FINAL REPORT

LAW QUARRY EXTENSION

PORT COLBORNE, ONTARIO

AIR QUALITY ASSESSMENT

RWDI #2202166

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SUBMITTED TO

Ed Lamb
elamb@waterfordgroup.ca

Waterford Sand & Gravel Limited
70 Ewart Avenue
Brantford, ON N3T 5M1

T: 519.752.1300 ext. 124
M: 519.500.8146

SUBMITTED BY

Monika Greenfield, M.Sc.
Senior Project Manager, Strategic Advisor
Monika.Greenfield@rwdi.com

Brian G. Sulley, B.A.Sc.
Technical Director, Principal
Brian.Sulley@rwdi.com

RWDI
600 Southgate Drive
Guelph, ON N1G 4P6
T: 519.823.1311

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Brian G. Sulley, B.A.Sc., P.Eng.

1 INTRODUCTION

RWDI was retained by Waterford Sand & Gravel Limited to conduct an air quality assessment for the proposed Law Quarry Extension (the Quarry) in Port Colborne, Ontario. The facility is applying for a Class A license, with an annual extraction limit of 800,000 tonnes per year.

This air quality assessment consists of the following steps:

1. Developing a site wide air emission inventory using published emission factors for all operations at both the Quarry. This includes emissions of like contaminants associated with the , including emissions that are operations at the separately owned and operated Miller Paving Limited hot-mix asphalt (HMA). The emission estimates were developing using guidance provided in Ontario Ministry of the Environment Guideline (MECP) Guideline A10, the Guide to Preparing an Emission Summary and Dispersion Modelling (ESDM) Report (Guideline A10). Although this is not an application for approval under Section 9 of the Environmental Protection Act (EPA), and therefore does require the preparation of an ESDM report, air emissions from such facilities are to O. Reg. 419/05, and MECP Guideline A10 is appropriate, with some modifications reflecting the more comprehensive nature of this inventory (such as emissions from motor vehicles).
2. The emission inventory is used as an inputs to an air dispersion model, which predicts airborne concentrations of contaminants at off-site receptor locations using five years of hourly meteorological data, processed and provided by the MECP. The emission estimates were developing using guidance provided in MECP Guideline A11, the Air Dispersion Modelling Guideline for Ontario (Guideline A11). Similar to the discussion regarding MECP Guideline A11, this is the appropriate guidance document. Similarly, some modifications are necessary, since the focus is on cumulative impacts at sensitive receptor locations, considering ambient background concentrations.
3. Nearby sources of similar air quality emissions are reviewed and if required, these sources are included explicitly in the assessment.
4. Background air quality levels are estimated through a review of published air quality monitoring data for suitable air quality monitoring stations.
5. The predicted impacts are then compared against the relevant provincial or federal air quality criteria. If predicted impacts are above the relevant criteria at nearby sensitive impact locations, mitigation measures are recommended, and the assessment is repeated.
6. This process continues until predicted impacts are below the criteria. The individual iterations are not retained, as they are not material to the final modelling analysis and conclusions.
7. The mitigation measures are incorporated into the Best Management Practices Plan (BMPP) for dust. A list of suitable references for understanding dust control practices are provided in **Section 14**.

2 SITE DESCRIPTION & OPERATIONS

The existing Quarry and the proposed extension are aggregate operations, to be operated under a Class A license (quarry operations with excavation below the water table) under the Aggregate Resources Act (ARA).

This Air Quality Assessment must be reviewed in conjunction with the Aggregate Resource Act Site Plans that accompany the ARA license application (Existing Features Plan, Operational Plan, Notes Plan, Rehabilitation Plan, and Cross Section Plan. These Site Plans provide all necessary details on the site as it currently exists, the proposed operations, and what the site will look like in the future following final rehabilitation.

The proposed extension will take place on the lands to the west of the existing Quarry, between Bierderman Rd. and Graybiel Rd., north of Highway 3. Operations in the proposed extension are expected to be similar to those at the existing Quarry. The site entrance will remain at the current location. The existing operations also include crushing of recycled concrete and asphalt, which is accounted for in the overall air quality assessment.

Operations at the proposed extension will consist of drilling, blasting, extraction of aggregate via front-end loader, processing, transportation, washing, stockpiling, and shipping of finished aggregate, all with a maximum daily capacity of 8,000 tonnes per day. The North American Industrial Classification System (NAICS) code for the facility is 212315, Dolostone Mining and Quarrying.

It is our understanding that there are archaeological features on the site that create exclusion areas for extraction. These areas were provided to RWDI by MHBC Planning and are reflected in the assessment and shown on the attached figures.

The Miller Paving Limited HMA plant is located on the southeast side of the existing Quarry property and although not part of the expansion, will be included for the assessment of like-contaminants, i.e., only emissions of contaminants that are in common with the proposed extension and the existing Quarry will be considered.

3 OPERATING SCENARIO

The maximum operating scenario examined in the assessment reflects the maximum production and shipping operations at the site, based on the peak day in the peak year over the entire life of the Quarry. This scenario is meant to provide a conservative estimate of potential air emissions. Operations would realistically occur at levels below these levels over most of the life of the Quarry. Operations during the winter months are normally much lower than during the construction season and have been reduced to 50% of maximum operations for the months of November through to February, inclusive.

Emissions associated with overburden stripping and berm construction are not examined explicitly in the assessment. These are considered short-term construction activities and are not part of the maximum operating scenario used in the assessment. Impacts associated with overburden stripping and berm construction are best managed through the development and implementation of the BMPP for dust. These controls will help to ensure that localized impacts due to the overburden stripping and berm construction are minimized, especially when they are occurring in close proximity to potential receptors.

In addition, the inclusion of fugitive dust from storage piles in the assessment of emissions and dispersion modelling is ineffective and often inaccurate. It is for this reason that the Ontario Ministry of Environment Conservation and Parks (MECP) prefers that applicants for Environmental Compliance Approvals (ECAs) at aggregate sites focus their efforts on developing BMPPs to deal with these sources, rather than conduct modelling exercises of little value. Modelling is not required in order to properly design control measures for these sources. RWDI believes that the mitigation measures in the BMPP are appropriate and that they will provide a suitable level of protection, as supported by our experience at numerous aggregate sites throughout Ontario.

Figure 1 provides a map showing the phases of extraction, license boundary, additional lands, and receptor locations.

4 SENSITIVE IMPACT LOCATIONS

In the area surrounding the proposed extension and the existing Quarry, there are two churches and several residences and receptor locations, as shown on **Figure 1**.

The physics of dispersion dictate that impacts from fugitive sources such as aggregate processing, material handling and vehicle movement on roadways decrease with distance. This is especially true for such sources that are below grade. Impacts will be greatest at receptors nearest to the site, and predicted impacts at more distance receptor locations will be lower than those already predicted. Therefore only the receptors closest to the proposed extension and the existing Quarry were modelled explicitly.

With respect to emissions from the HMA plant, the HMA plant is operated by a separate entity (Miller Paving), and these emissions are already managed under an Environmental Compliance Approval 8-2129-78-987. It has been included only as a source of like contaminants.

Where appropriate, these receptors also align with those used for the Noise Impacts Assessment and those shown on the ARA Existing Features Plan (e.g., receptors surrounding the existing quarry are not all shown on the ARA Existing Features Plan, since this application focuses on the extension).

5 CONTAMINANTS AND SOURCES CONSIDERED

The primary contaminant of interest is airborne dust generated by operations at the site. The following key components of dust were modelled:

- Suspended particulate matter, which consists of particles with an aerodynamic diameter of 44 micrometres (µm) or less (known as TSP);
- Inhalable particulate matter, which consists of particles with an aerodynamic diameter of 10 micrometres (µm) or less (known as PM_{10});
- Respirable particulate matter, which consists of particles with an aerodynamic diameter of 2.5 µm or less (known as $PM_{2.5}$); and,
- Crystalline silica within the PM_{10} portion of the dust.

In addition to dust, on-site vehicles and heavy equipment also emit products of combustion. Nitrogen dioxide gas (NO_2), TSP, PM_{10}, and $PM_{2.5}$ were modelled as the key representatives of combustion products. The relevant criterion for each contaminant is provided on **Table 2** through **Table 5**

The potential sources of emissions in the proposed extension and the existing Quarry are as follows:

- Overburden stripping and rehabilitation operations (does not occur during worst case operation conditions and considered insignificant);
- Drilling;
- Blasting;
- Extraction and stockpiling of shot rock from the muck pile;
- Material handling operations (loading haul trucks, dumping material at the primary crusher, and loading highway trucks for shipping; transport of material to wash station);
- Material crushing, screening; and stockpiling;
- Equipment travel over unpaved surfaces (front end loaders and highway trucks);
- Tailpipe emissions from on-site vehicles and heavy equipment; and,
- Delivery, handling and processing of reclaimed concrete and reclaimed asphalt pavement (RAP).

As mentioned above, the Miller Paving HMA plant was also considered as an additional source of particulates, crystalline silica and NO_2. The following activities were considered when determining the potential impact of the proposed Quarry in combination with the operations at this asphalt plant:

- Delivery of aggregates for use in the HMA plant;
- Handling of aggregates at the HMA plant cold feed bins;
- Operation of the HMA plant itself (aggregate dryer dust collector, silo filling, loadout to trucks);
- Equipment travel over unpaved surfaces to, at and from the asphalt plant (front end loaders and highway trucks); and,
- Tailpipe emissions of equipment associated with the asphalt plant.

Figures 2A to 2E show the representative source locations for operations in different phases of the project.

6 EMISSION ESTIMATION

Emissions were estimated in accordance with relevant guidance, using published emission factors. Detailed emission calculations are provided in **Appendix A to F**, inclusive. As identified in these appendices, all emission estimates are based on the U.S. EPA AP-42 emission factors. The appendices provide specific references to the individual AP-42 chapter for each estimate.

The appendices contain details on assumptions, equipment types, sample calculations and other details that provide clarity as to RWDI's methodology. Emissions from sources that are wind-speed dependent (e.g., material handling) were calculated on an hour-by-hour basis, using the wind speed for each hour in the meteorological record (taken from the meteorological files used for the AERMOD compliance modelling, discussed further in **Section 8**). The emission values shown in the appendices for the wind-speed dependent emissions sources are example values, based on the average wind speed from the meteorological data (in the actual analysis, there are more than 40,000 separate emission rates for each material handling source).

Emissions from the Miller Paving HMA Asphalt Plant were based on information from the 2020 AERMOD Compliance Assessment (ECA Number 8-2129-78-087) with some additional calculations for wind dependency, TSP size fraction, and additional contaminants not covered in the original assessment.

Four different operating scenarios over the course of operations were determined in consultation with Waterford Sand & Gravel Limited, consisting of extraction from various phases within the Quarry. Mitigation measures recommended in this assessment have been incorporated into a dust BMPP for the site. The emission estimates used in the final assessment account for the effects of these dust mitigation measures, such as watering of haul roads, and use of spray bars on processing equipment.

7 DISCUSSION OF MITIGATION MEASURES

The volume of truck and heavy equipment movement on unpaved surfaces within the proposed extension and existing Quarry require an above-average level of control, especially when operations move within 300m of sensitive receptors.

The 95% level of control used in the assessment for dust on the internal haul route is an outcome of the modelling, not an input assumption requiring justification. It represents the level of control found to be needed to achieve acceptable results at the nearest receptors. Published studies show that it is achievable. Rosbury (1985)[1] summarized results from various studies showing that levels of control as high as 98% were attained in some cases. Rosbury went on to prescribe a watering rate that would achieve near 100% control (approximately 1.7 L/m²/h). The U.S. EPA (AP-42, Chapter 13.2.2) showed that by maintaining a road surface moisture level of five times that of the ambient soil, a 95% level of control could be achieved. It is clear, therefore,

[1] Rosbury, Keith D. "Dust Control at Hazardous Waste Sites". Hazardous Waste Engineering Research Laboratory, Office of Research and Development, U.S. EPA. EPA/540/2-85/003,

that the 95% level of control prescribed by RWDI is attainable through sufficient watering. This finding of the studies is consistent with RWDI's experience in observing the effect of intensive watering programs.

Beginning with the wash screen, the wash plant processes and loading of washed product into trucks for shipment are considered insignificant. This reflects the washing process, in which the material is saturated with water, leading to no significant emissions of particulate. Handling of the washed product is also considered insignificant due to the absence of silt in the material. The moisture content of this product is often much higher as well, as some of the moisture from the washing process is retained. The MECP has accepted this approach for Environmental Compliance Approval (ECA) applications, and in their review of assessments conducted as part of applications under the ARA. This approach is consistent with the approach used in other jurisdictions as well. A review of available literature (e.g., San Joaquin Valley Air Pollution Control District, University of Minnesota, Golder) shows a similar approach in other jurisdictions.

The dispersion modelling analysis reflects the implementation of the controls described in Section 12.

8 DISPERSION MODELLING

Dispersion modelling was conducted to confirm that the proposed mitigation measures will be sufficient to control off-site impacts at the sensitive impact locations. The modelling was conducted in accordance with MECP Guideline A11: Air Dispersion Modelling Guideline for Ontario, using the U.S. EPA AERMOD v.19191 dispersion model (version date July 10, 2019). AERMOD assesses multiple sources of emissions at discrete off-site receptors or sensitive impact locations and is the current state-of-the-art regulatory model in Ontario.

Regional meteorological data obtained from the MECP website were used within the model, in accordance with the MECP's Guideline A11. Specifically, the data were those applicable to the West Central Ontario Region for cropland areas due to the significant proportion of agricultural lands in the area surrounding the site. This meteorological data includes surface data from London, Ontario and upper air data from White Lake, Michigan, from the years 1996 through 2000. The meteorological data set was pre-processed by the MECP using the 19191 version of AERMET. While the MECP has recently adopted the 22112 version of AERMOD, the modelling analysis has not been re-run, as the differences between the 19191 and 22112 versions of AERMOD are insignificant with respect to emissions from ground level fugitive sources.

Terrain information for the site was also obtained from the MECP website, in accordance with Guideline A11, but base elevations for sources within the site reflect the appropriate elevations shown in the Site Plans.

The model was run using the regulatory default options. The AERMOD model produced 1-hour, 24-hour, and annual average concentrations, as appropriate for each contaminant. The Oxygen Limiting Method (OLM) was used to convert NO_x to NO_2, and maximum O_3 concentrations were conservatively assumed.

Handling and processing sources were generally modelled as volume sources, in accordance with guidance from the National Stone Sand and Gravel Association (NSSGA)[2]. Haul routes and heavy equipment movement were

[2] National Stone Sand and Gravel Association, "Modeling Fugitive Dust Sources with AERMOD", January 2007.

modelled using adjacent volume sources, in accordance with guidance from the MECP and NSSGA. Point sources were modelled using the appropriate source parameters.

The dispersion modelling analysis includes the control efficiencies noted in the appendices.

9 LOCAL EMISSION SOURCES

Environment Canada's National Pollutant Release Inventory (NPRI) is Canada's legislated, publicly accessible inventory of pollutant releases. Data for 2017 (the most recent available at the time of this report) were reviewed for locally significant emission sources that would have similar emission contaminants. There are several facilities that report PM and NO_2 in Port Colborne. While these facilities lie within 5km of the eastern fence line of the facility, impacts from these sites are not expected to significantly influence the predicted impacts from the extension.

Aerial photography for the area was also reviewed, along with the Ministry of Natural Resources and Forestry (MNRF) Pits and Quarries Online tool and the MECP Access Environment tool for any registration on the Environmental Activity and Sector Registry (EASR) and ECAs for facilities in the area. The following sites are located within proximity to the facility, but do not report emissions to the NPRI:

- Reeb Quarry licenced to QBJR Aggregates Inc. (ALPS ID 607721), located due south of the current existing Quarry on the south side of Highway 3. This site is not currently in operation;
- Kwik-Mix Materials Limited (ECA 3106-8GGSAJ and 3106-8GGSAJ), located east of the Asphalt plant on Kwik Mix Rd.;
- The Vale Port Colborne Refinery (ECA 7581-CG4SRV), located at 187 Davis Street Port Colborne; and,
- Additional industrial facilities in Port Colborne with ECAs or EASR registrations, for equipment such as standby generator sets, welding operations, paint spray booths, or other smaller sources.

With the exception of Reeb Quarry, the impact from these sources is relatively small at the point of impact and RWDI believes that the adoption of a suitable background air quality level will provide a suitable estimate of cumulative impacts. Ambient background air quality for the region is provided in **Table 1**.

9.1 Reeb Quarry

Although not currently in operation, potential impacts from Reeb Quarry were included in the assessment explicitly because it is a licensed operation. Site Plans for Reeb Quarry were obtained from the MNRF and reviewed in order to inform this assessment. The Site Plans do not indicate that an air quality assessment was prepared for the Reeb Quarry, however Condition 12 on the Operations Plan for the Reeb Quarry Site Plans states that:

> "Dust will be controlled on site in accordance with applicable Ministry of Environment regulations and guidelines. Dust shall be mitigated and controlled by the use of spray bars located on contact points, conveyors and transfer points and through the use of water trucks, on internal haul roads and operation areas."

RWDI has therefore assumed that the Reeb sources have similar controls as those required at the proposed Quarry, which are described in Section 12. This includes a restriction on operations within 300 metres of a residence. As a simplification, emissions are therefore assumed to be similar between the two sites. Since RWDI does not have specific equipment locations for Reeb Quarry, an area source approach was used, as shown on the map provided in **Figure 3**.

9.2 Kwik Mix

RWDI was retained to conduct an air quality assessment on this facility for the purposes of an ECA application since the this AQA was originally submitted. The Kwik Mix facility is a self-contained packaging facility, with baghouse dust collectors that exhaust back inside the buildings. Potential impact from these sources is localized, and relatively small at the receptors of interest. RWDI continues to believe that the adoption of a suitable background air quality level will provide a suitable estimate of cumulative impacts.

9.3 Vale

The Vale facilities in Port Colborne are located approximately 5km from the project site. Based on a review of the publicly available ECAs for the Vale facility, it was noted that the Vale site had no sources greater than 30 metres in height, and therefore impacts are expected to be highest near the facility and will decrease rapidly with distance. It is not expected that emissions from the Vale facility would pose any significant cumulative effect with the emissions from the proposed extension and existing Quarry.

10BACKGROUND AIR QUALITY DATA

This assessment considered the impact of emissions from the proposed extension and existing Law Quarry in combination with background contaminant levels from other sources in the surrounding area. There are no air quality monitoring stations with publicly available data in close proximity to the site. Data from stations in the MECP monitoring network were reviewed, with a focus on the stations nearest to the site, and stations that may reflect a similar level of land use patterns and regional air quality sources.

MECP Station 27067 in St. Catharines is the nearest MECP monitoring station to the site. A review of stations with similar land use profiles to the area around the proposed extension and existing Quarry show results that are similar to or lower than those from the St. Catharines station. Background values were therefore assumed using data from the St. Catharines station.

Table 1 summarizes air quality background data used to characterize conditions in the study area. TSP and PM_{10} were estimated from station-measured $PM_{2.5}$ data using factors derived from the analysis of extensive monitoring

data from other sites, as presented by the 2004 report by Lall et. al.[3]. Silica was estimated using published data for cities in the northeast U.S.[4].

The 90th percentile concentration from the background monitoring data was used in the cumulative effects assessment. This represents the highest background concentration that could reasonably be expected to coincide with maximum impacts from existing operations in the area and the proposed extension and existing Law Quarry.

11 RECOMMENDATIONS FOR SITE PLAN

The Quarry must operate in accordance with the operating standards pertaining to dust outlined in section 0.12 (2) Ontario Regulation 244/97, which include:

- The licensee or permittee shall apply water or another provincially approved dust suppressant to internal haul roads and processing areas, as necessary to mitigate dust, if the pit or quarry is located within 1,000 metres of a sensitive receptor.
- The licensee or permittee shall equip any processing equipment that creates dust with dust suppressing or collection devices if it is located within 300 metres of a sensitive receptor.
- The licensee or permittee shall obtain an environmental compliance approval under the Environmental Protection Act where required to carry out operations at the pit or quarry.

Furthermore, this assessment is based on the following recommendation, which is to be included on the Site Plans:

- The site will operate in accordance with a Best Management Practices Plan for fugitive dust (BMPP), which may be amended from time to time, considering actual impacts and operational considerations. The recommendations in the BMPP are based on the maximum daily production rates. At lower production rates, the control measures specified in the BMPP can be reduced accordingly, provided dust remains mitigated on site.

[3] Lall, R., M. Kendall, K. Ito, and G. D. Thurston (2004). Estimation of Historical Annual $PM_{2.5}$ Exposures for Health Effects Assessments, Atmos. Env., 38, pp. 5217-5226.
[4] United States Environmental Protection Agency (1996). Ambient Levels and Noncancer Health effects of Inhaled Crystalline Silica and Amorphous Silica: Health Issue Assessment. EPA/600/R-95-115.

12 RECOMMENDED MANAGEMENT PRACTICES

RWDI recommends the following mitigation measures to be incorporated into the BMPP:

- A BMPP for the proposed extension and the existing Quarry will be developed with control measures capable of providing the emission reductions used in this assessment, including, but not limited to:
    - The portable processing plant shall not be located within 300m of a sensitive receptor, as shown on the attached figures;
    - When extraction operations move to within 300m of a sensitive receptor (the Portable Plant Exclusion and Enhanced Control Zone), as shown on the attached figures:
        - Blasting operations shall be allowed only when winds are blowing interior to the Quarry, or with a reduced blast area; and,
        - Extraction operations shall be curtailed as required to prevent visible dust from migrating to the sensitive receptor.
    - If a sensitive receptor property is purchased by Waterford Group, the 300-metre Portable Plant Exclusion and Enhanced Control Zone associated with that receptor location is no longer necessary.

RWDI also notes that the following mitigation measures have already been implemented at the existing operation:

- Paving of the main shipping haul route from the floor of the existing Quarry to the site entrance (a distance of approximately 300m), including all travelled areas around the scale house;
- Paving of the main shipping haul route for the Brennan Paving HMA plant; and,
- Contact with a third-party to conduct wet/vacuum sweeping of all paved areas as required to minimize buildup of surface silt and track-out onto the public roadway.

13 CONCLUSIONS

Tables 2 through 5 provide the results of the cumulative effects analyses at the closest receptors of interest, for the 4 operations scenarios considered. The results indicate that, with an appropriate BMPP for the site in place, concentrations at the nearby receptors are predicted to be at or below the relevant criteria for all contaminants 99.9% of the time during all phases. The results of the analysis demonstrate that the proposed Quarry extension has been appropriately designed, managed, and separated from surrounding sensitive land uses to prevent and mitigate adverse effects.

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TABLES

Table 1: Ambient Air Quality Data [1]

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Year	TSP [2]		PM_{10} [2]	Silica	$PM_{2.5}$		NO_2 [4]				O_3 [4]	
	90th Percentile 24-hour (µg/m³)	Annual Average (µg/m³)	90th Percentile 24-hour (µg/m³)	90th Percentile 24-hour [3] (µg/m³)	90th Percentile 24-hour (µg/m³)	Annual Average (µg/m³)	90th Percentile 1-Hour		90th Percentile 24-hour		99th Percentile 1-Hour	
							(ppb)	(µg/m³)	(ppb)	(µg/m³)	(ppb)	(µg/m³)
2016	43	21	24	1.4	13	6.3	14	28	11.1	22	64	132
2017	43	23	24	1.4	13	6.8	14	28	11.7	23	59	122
2018	47	23	26	1.6	14	6.9	12	24	10.1	20	61	126
2019	47	23	26	1.6	14	6.9	12	24	10.5	21	56	116
2020	40	21	22	1.3	12	6.3	10	20	8.9	18	60	124
Average	44	22	24	1.5	13	6.6	12	25	11	21	60	124

Notes:

[1] All data from MECP Station 27067 in St.Catharines, Ontario

[2] Estimated from PM2.5 measurements using published factors (Lall et al., 2004)

[3] Estimated as 6% of PM10, from published data for cities in the northeast US (U.S. EPA, 1996)

[4] Conversion from ppb to µg/m³ based on 10ºC

Table 2: Cumulative Effects Assessment - Operations in Phase 1A

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Modelled Values & Frequency of Excursions above the Relevant Criteria

Days of Valid Meteorological Data: 1745

Relevant Criteria:			
	TSP	120	µg/m³ 24-Hour AAQC
		60	µg/m³ Annual AAQC
	PM_{10}	50	µg/m³ Interim 24-Hour AAQC
	$PM_{2.5}$	27	µg/m³ 24-Hour CAAQS
		8.8	µg/m³ Annual CAAQS
	Silica	5	µg/m³ AAQC
	NO_2	400	µg/m³ 1-Hour AAQC
		200	µg/m³ 24-Hour AAQC

Background Concentrations (90th Percentile, all except O_3) (O_3 99th percentile)			
	TSP	44	µg/m³ (24-hour)
		22	µg/m³ (Annual)
	PM_{10}	24	µg/m³ (24-hour)
	$PM_{2.5}$	13	µg/m³ (24-hour)
		6.6	µg/m³ (Annual)
	Silica	1.5	µg/m³ (24-hour)
	NO_2	25	µg/m³ (1-hour)
		21	µg/m³ (24-hour)
	O_3	124	µg/m³ (1-hour)

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R01	Residence	638425	4750114	TSP	24	115	96%	0	0.0%	159	**132%**	**2**	**0.1%**
					Annual	7	11%	0	0.0%	29	48%	0	0.0%
				PM10	24	12	24%	0	0.0%	36	72%	0	0.0%
				PM2.5	24	6	21%	0	0.0%	19	69%	0	0.0%
					Annual	1	6%	0	0.0%	7	81%	0	0.0%
				Silica	24	2	36%	0	0.0%	3.3	66%	0	0.0%
				NO2	1	319	80%	0	0.0%	344	86%	0	0.0%
					24	47	24%	0	0.0%	68	34%	0	0.0%
R02	Church	638360	4750110	TSP	24	127	**106%**	**1**	**0.1%**	171	**143%**	**2**	**0.1%**
					Annual	6	10%	0	0.0%	28	46%	0	0.0%
				PM10	24	10	20%	0	0.0%	34	68%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	312	78%	0	0.0%	337	84%	0	0.0%
					24	52	26%	0	0.0%	73	36%	0	0.0%
R03	Residence	638256	4750109	TSP	24	128	**106%**	**1**	**0.1%**	172	**143%**	**1**	**0.1%**
					Annual	5	8%	0	0.0%	27	44%	0	0.0%
				PM10	24	8	16%	0	0.0%	32	64%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	334	83%	0	0.0%	359	90%	0	0.0%
					24	53	27%	0	0.0%	74	37%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R04	Residence	638287	4750108	TSP	24	130	**108%**	**1**	**0.1%**	174	**145%**	**1**	**0.1%**
					Annual	5	8%	0	0.0%	27	45%	0	0.0%
				PM10	24	9	17%	0	0.0%	33	65%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	41%	0	0.0%	3.6	71%	0	0.0%
				NO2	1	331	83%	0	0.0%	356	89%	0	0.0%
					24	54	27%	0	0.0%	75	37%	0	0.0%
R05	Residence	638228	4750108	TSP	24	125	**104%**	**1**	**0.1%**	169	**141%**	**1**	**0.1%**
					Annual	4	7%	0	0.0%	26	44%	0	0.0%
				PM10	24	8	16%	0	0.0%	32	64%	0	0.0%
				PM2.5	24	6	22%	0	0.0%	19	71%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	333	83%	0	0.0%	358	89%	0	0.0%
					24	53	26%	0	0.0%	74	37%	0	0.0%
R06	Residence	638203	4750110	TSP	24	121	**101%**	**1**	**0.1%**	165	**138%**	**1**	**0.1%**
					Annual	4	7%	0	0.0%	26	44%	0	0.0%
				PM10	24	7	15%	0	0.0%	31	63%	0	0.0%
				PM2.5	24	6	22%	0	0.0%	19	70%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	39%	0	0.0%	3.4	69%	0	0.0%
				NO2	1	329	82%	0	0.0%	354	88%	0	0.0%
					24	52	26%	0	0.0%	73	36%	0	0.0%
R07	Residence	638139	4750102	TSP	24	110	92%	0	0.0%	154	**128%**	**1**	**0.1%**
					Annual	4	6%	0	0.0%	26	43%	0	0.0%
				PM10	24	7	14%	0	0.0%	31	62%	0	0.0%
				PM2.5	24	5	20%	0	0.0%	18	68%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	35%	0	0.0%	3.2	65%	0	0.0%
				NO2	1	305	76%	0	0.0%	330	83%	0	0.0%
					24	47	24%	0	0.0%	68	34%	0	0.0%
R08	Residence	638104	4750105	TSP	24	103	86%	0	0.0%	147	**123%**	**1**	**0.1%**
					Annual	4	6%	0	0.0%	26	43%	0	0.0%
				PM10	24	7	13%	0	0.0%	31	61%	0	0.0%
				PM2.5	24	5	19%	0	0.0%	18	67%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	2	33%	0	0.0%	3.1	63%	0	0.0%
				NO2	1	293	73%	0	0.0%	318	79%	0	0.0%
					24	45	22%	0	0.0%	66	33%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R09	Residence	637990	4750082	TSP	24	76	63%	0	0.0%	120	100%	0	0.00%
					Annual	3	5%	0	0.0%	25	42%	0	0.0%
				PM10	24	6	12%	0	0.0%	30	60%	0	0.00%
				PM2.5	24	4	14%	0	0.0%	17	62%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	24%	0	0.0%	2.7	54%	0	0.0%
				NO2	1	297	74%	0	0.0%	322	80%	0	0.0%
					24	33	17%	0	0.0%	54	27%	0	0.0%
R10	Residence	637952	4750077	TSP	24	67	56%	0	0.0%	111	93%	0	0.0%
					Annual	3	5%	0	0.0%	25	41%	0	0.0%
				PM10	24	6	12%	0	0.0%	30	60%	0	0.0%
				PM2.5	24	3	12%	0	0.0%	16	60%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	21%	0	0.0%	2.6	51%	0	0.0%
				NO2	1	299	75%	0	0.0%	324	81%	0	0.0%
					24	30	15%	0	0.0%	51	25%	0	0.0%
R11	Church	637441	4750189	TSP	24	41	34%	0	0.0%	85	71%	0	0.0%
					Annual	2	3%	0	0.0%	24	39%	0	0.0%
				PM10	24	5	11%	0	0.0%	29	59%	0	0.0%
				PM2.5	24	2	7%	0	0.0%	15	56%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	12%	0	0.0%	2.1	42%	0	0.0%
				NO2	1	227	57%	0	0.0%	252	63%	0	0.0%
					24	18	9%	0	0.0%	39	20%	0	0.0%
R12	Residence	637471	4750310	TSP	24	47	39%	0	0.0%	91	76%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	5	11%	0	0.0%	29	59%	0	0.0%
				PM2.5	24	3	10%	0	0.0%	16	58%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	15%	0	0.0%	2.2	45%	0	0.0%
				NO2	1	196	49%	0	0.0%	221	55%	0	0.0%
					24	19	9%	0	0.0%	40	20%	0	0.0%
R13	Residence	637452	4750415	TSP	24	53	44%	0	0.0%	97	81%	0	0.0%
					Annual	2	3%	0	0.0%	24	39%	0	0.0%
				PM10	24	6	11%	0	0.0%	30	59%	0	0.0%
				PM2.5	24	3	10%	0	0.0%	16	59%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	17%	0	0.0%	2.3	47%	0	0.0%
				NO2	1	194	48%	0	0.0%	219	55%	0	0.0%
					24	21	11%	0	0.0%	42	21%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R14	Residence	637457	4750591	TSP	24	54	45%	0	0.0%	98	82%	0	0.0%
					Annual	2	3%	0	0.0%	24	39%	0	0.0%
				PM10	24	9	19%	0	0.0%	33	67%	0	0.0%
				PM2.5	24	3	10%	0	0.0%	16	58%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	17%	0	0.0%	2.4	47%	0	0.0%
				NO2	1	167	42%	0	0.0%	192	48%	0	0.0%
					24	21	11%	0	0.0%	42	21%	0	0.0%
R15	Residence	637437	4750858	TSP	24	44	37%	0	0.0%	88	74%	0	0.0%
					Annual	1	2%	0	0.0%	23	39%	0	0.0%
				PM10	24	10	21%	0	0.0%	34	69%	0	0.0%
				PM2.5	24	2	8%	0	0.0%	15	57%	0	0.0%
					Annual	0	1%	0	0.0%	7	76%	0	0.0%
				Silica	24	1	14%	0	0.0%	2.2	44%	0	0.0%
				NO2	1	128	32%	0	0.0%	153	38%	0	0.0%
					24	16	8%	0	0.0%	37	18%	0	0.0%
R16	Residence	638112	4751073	TSP	24	84	70%	0	0.0%	128	**107%**	**1**	**0.1%**
					Annual	3	4%	0	0.0%	25	41%	0	0.0%
				PM10	24	18	36%	0	0.0%	42	84%	0	0.0%
				PM2.5	24	4	15%	0	0.0%	17	63%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	29%	0	0.0%	3.0	59%	0	0.0%
				NO2	1	347	87%	0	0.0%	372	93%	0	0.0%
					24	36	18%	0	0.0%	57	28%	0	0.0%

Notes:

Values in bold indicate excursions above the relevant crtieria

Table 3: Cumulative Effects Assessment - Operations in Phases 1B and 5

RWDI# 2202166

Modelled Values & Frequency of Excursions above the Relevant Criteria

Days of Valid Meteorological Data: 1745

Relevant Criteria:			
	TSP	120	µg/m³ 24-Hour AAQC
		60	µg/m³ Annual AAQC
	PM_{10}	50	µg/m³ Interim 24-Hour AAQC
	$PM_{2.5}$	27	µg/m³ 24-Hour CAAQS
		8.8	µg/m³ Annual CAAQS
	Silica	5	µg/m³ AAQC
	NO_2	400	µg/m³ 1-Hour AAQC
		200	µg/m³ 24-Hour AAQC

Background Concentrations (90th Percentile, all except O_3) (O_3 99th percentile)			
	TSP	44	µg/m³ (24-hour)
		22	µg/m³ (Annual)
	PM_{10}	24	µg/m³ (24-hour)
	$PM_{2.5}$	13	µg/m³ (24-hour)
		6.6	µg/m³ (Annual)
	Silica	1.5	µg/m³ (24-hour)
	NO_2	25	µg/m³ (1-hour)
		21	µg/m³ (24-hour)
	O_3	124	µg/m³ (1-hour)

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R01	Residence	638425	4750114	TSP	24	115	96%	0	0.0%	159	**133%**	**2**	**0.1%**
					Annual	8	13%	0	0.0%	30	49%	0	0.0%
				PM10	24	13	25%	0	0.0%	37	73%	0	0.0%
				PM2.5	24	6	21%	0	0.0%	19	69%	0	0.0%
					Annual	1	7%	0	0.0%	7	82%	0	0.0%
				Silica	24	2	36%	0	0.0%	3.3	66%	0	0.0%
				NO2	1	319	80%	0	0.0%	344	86%	0	0.0%
					24	47	24%	0	0.0%	68	34%	0	0.0%
R02	Church	638360	4750110	TSP	24	128	**106%**	**1**	**0.1%**	172	**143%**	**2**	**0.1%**
					Annual	7	11%	0	0.0%	29	48%	0	0.0%
				PM10	24	12	23%	0	0.0%	36	71%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	1	6%	0	0.0%	7	81%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	312	78%	0	0.0%	337	84%	0	0.0%
					24	52	26%	0	0.0%	73	36%	0	0.0%
R03	Residence	638256	4750109	TSP	24	128	**107%**	**1**	**0.1%**	172	**143%**	**1**	**0.1%**
					Annual	5	9%	0	0.0%	27	46%	0	0.0%
				PM10	24	16	32%	0	0.0%	40	80%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	41%	0	0.0%	3.5	71%	0	0.0%
				NO2	1	334	83%	0	0.0%	359	90%	0	0.0%
					24	53	27%	0	0.0%	74	37%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R04	Residence	638287	4750108	TSP	24	130	**109%**	**1**	**0.1%**	174	**145%**	**1**	**0.1%**
					Annual	6	10%	0	0.0%	28	46%	0	0.0%
				PM10	24	21	41%	0	0.0%	45	89%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	41%	0	0.0%	3.6	71%	0	0.0%
				NO2	1	331	83%	0	0.0%	356	89%	0	0.0%
					24	54	27%	0	0.0%	75	37%	0	0.0%
R05	Residence	638228	4750108	TSP	24	125	**104%**	**1**	**0.1%**	169	**141%**	**1**	**0.1%**
					Annual	5	9%	0	0.0%	27	45%	0	0.0%
				PM10	24	13	27%	0	0.0%	37	75%	0	0.0%
				PM2.5	24	6	22%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	333	83%	0	0.0%	358	89%	0	0.0%
					24	53	26%	0	0.0%	74	37%	0	0.0%
R06	Residence	638203	4750110	TSP	24	122	**102%**	**1**	**0.1%**	166	**138%**	**1**	**0.1%**
					Annual	5	8%	0	0.0%	27	45%	0	0.0%
				PM10	24	14	29%	0	0.0%	38	77%	0	0.0%
				PM2.5	24	6	22%	0	0.0%	19	70%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	39%	0	0.0%	3.4	69%	0	0.0%
				NO2	1	329	82%	0	0.0%	354	88%	0	0.0%
					24	52	26%	0	0.0%	73	36%	0	0.0%
R07	Residence	638139	4750102	TSP	24	110	92%	0	0.0%	154	**129%**	**1**	**0.1%**
					Annual	4	7%	0	0.0%	26	44%	0	0.0%
				PM10	24	9	17%	0	0.0%	33	65%	0	0.0%
				PM2.5	24	5	20%	0	0.0%	18	68%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	35%	0	0.0%	3.3	65%	0	0.0%
				NO2	1	305	76%	0	0.0%	330	83%	0	0.0%
					24	47	24%	0	0.0%	68	34%	0	0.0%
R08	Residence	638104	4750105	TSP	24	104	86%	0	0.0%	148	**123%**	**1**	**0.1%**
					Annual	4	7%	0	0.0%	26	43%	0	0.0%
				PM10	24	8	16%	0	0.0%	32	64%	0	0.0%
				PM2.5	24	5	19%	0	0.0%	18	67%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	33%	0	0.0%	3.1	63%	0	0.0%
				NO2	1	293	73%	0	0.0%	318	79%	0	0.0%
					24	45	22%	0	0.0%	66	33%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R09	Residence	637990	4750082	TSP	24	76	63%	0	0.0%	120	100%	0	0.00%
					Annual	3	5%	0	0.0%	25	42%	0	0.0%
				PM10	24	6	12%	0	0.0%	30	60%	0	0.00%
				PM2.5	24	4	14%	0	0.0%	17	62%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	24%	0	0.0%	2.7	54%	0	0.0%
				NO2	1	297	74%	0	0.0%	322	80%	0	0.0%
					24	33	17%	0	0.0%	54	27%	0	0.0%
R10	Residence	637952	4750077	TSP	24	68	56%	0	0.0%	112	93%	0	0.0%
					Annual	3	5%	0	0.0%	25	42%	0	0.0%
				PM10	24	7	13%	0	0.0%	31	61%	0	0.0%
				PM2.5	24	3	12%	0	0.0%	16	61%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	21%	0	0.0%	2.6	51%	0	0.0%
				NO2	1	299	75%	0	0.0%	324	81%	0	0.0%
					24	30	15%	0	0.0%	51	25%	0	0.0%
R11	Church	637441	4750189	TSP	24	49	41%	0	0.0%	93	77%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	13	25%	0	0.0%	37	73%	0	0.0%
				PM2.5	24	2	8%	0	0.0%	15	56%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	22%	0	0.0%	2.6	52%	0	0.0%
				NO2	1	227	57%	0	0.0%	252	63%	0	0.0%
					24	18	9%	0	0.0%	39	20%	0	0.0%
R12	Residence	637471	4750310	TSP	24	46	39%	0	0.0%	90	75%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	9	17%	0	0.0%	33	65%	0	0.0%
				PM2.5	24	3	10%	0	0.0%	16	58%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	15%	0	0.0%	2.3	45%	0	0.0%
				NO2	1	196	49%	0	0.0%	221	55%	0	0.0%
					24	19	9%	0	0.0%	40	20%	0	0.0%
R13	Residence	637452	4750415	TSP	24	55	46%	0	0.0%	99	82%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	10	21%	0	0.0%	34	69%	0	0.0%
				PM2.5	24	3	11%	0	0.0%	16	59%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	17%	0	0.0%	2.4	47%	0	0.0%
				NO2	1	194	48%	0	0.0%	219	55%	0	0.0%
					24	23	11%	0	0.0%	44	22%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R14	Residence	637457	4750591	TSP	24	63	52%	0	0.0%	107	89%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	13	27%	0	0.0%	37	75%	0	0.0%
				PM2.5	24	3	12%	0	0.0%	16	60%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	20%	0	0.0%	2.5	50%	0	0.0%
				NO2	1	167	42%	0	0.0%	192	48%	0	0.0%
					24	26	13%	0	0.0%	47	24%	0	0.0%
R15	Residence	637437	4750858	TSP	24	65	54%	0	0.0%	109	91%	0	0.0%
					Annual	1	2%	0	0.0%	23	39%	0	0.0%
				PM10	24	15	30%	0	0.0%	39	78%	0	0.0%
				PM2.5	24	3	12%	0	0.0%	16	61%	0	0.0%
					Annual	0	1%	0	0.0%	7	76%	0	0.0%
				Silica	24	1	23%	0	0.0%	2.6	53%	0	0.0%
				NO2	1	164	41%	0	0.0%	189	47%	0	0.0%
					24	26	13%	0	0.0%	47	24%	0	0.0%
R16	Residence	638112	4751073	TSP	24	57	48%	0	0.0%	101	84%	0	0.0%
					Annual	2	4%	0	0.0%	24	40%	0	0.0%
				PM10	24	7	14%	0	0.0%	31	62%	0	0.0%
				PM2.5	24	3	9%	0	0.0%	16	58%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	18%	0	0.0%	2.4	48%	0	0.0%
				NO2	1	188	47%	0	0.0%	213	53%	0	0.0%
					24	20	10%	0	0.0%	41	21%	0	0.0%

Notes:

Values in bold indicate excursions above the relevant crtieria

Table 4: Cumulative Effects Assessment - Operations in Phase 2

RWDI# 2202166

Modelled Values & Frequency of Excursions above the Relevant Criteria

Days of Valid Meteorological Data: 1745

Relevant Criteria:			
	TSP	120	µg/m³ 24-Hour AAQC
		60	µg/m³ Annual AAQC
	PM_{10}	50	µg/m³ Interim 24-Hour AAQC
	$PM_{2.5}$	27	µg/m³ 24-Hour CAAQS
		8.8	µg/m³ Annual CAAQS
	Silica	5	µg/m³ AAQC
	NO_2	400	µg/m³ 1-Hour AAQC
		200	µg/m³ 24-Hour AAQC

Background Concentrations (90th Percentile, all except O_3) (O_3 99th percentile)			
	TSP	44	µg/m³ (24-hour)
		22	µg/m³ (Annual)
	PM_{10}	24	µg/m³ (24-hour)
	$PM_{2.5}$	13	µg/m³ (24-hour)
		6.6	µg/m³ (Annual)
	Silica	1.5	µg/m³ (24-hour)
	NO_2	25	µg/m³ (1-hour)
		21	µg/m³ (24-hour)
	O_3	124	µg/m³ (1-hour)

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R01	Residence	638425	4750114	TSP	24	115	96%	0	0.0%	159	**132%**	**2**	**0.1%**
					Annual	7	12%	0	0.0%	29	49%	0	0.0%
				PM10	24	12	23%	0	0.0%	36	71%	0	0.0%
				PM2.5	24	6	21%	0	0.0%	19	69%	0	0.0%
					Annual	1	6%	0	0.0%	7	81%	0	0.0%
				Silica	24	2	36%	0	0.0%	3.3	66%	0	0.0%
				NO2	1	319	80%	0	0.0%	344	86%	0	0.0%
					24	47	24%	0	0.0%	68	34%	0	0.0%
R02	Church	638360	4750110	TSP	24	127	**106%**	**1**	**0.1%**	171	**143%**	**2**	**0.1%**
					Annual	6	10%	0	0.0%	28	47%	0	0.0%
				PM10	24	10	20%	0	0.0%	34	68%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	312	78%	0	0.0%	337	84%	0	0.0%
					24	52	26%	0	0.0%	73	36%	0	0.0%
R03	Residence	638256	4750109	TSP	24	128	**107%**	**1**	**0.1%**	172	**143%**	**1**	**0.1%**
					Annual	5	9%	0	0.0%	27	45%	0	0.0%
				PM10	24	8	16%	0	0.0%	32	64%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	334	83%	0	0.0%	359	90%	0	0.0%
					24	53	27%	0	0.0%	74	37%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R04	Residence	638287	4750108	TSP	24	130	**108%**	**1**	**0.1%**	174	**145%**	**2**	**0.1%**
					Annual	5	9%	0	0.0%	27	46%	0	0.0%
				PM10	24	8	17%	0	0.0%	32	65%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	41%	0	0.0%	3.6	71%	0	0.0%
				NO2	1	331	83%	0	0.0%	356	89%	0	0.0%
					24	54	27%	0	0.0%	75	37%	0	0.0%
R05	Residence	638228	4750108	TSP	24	125	**104%**	**1**	**0.1%**	169	**141%**	**1**	**0.1%**
					Annual	5	8%	0	0.0%	27	45%	0	0.0%
				PM10	24	7	15%	0	0.0%	31	63%	0	0.0%
				PM2.5	24	6	22%	0	0.0%	19	71%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	333	83%	0	0.0%	358	89%	0	0.0%
					24	53	26%	0	0.0%	74	37%	0	0.0%
R06	Residence	638203	4750110	TSP	24	121	**101%**	**1**	**0.1%**	165	**138%**	**1**	**0.1%**
					Annual	5	8%	0	0.0%	27	45%	0	0.0%
				PM10	24	7	14%	0	0.0%	31	62%	0	0.0%
				PM2.5	24	6	22%	0	0.0%	19	70%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	39%	0	0.0%	3.4	69%	0	0.0%
				NO2	1	329	82%	0	0.0%	354	88%	0	0.0%
					24	52	26%	0	0.0%	73	36%	0	0.0%
R07	Residence	638139	4750102	TSP	24	110	92%	0	0.0%	154	**128%**	**1**	**0.1%**
					Annual	4	7%	0	0.0%	26	44%	0	0.0%
				PM10	24	6	13%	0	0.0%	30	61%	0	0.0%
				PM2.5	24	5	20%	0	0.0%	18	68%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	35%	0	0.0%	3.2	65%	0	0.0%
				NO2	1	305	76%	0	0.0%	330	83%	0	0.0%
					24	47	24%	0	0.0%	68	34%	0	0.0%
R08	Residence	638104	4750105	TSP	24	103	86%	0	0.0%	147	**123%**	**1**	**0.1%**
					Annual	4	7%	0	0.0%	26	43%	0	0.0%
				PM10	24	6	12%	0	0.0%	30	60%	0	0.0%
				PM2.5	24	5	19%	0	0.0%	18	67%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	33%	0	0.0%	3.1	63%	0	0.0%
				NO2	1	293	73%	0	0.0%	318	79%	0	0.0%
					24	45	22%	0	0.0%	66	33%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R09	Residence	637990	4750082	TSP	24	76	63%	0	0.0%	120	100%	0	0.00%
					Annual	3	6%	0	0.0%	25	42%	0	0.0%
				PM10	24	9	17%	0	0.0%	33	65%	0	0.00%
				PM2.5	24	4	14%	0	0.0%	17	62%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	24%	0	0.0%	2.7	54%	0	0.0%
				NO2	1	297	74%	0	0.0%	322	80%	0	0.0%
					24	33	17%	0	0.0%	54	27%	0	0.0%
R10	Residence	637952	4750077	TSP	24	68	56%	0	0.0%	112	93%	0	0.0%
					Annual	3	5%	0	0.0%	25	42%	0	0.0%
				PM10	24	12	24%	0	0.0%	36	72%	0	0.0%
				PM2.5	24	3	12%	0	0.0%	16	60%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	21%	0	0.0%	2.6	51%	0	0.0%
				NO2	1	299	75%	0	0.0%	324	81%	0	0.0%
					24	30	15%	0	0.0%	51	25%	0	0.0%
R11	Church	637441	4750189	TSP	24	41	34%	0	0.0%	85	71%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	6	12%	0	0.0%	30	60%	0	0.0%
				PM2.5	24	2	7%	0	0.0%	15	56%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	12%	0	0.0%	2.1	42%	0	0.0%
				NO2	1	227	57%	0	0.0%	252	63%	0	0.0%
					24	18	9%	0	0.0%	39	20%	0	0.0%
R12	Residence	637471	4750310	TSP	24	47	39%	0	0.0%	91	76%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	9	19%	0	0.0%	33	67%	0	0.0%
				PM2.5	24	3	10%	0	0.0%	16	58%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	15%	0	0.0%	2.2	45%	0	0.0%
				NO2	1	196	49%	0	0.0%	221	55%	0	0.0%
					24	19	9%	0	0.0%	40	20%	0	0.0%
R13	Residence	637452	4750415	TSP	24	53	44%	0	0.0%	97	81%	0	0.0%
					Annual	2	4%	0	0.0%	24	40%	0	0.0%
				PM10	24	11	22%	0	0.0%	35	70%	0	0.0%
				PM2.5	24	3	10%	0	0.0%	16	59%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	17%	0	0.0%	2.3	47%	0	0.0%
				NO2	1	194	49%	0	0.0%	219	55%	0	0.0%
					24	21	11%	0	0.0%	42	21%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R14	Residence	637457	4750591	TSP	24	62	51%	0	0.0%	106	88%	0	0.0%
					Annual	3	5%	0	0.0%	25	41%	0	0.0%
				PM10	24	17	34%	0	0.0%	41	82%	0	0.0%
				PM2.5	24	3	11%	0	0.0%	16	59%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	21%	0	0.0%	2.5	51%	0	0.0%
				NO2	1	220	55%	0	0.0%	245	61%	0	0.0%
					24	27	14%	0	0.0%	48	24%	0	0.0%
R15	Residence	637437	4750858	TSP	24	91	76%	0	0.0%	135	**113%**	**1**	**0.1%**
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	24	47%	0	0.0%	48	95%	0	0.0%
				PM2.5	24	4	16%	0	0.0%	17	65%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	2	36%	0	0.0%	3.3	66%	0	0.0%
				NO2	1	236	59%	0	0.0%	261	65%	0	0.0%
					24	37	18%	0	0.0%	58	29%	0	0.0%
R16	Residence	638112	4751073	TSP	24	68	56%	0	0.0%	112	93%	0	0.0%
					Annual	3	5%	0	0.0%	25	41%	0	0.0%
				PM10	24	12	23%	0	0.0%	36	71%	0	0.0%
				PM2.5	24	3	12%	0	0.0%	16	60%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	20%	0	0.0%	2.5	50%	0	0.0%
				NO2	1	188	47%	0	0.0%	213	53%	0	0.0%
					24	32	16%	0	0.0%	53	27%	0	0.0%

Notes:

Values in bold indicate excursions above the relevant crtieria

Table 5: Cumulartive Effects Assessment - Operations in Phases 3 and 4

RWDI# 2202166

Modelled Values & Frequency of Excursions above the Relevant Criteria

Days of Valid Meteorological Data: 1745

Relevant Criteria:			
	TSP	120	µg/m³ 24-Hour AAQC
		60	µg/m³ Annual AAQC
	PM_{10}	50	µg/m³ Interim 24-Hour AAQC
	$PM_{2.5}$	27	µg/m³ 24-Hour CAAQS
		8.8	µg/m³ Annual CAAQS
	Silica	5	µg/m³ AAQC
	NO_2	400	µg/m³ 1-Hour AAQC
		200	µg/m³ 24-Hour AAQC

Background Concentrations (90th Percentile, all except O_3) (O_3 99th percentile)			
	TSP	44	µg/m³ (24-hour)
		22	µg/m³ (Annual)
	PM_{10}	24	µg/m³ (24-hour)
	$PM_{2.5}$	13	µg/m³ (24-hour)
		6.6	µg/m³ (Annual)
	Silica	1.5	µg/m³ (24-hour)
	NO_2	25	µg/m³ (1-hour)
		21	µg/m³ (24-hour)
	O_3	124	µg/m³ (1-hour)

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R01	Residence	638425	4750114	TSP	24	115	96%	0	0.0%	159	**132%**	**2**	**0.1%**
					Annual	7	12%	0	0.0%	29	49%	0	0.0%
				PM10	24	12	24%	0	0.0%	36	72%	0	0.0%
				PM2.5	24	6	21%	0	0.0%	19	69%	0	0.0%
					Annual	1	6%	0	0.0%	7	81%	0	0.0%
				Silica	24	2	36%	0	0.0%	3.3	66%	0	0.0%
				NO2	1	319	80%	0	0.0%	344	86%	0	0.0%
					24	47	24%	0	0.0%	68	34%	0	0.0%
R02	Church	638360	4750110	TSP	24	127	**106%**	**1**	**0.1%**	171	**143%**	**2**	**0.1%**
					Annual	6	11%	0	0.0%	28	47%	0	0.0%
				PM10	24	10	20%	0	0.0%	34	68%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	6%	0	0.0%	7	81%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	312	78%	0	0.0%	337	84%	0	0.0%
					24	52	26%	0	0.0%	73	36%	0	0.0%
R03	Residence	638256	4750109	TSP	24	128	**107%**	**1**	**0.1%**	172	**143%**	**1**	**0.1%**
					Annual	5	9%	0	0.0%	27	46%	0	0.0%
				PM10	24	9	17%	0	0.0%	33	65%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	334	83%	0	0.0%	359	90%	0	0.0%
					24	53	27%	0	0.0%	74	37%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R04	Residence	638287	4750108	TSP	24	130	**108%**	**1**	**0.1%**	174	**145%**	**2**	**0.1%**
					Annual	6	9%	0	0.0%	28	46%	0	0.0%
				PM10	24	9	18%	0	0.0%	33	66%	0	0.0%
				PM2.5	24	6	23%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	41%	0	0.0%	3.6	71%	0	0.0%
				NO2	1	331	83%	0	0.0%	356	89%	0	0.0%
					24	54	27%	0	0.0%	75	37%	0	0.0%
R05	Residence	638228	4750108	TSP	24	125	**104%**	**1**	**0.1%**	169	**141%**	**1**	**0.1%**
					Annual	5	9%	0	0.0%	27	45%	0	0.0%
				PM10	24	9	18%	0	0.0%	33	66%	0	0.0%
				PM2.5	24	6	22%	0	0.0%	19	71%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	40%	0	0.0%	3.5	70%	0	0.0%
				NO2	1	333	83%	0	0.0%	358	89%	0	0.0%
					24	53	26%	0	0.0%	74	37%	0	0.0%
R06	Residence	638203	4750110	TSP	24	122	**101%**	**1**	**0.1%**	166	**138%**	**1**	**0.1%**
					Annual	5	8%	0	0.0%	27	45%	0	0.0%
				PM10	24	10	19%	0	0.0%	34	67%	0	0.0%
				PM2.5	24	6	22%	0	0.0%	19	70%	0	0.0%
					Annual	0	5%	0	0.0%	7	80%	0	0.0%
				Silica	24	2	38%	0	0.0%	3.4	68%	0	0.0%
				NO2	1	329	82%	0	0.0%	354	88%	0	0.0%
					24	52	26%	0	0.0%	73	36%	0	0.0%
R07	Residence	638139	4750102	TSP	24	110	92%	0	0.0%	154	**128%**	**1**	**0.1%**
					Annual	5	8%	0	0.0%	27	44%	0	0.0%
				PM10	24	10	20%	0	0.0%	34	68%	0	0.0%
				PM2.5	24	5	20%	0	0.0%	18	68%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	35%	0	0.0%	3.2	65%	0	0.0%
				NO2	1	305	76%	0	0.0%	330	83%	0	0.0%
					24	47	24%	0	0.0%	68	34%	0	0.0%
R08	Residence	638104	4750105	TSP	24	103	86%	0	0.0%	147	**123%**	**1**	**0.1%**
					Annual	4	7%	0	0.0%	26	44%	0	0.0%
				PM10	24	8	17%	0	0.0%	32	65%	0	0.0%
				PM2.5	24	5	19%	0	0.0%	18	67%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	2	33%	0	0.0%	3.1	63%	0	0.0%
				NO2	1	293	73%	0	0.0%	318	79%	0	0.0%
					24	45	22%	0	0.0%	66	33%	0	0.0%

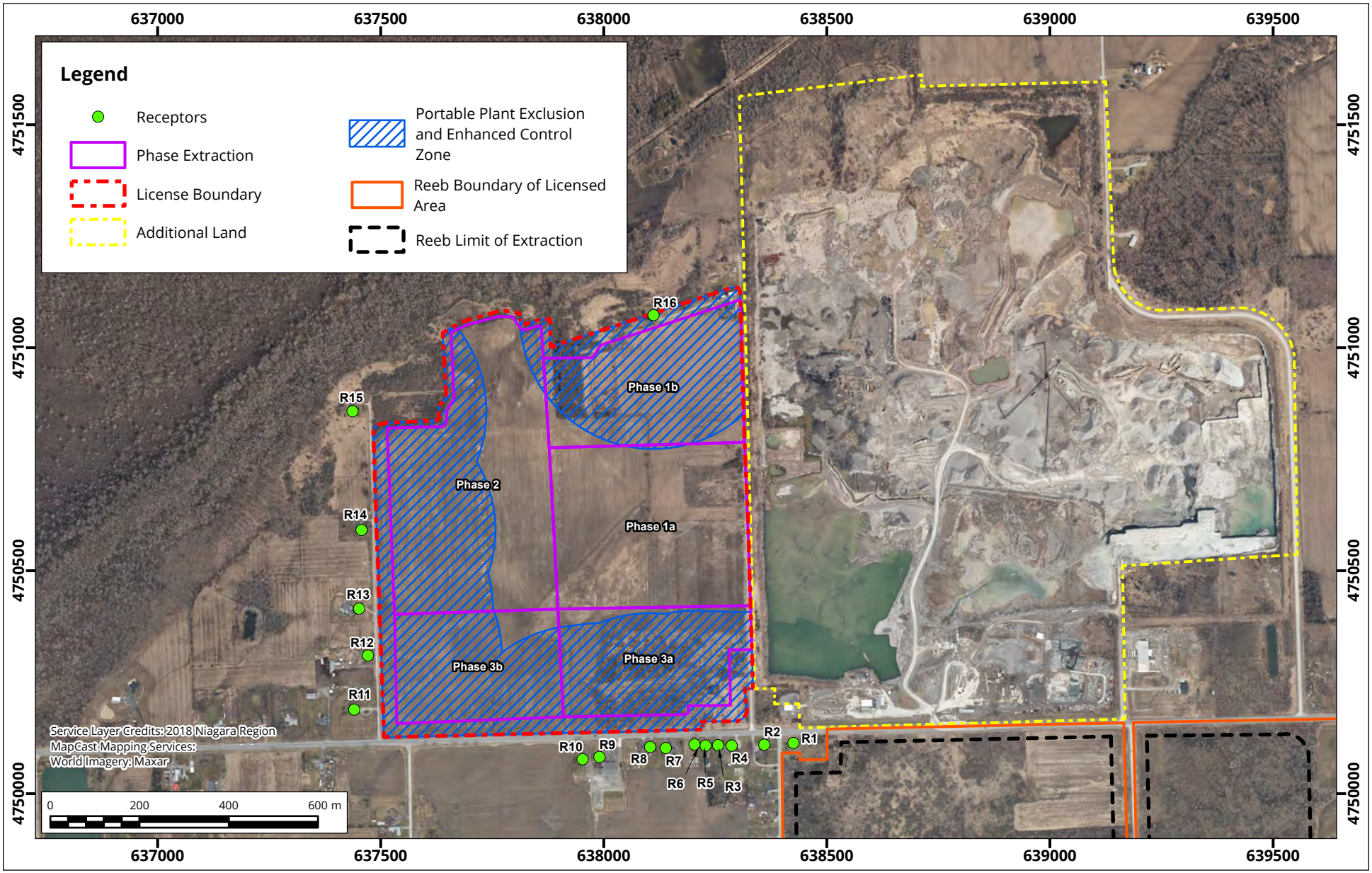
Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R09	Church	637990	4750082	TSP	24	76	63%	0	0.0%	120	100%	0	0.00%
					Annual	4	6%	0	0.0%	26	43%	0	0.0%
				PM10	24	9	18%	0	0.0%	33	66%	0	0.00%
				PM2.5	24	4	14%	0	0.0%	17	62%	0	0.0%
					Annual	0	4%	0	0.0%	7	79%	0	0.0%
				Silica	24	1	24%	0	0.0%	2.7	54%	0	0.0%
				NO2	1	297	74%	0	0.0%	322	80%	0	0.0%
					24	33	17%	0	0.0%	54	27%	0	0.0%
R10	Residence	637952	4750077	TSP	24	68	56%	0	0.0%	112	93%	0	0.0%
					Annual	4	6%	0	0.0%	26	43%	0	0.0%
				PM10	24	10	19%	0	0.0%	34	67%	0	0.0%
				PM2.5	24	3	12%	0	0.0%	16	61%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	21%	0	0.0%	2.6	51%	0	0.0%
				NO2	1	299	75%	0	0.0%	324	81%	0	0.0%
					24	30	15%	0	0.0%	51	25%	0	0.0%
R11	Church	637441	4750189	TSP	24	41	34%	0	0.0%	85	71%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	10	20%	0	0.0%	34	68%	0	0.0%
				PM2.5	24	2	7%	0	0.0%	15	56%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	12%	0	0.0%	2.1	42%	0	0.0%
				NO2	1	227	57%	0	0.0%	252	63%	0	0.0%
					24	18	9%	0	0.0%	39	20%	0	0.0%
R12	Residence	637471	4750310	TSP	24	80	66%	0	0.0%	124	**103%**	**1**	**0.1%**
					Annual	3	4%	0	0.0%	25	41%	0	0.0%
				PM10	24	29	57%	0	0.0%	53	**105%**	**1**	**0.1%**
				PM2.5	24	3	11%	0	0.0%	16	59%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	2	43%	0	0.0%	3.7	73%	0	0.0%
				NO2	1	196	49%	0	0.0%	221	55%	0	0.0%
					24	25	12%	0	0.0%	46	23%	0	0.0%
R13	Residence	637452	4750415	TSP	24	71	59%	0	0.0%	115	96%	0	0.0%
					Annual	3	5%	0	0.0%	25	42%	0	0.0%
				PM10	24	25	50%	0	0.0%	49	98%	0	0.0%
				PM2.5	24	4	13%	0	0.0%	17	62%	0	0.0%
					Annual	0	3%	0	0.0%	7	78%	0	0.0%
				Silica	24	1	30%	0	0.0%	3.0	60%	0	0.0%
				NO2	1	194	49%	0	0.0%	219	55%	0	0.0%
					24	24	12%	0	0.0%	45	23%	0	0.0%

Receptor		UTM Coordinates		Contaminant	Averaging Period	With No Background Concentration				With Additional Background Concentrations			
ID	Type	X (m)	Y (m)		(hours)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)	Maximum Predicted 24-Hour Concentration (µg/m³)	Percentage of Revelant Criteria (%)	Number of Predicted Excursions Above Criteria over 5 Years	Frequency of Predicted Excursions Above Criteria (%)
R14	Residence	637457	4750591	TSP	24	105	88%	0	0.0%	149	**124%**	**2**	**0.1%**
					Annual	3	5%	0	0.0%	25	42%	0	0.0%
				PM10	24	31	63%	0	0.0%	55	**111%**	**1**	**0.1%**
				PM2.5	24	5	19%	0	0.0%	18	67%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	2	39%	0	0.0%	3.4	69%	0	0.0%
				NO2	1	255	64%	0	0.0%	280	70%	0	0.0%
					24	45	22%	0	0.0%	66	33%	0	0.0%
R15	Residence	637437	4750858	TSP	24	62	52%	0	0.0%	106	89%	0	0.0%
					Annual	2	3%	0	0.0%	24	40%	0	0.0%
				PM10	24	11	22%	0	0.0%	35	70%	0	0.0%
				PM2.5	24	3	10%	0	0.0%	16	58%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	13%	0	0.0%	2.2	43%	0	0.0%
				NO2	1	224	56%	0	0.0%	249	62%	0	0.0%
					24	16	8%	0	0.0%	37	19%	0	0.0%
R16	Residence	638112	4751073	TSP	24	65	54%	0	0.0%	109	91%	0	0.0%
					Annual	3	4%	0	0.0%	25	41%	0	0.0%
				PM10	24	10	20%	0	0.0%	34	68%	0	0.0%
				PM2.5	24	3	11%	0	0.0%	16	60%	0	0.0%
					Annual	0	2%	0	0.0%	7	77%	0	0.0%
				Silica	24	1	16%	0	0.0%	2.3	46%	0	0.0%
				NO2	1	188	47%	0	0.0%	213	53%	0	0.0%
					24	30	15%	0	0.0%	51	25%	0	0.0%

Notes:

Values in bold indicate excursions above the relevant crtieria

FIGURES



Phase Extraction, License Boundary, Additional Lands & Receptor Locations

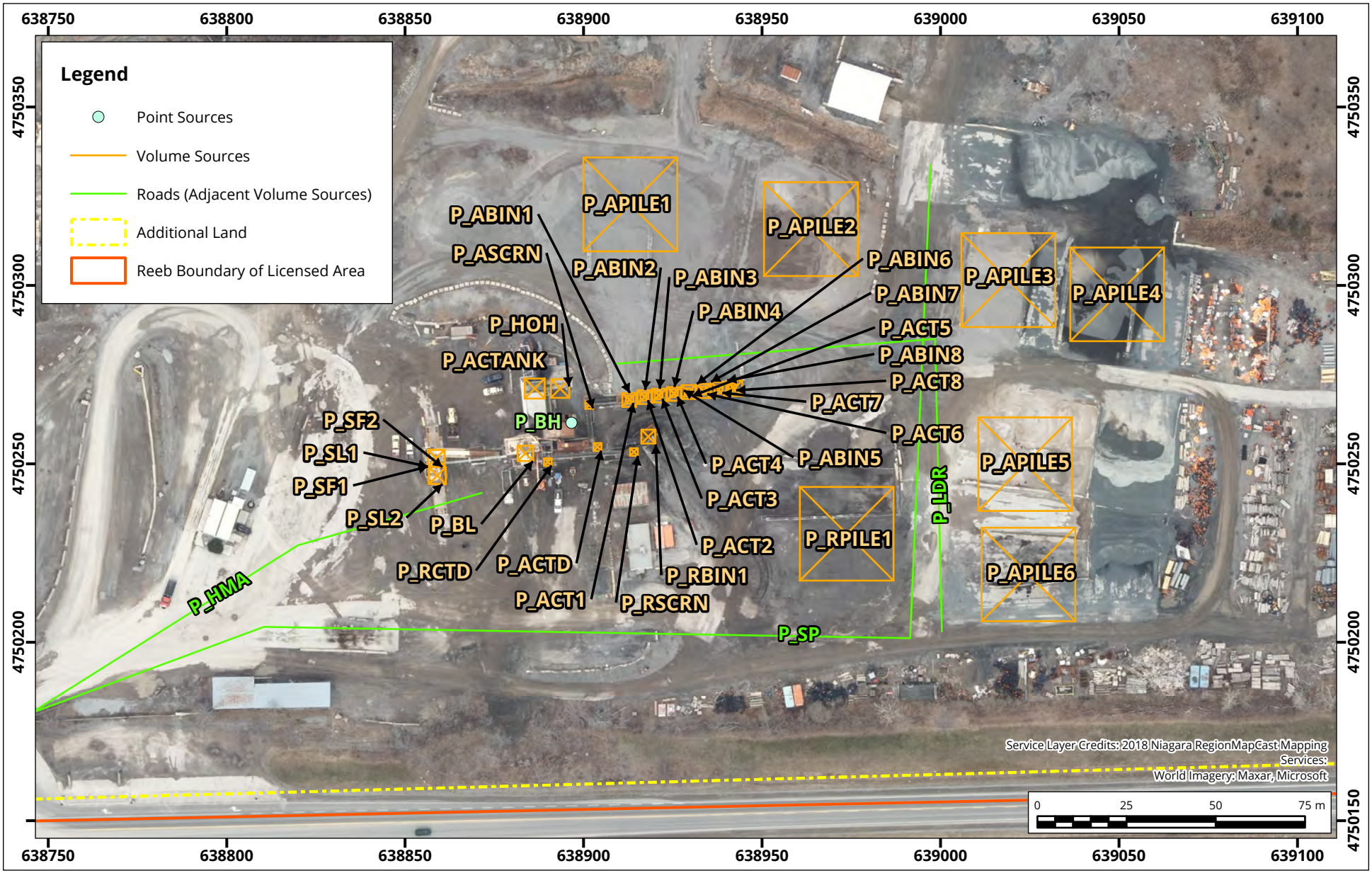
True North

Map Projection: NAD 1983 UTM Zone 17N
Law Quarry - Port Colborne ON

Project #: 2202166

Drawn by: LJN	Figure: 1
Approx. Scale:	1:12,000
Date Revised:	Jan 31, 2022

Map Document: C:\Users\LJN\OneDrive - ROWAN WILLIAMS DAVIES & IRWIN INC\Desktop\GIS\Law Quarry\Law Quarry\Law Quarry.aprx



Map Document: C:\Users\LJN\OneDrive - ROWAN WILLIAMS DAVIES & IRWIN INC\Desktop\GIS\Law Quarry\Law Quarry\Law Quarry.aprx

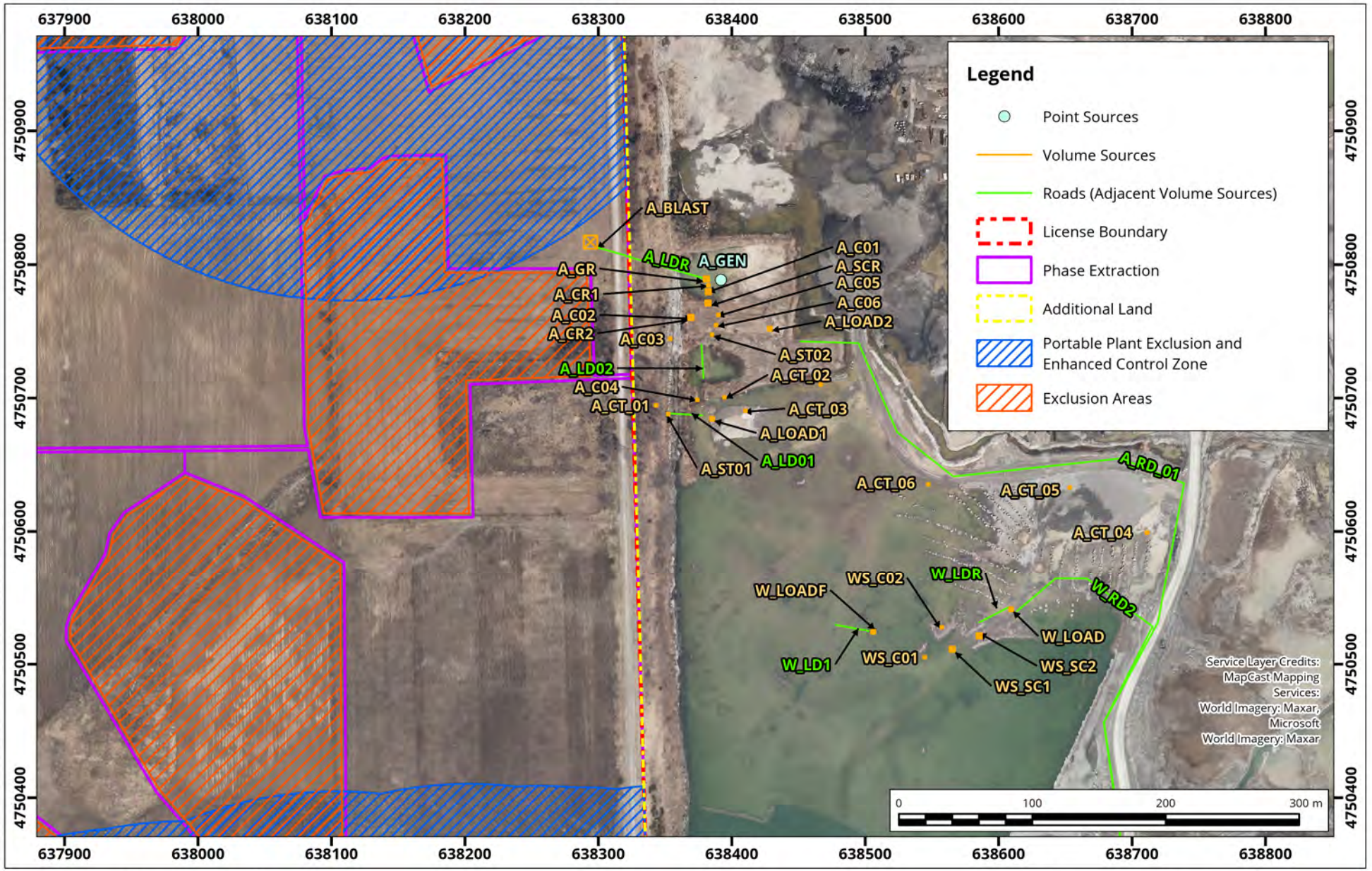
Location of Sources – Asphalt Plant

True North

Drawn by: LJN	Figure: 2A
Approx. Scale:	1:1,500
Date Revised:	Jan 31, 2022

Map Projection: NAD 1983 UTM Zone 17N
Law Quarry - Port Colborne ON

Project #: 2202166



Location of Sources – Phase 1A

True North

Drawn by: LJN	Figure: 2B
Approx. Scale: 1:4,000	
Date Revised: Dec 21, 2021	

Map Projection: NAD 1983 UTM Zone 17N
Law Quarry - Port Colborne ON

Project #: 2202166

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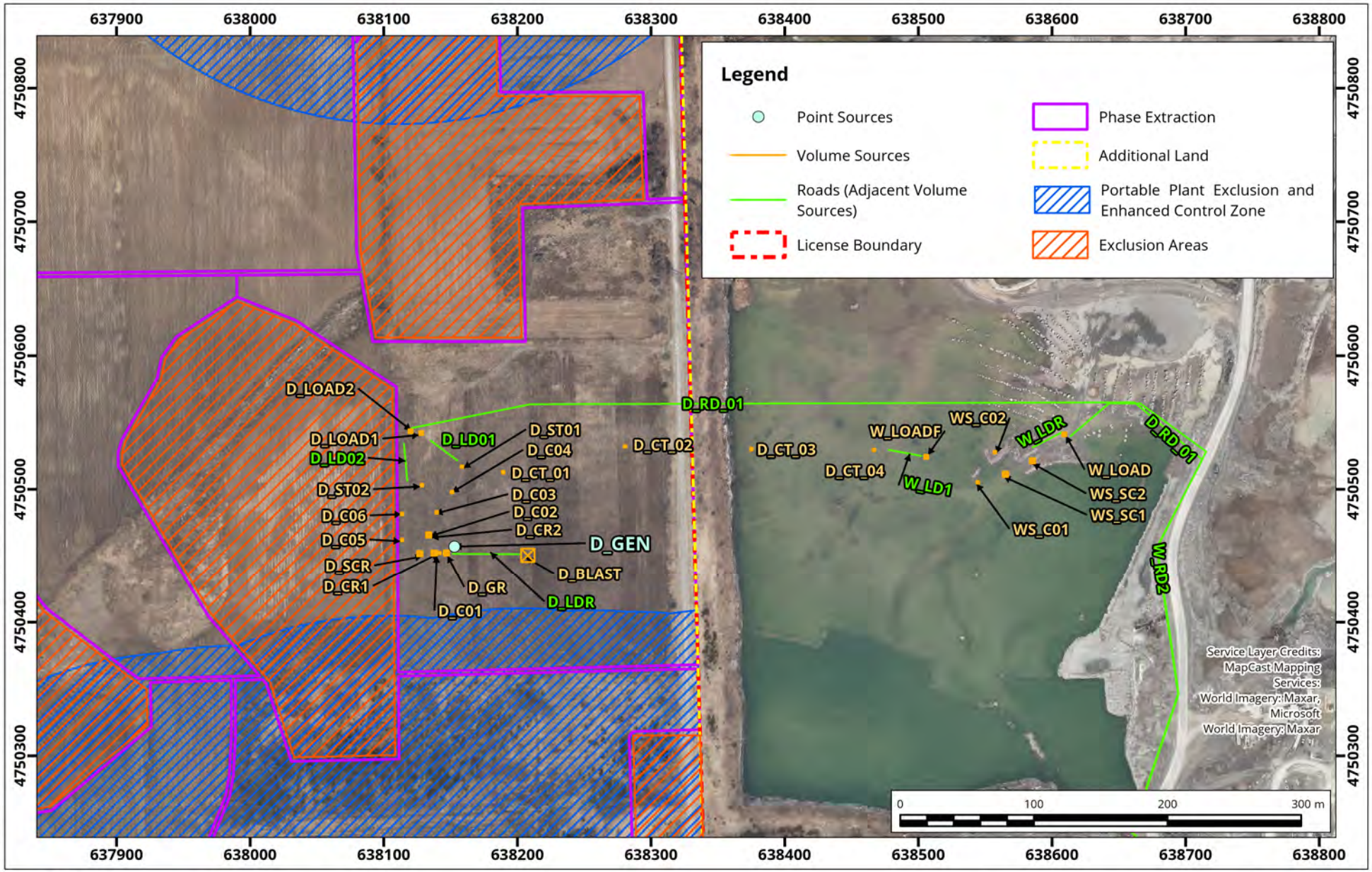

Location of Sources – Phase 1B

True North

Drawn by: LJN	Figure: 2C
Approx. Scale:	1:4,000
Date Revised: Dec 21, 2021	

Map Projection: NAD 1983 UTM Zone 17N
Law Quarry - Port Colborne ON

Project #: 2202166

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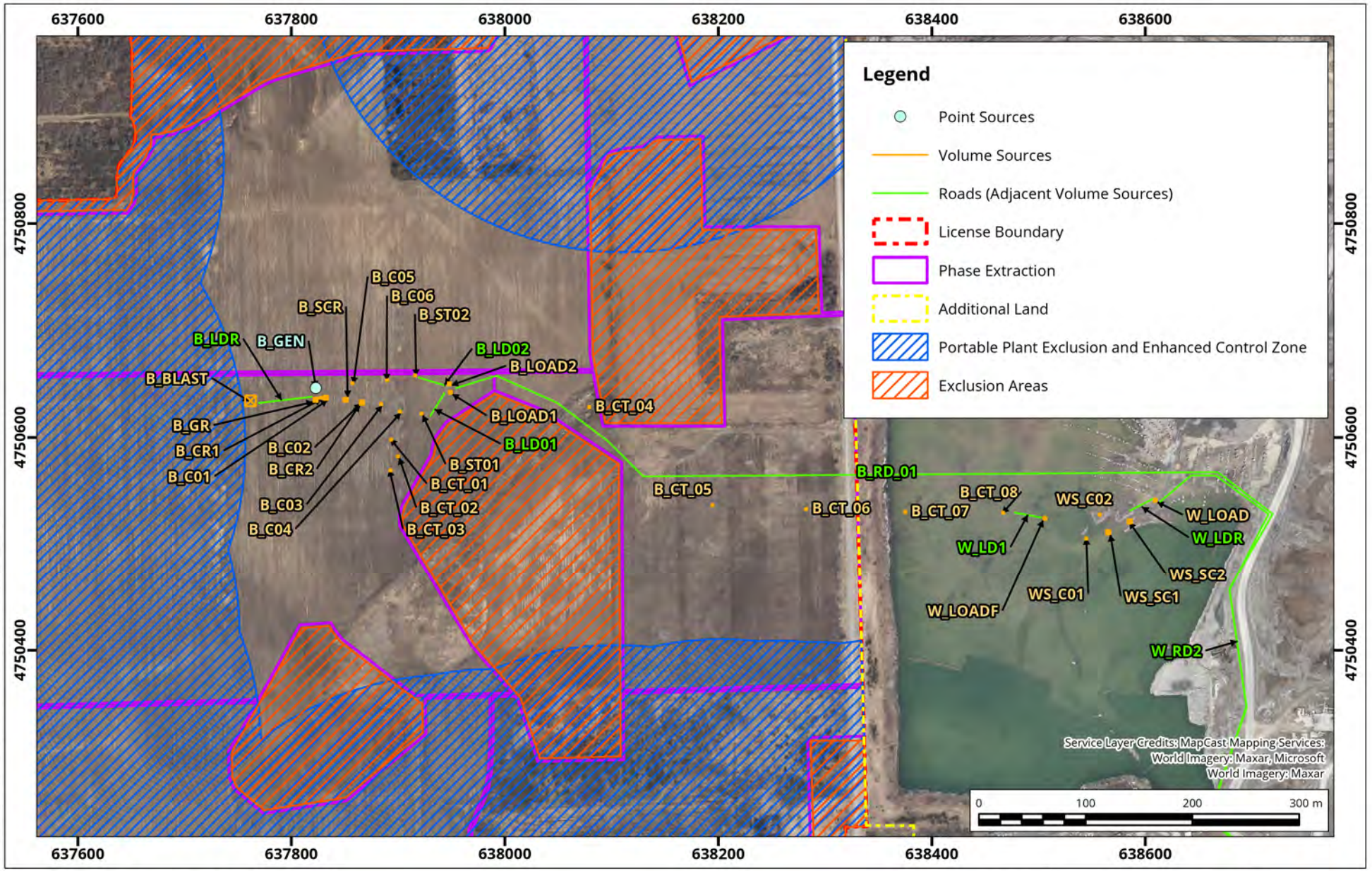

Location of Sources – Phase 2

True North

Drawn by: LJN | Figure: 2D

Approx. Scale: 1:5,000

Date Revised: Dec 21, 2021

Project #: 2202166

Map Projection: NAD 1983 UTM Zone 17N
Law Quarry - Port Colborne ON

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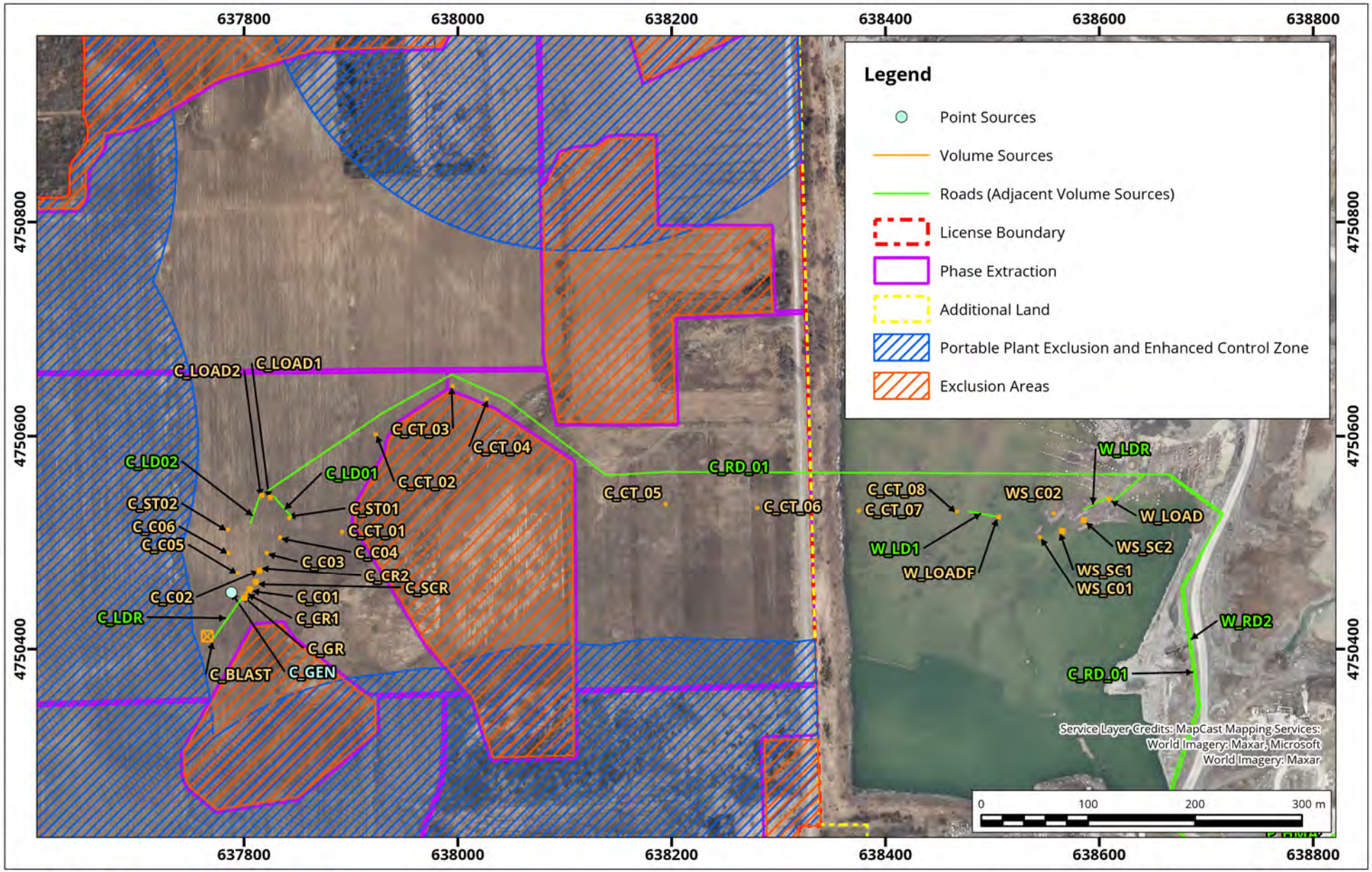

Location of Sources – Phase 3

True North

Drawn by: LJN | Figure: 2E

Approx. Scale: 1:5,000

Date Revised: Dec 21, 2021

Map Projection: NAD 1983 UTM Zone 17N
Law Quarry - Port Colborne ON

Project #: 2202166

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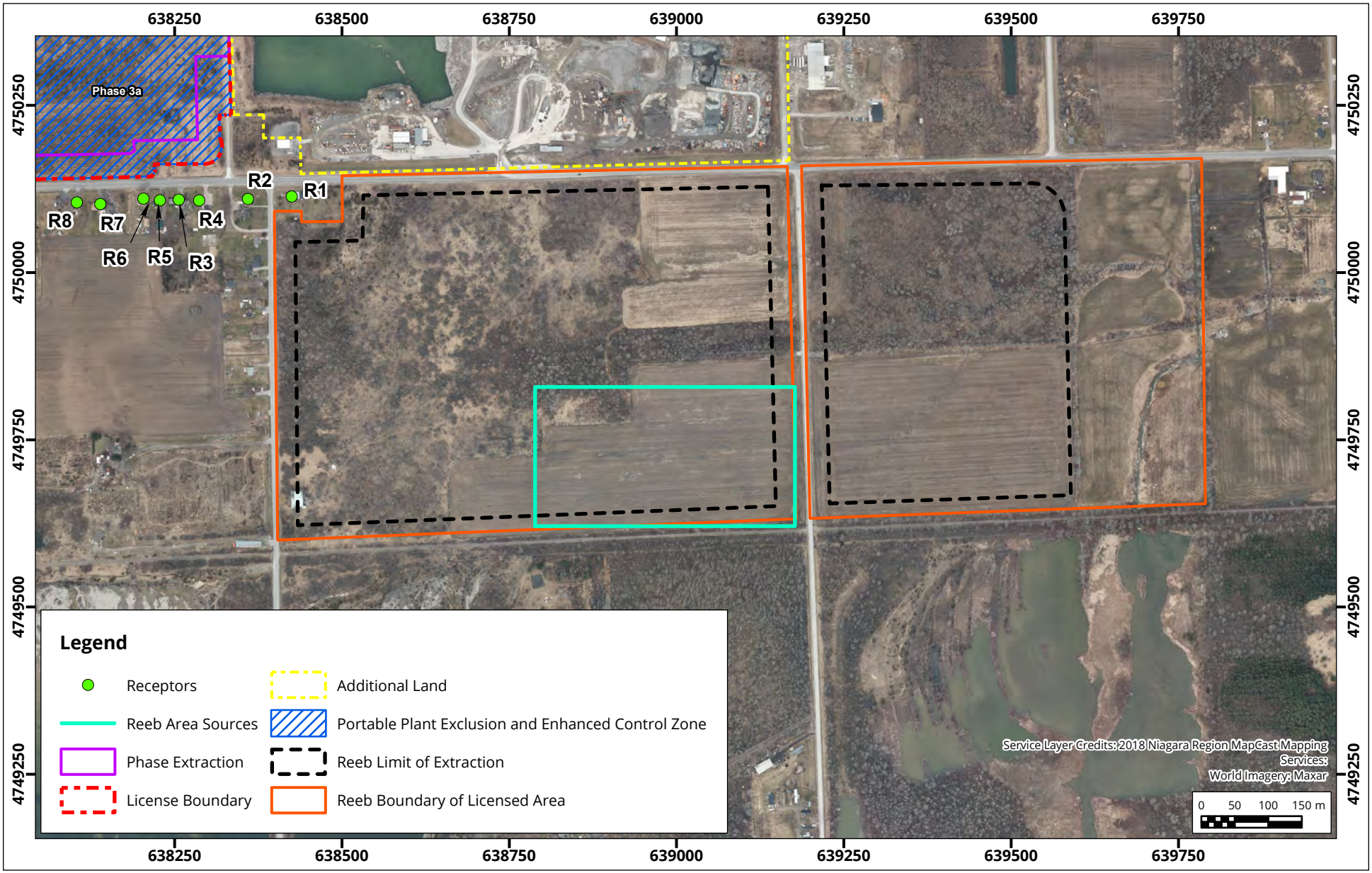


Reeb Limit of Extraction and Boundary of Licensed Area

True North

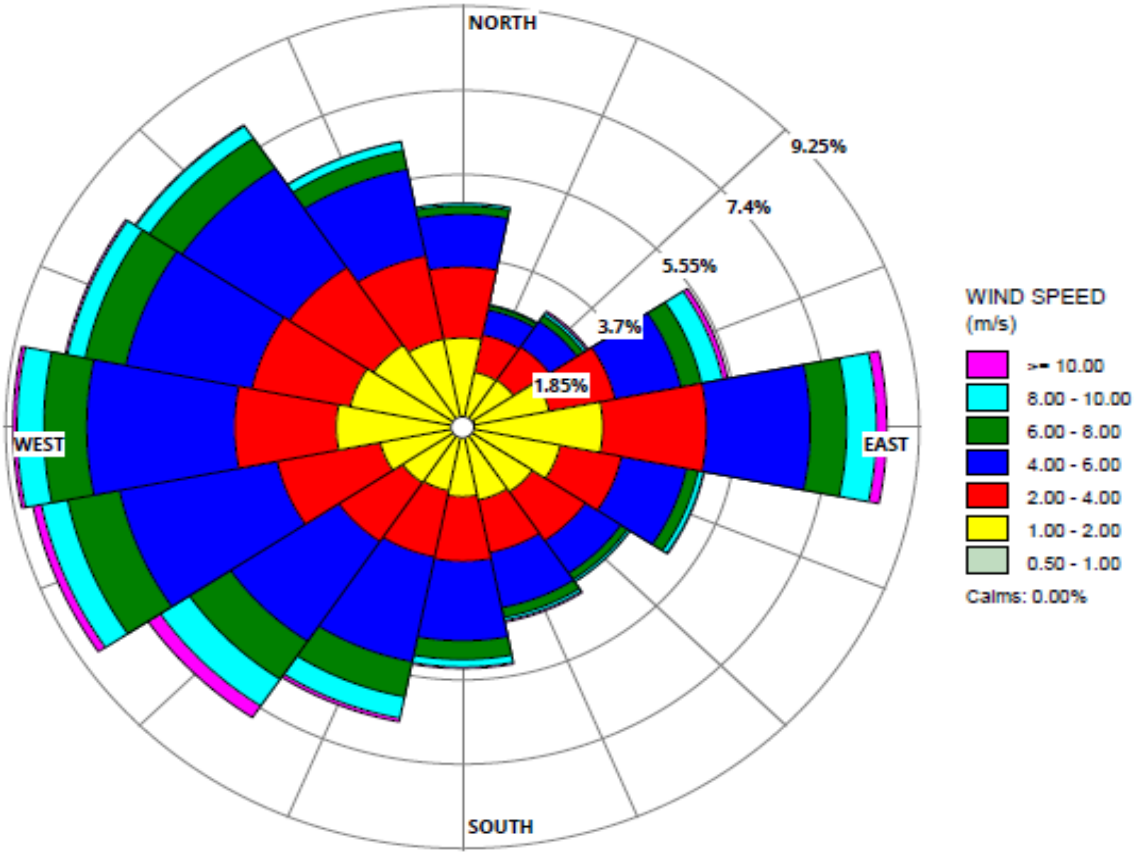
Map Projection: NAD 1983 UTM Zone 17N

Law Quarry - Port Colborne ON

Project #: 2202166

Drawn by: LJN	Figure: 3
Approx. Scale:	1:8,000
Date Revised:	Jan 31, 2022

Map Document: C:\Users\LJN\OneDrive - ROWAN WILLIAMS DAVIES & IRWIN INC\Desktop\GIS\Law Quarry\Law Quarry\Law Quarry.aprx



Wind Rose for MECP West Central CROPS Data Set	Drawn by: BGS	Figure: **4**	
	Approx. Scale: not to scale		
Law Quarry - Port Colborne ON Project #2202166	Date Revised: Feb 06, 2024		

APPENDIX A

Appendix A: Blasting Operations Emission Spreadsheet

Project #2202166

Law Crushed Stone

WESTERN SURFACE COAL MINING - AP-42 Section 11.9

Blasting operation particulate emissions: $E = 0.00022\ k * A^{1.5}$

E emission factor
k particle size multiplier (1.13, 1.0, 0.52 and 0.03 for TSP, PM_{30}, PM_{10} and $PM_{2.5}$, respectively)
A blast surface area (m^2)

Source ID	Source Description	Total Blast Area (m^2)	Number of Blasts			Base AP-42 Emission Factor				Base Emission Rate				Additional Control Efficiency Applied (%)	Final Controlled Emission Rate							
			Hourly	Daily	Annual	TSP (kg/blast)	PM_{10} (kg/blast)	$PM_{2.5}$ (kg/blast)	Silica (kg/blast)	TSP (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	Silica (g/s)		TSP (g/s)	Data Quality Rating	PM_{10} (g/s)	Data Quality Rating	$PM_{2.5}$ (g/s)	Data Quality Rating	Silica (g/s)	Data Quality Rating
Blasting at Law Crushed Stone																						
BLAST	Typical weekly blast	1000	1	1	25	7.0E+00	3.6E+00	2.1E-01	2.9E-01	1.9E+00	1.0E+00	5.8E-02	7.9E-02		1.9E+00	C	1.0E+00	C	5.8E-02	C	7.9E-02	C
Blasting at Reeb Quarry																						
REEB_BL	Typical weekly blast	1000	1	1	25	7.0E+00	3.6E+00	2.1E-01	2.9E-01	1.9E+00	1.0E+00	5.8E-02	7.9E-02		1.9E+00	C	1.0E+00	C	5.8E-02	C	7.9E-02	C

Sample calculation for uncontrolled TSP emission factor for Source BLAST: Typical weekly blast.

EF = 0.00022 x (1) x (1000 m)^1.5 = 7.0E+00 kg TSP / blast

Sample calculation for TSP emission rate for Source BLAST: Typical weekly blast.

$$\frac{1\ \text{blast}}{1\ \text{h}} \times \frac{7.0\text{E+00}\ \text{kg}_{TSP}}{1\ \text{blast}} \times \frac{1\ \text{h}}{3600\ \text{s}} \times \frac{1000\ \text{g}_{TSP}}{1\ \text{kg}_{TSP}} \times \frac{1\ \text{g}_{TSP\ uncontrolled}}{1\ \text{g}_{TSP}} = 1.9\text{E+00}\ \text{g}_{TSP} / \text{s}$$

Comments

A silica content of: 7.9% was used in the assessment, based on airborn crystalline silica measured on Oct 18,2017
k-factor for TSP (PM44) scaled up logarithmically to 1.13 from published k-factor of 1.0 which refers to PM_{30}.

As a conservative simpliction, blasting emissions from Reeb Quarry are assumed equivalent to Law Quarry.

APPENDIX B

Appendix B: Processing Emissions Spreadsheet

Project #2202166

Law Crushed Stone

Source ID	Source Description / Process Decription	AP-42 Process Description	AP-42 Chapter	Processing Rate			Base AP-42 Emission Factor				Base Emission Rate				Additional Control Efficiency Applied (%)	Final Controlled Emission Rate							
				Hourly (Mg/h)	Daily (Mg/d)	Annual (Mg/a)	TSP (kg/Mg)	PM_{10} (kg/Mg)	$PM_{2.5}$ (kg/Mg)	Silica (kg/Mg)	TSP (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	Silica (g/s)		TSP (g/s)	Data Quality Rating	PM_{10} (g/s)	Data Quality Rating	$PM_{2.5}$ (g/s)	Data Quality Rating	Silica (g/s)	Data Quality Rating
Operations at Working Face & Portable Plant																							
DRILL	Drilling at Working Face	Wet drilling: unfragmented stone	11.19.2-1	2	25	6300	5.7E-05	4.0E-05	6.0E-06		3.3E-05	2.3E-05	3.5E-06			3.3E-05	E	2.3E-05	E	3.5E-06	E		E
GR	Loader Drop onto Grizzly	Truck unloading - fragmented stone	11.19.2-1	500	5000	800000	1.1E-05	8.0E-06	1.2E-06		1.5E-03	1.1E-03	1.7E-04			1.5E-03	E	1.1E-03	E	1.7E-04	E		E
CR1	Primary Jaw Crusher	Primary crushing (controlled)	11.19.2-1	500	5000	800000	3.4E-04	2.7E-04	5.0E-05		4.7E-02	3.8E-02	6.9E-03			4.7E-02	E	3.8E-02	E	6.9E-03	E		E
C01	Conveyor Transfer Point	Conveyor transfer point (controlled)	11.19.2-1	600	6000	960000	3.7E-05	2.3E-05	6.5E-06		6.2E-03	3.8E-03	1.1E-03			6.2E-03	E	3.8E-03	D	1.1E-03	E		D
SCR	6 X 20 Screen	Screening (controlled)	11.19.2-1	600	6000	960000	5.6E-04	3.7E-04	2.5E-05		9.3E-02	6.2E-02	4.2E-03			9.3E-02	E	6.2E-02	C	4.2E-03	E		C
CR2	Secondary Cone Crusher	Secondary crushing (controlled)	11.19.2-1	100	1000	160000	3.4E-04	2.7E-04	5.0E-05		9.4E-03	7.5E-03	1.4E-03			9.4E-03	E	7.5E-03	E	1.4E-03	E		E
C02	Conveyor Transfer Point	Conveyor transfer point (controlled)	11.19.2-1	166	1660	265600	3.7E-05	2.3E-05	6.5E-06		1.7E-03	1.1E-03	3.0E-04			1.7E-03	E	1.1E-03	D	3.0E-04	E		D
C03	Conveyor Transfer Point	Conveyor transfer point (controlled)	11.19.2-1	166	1660	265600	3.7E-05	2.3E-05	6.5E-06		1.7E-03	1.1E-03	3.0E-04			1.7E-03	E	1.1E-03	D	3.0E-04	E		D
C04	Conveyor Transfer Point	Conveyor transfer point (controlled)	11.19.2-1	166	1660	265600	3.7E-05	2.3E-05	6.5E-06		1.7E-03	1.1E-03	3.0E-04			1.7E-03	E	1.1E-03	D	3.0E-04	E		D
ST01	Product Stacker	Conveyor transfer point (controlled)	11.19.2-1	166	1660	265600	3.7E-05	2.3E-05	6.5E-06		1.7E-03	1.1E-03	3.0E-04			1.7E-03	E	1.1E-03	D	3.0E-04	E		D
C05	Conveyor Transfer Point	Conveyor transfer point (controlled)	11.19.2-1	167	1670	267200	3.7E-05	2.3E-05	6.5E-06	1.8E-06	1.7E-03	1.1E-03	3.0E-04	8.4E-05		1.7E-03	E	1.1E-03	D	3.0E-04	E	8.4E-05	D
C06	Conveyor Transfer Point	Conveyor transfer point (controlled)	11.19.2-1	167	1670	267200	3.7E-05	2.3E-05	6.5E-06	1.8E-06	1.7E-03	1.1E-03	3.0E-04	8.4E-05		1.7E-03	E	1.1E-03	D	3.0E-04	E	8.4E-05	D
ST02	Product Stacker	Conveyor transfer point (controlled)	11.19.2-1	167	1670	267200	3.7E-05	2.3E-05	6.5E-06	1.8E-06	1.7E-03	1.1E-03	3.0E-04	8.4E-05		1.7E-03	E	1.1E-03	D	3.0E-04	E	8.4E-05	D
CT_n	Conveyor Transfer Points (per transfer)	Conveyor transfer point (controlled)	*11.19.2-1*	*167*	1670	267200	*3.7E-05*	*2.3E-05*	*6.5E-06*	*1.8E-06*	*1.7E-03*	*1.1E-03*	*3.0E-04*	*8.4E-05*		*1.7E-03*	*E*	*1.1E-03*	*D*	*3.0E-04*	*E*	*8.4E-05*	*D*
Wash Plant																							
WS_C01	Conveyor Transfer Point - Wash station	Conveyor transfer point (controlled)	11.19.2-1	167	1670	267200	3.7E-05	2.3E-05	6.5E-06	1.8E-06	1.7E-03	1.1E-03	3.0E-04	8.4E-05		1.7E-03	E	1.1E-03	D	3.0E-04	E	8.4E-05	D
WS_SC1	First Screen at Wash station	Screening (controlled)	11.19.2-1	167	1670	267200	5.6E-04	3.7E-04	2.5E-05	2.9E-05	2.6E-02	1.7E-02	1.2E-03	1.4E-03		2.6E-02	E	1.7E-02	C	1.2E-03	E	1.4E-03	C
WS_C02	Conveyor Transfer Point - Wash station	Conveyor transfer point (controlled)	11.19.2-1	84	835	133600	3.7E-05	2.3E-05	6.5E-06	1.8E-06	8.6E-04	5.3E-04	1.5E-04	4.2E-05		8.6E-04	E	5.3E-04	D	1.5E-04	E	4.2E-05	D
WS_SC2	Second Screen at Wash station	Screening (controlled)	11.19.2-1	167	1670	267200	5.6E-04	3.7E-04	2.5E-05	2.9E-05	2.6E-02	1.7E-02	1.2E-03	1.4E-03		2.6E-02	E	1.7E-02	C	1.2E-03	E	1.4E-03	C
WS_C03	Conveyor Transfer Point - Wash station	Conveyor transfer point (controlled)	11.19.2-1	167	1670	267200	3.7E-05	2.3E-05	6.5E-06	1.8E-06	1.7E-03	1.1E-03	3.0E-04	8.4E-05	100%		E		D		E		D
Asphalt Plant Sources (Provided by Miller Paving / Colas Canada)																							
BT1A	transfer - cold feed to conveyor - Coarse	Conveyor transfer point (controlled)	11.19.2-1	41	990	NA	3.7E-05	2.30E-05	6.5E-06	1.8E-06	4.2E-04	2.6E-04	7.4E-05	2.1E-05		4.2E-04	E	2.6E-04	D	7.4E-05	E	2.1E-05	D
BT1B	transfer - cold feed bins to conveyor - sand	Conveyor transfer point (controlled)	11.19.2-1	41	990	NA	3.7E-05	2.30E-05	6.5E-06	1.8E-06	4.2E-04	2.6E-04	7.4E-05	2.1E-05		4.2E-04	E	2.6E-04	D	7.4E-05	E	2.1E-05	D
BT2	transfer - RAP bins to conveyor	Conveyor transfer point (controlled)	11.19.2-1	22	528	NA	3.7E-05	2.30E-05	6.5E-06	1.8E-06	2.3E-04	1.4E-04	4.0E-05	1.1E-05		2.3E-04	E	1.4E-04	D	4.0E-05	E	1.1E-05	D
CT1A	transfer - inclined conveyor to dryer - coarse	Conveyor transfer point (controlled)	11.19.2-1	41	990	NA	3.7E-05	2.30E-05	6.5E-06	1.8E-06	4.2E-04	2.6E-04	7.4E-05	2.1E-05		4.2E-04	E	2.6E-04	D	7.4E-05	E	2.1E-05	D
CT1B	transfer - inclined conveyor to dryer - Sand	Conveyor transfer point (controlled)	11.19.2-1	41	990	NA	3.7E-05	2.30E-05	6.5E-06	1.8E-06	4.2E-04	2.6E-04	7.4E-05	2.1E-05		4.2E-04	E	2.6E-04	D	7.4E-05	E	2.1E-05	D
CT2	transfer - inclined to batch tower mixer	Conveyor transfer point (controlled)	11.19.2-1	22	528	NA	3.7E-05	2.30E-05	6.5E-06	1.8E-06	2.3E-04	1.4E-04	4.0E-05	1.1E-05		2.3E-04	E	1.4E-04	D	4.0E-05	E	1.1E-05	D
SC1A	Screening - Coarse Aggregate	Screening (controlled)	11.19.2-1	41	990	NA	5.6E-04	3.70E-04	2.5E-05	2.9E-05	6.4E-03	4.2E-03	2.9E-04	3.3E-04		6.4E-03	E	4.2E-03	C	2.9E-04	E	3.3E-04	C
SC1B	Screening - Sand	Screening (controlled)	11.19.2-1	41	990	NA	5.6E-04	3.70E-04	2.5E-05	2.9E-05	6.4E-03	4.2E-03	2.9E-04	3.3E-04		6.4E-03	E	4.2E-03	C	2.9E-04	E	3.3E-04	C
SC2	Screening - RAP	Screening (controlled)	11.19.2-1	22	528	NA	5.6E-04	3.70E-04	2.5E-05	2.9E-05	3.4E-03	2.3E-03	1.5E-04	1.8E-04		3.4E-03	E	2.3E-03	C	1.5E-04	E	1.8E-04	C
Reeb Quarry																							
REEB_PR	Total Processing Emissions at Reeb															1.7E-01		1.2E-01		1.6E-02		3.4E-04	

Sample calculation for TSP emissions from Source DRILL: Drilling at Working Face

$$\frac{2\ Mg_{processed}}{1\ h} \times \frac{5.7E\text{-}05\ kg_{TSP}}{1\ Mg_{processed}} \times \frac{1\ h}{3600\ s} \times \frac{1000\ g_{TSP}}{1\ kg_{TSP}} \times \frac{100\%\ g_{TSP\ uncontrolled}}{1\ g_{TSP}} = 3.3E\text{-}05\ g_{TSP}/s$$

Comments

A silica content of: 7.9% was used in the assessment, based on airborn crystalline silica measured on Oct 18,2017
AP-42 Emission Factor for TSP is based on PM100. The values have been corrected to reflect PM44.

Drilling reflects hole 4 1/2" diameter, 15m deep, assumed density of 2670kg/m³, 5 holes / hour
Reflects portable plant with 2 product stackers (typical)
Screen deck allows for 3 size fractions (including recrush) at a time, thus only 2 stackers are included.
Screen is reconfigured when different product sizes needed.
Number of Conveyor Transfer points (CT_n) is dependent on configuration and location of portable plant relative to the wash plant

NOx emissions rates were reported for the compliance assessment for the hot mix asphalt plant (ECA number 8-2129-79-987)
24 Hour 3.82E-01 g/s Quality D
1 Hour 7.64E-01 g/s Quality D
Assuming 2,640 tonnes/day or 220 tonnes/hour material throughput.

As a conservative assumption, emissions from Reeb Quarry are assumed equivalent to the total emissions from all sources at Law Quarry.

APPENDIX C

Appendix C: Bulk Material Handling Emissions Spreadsheet

Project #2202166

Law Crushed Stone

Material handling emissions: $E = 0.0016\ k\ (U / 2.2)^{1.3} / (M / 2)^{1.4}$

E emission factor
k particle size multiplier (0.8, 0.74, 0.35 and 0.053 for TSP, PM_{30}, PM_{10} and $PM_{2.5}$, respectively) [3]
U mean wind speed, meters per second (m/s)
M material moisture content (%)

AGGREGATE HANDLING AND STORAGE PILES - AP-42 Section 13.2.4

Average recorded hourly wind speed (m/s): 3.7
(used for sample calculations & factor validation)

Source ID [1]	Description	Processing Rate			Site Data				Base AP-42 Emission Factor				Base Emission Rate				Additional Control Efficiency Applied	Final Controlled Emission Rate at 3.7 m/s							
		Hourly	Daily	Annual	Site Specific Data?	Silt Content	Moisture Content	Source Conditions Valid [2]	TSP	PM_{10}	$PM_{2.5}$	Silica	TSP	PM_{10}	$PM_{2.5}$	Silica		TSP	Data Quality Rating	PM_{10}	Data Quality Rating	$PM_{2.5}$	Data Quality Rating	Silica	Data Quality Rating
		(Mg/h)	(Mg/d)	(Mg/y)	(y/n)	(%)	(%)		(kg/Mg)	(kg/Mg)	(kg/Mg)	(kg/Mg)	(g/s)	(g/s)	(g/s)	(g/s)	(%)	(g/s)		(g/s)		(g/s)		(g/s)	
Operations at Working Face & Portable Plant																									
LOAD1	Product Loading - Stockpiles	266	2656	265600	N	3.9%	2.1%	valid	2.3E-03	1.0E-03	1.6E-04	8.1E-05	1.7E-01	7.6E-02	1.1E-02	6.0E-03		1.7E-01	B	7.6E-02	B	1.1E-02	B	6.0E-03	B
LOAD2	Product Loading - Stockpiles 2	267	2672	267200	N	3.9%	2.1%	valid	2.3E-03	1.0E-03	1.6E-04	8.1E-05	1.7E-01	7.6E-02	1.2E-02	6.0E-03		1.7E-01	B	7.6E-02	B	1.2E-02	B	6.0E-03	B
Wash Plant																									
W_LOAD	Product Loading - Wash station	267	2672	267200	N	3.9%	4.8%	valid	7.4E-04	3.2E-04	4.9E-05	2.6E-05	5.5E-02	2.4E-02	3.6E-03	1.9E-03		5.5E-02	B	2.4E-02	B	3.6E-03	B	1.9E-03	B
W_LOADF	Feed Wash Station	267	2672	267200	N	3.9%	2.1%	valid	2.3E-03	1.0E-03	1.6E-04	8.1E-05	1.7E-01	7.6E-02	1.2E-02	6.0E-03		1.7E-01	B	7.6E-02	B	1.2E-02	B	6.0E-03	B
Asphalt Plant Sources (Provided by Miller Paving / Colas Canada)																									
SP1A	Delivery to stockpile - Coarse Aggregate	41	990			3.9%	4.8%	valid	7.4E-04	3.2E-04	4.9E-05	2.6E-05	8.5E-03	3.7E-03	5.6E-04	2.9E-04		8.5E-03		3.7E-03		5.6E-04		2.9E-04	
SP1B	Delivery to stockpiles - Sand	41	990			3.9%	4.8%	valid	7.4E-04	3.2E-04	4.9E-05	2.6E-05	8.5E-03	3.7E-03	5.6E-04	2.9E-04		8.5E-03		3.7E-03		5.6E-04		2.9E-04	
SP2	Delivery to stockpiles - RAP	22	528			3.9%	4.0%	valid	9.5E-04	4.2E-04	6.3E-05	3.3E-05	5.8E-03	2.5E-03	3.9E-04	2.0E-04		5.8E-03		2.5E-03		3.9E-04		2.0E-04	
B1A	Drop to cold feed bins - Coarse Agg.	41	990			3.9%	4.8%	valid	7.4E-04	3.2E-04	4.9E-05	2.6E-05	8.5E-03	3.7E-03	5.6E-04	2.9E-04		8.5E-03		3.7E-03		5.6E-04		2.9E-04	
B1B	Drop to cold feed bins - Sand	41	990			3.9%	4.8%	valid	7.4E-04	3.2E-04	4.9E-05	2.6E-05	8.5E-03	3.7E-03	5.6E-04	2.9E-04		8.5E-03		3.7E-03		5.6E-04		2.9E-04	
B2	Drop to cold feed bins - RAP	22	528			3.9%	4.0%	valid	9.5E-04	4.2E-04	6.3E-05	3.3E-05	5.8E-03	2.5E-03	3.9E-04	2.0E-04		5.8E-03		2.5E-03		3.9E-04		2.0E-04	
Reeb Quarry																									
REEB_MH	Product Loading at Reeb Quarry																	5.8E-01		2.5E-01		3.8E-02		2.0E-02	

[1] ID corresponds to process flow diagram for facility and / or material
[2] Relates to AP-42 Section 13.2.4-4
[3] k-factor for TSP (PM44) scaled up logarithmically to 0.8 from published k-factor of 0.74 which refers to PM30.

Sample calculation for uncontrolled TSP emission factor for Source LOAD1 : Product Loading - Stockpiles, at a sample wind speed of 3.7 m/s

EF = 0.0016 x (0.8) x ((3.7 m/s) / 2.2)^1.3 / ((2.1%) / 2)^1.4 = 2.3E-03 kg TSP / Mg handled

Sample calculation for TSP emission rate for Source LOAD1: Product Loading - Stockpiles, at a sample wind speed of 3.7 m/s

$$\frac{266\ Mg_{handled}}{1\ h} \left| \frac{2.3E\text{-}03\ kg_{TSP}}{1\ Mg_{handled}} \right| \frac{1\ h}{3600\ s} \left| \frac{1000\ g_{TSP}}{1\ kg_{TSP}} \right| \frac{100\%\ g_{TSP\ uncontrolled}}{1\ g_{TSP}} = 1.7E\text{-}01\ g_{TSP} / s$$

Comments
A silica content of: 7.9% was used in the assessment, based on airborn crystalline silica measured on Oct 18,2017
Shipping is assumed to have a maximum of : 800 tonnes/hour
As a conservative assumption, hourly tonnage reflects total hourly production split between 2 loading spots
Silt and moisture values reflect "various limestone products" on AP-42 Table 13.2.4.-1
After wash plant, moisture content was assumed to be similar to moisture provided in the ECA Number 8-2129-78-087 202 AERMOD Compliance Assessment;
4.8% Mositure content of Coarse Aggregate and Sand
4.0% Moisture content of RAP
As a conservative simpliction, emissions from Reeb Quarry are assumed equivalent to the total emissions from all sources at Law Quarry.

APPENDIX D

Appendix D: On-Site Mobile Equipment Emissions Spreadsheet - Fugitive Dust

Project #2202166

Law Crushed Stone

UNPAVED ROAD SECTIONS - AP-42 Section 13.2.2
PAVED ROAD SECTIONS - AP-42 Section 13.2.1

Paved Roads: $E = k\,(sL)^{0.91}\,(W)^{1.02}$
Unpaved Roads - Industrial: $E = 281.9\,k\,(s/12)^{a}\,(W/3)^{b}$
Unpaved Roads - Public: $E = 281.9\,k\,(s/12)^{d}\,(S/30)^{u}\,/\,(M/0.5)^{c} - C$

E particulate emission factor (g/VKT)
k particle size multiplier (see below)
sL road surface silt loading (g/m^2)
W average weight of the vehicles traveling the road (US short tons)
s surface material silt content (%)
C emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear
M surface material moisture content (%)
S mean vehicle speed (mph)
a,b,c,d constants (see below)

Route ID [1]	Route Description	Traffic Passes [2] Hourly (#/h)	Daily (#/d)	Annual (#/a)	Segment Length [2] (m)	Road Surface [3]	Roadway Type [4]	Mean Vehicle Speed (km/h)	(mph)	Average Vehicle Weight [5] (tons)	Surface Silt Content [7] (%)	Base AP-42 Emission Factor TSP (g/VKT)	PM_{10} (g/VKT)	$PM_{2.5}$ (g/VKT)	Silica (g/VKT)	Base Emission Rate TSP (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	Silica (g/s)	Additional Control Efficiency Applied (%)	Final Controlled Emission Rate TSP (g/s)	Data Quality Rating	PM_{10} (g/s)	Data Quality Rating	$PM_{2.5}$ (g/s)	Data Quality Rating	Silica (g/s)	Data Quality Rating
Operations at Working Face & Portable Plant																												
LDR	Loader Traffic Muck Pile to Grizzly	69.0	689.7	110345	50	Unpaved	Industrial	20	12	55.8	8.3%	6.2E+03	1.1E+03	1.1E+02	8.9E+01	5.9E+00	1.1E+00	1.1E-01	8.6E-02	95%	3.0E-01	C	5.4E-02	C	5.4E-03	C	4.3E-03	E
LD_01	Loader Traffic at stock pile 1	44.4	444.4	44267	25	Unpaved	Industrial	20	12	40.3	8.3%	5.3E+03	9.8E+02	9.8E+01	7.7E+01	1.6E+00	3.0E-01	3.0E-02	2.4E-02	95%	8.2E-02	C	1.5E-02	C	1.5E-03	C	1.2E-03	E
LD_02	Loader Traffic at stock pile 2	44.4	444.4	44533	25	Unpaved	Industrial	20	12	40.3	8.3%	5.3E+03	9.8E+02	9.8E+01	7.7E+01	1.6E+00	3.0E-01	3.0E-02	2.4E-02	95%	8.2E-02	C	1.5E-02	C	1.5E-03	C	1.2E-03	E
RD_01	Portable Plant Shipping Traffic	25.9	258.6	8586.9	1	Unpaved	Industrial	60	37	45.4	10.0%	6.3E+03	1.2E+03	1.2E+02	9.6E+01	4.5E-02	8.8E-03	8.8E-04	6.9E-04	95%	2.3E-03	C	4.4E-04	C	4.4E-05	C	3.5E-05	E
A_RD_01	*Portable Plant Shipping Traffic*	*25.9*	*258.6*	*8586.9*	*1111*	*Unpaved*	*Industrial*	*60*	*37*	*45.4*	*10.0%*	*6.3E+03*	*1.2E+03*	*1.2E+02*	*9.6E+01*	*5.0E+01*	*9.7E+00*	*9.7E-01*	*7.7E-01*	95%	*2.5E+00*	*C*	*4.9E-01*	*C*	*4.9E-02*	*C*	*3.8E-02*	*E*
B_RD_01	*Portable Plant Shipping Traffic*	*25.9*	*258.6*	*8586.9*	*1197*	*Unpaved*	*Industrial*	*60*	*37*	*45.4*	*10.0%*	*6.3E+03*	*1.2E+03*	*1.2E+02*	*9.6E+01*	*5.4E+01*	*1.0E+01*	*1.0E+00*	*8.3E-01*	95%	*2.7E+00*	*C*	*5.2E-01*	*C*	*5.2E-02*	*C*	*4.1E-02*	*E*
C_RD_01	*Portable Plant Shipping Traffic*	*25.9*	*258.6*	*8586.9*	*1337*	*Unpaved*	*Industrial*	*60*	*37*	*45.4*	*10.0%*	*6.3E+03*	*1.2E+03*	*1.2E+02*	*9.6E+01*	*6.0E+01*	*1.2E+01*	*1.2E+00*	*9.2E-01*	95%	*3.0E+00*	*C*	*5.9E-01*	*C*	*5.9E-02*	*C*	*4.6E-02*	*E*
D_RD_01	*Portable Plant Shipping Traffic*	*25.9*	*258.6*	*8586.9*	*1001*	*Unpaved*	*Industrial*	*60*	*37*	*45.4*	*10.0%*	*6.3E+03*	*1.2E+03*	*1.2E+02*	*9.6E+01*	*4.5E+01*	*8.8E+00*	*8.8E-01*	*6.9E-01*	95%	*2.3E+00*	*C*	*4.4E-01*	*C*	*4.4E-02*	*C*	*3.5E-02*	*E*
Wash Plant																												
W_LDR	Loader Traffic at Wash Pile	44.4	444.4	44533	25	Unpaved	Industrial	20	12	40.3	8.3%	5.3E+03	9.8E+02	9.8E+01	7.7E+01	1.6E+00	3.0E-01	3.0E-02	2.4E-02	95%	8.2E-02	C	1.5E-02	C	1.5E-03	C	1.2E-03	E
W_RD2	Wash Plant Shipping Traffic	13.0	129.7	4306.3	528	Unpaved	Industrial	60	37	45.4	10.0%	6.3E+03	1.2E+03	1.2E+02	9.6E+01	1.2E+01	2.3E+00	2.3E-01	1.8E-01	95%	6.0E-01	C	1.2E-01	C	1.2E-02	C	9.2E-03	E
W_LD1	Loader Traffic Feeding Wash plant	44.4	444.4	44533	25	Unpaved	Industrial	20	12	40.3	8.3%	5.3E+03	9.8E+02	9.8E+01	7.7E+01	1.6E+00	3.0E-01	3.0E-02	2.4E-02	95%	8.2E-02	C	1.5E-02	C	1.5E-03	C	1.2E-03	E
Asphalt Plant Sources (not required for ECA ESDM - added by RWDI)																												
P_SP	Haul Road - delivery to stockpiles	10.7	128.2	8738	394	Unpaved	Industrial	20	12	45.4	10.0%	6.3E+03	1.2E+03	1.2E+02	9.6E+01	3.7E+00	7.1E-01	7.1E-02	5.6E-02	95%	1.8E-01	C	3.6E-02	C	3.6E-03	C	2.8E-03	E
P_HMA	Haul Road - HMA shipping	10.7	128.2	8738	147	Unpaved	Industrial	20	12	45.4	10.0%	6.3E+03	1.2E+03	1.2E+02	9.6E+01	1.4E+00	2.7E-01	2.7E-02	2.1E-02	95%	6.8E-02	C	1.3E-02	C	1.3E-03	C	1.0E-03	E
P_LDR	Loader at Ashalt plant	36.7	440.0	30000	172	Unpaved	Industrial	20	12	40.3	10.0%	6.0E+03	1.2E+03	1.2E+02	9.1E+01	5.2E+00	1.0E+00	1.0E-01	8.0E-02	95%	2.6E-01	C	5.1E-02	C	5.1E-03	C	4.0E-03	E
Reeb Quarry																												
REEB_ME	Mobile Sources at Reeb Quarry																				######		8.16E-01		8.16E-02		6.44E-02	

Constants for Mobile Emission Equations

Roadway Type	Contaminant	k	a [7]	b [8]	PP [6]	d [6]	Quality
Paved Roads:	**$PM_{2.5}$**	0.15	-	-	-	-	-
	PM_{10}	0.62	-	-	-	-	LD
	PM_{30}	3.23	-	-	-	-	-
	TSP	4.79	-	-	-	-	-
Unpaved Roads - Industrial:	**$PM_{2.5}$**	0.15	0.9	0.45	-	-	C
	PM_{10}	1.5	0.9	0.45	-	-	B
	PM_{30}	4.9	0.7	0.45	-	-	B
	TSP	7.32	0.6	0.45	-	-	C
Unpaved Roads - Public:	**$PM_{2.5}$**	0.18	1	-	0.2	0.5	C
	PM_{10}	1.8	1	-	0.2	0.5	B
	PM_{30}	6	1	-	0.3	0.3	B
	TSP	8.96	1	-	0.49	0.2	C

Comments

A silica content of: 7.9% was used in the assessment, based on airborn crystalline silica measured on Oct 18,2017
Constants for TSP (PM44) extrapolated from published factors for PM30, PM10 and PM2.5. Data quality downgraded by one step.
Current working face loader Cat 988B, stock pile , wash plant and asphalt plant Cat 980H
Loader at working face (1) is a single Cat 988B (43.36Mg tare, 14.5Mg payload from Caterpillar specs)
Loaders at plant (2) are Cat 980H (30.52Mg tare, 12Mg payload, from Caterpillar specs)
It is assumed that the average fleet will be similar make of " 3-axle Truck and 4-axle Full Trailer, Aggregate Vehicle"
- Tare weight on average set to 21 tonnes, payload weight set to 41 tonnes (Gross Weight 62 tonnes)
Silt loading for haul rounds assumed 2X that from AP-42 Table 13.2.1-3, to account for some amount of potential dragout from the site.
Hourly and Daily traffic based off max 800 tonnes/hour shipping for 10 hours a day.
Annual traffic passes based on licence limits (800,000 tonnes/year)
Ashpalt plant emissions based off of 2640 tonnes/day and 180000 tonnes/year

As a conservative assumption, emissions from Reeb Quarry are assumed equivalent to the total emissions from all sources at Law Quarry.
(Route C_RD_01 used for shipping traffic).

[1] Route ID numbers provided on site plan.
[2] Length of a specific road segment. A separate segment should be used whenever one or more parameters change.
[3] Paved surfaces include asphalt, concrete, and recycled asphalt (if it forms a relatively consistent surface).
[4] Publicly accessible and dominated by light vehicles, or industrial, and dominated by heavy vehicles.
[5] The average vehicle weight reflects the average of the empty and loaded vehicle weight, for travel in both directions.
[6] Required only for publicly accessible unpaved roads.
[7] Required only for unpaved roads (public and industrial).
[8] Required only for industrial paved roads.

Sample calculation for uncontrolled TSP emission factor for Source LDR: Loader Traffic Muck Pile to Grizzly

EF = 281.9 x (4.9) x [(8.3% / 12)]^(0.7) x [(55.8 tons) / 3]^(0.45) = 6163 g TSP / vehicle kilometer travelled (vkt)

Sample calculation for TSP emission rate for Source LDR: Loader Traffic Muck Pile to Grizzly

$$\frac{69\ \text{vehicles}}{1\ \text{h}} \times \frac{50\ \text{m}}{} \times \frac{1\ \text{km}}{1000\ \text{m}} \times \frac{6163\ g_{TSP}}{1\ \text{vehicle km}} \times \frac{1\ \text{h}}{3600\ \text{s}} \times \frac{0.05\ g_{TSP\ \text{uncontrolled}}}{1\ g_{TSP}} = 2.95\text{E-}01\ g_{TSP}/\text{s}$$

APPENDIX E

Appendix E: Summary of Combustion Exhaust Emissions (Mobile and Stationary Sources)

Project #2202166

Law Crushed Stone

Source ID	Description	Gross Power Rating (kW)	Number Of Units	Traffic Passes [2] Hourly (#/h)	Traffic Passes [2] Daily (#/d)	Segment Length [3] (m)	Mean Vehicle Speed (km/h)	Load Factor [4] (%)	Tailpipe Emission Factor [5] TSP (g/vkt)	TSP (g/kW-h)	PM10 (g/vkt)	PM10 (g/kW-h)	PM2.5 (g/vkt)	PM2.5 (g/kW-h)	NOx (g/vkt)	NOx (g/kW-h)	Tailpipe Emission Rate TSP (g/s)	PM10 (g/s)	PM2.5 (g/s)	NOx (g/s)	Tailpipe + Fugitive Emission Rate [6] TSP (g/s)	PM10 (g/s)	PM2.5 (g/s)	NOx (g/s)
Operations at Working Face & Portable Plant																								
LDR	Loader Traffic Muck Pile to Grizzly	280	1	69.0	689.7	50	20	53%	--	0.02	--	0.02	--	0.02	--	6.6	8.2E-04	8.2E-04	8.2E-04	2.7E-01	3.0E-01	5.5E-02	6.2E-03	2.7E-01
LD_01	Loader Traffic at stock pile 1	260	1	44.4	444.4	25	20	53%	--	0.02	--	0.02	--	0.02	--	6.6	7.7E-04	7.7E-04	7.7E-04	2.5E-01	8.3E-02	1.6E-02	2.3E-03	2.5E-01
LD_02	Loader Traffic at stock pile 2	260	1	44.4	444.4	25	20	53%	--	0.02	--	0.02	--	0.02	--	6.6	7.7E-04	7.7E-04	7.7E-04	2.5E-01	8.3E-02	1.6E-02	2.3E-03	2.5E-01
RD_01	Portable Plant Shipping Traffic	n/a	n/a	25.9	258.6	1	60	n/a	0.83	--	0.83	--	0.83	--	6.98	--	6.0E-06	6.0E-06	6.0E-06	5.0E-05	2.3E-03	4.4E-04	5.0E-05	5.0E-05
A_RD_01	*Portable Plant Shipping Traffic*	*n/a*	*n/a*	*25.9*	*258.6*	*1111*	*60*	*n/a*	0.83	--	0.83	--	0.83	--	6.98	--	6.6E-03	6.6E-03	6.6E-03	*5.6E-02*	*2.5E+00*	*4.9E-01*	*5.5E-02*	*5.6E-02*
B_RD_01	*Portable Plant Shipping Traffic*	*n/a*	*n/a*	*25.9*	*258.6*	*1197*	*60*	*n/a*	0.83	--	0.83	--	0.83	--	6.98	--	7.1E-03	7.1E-03	7.1E-03	*6.0E-02*	*2.7E+00*	*5.3E-01*	*6.0E-02*	*6.0E-02*
C_RD_01	*Portable Plant Shipping Traffic*	*n/a*	*n/a*	*25.9*	*258.6*	*1337*	*60*	*n/a*	0.83	--	0.83	--	0.83	--	6.98	--	8.0E-03	8.0E-03	8.0E-03	*6.7E-02*	*3.0E+00*	*5.9E-01*	*6.7E-02*	*6.7E-02*
D_RD_01	*Portable Plant Shipping Traffic*	*n/a*	*n/a*	*25.9*	*258.6*	*1001*	*60*	*n/a*	0.83	--	0.83	--	0.83	--	6.98	--	6.0E-03	6.0E-03	6.0E-03	*5.0E-02*	*2.3E+00*	*4.4E-01*	*5.0E-02*	*5.0E-02*
Wash Plant																								
W_LDR	Loader Traffic at Wash Pile	260	1	44.4	444.4	25	20	53%	--	0.02	--	0.02	--	0.02	--	6.6	7.7E-04	7.7E-04	7.7E-04	2.5E-01	8.3E-02	1.6E-02	2.3E-03	2.5E-01
W_RD2	Wash Plant Shipping Traffic	n/a	n/a	13.0	129.7	528	60	n/a	0.83	--	0.83	--	0.83	--	6.98	--	1.6E-03	1.6E-03	1.6E-03	1.3E-02	6.0E-01	1.18E-01	1.32E-02	1.3E-02
W_LD1	Loader Traffic Feeding Wash plant	260	1	44.4	444.4	25	20	53%	--	0.02	--	0.02	--	0.02	--	6.6	7.7E-04	7.7E-04	7.7E-04	2.5E-01	8.3E-02	1.6E-02	2.3E-03	2.5E-01
Asphalt Plant Sources (not required for ECA ESDM - added by RWDI)																								
P_SP	Haul Road - delivery to stockpiles	n/a	n/a	10.7	128.2	394	20	53%	0.83	--	0.83	--	0.83	--	6.98	--	4.8E-04	4.8E-04	4.8E-04	8.2E-03	1.8E-01	3.6E-02	4.0E-03	8.2E-03
P_HMA	Haul Road - HMA shipping	n/a	n.a	10.7	128.2	147	20	53%	0.83	--	0.83	--	0.83	--	6.98	--	1.8E-04	1.8E-04	1.8E-04	3.0E-03	6.8E-02	1.3E-02	1.5E-03	3.0E-03
P_LDR	Loader at Ashalt plant	260	1	36.7	440.0	172	20	53%	--	0.02	--	0.02	--	0.02	--	6.6	7.7E-04	7.7E-04	7.7E-04	2.5E-01	2.6E-01	5.1E-02	5.8E-03	2.53E-01
Stationary Combustion Equipment																								
GEN	Portable Plant Generator Set	609	1	n/a	n/a	n/a	n/a	100%	--	0.63	--	0.63	--	0.63	--	6.4	1.1E-01	1.1E-01	1.1E-01	1.1E+00	1.1E-01	1.1E-01	1.1E-01	1.1E+00
Reeb Quarry																								
REEB_MB	Mobile Sources at Reeb Quarry																1.20E-01	1.20E-01	1.20E-01	2.45E+00	4.36E+00	9.36E-01	2.02E-01	2.45E+00

[1] ID should reflect Source ID or Route ID, as approprite.

[2] Where applicable, this value reflects travel in both directions (e.g., 1 round-trip = 2 passes)

[3] Length of a specific road segment. A separate segment should be used whenever one or more parameters change.

[4] Load Factors from "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", EPA-420-R-10-016, NR-005d, July 2010

[5] Emissions are input on either a vehicle distance or power rating basis. Load factor applies only to emissions based on power ratings.

[6] Applicable only for TSP, PM10 and PM2.5 emissions from mobile equipment. Emissions rates for NOx and stationary sources do not change.

Sample Calculations

Pit Loader Exhaust TSP Emissions:

$$\frac{280\ kW}{1}\ \frac{0.02\ g}{1\ kW\ h}\ \frac{53\%\ Load}{1}\ \frac{1\ h}{3600\ s} = 1.0E\text{-}03\ g_{TSP}/s$$

Truck Exhaust TSP from Wash Station:(10 Rd East)

$$\frac{13.0\ Vehicles}{1\ h}\ \frac{528\ m}{1}\ \frac{0.83\ g}{1\ Veh.\ Km}\ \frac{1\ km}{1000\ m}\ \frac{1\ h}{3600\ s} = 1.6E\text{-}03\ g_{TSP}/s$$

Comments
Emission factor from highway trucks based on U.S. EPA MOVES model at relevant speed for roadway segment.
Factors reflect highest of early morning, mid-day, and late-afternoon emission estimates provided by MOVES.
Working face loader rating based on Cat 988B Loader (www.ritchiespecs.com), Tier 2
Plant loader rating based on Cat 980H Loader (www.ritchiespecs.com), Tier 1
TSP (and PM2.5 emissions for loaders and generator sets) assumed to be equal to PM10 emissions.
Generator set engine (Cat 3412, 817hp) specification sheet provided by Toromont Tech Services.
Generator emissions were updated to reflect Tier 2 standards.
Generator exhaust data: 892.4ºF, 4,626.23 cfm — 478 ºC — 751 K
2.18 m³/s
Assume stack exit diameter of 12" — 0.30 m
30.8 m/s
Hourly and Daily traffic based on max 800 tonnes/hour shipping for 10 hours a day.
Annual traffic passes based on license limits (800,000 tonnes/year)
PM from Asphalt plant emissions based on 2640 tonnes/day
NOx from Asphalt plant based on 220 tonnes/hour (conservative)
Emissions from Reeb Quarry were conservatively assumed to be equivalent to the total emissions from all sources at Law Quarry (Route C_RD_01 used for shipping traffic).

APPENDIX F

Appendix F: Summary of Additional Emissions from Asphalt Plant

Law Crushed Stone Project # 2202166

Volume Sources

Modelling Source ID	Modelling Source Description	Emission Rate (g/s)				
		TSP (24H)	PM_{10} (24H)	$PM_{2.5}$ (24H)	NO_X (24H)	NO_X (1H)
H1	Hot Oil heater	0	0	0	2.35E-02	2.35E-02
ACTANKS	Asphalt Cement Storage Tanks	1.59E-04	1.59E-04	1.59E-04	0	0
SF1	HMA Silo Filling	6.41E-03	6.41E-03	6.41E-03	0	0
SF2	HMA Silo Filling	6.41E-03	6.41E-03	6.41E-03	0	0
SL1	HMA truck loadout from HMA silos	6.59E-03	6.59E-03	6.59E-03	0	0
SL2	HMA truck loadout from HMA silos	6.59E-03	6.59E-03	6.59E-03	0	0
BL	HMA truck loadout from batch tower	1.32E-02	1.32E-02	1.32E-02	0	0

Point Sources

Modelling Source ID	Modelling Source Description	Emission Rate (g/s)				
		TSP (24H)	PM_{10} (24H)	$PM_{2.5}$ (24H)	NO_X (24H)	NO_X (1H)
BH	Baghouse.servicing the HMA plant including the Natural gas-fired dryer/mixing	6.42E-01	6.42E-01	6.42E-01	3.82E-01	7.64E-01

Comments
Emissions were obtained from compliance assessment for the hot mix asphalt plant (ECA number 8-2129-79-987) Emissions that were dependent on wind speeds were modelled alongside of wind erosion or handling Emissions that needed size distribution are displayed in Processing and Handling to calculate All asphalt plant emissions were reduced to 25% in Winter (Jan, Feb, March) based on the compliance assessment for the hot mix asphalt plant (ECA number 8-2129-79-987)