exceedance occurrences, their location, exceedance level, date and time are presented in Table 5 of the BIA report. Although the data has been reviewed, it is not used in the BOM model prediction model for predicting expected vibration and overpressure levels

for the quarry extension. In our opinion, if the prediction formula established by Golder is used for calculation of predicted vibration and overpressure levels for the new extension, then the data collected from actual quarry blasting during the period of 2014 to 2019 should have been incorporated in the model.

As part of the mitigation plan to minimize vibration and overpressure impact on sensitive receptors, the BIA report under the heading “VIBRATION LEVELS AT THE NEAREST SENSITIVE RECEPTOR” and based on Golder’s site-specific attenuation formula (square root scaling) calculates and provides limits of quantity of explosives per delay period for given standoff distances from the blast site to the sensitive receptors to conform to and maintain MECP vibration level of 12.5 mm/s Peak Particle Velocity (PPV). The resulting calculations are presented in Table 3 in the BIA report. Similarly, same calculations are done using cube root scaling for maintaining acceptable overpressure levels.

Explotech has used the standard engineering approach for predicting expected vibration and overpressure levels at various standoff distances from the blasting site. DST conditionally agrees with Explotech’s CONCLUSION, provided issues identified in Section 6.0 of this report is addressed.

6.0 CONDITION OF APPROVAL

The BIA report under the heading “RECOMMENDATIONS” provides nine (9) recommendations as the condition of blasting in the proposed Nelson Aggregates Burlington Quarry Extension areas. DST concurs with these recommendations and suggest the following be addressed:

1. Critical conditions recommended by the BIA be included in the site plan notes,
2. The Golder Associates vibration attenuation study report referred to in the BIA report be provided for ease of technical review and cross reference,
3. The source of the Nelson Quarry vibration and Air Attenuation Curves included in Appendix C (Figures 5 and 6) of the BIA report be identified,
4. Vibration and overpressure data collected in the first 12 months of the proposed quarry extensions be incorporated in the data attenuation data base to develop a more reliable and new site-specific attenuation formula,
5. Provide the rational why the attenuation formula established by Golder in 2004 was used, but the historical vibration and overpressure data from the same site was not incorporated in formula,

6. According to the “Level 1 and Level 2 Natural Environment Technical Report, April 2020, page 60, Fish Habitat Summary” conducted by SAVANTA, there are potential direct fish habitat within 120 m of the adjacent lands, and no fish habitat within the extraction areas.

A review of historical supporting information and current Level 1 and Level 2 Natural Heritage Reports provided by the applicant was also carried out by the Halton Region Environmental Consultants Matrix Solutions Inc. (MSI). “This review provides the following overview of fish habitat within 500 m of the proposed Burlington Quarry Extension areas:

- West Arm of the West Branch of Mount Nemo Tributary of Grindstone Creek
- East Arm of the West Branch of Mount Nemo Tributary of Grindstone Creek
- Willoughby Tributary of Bronte Creek

In addition to these, there are waters containing fish within the existing quarry and proposed extension areas. Within the existing quarry, it can be assumed that all pond features contain fish. In historical reports prepared by ESG International (October 2000) the following features were noted:

- Pond 1 – support a largemouth bass population
- Pond 2 – supports a stickleback and pumpkinseed population
- Pond 3 – supports a largemouth bass population
- Pond 4 – supports largemouth bass, pumpkinseed and stickleback population

Although there are fish within these features, earlier reports do not classify these as “fish habitat” due to the isolation of these watercourses. According to MSI, the applicant has been requested to provide DFO concurrence that this is the case.

Within the West Extension area, largemouth bass is present in all of the irrigation ponds within the golf course. Although the fish are present within these watercourses, they are currently not viewed as “fish habitat” by the applicant. These irrigation ponds are hydrologically connected to Willoughby Creek Tributary. The applicant has been requested to provide DFO concurrence that this is not fish habitat”.

In the case that DFO confirms that the above noted features are considered as “fish habitat”, the applicant’s blasting consultant should revise their BIA to include a section addressing the impact of blasting on these features and recommend mitigation measures to address the potential impact on the fish habitat in accordance with the “Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters”. The document can be sourced online at <https://www.racerocks.ca/wp-content/uploads/2015/09/DND-explosive-guidelines.pdf> .

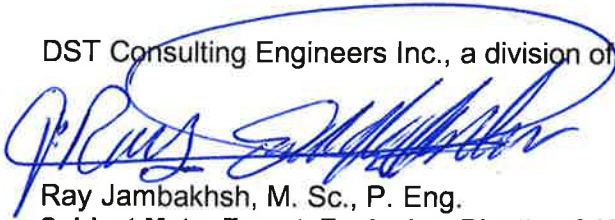
The potential impact of blasting may be insignificant on the fish habitat within 120 m of the adjacent lands considering the proposed blasting parameters. However, the potential impact should have been addressed by the BIA. The Location of these water bodies are also shown in the site plan drawings and described as “Water Features”, and

7. Considering that the proposed blasting operations at one point will approach a standoff distance of 12.8 m from Sun Canadian Pipeline corridor, all requirements of their blasting specifications outlined in Appendix 2, section 8.3 to 8.5 under the heading “ Vibration and Blasting Control” be implemented (copy attached for reference).

We trust the foregoing will satisfy your present requirements. Please contact the undersigned should you require further assistance.

Your sincerely,

DST Consulting Engineers Inc., a division of Englobe



Ray Jambakhsh, M. Sc., P. Eng.

Subject Mater Expert, Explosive, Blasting & Vibrations

Attachments

