TECHNICAL MEMORANDUM

DATE December 10, 2021 **Project No.** 21457143

TO Mr. Shawn Tylee, C.E.T., MBA
Rankin Construction Inc.

CC Natalie Jones

FROM Emily Lau **EMAIL Emily_Lau@golder.com**

RESPONSE TO THE JOINT AGENCY REVIEW TEAM LETTER - AIR QUALITY IMPACT ASSESSMENT - PORT COLBORNE QUARRIES INC., PIT 3 EXTENSION

Please find attached in Appendix A the response to the Joint Agency Review Team (JART) letter received on July 28, 2021 regarding the Air Quality Impact Assessment of the proposed extension of the existing Port Colborne Quarry to support a Category 2, Class “A” Quarry Below Water license application under the Aggregate Resources Act.

Appendix B provides an errata for the Air Quality Impact Assessment.

Do not hesitate to contact the undersigned if you require further information.

Golder Associates Ltd.

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APPENDIX A

JART Response

JART Response

Comment ID	Comment	Response
3.a.i	Figures to illustrate the receptor grids used for all of the dispersion modelling scenarios should be included in the report.	Receptor grid figures for all scenarios will be provided in an addendum to the AQIA Report.
3.a.ii	Clarify whether the Extraction 'Line Volume' sources used in model scenarios 2 and 4 (smaller in total size compared to the other model scenarios), have the same total emission rate as the other model scenarios, or a lower total emission rate divided among the fewer 'Line-Volume' sources used for model scenarios 2 and 4.	The Extraction LINE VOLUME source has the same total emission rate in all scenarios, therefore the LINE VOLUME sources in scenarios 2 and 4 have higher emissions per volume source as the line is shorter therefore there are less sources in the line.
3.a.iii	Revise Table A1 and/or Table A2 in Appendix A, to include the same 'Source identifier' (ID) numbers for the individual sources, to clarify how the individual sources in listed by ID number in Table A1 relate to the grouping of sources listed in Table A2.	An updated version of Tables A1 and A2 will be included in an addendum to the AQIA Report.
3.a.iv	Clarify or correct whether the sources listed in Table A2 as 'PR2' through 'SHIPROAD' should be listed as 'Volume' or corrected to be 'Line Volume' sources.	An updated version of Table A2 will be included an addendum to the AQIA Report.
3.b.i	In section 3.2 one example emission rate calculation is shown for the Crush Plant, representing the emissions from haul trucks unloading at the 'grizzly feeder'. DST understands this is one of components of the crush plant described in section 1.1 of the report. The emission factor that is referenced from the EPA AP42 Table 11.19.2-1 (0.000008 kg/Mg for SPM) is actually not listed in the AP42 table. Also, the reference to the AP42 section 11.19 notes it is dated 2006; however, the most current published date of this section as listed on the EPA's web site is dated 2004. The example emission rate calculation in this section shows an SPM emission rate of 1.00 x10-3 g/s, whereas the total emission rate for the crush plant is shown in Table A1 to be 5.84 x10-1 g/s. It seems apparent from this difference that other emission rate calculations and applicable emission factors contribute to the total emission rate for the crush plant (such as emissions from crushing steps, screening and material transfer). However, these other emission factors are not referenced in the report. Section 3.2 of the report should be revised to include a complete list of all the emission generating activities of the crush plant source, and the respective emission factors referenced for the emission rate calculations. Also, if emission factors for 'controlled' sources are referenced, there should be information provided to confirm that the emissions controls that will be used are consistent with the emission factor references.	Clarifications and detailed sample calculations for the crushing plant emissions will be provided in an addendum to the AQIA Report.
3.b.ii	In Section 3.3 it states that there are no emissions (such as SPM, PM-10 or PM-2.5) from the wash plant since the material processed is completely saturated. However, in Table A1 emission estimates are provided for this source and in Table A2 source details are listed for it. This section of the report should be revised to show the basis for the emission estimates if the wash plant source is used in the dispersion model scenarios.	Section 3.3 of the AQIA Report is correct, there are no emissions from the wash plant operations. The references to the wash plant will be removed from Tables A1 and A2. The updated tables with will be provided in an addendum to the AQIA Report.
3.b.iii	In section 3.4 the emission rate calculation for emissions from stockpiles (due to wind erosion) refers to an emission control efficiency of 75%, obtained from Table 9-4 from the WRAP 2006 reference. It should be clarified in the report that this emission reduction applies to an emission control consisting of three-sided enclosures around stockpiles, to shield each stockpile from wind. This emission control should also be specifically mentioned in the BMPP report as a best management practice (BMP) that can be implemented for stockpiles, along with alternate BMPs mentioned in the BMPP report.	The 75% emission control efficiency used for emissions from wind erosion of stockpiles is intended to account for a number of dust best management practices (BMPs) that will be implemented for stockpiles at the site. As noted in the BMPP Report, these practices include stockpile placement (use of natural wind breaks), reduced activity during high winds, watering as needed and progressive rehabilitation. These practices offer varying degrees of control. For example, spraying water as a dust suppressant can afford control efficiencies from 50%[1] to 90%[2], resulting in an average control efficiency of 70%. Use of wind breaks can afford a control efficiency of 30%[3]. When a combination of controls is applied, the reduction in emissions is multiplicative and translates to an overall reduction of 79% from the uncontrolled emission rate [i.e. (1-0.7) × (1-0.3) = 0.21, which is a 79% (or 0.79) reduction].

[1] Australian NPI Emission Estimation Technique Manual for Concrete Batching, Table 7, PM10 reduction factor for wind erosion from active stockpiles with water sprays.

[2] WRAP Fugitive Dust Handbook, page 3, control efficiency for wind erosion when exposed area is watered before high winds.

[3] Australian NPI Emission Estimation Technique Manual for Concrete Batching, Table 7, PM10 reduction factor for wind erosion from active stockpiles with wind breaks.

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		Due to the uncertainty in the control efficiency of practices like watering (where a range can apply depending on the watering methodology and frequency), the overall reduction calculated due to combined methods was rounded down to 75% as a conservative measure. The references will be updated to include both the WRAP 2006 and Australian NPI Emission Estimation Technique Manual for Concrete Batching documents in an addendum to the AQIA Report.
3.b.iv	In section 3.6, the emission rate calculation for dust emissions from unpaved roads involves an equation that uses in part an input variable for the silt content of the road surface material. The value of this variable referenced from the US EPA AP42 Table 13.2.2-1, is a 4.8 % silt content for plant roads in a sand and gravel processing facility. However more appropriate values for this variable, referenced from the same AP42 table, would be for unpaved roads at a stone quarrying and processing facility, including 10% silt content for plant roads and 8.3% silt content for haul roads to/from a pit.	PCQ has committed to carry out a road dust sampling program to verify the silt loading on the quarry roads. Additional road dust controls will be implemented as needed to maintain the silt loading at 4.8% or lower.
3.b.v	In section 3.6, the emission rate calculation for dust emissions from unpaved roads, refers to a referenced emission control efficiency of 75%. This reference was obtained from Table 4 of the reference Australian National Pollutant Inventory, Emission Estimation Technique Manual For Mining, Version 3.1, January 2012. This emission control reference applies to application of water to an unpaved road at a specific application rate. However, section 3.6 indicates the emission control would be achieved due to implementation of a fugitive dust BMPP, including road watering and a speed limit. For clarification, the AQIA report could also refer to the combined use of the two emission controls, watering (55% control) and limiting vehicle speeds (44% control) that are listed in the reference WRAP 2006 Table 6-6. When combined these two control references are approximately equivalent to a 75% control efficiency. These emission controls are specifically mentioned in the BMPP report as BMPs to be implemented for unpaved roads.	Acknowledged. The 75% control efficiency value from the Australian National Pollutant Inventory, Emission Estimation Technique Manual For Mining, Version 3.1, January 2012 should have described the use of watering at a rate of at least 2 litre/m² per hour during dry periods instead of referencing the implementation of a fugitive dust BMPP. Although PCQ will implement other types of controls in addition to watering as mentioned in the fugitive dust BMPP, the control efficiency value was left at 75% to increase the conservatism of the assessment.
3.b.vi	In section 3.9, the emission rate calculation for conveyor drop operations involves an equation that uses in part an input variable for the moisture content of the material. The value of this variable referenced from the US EPA AP42 Table 13.2.4-1, is 2.1% moisture referenced for 'Various limestone products', applicable to the industry 'Stone quarrying and processing'. A more appropriate value for this variable would be the 0.7% moisture value for 'Crushed limestone', listed in this reference table for this same industry.	The existing crushing plant and proposed new crushing plant will have water spray systems to control fugitive dust. The material transferred from the conveyors onto stockpiles is already wet, and therefore, the 2.1% moisture content was used for the assessment.
3.b.vii	In section 3.10, the emission rate calculation for dust emissions from blast holes drilling, refers to a referenced emission control efficiency of 99% with the use of a vacuum filter bag system. This reference was obtained from Table 4 of the reference Australian National Pollutant Inventory, Emission Estimation Technique Manual For Mining, Version 3.1, January 2012. This emission control is specifically mentioned in the BMPP report as a BMP to be used during blast hole drilling.	The question here is unclear. However, Section 3.10 of the AQIA Report and the BMPP Report are correct, the drill rig will be equipped with a vacuum filter bag system.
3.b.viii	In section 3.12, the emission rate calculations for combustion emissions from blasting operations are based on use of ammonium nitrate and fuel oil (ANFO) emulsion blend explosives. This section should include an explanation of how the maximum quantity of explosives to be used (6160 kg) was determined for the calculation of the emission rates. Also, if other explosives are to be used in blasting operations, other applicable contaminants (such as ammonia and hydrogen cyanide) should be added to the emissions calculations and air quality assessment.	The amount of explosive used in the assessment was provided by PCQ. Only ANFO emulsion blends will be used at the site. No other explosives will be used.
3.b.ix	For clarity of the emission rate calculations, a table should be included in the report (such as in Appendix A) to illustrate all of the inputs and outputs of the emission rate calculations. For example it is suggested that the table should list data in columns for each calculation listed in rows, including columns for the source ID number, source descriptive name, emission factor numeric value and units, reference for the emission factor, process/activity rate or quantity used in the calculation, calculated emission rate for the individual activity, and a total emission rate where several individual activity emission rates are combined to form the total emission rate of the source as shown in Table A1.	Detailed sample calculations, including a table of calculation inputs, and updated Tables A1 and A2 will be provided in an addendum to the AQIA Report.

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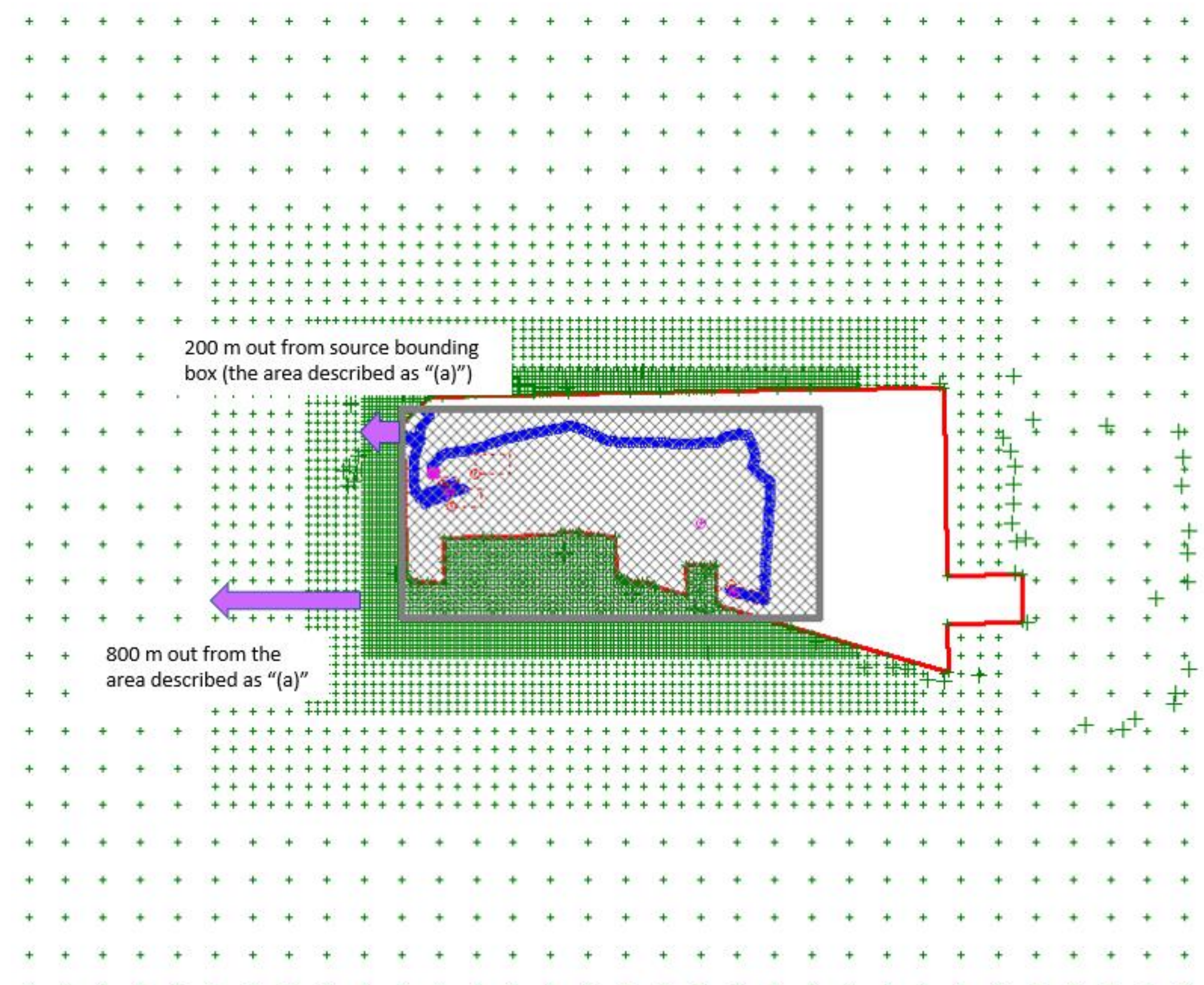
3.c.i	In section 4.5.2.2 the description of how grid-based receptors were selected for dispersion modelling seems to suggest square grid areas (200m x 200m, 300 m x 300 m etc.); however, the example receptors grid layout shown in Figure 5 is clearly not square. This section should be revised to clarify the starting boundary for the grid-based receptors, and how the receptor grids increase in spacing with distance from the starting boundary (such as 20 m grid spacing for receptors up to a distance of 200 m from the starting boundary).	The receptors used in the assessment were generated in accordance with the requirements of Section 14 of Ontario Regulation 419/05 and Section 7.1 of the February 2017 Air Dispersion Modelling Guideline for Ontario (ADMGO), for receptors up to 2 km out from the source box, using the nested grid receptor generating tool in the Lakes Environmental AERMOD View program. A source bounding box (coloured grey in the image below) was drawn around the emission sources in each scenario and receptors were generated in grids with different spacing intervals. The shape of the receptor grid depends on the shape of the bounding box. For example, the nested grid in the image below has 20 m spaced receptors starting at the bounding box and extending to 200 m away from each side of the bounding box (area described as "(a)" in the ADMGO). Further, the 100 m spaced receptors are in an area within 800 m of the area described as "(a)". As the bounding box is rectangular, so is the shape of the receptor grid. 

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3.d.i	Section 3.1 mentions that in future PCQ may relocate the crushing and washing aggregate processing operations from the current location in Pit 1 area to Pit 3. It is not specifically stated whether the other aggregate processing operations (stockpiling and shipping access/egress routes) would also be relocated to Pit 3. It is stated that the dispersion model scenarios used are all based on the processing operations remaining at the current location. The rationale is that the on-site haul road emission sources have the highest emission rates with the longest length of road, which is the case for the current location of the processing operations. Thus, the rationale states that the model scenarios used are considered more conservative modelling approaches for assessment of the air quality impacts.	Acknowledged. An assessment of the relocated truck entrance and crushing/washing operations will be included in an addendum to the AQIA Report.
3.d.ii	DST is of the opinion that a dispersion modelling scenario involving the processing operations located in Pit 3 may generate higher predicted air quality impacts at receptors in the vicinity of Pit 3. This is due to the grouping of emission sources in a smaller overall area, with less distance for dispersion of emissions from all sources combined, even though the haul road sources will have lower emission rates.	Acknowledged. An assessment of the relocated truck entrance and crushing/washing operations will be included in an addendum to the AQIA Report.
3.d.iii	Subject to input from the regulatory authorities, an evaluation of air quality impacts associated with a possible future change in the location of the aggregate processing operations may need to be addressed in a separate application for approvals. If the change to the location of the processing operations is part of the current application, a suitably conservative dispersion model scenario should be developed to evaluate air quality impacts for the case of a facility layout where applicable emission sources are relocated to Pit 3.	Acknowledged. An assessment of the relocated truck entrance and crushing/washing operations will be included in an addendum to the AQIA Report.
3.e.i	It should be noted that section 6.3 includes a recommendation that an air quality monitoring program should be developed. Section 7 includes a statement that “Off-site impacts from combustion gases, while not directly assessed under the facility’s blast monitoring program, will be influenced by the amount of explosive used and termination point for blasting operations.” Since no details of proposed air quality monitoring or blast emissions monitoring programs were provided, they were not evaluated in this peer review. DST recommends that air quality monitoring and blast emissions monitoring programs should be developed, peer reviewed and implemented, as part of conditions imposed by planning or other applicable regulatory approvals for the proposed quarry expansion.	Acknowledged.
3.f.i	As noted above for section 3.4 of the AQIA report, a BMP is referenced to achieve a 75 % emission control for fugitive dust emissions from stockpiles. In the WRAP 2006 reference where this emission control value is listed, it refers specifically to the use of three-sided enclosures around stockpiles, to shield the stockpiles from wind. This emission control should be specifically mentioned in the BMPP report as a BMP to be implemented for stockpiles. In the Golder BMPP report, Table 3, alternate approaches to shielding stockpiles from wind are proposed, including the use of natural windbreaks, and stockpiles located below grade. The report should note that where these alternates approaches cannot be implemented, other BMPs could be implemented as noted in the WRAP 2006 reference, such as use of three-sided enclosures or watering of stockpiles in advance of high wind conditions.	The 75% emission control efficiency used for fugitive emissions from stockpiles is intended to account for a number of dust best management practices (BMPs) that will be implemented for stockpiles at the site. As noted in the BMPP Report, these practices include stockpile placement (use of natural wind breaks), reduced activity during high winds, watering as needed and progressive rehabilitation. These practices offer varying degrees of control. For example, spraying water as a dust suppressant can afford control efficiencies from 50%[4] to 90%[5], resulting in an average control efficiency of 70%. Use of wind breaks can afford a control efficiency of 30%[6]. When a combination of controls is applied, the reduction in emissions is multiplicative and translates to an overall reduction of 79% from the uncontrolled emission rate [i.e. (1-0.7) × (1-0.3) = 0.21, which is a 79% (or 0.79) reduction]. Due to the uncertainty in the control efficiency of practices like watering (where a range can apply depending on the watering methodology and frequency), the overall reduction calculated due to combined methods was rounded down to 75% as a conservative measure. The references will be updated to include both the WRAP 2006 and Australian NPI Emission Estimation Technique Manual for Concrete Batching documents in an addendum to the AQIA Report.

[4] Australian NPI Emission Estimation Technique Manual for Concrete Batching, Table 7, PM10 reduction factor for wind erosion from active stockpiles with water sprays.

[5] WRAP Fugitive Dust Handbook, page 3, control efficiency for wind erosion when exposed area is watered before high winds.

[6] Australian NPI Emission Estimation Technique Manual for Concrete Batching, Table 7, PM10 reduction factor for wind erosion from active stockpiles with wind breaks.

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3.f.ii	In section 4.3 it is noted that inspections on the conformity with the BMPs will be documented weekly by the Operations Supervisor using the Dust Control Inspection Form. However, changes in site conditions affecting dust generation and transport off-site can change quickly, even during a single day. In particular, changes in dust generation due to weather conditions, such as winds, sun and hot dry weather, can quickly evaporate water applied as a BMP on paved and unpaved roads. Also, during freezing conditions when watering cannot be implemented safely on roads, dusty conditions may occur more quickly and be difficult to control. A program of more frequent regular inspections (such as daily or regular intervals during the day) should be included for the most critical BMPs, such as watering and activities with greater risk of dust generation during high winds (material drop heights, drilling and blasting). A simplified daily inspections program and form could be developed, involving additional employees to complete regular 'high priority' item inspections as part of their daily work routine. Also, a system involving more employees trained and participating in monitoring and reporting problems with BMPs implementation/effectiveness during the work-day could improve response times to problems that develop and improve effectiveness of BMPs. If the additional monitoring/reporting activity is recorded (logs, forms) it would provide further documentation of the BMPs implementation.	PCQ has procedures in place to inspect the crushing plant spray systems on a daily basis, although it is currently not documented. PCQ will develop a daily inspection form and keep it on file. This will be updated in the next version of the BMPP.

APPENDIX B

Errata for Air Quality Impact Assessment - Port Colborne Quarries Inc., Pit 3 Extension

TECHNICAL MEMORANDUM

DATE December 10, 2021 **Project No.** 21457143

TO Shawn Tylee, C.E.T., MBA
Rankin Construction Inc.

CC Natalie Jones

FROM Emily Lau **EMAIL emily_lau@golder.com**

ERRATA - AIR QUALITY IMPACT ASSESSMENT - PORT COLBORNE QUARRIES INC., PIT 3 EXTENSION

Please find below a correction for the December 2020 Air Quality Impact Assessment - Port Colborne Quarries Inc., Pit 3 Extension.

- On page 37 Section 6.1 the material handling rate at the extraction face was incorrectly stated to be 4,500 kg per day. The correct value is 4,500 tonnes per day.

EKL/NCJ/ng

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