FINAL

Air Quality Assessment Report

Meridian Brick Canada Ltd.
5155 Dundas Street West
Burlington, ON
L7R 3Y2

Submitted To:

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EXECUTIVE SUMMARY

Meridian Brick Canada Ltd. operates the Aldershot Quarry at its 1775 King Street, Burlington, ON site.

This Air Quality Assessment (AQA) report documents the expected emissions from the facility. This AQA report was completed voluntarily as part of the company's internal environmental initiatives. The report has been prepared in accordance with O.Reg.419/05 and the "Procedure for Preparing an Emission Summary and Dispersion Modelling Report", published by the MOECC in February 2017. All potential sources and contaminants have been identified and assessed for significance; those deemed insignificant have been rationalized and tabulated.

Processes include excavation, material delivery, road dust (on-site and on King Road from the facility entrance to the North Service Road), and wind erosion from piles. The airborne emissions assessed from the facility were crystalline silica and speciated particulate matter; specifically respirable (PM_{10}), inhalable ($PM_{2.5}$) and total particulate matter (PM).

The assessment captured operation at the Centre and future East Quarry. Three scenarios were considered for the assessment, based on three time periods:

- A 1 - 5 Year Scenario (Centre Quarry only),
- A 6 - 15 Year Scenario (Centre and East Quarry), and
- A 16 - 25 Year Scenario (East Quarry Only).

The US EPA AERMOD dispersion model was used to predict the maximum point of impingement (POI) contaminant concentrations. The modelled concentration was compared to the regulatory benchmarks of O.Reg.419/05, where applicable.

Background concentrations were added to the modelled concentrations using data from the MOECC's Burlington Monitoring station. The combined concentration (background plus modelled concentration) was compared to applicable Ontario Ambient Air Quality Criteria (AAQCs).

A Short Term Predictive Ambient Air Quality Program was performed in conjunction with this AQA.

The results of this AQA were provided to Intrinsik Corp, to be used as part of a Screening Level Human Health Risk Assessment (SLHHRA). The maximum results have been included in Table A4a and combined concentrations have been included in A4b. The maximum results in Table A4a indicate that the facility emissions result in maximum POI concentrations that are below the regulatory benchmarks of O.Reg. 419/05, where applicable.

The results found in Table A4b indicate that the combined concentrations are below the AAQCs for PM and $PM_{2.5}$, and above for crystalline silica and PM_{10}. However, a more detailed analysis of the combined concentrations found when adding the modelled results to the background concentration for the same day

was completed as part of the SLHHRA. This analysis found that for all values above the AAQCs, the results were driven by the background concentrations (i.e., bad air days). Furthermore, the results of an Ambient Air Quality Program were found to be below all respective AAQC.

Table A4a. Emission Summary Table Without Background Concentrations

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	MOE Benchmark Limit (µg/m^3)	Averaging Period (h)
1 - 5 Year Scenario						
Crystalline Silica	14808-60-7	2.52E-01	AERMOD	95.6	-	1
			AERMOD	4.68	5	24
			AERMOD	0.410 *	-	Annual
Particulate matter	n/a	4.46E+00	AERMOD	1683	-	1
			AERMOD	79.0	120	24
			AERMOD	6.49 *	-	Annual
PM10	n/a	1.33E+00	AERMOD	501	-	1
			AERMOD	24.6	-	24
			AERMOD	2.16 *	-	Annual
PM2.5	n/a	1.45E-01	AERMOD	52.7	-	1
			AERMOD	2.93	-	24
			AERMOD	0.280 *	-	Annual
6 - 15 Year Scenario						
Crystalline Silica	14808-60-7	2.97E-01	AERMOD	57.9	-	1
			AERMOD	3.90	5	24
			AERMOD	0.253 *	-	Annual
Particulate matter	n/a	5.23E+00	AERMOD	1014	-	1
			AERMOD	57.9	120	24
			AERMOD	3.72 *	-	Annual
PM10	n/a	1.56E+00	AERMOD	304	-	1
			AERMOD	20.5	-	24
			AERMOD	1.33 *	-	Annual
PM2.5	n/a	1.70E-01	AERMOD	31.9	-	1
			AERMOD	2.61	-	24
			AERMOD	0.174 *	-	Annual

Table A4a. Emission Summary Table Without Background Concentrations

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	MOE Benchmark Limit (µg/m^3)	Averaging Period (h)
16 - 25 Year Scenario						
Crystalline Silica	14808-60-7	2.75E-01	AERMOD	49.7	-	1
			AERMOD	3.23	5	24
			AERMOD	0.238 *	-	Annual
Particulate matter	n/a	4.90E+00	AERMOD	882	-	1
			AERMOD	51.7	120	24
			AERMOD	3.60 *	-	Annual
PM10	n/a	1.45E+00	AERMOD	261	-	1
			AERMOD	18.0	-	24
			AERMOD	1.26 *	-	Annual
PM2.5	n/a	1.56E-01	AERMOD	27.0	-	1
			AERMOD	2.15	-	24
			AERMOD	0.154 *	-	Annual

*5-year annual average result was increased by a factor of 140% to account for potential variability between the overall 5-year annual average versus the maximum annual result per individual year.

Table A4b. Emission Summary Table With Backround Concentrations

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	Background Concentratrion (µg/m^3)	Maximum Concentration with Background (µg/m^3)	Ontario Ambient Air Quality Criteria (AAQC) (µg/m^3)	Averaging Period (h)
1 - 5 Year Scenario								
Crystalline Silica	14808-60-7	2.52E-01	AERMOD	95.6	2.44	98.0	-	1
			AERMOD	4.68	2.20	6.88	5	24
			AERMOD	0.410 *	1.19	1.60	-	Annual
Particulate matter	n/a	4.46E+00	AERMOD	1683	36.9	1720	-	1
			AERMOD	79.0	33.3	112	120	24
			AERMOD	6.49 *	18.0	24.5	60	Annual
PM10	n/a	1.33E+00	AERMOD	501	46.7	548	-	1
			AERMOD	24.6	42.2	66.8	50	24
			AERMOD	2.16 *	22.8	24.9	-	Annual
PM2.5	n/a	1.45E-01	AERMOD	52.7	16.6	69.3	-	1
			AERMOD	2.93	15.0	17.9	30	24
			AERMOD	0.280 *	8.09	8.37	-	Annual
6 - 15 Year Scenario								
Crystalline Silica	14808-60-7	2.97E-01	AERMOD	57.9	2.44	60.3	-	1
			AERMOD	3.90	2.20	6.10	5	24
			AERMOD	0.253 *	1.19	1.44	-	Annual
Particulate matter	n/a	5.23E+00	AERMOD	1014	36.9	1051	-	1
			AERMOD	57.9	33.3	91	120	24
			AERMOD	3.72 *	18.0	21.7	60	Annual
PM10	n/a	1.56E+00	AERMOD	304	46.7	351	-	1
			AERMOD	20.5	42.2	62.7	50	24
			AERMOD	1.33 *	22.8	24.1	-	Annual
PM2.5	n/a	1.70E-01	AERMOD	31.9	16.6	48.5	-	1
			AERMOD	2.61	15.0	17.6	30	24
			AERMOD	0.174 *	8.09	8.26	-	Annual

Table A4b. Emission Summary Table With Backround Concentrations

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	Background Concentratrion (µg/m^3)	Maximum Concentration with Background (µg/m^3)	Ontario Ambient Air Quality Criteria (AAQC) (µg/m^3)	Averaging Period (h)
16 - 25 Year Scenario								
Crystalline Silica	14808-60-7	2.75E-01	AERMOD	49.7	2.44	52.1	-	1
			AERMOD	3.23	2.20	5.44	5	24
			AERMOD	0.238 *	1.19	1.43	-	Annual
Particulate matter	n/a	4.90E+00	AERMOD	882	36.9	918	-	1
			AERMOD	51.7	33.3	85	120	24
			AERMOD	3.60 *	18.0	21.6	60	Annual
PM10	n/a	1.45E+00	AERMOD	261	46.7	308	-	1
			AERMOD	18.0	42.2	60.2	50	24
			AERMOD	1.26 *	22.8	24.0	-	Annual
PM2.5	n/a	1.56E-01	AERMOD	27.0	16.6	43.6	-	1
			AERMOD	2.15	15.0	17.2	30	24
			AERMOD	0.154 *	8.09	8.24	-	Annual

*5-year annual average result was increased by a factor of 140% to account for potential variability between the overall 5-year annual average versus the maximum annual result per individual year.

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1.0 INTRODUCTION AND FACILITY DESCRIPTION

1.1 Purpose and Scope of AQA Report

This Air Quality Assessment (AQA) report documents the expected emissions from the facility. This AQA report was completed voluntarily as part of the company's internal environmental initiatives. The report has been prepared in accordance with O.Reg.419/05 and the "Procedure for Preparing an Emission Summary and Dispersion Modelling Report", published by the MOE in February 2017. All potential sources and contaminants have been identified and assessed for significance; those deemed insignificant have been rationalized and tabulated.

1.2 Description of Facility and Processes

Meridian Brick Canada Ltd. (Meridian Brick) operates the Aldershot Quarry at its 1775 King Street, Burlington, ON site. The current quarry comprises 3 parts, with a brick plant in the West Quarry, and excavation currently in process at the Centre Quarry, and no operations currently at the East Quarry.

The adjacent land surrounding the facility includes homes to the north-east, a school (Fern Hill School) to the south-east, and a gun club and model airplane club to the south-west. The site is approximately 585 metres north of Highway 403.

There are no buildings or structures at the Centre or future East Quarry. The main process of the facility is the excavation of shale from the quarry. Excavation is done using a bulldozer and front end loader. In the Centre quarry, the bulldozer "rips" the material downhill (C_EX), then pushes the shale uphill to a stockpile, with the reverse to be done at the East Quarry (material ripped uphill (E_EX), and pushed to a downhill stockpile). A front-end loader (C_LOAD and E_LOAD) is used to gather the material, and to manage the piles (C_LP1, C_LP2 and E_LP1). The front-end loader is also used to load the material to the haul trucks (C_TRUCK and E_TRUCK). The haul trucks transport the material off-site (C_HAUL & E_HAUL). For the purposes of this assessment, emissions from the haul trucks along King Road from the facility entrance to the North Service Road was also considered (ROAD). Emissions from wind erosion of storage piles were also considered (C_PILE1, C_PILE2 and E_PILE1).

1.3 Description of Products and Raw Materials

The main material extracted from the quarry is shale, which is used in the production of bricks. The shale material is not processed on-site (i.e., no mechanical crushing or screening).

Currently all operations occur at the Centre Quarry. The current plan, is for all shale to be derived from the Centre Quarry, for the next 5 years, then both the Centre and East Quarry will produce 150,000 tonnes/year to 200,000 tonnes/year, until the Centre Quarry is depleted. Following this, the East Quarry will be the sole source of material, until it is depleted.

For the purposes of this assessment, it was assumed that a maximum of 400,000 tonnes/year will be extracted from either quarry combined. This may be conservative, as the current plans for the quarry are more in-line with a plan of extracting 300,000 tonnes/year, but has been considered to provide the facility with more flexibility, and a worst-case estimate of emissions.

This assessment focuses on three scenarios:

- **1 - 5 Year Scenario**: the facility between years 1 and 5, when all extraction activities will occur in the Centre quarry (400,000 tonnes/year), and no activities in the East quarry,
- **6 - 15 Year Scenario**: the facility between years 6 and 15, when the extraction activities are underway at both the Centre and East quarry at the same capacity (200,000 tonnes/year each, or 400,000 tonnes/year total), and
- **16 - 25 Year Scenario**: the facility between years 16 and 25, when all extraction activities will occur in the East quarry (400,000 tonnes/year), and no activities in the Centre quarry.

A maximum of six (6) haul trucks will be received by the facility per hour. Therefore, the trucks were assumed to be received as follows:

- **1 - 5 Year Scenario**: six (6) haul trucks will be received by the Centre quarry only,
- **6 - 15 Year Scenario**: three (3) haul trucks at the Centre quarry and three (3) at the East quarry, and
- **16 - 25 Year scenario**: six (6) haul trucks will be received by the East quarry only.

As the main entrance to the facility is at the Centre quarry, all trucks to be received by the East quarry would drive through the Centre quarry first.

1.4 Operating Schedule

Extraction from the quarry occurs 200 days per year. The facility operates between the hours of 7am to 4pm, Monday to Friday, however, haul trucks are only received between the hours of 9am and 4pm.

2.0 INITIAL IDENTIFICATION OF SOURCES AND CONTAMINANTS

2.1 Sources and Contaminants Identification Table

Sources of emissions assessed in this study were:

- Excavation of material from the quarry (C_EX and E_EX),
- Transport of active material by front-end loader (C_LOAD and E_LOAD),
- Material delivery to storage piles by front-end loader (C_LP1, C_LP2 and E_LP1),
- Material delivery to haul trucks (C_TRUCK and E_TRUCK),

- Road dust from haul trucks on unpaved internal haul routes (C_HAUL & E_HAUL),
- Wind erosion from piles (C_PILE1, C_PILE2 and E_PILE1), and
- Road dust on King Road (paved) from haul trucks (ROAD).

The airborne emissions assessed from the facility were crystalline silica and speciated particulate matter; specifically respirable (PM_{10}), inhalable ($PM_{2.5}$) and total particulate matter (PM).

O.Reg.419/05 assesses crystalline silica as respirable silica (i.e. < 10 µm). Emissions of crystalline silica were determined by assessing each process's particulate matter emissions at <10 µm (i.e., PM_{10}) and then pro-rating the emission rate by the percent composition of crystalline silica. The percent composition of crystalline silica (19%) was obtained from a Material Safety Data Sheet (MSDS) provided by Meridian Brick. This should provide a conservative estimate, as the MSDS would provide a maximum composition.

3.0 ASSESSMENT OF THE SIGNIFICANCE OF CONTAMINANTS AND SOURCES

3.1 Identification of Negligible Contaminants and Sources

Some sources/contaminants at the facility have been deemed insignificant, or were not considered in this assessment. These sources/contaminants are listed in the following section, with a rationale provided.

3.2 Rationale for Assessment

- As new areas are prepared for material extraction, topsoil and overburden stripping and removal, will occur, as will tree removal. Furthermore, once the material has been depleted from a quarry, rehabilitation (i.e., backfilling with soil, tree planting) will follow. Though, these processes may be considered a source of potential emissions, these are operations that were not considered to be consistent with normal or typical operations of the quarry and were not included as part of this assessment.
- This assessment was requested by Meridian to confirm whether East Quarry air quality forecasts, approved during the 1990s Tyandaga West subdivision planning process, were consistent with current Provincial standards and to provide estimates of silica for an assessment of human health implications. As such the assessment only focuses on these contaminants.

4.0 OPERATING CONDITIONS, EMISSION ESTIMATES AND DATA QUALITY

4.1 Description of Operating Conditions

Emission calculations and dispersion modelling were based on the following worst case operating conditions:

- Excavation of material from the quarry (C_EX and E_EX), was assessed based on one bulldozer, when the plant is in operation, travelling at 3 kilometers/hour along an 800 meter active quarry slope. The average weight of the bulldozer was assumed to be 25 tons. The active extraction area is unpaved, and watering is not feasible. A control efficiency of 80% was assumed for winter periods only, to account for increased moisture levels, such as snow and ice build-up and the natural high water content of shale. No control efficiency was applied for the remaining months.
- Transport of active material by front-end loader (C_LOAD and E_LOAD), was assessed based on 222 tonnes/hour of extracted material at the Centre or East quarry, during the 1 - 5 Year and 16 - 25 Year Scenarios, respectively, or 111 tonnes/hour at each quarry for the 6 - 15 Year Scenario.
- Material delivery to storage piles by front-end loader (C_LP1, C_LP2 and E_LP1), was assessed based on 222 tonnes/hour of extracted material at the Centre or East quarry, during the 1 - 5 Year and 16 - 25 Year Scenarios, respectively, or 111 tonnes/hour at each quarry for the 6 - 15 Year Scenario.
- Material delivery to haul trucks (C_TRUCK and E_TRUCK), was assessed based on 222 tonnes/hour of extracted material at the Centre or East quarry, during the 1 - 5 Year and 16 - 25 Year Scenarios, respectively, or 111 tonnes/hour at each quarry for the 6 - 15 Year Scenario.
- Road dust from haul trucks on unpaved haul routes (C_HAUL & E_HAUL) was assessed based on six (6) trucks/hour travelling on unpaved haul routes at the Centre or East quarry, during the 1 - 5 Year and 16 - 25 Year Scenarios, respectively, or three (3) trucks/hour at each quarry for the 6 - 15 Year Scenario. Though the haul routes are unpaved, a control efficiency of 80% was applied for water suppression and the natural high water content of shale. The average weight of the haul trucks was assumed to be 35 tons. The routes travelled by the haul trucks were provided by Meridian Brick, and was used to derive the distances travelled for the emission estimates.
- Wind erosion from piles (C_PILE1, C_PILE2 and E_PILE1), were assumed assuming two smaller piles at the Centre quarry, and one larger one at the East Quarry. The dimensions of the piles were estimated based on a site visit conducted on March 28, 2017, and satellite imagery. All piles were assumed to be 4.5 metres tall.
- Road dust on King Road (paved) from haul trucks (ROAD) was assessed based on six (6) trucks/hour travelling on King Road from the entrance of the facility to the North Service Road to the south of the facility, during all scenarios. The average weight of the haul trucks was assumed to be 35 tons.

5.0 SOURCE SUMMARY TABLE AND SITE PLAN

5.1 Source Summary Table

The Source Summary Tables are provided as Table A1 to A3 (for the 5, 10 and 16 - 25 Year Scenarios, respectively), Appendix A.

5.2 Site Plan

The property boundary, source locations and haul routes are given in Figures B1 to B3 (for the 5, 10 and 16 - 25 Year Scenarios, respectively), for the Appendix B.

6.0 DISPERSION MODELLING

6.1 Description of Dispersion Modelling

The US EPA AERMOD dispersion model (v. 14134) was used to predict the maximum point of impingement (POI) concentrations of contaminants. The modelling was conducted in accordance with the Air Dispersion Modelling Guideline for Ontario (ADMGO), Version 3.0, March 2017.

6.2 AERMOD Model

The site contains no major structures, or point sources so building downwash was not a concern. Receptors were placed in the model at select locations within an approximate radius of 1000 metres of the facility, as detailed in section 6.4 of this report. The digital elevation dataset for Burlington from the MOECC's website was entered into the model. The surrounding area is a mix of rural and urban areas; therefore, the "RURAL" dispersion factor was chosen, as it is both more conservative than the "URBAN" option, and based on previous experience, the preferred methodology by MOECC reviewers. The MOECC provided local meteorological data (5 years) that is applicable for the site and its surrounding land use. The data provided covers the years 2012 to 2016.

NOTE 1: Base elevations for all sources and receptors are values assigned by the AERMOD terrain processor. Some sources are located (or begin) in the base of the quarry pit and their respective terrain heights were adjusted to reflect this. Therefore these elevations were manually entered.

Most sources were modelled as "Volume" sources, located where emission are most likely to occur. Other sources, such as haul routes and material extraction, were assessed as "Line" Sources, as the emissions would be occur along the path the sources travel. A summary of the source types selected is included below:

- Excavation of material from the quarry (C_EX and E_EX) **- LINE**

- Transport of active material by front-end loader (C_LOAD and E_LOAD) **- LINE**
- Material delivery to storage piles by front-end loader (C_LP1, C_LP2 and E_LP1) **- VOLUME**
- Material deliver to haul trucks (C_TRUCK and E_TRUCK) **- VOLUME**
- Road dust from haul trucks on unpaved haul routes (C_HAUL & E_HAUL) **- LINE**
- Wind erosion from piles (C_PILE1, C_PILE2 and E_PILE1) **- VOLUME**
- Road dust on King Road (paved) from haul trucks (ROAD) **- LINE**

Modelling source parameters were developed using guidance provided by the National Sand Stone and Gravel Association. Additional guidance for "Line" source development was obtained from the software developed by Lakes Environmental.

The quarry operates between the hours of 7am and 4pm, Monday to Friday; as such, emissions from all sources (with exception of wind erosion of piles) were set to zero outside of these hours. Wind erosion from piles was assumed to occur 24 hours/day, 7 days/week, 52 weeks/year.

Crystalline silica, PM_{10}, $PM_{2.5}$ and PM were modelled separately (Silica.isc, PM10.isc, PM25.isc, and TSP.isc, respectively).

NOTE 2: Modelled concentrations were assessed based on a 1-hour, 24-hour and an annual basis. One model was run for each contaminant which outputted the 5 year annual average concentration. Since there may be some variability between an individual years' maximum annual concentration versus the 5 year annual average concentration, the outputted result was scaled up by a factor of 140% (i.e., 1.40). It should be noted that this is deemed to be very conservative as the variability between the 5 year annual average concentration and the individual years' maximum concentration is not expected to be that great.

6.3 Receptor Summary

The adjacent land surrounding the facility includes homes to the north-east, a school (Fern Hill School) to the south-east, and a gun club and model airplane club to the south-west. The site is approximately 585 metres north of Highway 403.

Receptors were placed in thirty-five (35) discrete locations within an approximate 1000 metre radius of the facility for the dispersion modelling. These locations were selected to represent homes, schools, churches, or anywhere else people may congregate. These locations were selected based on a combination of a driving tour of the area (completed by Meridian Brick, March 31, 2017) and a review of satellite imagery. Table 6.4 (below) summarizes these source locations, and the receptor heights

selected for the model. In some cases two heights were selected to represent the receptor (for example one height to represent a first-floor window, and another for a two-story window).

A Site Plan showing the location of the site and all receptors can be found in Figure B4, Appendix B.

Table 6.4. Receptor Summary

Receptor ID	Description	Receptor Address	Receptor Type	Receptor Height (m)	Receptor Height (m)
R1	Westhaven Drive - Receptor 1	Westhaven Drive	Residential Area	1.5	4.5
R2	Westhaven Drive - Receptor 2	Westhaven Drive	Residential Area	1.5	4.5
R3	Westhaven Drive - Receptor 3	Westhaven Drive	Residential Area	1.5	4.5
R4	Westhaven Drive - Receptor 4	Westhaven Drive	Residential Area	1.5	4.5
R5	Westhaven Drive - Receptor 5	Westhaven Drive	Residential Area	1.5	4.5
R6	Westhaven Drive - Receptor 6	Westhaven Drive	Residential Area	1.5	4.5
R7	Tyanadaga Oaks - Receptor 1	Skyview Drive	Residential Area	1.5	4.5
R8	Tyanadaga Oaks - Receptor 2	Skyview Drive	Residential Area	1.5	4.5
R9	Forestvale Drive - Receptor 1	Forestvale Drive	Residential Area	1.5	4.5
R10	Forestvale Drive - Receptor 2	Forestvale Drive	Residential Area	1.5	4.5
R11	Crofton Way - Receptor 1	Crofton Way	Residential Area	1.5	4.5
R12	Heather Hills Drive - Receptor 1	Heather Hills Drive	Residential Area	1.5	4.5
R13	Scenic Point - Receptor 1	Scenic Point	Residential Area	1.5	4.5
R14	Four Seasons Drive - Receptor 1	Four Seasons Drive	Residential Area	1.5	4.5
R15	Four Seasons Drive - Receptor 2	Four Seasons Drive	Residential Area	1.5	4.5
R16	Kerns Road - Receptor 1	Kerns Road	Residential Area	1.5	4.5
R17	Kerns Road - Receptor 2	Kerns Road	Residential Area	1.5	4.5
RX18	Kids & Company	1600 Kerns Rd (cnr Four Seasons)	Day Care Centre	1.5	-
RX19	The Ressel Day Nursery School	2138 Brant St	Day Care Centre	1.5	-
RX20	Willowbrae Academy	1250 Brant St	Day Care Centre	1.5	-
RX21	Kid Logic	Cnr Brant & Upper Middle	Day Care Centre	1.5	-
RX22	Kerns Park	Kerns Road opp Village Green	Play Grounds	1.5	-
RX23	Forest Vale Park	Forestvale Drive	Play Grounds	1.5	-
RX24	Performance School of Music & Dance	1600 Kerns Rd	School	1.5	4.5
RX25	Fern Hill School	801 North Service Rd	School	1.5	4.5
RX26	Compass Point Bible Church	1500 Kerns Rd	Church	1.5	4.5
RX27	Crossroads Family of Ministry	1295 North Service Rd	Church	1.5	4.5
RX28	Brant Hills Presbyterian Church	2138 Brant St	Church	1.5	4.5
RX29	Burlington Christian Fellowship	2030 Mountain Side	Church	1.5	4.5
RX30	Associated Gospel Churches	1500 Kerns Rd	Church	1.5	4.5
RX31	Tyanadaga Golf Club	1265 Tyanadaga Park Dr	Sport	1.5	-
RX32	Tyandaga Tennis Club	1265 Tyanadaga Park Dr	Sport	1.5	-
RX33	Burlington Rifle & Revolver Club	1540 King Rd	Sport	1.5	-
RX34	Bayview Park Model airplane Club	King Rd	Sport	1.5	-
RX35	Talc Academy	2054 Mountainside Dr	School	1.5	4.5

6.4 Background Concentrations

In order to provide a more complete assessment of the concentrations at each receptor, a background concentration can be added to provide a cumulative assessment (i.e., modelled concentrations from the facility plus to background concentrations). As such, background concentrations were obtained from the nearest MOECC monitoring station, located at North Shore Blvd. E./Lakeshore Rd., Burlington.

The station is located in close proximity to the Queen Elizabeth Expressway and near the Skyway bridge. As this is a high traffic area, it is possible that this would lead to conservative estimates of background concentrations from cars and trucks. The station is located approximately 4.2 kilometres south of the site.

The 90th percentile concentration was extracted from the available station for a 1-hour, and 24-hour basis, as well as the annual average concentration. Only $PM_{2.5}$ data is available from the station data, as such the values were converted as detailed below.

Table 6.6 - Background Concentrations

Contaminant	Parameter	Year					
		2011	2012	2013	2014	2015	Average
Crystalline Silica*	1-hour avg. (µg/m³)	2.1	2.1	2.5	2.6	2.9	**2.4**
	24-hour avg. (µg/m³)	1.8	1.9	2.2	2.5	2.6	**2.2**
	Annual Average (µg/m³)	0.9	0.9	1.3	1.4	1.4	**1.2**
Particulate matter**	1-hour avg. (µg/m³)	31.1	31.1	37.8	40.0	44.4	**36.9**
	24-hour avg. (µg/m³)	26.7	28.9	33.3	37.8	40.0	**33.3**
	Annual Average (µg/m³)	13.8	14.3	19.4	21.7	20.7	**18.0**
PM_{10}***	1-hour avg. (µg/m³)	39.4	39.4	47.8	50.6	56.3	**46.7**
	24-hour avg. (µg/m³)	33.8	36.6	42.2	47.8	50.6	**42.2**
	Annual Average (µg/m³)	17.4	18.0	24.6	27.4	26.3	**22.8**
$PM_{2.5}$	1-hour avg. (µg/m³)	14	14	17	18	20	**16.6**
	24-hour avg. (µg/m³)	12	13	15	17	18	**15**
	Annual Average (µg/m³)	6.2	6.4	8.8	9.8	9.3	**8.1**

Data From NAPS Station 063001 (Burlington, Hwy 2 and Northshore Blvd).

*Environment Canada (Screening Assessment for the Challenge <https://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=1EB4F4EF-1>) estimated that 5.22% of PM_{10} from monitoring studies is crystalline silica.

**Total Particulate matter background concentrations were not available. US-EPA AP-42, Appendix B.2 (Generalized Particle Size Distributions) states that for Combustion - Mixed Fuels, 45% of total Particulate Matter is $PM_{2.5}$.

***PM10 background concentrations were not available. US-EPA AP-42, Appendix B.2 (Generalized Particle Size Distributions) states that for Combustion - Mixed Fuels, 79% of total Particulate Matter is PM_{10}.

Adding background concentrations to modelled concentrations should be considered conservative, as the worst-case results occurring from the facility are not likely to occur at the same time as the worst-case background concentrations. For the purposes of this report, the maximum modelled concentrations have been added to the background concentrations. However, a summary of the daily modelled

concentrations added to the daily background concentrations for the corresponding day, was provided to Intrinsik Corp. This data would represent a more realistic scenario.

7.0 EMISSION SUMMARY TABLE AND CONCLUSIONS

7.1 Emission Summary Table

The maximum POI concentration of contaminants predicted by the dispersion modelling is included in Table A4a, "Emission Summary Table", given in Appendix A. The modelled concentration results were compared to the regulatory benchmarks of O.Reg.419/05, where applicable.

The combined POI concentration of contaminants predicted by the dispersion modelling and the background concentrations (i.e, background plus modelled concentration), are included in Table A4b, "Emission Summary Table", given in Appendix A. The combined concentration was compared to applicable Ontario Ambient Air Quality Criteria (AAQCs).

Though the maximum combined concentrations presented in Table A4b demonstrate values for crystalline silica and PM_{10} which are above the Ontario Ambient Air Quality Criteria (AAQC), these values were based on the maximum modelled concentration added to the 90th percentile background concentration, and may not reflect conditions that are occurring in reality (i.e.,, the maximum concentration from the facility may not occur at the same time as elevated background concentrations). A more detailed analysis of the data performed as part of the SLHHRA (which combined the modelled concentration results with the actual corresponding results for each individual day) found any values above the AAQC to be driven by the background data (i.e., bad air days).

7.2 Ambient Air Quality Program

As part of the company's internal environmental initiatives, Meridian Brick performed a voluntary, short-term ambient sampling program for respirable silica and speciated particulate matter (PM); specifically respirable (PM_{10}) and inhalable ($PM_{2.5}$) at their centre quarry, to estimate potential downwind impact. The short-term ambient program was conducted on four (4) separate days between October 3, 2017 and October 20, 2017. Warm, dry days were targeted.

The results of this monitoring program were compared against 24-hour Ontario Ambient Air Quality Criteria (AAQC) at three locations within the site perimeter. Based on this monitoring program, all results were found to be below their respective AAQC. Results from this program were provided to Meridian Brick as a separate report.

7.3 Conclusions

The results of this AQA were provided to Intrinsik Corp, to be used as part of a Screening Level Human Health Risk Assessment (SLHHRA). The maximum results have been included in Table A4a and

combined concentrations have been included in A4b. The maximum results in Table A4a indicate that the facility emissions result in maximum POI concentrations that are below the regulatory benchmarks of O.Reg. 419/05, where applicable.

The results found in Table A4b indicate that the combined concentrations are below the AAQCs for PM and $PM_{2.5}$, and above for crystalline silica and PM_{10}. However, a more detailed analysis of the combined concentrations found when adding the modelled results to the background concentration for the same day was completed as part of the SLHHRA. This analysis found that for all values above the AAQCs, the results were driven by the background concentrations (i.e., bad air days). Furthermore, the results of an Ambient Air Quality Program were found to be below all respective AAQC.

8.0 REFERENCES

1. "Procedure for Preparing an Emission Summary and Dispersion Modelling Report", Ministry of the Environment and Climate Change, February 2017.
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3. Meridian Brick, "Safety Data Sheet, Brick & Structural Clay Units", October 6, 2015.
4. Meridian Brick, "Centre & East Site Operational Plan", April, 2017.
5. "Air Dispersion Modelling Guideline for Ontario (ADMGO), Version 3.0", Ministry of the Environment and Climate Change, March 2017.
6. "Modeling Fugitive Dust Sources", National Stone, Sand & Gravel Association, 2004.
7. "Screening Assessment for the Challenge" Environment Canada, Health Canada, June 2013.
8. "AP-42: Compilation of Air Emission Factors, Appendix B.2, Generalized Particle Size Distributions", US-EPA, September 1996.
9. "Report for a Short Term Particulate Ambient Air Quality Program performed at the Aldershot Centre Quarry – October 2017", Pinchin Ltd., November 2017.
10. "Screening Level Human Health Risk Assessment (SLHHRA) of Air Quality Impacts of the Planned Meridian Brick East Quarry Expansion. Draft Report.", Intrinsik Corp., November 2017.

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APPENDIX A

Tables

(8 Pages)

Table A1. Source Summary Table : 1 - 5 Year Scenario

Source ID	Source Description	Source Data						Emission Data					
		Flow Rate (m^3/s)	Exit Gas Temp (°C)	Inner Dia. (m)	Height Above Grade (m)	Height Above Roof (m)	Release Type	Contaminant	CAS #	Maximum Emission Rate (g/s)	Avg. Period (h)	Emission Estimating Technique	% of Overall Emissions
Centre Quarry													
C_LOAD	Loading of Active Material	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	5.86E-04	1, 24, annual	EC	0.2%
								Particulate matter	n/a	6.05E-03	1, 24, annual	EF	0.1%
								PM10	n/a	3.09E-03	1, 24, annual	EF	0.2%
								PM2.5	n/a	9.08E-04	1, 24, annual	EF	0.6%
C_LP1	Material Delivery to Storage Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	2.08E-03	1, 24, annual	EC	1%
								Particulate matter	n/a	2.51E-02	1, 24, annual	EF	1%
								PM10	n/a	1.10E-02	1, 24, annual	EF	1%
								PM2.5	n/a	1.66E-03	1, 24, annual	EF	1%
C_LP2	Material Delivery to Storage Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	2.08E-03	1, 24, annual	EC	1%
								Particulate matter	n/a	2.51E-02	1, 24, annual	EF	1%
								PM10	n/a	1.10E-02	1, 24, annual	EF	1%
								PM2.5	n/a	1.66E-03	1, 24, annual	EF	1%
C_TRUCK	Material Delivery to Truck	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	4.17E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	5.01E-02	1, 24, annual	EF	1%
								PM10	n/a	2.19E-02	1, 24, annual	EF	2%
								PM2.5	n/a	3.32E-03	1, 24, annual	EF	2%
C_HAUL	Haul Route	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	7.55E-02	1, 24, annual	EC	30%
								Particulate matter	n/a	1.35E+00	1, 24, annual	EC	30%
								PM10	n/a	3.97E-01	1, 24, annual	EC	30%
								PM2.5	n/a	3.97E-02	1, 24, annual	EC	27%
C_EX	Excavation Route	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	1.48E-01	1, 24, annual	EC	59%
								Particulate matter	n/a	2.63E+00	1, 24, annual	EC	59%
								PM10	n/a	7.76E-01	1, 24, annual	EC	59%
								PM2.5	n/a	7.76E-02	1, 24, annual	EC	54%
C_PILE1	Wind Erosion of Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	5.50E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	6.43E-02	1, 24, annual	EC	1%
								PM10	n/a	2.90E-02	1, 24, annual	EC	2%
								PM2.5	n/a	4.35E-03	1, 24, annual	EC	3%
C_PILE2	Wind Erosion of Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	5.50E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	6.43E-02	1, 24, annual	EC	1%
								PM10	n/a	2.90E-02	1, 24, annual	EC	2%
								PM2.5	n/a	4.35E-03	1, 24, annual	EC	3%
Off-site Roadways													
ROAD	Paved Road (King Street)	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	8.89E-03	1, 24, annual	EC	4%
								Particulate matter	n/a	2.44E-01	1, 24, annual	EC	5%
								PM10	n/a	4.68E-02	1, 24, annual	EC	4%
								PM2.5	n/a	1.13E-02	1, 24, annual	EC	8%

EF : Emission Factor
EC : Engineering Calculation

Table A2. Source Summary Table : 6 - 15 Year Scenario

Source ID	Source Description	Source Data						Emission Data					
		Flow Rate (m^3/s)	Exit Gas Temp (°C)	Inner Dia. (m)	Height Above Grade (m)	Height Above Roof (m)	Release Type	Contaminant	CAS #	Maximum Emission Rate (g/s)	Avg. Period (h)	Emission Estimating Technique	% of Overall Emissions
Centre Quarry													
C_LOAD	Loading of Active Material	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	2.93E-04	1, 24, annual	EC	0.1%
								Particulate matter	n/a	3.03E-03	1, 24, annual	EF	0.1%
								PM10	n/a	1.54E-03	1, 24, annual	EF	0.1%
								PM2.5	n/a	4.54E-04	1, 24, annual	EF	0.3%
C_LP1	Material Delivery to Storage Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	1.04E-03	1, 24, annual	EC	0.4%
								Particulate matter	n/a	1.25E-02	1, 24, annual	EF	0.2%
								PM10	n/a	5.48E-03	1, 24, annual	EF	0.4%
								PM2.5	n/a	8.30E-04	1, 24, annual	EF	0.5%
C_LP2	Material Delivery to Storage Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	1.04E-03	1, 24, annual	EC	0.4%
								Particulate matter	n/a	1.25E-02	1, 24, annual	EF	0%
								PM10	n/a	5.48E-03	1, 24, annual	EF	0%
								PM2.5	n/a	8.30E-04	1, 24, annual	EF	0%
C_TRUCK	Material Delivery to Truck	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	2.08E-03	1, 24, annual	EC	1%
								Particulate matter	n/a	2.51E-02	1, 24, annual	EF	0%
								PM10	n/a	1.10E-02	1, 24, annual	EF	1%
								PM2.5	n/a	1.66E-03	1, 24, annual	EF	1%
C_HAUL	Haul Route	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	5.87E-02	1, 24, annual	EC	20%
								Particulate matter	n/a	1.05E+00	1, 24, annual	EC	20%
								PM10	n/a	3.09E-01	1, 24, annual	EC	20%
								PM2.5	n/a	3.09E-02	1, 24, annual	EC	18%
C_EX	Excavation Route	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	7.38E-02	1, 24, annual	EC	25%
								Particulate matter	n/a	1.32E+00	1, 24, annual	EC	25%
								PM10	n/a	3.88E-01	1, 24, annual	EC	25%
								PM2.5	n/a	3.88E-02	1, 24, annual	EC	23%
C_PILE1	Wind Erosion of Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	5.50E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	6.43E-02	1, 24, annual	EC	1%
								PM10	n/a	2.90E-02	1, 24, annual	EC	2%
								PM2.5	n/a	4.35E-03	1, 24, annual	EC	3%
C_PILE2	Wind Erosion of Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	5.50E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	6.43E-02	1, 24, annual	EC	1%
								PM10	n/a	2.90E-02	1, 24, annual	EC	2%
								PM2.5	n/a	4.35E-03	1, 24, annual	EC	3%

Table A2. Source Summary Table : 6 - 15 Year Scenario

Source ID	Source Description	Source Data						Emission Data					
		Flow Rate (m^3/s)	Exit Gas Temp (°C)	Inner Dia. (m)	Height Above Grade (m)	Height Above Roof (m)	Release Type	Contaminant	CAS #	Maximum Emission Rate (g/s)	Avg. Period (h)	Emission Estimating Technique	% of Overall Emissions
East Quarry													
E_LOAD	Loading of Active Material	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	2.93E-04	1, 24, annual	EC	0.1%
								Particulate matter	n/a	3.03E-03	1, 24, annual	EF	0.1%
								PM10	n/a	1.54E-03	1, 24, annual	EF	0.1%
								PM2.5	n/a	4.54E-04	1, 24, annual	EF	0.3%
E_LP1	Material Delivery to Storage Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	2.08E-03	1, 24, annual	EC	1%
								Particulate matter	n/a	2.51E-02	1, 24, annual	EF	0%
								PM10	n/a	1.10E-02	1, 24, annual	EF	1%
								PM2.5	n/a	1.66E-03	1, 24, annual	EF	1%
E_TRUCK	Material Delivery to Truck	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	2.08E-03	1, 24, annual	EC	1%
								Particulate matter	n/a	2.51E-02	1, 24, annual	EF	0%
								PM10	n/a	1.10E-02	1, 24, annual	EF	1%
								PM2.5	n/a	1.66E-03	1, 24, annual	EF	1%
E_HAUL	Haul Route	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	5.66E-02	1, 24, annual	EC	19%
								Particulate matter	n/a	1.01E+00	1, 24, annual	EC	19%
								PM10	n/a	2.98E-01	1, 24, annual	EC	19%
								PM2.5	n/a	2.98E-02	1, 24, annual	EC	17%
E_EX	Excavation Route	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	7.38E-02	1, 24, annual	EC	25%
								Particulate matter	n/a	1.32E+00	1, 24, annual	EC	25%
								PM10	n/a	3.88E-01	1, 24, annual	EC	25%
								PM2.5	n/a	3.88E-02	1, 24, annual	EC	23%
E_PILE1	Wind Erosion of Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	5.66E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	6.61E-02	1, 24, annual	EC	1%
								PM10	n/a	2.98E-02	1, 24, annual	EC	2%
								PM2.5	n/a	4.47E-03	1, 24, annual	EC	3%
Off-site Roadways													
ROAD	Paved Road (King Street)	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	8.89E-03	1, 24, annual	EC	3%
								Particulate matter	n/a	2.44E-01	1, 24, annual	EC	5%
								PM10	n/a	4.68E-02	1, 24, annual	EC	3%
								PM2.5	n/a	1.13E-02	1, 24, annual	EC	7%

EF : Emission Factor
EC : Engineering Calculation

Table A3. Source Summary Table : 16 - 25 Year Scenario

Source ID	Source Description	Source Data						Emission Data					
		Flow Rate (m^3/s)	Exit Gas Temp (°C)	Inner Dia. (m)	Height Above Grade (m)	Height Above Roof (m)	Release Type	Contaminant	CAS #	Maximum Emission Rate (g/s)	Avg. Period (h)	Emission Estimating Technique	% of Overall Emissions
East Quarry													
E_LOAD	Loading of Active Material	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	5.86E-04	1, 24, annual	EC	0.2%
								Particulate matter	n/a	6.05E-03	1, 24, annual	EF	0.1%
								PM10	n/a	3.09E-03	1, 24, annual	EF	0.2%
								PM2.5	n/a	9.08E-04	1, 24, annual	EF	0.6%
E_LP1	Material Delivery to Storage Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	4.17E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	5.01E-02	1, 24, annual	EF	1%
								PM10	n/a	2.19E-02	1, 24, annual	EF	2%
								PM2.5	n/a	3.32E-03	1, 24, annual	EF	2%
E_TRUCK	Material Delivery to Truck	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	4.17E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	5.01E-02	1, 24, annual	EF	1%
								PM10	n/a	2.19E-02	1, 24, annual	EF	2%
								PM2.5	n/a	3.32E-03	1, 24, annual	EF	2%
E_HAUL	Haul Route	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	1.04E-01	1, 24, annual	EC	38%
								Particulate matter	n/a	1.85E+00	1, 24, annual	EC	38%
								PM10	n/a	5.46E-01	1, 24, annual	EC	38%
								PM2.5	n/a	5.46E-02	1, 24, annual	EC	35%
E_EX	Excavation Route	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	1.48E-01	1, 24, annual	EC	54%
								Particulate matter	n/a	2.63E+00	1, 24, annual	EC	54%
								PM10	n/a	7.76E-01	1, 24, annual	EC	54%
								PM2.5	n/a	7.76E-02	1, 24, annual	EC	50%
E_PILE1	Wind Erosion of Piles	n/a	n/a	n/a	n/a	n/a	Volume	Crystalline Silica	14808-60-7	5.66E-03	1, 24, annual	EC	2%
								Particulate matter	n/a	6.61E-02	1, 24, annual	EC	1%
								PM10	n/a	2.98E-02	1, 24, annual	EC	2%
								PM2.5	n/a	4.47E-03	1, 24, annual	EC	3%
Off-site Roadways													
ROAD	Paved Road (King Street)	n/a	n/a	n/a	n/a	n/a	Line	Crystalline Silica	14808-60-7	8.89E-03	1, 24, annual	EC	3%
								Particulate matter	n/a	2.44E-01	1, 24, annual	EC	5%
								PM10	n/a	4.68E-02	1, 24, annual	EC	3%
								PM2.5	n/a	1.13E-02	1, 24, annual	EC	7%

EF : Emission Factor

EC : Engineering Calculation

Table A4a. Emission Summary Table Without Background Concentrations

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	MOE Benchmark Limit (µg/m^3)	Averaging Period (h)
1 - 5 Year Scenario						
Crystalline Silica	14808-60-7	2.52E-01	AERMOD	95.6	-	1
			AERMOD	4.68	5	24
			AERMOD	0.410 *	-	Annual
Particulate matter	n/a	4.46E+00	AERMOD	1683	-	1
			AERMOD	79.0	120	24
			AERMOD	6.49 *	-	Annual
PM10	n/a	1.33E+00	AERMOD	501	-	1
			AERMOD	24.6	-	24
			AERMOD	2.16 *	-	Annual
PM2.5	n/a	1.45E-01	AERMOD	52.7	-	1
			AERMOD	2.93	-	24
			AERMOD	0.280 *	-	Annual
6 - 15 Year Scenario						
Crystalline Silica	14808-60-7	2.97E-01	AERMOD	57.9	-	1
			AERMOD	3.90	5	24
			AERMOD	0.253 *	-	Annual
Particulate matter	n/a	5.23E+00	AERMOD	1014	-	1
			AERMOD	57.9	120	24
			AERMOD	3.72 *	-	Annual
PM10	n/a	1.56E+00	AERMOD	304	-	1
			AERMOD	20.5	-	24
			AERMOD	1.33 *	-	Annual
PM2.5	n/a	1.70E-01	AERMOD	31.9	-	1
			AERMOD	2.61	-	24
			AERMOD	0.174 *	-	Annual

Table A4a. Emission Summary Table Without Background Concentrations

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	MOE Benchmark Limit (µg/m^3)	Averaging Period (h)
16 - 25 Year Scenario						
Crystalline Silica	14808-60-7	2.75E-01	AERMOD	49.7	-	1
			AERMOD	3.23	5	24
			AERMOD	0.238 *	-	Annual
Particulate matter	n/a	4.90E+00	AERMOD	882	-	1
			AERMOD	51.7	120	24
			AERMOD	3.60 *	-	Annual
PM10	n/a	1.45E+00	AERMOD	261	-	1
			AERMOD	18.0	-	24
			AERMOD	1.26 *	-	Annual
PM2.5	n/a	1.56E-01	AERMOD	27.0	-	1
			AERMOD	2.15	-	24
			AERMOD	0.154 *	-	Annual

*5-year annual average result was increased by a factor of 140% to account for potential variability between the overall 5-year annual average versus the maximum annual result per individual year.

Table A4b. Emission Summary Table With Backround Concentrations

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	Background Concentratrion (µg/m^3)	Maximum Concentration with Background (µg/m^3)	Ontario Ambient Air Quality Criteria (AAQC) (µg/m^3)	Averaging Period (h)
1 - 5 Year Scenario								
Crystalline Silica	14808-60-7	2.52E-01	AERMOD	95.6	2.44	98.0	-	1
			AERMOD	4.68	2.20	6.88	5	24
			AERMOD	0.410 *	1.19	1.60	-	Annual
Particulate matter	n/a	4.46E+00	AERMOD	1683	36.9	1720	-	1
			AERMOD	79.0	33.3	112	120	24
			AERMOD	6.49 *	18.0	24.5	60	Annual
PM10	n/a	1.33E+00	AERMOD	501	46.7	548	-	1
			AERMOD	24.6	42.2	66.8	50	24
			AERMOD	2.16 *	22.8	24.9	-	Annual
PM2.5	n/a	1.45E-01	AERMOD	52.7	16.6	69.3	-	1
			AERMOD	2.93	15.0	17.9	30	24
			AERMOD	0.280 *	8.09	8.37	-	Annual
6 - 15 Year Scenario								
Crystalline Silica	14808-60-7	2.97E-01	AERMOD	57.9	2.44	60.3	-	1
			AERMOD	3.90	2.20	6.10	5	24
			AERMOD	0.253 *	1.19	1.44	-	Annual
Particulate matter	n/a	5.23E+00	AERMOD	1014	36.9	1051	-	1
			AERMOD	57.9	33.3	91	120	24
			AERMOD	3.72 *	18.0	21.7	60	Annual
PM10	n/a	1.56E+00	AERMOD	304	46.7	351	-	1
			AERMOD	20.5	42.2	62.7	50	24
			AERMOD	1.33 *	22.8	24.1	-	Annual
PM2.5	n/a	1.70E-01	AERMOD	31.9	16.6	48.5	-	1
			AERMOD	2.61	15.0	17.6	30	24
			AERMOD	0.174 *	8.09	8.26	-	Annual

Table A4b. Emission Summary Table With Backround Concentrations

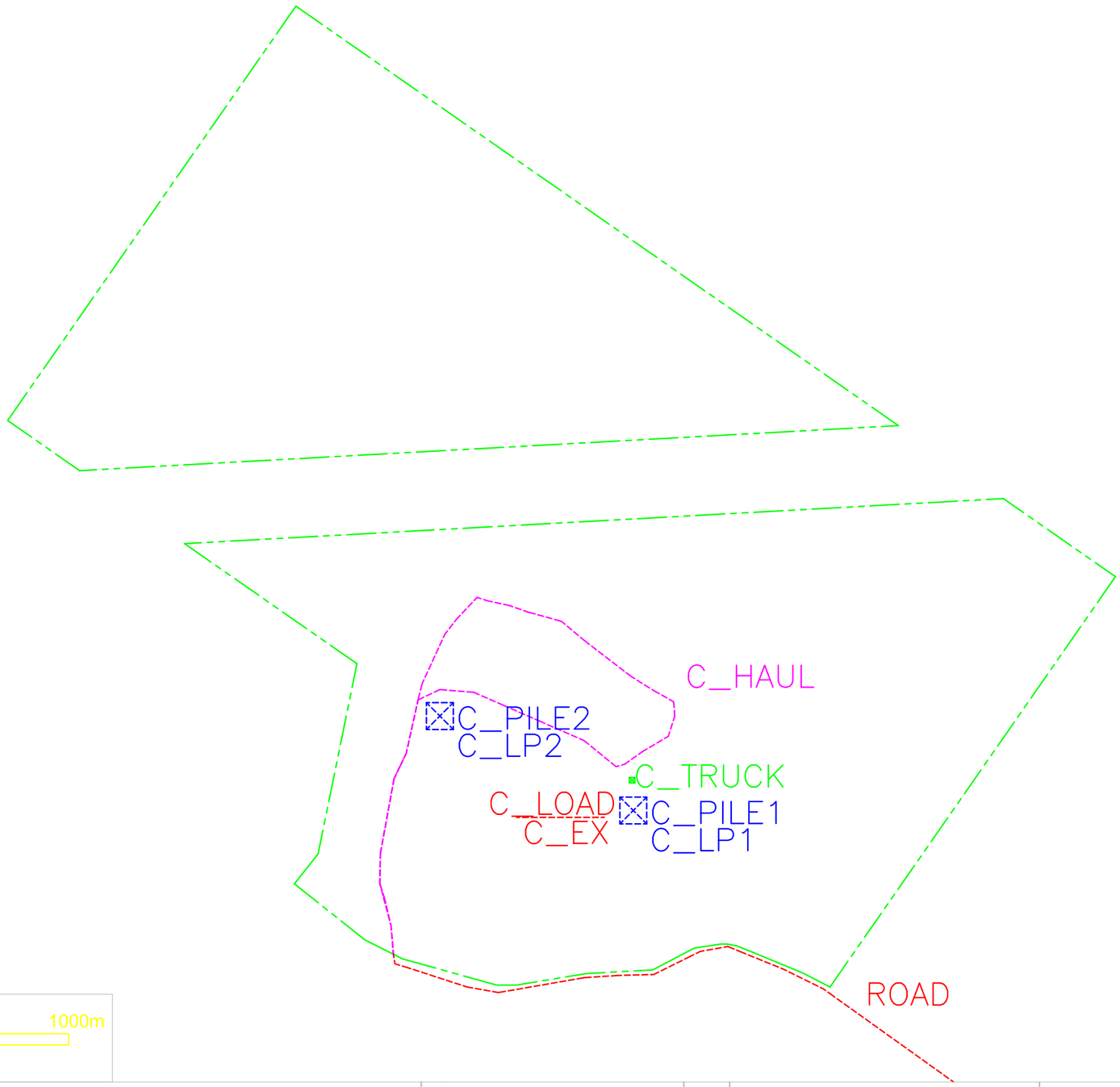
Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	Background Concentratrion (µg/m^3)	Maximum Concentration with Background (µg/m^3)	Ontario Ambient Air Quality Criteria (AAQC) (µg/m^3)	Averaging Period (h)
16 - 25 Year Scenario								
Crystalline Silica	14808-60-7	2.75E-01	AERMOD	49.7	2.44	52.1	-	1
			AERMOD	3.23	2.20	5.44	5	24
			AERMOD	0.238 *	1.19	1.43	-	Annual
Particulate matter	n/a	4.90E+00	AERMOD	882	36.9	918	-	1
			AERMOD	51.7	33.3	85	120	24
			AERMOD	3.60 *	18.0	21.6	60	Annual
PM10	n/a	1.45E+00	AERMOD	261	46.7	308	-	1
			AERMOD	18.0	42.2	60.2	50	24
			AERMOD	1.26 *	22.8	24.0	-	Annual
PM2.5	n/a	1.56E-01	AERMOD	27.0	16.6	43.6	-	1
			AERMOD	2.15	15.0	17.2	30	24
			AERMOD	0.154 *	8.09	8.24	-	Annual

*5-year annual average result was increased by a factor of 140% to account for potential variability between the overall 5-year annual average versus the maximum annual result per individual year.

APPENDIX B

Figures & Drawings

(4 Pages)



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SCALE

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MERIDIAN BRICK CANADA LTD.
ALDERSHOT QUARRY DUST MODELLING - 5 YEAR

DRAWING NAME:
SITE PLAN

SCALE: AS SHOWN

PROJECT NO: 120235.001

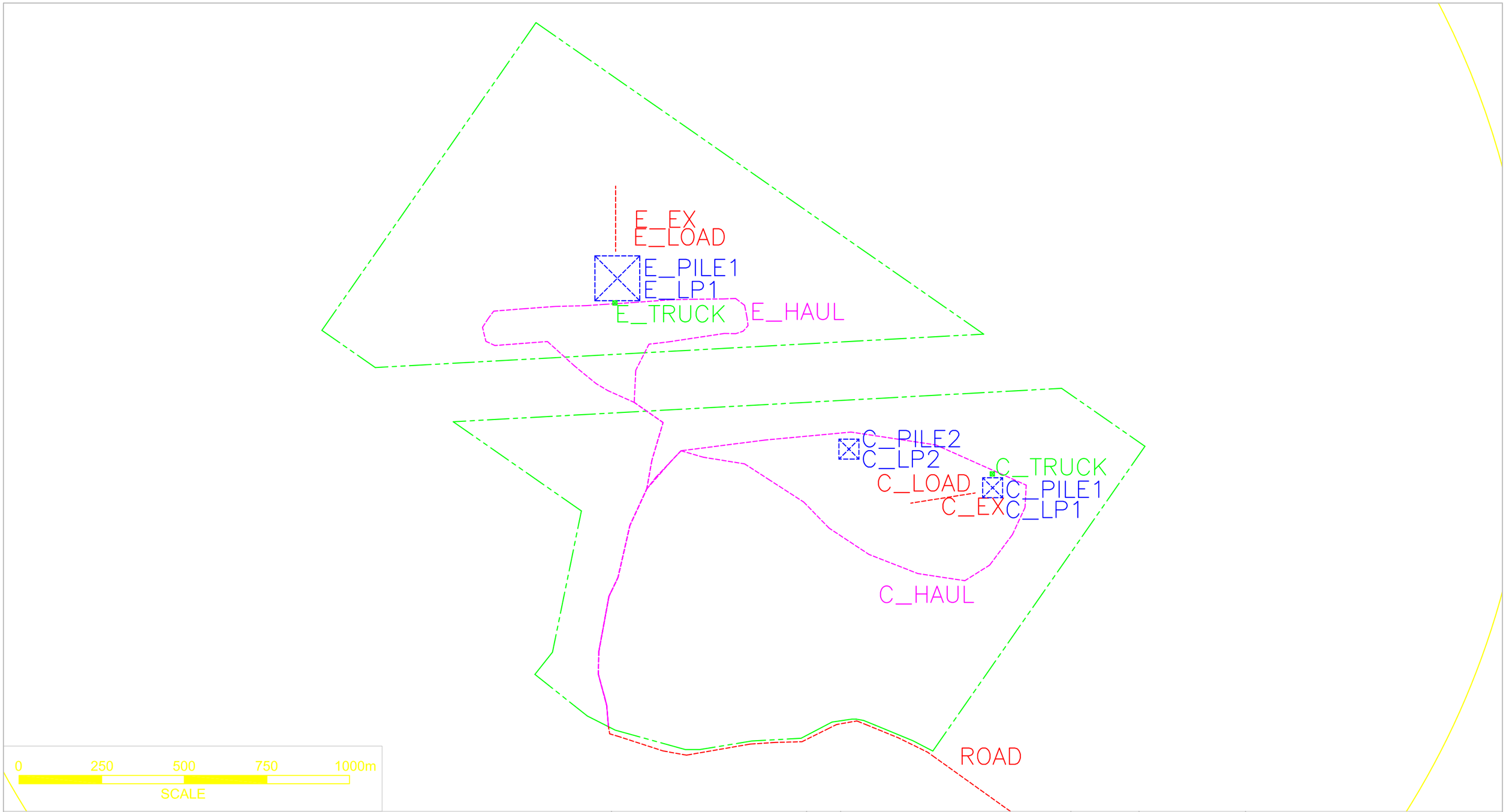
DRAWING NO: B1

DRAWN BY: DGB

NO.	REVISION	DATE
02.	FINAL REPORT	NOV. 2017
01.	DUST MODELLING	APRIL 2017

N

PINCHIN



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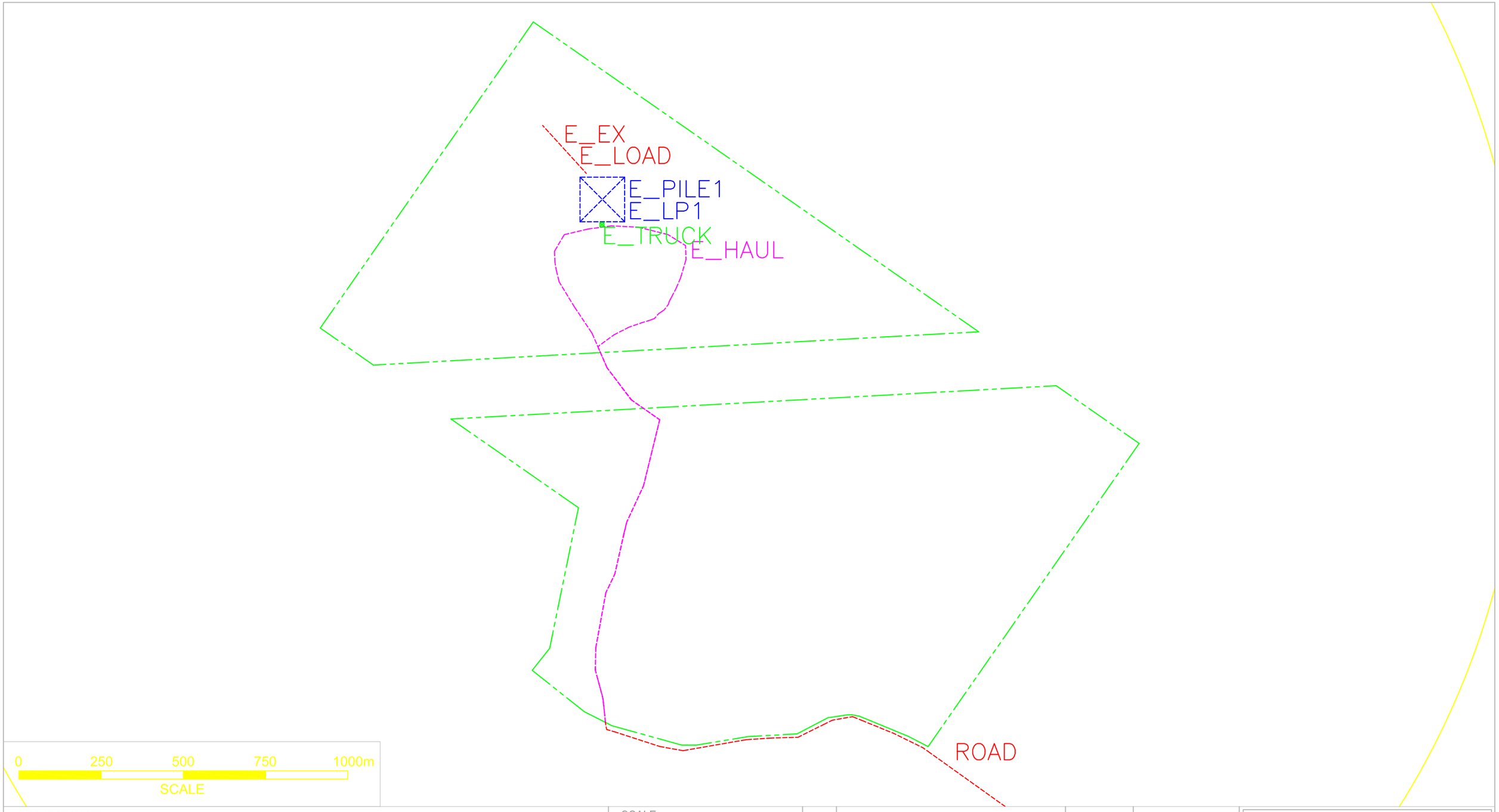

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MERIDIAN BRICK CANADA LTD.
ALDERSHOT QUARRY DUST MODELLING - 25 YEAR

DRAWING NAME:
SITE PLAN

SCALE: AS SHOWN

PROJECT NO: 120235.001

DRAWING NO: B3

DRAWN BY: DGB

NO.	REVISION	DATE
02.	FINAL REPORT	NOV. 2017
01.	DUST MODELLING	APRIL 2017

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PROJECT NAME:
MERIDIAN BRICK CANADA LTD.
ALDERSHOT QUARRY DUST MODELLING

DRAWING NAME:
SITE PLAN

SCALE: AS SHOWN
PROJECT NO: 120235.001
DRAWING NO: B4
DRAWN BY: DGB

NO.	REVISION	DATE
02.	FINAL REPORT	NOV. 2017
01.	DUST MODELLING	APRIL 2017

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