Air Quality Assessment Report
Vicdom Utica Pit

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Prepared for:

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Definitions

Vicdom	Vicdom Sand & Gravel
Site[1]	3900 Lakeridge Road, Part of Lot 15, Concession 7 and 8 and Part of the Road Allowances between Lots
The ADMGO	"Air Dispersion Modelling Guideline for Ontario", PIBS: 5165e
Air Dispersion Model	Air Dispersion Model described in Appendix to Ontario Regulation 346.
CAS#	Chemical Abstract Society reference number
EF	Emission Factor
ESDM	Emissions Summary and Dispersion Model
ESDM Procedure Document	"Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009, PIBS: 3614e03
ESDM Report Checklist	"Emission Summary and Dispersion Modelling Checklist", dated November 2005, PIBS: 5357e
Insignificant	Negligible
List of MOE POI Limits	Schedule 3 of "SUMMARY of STANDARDS and GUIDELINES to support Ontario Regulation 419: Air Pollution – Local Air Quality (including Schedule 6 of O. Reg. 419 on UPPER RISK THRESHOLDS)" Dated April 2012, PIBS: 6569e01 And "Jurisdictional Screening Level (JSL) List, A Screening Tool for Ontario Regulation 419: Air Pollution – Local Air Quality", 6547e.pdf dated February 2008.
MOE	Ontario Ministry of the Environment
NOx	Nitrogen Oxides
O. Reg. 346	Ontario Regulation 346
O. Reg. 419	Ontario Regulation 419/05
SPM	Suspended Particulate Matter
TSP	Total Suspended Particulate
PM	Particulate Matter
POI	Point of Impingement (Contaminant)
POR	Point of Reception (Noise)
Products of Combustion	Contaminants emitted as a result of burning natural gas
Significant	Non-negligible
Source ID	The alphanumeric string assigned to a discharge point otherwise known as a "source reference number" in the "Acme Example" PIBS: 5987e.pdf.

[1] The term Site is used specifically to clearly indicate the difference between the term facility used in O. Reg. 419 and the term Site which refers to the specific address and everything inside the property boundary.

Executive Summary

This Air Quality Assessment was prepared for Vicdom Sand & Gravel (Ontario) Limited's proposed Utica Pit using approved dispersion modelling in accordance with s.26 of Ontario Regulation 419/05 ("O. Reg. 419") and the ESDM Procedure Document.

The potential air quality issue for sand and gravel operations is typically the airborne dust that can occur due to equipment activity during dry weather. In this assessment airborne dust is referred to as suspended particulate matter (SPM). Odour is not among the typically expected air quality issues for sand and gravel operations and as such odour is not anticipated to be an issue for the proposed Utica Pit. This assessment considers the impact of operations in the proposed Utica Pit through the use of dispersion modelling to predict maximum off-property concentrations for SPM and a comparison of these predictions to the applicable Provincial standards.

The proposed Utica Pit is an aggregate extraction facility which operates as a feeder pit for operations at Vicdom's approved Brock Road Pit. Material extracted from the Utica Pit may undergo on-site screening, through the use of a portable screen; however, if any further processing is required, the material will be shipped to the Brock Road Pit for crushing, washing, and/or additional screening.

The maximum POI concentrations were calculated based on the operating conditions where all significant sources are operating simultaneously at their individual maximum rates of production. A POI concentration for each significant contaminant emitted from the Site was calculated based on the calculated emission rates and the output from the Air Dispersion Model; the results are presented in the following Emissions Summary Table in accordance with s.26 of O. Reg. 419.

Of the contaminants listed in Table 4 – Emissions Summary Table that have limits in the List of Ministry POI Limits, all the predicted POI concentrations are below the corresponding limits. The contaminant with the greatest percentage of its limit was predicted to be suspended particulate matter (SPM) where the predicted 24 hour POI concentration is 84.40 µg/m^3 at 70.34 % of the guideline of 120 µg/m^3.

With the adoption of the following recommendations, the Utica Pit is expected to operate with acceptable air quality impacts:

- A speed limit of 20 km/h shall be strictly enforced on all internal haul roads;
- On dry days when operations are occurring, a water truck shall be deployed at the site with a sufficient capacity to be able to cover the entire pit truck haul route at a frequency of one full tank every 1 hour. The water supply must therefore be capable of providing up to 180,000 litres of water per day under worst-case conditions;

- In situations where winds are blowing from the proposed expansion area towards the nearest sensitive receptors, extraction in that area shall be suspended if the condition of the active face is dry and dusty, and the wind is directed toward the sensitive receptor at a speed sufficient to cause wind-spread visible erosion of the open face. The active face shall then be stabilized with water sprays or chemical binder as quickly as possible;
- Water spray cannons must be available to stabilize the exposed pit face or stockpiles when required; and,
- An implementation plan shall be put in place that addresses the chain of responsibility for dust control, staff training, inspection and maintenance of dust control equipment, visual inspection of dust sources, record keeping and complaint response.

CAS#	Contaminant	Total Emission Rate (g/s)	Dispersion Model Used	Max POI Value (µg/m³)	Location of Maximum POI		Averaging Period of Criterion (h)	Criteria (µg/m³)	Limiting Effect	Regulation Schedule #	Percentage of Criteria or Likelihood of adverse effect (%)
					X (m)	Y (m)					
Scenario 1											
N/A	Suspended Particulate Matter	0.4398	AERMOD	44.31	654009	4880542	24	120	Particulate	Schedule 3	36.92%
10102-44-0	Nitrogen oxides	0.3909	AERMOD	48.65	654039	4880408	24	200	Health	Schedule 3	24.33%
				207.23	654022	4880423	1	400	Health	Schedule 3	51.81%
Scenario 2											
N/A	Suspended Particulate Matter	0.4560	AERMOD	45.02	654389	4880634	24	120	Particulate	Schedule 3	37.52%
10102-44-0	Nitrogen oxides	0.3909	AERMOD	32.90	654419	4880648	24	200	Health	Schedule 3	16.45%
				184.40	654419	4880648	1	400	Health	Schedule 3	46.10%
Scenario 3											
N/A	Suspended Particulate Matter	0.4560	AERMOD	84.40	654389	4880634	24	120	Particulate	Schedule 3	70.34%
10102-44-0	Nitrogen oxides	0.3909	AERMOD	42.13	654499	4880248	24	200	Health	Schedule 3	21.06%
				182.17	654522	4880253	1	400	Health	Schedule 3	45.54%

1.0 Introduction and Site Description

1.1 Purpose and Scope of the Air Quality Assessment

This Air Quality Assessment was prepared for Vicdom Sand & Gravel (Ontario) Limited's proposed Utica Pit using approved dispersion modelling in accordance with s.26 of Ontario Regulation 419/05 ("O. Reg. 419") and the ESDM Procedure Document. This assessment considers the impact of operations in the proposed extraction area, through the use of dispersion modelling to predict maximum off-property concentrations of suspended particulate matter and a comparison of these predictions to the applicable Provincial standards. Odour is not among the typically expected air quality issues for sand and gravel operations and as such odour is not anticipated to be an issue for the proposed Utica Pit.

1.2 Description of Processes and NAICS Code

The proposed Utica Pit is an aggregate extraction operation, to be operated under a Class A, Category 3 License under the Aggregate Resources Act (ARA) for a pit with extraction restricted to 1.5 metres above the water table.

Activities in the proposed Utica Pit will include above-water extraction using a front-end loader and/or excavator. Depending on the type of material encountered and customer demand, extracted material is moved and processed differently. Screened material (Granular B and Sandfill) will typically be stockpiled, loaded into shipping trucks (tandem or tractor trailer), weighed, and shipped directly to the customer. Raw, unscreened material ("Pit Run") will typically be loaded into pit trucks for transport to the Brock Road Pit for processing. No processing (crushing and washing) of material will occur at the Utica Pit. All truck traffic will occur through the existing Miller Boynton Pit entrance from Goodwood Road (See Figure 3).

The North American Industry Classification System (NAICS) code that applies to the Site is 212323, Sand and Gravel Mining and Quarrying.

1.3 Description of Products and Raw Materials

The Utica Pit will produce sand and gravel for a variety of end uses. The raw material is naturally occurring aggregate obtained from the working face. In addition, diesel fuel may be required for onsite vehicles and diesel-fired generating equipment associated with the portable screen.

1.4 Process Flow Diagram

Figure 4 shows the typical above-ground extraction process for the Utica Pit. Other processes are not described in detail because the emissions, if any, do not exhaust from the Site. The maximum extraction rate is 200 tonnes per hour.

1.5 Operating Schedule

The Utica Pit operates from 7:00 AM to 4:00 PM on weekdays, and from 7:00 AM to 12:00 PM on Saturdays, and generally operates from late March to late November.

2.0 Initial Identification of Sources and Contaminants

This section provides an initial identification of all of the sources and the contaminants emitted from the Site.

2.1 Operating Configuration

- Overburden stripping at the working face;
- Loading of raw aggregate material at the extraction face by front-end loader into a pit truck at a maximum rate of approximately 200 tonnes per hour;
- Hauling of raw aggregate material ("Pit Run") from the working face to the off-site processing plant at a maximum rate of approximately 200 tonnes per hour;
- Loading of raw aggregate material at the extraction face by front-end loader into a portable screening plant at a maximum rate of approximately 200 tonnes per hour (Note that the total processing rate is 200 tonnes per hour. That amount may either be hauled off-site or screened on Site.);
- Loading of screened aggregate (Granular B and Sandfill) by a front-end loader into shipping trucks (tandem or tractor trailer) at a rate of approximately 200 tonnes per hour;
- On-site traffic of shipping and pit trucks;
- Tailpipe emissions from on-site mobile equipment; and,
- On-site storage tanks and facilities used for fuelling onsite vehicles

2.2 Sources and Contaminants Identification Table

Table 1 – Sources and Contaminants Identification Table tabulates all the emission sources at the Site, for example, the movement of the loader at the working face (LOADER) is identified as a source. The expected contaminants emitted from each source are also identified in Table 1; for example, the expected contaminant emitted from LOADER is Suspended Particulate Matter (SPM).

3.0 Assessment of the Significance of Contaminants and Sources

This section provides an explanation for each source and contaminant identified in Table 1 – Sources and Contaminants Identification Table.

In accordance with s.8 of O. Reg. 419, emission rate calculations, and dispersion modelling does not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from significant sources.

3.1 Identification of Negligible Contaminants and Sources

The principal airborne emission at aggregate extraction operations is dust from handling of materials and dust from equipment traffic. This dust is referred to Suspended Particulate Matter (SPM). The SPM from aggregate operations contains relatively few trace metals or other contaminants of concern. With the exception of the diesel-fired engine associated with the portable screen and emissions from mobile equipment, there are no major sources that would emit contaminants other than SPM.

The only contaminants carried forward for quantitative assessment of the non-negligible sources was suspended particulate matter (airborne dust and combustion particles) and nitrogen oxides (NO_x) from the diesel-fired engine. Individual contaminants contained within the SPM were not specifically assessed, as they were considered to be adequately represented by SPM as surrogates. A discussion of the contaminants excluded from the dispersion modelling assessment is provided in the following sections.

3.1.1 Rationale for Assessment

3.1.1.1 PM_{10} and $PM_{2.5}$

Schedule 3 of regulation 419/05 includes a standard for SPM, expressed in terms of micrograms of contaminant per cubic meter of air ($\mu g/m^3$). The standard is 120 $\mu g/m^3$, averaged over 24 hours. SPM embodies all sizes of particles that can become airborne and remain suspended in the air long enough to impact off-site locations. The terms PM_{10} and $PM_{2.5}$ refer to smaller size fractions of dust which can enter the human lungs, i.e. particles less than 10 microns in diameter (inhalable particulate matter, or PM_{10}) and particulate less than 2.5 microns in diameter (respirable particulate matter $PM_{2.5}$).These components of SPM do not have standards under Regulation 419/05. Instead, PM_{10} has an interim Ambient Air Quality Criterion available, while $PM_{2.5}$ has a Canada Wide Standard in place. The MOE has not required specific quantitative assessment of these contaminants for aggregate operations.

The majority of the dust generated at aggregate operations consists of particles larger than PM_{10} and $PM_{2.5}$. As a result, compliance with the provincial standard of SPM also ensures acceptable levels of PM_{10} and $PM_{2.5}$. Therefore, while PM_{10} and $PM_{2.5}$ have acceptability criteria of their own, they are considered to be adequately addressed by assessing SPM, and were excluded from the dispersion modelling assessment.

3.1.1.2 Dustfall

Dustfall is a term used to describe larger dust particles (generally larger than 10 to 20 microns in diameter) that can be transported relatively short distances off-site and then be deposited on surfaces (houses, vehicles, etc.) with the potential to be a nuisance. Dustfall currently has a standard in Regulation 419/05; however, the MOE has not required it to be assessed quantitatively. As with PM_{10} and $PM_{2.5}$, industry experience in estimating dustfall levels has indicated that a demonstration of compliance with the standard for SPM, also demonstrates compliance with the standard for dustfall. Therefore, dustfall was excluded from the dispersion modelling assessment.

3.1.1.3 Combustion Emissions from the Diesel Engine

While diesel fuel combustion can emit a range of contaminants, NO_x is typically the limiting contaminant. As a result, if NO_x concentrations are within acceptable levels, all other contaminants are also expected to be within acceptable levels. Therefore, only emissions of NO_x (as the limiting contaminant) and SPM (as a common contaminant with the aggregate operations) were considered in the dispersion modeling.

3.2 Identification of Negligible Contaminants and Sources

In accordance with s.8 of O. Reg. 419, emission rate calculations and dispersion modelling does not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from non-negligible sources. The following section intends to review all sources of contaminants and identify those that can be considered negligible and consequently excluded from the dispersion modelling assessment. The MOE recognizes this approach as appropriate when dealing with these source types at aggregate operations.

The following sources were determined to be negligible:

- Aggregate storage piles;
- Tailpipe emissions from on-site mobile equipment;
- Overburden stripping and rehabilitation activities; and,
- Wind erosion of open working face.

3.2.1 Rationale for Assessment

3.2.1.1 Aggregate Storage Piles

Small aggregate stockpiles may be located within the proposed Utica Pit area, consisting of Granular B, Sandfill, and “Pit Run”. These piles will normally have high moisture contents, and therefore are not expected to be significant contributors to the overall emissions from the proposed area.

3.2.1.2 Tailpipe Emissions from On-Site Mobile Equipment

In accordance with s.5 of O. Reg. 419, the compliance assessment “does not apply to discharges of contaminants from motor vehicles.”

3.2.1.3 Overburden Stripping and Rehabilitation Activities

The MOE has not required overburden, stripping, and rehabilitation activities to be explicitly assessed for aggregate operations. These activities do not typically coincide with the maximum production operations and therefore are not part of the maximum operating scenario.

In addition, stripping of overburden typically involves material that has inherently high moisture content. As per Section 7.2.2 of the ESDM Procedure Document, it may not be necessary to consider a source of contaminant that discharges a negligible amount of the relevant contaminant, having regard to the total amount of the contaminant that is discharged by all the sources of that contaminant to the nature of the contaminant.

Sources that, in combination, represent less than 5 % of total property-wide emissions of a contaminant can, in many cases, be considered insignificant sources. A review of the emission factors provided in US EPA AP-42 Chapter 13.2.4 suggest that with elevated moisture content, the emission factors are insignificant compared to the overall site-wide emissions of particulate. As per Section 7.2.2 of the ESDM Procedure Document the potential emissions from overburden, stripping, and rehabilitation activities are considered to be less than 5 % of total property-wide particulate emissions and have therefore been excluded from the dispersion modeling analysis.

The scenario that results in the highest emission of SPM uses one loader to move material from the face to the screener and the other to move material from the screened piles to trucks. This scenario does not allow another vehicle to simultaneously remove overburden.

3.2.1.4 Wind Erosion of Open Working Face

The incidence of wind erosion from exposed pit faces is relatively infrequent. Wind erosion occurs only when conditions are dry and the wind is high, nevertheless, it is a potentially significant dust source when it takes place. Wind erosion is possible when wind speeds exceed 15 to 20 km/h and becomes significant with wind speeds greater than 30 km/h.

In the proposed Utica area, winds above 30 km/h in the direction of the nearest sensitive receptors, west through south, occur less than 0.5 % of the time over a full year.

If surfaces are wet due to precipitation wind erosion will not occur. In addition, the location of the extraction area relative to the sensitive receptors varies throughout the life of the proposed pit. Overall, wind erosion is expected to occur less than 0.5% of the time over a full year.

In situations where winds erosion is possible or occurring, additional preventative measures may be considered. R.J. Burnside recommends the following control strategies:

- Extraction shall be suspended if the condition of an active face is dry and dusty with 30 km/h or greater winds directed toward sensitive receptors;
- The active face shall be stabilized with water or chemical wetting agents; and,
- By monitoring wind forecasts, wind erosion at the working face can be prevented or reduced by planning and anticipating response to high wind speeds using the two aforementioned strategies. To implement this control strategy, specific actions that may be undertaken by the operator include a daily weather forecast check. 24-hours, 36-hours, and 7 day wind speed and direction forecasts are available from online services such as The Weather Network.

With these recommendations in place, wind erosion effects are not expected to be a concern at the proposed site and have therefore been excluded from the dispersion modeling analysis.

4.0 Operating Conditions, Emissions Estimating and Data Quality Emissions

This section provides a description of the operating conditions used in the calculation of the emission estimates and an assessment of the data quality of the emission estimates for each significant contaminant from the Site. In accordance with s.8 of O. Reg. 419, emission rate calculations and dispersion modelling does not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from negligible sources.

4.1 Description of Operating Conditions

Section 10 of O. Reg. 419 states “A scenario that assumes operating conditions for the Facility that would result, for the relevant contaminant, in the highest concentration of the contaminant at a point of impingement that the Facility is capable of”. The operating condition described in this Air Assessment Report meets this requirement.

The assessment of all operating conditions for the proposed Utica Pit describes the above-ground operation. Raw aggregate extracted from the working face may be transferred off-site or it may undergo screening using the portable screen near the working face. Worst case operations would assume all material is screened before being moved off site. The maximum operating scenario includes movement of the loader at the working face, screening of the material, operation of the screen’s diesel-fired engine, transfer of the material to stockpiles via stacker, loading of the trucks via front-end loader, and movement of the trucks off-site. The activities of the maximum operating scenario were assumed to occur simultaneously at a maximum rate of 200 tonnes per hour over the entire operational day. Continuous operation is expected to provide the largest POI concentration estimate so that method is used as the basis of calculations in this Air Quality Assessment. The operating schedule is described in Section 1.5 above.

4.2 Explanation of the Method Used to Calculate Emission Rates

The maximum emission rates for each significant contaminant emitted from the significant sources were calculated using the methodologies discussed in Appendix A – Supporting Calculations.

The emission rates and the methodology used for each calculation are documented in Table 2 – Source Summary Table. The technical rationale, including sample calculations, is documented in Appendix A – Supporting Calculations.

4.3 Assessment of Data Quality

This section provides a description of the assessment of the data quality of the emission estimates for each significant contaminant from the Site.

The assessment of data quality of the emission rate estimates for each significant contaminant emitted from significant sources was performed in accordance with the requirements of sub paragraph 7iii of s.26 (1) of O. Reg. 419. For example, the EF technique used to calculate the emissions from the portable screener's diesel engine is based on the USEPA NOx emission factor published in AP-42. The data quality of that emission factor is "D" which is equivalent to the MOE data Quality of "Marginal".

For each contaminant, the emission rate was estimated and the data quality of the estimate is documented in Table 2 – Source Summary Table. The assessment of data quality for each type of source listed in Table 2 is documented in Appendix A – Supporting Calculations.

All the emission rates listed in Table 2 are documented as having between Above-Average and Marginal Data Quality and correspond to the operating scenario where all significant sources are operating simultaneously at their individual maximum rates averaged over the appropriate averaging time for that contaminant.

A data quality range of Above-Average to Marginal is considered acceptable since this assessment assumes that 100 % of the extracted material is screened out. In reality, the operator expects that between 25 % and 50 % will not be screened. Furthermore, this assessment assumes that operations will occur at the closest point to the property line at all times, while in reality this will only occur during a relatively small part of the time. Similarly, this assessment conservatively assumes that the longest loader path and haul routes will be used at all times.

5.0 Source Summary Table and Site Plan

5.1 Source Summary Table

The emission rate estimates for each source of significant contaminants are documented in Table 2 – Source Summary Table.

For each source of significant contaminants the following parameters are referenced:

- Contaminant name,
- Chemical Abstract Society (“CAS”) reference number,
- Source ID,
- Source description,
- Source parameters (flow rate, exhaust temperature, diameter, height above grade, height above roof),
- Location referenced to UTM coordinate system presented on Figure 1 – Site Location Plan
- Averaging period,
- Emission estimating technique,
- Estimation of data quality, and
- Percentage of overall emission.

5.2 Site Plan

Figure 1 and 3 provide the site plan for the Utica Pit.

6.0 Dispersion Modelling

Dispersion modelling for the proposed Utica Pit was conducted using the estimated emission rates discussed in Section 4.0 and Appendix A in conjunction with the AERMOD dispersion model to predict SPM and NOx concentrations at points of impingement along the property line and beyond.

Sources were modelled as a series of volume sources with parameters based on information obtained from site plans, the approximate dimensions of processing equipment, and vehicles proposed to be used at the facility. Internal haul roads were modelled as volume line sources and the exhaust stack from the diesel-fired engine was modelled as a point source.

6.1 Dispersion Modelling Scenarios

Three separate scenarios were considered in the dispersion modelling assessment, representing worst-case operations for each of the future phases. These operations are represented by Scenario 1, Scenario 2, and Scenario 3 (Figure 3). The processing rate and relative position of equipment is consistent within each phase; the locations were changed to provide the closest approach to each possible property line.

The dispersion modelling scenario includes movement of the loader at the working face, screening of the raw aggregate, the diesel-fired engines powering the screen, stacking of the screened aggregate into stockpiles, loading of the trucks (tandem, tractor trailer and pit), and movement of the trucks to the existing Miller Boynton Pit property entrance.

Note that since Vicdom will be implementing a Best Management Practise Plan (“BMPP”) and so are allowed to ignore road dust emissions in their assessment; however, road dust emissions have been included to ensure that they meet the criteria despite this allowance.

6.2 Dispersion Modelling Input Summary

6.2.1 Deposition

AERMOD has the capability to account for wet and dry deposition of substances that would reduce airborne concentrations.

Operations in the pit occur below grade. Therefore, for the SPM contaminant, the model was run using the dry deposition and depletion algorithms, which account for gravitational settling and deposition of particles. The particle size distribution and density was taken from reference material for typical bulk materials. The model runs for NOx did not consider the dry deposition and depletion algorithms, since NOx is a gaseous pollutant.

6.2.2 Meteorology and Land Use Data

A land use zoning plan is provided on Figure 2 – Land Use Zoning Plan. Figure 2 also illustrates the extent of the Site property boundary and provides the zoning of adjacent land uses. The Site is located in an area currently zoned “Countryside Area”. To the north is an existing aggregate operation (Miller Boynton Pit), to the east an existing aggregate operation, to the south woodlands and rural residential, and to west rural residential.

The MOE has created, and periodically updates, AERMOD-ready regional meteorological datasets for use with dispersion modelling using AERMOD. Depending upon the local land use of the Site, the dataset used can be urban, crops, or forest. As the Site is situated within the geographical coverage of MOE Central Region Office and based on the land-use characteristics around the site, the “Crops” dataset was used. The surface data is from the Toronto Pearson Airport and the Upper Air Data is from Buffalo, New York. The meteorological data covers the dates from January 1, 1996 to December 31, 2000. The hourly data includes many factors which affect the dispersion of air contaminants including wind speed, wind direction, temperature, ceiling height, and atmospheric stability.

Removal of meteorological anomalies was performed in this analysis. The results shown are the maximum value of the second highest 24-hour values and the ninth highest 1-hour values of all five years.

6.3 Terrain

In this assessment, terrain elevation contour data was downloaded from Natural Resources Canada's Canadian Digital Elevation Data (CDED) dataset and processed using the AERMOD terrain processor AERMAP. AERMAP determines base terrain elevation using the DEM data for all sources and receptors, and provides the user with a suitable input file for use with AERMOD.

6.4 Area of Modelling Coverage

For both SPM and NOx, impacts were assessed at ground level, at and beyond the property line. Receptors were chosen based on recommendations provided in Section 7.1 of the ADGMO, which is in accordance with s.14 of O. Reg. 419/05.

Property line receptors were placed every 10 m along the property boundary. No receptors were placed inside the Site's property line.

Beyond the property line, a nested receptor grid, generally centred on proposed operations centre, was placed as follows:

- A bounding box was created that encompasses all the sources at the Site.
- 20 m spacing within 200 m of the edge of the bounding box;
- 50 m spacing from 200 m to 500 m;
- 100 m spacing from 500 to 1000 m;
- 200 m spacing from 1000 to 2000 m; and
- 500 m spacing from 2000 m to 5000 m.

6.5 Coordinate System

The Universal Transverse Mercator ("UTM") coordinate system, as per Section 5.2.2 of the ADGMO, was used to specify model sources and receptors. All coordinates were defined in the North American Datum of 1983 ("NAD83").

6.6 Averaging Time and Conversions

Schedule 3 standards of O. Reg. 419/05 are being applied to this Site. The relevant Schedule 3 averaging time for SPM is 24-hours and for NOx both 1-hour and 24-hours.

6.7 Dispersion Modelling Input and Output Files

The information entered into the approved dispersion model is recorded in Appendix B. AERMOD dispersion model data of all the contaminants is provided in electronic form on the CD in Appendix B. As an illustration, a copy of the contour plot and the model output file for the contaminant NOx is also contained in Appendix B.

7.0 Emissions Summary Table and Conclusions

7.1 Emissions Summary Table

A POI concentration for each significant contaminant emitted from the Site was calculated based on the emission rates listed in Table 2 – Source Summary Table and the output from the approved dispersion model. The results are presented in Table 4 – Emissions Summary Table.

The following parameters are referenced for each source of significant contaminants:

- Contaminant name,
- Chemical Abstract Society ("CAS") reference number,
- Total Site emission rate,
- Approved dispersion model used,
- Max POI concentration,
- Averaging period for the dispersion modelling,
- MOE POI limit,
- Indication of the limiting effect,
- Schedule in O. Reg. 419/05, and
- The percentage of standard or indication of the likelihood of an adverse effect.

The POI concentrations listed in Table 4 – Emission Summary Table are the maximum predicted ground level concentrations (after removing outliers), occurring at or beyond the property line for each of the three future operating phases – Scenario 1, 2, and 3. The POI concentrations listed in the Emissions Summary Table were compared to the Schedule 3 Standards under Ontario Regulation 419/05 – Local Air Quality.

Modelling using meteorological data sets may produce certain rare, extreme, or transient meteorological conditions, which can be considered outliers. When determining the maximum POI concentrations these meteorological anomalies were removed from consideration. Consistent with the "Air Dispersion Modelling Guideline for Ontario", the top 1 meteorological event can be removed when modelling for a 24-hour averaging period and the top 8 meteorological events per year can be removed from the results when modelling for a 1-hour averaging.

7.2 Assessment of Contaminants with no MOE POI Limits

All of the contaminants identified in the emission inventory have established Point of Impingement (POI) limits.

7.3 Conclusions & Recommendations

The emission rate estimates for each source of significant contaminants are documented in Table 2 – Source Summary Table. All the emission rates listed in Table 2 correspond to the operating scenario where all sources are operating simultaneously at their individual maximum rates of production. Therefore, these emission rate estimates listed in Table 2 – Source Summary Table, are not likely to be an underestimate of the actual emission rates.

A POI concentration for each contaminant emitted from the Site was calculated based on the calculated emission rates and the output from the model; the results are presented in Table 4 – Emissions Summary Table. The POI concentrations listed in Table 4 were compared to the Schedule 3 Standards under Ontario Regulation 419/05 – Local Air Quality.

Of the contaminants listed in Table 4 – Emissions Summary Table that have limits in the List of Ministry POI Limits, all the predicted POI concentrations are below the corresponding limits. The contaminant with the greatest percentage of its limit was predicted to be suspended particulate matter (SPM) where the predicted 24 hour POI concentration is 84.40 µg/m^3 at 70.34 % of the guideline of 120 µg/m^3.

With the adoption of the following recommendations, the Utica Pit is expected to operate with acceptable air quality impacts:

- A speed limit of 20 km/h shall be strictly enforced on all internal haul roads;
- On dry days when operations are occurring, a water truck shall be deployed at the site, with a sufficient capacity to be able to cover the entire pit truck haul route at a frequency of one full tank every 1 hour. The water supply must therefore be capable of providing up to 180,000 litres of water per day under worst-case conditions;
- In situations where winds are blowing from the proposed expansion are towards the nearest sensitive receptors, extraction in that area shall be suspended if the condition of the active face is dry and dusty, and the wind is directed toward the sensitive receptor at a speed sufficient to cause wind-spread visible erosion of the open face. The active face shall then be stabilized with water sprays or chemical binder as quickly as possible;
- Water spray cannons must be available to stabilize the exposed pit face or stockpiles when required; and,
- An implementation plan shall be put in place that addresses the chain of responsibility for dust control, staff training, inspection and maintenance of dust control equipment, visual inspection of dust sources, record keeping and complaint response.

7.4 Limitations and Use of Report

R. J. Burnside & Associates Limited (Burnside) has completed this report in accordance with generally accepted standards and practices. The conclusions and recommendations in this report are professional opinions based upon our understanding of anticipated Site conditions at the time of this assessment. To the best of our knowledge, the information contained in our report is accurate however Burnside does not guarantee the accuracy and reliability of the information provided by other persons or agencies. Burnside is not responsible for environmental concerns that are not visible or otherwise disclosed to us.

This report was prepared for the exclusive use Vicdom Sand & Gravel. Any use or reliance on or decisions based on this report by a third party, are the responsibility of such third parties. Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

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BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Tables

Table 1:
Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Significant
Source ID	**Description**	**General Location**	**Contaminants**	**Yes or No?**
LOADER	Loader movement between working face and screen	Scenario 1, 2, & 3	SPM	Yes
SCREEN	Screening of raw aggregate material	Scenario 1, 2, & 3	SPM	Yes
ENGINE	Diesel engine (on portable screen)	Scenario 1, 2, & 3	SPM and NOx	Yes
STACK	Dropping of material from stacker to stockpiles	Scenario 1, 2, & 3	SPM	Yes
LOAD	Loading of material into trucks (tandem, tractor trailer, pit)	Scenario 1, 2, & 3	SPM	Yes
HAUL	Truck movement on internal unpaved haul route	Scenario 1, 2, & 3	SPM	Yes

Source ID	Source Type	Description	Source Location X	Source Location Y	CAS	Contaminant Name	Averaging Period (h)	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
Scenario 1											
LOADER_1	Volume	Loader movement between working face and screen	654044	4880481	N/A	Suspended Particulate Matter	24	EF	Above-Average	0.1254	29%
SCREEN_1	Volume	Screening of raw aggregate material	654049	4880491	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0611	14%
ENGINE_1	Point	Diesel engine (on portable screen)	654049	4880491	10102-44-0	Nitrogen oxides	1, 24	EF	Marginal	0.0277	100%
					N/A	Suspended Particulate Matter	24	EF	Marginal	0.3909	6%
STACK_1	Volume	Dropping of material from stacker to stockpiles	654053	4880483	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0039	1%
LOAD_1	Volume	Loading of material into trucks (tandem, tractor trailer, pit)	654078	4880485	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0917	21%
HAUL_1	Volume Line	Truck movement on internal unpaved haul route	654078	4880485	N/A	Suspended Particulate Matter	24	EF	Above-Average	0.1299	30%
Scenario 2											
LOADER_2	Volume	Loader movement between working face and screen	654467	4880581	N/A	Suspended Particulate Matter	24	EF	Above-Average	0.1254	28%
SCREEN_2	Volume	Screening of raw aggregate material	654457	4880584	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0611	13%
ENGINE_2	Point	Diesel engine (on portable screen)	654457	4880584	10102-44-0	Nitrogen oxides	1, 24	EF	Marginal	0.0277	100%
					N/A	Suspended Particulate Matter	24	EF	Marginal	0.3909	6%
STACK_2	Volume	Dropping of material from stacker to stockpiles	654459	4880578	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0039	1%
LOAD_2	Volume	Loading of material into trucks (tandem, tractor trailer, pit)	654460	4880572	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0917	20%
HAUL_2	Volume Line	Truck movement on internal unpaved haul route	654460	4880572	N/A	Suspended Particulate Matter	24	EF	Above-Average	0.1446	32%
Scenario 3											
LOADER_3	Volume	Loader movement between working face and screen	654522	4880328	N/A	Suspended Particulate Matter	24	EF	Above-Average	0.1254	23%
SCREEN_3	Volume	Screening of raw aggregate material	654522	4880335	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0611	11%
ENGINE_3	Point	Diesel engine (on portable screen)	654522	4880335	10102-44-0	Nitrogen oxides	1, 24	EF	Marginal	0.0277	100%
					N/A	Suspended Particulate Matter	24	EF	Marginal	0.3909	5%
STACK_3	Volume	Dropping of material from stacker to stockpiles	654517	4880333	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0039	1%
LOAD_3	Volume	Loading of material into trucks (tandem, tractor trailer, pit)	654514	4880342	N/A	Suspended Particulate Matter	24	EF	Marginal	0.0917	17%
HAUL_3	Volume Line	Truck movement on internal unpaved haul route	654514	4880342	N/A	Suspended Particulate Matter	24	EF	Above-Average	0.2256	42%

Relevant Section of the Regulation	Section Title	Description of How the Approved Dispersion Model Was Used
Section 8	Negligible sources	The sources deemed negligible are discussed in Section 3.
Section 9	Same Structure contamination	Not applicable.
Section 10	Operating Conditions	See Section 4 and Appendix A.
Section 11	Source of Contaminant Emission rates	See Appendix A.
Section 12	Combined effect of Assumptions for Operating Conditions and Emission Rates	Not applicable.
Section 13	Meteorological Conditions	Regional Meteorological data was used for AERMOD.
Section 14	Area of Modelling Coverage	The entire grid specified is used.
Section 15	Stack Height for Certain New Sources of Contaminant	Not applicable.
Section 16	Terrain Data	Terrain elevation contour data was used downloaded from Natural Resources Canada's Canadian Digital Elevation Data (CDED) dataset.
Section 17	Averaging Periods	1 hour and 24 hours.

CAS#	Contaminant	Total Emission Rate (g/s)	Dispersion Model Used	Max POI Value (µg/m³)	Location of Maximum POI		Averaging Period of Criterion (h)	Criteria (µg/m³)	Limiting Effect	Regulation Schedule #	Percentage of Criteria or Likelihood of adverse effect (%)
					X (m)	Y (m)					
Scenario 1											
N/A	Suspended Particulate Matter	0.4398	AERMOD	44.31	654009	4880542	24	120	Particulate	Schedule 3	36.92%
10102-44-0	Nitrogen oxides	0.3909	AERMOD	48.65	654039	4880408	24	200	Health	Schedule 3	24.33%
				207.23	654022	4880423	1	400	Health	Schedule 3	51.81%
Scenario 2											
N/A	Suspended Particulate Matter	0.4560	AERMOD	45.02	654389	4880634	24	120	Particulate	Schedule 3	37.52%
10102-44-0	Nitrogen oxides	0.3909	AERMOD	32.90	654419	4880648	24	200	Health	Schedule 3	16.45%
				184.40	654419	4880648	1	400	Health	Schedule 3	46.10%
Scenario 3											
N/A	Suspended Particulate Matter	0.4560	AERMOD	84.40	654389	4880634	24	120	Particulate	Schedule 3	70.34%
10102-44-0	Nitrogen oxides	0.3909	AERMOD	42.13	654499	4880248	24	200	Health	Schedule 3	21.06%
				182.17	654522	4880253	1	400	Health	Schedule 3	45.54%

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Figures

LEGEND

APPROXIMATE SITE BOUNDARY

(653851, 4880449) BOUNDARY COORDINATE
UTM NAD83

N

0 50 100 200 300 400

Metres

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Client

Vicdom Sand & Gravel

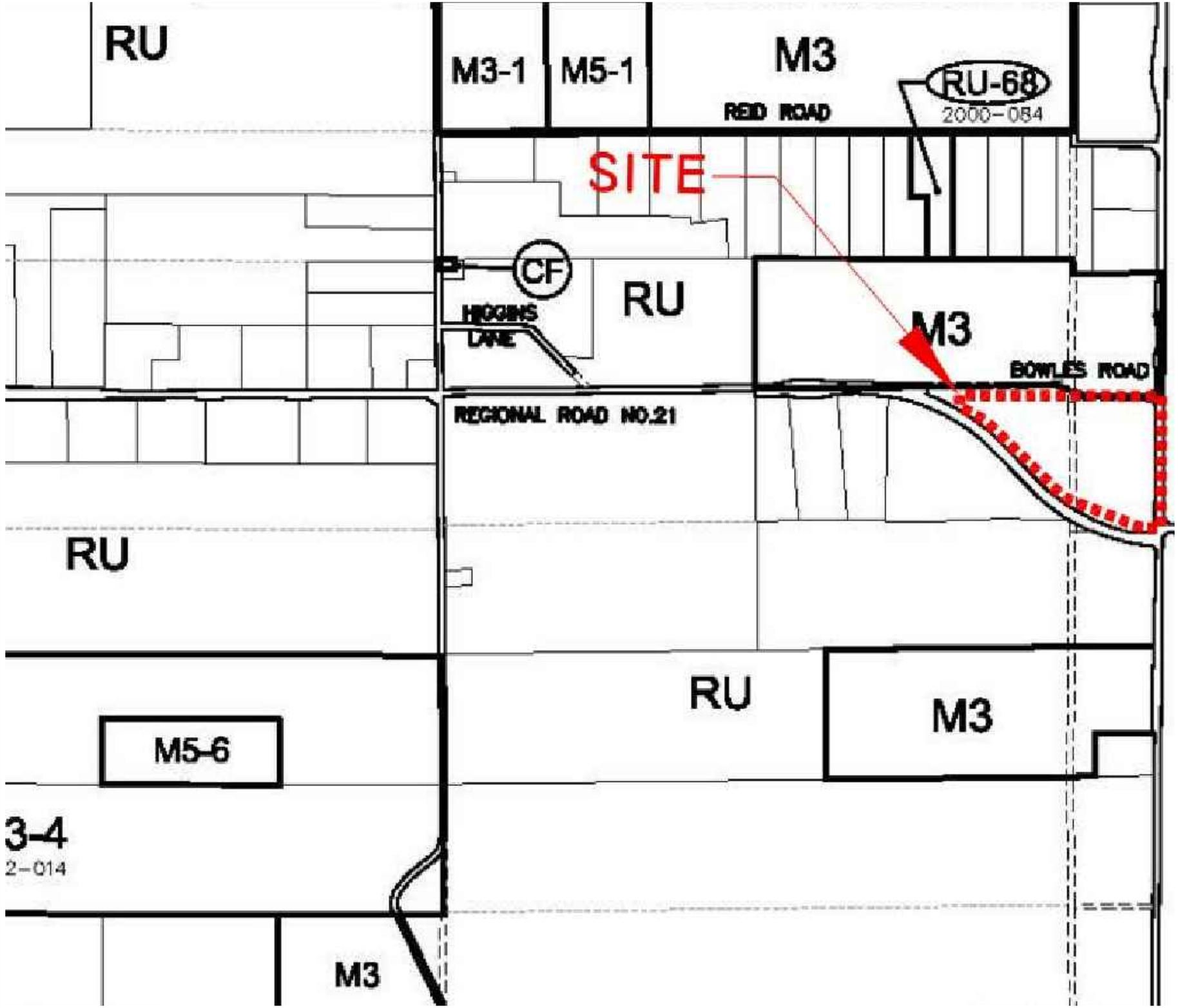
Figure Title

Utica Air Quality Assessment Report

Figure 1: Site Location Plan

Drawn	Checked	Date	Figure No.
KA	HW	13/09/12	1
Scale		Project No.	
1:5000		300034048	

File Name: 034048 Air Quality Assessment Drawing.dwg Date Plotted: September 17, 2013 - 3:20 PM



LEGEND

RC RECREATIONAL CLUSTER ZONE

ER ESTATE RESIDENTIAL ZONE

M1 RURAL INDUSTRIAL ZONE

M3 RURAL RESOURCE EXTRACTION ZONE

M5 AGGREGATE PROCESSING ZONE

EP ENVIRONMENTAL PROTECTION ZONE

OS RECREATIONAL OPEN SPACE ZONE

RU RURAL ZONE

CF COMMUNITY FACILITY ZONE

Lands Affected By Freestanding By-law No. 90-39

N

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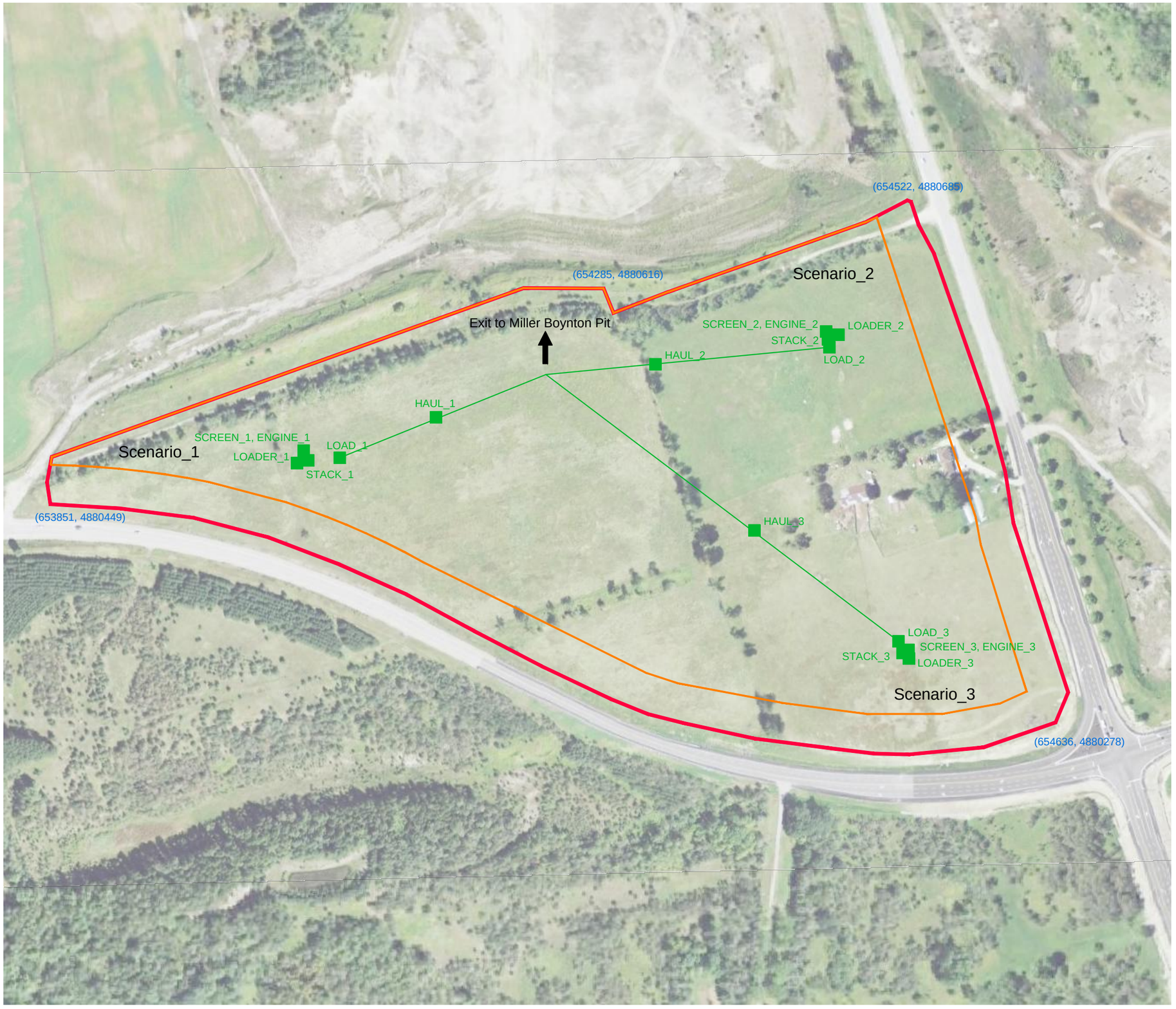
Figure Title

Utica Air Quality Assessment Report

Figure 2: Land Use Zoning Plan

Drawn	Checked	Date	Figure No.
KA	HW	13/09/12	**2**
Scale		Project No.	
NTS		300034048	

File Name: 034048 Air Quality Assessment Drawing.dwg Date Plotted: October 15, 2013 - 10:17 AM



LEGEND

APPROXIMATE SITE BOUNDARY

APPROXIMATE EXTRACTION AREA

(653851, 4880449) BOUNDARY COORDINATE
UTM NAD83

N

0 60 120 180 240

Metres

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Figure Title

Utica Air Quality Assessment Report

Figure 3: Site Operational Plan

Drawn	Checked	Date	Figure No.
KA	HW	13/09/12	**3**
Scale		Project No.	
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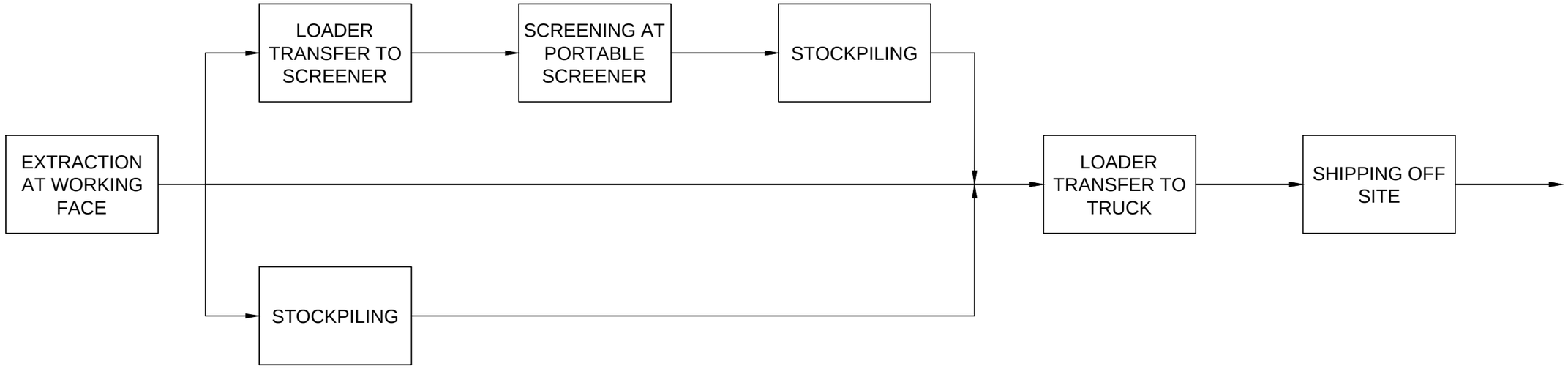
File Name: 034048 Air Quality Assessment Drawing.dwg Date Plotted: September 18, 2013 - 10:59 AM



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Vicdom Sand & Gravel

Figure Title

Utica Air Quality Assessment Report

Figure 4: Process Flow Diagram

Drawn	Checked	Date	Figure No.
KA	HW	13/09/12	4
Scale		Project No.	
NTS		300034048	

File Name: 034048 Air Quality Assessment Drawing.dwg Date Plotted: October 15, 2013 - 9:21 AM

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Appendix A
Supporting Calculations

Appendix A
Supporting Calculations

1.0 Combustion Emissions

Combustion emissions will result from the diesel-fired engine on the portable screener. See Attachment C for the technical specifications for the screen's diesel-fired engine.

The emission calculations for this source are shown on Table A-1: Combustion Emissions. The process flow diagram is shown in Figure 4.

Methodology: Emission Factor ("EF")

Chapter 3.3 of the U.S. AP-42 Document provides emission factors that can be used to predict emissions from a diesel-fired engine. The following equation was used to predict emissions from the screen's diesel engine:

Emission Rate = Engine Horsepower x Emission Factor

Emission Factor = 0.031 lb/hp-hr

Engine Horsepower = 100 hp

Sample Calculation:

Emission Rate = 100 hp/hr * (0.031 lb_{NOx}/hp-hr) * (454 g/1 lb) * (1 hr/3600 s)

= 0.3909 g/s

Particulate emissions from the screener's diesel-fired engine were calculated analogously.

Data Quality: Marginal

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.4 of the ESDM Procedure Document titled "Marginal Data Quality" Emission Estimating Techniques states:

Emission Factors: Emission rate estimates that are developed from tests on only a small number of facilities where there is evidence of variability within the source category population (e.g., US EPA, AP-42, emission factor quality rating of D or E) and/or the emission factor rating is uncertain are considered to have uncertain data quality.

2.0 Processing Operations

Processing operations include the screening of raw aggregate materials and the dropping of material from stacker to stockpile. No crushing or washing of material will occur at the Utica Pit; rather, material will be shipped to Brock Road Pit for further processing, if necessary.

The emission calculations for this source are shown on Table A-2: Processing Operations. The process flow diagram is shown in Figure 4.

Methodology: Emission Factor ("EF")

Emission factors from the US EPA's AP-42 Chapter 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing were used to predict emission rates from the processing operations. The following equation was used to predict emissions from the screen processing operations:

Emission Rate = Material Handling Rate x Emission Factor

The processing operation emission rates are dependent on the amount of material being handled as well as the control efficiency. As noted in Section 3.2.1.1, aggregate stockpiles are considered negligible due to high moisture contents, similarly, controlled emission factors were used for the screen and stackers to account for the high moisture levels of the extracted material.

Screening Emission Factor (controlled) = 0.0011 kg_{SPM}/ $Mg_{aggregate}$

Handling Rate = 200 $Mg_{aggregate}$/hr

Sample Calculation:

Emission Rate = 200 $Mg_{aggregate}$/hr * (0.001 kg_{SPM}/ $Mg_{aggregate}$) * (1000 g/1 kg) * (1 hr / 3600 s)

= 0.0611 g/s

Particulate emissions from the stacker were calculated analogously, with the appropriate emission factor.

Data Quality: Marginal

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.4 of the ESDM Procedure Document titled "Marginal" or "Uncertain Data Quality" Emission Estimating Techniques states:

> Emission Factors: Emission rate estimates that are developed from tests on only a small number of facilities where there is evidence of variability within the source category population (e.g., US EPA, AP-42, emission factor quality rating of D or E) and/or the emission factor rating is uncertain are considered to have uncertain data quality.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculations for this source are based on the maximum operating scenario with a "maximum worst-case" handling rate of 200 tonnes per hour.

3.0 Bulk Material Handling

Bulk material handling emissions include the loading of material into trucks.

The emission calculations for this source are shown on Table A-3: Bulk Material Handling. The process flow diagram is shown in Figure 4.

Methodology: Emission Factor ("EF")

Emission Factors from AP-42 Chapter 13.2.4, "Aggregate Handling and Storage Piles," were used to predict the emission rates from the bulk material handling.

The emission factors from Chapter 13.2.4 are dependent on wind speed. To accurately reflect the change in emissions with changes in wind speed, hourly wind speeds from the meteorological data file were used in conjunction with the emission factor to develop a file of hourly emission rates for use in the dispersion modelling analysis.

Chapter 13.2.4 of the U.S. EPA Compilation of Air Pollutant Emission Factors (AP-42) provides the following equation to predict emissions from bulk material handling operations.

Emission Rate = Material Handling Rate x Emission Factor

Emission Factor (kg_{SPM}/ $Mg_{aggregate}$) = k(0.0016) * $((U/2.2)^{1.3}/(M/2)^{1.4})$

Where: k = particle size multiplier (dimensionless)
U = mean wind speed (m/s)
M = material moisture content (%)

Sample Calculation:

The particle size multiplier (k), varies with aerodynamic particle size range, and for particles that are less than 30 µm, k = 0.74. As a worst case scenario, assuming all material is screened, reference documentation from a similar assessment indicates that the moisture content of screened material from this geographic area is approximately 3.38%. For this sample calculation, a sample wind speed of 5 m/s was chosen. The hourly handling rate is proposed to be 200 tonnes per hour.

Emission Factor (kg_{SPM}/ $Mg_{aggregate}$) = 0.74 (0.0016) * ((5/2.2)$^{1.3}$ / (3.38/2)$^{1.4}$))

= 0.0017 kg_{SPM}/ $Mg_{aggregate}$

Emission Rate = 200 $Mg_{aggregate}$/hr * 0.001651284 kg_{SPM}/ $Mg_{aggregate}$ *(1000 g/1 kg) * (1 hr /3600 s)

= 0.0917 g/s

Data Quality: Marginal

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.4 of the ESDM Procedure Document titled “Marginal” or “Uncertain Data Quality” Emission Estimating Techniques states:

> Emission Factors: Emission rate estimates that are developed from tests on only a small number of facilities where there is evidence of variability within the source category population (e.g., US EPA, AP-42, emission factor quality rating of D or E) and/or the emission factor rating is uncertain are considered to have uncertain data quality.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculations for this source are based on the maximum operating scenario with a “maximum worst-case” handling rate of 200 tonnes per hour.

4.0 Unpaved Haul Roads

Unpaved Haul Road emissions include the loader movement at the working face and truck movement on internal unpaved haul routes.

The emission calculations for this source are shown on Table A-4: Unpaved Haul Roads. The process flow diagram is shown in Figure 4.

Methodology: Emission Factor ("EF")

Emission factors from Chapter 13.2.2 of the U.S. EPA Compilation of Air Pollutant Emission Factors (AP-42) were used to predict the emission rates from haul truck traffic on the unpaved internal haul road and movement of the loader at the working face.

The emission rates were calculated based on hourly traffic volume estimates consistent with the processing rate of the proposed Utica Pit. A supplemental control efficiency of 95% was applied to the calculated emission factors from the unpaved haul routes to account for the mitigating effects of moisture and speed reductions. This control efficiency is based on AP-42 guidance.

Chapter 13.2.2 of the U.S. EPA Compilation of Air Pollutant Emission Factors (AP-42) provides the following equation to predict emissions from vehicle movement on unpaved haul routes.

Emission Rate = Traffic Volume x Route Length x Emission Factor x Control Efficiency

Emission Factor (g_{SPM}/vkt) = $281.9k * (s/12)^{0.7} * (W/3)^{0.45}$

Where: g_{SPM}/vkt = grams per vehicle kilometre travelled
k = particle size multiplier
s = road surface silt material content (%)
W = average weight of the vehicles travelling the road (US short ton)
CE = emission control efficiency (%)

Sample Calculation:

The particle size multiplier (k), varies with aerodynamic particle size range, and for suspended particulate matter, k = 4.9. For the unpaved pit truck haul road, the mean value for typical silt content of surface material on industrial unpaved roads, s = 4.8% given in Table 13.2.2-1 of AP-42, was used.

Emissions for the haul road trucks were based on an average empty vehicle weight of 15.5 tonnes (17.1 tons) and an average full vehicle weight of 31.5 tonnes (34.7 tons). To account for the non-linear emissions based on weight, two emission factors, one representing the average empty case and one representing the average full case, were determined. Two emission rates were therefore determined for each Operational Scenario, using the average of the two as representative for each Operational Scenario.

Average Empty Vehicle Emission Factor (g_{SPM}/vkt)	*Average Full Vehicle Emission Factor (g_{SPM}/vkt)*
= 281.9k * (s/12)$^{0.7}$ * (W/3)$^{0.45}$	= 281.9k * (s/12)$^{0.7}$ * (W/3)$^{0.45}$
= 281.9* 4.9 * (4.8/12) $^{0.7}$ * (17.1/3)$^{0.45}$	= 281.9* 4.9 * (4.8/12) $^{0.7}$ * (34.7/3)$^{0.45}$
= 1591.76	= 2188.65

A control efficiency of 95% was used to account for the mitigating effects of the watering program, improved road grading, and strictly enforced speed limits. This control efficiency was based on AP-42 guidance and Table 13.2.2-2 (AP-42 Chapter 13.2.2) which suggests that 95% control is achievable with the application of water alone. As the proposed operation – in conjunction with a watering program – will restrict vehicle speed and strategically grade internal haul roads so silt stays to a minimum and water distributes evenly, thereby conserving water and reducing airborne silt, the 95 % control efficiency is considered appropriate.

Average Empty Vehicle Emission Rate (g/s)	*Average Full Vehicle Emission Rate (g/s)*
= 26.6 vehicles/hr * 323 m * (1 km / 1000 m) * 1591.76 g_{SPM}/vkt * (1 hr / 3600 s) * (1-(95% /100%))	= 26.6 vehicles/hr * 323 m * (1 km / 1000 m) * 2188.65 g_{SPM}/vkt * (1 hr / 3600 s) * (1-(95% /100%))
= 0.1899 g/s	= 0.2612 g/s

Traffic volume was determined relative to the maximum of 120 trucks per day during the 9 hours of operation. This volume equates to 13.3 trucks per hour and therefore 26.6 one-way trips per hour. The haul route length differs for each Operational Scenario, the worst case haul route, Scenario 3, from the working face to the Miller Boynton Pit entrance to the north is shown below.

Emissions Rate = (0.1899 g/s + 0.2612 g/s) / 2

= 0.2256 g/s

Emissions resulting from the movement of the loader at the working face were calculated analogously.

Data Quality: Above-Average

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.2 of the ESDM Procedure Document titled “Above-Average Data Quality” Emission Estimating Techniques states:

> Emission Factors: Emission rate estimates that are developed from tests on a moderate to large number of sources where the source category population is sufficiently specific to minimize variability (e.g., US EPA, AP-42, emission factor quality rating of A or B) are anticipated to provide above-average quality of emission rate estimates.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculations for this source are based on the maximum operating scenario with a “maximum worst-case” handling rate of 200 tonnes per hour.

Methodology: Emission Factor
Source: U.S. AP-42
Chapter: 3.3 Gasoline And Diesel Industrial Engines

Source ID	Description	Contaminant Name	CAS#	Emission Factor	Emission Factor Units	Convert to g	Convert to s	Data Quality	Engine Horsepower (HP)	Emission Rate (g/s)
ENGINE	Diesel engine (on portable screen)	Nitrogen oxides	10102-44-0	0.0310	lb/hp-hr	454	3600	Marginal	100	0.3909
		Suspended Particulate Matter	N/A	0.0022	lb/hp-hr	454	3600	Marginal	100	0.0277

Methodology: Emission Factor
Source: U.S. AP-42
Chapter: 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing

Source ID	Description	Contaminant Name	CAS#	Controlled Emission Factor	Controlled Emission Factor Units	Data Quality	Aggregate Handling Rate	Material Handling Rate Units	Convert to g	Convert to s	Emission Rate (g/s)
SCREEN	Screening of raw aggregate material	Suspended Particulate Matter	N/A	0.0011	kgSPM/ Mgaggregate	Marginal	200	tonnes/hour	1000	3600	0.0611
STACK	Dropping of material from stacker to stockpiles	Suspended Particulate Matter	N/A	0.00007	kgSPM/ Mgaggregate	Marginal	200	tonnes/hour	1000	3600	0.0039

Methodology: Emission Factor
Source: U.S. AP-42
Chapter: 13.2.4 Aggregate Handling And Storage Piles

Source ID	Description	Contaminant Name	CAS#	k	U (m/s)	M (%)	Emission Factor	Emission Factor Units	Data Quality	Aggregate Handling Rate	Material Handling Rate Units	Convert to g	Convert to s	Emission Rate (g/s)
LOAD	Loading of material into trucks (tandem, tractor trailer, pit)	Suspended Particulate Matter	N/A	0.74	5	3.38	0.0017	kgSPM/ Mgaggregate	Marginal	200	tonnes/hour	1000	3600	0.0917

Where: Emission Factor = k(0.0016)(((U/2.2)^1.3)/((M/2)^1.4))
k = particle size multiplier (dimensionless) = 0.74 for SPM
U = mean wind speed, meters per second (m/s) = 5 m/s for example calculation
M = material moisture content (%) = 3.38 % from reference documentation

Methodology: Emission Factor
Source: U.S. AP-42
Chapter: 13.2.2 Unpaved Roads

Source ID	Description	Contaminant Name	CAS#	k	s (%)	Average Empty Vehicle Weight (ton)	Average Full Vehicle Weight (ton)	CE (%)	Average Empty Vehicle Emission Factor	Average Full Vehicle Emission Factor	Data Quality	Route Length (m)	Vehicles Per Hour	Convert to g	Convert to s	Average Empty Vehicle Emission Rate (g/s)	Average Full Vehicle Emission Rate (g/s)	Emission Rate (g/s)
HAUL_1	Truck movement on internal unpaved haul route (Scenario 1 to Miller Boynton Entrance)	Suspended Particulate Matter	N/A	4.9	4.8	17.1	34.7	95	1592	2189	Above-Average	198	26.6	1000	3600	0.1164	0.1601	0.1383
HAUL_2	Truck movement on internal unpaved haul route (Scenario 2 to Miller Boynton Entrance)	Suspended Particulate Matter	N/A	4.9	4.8	17.1	34.7	95	1592	2189	Above-Average	223	26.6	1000	3600	0.1311	0.1803	0.1557
HAUL_3	Truck movement on internal unpaved haul route (Scenario 3 to Miller Boynton Entrance)	Suspended Particulate Matter	N/A	4.9	4.8	17.1	34.7	95	1592	2189	Above-Average	347	26.6	1000	3600	0.2041	0.2806	0.2423
LOADER	Loader movement between working face and screen	Suspended Particulate Matter	N/A	4.9	4.8	34.5	40	95	2183	2333	Above-Average	50	80	1000	3600	0.1213	0.1296	0.1254

Where: Emission Factor (kgSPM/ Mgaggregate) = 281.9k((s/12)^0.7)((W/3)^0.45)
k = particle size multiplier (dimensionless) = 4.9 for SPM from Table 13.2.2-2
s = road surface silt material content (%) = 4.8 % from Table 13.2.2-1
W = average weight of the vehicles traveling the road (US short tons)
CE = emission control efficiency (%)

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Appendix B

Dispersion Modelling Printouts

Appendix B
Dispersion Modelling

The property boundary points are listed in Table C-1. The emission rates organized by emission source are found in Table 2. Selected pages from the simulation output file for nitrogen oxides are shown at the end of this Appendix.

1.0 Nitrogen Oxides

The nitrogen oxides simulation is found in the “034048 Vicdom Utica NOx.zip” backup. The NO_x emission is predicted from the maximum firing rate of the screen’s diesel engine and simulated as a point source. All three modelling scenarios (1, 2, and 3) are included in the modelling file. The first highest predicted values are reported in Table 4.

A contour plot showing the first highest value for Scenario 1, 2, and 3 is shown in this Appendix labelled “Vicdom Utica Pit – NOx (1-hour averaging period)”.

2.0 Suspended Particulate Matter

The particulate matter simulation is found in the “034048 Vicdom Utica SPM.zip” backup. All sources, with the exception of internal haul roads and the diesel engine, were modelled as volume sources with parameters based on information obtained from site plans, the approximate dimensions of processing equipment, and vehicles proposed to be used at the facility. Internal haul roads were modelled as volume line sources and the exhaust stack from the diesel-fired engine was modelled as a point source.

Table B-1:
Modelling Input Values

Property Boundary	
UTM Coordinates	
X (m)	Y (m)
653851.44	4880448.86
653906.05	4880445.56
653963.59	4880438.24
654022.22	4880422.85
654077.31	4880401.79
654129.72	4880378.35
654182.50	4880349.78
654235.27	4880322.31
654289.15	4880296.67
654318.10	4880284.95
654345.59	4880277.99
654401.43	4880265.82
654461.53	4880258.12
654494.89	4880254.09
654522.01	4880253.36
654580.28	4880258.86
654636.72	4880278.27
654646.61	4880301.71
654603.77	4880434.41
654597.54	4880473.60
654583.97	4880524.35
654541.82	4880644.49
654529.72	4880667.20
654523.86	4880685.14
654520.93	4880686.24
654487.94	4880669.03
654334.38	4880614.82
654291.38	4880598.33
654283.69	4880617.38
654221.38	4880617.74
653852.54	4880485.86
653848.87	4880466.08

```
** Lakes Environmental AERMOD MPI
**
**************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 8.1.0
** Lakes Environmental Software Inc.
** Date: 9/17/2013
** File: C:\AERMOD\VicDom\034048\Rev0\NOx\034048 NOx.ADI
**
**************************************
**
**
**************************************
** AERMOD Control Pathway
**************************************
**
**
CO STARTING
   TITLEONE C:\AERMOD\VicDom Utica\VicDom Utica.isc
   MODELOPT DFAULT CONC
   AVERTIME 1 24
   POLLUTID MULTI
   RUNORNOT RUN
   ERRORFIL "034048 NOx.err"
CO FINISHED
**
**************************************
** AERMOD Source Pathway
**************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
   LOCATION ENGINE1NOX   POINT      654049.357  4880490.712      348.040
** DESCRSRC diesel engine (on portable screen)
   LOCATION ENGINE2NOX   POINT      654457.484  4880583.773      346.000
** DESCRSRC diesel engine (on portable screen)
   LOCATION ENGINE3NOX   POINT      654521.860  4880335.020      340.720
** DESCRSRC diesel engine (on portable screen)
** Source Parameters **
   SRCPARAM ENGINE1NOX   0.3909444444     3.000   816.000  44.56338     0.100
   SRCPARAM ENGINE2NOX   0.3909444444     3.000   816.000  44.56338     0.100
   SRCPARAM ENGINE3NOX   0.3909444444     3.000   816.000  44.56338     0.100

** Variable Emissions Type: "By Hour / Day (HRDOW)"
** Variable Emission Scenario: "Scenario 2"
** WeekDays:
   EMISFACT ENGINE1NOX   HRDOW 0.0 0.0 0.0 0.0 0.0 0.0
   EMISFACT ENGINE1NOX   HRDOW 1.0 1.0 1.0 1.0 1.0 1.0
   EMISFACT ENGINE1NOX   HRDOW 1.0 1.0 1.0 0.0 0.0 0.0
   EMISFACT ENGINE1NOX   HRDOW 0.0 0.0 0.0 0.0 0.0 0.0
** Saturday:
   EMISFACT ENGINE1NOX   HRDOW 0.0 0.0 0.0 0.0 0.0 0.0
   EMISFACT ENGINE1NOX   HRDOW 1.0 1.0 1.0 1.0 1.0 0.0
   EMISFACT ENGINE1NOX   HRDOW 0.0 0.0 0.0 0.0 0.0 0.0
   EMISFACT ENGINE1NOX   HRDOW 0.0 0.0 0.0 0.0 0.0 0.0
** Sunday:
```

**MODELOPTs: RegDFAULT CONC ELEV

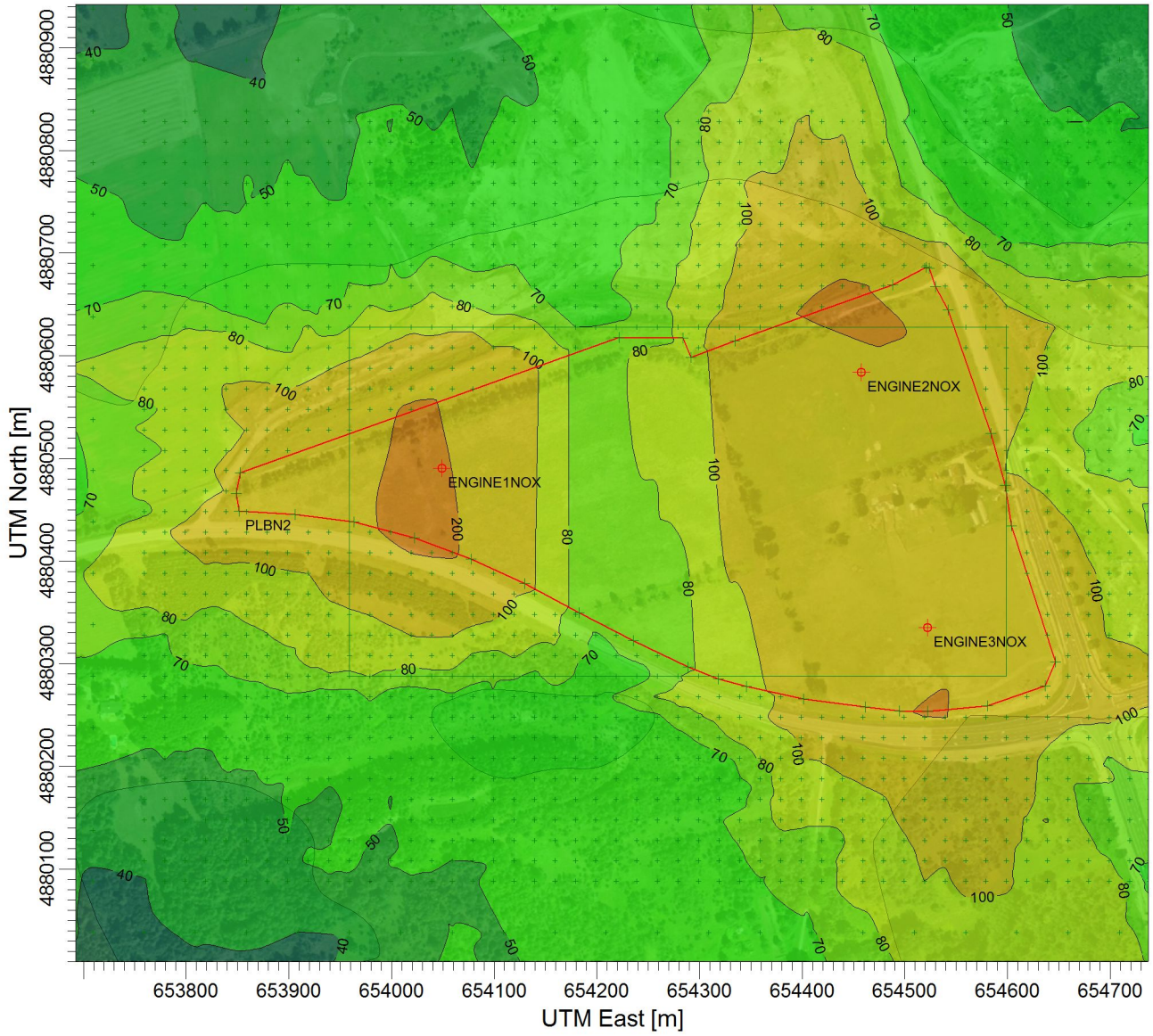
*** THE MAXIMUM 200 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ENGINE1NOX , ENGINE2NOX , ENGINE3NOX ,

** CONC OF MULTI IN MICROGRAMS/M**3 **

RANK	CONC	(YYMMDDHH)	AT	RECEPTOR (XR,YR)	OF TYPE	RANK	CONC	(YYMMDDHH)	AT	RECEPTOR (XR,YR)	OF TYPE
1.	239.89003	(99122008)	AT	(654419.00, 4880648.00)	DC	41.	208.00333	(98021307)	AT	(654039.00, 4880408.00)	DC
2.	238.05449	(00020307)	AT	(654419.00, 4880648.00)	DC	42.	207.61864	(99122010)	AT	(654019.00, 4880548.00)	DC
3.	237.06266	(96011615)	AT	(654419.00, 4880648.00)	DC	43.	207.58937	(99022207)	AT	(654039.00, 4880408.00)	DC
4.	235.31593	(98011409)	AT	(654022.22, 4880422.85)	DC	44.	207.38551	(96010808)	AT	(654059.00, 4880408.00)	DC
5.	234.34142	(96011614)	AT	(654419.00, 4880648.00)	DC	45.	206.49921	(98011608)	AT	(654039.00, 4880408.00)	DC
6.	234.32436	(98011511)	AT	(654022.22, 4880422.85)	DC	46.	206.48796	(96032707)	AT	(654022.22, 4880422.85)	DC
7.	232.23713	(99020215)	AT	(654419.00, 4880648.00)	DC	47.	206.28665	(00020407)	AT	(653999.00, 4880428.00)	DC
8.	227.38842	(96121110)	AT	(654022.22, 4880422.85)	DC	48.	206.19196	(00121408)	AT	(654059.00, 4880408.00)	DC
9.	226.28480	(99120815)	AT	(654419.00, 4880648.00)	DC	49.	206.15747	(99022007)	AT	(654059.00, 4880408.00)	DC
10.	225.71665	(00092807)	AT	(654022.22, 4880422.85)	DC	50.	205.66123	(99122008)	AT	(654019.00, 4880548.00)	DC
11.	224.57553	(97011515)	AT	(654419.00, 4880648.00)	DC	51.	205.36725	(98022409)	AT	(654522.01, 4880253.36)	DC
12.	222.69560	(99022407)	AT	(654022.22, 4880422.85)	DC	52.	205.34826	(00011507)	AT	(654459.00, 4880668.00)	DC
13.	221.30905	(97011515)	AT	(654019.00, 4880548.00)	DC	53.	205.20632	(97110807)	AT	(654522.01, 4880253.36)	DC
14.	220.41955	(96123010)	AT	(654022.22, 4880422.85)	DC	54.	205.15951	(97013108)	AT	(654459.00, 4880668.00)	DC
15.	219.86492	(99020215)	AT	(654019.00, 4880548.00)	DC	55.	204.74206	(99121312)	AT	(654522.01, 4880253.36)	DC
16.	219.26971	(96121109)	AT	(654022.22, 4880422.85)	DC	56.	204.73780	(98121708)	AT	(654039.00, 4880408.00)	DC
17.	217.03577	(98011612)	AT	(654022.22, 4880422.85)	DC	57.	203.96934	(99022208)	AT	(654522.01, 4880253.36)	DC
18.	216.01038	(99122010)	AT	(654419.00, 4880648.00)	DC	58.	203.85135	(00122909)	AT	(654522.01, 4880253.36)	DC
19.	215.33924	(96011614)	AT	(654019.00, 4880548.00)	DC	59.	203.82888	(96022207)	AT	(654039.00, 4880408.00)	DC
20.	215.32724	(00011013)	AT	(654419.00, 4880648.00)	DC	60.	203.53705	(98021409)	AT	(654059.00, 4880408.00)	DC
21.	214.69474	(96012207)	AT	(654439.00, 4880668.00)	DC	61.	203.50645	(99120115)	AT	(654419.00, 4880648.00)	DC
22.	214.60489	(00123010)	AT	(653999.00, 4880428.00)	DC	62.	203.48900	(00120107)	AT	(654522.01, 4880253.36)	DC
23.	214.58302	(96011615)	AT	(654019.00, 4880548.00)	DC	63.	203.30107	(97020808)	AT	(654059.00, 4880408.00)	DC
24.	214.17307	(96011611)	AT	(654019.00, 4880548.00)	DC	64.	203.18787	(00122115)	AT	(654459.00, 4880668.00)	DC
25.	213.65015	(00122113)	AT	(654019.00, 4880548.00)	DC	65.	203.09623	(00121113)	AT	(654022.22, 4880422.85)	DC
26.	213.06780	(96011611)	AT	(654419.00, 4880648.00)	DC	66.	202.96816	(97013007)	AT	(653999.00, 4880428.00)	DC
27.	212.92441	(98011514)	AT	(654022.22, 4880422.85)	DC	67.	202.88770	(96022210)	AT	(654522.01, 4880253.36)	DC
28.	212.56805	(00120208)	AT	(654059.00, 4880408.00)	DC	68.	202.60109	(99122708)	AT	(654059.00, 4880408.00)	DC
29.	211.16591	(98020507)	AT	(654522.01, 4880253.36)	DC	69.	202.24139	(96121008)	AT	(654459.00, 4880668.00)	DC
30.	210.75975	(00120107)	AT	(654059.00, 4880408.00)	DC	70.	202.15616	(98011607)	AT	(654522.01, 4880253.36)	DC
31.	210.68033	(98022408)	AT	(654522.01, 4880253.36)	DC	71.	202.01164	(00120108)	AT	(654059.00, 4880408.00)	DC
32.	209.86502	(96021508)	AT	(654059.00, 4880408.00)	DC	72.	201.97433	(98122607)	AT	(654459.00, 4880668.00)	DC
33.	209.83265	(98011610)	AT	(654022.22, 4880422.85)	DC	73.	201.55760	(98010812)	AT	(654022.22, 4880422.85)	DC
34.	209.66079	(97091707)	AT	(654419.00, 4880648.00)	DC	74.	201.51769	(00021910)	AT	(654059.00, 4880408.00)	DC
35.	209.43679	(00012008)	AT	(654522.01, 4880253.36)	DC	75.	201.19534	(99121510)	AT	(654459.00, 4880668.00)	DC
36.	209.10275	(98100707)	AT	(654419.00, 4880648.00)	DC	76.	201.07101	(00122908)	AT	(654539.00, 4880248.00)	DC
37.	208.90276	(96022209)	AT	(654059.00, 4880408.00)	DC	77.	200.88191	(98021308)	AT	(654039.00, 4880408.00)	DC
38.	208.56183	(00122113)	AT	(654419.00, 4880648.00)	DC	78.	200.83475	(97020807)	AT	(654059.00, 4880408.00)	DC
39.	208.13907	(00020408)	AT	(654522.01, 4880253.36)	DC	79.	200.81738	(98011409)	AT	(654019.00, 4880408.00)	DC
40.	208.10636	(97121107)	AT	(654059.00, 4880408.00)	DC	80.	200.57238	(00121408)	AT	(654522.01, 4880253.36)	DC

PROJECT TITLE:

Vicdom Utica Pit
NOx (1-hour averaging period)



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: ALL

ug/m^3

8 10 20 40 50 70 80 100 200 300

COMMENTS: - Scenario 1 MAX POI at 58.79% of criteria - Scenario 2 MAX POI at 56.13% of criteria - Scenario 3 MAX POI at 48.95 % of criteria	SOURCES: **3**	COMPANY NAME:	
	RECEPTORS: **3393**	MODELER:	
	OUTPUT TYPE: **Concentration**	SCALE: 1:6,571 0 0.2 km	
	MAX: **239.89003 ug/m^3**	DATE: **9/18/2013**	PROJECT NO.: **034048**

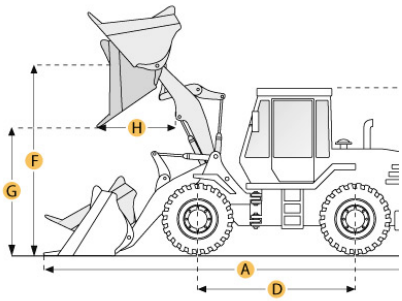
BURNSIDE

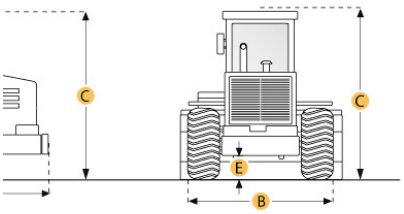
[THE DIFFERENCE IS OUR PEOPLE]

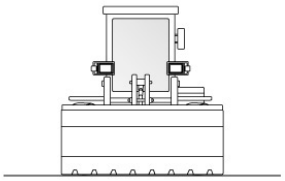
Appendix C
Equipment Data

RITCHIE Specs Everything about Equipment

VOLVO L220E WHEEL LOADER







Bucket		
G. DUMP CLEARANCE AT MAX RAISE	10.3 ft in	3150 mm

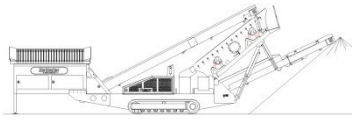
Dimensions		
A. LENGTH WITH BUCKET ON GROUND	30.5 ft in	9300 mm
B. WIDTH OVER TIRES	10.4 ft in	3170 mm
C. HEIGHT TO TOP OF CAB	12.2 ft in	3730 mm
D. WHEELBASE	12.1 ft in	3700 mm
E. GROUND CLEARANCE	1.7 ft in	510 mm
F. HINGE PIN - MAX HEIGHT	15.4 ft in	4680 mm
H. REACH AT MAX LIFT AND DUMP	4.6 ft in	1400 mm

RITCHIE Specs Everything about Equipment

VOLVO L220E WHEEL LOADER

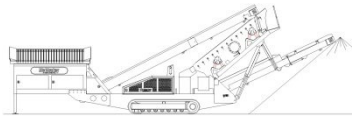
Specification

Engine		
MAKE	Volvo	
MODEL	D12CLBE2	
NET POWER	351 hp	261.7 kw
GROSS POWER	352 hp	262.5 kw
POWER MEASURED @	1600 rpm	
DISPLACEMENT	732.3 cu in	12 L
TORQUE MEASURED @	1200 rpm	
MAX TORQUE	1301.8 lb ft	1765 Nm
NUMBER OF CYLINDERS	6	
Operational		
OPERATING WEIGHT	68960.6 lb	31280 kg
FUEL CAPACITY	97.7 gal	370 L
HYDRAUILC SYSTEM FLUID CAPACITY	64.2 gal	243 L
ENGINE OIL FLUID CAPACITY	12.7 gal	48 L
COOLING SYSTEM FLUID CAPACITY	11.4 gal	43 L
TRANSMISSION FLUID CAPACITY	11.9 gal	45 L
FRONT AXLE/DIFF FLUID CAPACITY	20.3 gal	77 L
REAR AXLE/DIFF FLUID CAPACITY	18.8 gal	71 L
STATIC TIPPING WEIGHT	51808.6 lb	23500 kg
TURNING RADIUS	25.6 ft in	7810 mm
OPERATING VOLTAGE	24 V	
ALTERNATOR SUPPLIED AMPERAGE	55 amps	
REAR AXLE OSCILLATION	30 degrees	
TIRE SIZE	29.5R25 L3	
Transmission		
TYPE	Volve HTE 305	
NUMBER OF FORWARD GEARS	4	
NUMBER OF REVERSE GEARS	4	
MAX SPEED - FORWARD	20.4 mph	32.8 km/h
MAX SPEED - REVERSE	20.4 mph	32.8 km/h
Hydraulic System		
RELIEF VALVE PRESSURE	3625.9 psi	25000 kPa
PUMP FLOW CAPACITY	61.8 gal/min	234 L/min
RAISE TIME	5.8 sec	
DUMP TIME	1.6 sec	
LOWER TIME	3.2 sec	
Bucket		
BREAKOUT FORCE	50177.4 lb	223.2 kN
DUMP CLEARANCE AT MAX RAISE	10.3 ft in	3150 mm
BUCKET WIDTH	11.3 ft in	3430 mm
BUCKET CAPACITY - HEAPED	6.8 yd3	5.2 m3
Dimensions		
LENGTH WITH BUCKET ON GROUND	30.5 ft in	9300 mm
WIDTH OVER TIRES	10.4 ft in	3170 mm
HEIGHT TO TOP OF CAB	12.2 ft in	3730 mm
GROUND CLEARANCE	1.7 ft in	510 mm
WHEELBASE	12.1 ft in	3700 mm
HINGE PIN - MAX HEIGHT	15.4 ft in	4680 mm
REACH AT MAX LIFT AND DUMP	4.6 ft in	1400 mm



SPECIFICATIONS

McCloskey S130



DESCRIPTION

Heavy duty mobile screener with following features:

- 14x5 heavy duty high energy 2 bearing screenbox.
- 100Hp Cat engine.
- Track or wheel mobile.
- Integrated hydraulic folding stockpiling conveyors.
- Remote control tipping grid.
- Fast on site setup time – 10 minutes.

DIMENSIONS AND WEIGHTS

Length - transport	15.09m (49' - 6")
Width - transport	2.90m (9' - 6")
Height - transport 2 deck track	3.40m (11' - 2")
Height - transport 2 deck wheel	3.68m (12' - 1")
Weight - 2 deck track	27,200 Kgs (59,965 lbs)
Weight - 2 deck wheel	23,000 Kgs (50,706 lbs) - estimated

CAPACITIES

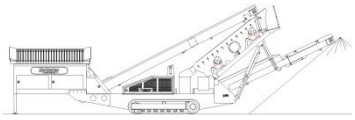
Diesel tank capacity	399 L (105 US gal)
Hydraulic tank capacity	630 L (166 US gal)
Capacity - 12ft hopper	8.01 m^3 (10.48 yd^3)

FEED CONVEYOR

Belt width	1200mm (48”)
Belt spec	Plain 500/3 6+3
Drive drum dia.	335mm (13.1")
Tail drum dia.	320mm (12.5")
Gearbox	Bonfig 805 W2
Gearbox ratio	24.2
Gearbox torque	7000Nm cont, 12500Nm max
Motor	Danfoss OMSS160
Flow rate	50.6 Lpm (13.4 US gpm)
Adjustable speed	YES
Maximum speed	13.1 rpm

MAIN CONVEYOR

Belt width	1050mm (42")
Belt spec	Plain 400/3 6+1.5
Drive drum dia.	285mm (11.2")
Tail drum dia.	270mm (10.6")
Motor	Danfoss OMV630
Flow rate	72.6 Lpm (19.2 US gpm)
Adjustable speed	OPTION
Maximum speed	115.2 rpm



TAIL CONVEYOR

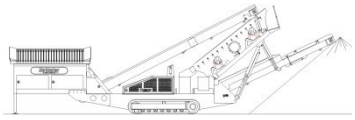
Stockpile height - track model	3871mm (12' - 8")
Stockpile height - wheel model	4139mm (13' - 7")
Belt width	1200mm (48")
Belt spec	Plain - 400/2 6+1.5
Drive drum dia.	285mm (11.2")
Tail drum dia.	270mm (10.6")
Motor	Danfoss OMV630
Flow rate	72.6 Lpm (19.2 US gpm)
Maximum speed	115.2 rpm

SIDE CONVEYOR

Stockpile height - track model	4600mm (15' - 1")
Stockpile height - wheel model	4870mm (15' - 11")
Belt width	650mm (26")
Belt spec	Chevron - 400/3 6+1.5
Drive drum dia.	285mm (11.2")
Tail drum dia.	270mm (10.6")
Motor	OMT400
Flow rate	50.6 Lpm (13.4 US gpm)
Adjustable speed	YES
Maximum speed	126.5 rpm

SCREENBOX

Dimensions - top deck	4270mm x 1524mm (14' x 5')
Dimensions - bottom deck	3660mm x 1524mm (12' x 5')
Bearing type 2 Deck	NSK/RHP 22319 - 95mm bore
Screens - top deck	5' x 4' side tension - 3 off & 5’ x 2’ side tension - 1 off
Screens - bottom deck	5' x 6' end tension - 2 off
Tensioning - top deck	Quick release pin and wedge
Tensioning - bottom deck	Curved tension bar and adjuster
Screen angle	25 to 38 deg
Screen motor	DBH MCC2208 (58.9cc/rev)
Drive system	Direct drive with HRC180 coupling
Hydraulic flowrate	72.6 Lpm (19.2 US gpm)
Speed adjustable	YES - Pressure compensated FCV
Screen stroke adjustable	6 - 10mm maximum
Screen shaft speed	1130 - 950 rpm
Screen 'g' force	4.29 - 5.05



POWERUNIT AND HYDRAULICS

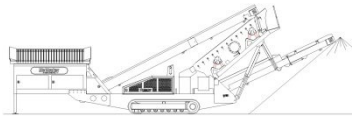
Engine	CAT 3054 C DIT (Tier II)
Engine power	100 HP
Engine speed	2200 rpm
Flywheel Pump 1	DBH 5033,5033
LH PTO Pump 2	DBH 5023,5023
RH PTO Pump 3	DBH 2SPA11
Total system flow	289 L (76.3 US Gpm)
Hydraulic tank capacity	630 L (166 US Gals)
Hydraulic tank ratio	2.18 : 1
Hydraulic Oil cooler	YES

ELECTRICS

Emergency stops	6 off, 1 feeder, 2 powerunit RH&LH, 2 chassis front RH&LH, 1 Walkway
Chassis cabling	Armored cable
Start Siren	YES - 10 sec delay
Engine shutdowns:	Low oil pressure
	High water temp
	Air filter blockage (selectable)
	Fuel contamination
	Low hydraulic tank level
Engine room light	YES
Remote tipping grid	YES - 2 function timed
Radio control tracks	optional - Hetronic system
Pendant track control	YES - plugged in at feeder end

TRACKS

Width	500mm (19.7")
Length	2920mm (9' - 7") crs
Height	739mm (29.4")
Gearbox	Bonfiglioli 707
Ratio	122:1
Motor	Rexroth 63
Speed max	1.32 Kph (0.82 Mph)
Flow rate	72.6 Lpm (19.2 US gpm)
Dual speed	***TBC***
Attachment to chassis	Bolt On for quick change



WHEELS

Width	2900mm (9' - 6")
Axle centers	1360mm (4' - 6")
Wheels	235/75/R17.5 dual
Axles	2 off
Brakes	YES
Spring suspension	YES
Mudguards	YES
Handbrake	OPTION
ABS	OPTION

OPTIONS

Single or double deck live head
Roll-in bogie system
Single shaft shredder
2 Deck Rinser
Crusher chute (available with 15ft hopper only)
Radio remote control

SAFETY FEATURES

External belt alignment points
External grease points
Engine safety shutdown systems
Full safety guarding for nip points