CONSULTING ENGINEERS & SCIENTISTS

April 20, 2009

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**Re: Martin Pit Expansion – Dust Assessment**
**RWDI Project 0925160A** **Email: gibsonr@rogers.com**

As requested, RWDI AIR Inc. (RWDI) conducted a qualitative dust control review of the proposed Martin Pit Expansion to provide preliminary opinion of potential impacts from dust on the surroundings and develop a set of practical dust control concepts that could be adopted into the pit design. This review consisted of the following tasks:

- Review of site plans,
- Visit to the site and surrounding area;
- Review of local, available climate conditions, in the form of a wind-rose,
- Review of applicable regulations;
- Discussion of potential impacts from dust based on review of existing site specific information, as provided by the client, and experience in evaluating aggregate operations in Ontario, and
- General discussion of best practices to be considered for the site

The proposed operational plan reviewed in this study is dated September 5, 2008. The findings from our review are summarized in the following sections.

## 1. SITE DESCRIPTION

In reviewing Site Plan drawings for the proposed Martin Pit Expansion, it is understood that the proposed pit is located on part of Lots 72 and 73, German Company Tract (GCT), in the Township of Woolwich, Regional Municipality of Waterloo. The proposed pit would be subject to a Category 3, Class A licence under the Aggregate Resources Act and Regulations. The proposed pit will have a maximum annual extraction limit of 150 000 tonnes, with a licensed area of 9.73 hectares, and an extraction area of 9.73 hectares. There will be setback between the proposed licence boundary and the limit of extraction. The site will operate between 7am and 6pm Monday to Saturday, with no processing on Saturday or civic holidays.

Operations within the pit will consist of the following:

- Site preparation (overburden removal, berm construction, rehabilitation);
- Aggregate Extraction (loaders and / or excavators extract material from the active face, which is then loaded directly into the processing plant by loaders).
- Aggregate Processing (crushing and screening of aggregate at a portable crushing and / or screening plant); and
- Shipping (front-end loader loads highway trucks for shipment off site).

Extraction will occur in one or two lifts, depending on the height of the extraction face, and will not occur within 1.5 metres of the established water table. The portable processing plant will follow, and will be located as close as possible to the extractive faces.

## 2. POTENTIAL IMPACT LOCATIONS

There are 3 residences located within approximately 500m of the proposed pit, as outlined below:

- One rural residence, located on the east side of Middlebrook Road, approximately 220m southwest of the proposed limit of extraction;
- One rural residence, located on the west side of Middlebrook Road, approximately 380m southwest of the proposed limit of extraction;
- One Mennonite Meeting Hall, located on the east side of Middlebrook Road, approximately 390m southwest of the proposed limit of extraction;
- Scattered rural residences along the north side of Line 86, east of Middlebrook Road, the closest of which is approximately 460m southwest of the proposed limit of extraction;
- Scattered rural residences along the west side of Middlebrook Road, north of Line 86, the closest of which is approximately 480m southwest of the proposed limit of extraction;

## 3. SITE VISIT

On March 11, 2009, the site was visited by Brian Sulley of RWDI. As part of the site visit, a tour of the area surrounding the proposed pit was conducted, to further understand the terrain and land-use characteristics.

## 4. WIND CLIMATE

To get information on wind climate at the study site, historical data reported by Environment Canada were examined for the Region of Waterloo International Airport (see Figure 1). During the summer season, the wind most often comes from the west, west-northwest and northwest (about 26% of the time in total). Winds from the south through west-southwest are also relatively common (about 25% of the time). The least common winds are from south easterly and north easterly directions.

Strong winds (greater than 30 km/h) are predominantly from the west during both the summer and the winter, but also come from the southwest, west-southwest and west-northwest. Altogether, winds above 30 km/h occur only 1.7% of the time during the summer, which is the period during which the majority of the pit operations will take place.

Therefore the residences along Middlebrook Road and those along Line 86 will generally not be downwind of the operations for the prevailing westerly winds, nor for winds in excess 30 km/h.

## 5. APPLICABLE REGULATIONS

The Aggregate Resource Act (ARA) for Ontario states that, in considering whether a license should be issued or refused, the Minister of Natural Resources shall have regard to effects on the environment and nearby communities. Standards have been developed in support of the ARA, and these standards include three prescribed conditions for Category 3 licenses that pertain to dust emissions. The first states that dust will be mitigated on site. The second states that water or other approved dust suppressant will be applied to internal haul roads and processing areas as required to mitigate dust. The third states that processing equipment will be equipped with dust suppressing or collection devices where the equipment creates dust and is operated within 300 m of a sensitive receptor.

Section 14 of the Ontario Environmental Protection Act (EPA) states that no person shall discharge a contaminant into the natural environment that causes or is likely to cause an adverse effect. The term adverse effect is defined in the EPA as meaning one or more of:

a) Impairment of the quality of the natural environment for any use that can be made of it;
b) Injury or damage to property or to plant or animal life;
c) Harm or material discomfort to any person;
d) An adverse effect on the health of any person;
e) Impairment of the safety of any person;
f) Rendering any property or plant or animal life unfit for human use;
g) Loss of enjoyment of normal use of property, and
h) Interference with the normal conduct of business.

Section 9 of the EPA states that no person can construct alter, extend or replace any plant, structure, equipment, apparatus, mechanism or thing that may discharge or from which may be discharged a contaminant, except in accordance with a certificate of approval (C of A) issued by the Director of Approvals at the Ministry of Environment. However, Regulation 524/98 identifies certain types of equipment for which Section 9 of the EPA does not apply. This includes mobile equipment used for the crushing or screening of aggregate, if the mobile equipment is located below grade in a pit or quarry that is operated in accordance with a license issued under the ARA. According to current plans for portable equipment at the Martin Pit Expansion, a C of A will not be required.

Ontario Regulation 419/05 under the EPA sets standards for various air pollutants including dust. Section 18, paragraph 2 of the regulation prohibits anyone from discharging a contaminant, if the discharge results in a concentration that exceeds the standard for that contaminant, according to the calculation method set out by the regulation, at a point of impingement (POI). A POI is any point at or beyond the property boundary of the site. Even though the Martin Pit Expansion may not require a Certificate of Approval, it will be subject to O. Reg. 419/05.

## 6. POTENTIAL DUST IMPACTS

The key potential dust sources at the Martin Pit Expansion, in approximate order of priority, are on-site truck traffic, the processing plant (crushing, screening and stockpiling), wind erosion of certain stockpiles and exposed areas, and loader activity. The key dust sources are discussed further in the following sections.

### 6.1 Truck Traffic

Movement of trucks over unpaved haul routes within the pit can generate significant amounts of airborne dust. One of the prescribed conditions under the Aggregate Resources Act (ARA) states that water or another provincially approved dust suppressant will be applied to internal haul routes and processing areas. In the present case, the internal haul routes are partially defined, but in general the truck route from the stockpiles to the site entrance should be laid out such that the route remains at least 100m from the nearest residence. With respect to the Martin Pit Expansion, there are no residences within 100m of the licence boundary, or within 100m of the existing site entrance road extending from Middlebrook Road to the licence boundary. Therefore, standard practices in terms of watering and/or use of dust suppressant would be adequate to avoid adverse effects at the residences, when properly implemented.

In general, however, the operator should aim to minimize visible dust emissions. Water may needs to be applied several times per day when the pit is operating in dry weather, in order to effectively suppress the dust. This requires that a water truck and a suitable supply of water be available during dry weather.

Although chemical dust suppressants are also an option; RWDI's recommendations are based on the use of water as the primary means of dust control. When a chemical dust suppressant is used, suppressants normally require several repeat applications over the course of a typical operating season. Suppressants do not completely eliminate the need for watering, which will still be needed on less-defined traffic areas around the stockpiles; however, the amount of water that needs to be available is significantly less when a chemical dust suppressant is used.

Track out of gravel onto public roadways due to truck traffic is a common source of dust impacts related to aggregate operations. Track out of gravel along Middlebrook Road near the site entrance may be a source of dust impacts, as the site entrance road is not paved. Periodic wet sweeping and / or flushing of this roadway in conjunction with watering the on-site haul routes will reduce the potential for these impacts. Another option would be to resurface the site entrance road with recycled asphalt, or tar and chip, for a distance of 75m into the site from Middlebrook Road. This will further reduce the potential for impacts, as long as this section of road is kept clean through wet sweeping and / or flushing.

As the facility has a maximum annual extraction limit of 150 000 tonnes, the amount of truck traffic will be relatively small, averaging 2 to 4 trucks per hour.

### 6.2 Processing Plant

Potential dust emission sources at the processing plant include the crusher, screens, transfer points between conveyors and stockpiling operations. Typically, portable processing plants used at a site such as the Martin Pit Expansion would have an hourly processing rate of 400 tonnes per hour. As the facility has a maximum annual extraction limit of 150 000 tonnes, the duration of processing activities is expected to be relatively small, on the order of 375 hours per year. Therefore, in relation to the total available operating hours for the facility, processing operations are a relatively short duration activity.

However, one of the prescribed conditions under the ARA states that processing equipment will be equipped with dust suppressing or collection devices where the equipment creates dust and is being operated within 300m of a sensitive receiver. In the current proposal, the portable plant may be located within 300m from the nearest residence, during the initial phase of extraction. Therefore dust suppressing or collection devices are required under the ARA. Furthermore, in order to ensure compliance with Regulation 419/05, which applies at the nearest property line, the plant should be equipped with spray bars for dust control during extremely dry and windy conditions.

### 6.3 Wind Erosion

Wind erosion from exposed pit faces and stockpile areas is relatively infrequent, occurring only when the wind is high and conditions are dry, but is a potentially significant dust source when it happens. Wind erosion begins to occur when the wind gusts exceed 15 to 20 km/h and becomes significant when the gusts exceed about 30 km/h. If surfaces are wet due to rainfall or other precipitation (as is often the case during the winter months, for example), then wind erosion will not occur. Once extraction is completed in a specific area, the faces must be stabilized to prevent erosion. Overall, wind erosion is expected to occur less than 1.7% of time.

As noted, strong winds predominantly come from westerly directions, which would direct emissions away from residences along Middlebrook Road and those along Line 86. For these reasons, wind erosion of stockpiles and the active face is not considered to be a concern.

### 6.4 Loader Activity

Front-end loaders are used to load trucks with aggregate. Both the movement of the loaders and the dumping of material into the trucks can generate dust. Since these operations take place in the open at aggregate operations, the dust emissions are uncontrolled. Fortunately, the potential emissions due to loader operations are relatively minor compared to other emission sources. The average moisture content of the material being handled by the loaders is usually high enough that dust emissions are small.

## 7. RECOMMENDATIONS

It is RWDI's opinion, based on this review, that the proposed Martin Pit Expansion can meet the requirements of the regulation. This is particularly true, given the limited number of sensitive receptors in the area, the low anticipated rate of truck traffic and processing, and the favourable wind direction with respect to the nearest residences. Also, given these factors, further study is not warranted. The following dust control measures are recommended for this purpose.

- Internal haul routes should be watered, as per the prescribed conditions in the ARA. It is recommended that the operator have the capability to water all internal haul routes once per hour during the hours of operation, in case it is needed during busy periods with hot, dry weather. The actual watering rate can be adjusted by the operator as needed to suppress visible dust emissions.
- A 75m section of the internal haul route, extending from Middlebrook Road into the site, shall be resurfaced with recycled asphalt or tar and chip.
- The portable plant should be equipped with spray bars for dust control.
- Based on the assumed processing rate of 400 tonnes per hour, the processing operations, stockpile area and loading of highway trucks around the stockpiles should be kept a minimum of 100m from the nearest point on the property boundary.

## CLOSING

Please contact Nigel Taylor or Brian Sulley with any questions or comments concerning this report.

**RWDI AIR Inc.**

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Senior Engineer

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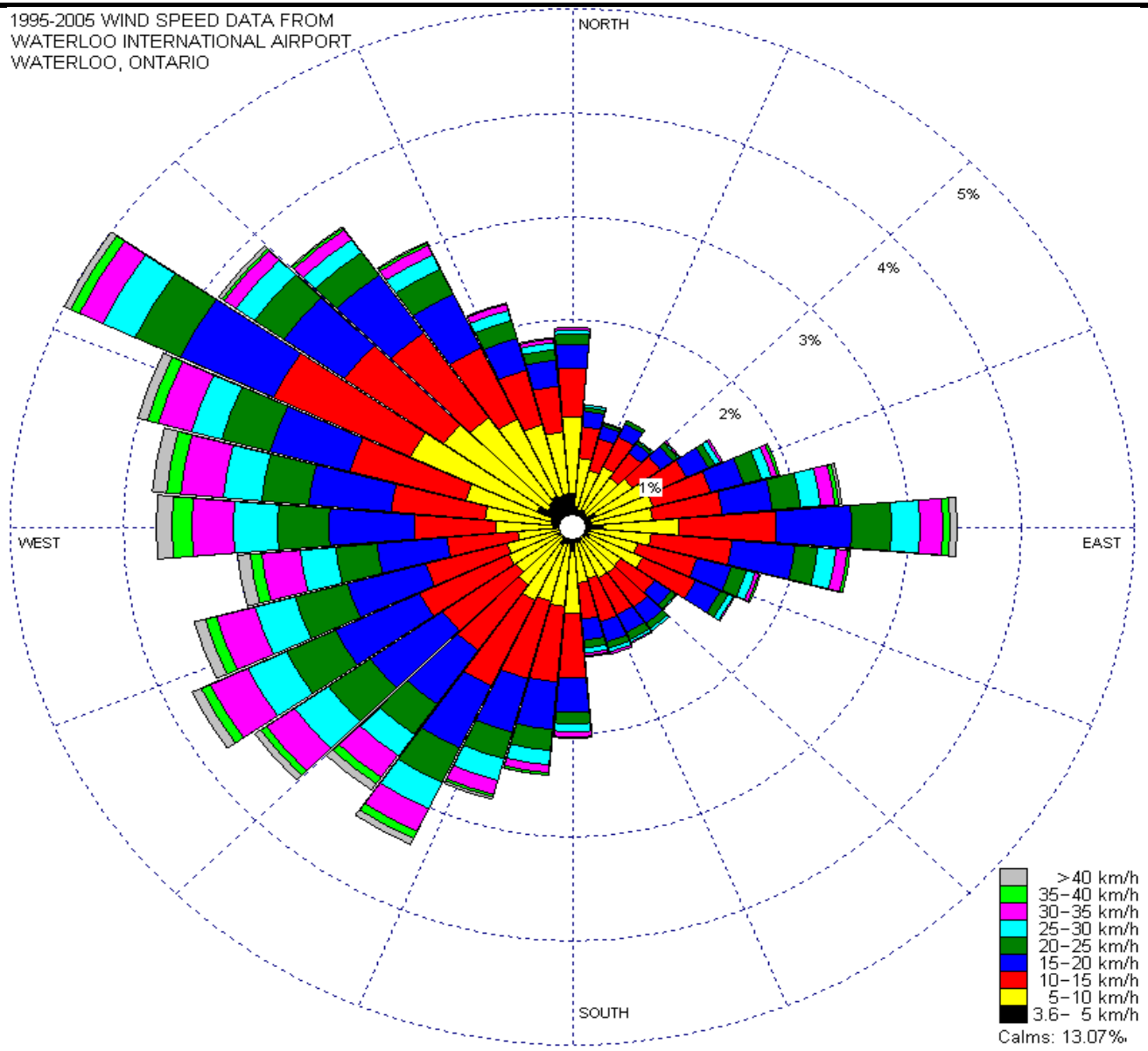
Project Manager Senior Specialist

# FIGURES




**Wind Rose from Waterloo International Airport, Waterloo, Ontario**

Martin Pit Expansion - Township of Woolwich, Ontario

Project #0925160A

Figure No.: 1

Date: Apr 03, 2009

RWDI