

## WILMOT CREEK SECONDARY PLAN

MUNICIPALITY OF CLARINGTON, ONTARIO

AIR QUALITY FEASIBILITY ASSESSMENT

RWDI # 1800162

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# 1 INTRODUCTION

RWDI was retained to complete an air quality land use compatibility study for the proposed Wilmot Creek Secondary Plan Area in the Municipality of Clarington. The Wilmot Creek study area is shown in Figure 1.

An air quality land use compatibility study was completed previously in October 2016 for the proposed Wilmot Creek mixed-use development. In 2017, the Municipality of Clarington initiated the preparation of a Secondary Plan for these lands. The Secondary Plan will provide a land use planning framework for the development of the final phases of the Wilmot Creek Community. The objective of this study is to update the previous technical report completed by RWDI in 2016 to consider the entire Wilmot Creek study area.

The Ministry of the Environment, Conservation and Parks (MECP) D-series guidelines provide direction for land use planning to maximize compatibility of industrial uses with adjacent land uses. The goal of Guideline D-6 is to minimize encroachment of sensitive land uses on industrial facilities and vice versa, in order to address potential incompatibility due to adverse effects such as noise, odour and dust. Recommended minimum separation distances are provided based on the industry size and operation type.

This air quality assessment focusses on odour and fugitive dust because they are the main air quality issues for land use compatibility. Other types of air contaminants are addressed through the Province's industrial air permitting process. Odours and certain types of dust emissions (e.g., dust from on-site vehicle traffic) are not always addressed in the permitting process and, therefore, are considered here.

Air dispersion modelling was completed for odour and particulate matter (dust) to predict air quality in the Wilmot Creek study area. The predicted air quality concentrations are compared to provincial ambient air quality standards and guidelines.

## 2 BACKGROUND

### 2.1 Wilmot Creek Secondary Plan

The Wilmot Creek study area is located in the Municipality of Clarington, Ontario to the east of Bennett Road. See Figure 1 for an illustration of Wilmot Creek study area with respect to its surroundings.

The Wilmot Creek study area is 22 hectares in size and could include future residential and commercial uses.

### 2.2 Surrounding Study Area

The Wilmot Creek study area is bounded by Bennett Road to the west, Highway 401 to the north, and a CN rail line to the south. Earlier phases of the Wilmot Creek Community development are located to the southeast. Two industrial facilities are located to the west of Bennett Road. Other adjacent land-uses include a rail corridor going through the study area, and agricultural land to the north (above Highway 401) and to the southwest.



## 2.3 Canopy Growth

Canopy Growth is a licensed manufacturer of recreational and medical cannabis. Their operations are included within an approximately 4,800 sq. metre facility that was once occupied by Atlantic Lifts. The main shipping road is paved. All operations related to the growing and manufacture of cannabis occurs inside the building. Due to the potential for contamination of their product from spray drift from local agriculture operations, the facility recirculates 100% of its building air. There are no fresh air intakes or building air exhausts. It is our understanding from discussions with Canopy Growth that they use charcoal and high efficiency particulate air filters inside their facility to maintain clean air. Although there are no process or building exhausts, there is still the potential for odour emissions from their operations due to air leakage through the building envelope, including from door openings for material handling and people movement.

## 2.4 Detox Environmental Ltd.

Detox handles, transports and disposes of industrial hazardous and non-hazardous wastes to secure landfill sites for disposal. The building structure is approximately 1,700 sq. metres with an open storage/shipping yard in behind the building of approximately 13,000 sq. metres. The storage/shipping yard shipping road is not paved. Detox has not previously participated in the studies and has therefore not provided RWDI with any additional information other than what can be obtained through public sources. Detox has an ECA for air and waste.

# 3 LAND-USE PLANNING GUIDELINES

## 3.1 Guideline D-6

Land use considerations are a means to reduce the risk of adverse air quality effects from industrial facilities. For example, this can be achieved by creating a land use buffer between industry and a sensitive land use, such as residences, schools, seniors' facilities, daycares, hospitals, churches and campgrounds. The MECP has a guideline (D-6: Compatibility between Industrial Facilities) to assist planners in establishing adequate buffers.

Guideline D-6 provides a classification scheme for industries, based their potential for fugitive emissions that could cause adverse effects. For each class, the guideline provides an estimate of potential influence area and a recommended minimum separation distance between each class of industry and sensitive land uses (see Table 1).



**Table 1: Summary of Guideline D-6**

Industry Class	Definition	Potential Influence Area	Recommended Minimum Separation Distance (property line to property line)
I	Small scale, self-contained, daytime only, infrequent heavy vehicle movements, no outside storage.	70m	20m
II	Medium scale, outdoor storage of wastes or materials, shift operations and frequent heavy equipment movement during the daytime.	300m	70m
III	Large scale, outdoor storage of raw and finished products, large production volume, continuous movement of products and employees during daily shift operations.	1000m	300m

Often an industry will fall between two Classes and judgment is required to apply the most appropriate classification given the balance of the criteria. Guideline D-6 states that no incompatible development should occur within the recommended minimum separation distance as noted in Table 1. Section 4.10 of D-6 however identifies exceptional circumstances with respect to redevelopment, infill and mixed-use areas. In these cases, it suggests that separation distances less than the recommended minimum values may be acceptable if a justifying impact assessment is provided.

## **3.2 Environmental Regulations**

The following sections outline the current framework for federal and provincial regulations regarding air quality and odour.

### **3.2.1 Federal Regulations**

In 2018, Cannabis Regulations SOR/2018-144 came into effect that provides guidance in Part 5 – Good Production Practices. This regulation includes provisions related to a facility’s ventilation system including odour control requirements to prevent the escape of odours.

The regulation does not specify the exact control technology to be selected but provides the above guidance to ensure that each facility evaluates the air filtration systems to prevent the escape of odours.

### **3.2.2 Provincial Regulations**

Industrial air emissions in Ontario are governed by the Environmental Protection Act (EPA) and its regulations. Table 2 summarizes key sections of the EPA and the relevant MECP regulations.



**Table 2: Summary of Ontario Regulations**

Ontario Statute	Section	Summary
EPA	9	Prohibits the use, operation, construction, alteration, expansion or replacement of anything that may discharge a contaminant into the atmosphere, unless in accordance with an Environmental Compliance Approval (ECA), issued by MECP. There are exceptions to this requirement for certain minor types of emission sources.
Reg. 419/05	Various Sections	Sets out requirements for air quality modelling and reporting that must be completed when applying for an ECA
EPA	14	Prohibits anyone from discharging a contaminant (including noise and odour) into the environment if it causes or may cause an adverse effect.  Adverse effect: impairment of the quality of the natural environment for any use; injury or damage to property or to plant or animal life; harm or material discomfort to any person; an adverse effect on the health of any person; rendering any property or plant or animal life unfit for human use; loss of enjoyment of normal use of property; and/or interference with the normal conduct of business.
419/05	45	Prohibits anyone from causing or permitting the emission of any air contaminant to a degree that may cause discomfort to persons, loss of enjoyment of normal use of property, interference with normal conduct of business or damage to property
419/05	19 and 20	Prohibits anyone from causing or permitting the standards to be exceeded at points of impingement.

The growing of cannabis and other associated activities (such as packaging, research and development, oil extraction and sales) would be considered exempt under section 9(3)(e) of the EPA that provides an exemption for agriculture purposes and an ECA or EASR may not be required for certain facilities. An exempt facility would produce all its own crops on site and then would process, package and then ship product out of the same facility.

Section 14 of the EPA prohibits discharges of contaminants that cause or may cause an adverse effect. Odours and dust are included in the definition of contaminants. Cannabis production facilities are not exempt from this section of the Act. If an odour complaint was to be received, the local District Branch of the MECP would have the ability to review the complaint in terms of the potential for adverse impact under s.14. The EPA has several definitions of adverse effect which include the following two most common and applicable examples:

- (g) loss of enjoyment of normal use of property, and
- (h) interference with the normal conduct of business.

Fugitive dust from industrial operations does not necessarily need to be assessed quantitatively under O. Reg. 419/05 (except in specific circumstances), but as a minimum, industries with extensive outdoor handling of bulk



materials and/or operations of mobile equipment on unpaved areas are typically required to have a dust management plan in place, consistent with industry best practices.

## 4 SOURCES AND AIR EMISSIONS

### 4.1 Canopy Growth

Appendix A of Guideline D-6 provides criteria for classifying industrial land uses, based on their outputs, scale of operations, processes, schedule and intensity of operations. Based on the Guideline D-6 categorization criteria, it is our opinion that Canopy Growth facility resembles a Class I facility. Their operations are enclosed and only a modest amount of outdoor movement of vehicles and material.

Based on a Class I industry, the facility has a potential area of influence of 70 metres, and a recommended minimum setback distance of 20 metres. The actual minimum separation distance is approximately 20 metres from the property line to the Wilmot Creek study area and is within the minimum separation distance / zone of influence. Therefore, further evaluation of the potential impacts due to their operations has been completed.

Canopy Growth operates with a license from Health Canada and any air emissions are regulated as detailed in Section 3.2. Odour is the contaminant of concern from a cannabis facility. No other contaminant was assessed. As there is the potential for fugitive odour emissions from the facility (e.g., odour air escaping through a door opening, and general leakage through building envelope) an odour assessment has been completed. This is a conservative approach.

Odour levels are expressed in terms of Odour Units (OU), where a value of 1 OU corresponds to the 50% detection threshold. Expressed in these units, the complaint threshold for odour is typically 3 to 5 OU.

Odour sampling was completed at a temporary Canopy Growth operating facility located on Bennett Road north of Highway 401 on July 23, 2015. This facility has similar cannabis production to the facility across from the Wilmot Creek study area. The exception is that this temporary facility had building air exhaust points where odour samples could be taken from on the roof of the building. One sample was collected neat (no field dilution), over a 2-minute period, from various exhaust points at the temporary facility for the following building areas:

- Flowering
- Mezzanine
- Juvenile Plants
- 4 Week old Plants
- Drying/Cutting
- Hallway

The samples were taken from exhausts that did not have charcoal or air filtration. The samples were delivered in opaque plastic bags to Pinchin Environmental who analysed the samples using an eight-member odour panel.

Table 3 summarizes the results of the odour sampling. Appendix A contains the detailed information regarding these odour panel results, including the calculation spreadsheets and laboratory results.



**Table 3: Concentration of Odour Inside Stack**

Location	Odour Concentration (OU)
Flowering	213
Mezzanine	213
Juvenile Plants	196
4 Week Old Plants	276
Drying/Cutting	712
Hallway	75

Canopy Growth has confirmed the following operations at their facility across from the Wilmot Creek study area:

- Each production room will be approximately 2000 sq. feet with 10 ft. high ceilings.
- Each production room will have a 20-ton chiller providing 12,000 CFM of tempered re-circulation air. There are systems in place to control CO<sub>2</sub> and humidity within the growing rooms.
- Inside building air will have an air filtration system and charcoal filtering before being recirculated within the production room. There is no ventilation equipment that brings in fresh air or exhausts building air to the atmosphere.
- There are 17 growing rooms (e.g., flowering) however only 8 or 9 are in production at any one time; one mother room (e.g., juvenile); two veg rooms (e.g., 4-week old); one drying room; and one trimming room (e.g., cutting).

Development of the odour emission rates are presented in detail in Appendix A. The odour emission rates of Table 3 were factored by the re-circulation flow rate to determine an internal odour emission rate for each production room. This odour emission rate was further factored by the following:

- Air leakage through the building envelope (e.g., open doors, and general air leakage through the building envelope) was assumed to be 5% of the re-circulation air filtration system within each production room.
- The odour concentrations shown in Table 3 were reduced by 80% to account for the odour filtration systems at the current Canopy Growth facility, which were not present at the temporary facility where the odours were sampled.
- The reduced odour concentrations were applied to the calculated leakage rate to determine an odour emission rate into the environment.

These factors are considered conservative based on our experience with building systems and odour control methods. Canopy Growth was modelled as a volume source with a fugitive odour emission rate of 281 OU/s.

## 4.2 Detox Environmental Ltd.

Based on the Guideline D-6 categorization criteria, it is our opinion that the Detox facility resembles a Class II facility. Detox's operations are largely enclosed and only have a modest amount of outdoor movement of vehicles and material.



Based on a Class II industry, the facility has a potential area of influence of 300 metres, and a recommended minimum setback distance of 70 metres. The actual minimum separation distance is approximately 20 metres property line to property line. The distance between the eastern edge of the facility building and the closest sensitive receiver on the development is approximately 75 metres.

The proposed development is within the minimum setback distance / zone of influence and there may be a potential for adverse impacts. Therefore, further evaluation of the potential impacts due to Detox's operations has been completed.

Detox did not participate in the study, and therefore, did not provide any operational information that could be used to estimate air emissions. Detox has existing ECAs with the MECP. The publicly available information on the National Pollutant Release Inventory (NPRI) was searched for additional information about Detox. Carbon monoxide was reported by Detox as having air emissions on site in 2017. Presumably Detox had demonstrated compliance with provincial standards in order to obtain their ECA. The last reporting period for particulate matter is 2010. The Detox storage and shipping yard is unpaved and onsite truck traffic is likely the primary generator of dust or particulate emissions. Road dust for this type of facility is generally not assessed under an ECA. With the exception of particulate emissions, it has been assumed that all contaminants emitted from their facility meet applicable MECP air standards at their property line and beyond.

Particulate emissions from the onsite truck traffic were developed from AP-42 emission factors for unpaved roads. Development of the emission rates for the roadways is presented in detail in Appendix B. There are three different particulate ambient air quality criteria values representing suspended particulate matter (particles < 44 µm in diameter), inhalable particulate (particles < 10 µm in diameter), and respirable particulate (particles < 2.5 µm in diameter).

## **5 AIR QUALITY MODELLING**

### **5.1 Dispersion Model**

Air contaminants emitted from industrial sources will disperse as they travel downwind. The degree to which the contaminants disperse depends on the weather-related factors, such as wind speed and amount of turbulence. The most common approach to determine potential future downwind concentrations from a proposed project is through the use of computer simulation that predicts the dispersal of air pollutants as they drift away from the point of emission. These simulations are referred to as dispersion models.

The AERMOD dispersion model was used to predict air quality impacts as a result of the operations at Canopy Growth and Detox. AERMOD is a steady-state dispersion model designed to predict air pollution concentrations at receptor locations downwind of emission sources. It was developed by the U.S. Environmental Protection Agency (EPA) and is approved by the MECP.

## 5.2 Meteorological Data

Pre-processed hourly meteorological data available from the MECP for the Central Ontario region were used in this study. This data set covers the period from 1996 to 2000 inclusive and is based on surface data from the Toronto Pearson International Airport, Toronto, Ontario and upper air data from Buffalo, New York.

## 5.3 Averaging Periods Used

The AERMOD dispersion model predicts 1-hour average concentrations. To obtain different averaging times, the 1-hour average concentrations from the model output are factored. For example, odour has a 10-minute averaging period and the 1-hour averaged model odour values were adjusted by a factor of 1.65 to obtain 10-minute averaged concentrations.

## 5.4 Receptors

The receptors in the AERMOD model include a grid of ground level receptors positioned over the Wilmot Creek study area. The receptors were positioned at a height of 1.5 m. There were flagpole receptors ranging in height from 4 to 8 metres selectively positioned near the two industries on Bennett Road to simulate elevated receptors consistent with mid-rise towers should these be planned for the western end of the Wilmot Creek study area. The worst-case results have been presented.

## 5.5 Air Quality Thresholds

Guidance with respect to odour guidelines in Ontario is provided by the MECP in two documents, namely the "Proposed Odour Policy Framework Proposal" issued in 2005, and the 2008 Technical Bulletin "Methodology for Modelling Assessments of Contaminants With 10-Minute Average Standards and Guidelines Under O. Reg. 419/05". RWDI has applied the common approach in Ontario that it is considered acceptable if the modelled impact for odour at the nearest sensitive receptor the guideline of 1 OU is exceeded less than 0.5% of the time.

Ontario has established both criteria and standards for concentrations of airborne contaminants. The Ambient Air Quality Criteria (AAQC) are effects-based levels in air, based on health and/or other effects. They are used in environmental assessments, special air monitoring studies and assessments of general air quality to determine the potential for adverse effects. The 24-hr AAQC air quality criteria for particulate are:

- Suspended particulate – 120  $\mu\text{g}/\text{m}^3$
- Inhalable particulate – 50  $\mu\text{g}/\text{m}^3$
- Respirable particulate – 30  $\mu\text{g}/\text{m}^3$



## 6 RESULTS

### 6.1 Maximum Predicted Concentrations

The AERMOD dispersion model predicted off-site concentrations for each contaminant at various receptors. The maximum concentration of particulate occurred at ground level just inside the western boundary of the Wilmot Creek study area. Odour is normally evaluated at a sensitive location such as a residence, park or a school. As this is a Secondary Plan assessment there are no defined or specific land uses within the study area. Therefore, the worst-case results have been presented. Tables 4 and 5 provide the modelling results.

**Table 4: Summary of Predicted Maximum Particulate Results**

Contaminant	Predicted Concentration ( $\mu\text{g}/\text{m}^3$ )	24-hr AAQC Threshold ( $\mu\text{g}/\text{m}^3$ )	Percentage of AAQC
Suspended Particulate	77	120	64%
Inhalable Particulate	20	50	40%
Respirable Particulate	2	30	7%

**Table 5: Summary of Predicted Maximum 10-minute Odour Results**

Contaminant	Predicted Concentration (OU)	Guideline (OU)	Percentage of Guideline
Odour	0.7	1.0	70%

### 6.2 Discussion of Modelling Results

The predicted concentration for particulate in the Wilmot Creek study area due to vehicle movement on the unpaved Detox yard is expected to be below the applicable ambient air quality criteria. It should be noted that the calculated particulate emission rate is conservative as the emission factor data for vehicles on unpaved roads assume a vehicle speed much higher than what would be expected in the yard. Furthermore, regardless of the development, Detox is not permitted to create an adverse impact on the environment even on the existing undeveloped Wilmot Creek study area lands. This development does not in our opinion create an increased regulatory burden for Detox.

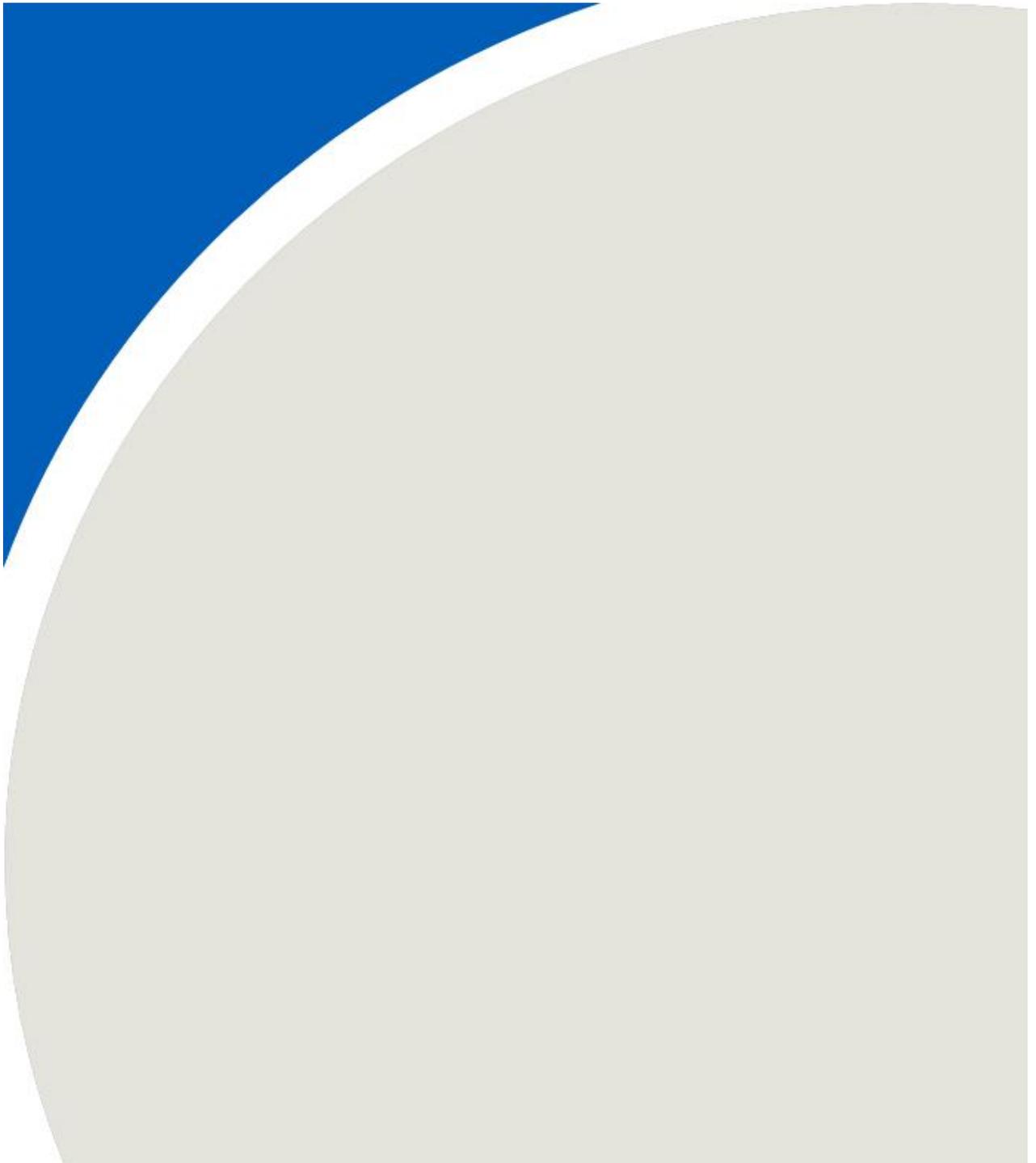
The results of the odour dispersion modelling indicate that odour levels from Canopy Growth are predicted to be below 1 OU anywhere within the Wilmot Creek study area. This study has assumed some air leakage of odour from cannabis production. The predicted levels are relatively low and therefore a frequency analysis was not completed.



## 7 CONCLUSIONS

The predicted particulate and odour levels are within the applicable thresholds and are therefore considered to be acceptable throughout the Wilmot Creek Secondary Plan study area. No buffer zone is required with respect to the nearby industries.

# FIGURES





# Wilmot Creek Secondary Plan and Surrounding Land Uses

Map Projection: NAD 1983 UTM Zone 17N  
 Wilmot Creek Secondary Plan - Clarington, Ontario



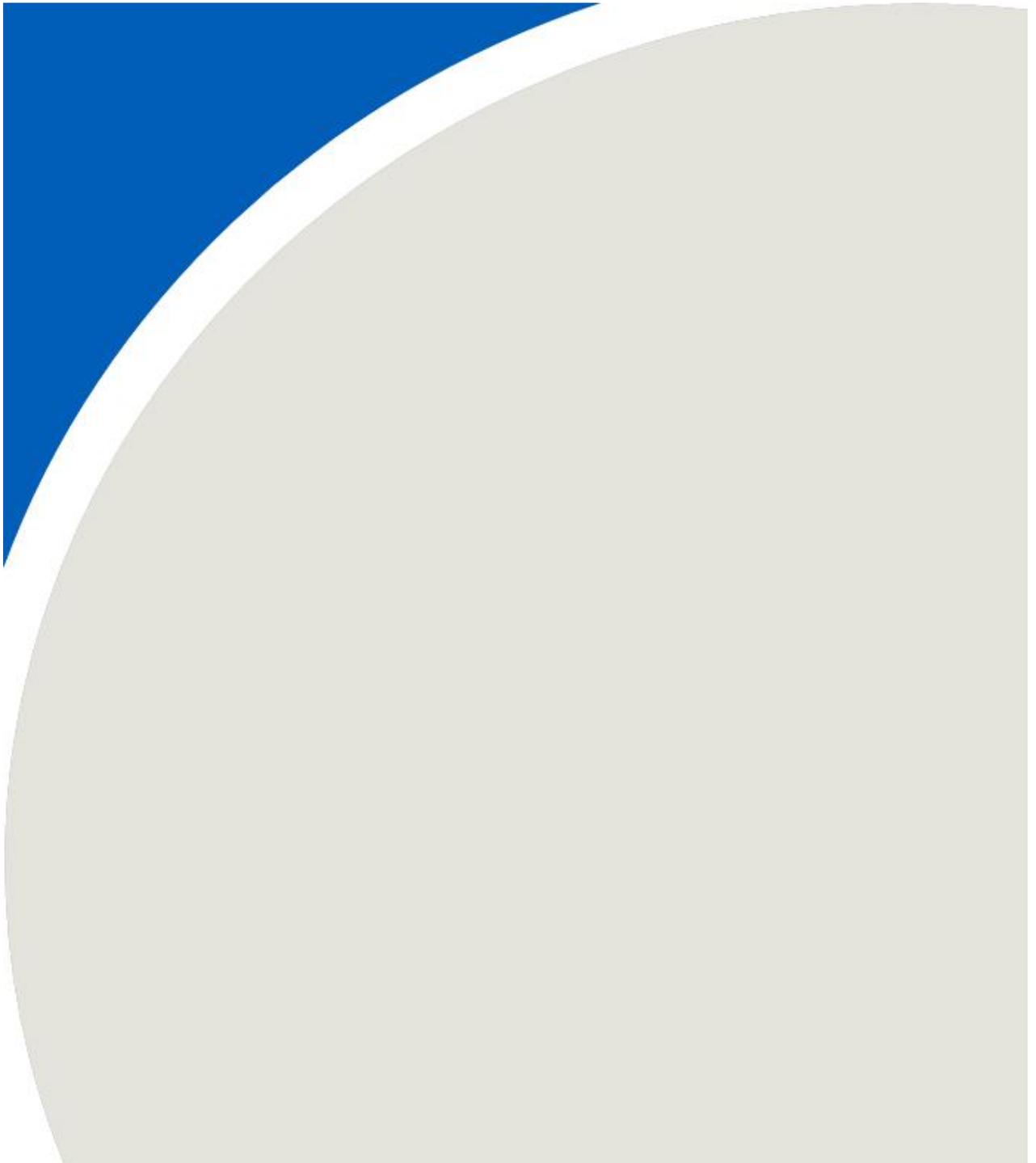
Drawn by: HNK	Figure: 1
Approx. Scale: 1:9,500	
Date Revised: Nov 29, 2018	



Project #: 1800162

Map Document: K:\1800162\4\_Analysis\GIS\SAQ\_Figures\p2\_Template\_Landscape\_DRAFT\_v170824\_10p4.mxd

# APPENDIX A







## APPENDIX B



## Appendix C - Emissions from Detox - Truck Traffic

### Detox Gravel Yard Source - Emission Rate Development:

#### Particulate Emission Estimates for Gravel Yard (Truck Traffic):

Formula:  $E = k (s/12)^a (W/3)^b * E_{ext}$

	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	
E = Emission Factor (lb/VMT)	3.73	0.95	0.10	
k = Empirical constant [1]	4.9	1.5	0.15	
a = Empirical constant [1]	0.7	0.9	0.9	
b = Empirical constant [1]	0.45	0.45	0.45	
s = Surface material silt content (%)	4.8	4.8	4.8	
W = Mean weight of vehicle (tons)	20	20	20	
P = # of days in year with 0.23mm precip	140	140	140	(based on Toronto 2003)
E <sub>ext</sub> = emission factor for precipitation	0.62	0.62	0.62	(365-P)/365

[1] Empirical constants from US-EPA AP-42 Chapter 13.2.2. TSP values based on PM<sub>30</sub>.

Roadway length (miles)	0.155	0.155	0.155	(Based on perimeter of yard)
Maximum number of trucks per hour	5	5	5	(RWDI estimated from site visit)
Maximum number of trucks per second	0.0014	0.0014	0.0014	
Emission Rate (lb/s)	0.001	0.0002	0.00002	
Emission Rate (g/s)	0.365	0.093	0.0093	
Area (m <sup>2</sup> )	3850	3850	3850	
Emission Rate (g/s/m <sub>2</sub> )	9.47E-05	2.41E-05	2.41E-06	

#### Source Characteristics for Gravel Yard at Detox Environmental

Source ID	Length (m)	Width (m)	Height (m)
Y1	70	55	0

#### Notes

Estimated area of unpaved yard from Google Earth image.