



Cumulative Air Assessment

**Hallman Pit, Jackson Harvest Farms,
Township of Wilmot, Ontario**

Jackson Harvest Farms Ltd.

August 05, 2021

GHD

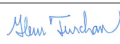
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1. Introduction

GHD was retained by Jackson Harvest Farms Ltd. to perform a cumulative air quality assessment of the Hallman Pit site located at 1894 Witmer Road in Township of Wilmot, Ontario (Site). Figure 1 presents the Site location. The Site is near seven other operational and non-operational licensed pits. The purpose of this assessment was to determine the cumulative impact of the multiple pits operating simultaneously consistent with a request from the Region of Waterloo.

The primary air contaminants assessed were from pit processes: total suspended particulate matter (TSP), particulate matter less than 10 microns in diameter (PM₁₀), particulate matter less than 2.5 microns in diameter (PM_{2.5}), and silica.

In addition to the Site, the following nearby quarries were included in this assessment:

- Cattleland Pit
- Spring Valley Pit
- Barnes Pit
- Seibert Pit
- Dino Pit
- Township Pit
- Poll Pit

Not all pits are currently operational or operating at capacity. This assessment was completed assuming that all pits were fully operational.

Operational emissions were estimated with accepted United States Environmental Protection Agency (USEPA) emission factors and methods consistent with the standard of practice in Ontario.

Ambient air background concentrations were considered for assessing overall air quality.

Air dispersion modelling was performed using the USEPA AERMOD dispersion modelling suite of programs, and followed the Ministry of Environment, Conservation and Parks (MECP) *Air Dispersion Modelling Guideline for Ontario, version 3* (ADMGO).

GHD worked with the Region of Waterloo and SLR Consulting on a proposed scope of work for the air quality assessment. The correspondence is provided in Appendix 1.

2. Emission Calculations

2.1 Site Emission Calculations

Emission estimates were completed for the truck traffic as well as on-Site operations. On-Site operations included the following sources:

- Primary Crusher
- Secondary Crusher
- Tertiary Crusher
- Cement Recycling Crusher
- Handling, Transferring, and Conveying of Material
- Loading Stockpiles

- Unloading from Stockpiles
- Primary Stacker Conveyor
- Truck Loading at Working Face

USEPA AP-42 emission factors were used for each of the operations.

The emission estimates for the on-Site road emissions are provided in Table 1 using the USEPA-AP42 emission factors. The inputs for the emission estimate calculations are provided in Table 1 as well. It was conservatively assumed that all roads were unpaved and 90% dust mitigation would be achieved. The Site has a fugitive dust management plan that minimizes the generation of fugitive emissions. 90% dust mitigation is easily achievable by following the Fugitive Dust Best Management Plan and has been documented to be over 95% effective (Dust Control at Hazardous Waste Sites, EPA/540/2-85/003, 1985). A dust mitigation of 90% was used as a conservative estimate.

The emission estimates for the on-Site operations are provided in Table 2. USEPA-AP42 emission factors were used for each of the sources. The emission estimates and the assumptions are provided in Table 2.

The silica content from the Site operations is currently unknown. Based on other operations in the area it is expected to be less than 10%. However, as a conservative estimate the silica emissions were assumed to be equivalent to 17% of PM10 emissions, based on “PM4 Crystalline Silica and PM10 Particulate Matter Emission Factors for Aggregate Producing Sources”, Richards, Brozell, Air Control Techniques, July 31, 2007.

No emissions were included from vehicle wear and tear (brakes or tailpipe emissions) for particulate matter as they are insignificant compared to the Site operations and road emissions.

Key Dust Management Practices is provided on Figure 2. A wind rose is provided on Figure 3 and the wind class frequency distribution chart is provided on Figure 4.

2.2 Cumulative Assessment Emission Calculations

There are currently seven other pits licensed in the area. The pits that are located in the vicinity of the proposed Site are included in Figure 5 and Figure 6 and are listed as follows:

1. Cattleland Pit
ARA Licence No. 10600
Licensed Area: 96.3 hectares
Class A, Category 1 (pit below water)
Annual Tonnage: 500,000 tonnes
(*Never opened for extraction*)
2. Barnes Pit
ARA Licence No. 5725
Licensed Area: 55.5 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 454,000 tonnes
(*No extraction for many years*)
3. Siebert Pit
ARA Licence No. 5553
Licensed Area: 38.4 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 500,000 tonnes
(*No/minimal extraction. Asphalt plant operation currently*)

4. Spring Valley (Voisin) Pit
ARA Licence No. 608502
Licensed Area: 27.7 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 200,000 tonnes
(*Open*)
5. Township Pit
ARA Licence No. 5557
Licensed Area: 41.8 hectares
Class A, Category 1 (pit below water)
Annual Tonnage: 75,000 tonnes
(*Open – Minimal annual activity*)
6. Dino Pit
ARA Licence No. 5728
Licensed Area: 25.2 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 250,000 tonnes
(*Open/Rehabilitation – Minimal annual activity*)
7. Poll Pit
ARA Licence No. 5550
Licensed Area: 45.7 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 50,000 tonnes
(*Closed/Rehabilitation*)

As the operations at the other pits are not available and the air emission estimates are not available the emission rates for each of the other pits was conservatively estimated based on the annual tonnage. The table below summarizes the location and the maximum capacity:

Pit Name	Capacity (tonnes/year)	Notes
Site	750,000	
Catteland Pit (1)	500,000	Never opened for extraction
Barnes Pit (2)	454,000	No extraction for many years
Siebert Pit (3)	500,000	Asphalt plant, minimal extraction
Spring Valley (Voisin) Pit (4)	200,000	Open
Township Pit (5)	75,000	Open, minimal activity
Dino Pit (6)	250,000	Open/rehabilitation
Poll Pit (7)	50,000	Closed/rehabilitation

As noted in the table above, the operations at each of the other pits, with the exception of Spring Valley Pit (4), have minimal to no operations at the present time. However, as the operations at each of the other pits is unknown it has been conservatively assumed that they are operating at their maximum annual capacity.

The emissions for each of the other pits was estimated by multiplying the emissions from the Site by the ratio of the capacity for each of the pits.

The emission rates and source parameters for the neighbouring pits are provided in Table 3.

3. Ambient Air Background Concentrations

As part of the cumulative assessment the ambient air background concentrations were included. The MECP Station 28028 (Guelph, Ontario) was chosen as it was the closest station that was not in major city centre, such as Kitchener. This station is still located in a city but is expected to be more representative than a major city centre station would be. The ambient air stations located in cities are expected to have higher concentrations of all fractions of particulate matter due to the increase in traffic and industry. It should be noted that by completing the cumulative assessment by modelling the surrounding pits and using the background data it could be counted as double accounting, therefore being an overly conservative assessment.

4. Air Quality Standards

The following air quality standards and guidelines were used:

- TSP – MECP Point of Impingement (POI) limit of 120 $\mu\text{g}/\text{m}^3$ (24-hour basis)
- PM₁₀ – MECP ambient air quality criteria (AAQC) of 50 $\mu\text{g}/\text{m}^3$ (24-hour basis)
- PM_{2.5} – Canadian ambient air quality standards (CAAQS), as established by the Canadian Council of Ministers of the Environment (CCME), of 27 $\mu\text{g}/\text{m}^3$ (24-hour basis) and 8.8 $\mu\text{g}/\text{m}^3$ (annual basis)
- Silica – MECP POI limit of 5 $\mu\text{g}/\text{m}^3$ (24-hour basis)

5. Air Dispersion Modelling Methodology

5.1 Model Executables

The following USEPA AERMOD executables were used:

- AERMOD dispersion model, v.19191
- AERMAP surface pre-processor, v.18081
- BPIP building downwash pre-processor, v.04274

AERMET was not used in this assessment, as a pre-processed MECP regional meteorological dataset was used.

5.2 Meteorology Data

The AERMOD model was run using MECP regional screening meteorological data (i.e., surface and profile files) for the years 1996 to 2000. The Toronto (crops) dataset was used.

5.3 Building Downwash

On-Site structures are generally included to account for building cavity downwash. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions, which can result in higher than expected near-field ground level concentrations.

Although a pit typically maintains a number of small semi-permanent support structures (offices, change/break rooms, equipment storage, etc.), they were not considered in this assessment; the AERMOD source type used in this assessment is not affected by building downwash.

5.4 Terrain

AERMOD captures the essential physics of dispersion in complex terrain through the use of a separate height scale factor for each receptor (USEPA, 1998 – AERMAP UG). The highest scale factor represents the terrain that would dominate flow in the vicinity of the receptor.

The height scale factor that is used by AERMOD is generated by an AERMAP terrain pre-processor. AERMAP utilizes terrain data, or Digital Elevation Model (DEM) data in conjunction with a layout of receptors and sources to height scale factors that can be directly used in AERMOD. Terrain data used in this assessment was obtained from MECP (7.5-minute format).

5.5 Receptors

Receptors were chosen based on recommendations provided in Section 7.1 of the ADMGO, which is in accordance with s.14 of O. Reg. 419/05. A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

- 20-m spacing within 200 m of the edge of the bounding box
- 50-m spacing from 200 to 500 m
- 100-m spacing from 500 to 1,000 m
- 200-m spacing from 1,000 to 2,000 m
- 500-m spacing from 2,000 to 5,000 m

A property line ground level receptor grid with 10-m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed inside the Site's property line.

5.6 Source Parameters and Emission Rates

The Site and all adjacent pits were modelled using AERMOD's Open Pit source. This source is a heavily modified area source designed to simulate pits where the majority of processes occur near the bottom of the pit, allow for containment and recirculation of pit derived emissions at the pit's surface opening and lip edge, and emissions along its surface opening. Source parameters were based on the following assumptions:

- Volume of pit
- Maximum pit depth of 20 m
- Process release height of 4 m above pit floor

All pit sources were modelled individually.

Emission rates for TSP, PM10, PM2.5, and silica were applied to the Site as calculated above. Emission rates for all other adjacent pits were estimated based on pro-ratio of individual pit production capacity versus those of the Site.

Source parameters and emission rates are summarized in Table 3 (Dispersion Modelling Options).

The options used in the AERMOD dispersion model are summarized in the table below.

Modelling Parameter	Description	Used in the Assessment
DFAULT	Specifies that regulatory default options will be used	Yes
ADJ_U*	Specifies that the AERMET met files were pre-processed using the ADJ_U* (adjusted friction velocity for low wind conditions) option.	Yes
CONC	Specifies that concentration values will be calculated	Yes

Modelling Parameter	Description	Used in the Assessment
DDPLETE	Specifies that dry deposition will be calculated	No
WDPLETE	Specifies that wet deposition will be calculated	No
FLAT	Specifies that the non-default option of assuming flat terrain will be used	No, the model will use elevated terrain as detailed in the AERMAP output
NOSTD	Specifies that the non-default option of no stack-tip downwash will be used	No
AVERTIME	Time averaging periods calculated	24-hour, annual
URBANOPT	Allows model to incorporate the effects of increased surface heating from an urban area on pollutant dispersion under stable atmospheric conditions	No
URBANROUGHNESS	Specifies the urban roughness length (m)	Not applicable
FLAGPOLE	Specifies that receptor heights above local ground level are allowed on the receptors	No

6. Summary of Predicted Results

Table 4 summarizes the ground level concentrations predicted by AERMOD and measured ambient air concentrations for TSP, PM10, PM2.5, and silica. Modelling and ambient concentrations indicates all air contaminants are within the MECP and CAAQS limits.

7. Discussion

This section discusses any assumptions related to the cumulative assessment.

7.1 Pit Operations

All modelled open pits were assumed to be operating at capacity on a continuous basis. Factually, this is not the case:

- Cattleland Pit was never opened for extraction
- Barnes Pit has not performed any extractions for the past several years
- Seibert, Dino, and Township Pits operate with minimal activities
- Poll Pit is closed

As a result, the modelled results can be considered conservatively high.

The current modelling does not take into account additional berms, silt fences, and vegetation that are located at the Site boundaries. These measures will also help reduce emissions from the Site. It is not known what additional measures are installed at the other pits to further reduce air emissions.

7.2 Open Pit Source

This source type has inherent limitations regarding its shape and orientation, which is limited to a length, width, and angle of rotation. Ideally, the source would be shaped to conform with the edges of the physical pit, and all remaining

parameters derived from the final pit volume. As the physical quarries are not uniformly rectangular in shape, a best fit approximation was used to represent each pit.

7.3 Ambient Air Quality Data

The ambient air quality data was taken from a nearby city (Guelph) where the road traffic and industry are expected to result in higher ambient air concentrations. As the surrounding sources of emission, neighbouring pits, are included in the assessment as well the addition of the ambient air quality data to the modelled emission rates may be equivalent to double counting an emissions source.

7.4 Plume Depletion

The modelling results do not consider the effects of air contaminants being depleted from their plumes. Plume depletion is typically the result of air contaminants being removed from a plume through two common mechanisms:

- Dry depletion – depletion due to removal of contaminants resulting from gravity and/or impingement on obstructing materials/objects in the plume's path (e.g., greenery).
- Wet depletion – depletion due to removal of contaminants resulting from atmospheric scrubbing, typically in the forms of rainfall, dew, and mist.

Plume depletion typically results in higher near-field and lower far-field concentrations.

7.5 Meteorological Conditions

This assessment used MECP regional screening meteorological data, which may not accurately represent the meteorological conditions of the locale. However, as the MECP screening data is considered a conservative data set, it was used for this assessment.

7.6 Sensitive Receptors

No sensitive receptors were assessed. The assessment only examined the potential off-Site concentrations for the purpose of determining compliance. As compliance with the air quality standards was demonstrated at all off-Site locations no assessment was completed at sensitive receptors.

8. Conclusions

The cumulative dispersion modelling assessment of the Hallman Pit, and the neighbouring pits, and with consideration of representative ambient air monitoring data, indicates compliance with the MECP POI limit for TSP and silica, the MECP AAQC for PM10, and the CCME CAAQS for PM2.5.

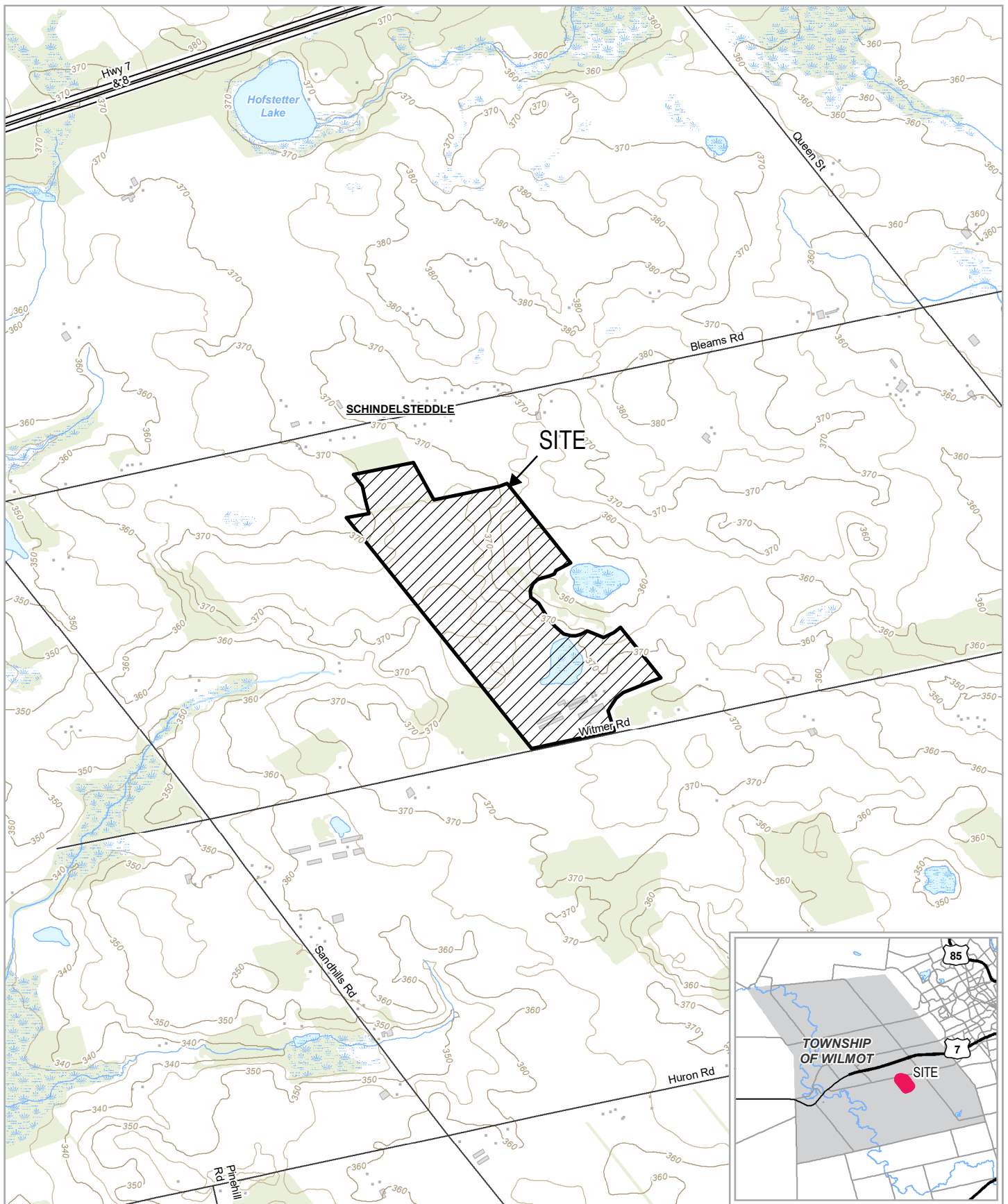
All of Which is Respectfully Submitted,



Matthew Griffin, P. Eng.

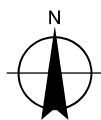


Bryan Rubie, P. Eng.



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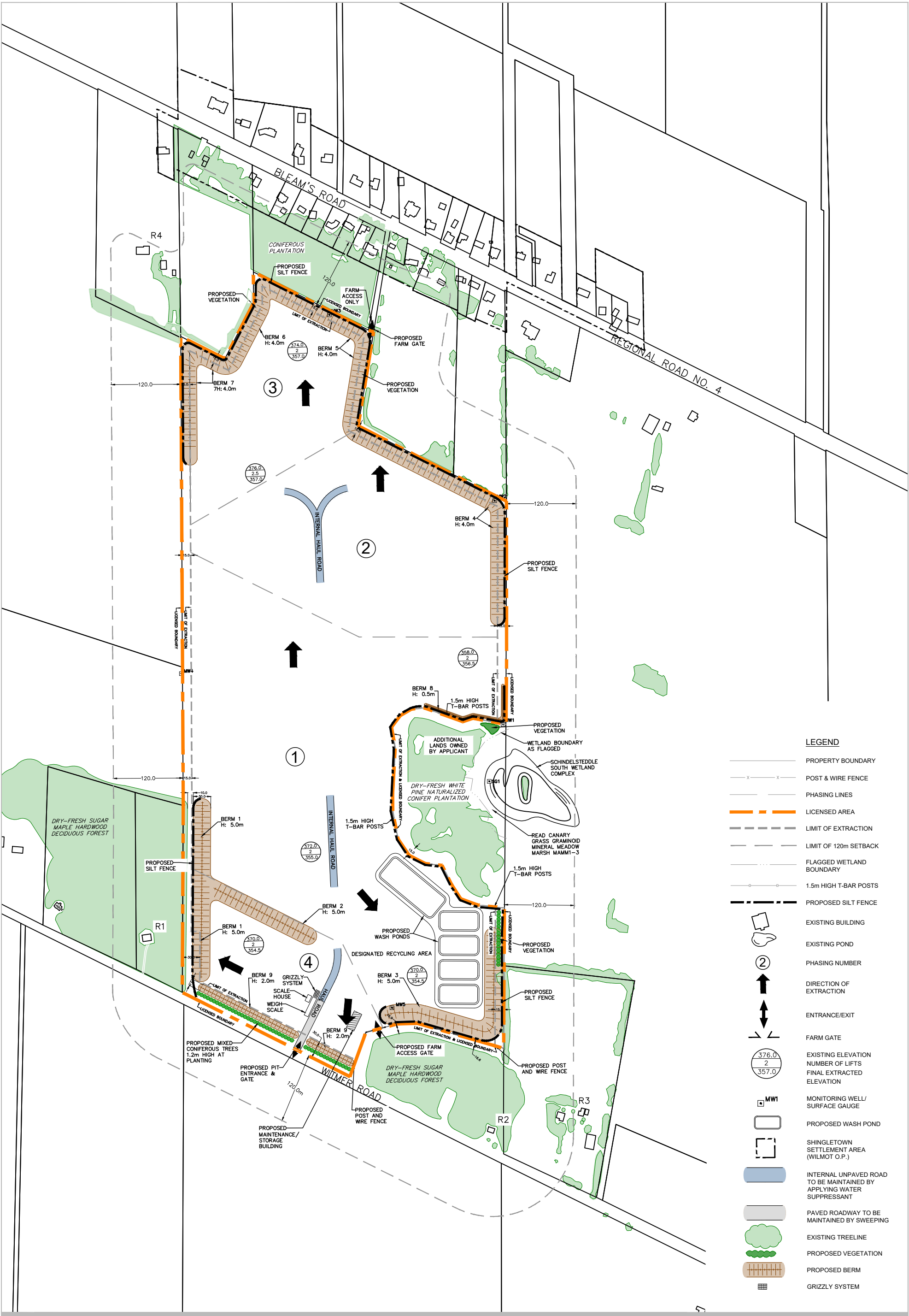


HALLMAN PIT
1984 WITMER ROAD
WILMOT, ONTARIO

Project No. **11202973**
 Revision No. -
 Date **Jul 28, 2021**

SITE LOCATION MAP

FIGURE 1



0 60 120 180m

Coordinate System:
UTM, NAD83, ZONE 17

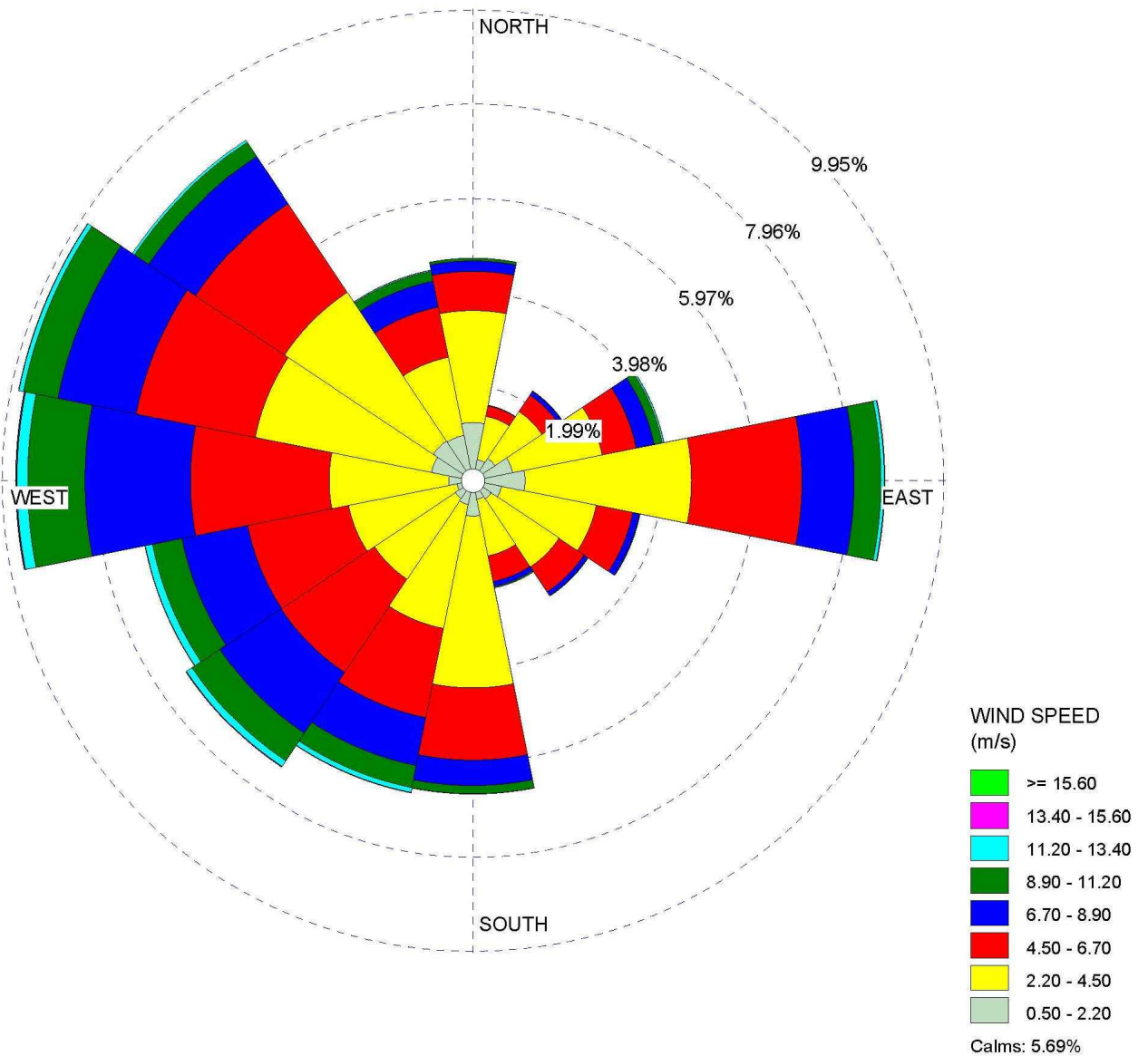


HALLMAN PIT
1894 WITMER ROAD, WILMOT, ONTARIO
CUMULATIVE ASSESSMENT

KEY DUST
MANAGEMENT PRACTICES

Project No. 11202973
Date July 2021

FIGURE 2

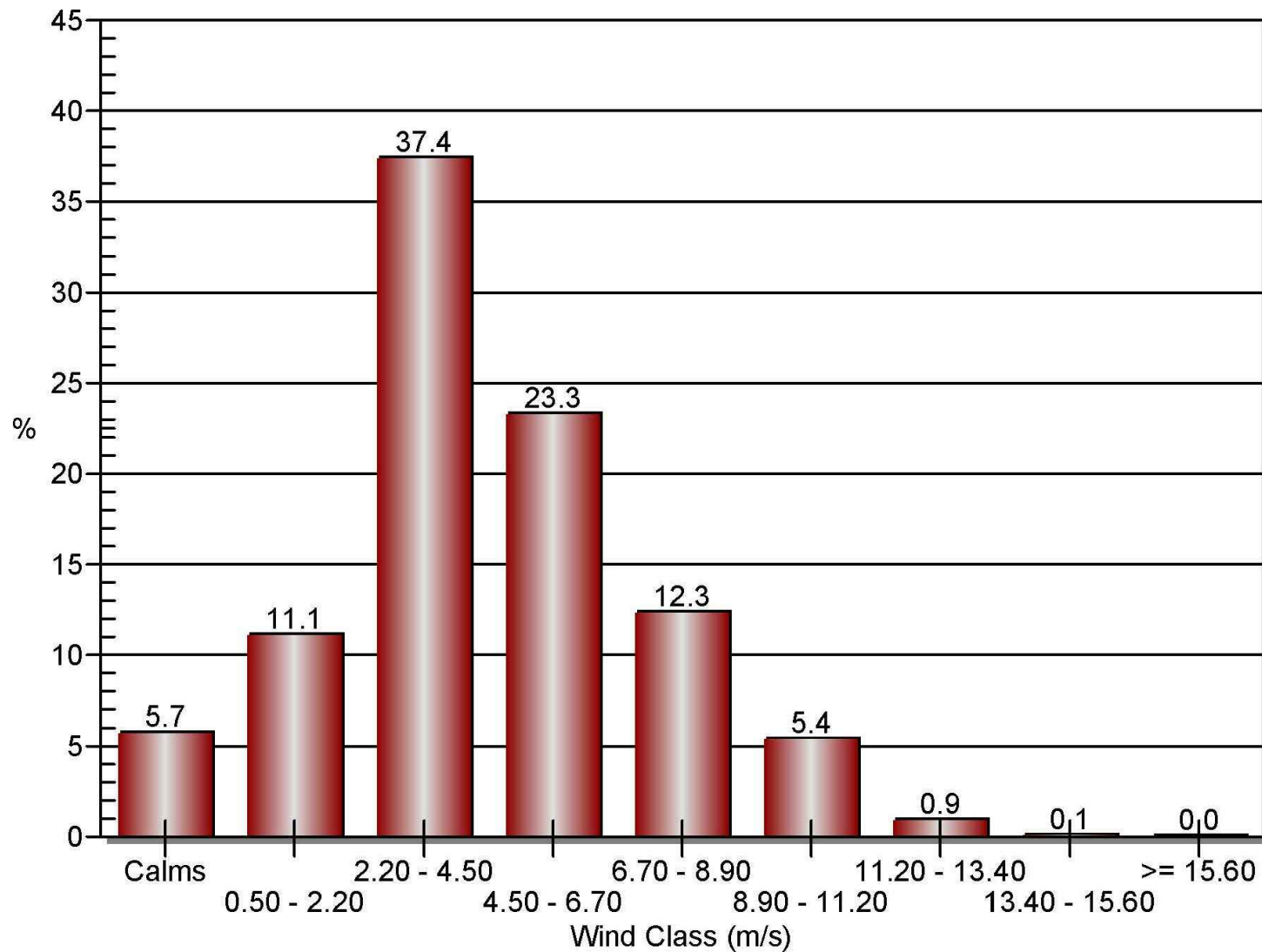


HALLMAN PIT
1894 WITMER ROAD, WILMOT, ONTARIO
CUMULATIVE ASSESSMENT

KITCHENER/WATERLOO
WIND ROSE 2014-2018

Project No. 11202973
Date July 2021

FIGURE 3

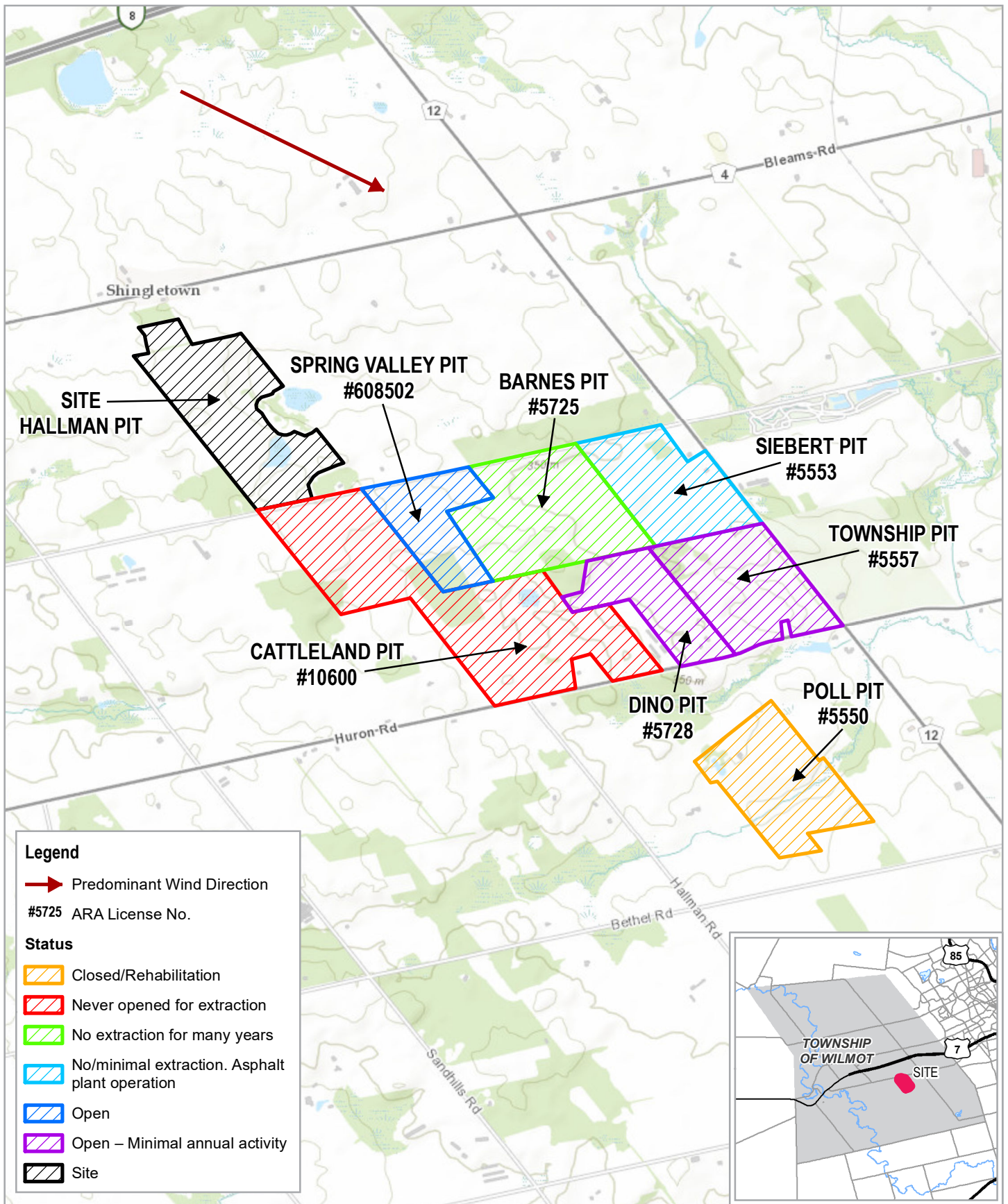


HALLMAN PIT
1894 WITMER ROAD, WILMOT, ONTARIO
CUMULATIVE ASSESSMENT

KITCHENER/WATERLOO WIND CLASS
FREQUENCY DISTRIBUTION GRAPH

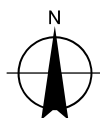
Project No. 11202973
Date July 2021

FIGURE 4



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Grid: NAD 1983 UTM Zone 17N

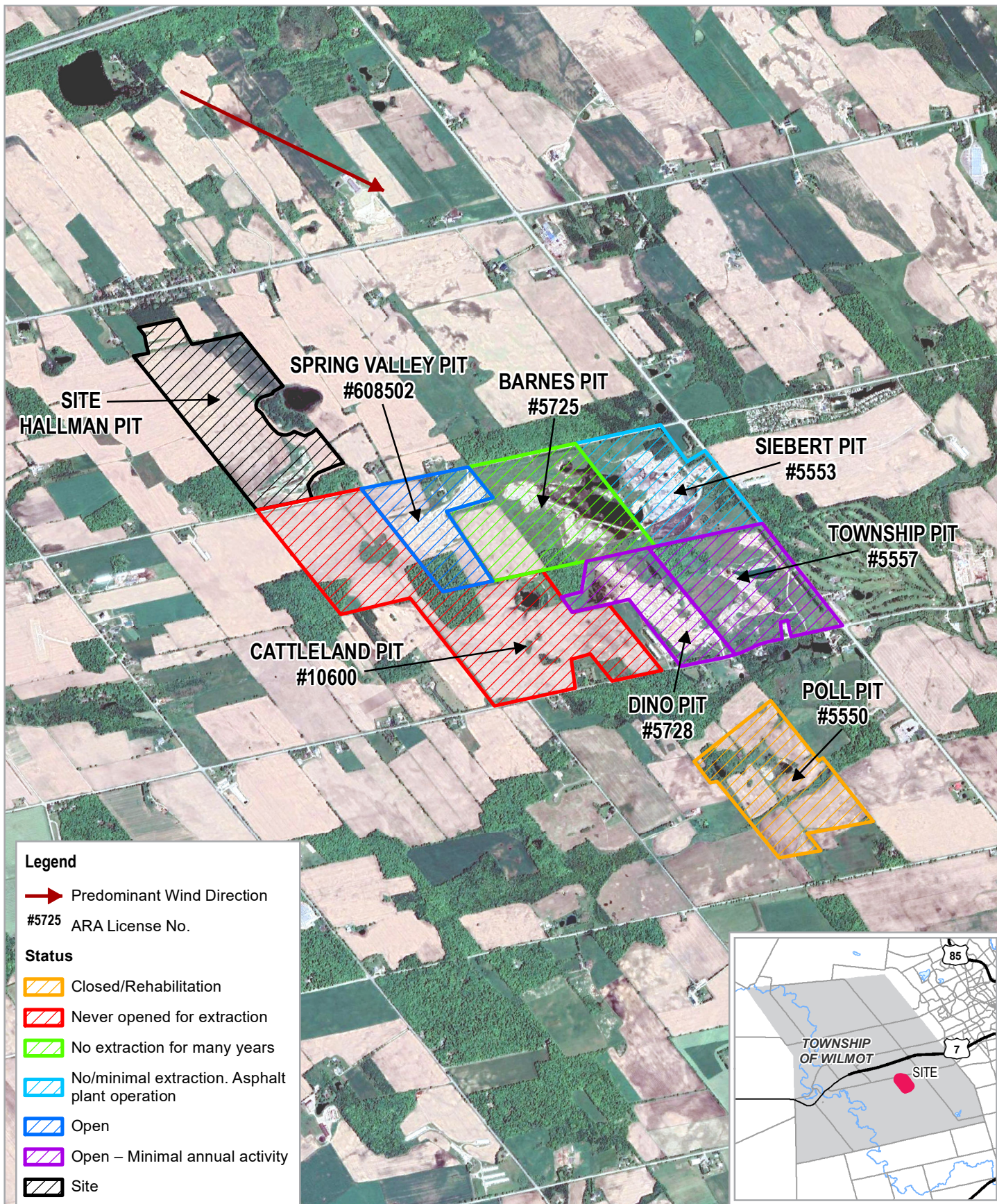


HALLMAN PIT
1984 WITMER ROAD
WILMOT, ONTARIO

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Date Jul 28, 2021

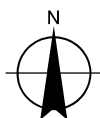
NEARBY PIT OPERATIONS

FIGURE 5



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Map Projection: Transverse Mercator
 Horizontal Datum: North American 1983
 Grid: NAD 1983 UTM Zone 17N



HALLMAN PIT
 1984 WITMER ROAD
 WILMOT, ONTARIO

Project No. 11202973
 Revision No. -
 Date Jul 28, 2021

AERIAL SITE LOCATION MAP

FIGURE 6

Table 1

Estimated Particulate Emission Rates - On-Site Haul Route – 90% Road Dust Mitigation
Jackson Harvest Farms, Hallman Pit Cumulative Assessment
Township of Wilmot, Ontario

Variable or Constant	PM2.5	PM10	TSP
k	0.15	1.5	4.9
a	0.9	0.9	0.7
b	0.45	0.45	0.45
Surface material silt content (3)	6.4	6.4	6.4
Conversion from lb/VMT to g/VKT	281.9	281.9	281.9

Formula:

$$ER(g/s) = 281.9 (g/VKT / lb/VMT) * k * (S/12)^a * (M/3)^b * \# \text{ of trips} * \text{Distance (km)} / (\# \text{ of hours per day}) / (3600 \text{ s/hr})$$

Site Traffic**50**

Sum of 2-way trips * 2 (to generate number of 1-way vehicle trips per day)

Variable	Value	Comments
Road Length (km)	0.72	
Hours of Operation per day	10	7 AM to 5 PM
Average Vehicle Weight (tonnes)	30	Fleet average, all sources, empty and full
Average Vehicle Weight (tons)	33.1	
Emission Factors (g/VKT)		
TSP	2619.6	
PM10	707.2	
PM2.5	70.7	
% Dust Control	90%	
Emission Rates (g/s)		
TSP	0.26	
PM10	0.07	
PM2.5	0.01	

Notes:

Mean Municipal Solid Waste Landfill surface silt loading (USEPA AP-42 Paved Roads Emissions Model - Chapter 13.2.1).

An estimated reduction was applied based on expected mitigation measures.

As noted in USEPA AP-42 Chapter 13.2.1 - Paved Roads and 13.2.2 - Unpaved Roads, 'W' is the mean weight of all vehicles travelling the road. Only one emission factor (E) is to be calculated to represent the 'fleet' average of all vehicles travelling each road.

Silt content used for all material types as a conservative estimate (USEPA AP-42 Unpaved Roads - Chapter 13.2.2).

Converted to g/VKT using a conversion factor of 281.9 as specified in USEPA AP-42 Chapter 13.2.2 - Unpaved roads.

Mean landfill surface silt loading (USEPA AP-42 Paved Roads Emissions Model - Chapter 13.2.1).

Equations used to estimate dust emissions are found in USEPA AP-42 (Chapters 13.2.2 - Unpaved Road).

Tailpipe emissions have not been included as they are insignificant.

Table 2
Estimated Particulate Emissions from Site Operations
Jackson Harvest Farms, Hallman Pit Cumulative Assessment
Township of Wilmot, Ontario

Crushers

Source ID	Max. Production Rate (tonnes/hour)	Controlled or Uncontrolled?	Species	USEPA AP-42 Emission Factor (kg/Mg) (1)	Emission Rate (g/s)
Primary Crusher	175	Controlled	TSP	0.0006	2.92E-02
			PM10	0.00027	1.31E-02
			PM2.5	5.00E-05	2.43E-03
Secondary Crusher	175	Controlled	TSP	0.0006	2.92E-02
			PM10	0.00027	1.31E-02
			PM2.5	5.00E-05	2.43E-03
Cement Recycling	250	Controlled	TSP	0.0006	4.17E-02
			PM10	0.00027	1.88E-02
			PM2.5	5.00E-05	3.47E-03

Note:
(1) Emission factors for Tertiary Crushing have been used due to a lack of Primary Crushing and Secondary Crushing emission factors. This is a conservative assumption.

Transfer operations around Raw Material Storage Pile

Source ID	Max. Production Rate (tonnes/hour)	Controlled or Uncontrolled?	Species	USEPA AP-42 Emission Factor (kg/Mg)	TSP Emission Rate (g/s)
Handling, Transferring and Conveying	288	Controlled	TSP	1.50E-03	1.20E-01
			PM10	5.50E-04	4.40E-02
			PM2.5	2.75E-04 (1)	2.20E-02
Loading Stockpiles	288	Controlled	TSP	1.60E-05 (2)	1.28E-03
			PM10	8.00E-06	6.40E-04
			PM2.5	4.00E-06 (3)	3.20E-04
Unloading from Stockpiles	288	Controlled	TSP	1.00E-04 (4)	8.00E-03
			PM10	5.00E-05	4.00E-03
			PM2.5	2.50E-05 (5)	2.00E-03

Notes:
(1) Emission factors are from USEPA AP-42, Section 11.19.1 Crushed Stone Processing and Pulverized Mineral Processing, Table 11.19.2-1 for Conveyor Transfer Point. As there is no PM-2.5 emission factor, emission factors were assumed to be the PM-10 emission factor divided by 2.
(2) Emission factors are from USEPA AP-42, Section 11.19.1 Crushed Stone Processing and Pulverized Mineral Processing, Table 11.19.2-1 for Truck Unloading Fragmented Stone. As the emission factors are given for PM-10 only, the total PM emission factors were assumed to be the PM-10 emission factor times 2.
(3) Emission factors are from USEPA AP-42, Section 11.19.1 Crushed Stone Processing and Pulverized Mineral Processing, Table 11.19.2-1 for Truck Unloading Fragmented Stone. As the emission factors are given for PM-10 only, the PM2.5 emission factors were assumed to be the PM-10 emission factor divided by 2.
(4) Emission factors are from USEPA AP-42, Section 11.19.1 Crushed Stone Processing and Pulverized Mineral Processing, Table 11.19.2-1 for Truck Loading Conveyor, crushed stone. As the emission factors are given for PM-10 only, the TSP emission factors were assumed to be the PM-10 emission factor times 2.
(5) Emission factors are from USEPA AP-42, Section 11.19.1 Crushed Stone Processing and Pulverized Mineral Processing, Table 11.19.2-1 for Truck Loading Conveyor crushed stone. As the emission factors are given for PM-10 only, the PM2.5 emission factors were assumed to be the PM-10 emission factor divided by 2.

Open Pit - Conveyors

Source ID	Max. Production Rate (tonnes/hour)	Controlled or Uncontrolled?	Species	USEPA AP-42 Emission Factor (kg/Mg) (1) (2)	Emission Rate (g/s)
Primary Stacker Conveyor	288	Controlled	TSP	7.00E-05	5.60E-03
			PM10	2.30E-05	1.84E-03
			PM2.5	6.50E-06	5.20E-04

Notes
(1) Emission factors are from USEPA AP-42, Section 11.19.2 Crusher Stone Processing and Pulverized Mineral Processing, Table 11.19.2-1 for controlled conveyor transfer points.
(2) It has been assumed there is only one transfer point.

Open Pit - Truck Loading

Source ID	Max. Production Rate (tonnes/hour)	Controlled or Uncontrolled?	Species	USEPA AP-42 Emission Factor (kg/Mg)	TSP Emission Rate (g/s)
Truck Loading at Working Face	288		TSP	1.60E-05 (1)	1.28E-03
			PM10	8.00E-06	6.40E-04
			PM2.5	4.00E-06 (2)	3.20E-04

Notes:
(1) Emission factors are from USEPA AP-42, Section 11.19.2 Crusher Stone Processing and Pulverized Mineral Processing, Table 11.19.2-1 for truck unloading of fragmented stone. As the emission factors are given for PM-10 only, the total PM emission factors was assumed to be the PM-10 emission factor multiplied by 2.
(2) Emission factors are from USEPA AP-42, Section 11.19.2 Crusher Stone Processing and Pulverized Mineral Processing, Table 11.19.2-1 for truck unloading of fragmented stone. As the emission factors are given for PM-10 only, the total PM emission factors was assumed to be the PM-10 emission factor divided by 2.

Table 3
Emission Source Summary Table
Jackson Harvest Farms, Hallman Pit Cumulative Assessment
Township of Wilmot, Ontario

Source ID	Description	Source Type	UTM Coordinates		Capacity (tonnes/yr)	Release Height (m) ⁽¹⁾	Length of Side		Volume (m³)	Open Area (m²)	Emission Rates			
			X	Y			X	Y			PM, total	PM-10	PM-2.5	Silica
			(m)	(m)			(m)	(m)			(g/s)	(g/s)	(g/s)	(g/s)
S-1	Hallman Pit (site)	open pit	532334.34	4802806.67	750,000	4	546	1048	11438700	571935	4.98E-01	1.67E-01	4.06E-02	2.84E-02
S-2	Cattleland Pit (never opened for extraction)	open pit	533388.22	4801631.94	500,000	4	850	1181	20078700	1003935	3.32E-01	1.11E-01	2.70E-02	1.89E-02
S-3	Spring Valley Pit (open)	open pit	533423.91	4802379.95	454,000	4	420	662	5556600	277830	3.02E-01	1.01E-01	2.46E-02	1.72E-02
S-4	Barnes Pit (no extraction for many years)	open pit	533807.00	4802266.33	500,000	4	830	671	11138600	556930	3.32E-01	1.11E-01	2.70E-02	1.89E-02
S-5	Seibert Pit (no/minimal extraction; asphalt plant operation)	open pit	534708.02	4802482.89	200,000	4	538	725	7806800	390340	1.33E-01	4.45E-02	1.08E-02	7.56E-03
S-6	Dino Pit (open; minimal annual activity)	open pit	534661.63	4801881.31	75,000	4	380	715	5434000	271700	4.98E-02	1.67E-02	4.06E-03	2.84E-03
S-7	Township Pit (open; minimal annual activity)	open pit	535158.98	4801889.29	250,000	4	551	800	8809101	440455	1.66E-01	5.56E-02	1.35E-02	9.45E-03
S-8	Poll Pit (closed/rehabilitation)	open pit	535376.18	4800763.68	50,000	4	536	821	8791908	439595	3.32E-02	1.11E-02	2.70E-03	1.89E-03

Note:

(1) From bottom of open pit source.

Table 4
Maximum Predicted Concentration Summary
Jackson Harvest Farms, Hallman Pit Cumulative Assessment
Township of Wilmot, Ontario

Air Contaminant	CAS No.	Total Emission Rate (g/s)	Air Dispersion Model Used	Max. Predicted Concentrations (µg/m³)	Background Concentrations (µg/m³)⁽³⁾	Averaging Period (hours)	MECP POI Limit (µg/m³)	Limiting Effect	Regulation Schedule	Percent of Limit (%)
Particulate Matter, total (4)	n/a	1.85E+00	AERMOD v.19191	42.81	51.0	24	120	Visibility	B1-standard	78.2%
Particulate Matter, PM10 (4)	n/a	6.18E-01	AERMOD v.19191	14.36	28.0	24	50	AAQC	n/a	84.7%
Particulate Matter, PM2.5	n/a	1.50E-01	AERMOD v.19191	2.22	15.0	24	27	CAAQS (1)	CCME	63.8%
Particulate Matter, PM2.5	n/a	1.50E-01	AERMOD v.19191	0.71	7.6	annual	8.8	CAAQS (2)	CCME	94.5%
Silica, respirable (<10 microns), quartz (5)	14808-60-7	1.05E-01	AERMOD v.19191	2.44	1.7	24	5	Health	B1-guideline	82.8%

Notes:

- AAQC - Ontario Ambient Air Quality Criteria
CAAQS - Canadian Ambient Air Quality Standard
CCME - Canadian Council of Ministers of the Environment
(1) Three year average of the annual 98th percentile of the daily 24-hour average concentrations.
(2) Three year average of the annual average concentrations.
(3) 24-hour 90th percentile; annual maximum average. MECP Station 28028, Guelph, Ontario.
(4) Estimated from PM2.5 values using published data.
(5) Estimated as 17% of PM10.

Appendices

Appendix 1

**Correspondence with Region of Waterloo
and SLR**

From: [Laura Clark](#)
To: [Bryan Rubie](#)
Cc: [Matt Griffin](#); [David Welwood](#); [Rick Esbaugh](#); [David Sisco](#); [Nigel Taylor](#)
Subject: RE: Jackson Harvest Farms - Hallman Pit - Proposed Air Methodology
Date: Thursday, June 10, 2021 11:46:33 AM
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.png](#)
[image446004.png](#)
[image925676.png](#)
[image751578.png](#)
[image257629.png](#)

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Hi Bryan,

Nigel and I agree with the workplan you have outlined, and have no comments at this time.

Hope you are keeping well.

Regards,
Laura



Laura Clark, B.Eng., EIT
[Intermediate Air Quality Scientist](#)

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From: Bryan Rubie <Bryan.Rubie@ghd.com>
Sent: June 07, 2021 12:46 PM
To: Nigel Taylor <ntaylor@slrconsulting.com>; Laura Clark <lclark@slrconsulting.com>
Cc: Matt Griffin <Matthew.Griffin@ghd.com>; David Welwood <DWelwood@regionofwaterloo.ca>; Rick Esbaugh <rickesbaugh@outlook.com>; David Sisco <David.Sisco@IBIGROUP.COM>
Subject: RE: Jackson Harvest Farms - Hallman Pit - Proposed Air Methodology

Hi Nigel and Laura,

Were you able to review the workplan?

Please let us know if you have any questions or comments.

Thanks,

Bryan Rubie, P. Eng.
Air Quality Engineer

GHD

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D +1 780 229-3750 E bryan.rubie@ghd.com

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From: Bryan Rubie

Sent: Tuesday, June 1, 2021 1:23 PM

To: Nigel Taylor <ntaylor@slrconsulting.com>; Laura Clark <lclark@slrconsulting.com>

Cc: Matt Griffin <Matthew.Griffin@ghd.com>; David Welwood <DWelwood@regionofwaterloo.ca>

Subject: Jackson Harvest Farms - Hallman Pit - Proposed Air Methodology

Hi Nigel and Laura,

As discussed last week please find our proposed methodology for completing the quantitative assessment below.

Proposed GHD Methodology:

- Complete detailed emissions inventory (TSP, PM10, PM2.5, and Silica) for Proposed Hallman Pit using USEPA emission factors and other sources that have been accepted by MECP review engineers.
- The expected sources that would be included for the Proposed Hallman Pit would include the following:
 - On-Site Traffic (paved and unpaved roads)
 - Processing equipment (screening and crushing)
 - Material conveyance systems
 - Material stockpiles
 - Material loading/unloading
- Prior to modelling emission sources will be evaluated to determine if any are insignificant according to Section 7.0 of the ESDM Procedure Document
- Retrieve background air quality data (5 years' worth) from nearest air monitoring station (if it is representative of the area). If the nearest station is downtown Kitchener alternate stations will be investigate and discussed with SLR that would be more appropriate.
- Retrieve applicable terrain and meteorological data from MECP Regional datasets.
- Identify specific sensitive receptors within modelling domain
- Based on detailed emissions inventory from Proposed Hallman Pit, complete emissions estimation for other applicable pits based on ratio of total approved annual processing rates for some various cases
- Run AERMOD assessment with and without contribution of applicable off-site potential pits. It is expected that the modelling for the other applicable potential pits will be completed using a single pit source as the locations and types of equipment will be not available.
- Compare results for all contaminants at all sensitive receptors to applicable CAAQS and AAQC
- For any exceedances at sensitive receptors, run frequency of exceedance assessment
- Complete report documenting methodology and results

After you have a chance to read over the above could you please let us know if you have any questions or would like to schedule a conference call to discuss.

Thanks,

Bryan Rubie, P. Eng.

Air Quality Engineer

GHD

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Appendix 2

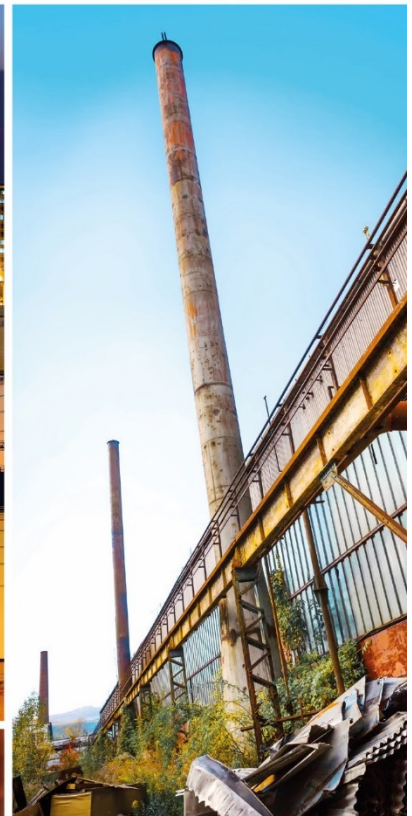
**Dust Best Management Practices Plan -
Revision 2**



Best Management Practices Plan for Control of Fugitive Dust Emissions

Jackson Harvest Farms Ltd.
1894 Witmer Road
Wilmot, Ontario

Revision 2





Foreword

This Dust Best Management Practices Plan (BMPP) documents the practices that will be in place to control potential fugitive dust at the Jackson Harvest Farms Ltd. operations at 1894 Witmer Road in Wilmot, Ontario (Facility or Site) and has been prepared in accordance with the requirements of the Ontario Ministry of the Environment, Conservation and Parks (MECP) Technical Bulletin "Management Approaches for Industrial Fugitive Dust Sources", published in February 2017.

As operations change and new fugitive dust sources are added to the Facility, this Plan will be updated as required. In order to maintain version control all pages in the Dust BMPP have been dated and documented with a version number. This Plan is Revision 2. The version number will change if the entire report is re-issued; if individual pages are provided to update small portions of the Plan then they will be issued with a X sub-revision number and the updated pages will be listed on the following Revision Control Page.



Version Control

Version	Date	Description of Changes	Updated Pages	Approved By
0	October 2019	Original	NA	Glenn Turchan, GHD Limited Bryan Rubie, GHD Limited Rick Esbaugh, JHF
1	April 2020	Additional detail on crusher operation and daily site inspections	Various	Glenn Turchan, GHD Limited Bryan Rubie, GHD Limited Rick Esbaugh, JHF
2	October 2020	Additional Section 8 to discuss potential cumulative impacts	Various	Glenn Turchan, GHD Limited Bryan Rubie, GHD Limited Rick Esbaugh, JHF

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Appendix A	Fugitive Dust Checklist
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1. Introduction

This document entitled "Best Management Practices Plan for Control of Fugitive Dust Emissions" (Dust BMPP) has been prepared for the Jackson Harvest Farms Ltd. (JHF) Hallman Pit (Facility or Site) to be located at 1894 Witmer Road in Wilmot, Ontario. The Facility location is presented on Figure 1. The Site is a proposed sand and gravel extraction pit, which will be licensed under the Aggregate Resources Act through the Ministry of Natural Resources and Forestry (MNRF).

The purpose of this Dust BMPP is to provide details about the best management practices that will be in place to control potential fugitive dust emissions, as well as planned strategies for dealing with potential fugitive dust issues, based on the dust conditions observed.

This Dust BMPP has been prepared in accordance with the requirements of the Ontario Ministry of the Environment, Conservation and Parks (MECP) Technical Bulletin "Management Approaches for Industrial Fugitive Dust Sources", published in February 2017.

This Dust BMPP include the following information:

- Description of the operational activities at the Site.
- Identification of the main sources of fugitive dust emissions at the Site.
- Potential causes for high dust emissions and opacity resulting from these sources.
- Preventative and control measures in place or under development to minimize the likelihood of high dust emissions and opacity issues from the sources of fugitive dust emissions.
- Potential for cumulative impacts from nearby aggregate operations.
- Inspection and maintenance procedures and monitoring initiatives to ensure effective implementation of the preventative and control measures.
- Training requirements of Site personnel.
- Opportunities for continuous improvement of the Dust BMPP.

Upon commencement of operations at the Facility, JHF shall immediately implement the Dust BMPP for the control and mitigation of potential fugitive dust emissions resulting from the Site's operations. This Dust BMPP will be followed throughout the lifespan of the Site and be revised based on "as-constructed" conditions or to circumvent dust issues. The Dust BMPP will be a "living" document.

2. Responsibilities

The following identifies the responsibilities held by each of the employment levels at the Site as they pertain to this Dust BMPP.



JHF Management

The JHF Management Representatives, or designates, are responsible for:

- Reviewing the effectiveness of the current dust control measures at the Site on an ongoing basis.
- Ensuring the required resources are in place to execute the Dust BMPP.
- Scheduling and coordinating the implementation of fugitive dust control measures, as required.
- Maintaining documentation of schedules and daily logs.
- Ensuring the training of all applicable Site personnel and contractors on the plan and best management practices for the prevention of fugitive dust emissions.
- Completing Fugitive Dust Checklists, as necessary.

Applicable Site Personnel

All Site Personnel/Contractors who could be engaged in the associated work outlined in this Dust BMPP are responsible for:

- Reviewing the effectiveness of the current dust control measures at the Site on an on-going basis.
- Following the best available practices for dust control that are currently in place.

3. Process Description

JHF owns the Hallman Pit with plans to operate it as a sand and gravel extraction pit. The area to be extracted covers an area of 57.3 hectares and it is expected that no more than 750,000 tonnes per year of aggregate will be removed from the pit. The operations at the Site will consist of mobile equipment used to extract, process, and transport the aggregate. The mobile equipment on-Site will include, but not be limited to; scrapers, bull dozers, power shovels, and dump trucks for stripping and rehabilitation, front-end loaders, dump trucks, crushers, conveyor belts, and other portable processing equipment for material extraction.

There are three primary areas on-Site where the majority of the operations will occur: the processing area, the wash plant area, and the recycling area. The processing area will consist of the primary extraction processing in addition to some dry screening operations. There will be a few stockpiles associated with the screened materials in the processing area. The wash plant area will further screen the aggregate material into five different stockpiles. The material will be sent through a sprayer prior to screening and will be transported using open conveyor belts. The recycling area will receive and process used concrete. The concrete will be pulverized and crushed so that any steel components can be separated. There will be one or two stockpiles associated with the crushed concrete in this process area. All processing operations will occur at the lowest pit floor elevation, with the exception of the screening operations. The screening operations will still occur well below the upper level of the pit.

The only pit entrance/exit will be located at the southern boundary of the Site with access onto Witmer Road. The weigh scale and scale house facilities will be located near the entrance/exit. Earthen berms will be located at key points along the property boundary. These berms will range in height from 0.5 metres (m) to 5 m and will be vegetated with a perennial legume/grass to control erosion and prevent dust generation.

Table 1 below presents general information about the Facility relevant to this Plan.

Table 1 Facility Description

Facility:	Jackson Harvest Farms Ltd. Hallman Pit
Location:	1894 Witmer Road, Wilmot, Ontario
Main activities/equipment used:	Sand and Gravel Pit
Area occupied:	57.3 hectares
Production:	Up to 750,000 tonnes of aggregate per year
Nearest sensitive receptors:	Residences in Shingletown, which is located just beyond the northern property boundary of the Site

A Site location map is presented on Figure 1. A Site operational plan is presented on Figure 2, which shows the buildings, property line, and berm locations. Figure 2 also summarizes key best management practices that will be applied to limit fugitive dust generation.

4. Fugitive Dust BMPP Methodology

This fugitive Dust BMPP has been developed by following the Plan Do Check and Act (PDCA) cycle according to ISO guideline as follows:

- **PLAN** - identifies and characterizes the emission sources and BMPs at the Site.
- **DO** - documents the schedule for implementation of the proposed improvements.
- **CHECK** - describes the monitoring procedures and a recordkeeping system.
- **ACT** – describes, when necessary, the BMPP review and update procedures in order to promote its continuous improvement.

5. Identification and Classification of Fugitive Dust Emission Sources

Fugitive dust emissions occur due to mechanical disturbances of granular materials exposed to the air. Dust generated from these open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream, such as in an exhaust pipe or stack.

The mechanical disturbance may be equipment movement, the wind, or both. Therefore, some fugitive dust emissions occur and/or are intensified by equipment use, while others, i.e., wind erosion emissions, are independent of equipment use.

The main factors affecting the amount of fugitive dust emitted from a source include characteristics of the granular material being disturbed (i.e., particulate size distribution, density, and moisture) and intensity and frequency of the mechanical disturbance (i.e., wind conditions and/or equipment use conditions). Precipitation and evaporation conditions can affect the moisture of the granular material being disturbed and, therefore, have an indirect effect on the amount of fugitive dust emitted.

Once dust is emitted, its travelling distance from the source is affected by various parameters. Namely climatic conditions; specifically wind speed, wind direction and precipitation, and particle size distribution. Higher wind speeds increase the distance travelled while precipitation can accelerate its deposition. Finer particulates can travel longer before settling and, therefore are of more concern.

The potential sources of fugitive dust emissions that have been identified for the Site include the following:

- On-Site traffic
- Processing operations
- Material conveyance systems
- Material stockpiles
- Material loading/unloading

5.1 On-Site Traffic/Roads

The Site will receive a number of trucks on a daily basis which will load and transport out the aggregate material. Therefore, on-Site traffic is expected to be a potential source of fugitive dust emissions. Within the property there will be a mixture of paved and unpaved roads. Prior to exiting the Site, all heavy vehicles will need to pass over a grizzly screen system where dirt on the tires will be knocked off. This will help minimize dirt track-out.

Paved Roads/Areas

Paved roads significantly reduce the potential for fugitive dust emissions from vehicle traffic. The haul road is unpaved up to the grizzly on the scale and paved after the scale to the road as it will see the most traffic. However, the status of the roads on-Site will continuously be evaluated to understand the need for additional paving. The paved road will be maintained to mitigate the accumulation of dirt on the road surface. By sweeping or clearing the paved road, the potential for dust emissions and dirt track-out will be minimized.

Unpaved Roads/Areas

Unpaved roads have a much greater potential to release fugitive dust emissions than paved roads. These gravel roads release dust emissions as the accumulation of dust on the road surface is disturbed by vehicular traffic. Vehicle speed, vehicle weight, moisture content, and silt content are all critical factors in the amount of fugitive dust emitted from the roads. Should a significant amount of dust be generated on the roads, water suppressant will be applied to reduce fugitive dust release. A water truck will be used to apply water to the road surface on a daily basis and as needed thereafter based on weather conditions.

5.2 Processing Operations

At the Site, processing operations will occur at the processing area, the wash plant area, and the recycling area. Each of these areas will involve some form of screening or crushing operations which are expected to be potential sources of fugitive dust emissions. The crusher will be equipped with a spray bar to minimize the potential for fugitive dust emissions from the crushing operations. Furthermore, with the exception of the screening operations, all processing operations will occur at the lowest pit floor elevation, which will reduce the potential for dust emissions from these activities. The screening operations will still occur well below the upper level of the pit.

5.3 Material Conveyance Systems

The excavated aggregate will be sent through screening equipment to filter out the various material grades. Conveyance systems will be in place to transfer the material within the Site. The transportation of the material through this process is a potential source of fugitive dust emissions. The conveyance system used at the main processing area will handle dry material and the conveyance system used at the wash plant will handle wet material. The conveyance of the wet material is not expected to be a source of fugitive dust.

5.4 Material Stockpiles

On-Site will be several outdoor stockpiles of various aggregate products of different types and sizes reflecting the range of product demand, and each will be active in terms of being continuously drawn from and replenished as demand warrants. These stockpiles will potentially be a source of fugitive dust emissions from wind erosion. Under normal operating conditions, these piles are not expected to be a significant source of fugitive dust emissions. However, extremely dry and windy conditions could pose a concern. Therefore, the weather will be actively monitored and water suppressant will be applied to the piles, if needed. There will be stockpiles at each of the three processing areas. The wash plant is expected to have up to five different stockpiles; however, material that is added to those piles will be wet from the washing that occurs within the area.

5.5 Material Loading/Unloading

Material loading and unloading will occur at various stages of the process operations occurring on-Site. Each loading and unloading event represents a potential source of fugitive dust emissions.

Material loading occurs anytime a piece of equipment (like a front end loader) is being used to pick up material. To minimize potential emissions, material loading should be carefully completed at a reduced speed to limit disturbance.

Material unloading occurs anytime material is dropped from one height to another. Examples of this would include material being dropped into a dump truck and material being dropped from a conveyance system to a stockpile. To minimize potential emissions, the drop distance of materials should be minimized.

5.6 Summary

Table 2 below summarizes each potential source of fugitive dust emissions and the potential cause for increased emissions.

Table 2 Sources of Fugitive Dust Emissions within the Site and Potential Causes for High Emissions

Source Description	Potential Causes for High Emissions and Opacity from Each Source
Paved roads	Increased accumulation of dirt on road surface Increased vehicle traffic frequency Increased vehicle speed and weight Dry conditions High wind speed
Unpaved roads	Increased vehicle traffic frequency Increased vehicle speed and weight Dry conditions High wind speed
Processing areas	Increased processing activities Increased elevation of processing activities Dry conditions High wind speed
Material conveyance systems	Increased processing activities Increased speed of conveyance systems Increased elevation of processing activities Dry conditions High wind speed
Material stockpiles	Increased stockpile size Increased elevation of stockpiles Fine materials included in the stockpiles Dry conditions High wind speed
Material loading/unloading	Larger drop distance during loading/unloading Increased frequency of operations Fine materials included in the loaded/unloaded material Dry conditions High wind speed

6. Control Measures

Control measures to reduce fugitive dust emissions should take into account the source of the dust emissions, the dispersion conditions, and the location of sensitive areas in order to avoid relevant impacts of dust emissions on receptors.

Control measures are implemented to reduce the generation and/or dispersion of fugitive dust emissions. These control measures can be classified as follows:

- **Preventative Procedure:** Measures pertaining to the design and installation of structures and the operating procedures which are implemented on a regular basis in order to prevent the generation of dust and/or the dispersion of dust emitted reaching sensitive areas.
- **Reactive Control Measures:** Measures which are implemented in the event of unexpected circumstances which can lead to the generation of dust and/or the dispersion of dust emitted reaching sensitive areas.

Table 3 presents a list of preventative procedures and control measures that will be used to mitigate fugitive dust emissions that are associated with the Site's operations. Key dust management practices are highlighted on Figure 2.

Table 3 Description of Preventative Procedures and Control Measures for Potential Fugitive Dust Emissions at the Site

Preventative Procedure/Control Measure	Description	Frequency
Applying water suppressant	Water suppressant will be sprayed on the roads. Applying water to the road surfaces will reduce the potential for dust to be picked up by winds.	Water will be applied to the roads on a daily basis based on climatic conditions (e.g., windy dry day vs. a precipitation day).
Spray bar	The crushing equipment will be equipped with spray bars. Applying water suppressant to the crushed material will reduce the potential for dust to be picked up by winds.	The watering rate will be set, as needed, to suppress visible dust based on climatic conditions (e.g., windy dry day vs. a precipitation day).
Grizzly screen system	Prior to exiting the Site, all heavy vehicles will need to pass over a grizzly screen system where dirt on the tires will be knocked off. This will help minimize dirt track-out.	All heavy vehicles will need to pass over grizzly screen prior to leaving site.
Road sweeping	The paved road areas will need to be maintained to mitigate the accumulation of dirt on the road surface. By sweeping the paved roads, the potential for dust emissions and dirt track-out will be minimized.	The paved roads should be assessed on a daily basis and swept, as needed.
Optimized truck routes	The truck routes will be optimized for each transport activity occurring on Site to minimize the distances travelled. The optimized truck routes for on-Site traffic provide the most appropriate traffic flow for the activities occurring at the Site. This is an effective best management practice as it reduces the amount of dust kick up by minimizing trip distance.	The truck route optimization will be subject to change as the Site develops.

Preventative Procedure/Control Measure	Description	Frequency
Maximum speed limit	A maximum speed limit of 20 kilometres per hour will be required throughout the Site to minimize emissions of fugitive dust from vehicular traffic.	This speed limit will be required for all vehicles travelling on-Site at all times.
Maintaining the stockpile sizes, appropriate drop heights, and material type	The size of each stockpile is to be maintained relatively consistent. The piles are to be kept as intended and not have any fines added. Materials are dropped onto the stockpiles by loader, conveyor, or truck. Efforts will be made to minimize the drop height wherever possible.	Stockpile size, location, material type, and material drop heights to be monitored and maintained daily.
Berms	The Site will have various earthen berms around the property line based on the phase of the operational plan.	Berms will be constructed prior to operational activities begin on-Site. Maintenance of the berms and pit slopes on-Site will be carried out throughout the life of the pit.
Vegetation	A schedule of vegetation planting has been defined by JHF. Prior to each phase of excavation, JHF will ensure the designated vegetation will be in place. This vegetation will help prevent fugitive dust from escaping the Site.	Vegetation will be planted prior to the operational activities of each project phase begin.

The highest risk source of fugitive dust emissions is considered to be vehicle traffic on unpaved roadways. Therefore, applying water suppressant to the roads is considered to be the highest priority with respect to fugitive dust mitigation.

The images below demonstrate the water suppressant and grizzly screen mitigation methods that will be in use on-Site.



Figure 6.1 Water truck (left) and Grizzly screen (right)

7. Meteorological Data

As the Site will process aggregate material in an outdoor environment, there is the potential for wind to pick up and transport fine dust particles. Therefore, it is important to have an understanding of the local meteorological conditions and how they might affect fugitive dust emissions.

Meteorological data was acquired from the Kitchener/Waterloo Municipal Airport through Environment Canada's historical climate data portal for period from January 2014 through December 2018. This is the closest weather station to the Site (approximately 19 km northeast) and is therefore the most representative data available for the Site.

The weather station (Kitchener/Waterloo) is a continuous hourly station that has been in operation since 2002. Monthly meteorological data for the weather station was downloaded and organized into a spreadsheet where it was checked for completeness. The data was 99.81 percent complete for wind speeds and 96.13 percent complete for wind direction.

The data was converted into a wind rose plot (WRPLOT) supported file format (USEPA SAMSON format). Wind roses and wind speed frequencies were then generated using WRPLOT to assess the local wind speeds and wind directions. The wind rose plot is presented on Figure 3 and the wind class frequency distribution is presented on Figure 4.

The wind rose plot demonstrates that the predominant wind directions are blowing to the east (and southeast and northeast) and that approximately 54 percent of the winds have a speed of 4.5 metres per second (m/s) or less.

A review of the area has identified that there are a few residences located along Witmer Road in addition to residences located in Shingletown immediately north of the Site. The planned control measures will effectively minimize the impact that residences along Witmer Road may encounter from westerly winds. In addition, there is existing tree cover along the southwest and southeast corners of the Site that would reduce potential impacts at those receptors along Witmer Road. The residences in the Shingletown area would be subject to minimal fugitive dust impact without implementing the best management practices presented herein, as there are infrequent winds coming from the south and the majority of them are of low wind speed.

8. Potential for Cumulative Impacts

It is recognized that there are several existing aggregate operations located in the vicinity of the proposed Site. At the request of the Region of Waterloo, a cumulative dust impacts assessment has been completed as part of the best management practices that will be in place at the Site to control potential fugitive dust emissions.

The pits that are located in the vicinity of the proposed Site are included in Figure 5 and Figure 6 and are listed as follows:

1. Cattleland Pit
ARA Licence No. 10600
Licensed Area: 96.3 hectares
Class A, Category 1 (pit below water)
Annual Tonnage: 500,000 tonnes
(*Never opened for extraction*)
2. Barnes Pit
ARA Licence No. 5725
Licensed Area: 55.5 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 454,000 tonnes
(*No extraction for many years*)
3. Siebert Pit
ARA Licence No. 5553
Licensed Area: 38.4 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 500,000 tonnes
(*No/minimal extraction. Asphalt plant operation currently*)



4. Spring Valley (Voisin) Pit
ARA Licence No. 608502
Licensed Area: 27.7 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 200,000 tonnes
(Open)
5. Township Pit
ARA Licence No. 5557
Licensed Area: 41.8 hectares
Class A, Category 1 (pit below water)
Annual Tonnage: 75,000 tonnes
(Open – Minimal annual activity)
6. Dino Pit
ARA Licence No. 5728
Licensed Area: 25.2 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 250,000 tonnes
(Open/Rehabilitation – Minimal annual activity)
7. Poll Pit
ARA Licence No. 5550
Licensed Area: 45.7 hectares
Class A, Category 3 (pit above water)
Annual Tonnage: 50,000 tonnes
(Closed/Rehabilitation)

As a general comment, aggregate extraction operations are primarily associated with ground-based emissions sources, which have limited potential for dispersion across a significant distance. In addition, aggregate operations typically occur well below grade, which further restricts the potential for dust to disperse beyond the property line. Therefore, the potential for adverse effects resulting from cumulative impacts is expected to be minimal from these types of operations.

However, the following provides more information on the nearby pits and the potential for cumulative impacts. As a note, this cumulative assessment discussion will focus on potential impacts in the immediate vicinity of the Site.

The location of the various operations with respect to each other is a key factor in understanding the potential for cumulative impacts. As shown on Figures 5 and 6, the Site is located generally upwind to the northwest compared to the other existing pits in the generally vicinity. This location isolates it from the other pits and reduces the potential for cumulative impacts from most of the other pits. It should also be noted that only two or three of the seven pits are generally open for extraction (Barnes, Spring Valley, and Township Pit).

The operations at Cattleland Pit, located directly south of the Site, and the Spring Valley (Voison) Pit, located southeast of the Site, were further reviewed to evaluate the potential for cumulative impacts.

The Cattleland Pit, although never opened, is the closest aggregate operation to the Site and has the highest potential to contribute to cumulative impacts. The Cattleland Pit was licensed in 1991 but has never been opened for any active extraction to date. It is understood that the Cattleland Pit is licensed for an operational plan consisting of 10 planned phases.

The first five phases are to be located in the southeastern portion of the pit. This area of the pit is located over one kilometre away from the Site and therefore are expected to result in negligible cumulative impacts.

The last five phases are to be located just south of Witmer Road and would be the closest aggregate operation to the proposed Site. It is understood that when/if these phases are to commence, a three metre tall berm will be constructed between the operations and Witmer Road. In addition, it is understood that the extraction operations and associated equipment will be located as much as eighteen metres below the height of the berm.

Finally, it is understood that all extracted material from the Cattleland Pit will be shipped out via conveyor through the Barnes Pit to the Seibert Pit for processing with the final product shipped out via the Queen Street access point. This arrangement will significantly reduce dust generation from material transport since vehicles will not need to access Witmer Road where the Site is to be located. Therefore, should the Cattleland Pit ever commence operation, it is expected to result in minimal cumulative impacts in consideration of the operation of the Site.

The Spring Valley (Voison) Pit is the second closest aggregate operation to the Site and therefore has the potential to contribute to cumulative impacts. The pit was licensed over ten years ago and has been in consistent operation since.

It is understood that the Spring Valley Pit is associated with two phases. Phase one consists of processing operations that occur near the center of the licensed area and are surrounded by a four metre tall berm. Phase two only consists of 'load and haul' operations. The portion of the pit located closest to the Site operations will only involve phase two operations and therefore will not include any processing operations.

Due to the close proximity of residences along Witmer Road, the portable processing operations are also required to be shielded by a barrier with a minimum height of 10 to 12 metres. This shield will greatly minimize the potential impact from dust generation. The access point to the Spring Valley Pit is located off of Witmer Road, which is located just under one kilometre from the Site. Finally, a three metre tall berm is located at the northern perimeter of the pit along Witmer Road and vegetation has been proposed for planting. Therefore, the Spring Valley Pit is expected to result in minimal cumulative impacts in consideration of the operation of the Site.

Based on available information on the remainder of the pits, many are operating minimal activities or appear to have completed active extraction and are to undergo rehabilitation. It is understood that the Barnes Pit (which has been open for over 40 years) has not been open for active extraction in many years. It is understood that the Seibert Pit (which has been open for over 40 years) is associated with minimal extraction operations in recent years. However, the Seibert Pit is permitted for and operates an active asphalt plant. It is understood that the Township Pit is associated with minimal annual extraction operations. It is understood that the Dino Pit is still open but only produces less than 50,000 tonnes per year and is undergoing rehabilitation. Finally, it is understood that the Poll Pit is not undergoing any active extraction operations any longer and is required to undergo

rehabilitation as part of its site plans. All of these pits are also located over one kilometer away from the Site. Based on the understanding of how dust disperses from ground-based sources, which are located below grade, these pits are expected to result in negligible cumulative impacts in consideration of the operation of the Site.

The specifics of the dust mitigation practices that the other pits are or will be utilizing are not fully understood. However, based on the prescribed conditions that apply to Category 1 (Class A Pit Below Water) and Category 3 (Class A Pit Above Water), license holders are subject to the following conditions:

3.1 Dust will be mitigated on site.

3.2 Water or another provincially approved dust suppressant will be applied to internal haul roads and processing areas as often as required to mitigate dust.

3.3 Processing equipment will be equipped with dust suppressing or collection devices, where the equipment creates dust and is being operated within 300 metres of a sensitive receptor.

With these conditions in mind, it is expected that all of the pits operating in the area will be held to a certain standard of fugitive dust control independent of other operations. If all pits are operated in accordance of these conditions, the potential for cumulative impacts will be minimized.

In summary, the potential for adverse effects resulting from cumulative impacts is expected to be minimal and that the construction and operation of the Site will not change this understanding.

9. Inspection, Maintenance, and Documentation

The presence of visible dust will be monitored continuously and control measures will be implemented on an as-needed basis. In addition, daily process inspections by all operation and maintenance staff will be conducted at the Site to monitor the effectiveness of dust control practices. The housekeeping practices will be reviewed as part of these daily inspections, and further practices required, if any, are identified at that time. As part of the daily process inspections, the weather conditions will be reviewed and the temperature and windspeed will be documented in the daily logs. If the temperature is greater than 20 degrees Celsius (°C) and wind speeds are in excess of 5 m/s, process inspections will occur twice per day.

The dust management and inspection responsibility falls on the technical Operations Manager at the Site. On a bi-weekly basis, the Operations Manager or alternate will conduct a full Site walkthrough, including perimeter inspections to identify any potential areas of concern related to the generation of fugitive dust. The Operations Manager should also make note of visible activities being conducted at the nearby pits. Should any off-site operation cause concern for adverse dust impacts near the Site, the site may need to implement more regular inspections and maintenance procedures. Additionally, all applicable Site personnel will be directed to be cognizant of any potential fugitive dust emissions from the Site operations and will be instructed to communicate potential issues to the Operations Manager immediately upon detection.



The bi-weekly inspection will include special attention to the following areas:

- Unpaved roads/areas
- Outdoor stockpiles (wind erosion and drop operations)
- Material loading/unloading areas
- Property boundary berms

Daily observations will be logged and filed as per standard Site procedures. Bi-weekly fugitive dust checks will be completed in a similar fashion to the example checklist provided in Appendix A. Based upon the findings, equipment maintenance is completed and housekeeping practices are reviewed and modified, as appropriate.

The documentation requirements for this fugitive dust BMPP includes JHF recording, in a log book, each time a specific preventative and control measure described in the Dust BMPP is implemented. JHF shall record, at a minimum:

- The date when each emission control measure is installed, including a description of the control measure.
- The date when each new preventative measure or operating procedure to minimize emissions is implemented, including a description of the preventative measure or operating procedure.
- The date, time of commencement, and time of completion of each periodic activity conducted to minimize emissions, including a description of the preventative measure/procedure and the name of the individual performing the periodic activity.

10. Training

As part of maintaining best management practices for controlling and preventing fugitive dust emissions, an initial and ongoing training program will be provided for all applicable staff.

The training will address the existing control techniques in place for managing fugitive dust emissions and how to maintain them; how to conduct a fugitive dust observation check and complete the associated paperwork; what to do in the case of an unexpected fugitive dust release; and, who to notify of any concerns or problems pertaining to fugitive dust emissions. Refresher training will be provided, as necessary, based on changes to the fugitive dust emission control techniques or process operations.

JHF will ensure that all new hires, including JHF personnel and contractors that will be engaged in the associated work listed in this Dust BMPP will be familiar with this Dust BMPP.

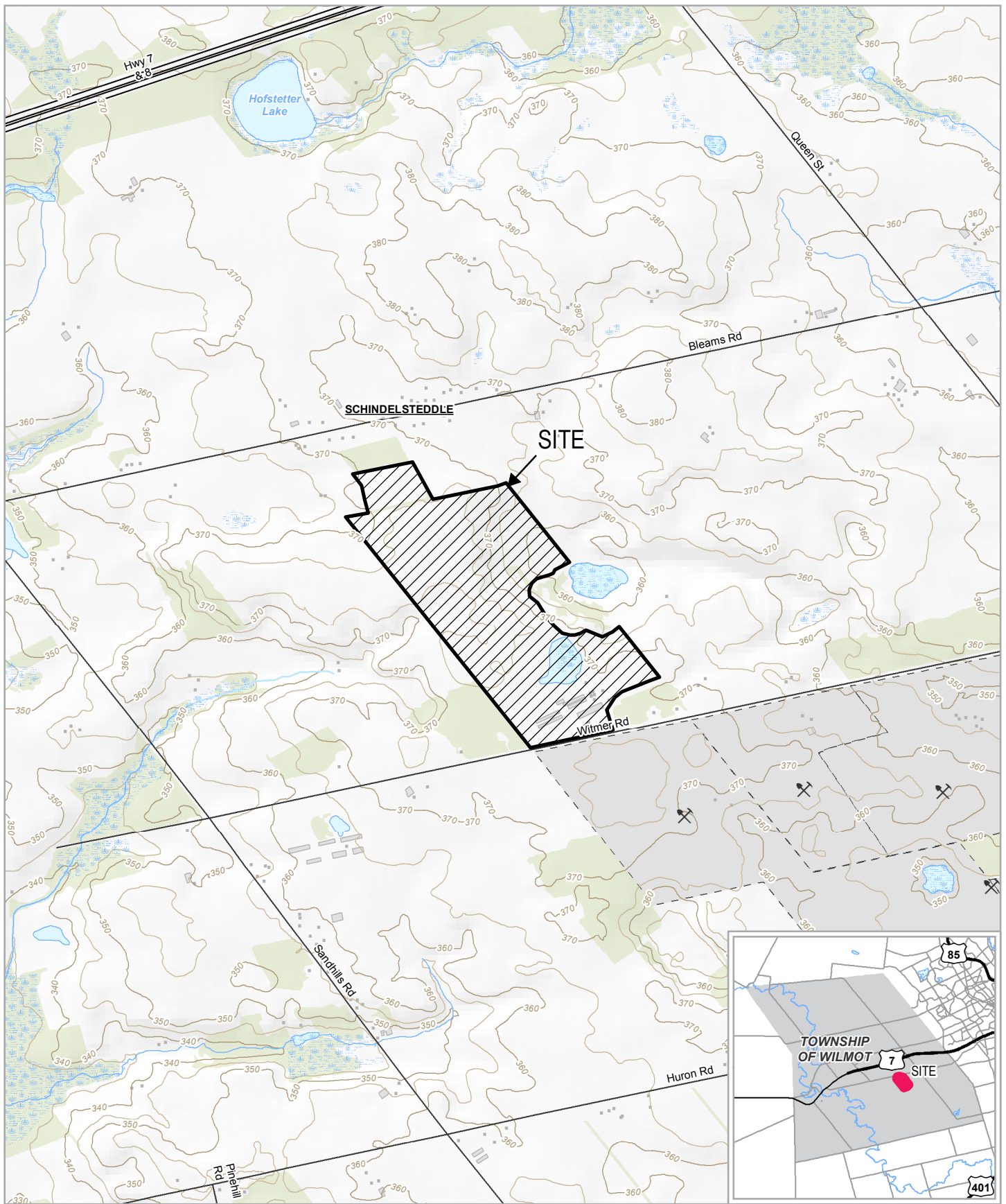
11. Dust BMPP Review and Continuous Improvement

Inspections and monitoring procedures will assist JHF personnel with the maintenance of an effective Dust BMPP. The Dust BMPP should be monitored and updated, as follows:

- If there are significant changes in the fugitive dust emissions sources (e.g. "as-constructed" site, etc.).
- If there are verified complaints associated with fugitive dust emissions from the Site.
- When there are visible dust emissions occurring more frequently and/or at a higher rate (excluding seasonal conditions).

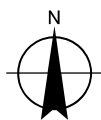
Review of the Dust BMPP is intended to evaluate the effectiveness of the dust control practices and focus on the identification of improvement opportunities that can reduce the risk of complaints related to fugitive dust emissions. A review of the Dust BMPP will ensure it is remaining effective in controlling fugitive dust emissions.

As part of implementing a successful fugitive Dust BMPP, it is important to be aware of areas where fugitive dust emissions can be reduced further. The Site will endeavor to improve its capacity for controlling fugitive dust emissions by identifying areas for potential future improvements and implementing additional practices as appropriate.



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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

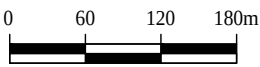
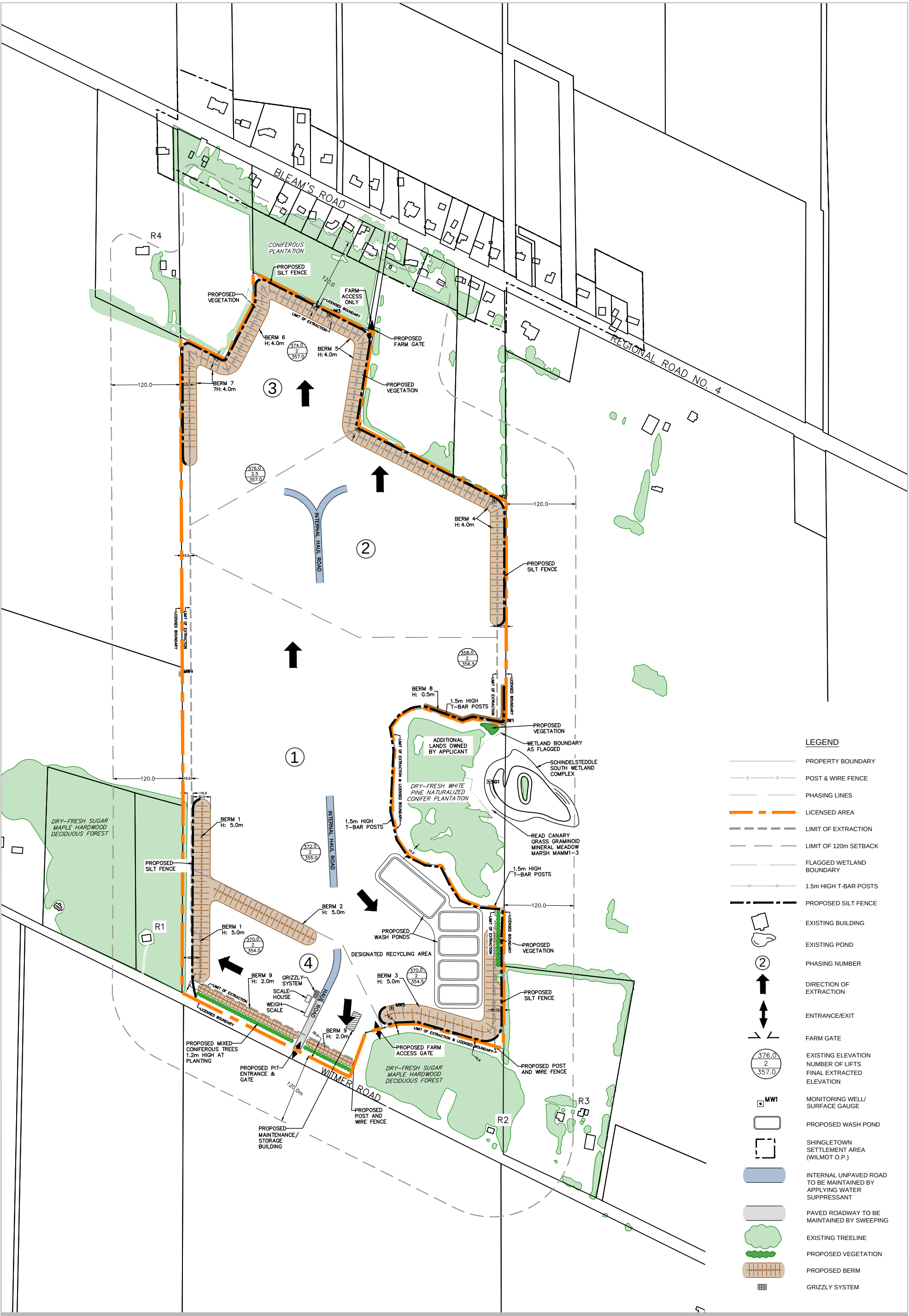


**HALLMAN PIT
1984 WITMER ROAD
WILMOT, ONTARIO
BMPP FOR CONTROL OF FUGITIVE DUST EMISSIONS**

SITE LOCATION MAP

Project No. 11202973
Revision No. -
Date Sep 19, 2019

FIGURE 1



Coordinate System:
UTM, NAD83, ZONE 17

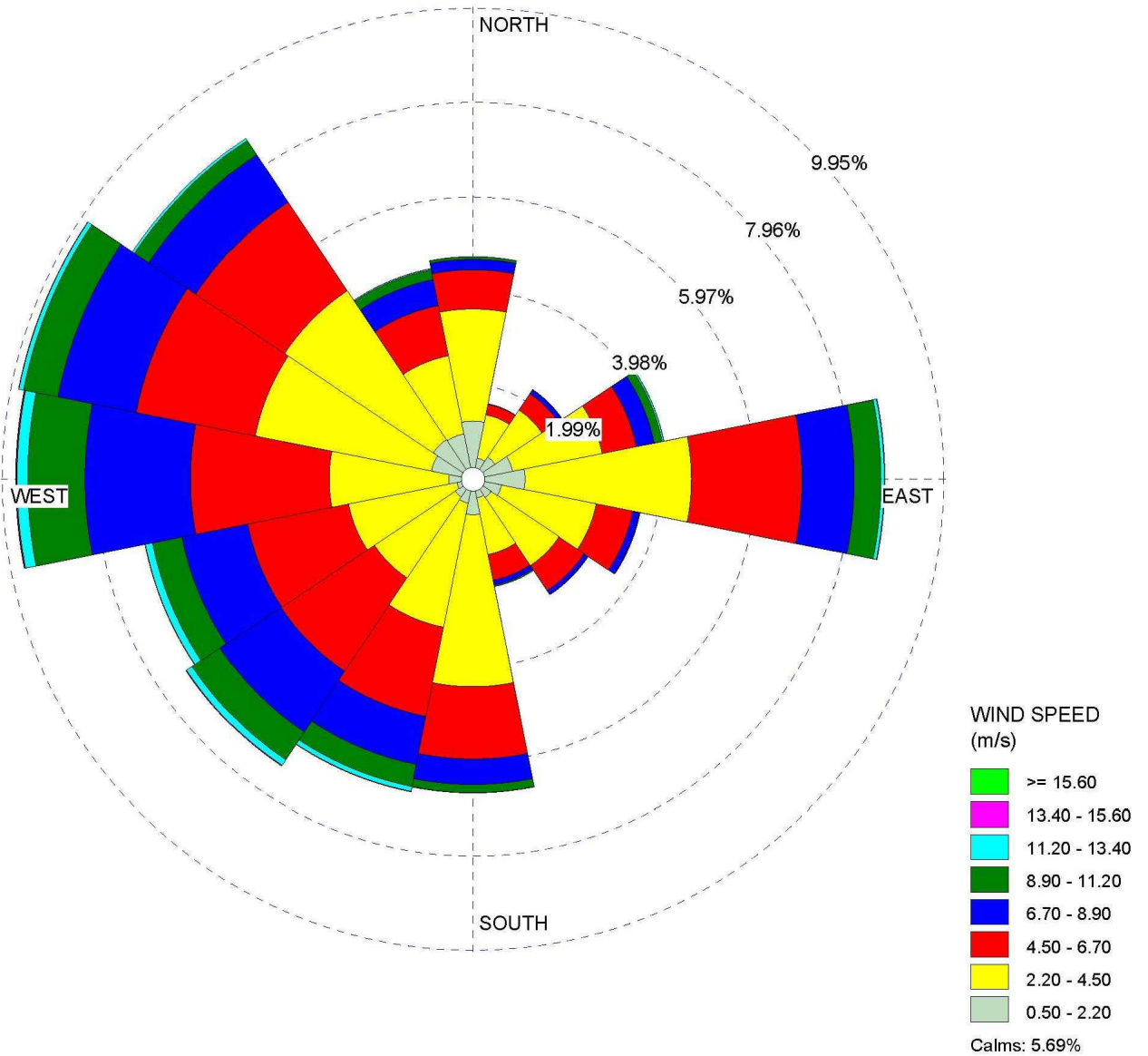


HALLMAN PIT
1894 WITMER ROAD, WILMOT, ONTARIO
BMPP FOR CONTROL OF
FUGITIVE DUST EMISSIONS

KEY DUST MANAGEMENT PRACTICES

Project No. 11202973-01
Date September 2019

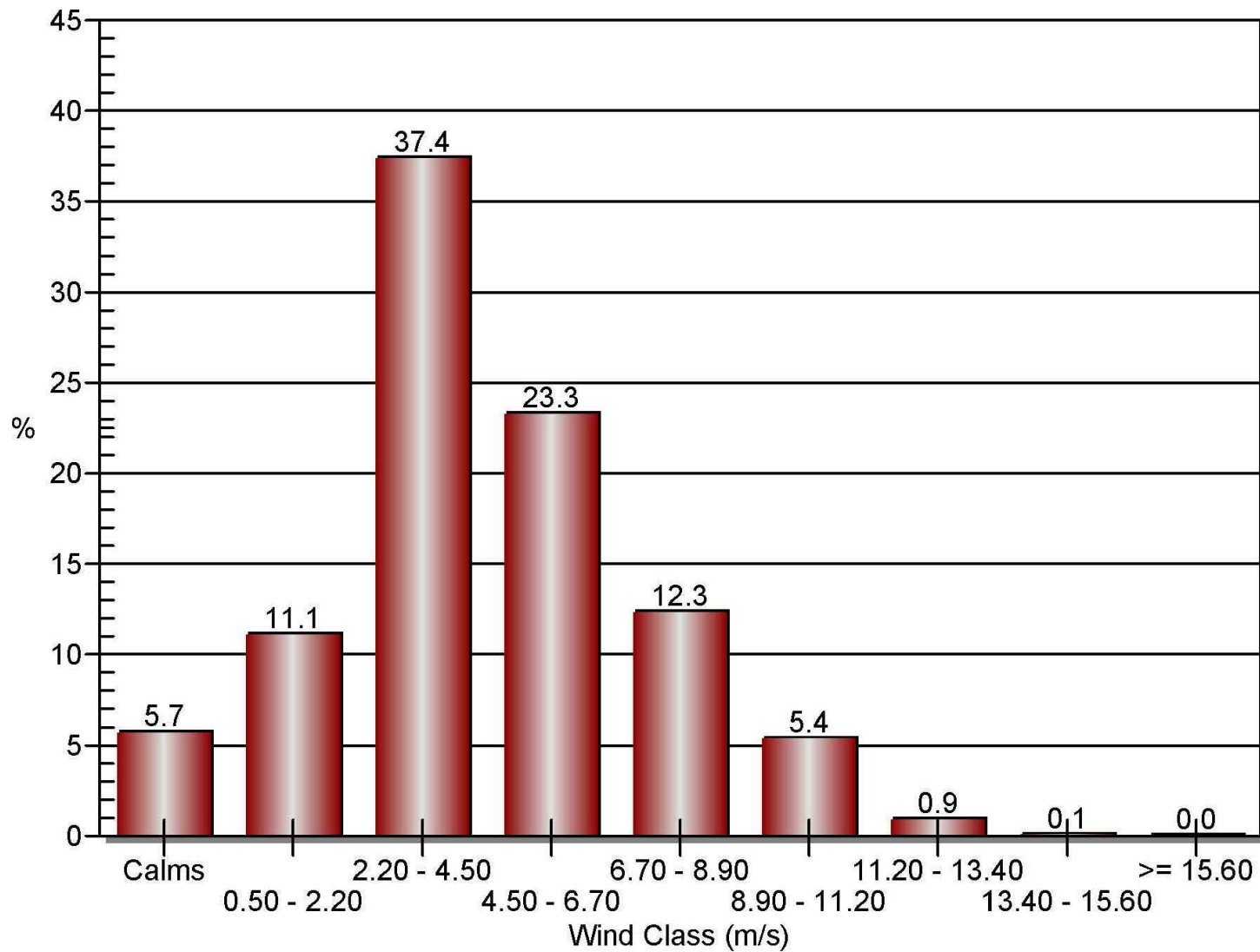
FIGURE 2



HALLMAN PIT
1894 WITMER ROAD, WILMOT, ONTARIO
BMPP FOR CONTROL OF
FUGITIVE DUST EMISSIONS
KITCHENER/WATERLOO
WIND ROSE 2014-2018

Project No. 11202973-01
Date September 2019

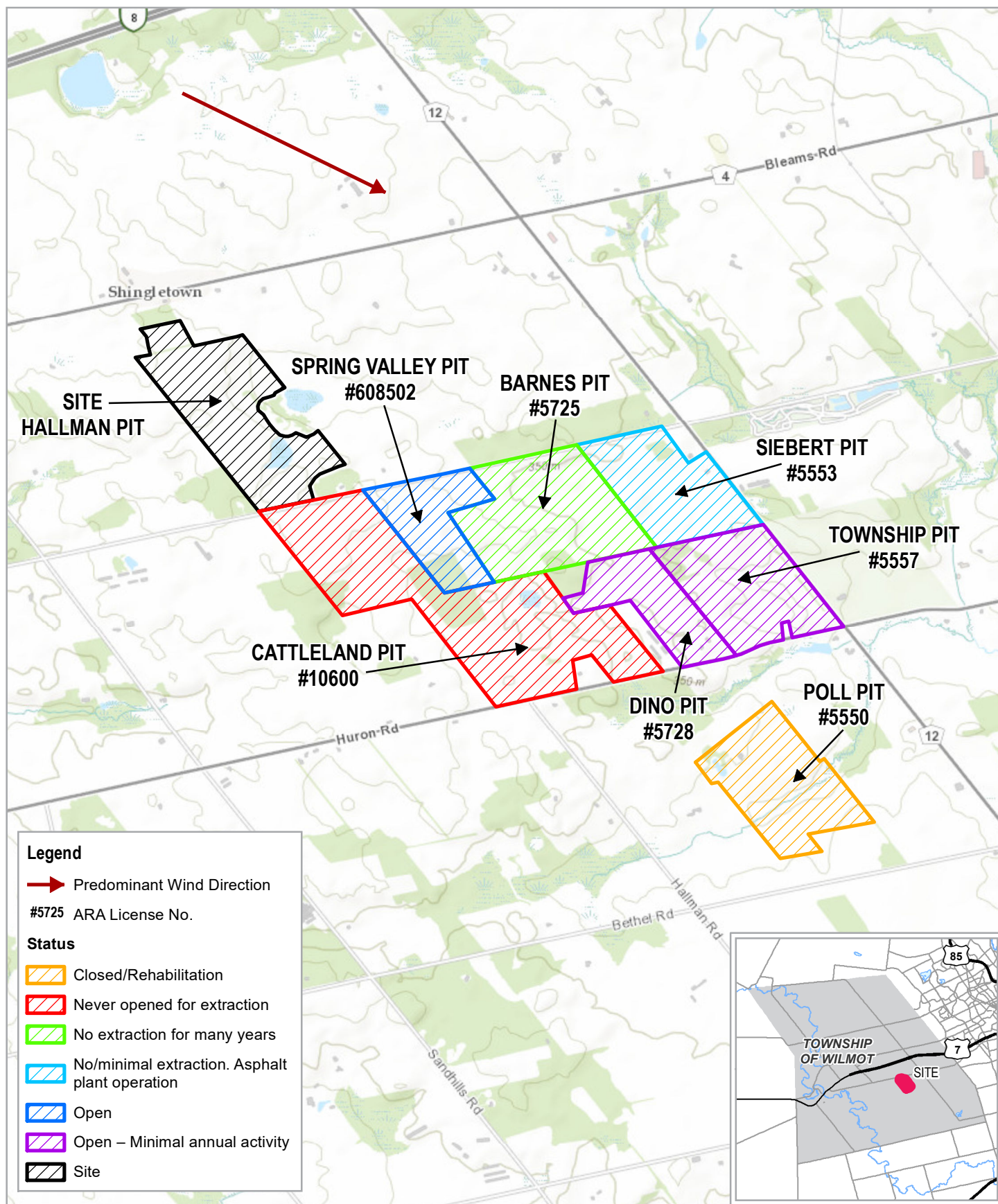
FIGURE 3



HALLMAN PIT
1894 WITMER ROAD, WILMOT, ONTARIO
BMPP FOR CONTROL OF
FUGITIVE DUST EMISSIONS
KITCHENER/WATERLOO WIND CLASS
FREQUENCY DISTRIBUTION GRAPH

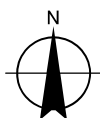
Project No. 11202973-01
Date September 2019

FIGURE 4



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Map Projection: Transverse Mercator
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Grid: NAD 1983 UTM Zone 17N

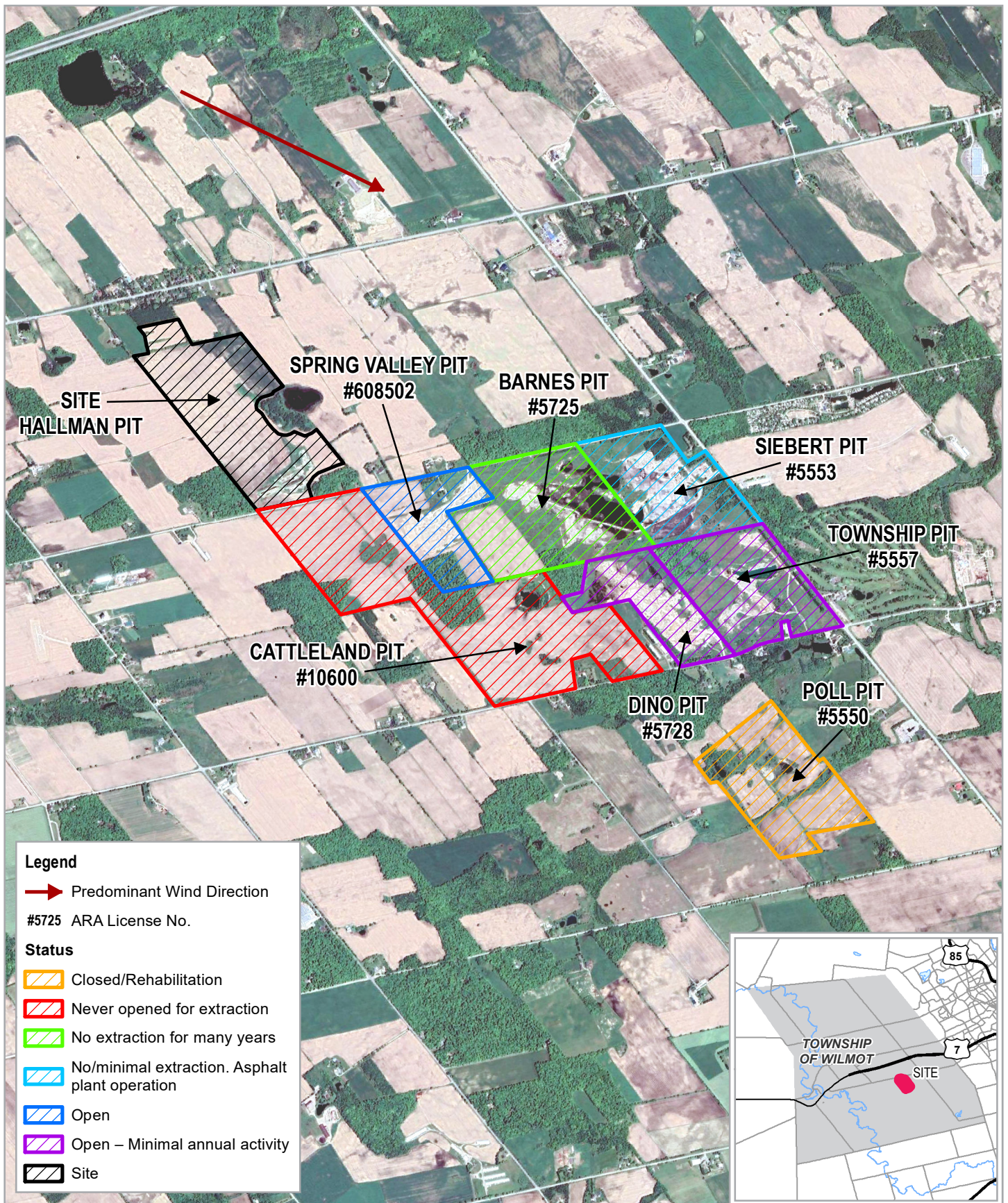


HALLMAN PIT
1984 WITMER ROAD
WILMOT, ONTARIO
BMPP FOR CONTROL OF FUGITIVE DUST EMISSIONS

Project No. 11202973
Revision No. -
Date Oct 14, 2020

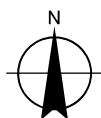
NEARBY PIT OPERATIONS

FIGURE 5



Paper Size ANSI A
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Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N



HALLMAN PIT
1984 WITMER ROAD
WILMOT, ONTARIO
BMPP FOR CONTROL OF FUGITIVE DUST EMISSIONS

Project No. 11202973
Revision No. -
Date Oct 14, 2020

AERIAL SITE LOCATION MAP

FIGURE 6

Appendix A

Fugitive Dust Checklist

Fugitive Dust BMPP Inspection Checklist
Jackson Harvest Farms Ltd.
1894 Witmer Road, Wilmot

Completed by: _____

Date: _____

Weather Conditions: Precipitation? Yes ☐ No ☐
 Rain ☐ Snow ☐ Temperature: _____ °C Wind Speed: Calm ☐ Moderate ☐ High ☐
 Wind Direction (blowing from): _____

SOURCE	INSPECTION POINTS	Yes	No	NOTES
Paved Roads	Are dust emissions observed to be under control?	☐	☐	
	Are vehicles obeying the posted speed limit?	☐	☐	
	Is washing/sweeping required?	☐	☐	
Unpaved Roads	Are dust emissions observed to be under control?	☐	☐	
	Is water spraying required?	☐	☐	
	Are vehicles obeying the posted speed limit?	☐	☐	
Stockpiles	Are dust emissions observed to be under control?	☐	☐	
	Is water spraying required?	☐	☐	
Transfer Locations	Are dust emissions observed to be under control?	☐	☐	
	Are drivers required to unload at lower height	☐	☐	
Berms	Are dust emissions observed to be under control?	☐	☐	
	Are berms in good condition	☐	☐	

Additional Comments / Corrective Action:



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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