




# COMMUNICATION UPDATE

<b>TO:</b>	Mayor and Members Board of Health
<b>DATE:</b>	October 19, 2023
<b>SUBJECT:</b>	Air Monitoring On-Site Assessment at Green for Life Stoney Creek Regional Facility (Ward 9)
<b>WARD(S) AFFECTED:</b>	Ward 9
<b>SUBMITTED BY:</b>	Dr. Elizabeth Richardson, MD, MHSc, FRCPC Medical Officer of Health Public Health Services
<b>SIGNATURE:</b>	

This communication provides the Board of Health with a second update concerning the Ministry of Environment Conservation and Parks' (Ministry) actions including air monitoring onsite assessment at the Green For Life Environmental Stoney Creek Regional Facility (Facility) located at 65 Green Mountain Road West in Stoney Creek (Ward 9) to address public complaints concerning air quality and odours specifically during evening and early morning time periods emanating from the Facility and impacting nearby residences.

## Summary

Subsequent to the Ministry's August 2023 Air Monitoring On-Site Assessment at Green for Life Stoney Creek Regional Facility and community-raised concerns regarding odours emanating from the Facility during evening and early morning time periods not measured in the Ministry's first assessment, the second Ambient Air Monitoring Assessment Survey conducted by the Ministry in September 2023 incorporated both evening and early morning monitoring periods.

Ministry staff identified odours on each of the six survey days with the leachate pond and the Facility as the likely source of odours. Furthermore, measurements taken by the Ministry indicate a total of twenty-nine exceedances of the Total Reduced Sulfur 10-minute odour-based O. Reg. 419/05 Standard of  $13 \mu\text{g}/\text{m}^3$ . Since hydrogen sulphide ( $\text{H}_2\text{S}$ ) was the only pollutant that was seen with any degree of regularity in the study it was assumed that Total Reduced Sulfur was composed entirely of hydrogen sulfide ( $\text{H}_2\text{S}$ ) which allowed for comparison to applicable Total Reduced Sulfur air standards.

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OUR Vision: To be the best place to raise a child and age successfully.

OUR Mission: To provide high quality cost conscious public services that contribute to a healthy, safe and prosperous community, in a sustainable manner.

OUR Culture: Collective Ownership, Steadfast Integrity, Courageous Change, Sensational Service, Engaged Empowered Employees.

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Based on the location of measured Total Reduced Sulfur exceedances, Facility operations and wind conditions during exceedances, the Ministry identified that the Facility and leachate pond as the most likely Total Reduced Sulfur source and cause of exceedances. Given the frequency, magnitude and widespread nature of 10-minute Total Reduced Sulfur exceedances measured on select days by the Ministry, there is acknowledgement that exceedances may have occurred at other times when air monitoring was not being conducted by the Ministry. Therefore, the Ministry has identified the need for continuous Total Reduced Sulfur monitoring in the general area around the Facility to be evaluated to ensure the 24-hour Total Reduced Sulfur O. Reg 419/05 health-based standard of  $7 \mu\text{g}/\text{m}^3$ , is not being exceeded. Public Health Services is supportive of this latter initiative. On October 17, 2023, the Ministry issued an Order to the Facility; the order is to be posted on the company's website.

Ministry Inspectors continue daily on-site monitoring at the Facility. Furthermore, the Hamilton District Office of the Ministry has referred this matter to their Investigations and Enforcement Branch for appropriate follow-up. As well, the Ministry has asked the Facility to enhance public communications via weekly written status updates on the Green For Life Environmental Stoney Creek Regional Facility website and monthly virtual Community Update Meetings for members the public hosted by Green For Life Environmental.

Moreover, Public Health Services is preparing a Recommendation Report in response to Council's direction at its September 27, 2023 meeting:

“That staff be directed to explore the ways and means to provide independent third party air monitoring for a minimum seven day period at GFL Stoney Creek Landfill to be funded by the Stoney Creek Compensation Royalties (GFL Landfill) Reserve 117036 and report back to the Public Health Committee.”

### **Background**

In response to residents' odour complaints and concerns regarding potential contaminants and impacts from odour, Public Health Services staff have continued to meet with Ministry staff to discuss their findings from additional evening and early morning air monitoring, as requested by the community, on-site and around the Facility in Stoney Creek conducted in September 2023.

The Technical Support Section of the Ministry completed an air monitoring assessment in the vicinity of the Facility over six different days from September 1, 14, 15, 22, 28, and 29, 2023. The Ministry measured the following compounds: benzene, trichloroethylene, toluene, tetrachloroethylene, chlorobenzene, ethylbenzene, styrene, 1,2,4 trimethylbenzene, naphthalene, nitrogen oxides (NO<sub>x</sub>), including nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>), Total Reduced Sulfur compounds, and sulfur dioxide (SO<sub>2</sub>).

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It is important to point out that based on the Ministry's previous observations of elevated contaminant concentrations and likely contaminants of interest, as shared in the first Communication Update on September 15, 2023, the Ministry prioritized Total Reduced Sulfur compounds and sulfur dioxide (SO<sub>2</sub>) measurements. Although Total Reduced Sulfur compounds can include dimethyl disulfide, dimethyl sulfide, hydrogen sulfide (H<sub>2</sub>S) and mercaptans, for the purposes of this assessment, based on the Ministry's finding in the August 2023 Air Monitoring On-Site Assessment at Green for Life Stoney Creek Regional Facility, it was assumed that Total Reduced Sulfur was composed entirely of hydrogen sulfide (H<sub>2</sub>S) and allowed for comparison to applicable Total Reduced Sulfur air standards. Hence, hydrogen sulphide (H<sub>2</sub>S) was the only pollutant that was seen with any degree of regularity in the study.

Additionally, to further address the odour concerns, the Technical Support Section used a St. Croix Sensory Nasal Ranger (Nasal Ranger) for the measurement and quantification of odour strength in the ambient air.

As was completed with the first set of Ministry data collected from the Facility and received by Public Health Services in August 2023, this second set of Ministry findings received by Public Health Services on October 11, 2023, were independently reviewed by Public Health Services' Environmental Health Consultant.

Odours described as raw sulphur, leachate, herb, garbage, solvent, chemical, burnt, rotten eggs, and odour masking agents (Febreeze, sweet, mouthwash, fluoride, perfume) were identified on all six survey days by Ministry staff. Over the course of all sampling days, the data collection suggests that the leachate pond and the Facility as a likely source of odours.

Toluene, ethylbenzene and 1,3-dimethylbenzene were detected at 10:55 a.m. on September 1, 2023. The Ministry found, these compounds to be well below their respective O. Reg. 419/05 Guidelines; hence these measurements were within the parameters to limit exposure that can affect human health and the environment.

On September 22, 2023 from 4:40 a.m. to 4:50 a.m., the Ministry found that the maximum 10-minute Total Reduced Sulfur concentration to be 266.5 µg/m<sup>3</sup> which was above the Total Reduced Sulfur 10-minute odour-based O. Reg. 419/05 Standard of 13 µg/m<sup>3</sup>. This 10-minute standard is based on odour and, therefore, comfort for residents. The Ministry measured this maximum concentration along the Facility western property line approximately 500m from the nearest residence. Additionally, the Ministry measured a total of twenty-nine 10-minute Total Reduced Sulfur O. Reg. 419/05 Standard exceedances over the following dates: September 14, 15, 22, 28 and 29, 2023. These Total Reduced Sulfur exceedances were measured by the Ministry at many locations surrounding the Facility including residential areas. Hence, exceedances above the standard may understandably decrease comfort for residents

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within the vicinity of the Facility particularly on September 22, 2023 when the measurement was considerably above the standard.

By taking into account the location of measured Total Reduced Sulfur exceedances, Facility operations and wind conditions during exceedances, the Ministry has identified the Facility and leachate pond as the most likely Total Reduced Sulfur source and cause of exceedances. Further, the Ministry brings attention to the fact it is likely that exceedances occurred at other times when air monitoring was not being done given the frequency, magnitude and widespread nature of 10-minute Total Reduced Sulfur exceedances measured during the survey period.

Although hydrogen sulfide (H<sub>2</sub>S) has not been known to cause cancer<sup>1</sup>, prolonged exposure to low concentrations of Total Reduced Sulfur compounds such as hydrogen sulfide (H<sub>2</sub>S) may cause headaches, tiredness, and nausea.<sup>1</sup> This is consistent with community concerns raised regarding their lived experience with the odour emanating from the Facility impacting their quality of life<sup>2,3,4,5</sup>, which research confirms can trigger an individual's stress response.<sup>6</sup>

Therefore, based on the fact that elevated 10-minute Total Reduced Sulfur concentrations were measured on five of the six survey days, the Ministry has pointed

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<sup>1</sup> Canadian Centre for Occupational Health and Safety (CCOHS), 2023. Hydrogen Sulfide. Available from:

[https://www.ccohs.ca/oshanswers/chemicals/chem\\_profiles/hydrogen\\_sulfide.html](https://www.ccohs.ca/oshanswers/chemicals/chem_profiles/hydrogen_sulfide.html)

<sup>2</sup> Aatamila M., Verkasalo P. K., Korhonen M. J., Suominen A. L., Hirvonen M. R., Viluksela M. K., et al. 2011 Odour annoyance and physical symptoms among residents living near waste treatment centres Environ Res 111 1 164 -170 Available from:

<https://pubmed.ncbi.nlm.nih.gov/21130986/>

<sup>3</sup> Baldacci S., Maio S., Martini F., Silvi P., Sarno G., Cerrai S., et al. 2015 Odor annoyance perception and health effects in an Italian general population sample Eur Respir J PA1115 Available from:

[https://erj.ersjournals.com/content/46/suppl\\_59/PA1115](https://erj.ersjournals.com/content/46/suppl_59/PA1115)

<sup>4</sup> Blanes-Vidal V. 2015 Air pollution from biodegradable wastes and non-specific health symptoms among residents: Direct or annoyance-mediated associations?

Chemosphere 120 371 -377 Available from: <https://pubmed.ncbi.nlm.nih.gov/25192839/>

<sup>5</sup> Hooiveld M., van Dijk C. E., van der Sman-De Beer F., Smit L. A. M., Vogelaar M., Wouters I. M., et al. 2015 Odour annoyance in the neighbourhood of livestock farming – Perceived health and health care seeking behaviour Ann Agric Environ Med 22 1 55 -61 Available from: <https://pubmed.ncbi.nlm.nih.gov/25780829/>

<sup>6</sup> Hirasawa Y., Shirasu M., Okamoto M., and Touhara K. 2019 Subjective unpleasantness of malodors induces a stress response Psychoneuroendocrinology 106 206 -215 Available from:

<https://www.sciencedirect.com/science/article/abs/pii/S0306453018312125>

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out the need for continuous Total Reduced Sulfur monitoring in the general area around the Facility to be evaluated to ensure the 24-hour Total Reduced Sulfur O. Reg 419/05 health-based standard of  $7 \mu/m^3$ , is not being exceeded. Consequently, on October 17, 2023, the Ministry issued an order to the Facility; the order is to be posted on the company's website.

Public Health Services has been informed that Ministry Inspectors continue to conduct daily on-site monitoring at the facility ensuring agreed to measures are being taken such as daily application of "foam treatment" to leachate pods. Furthermore, the Hamilton District Office of the Ministry has referred this matter to their Investigations and Enforcement Branch for appropriate follow-up. As well, the Ministry is working with the Facility to enhance public communications via weekly written status updates on the Facility's website and monthly virtual Community Update Meetings for members the public organized by Green For Life Environmental. These meetings will be hosted on Zoom where community members will have the opportunity to hear how Green For Life is addressing odour issues at the Stoney Creek Regional Facility landfill and pose questions to Green For Life and the Ministry of the Environment, Conservation and Parks representatives.

To register, please click on the zoom meeting links below. You may register at any time for the meetings.

- Wednesday, October 18, 2023: 6:00 p.m. – 7:00 p.m.  
<https://us06web.zoom.us/meeting/register/tZcofuGgqDItE9aQxmSg-XS263c8PCL-rS-9>
- Thursday, November 16, 2023: 6:00 p.m. – 7:00 p.m.  
[https://us06web.zoom.us/meeting/register/tZwpdeivrT0oG93zTTGILLJqR\\_clncNqizIA](https://us06web.zoom.us/meeting/register/tZwpdeivrT0oG93zTTGILLJqR_clncNqizIA)
- Thursday, December 14, 2023: 6:00 p.m. – 7:00 pm  
[https://us06web.zoom.us/meeting/register/tZErdiprj4oEtfCiEAFiwVhl\\_kGDEhw9-Dg](https://us06web.zoom.us/meeting/register/tZErdiprj4oEtfCiEAFiwVhl_kGDEhw9-Dg)

Next steps for Public Health Services include preparing a Recommendation Report, tentatively scheduled for the November 13, 2023 Public Health Committee Meeting, in response to Council's direction at its September 27, 2023 meeting:

"That staff be directed to explore the ways and means to provide independent third party air monitoring for a minimum seven day period at GFL Stoney Creek Landfill to be funded by the Stoney Creek Compensation Royalties (GFL Landfill) Reserve 117036 and report back to the Public Health Committee."

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Additionally, Public Health Services recognizes that landfill impacts to the environment not only include air but also involve soil and water.<sup>7</sup> Therefore, Public Health Services staff have connected with both the City's Waste and Water Management staff who have indicated that they are continuously monitoring and following-up with the Facility as appropriate.

Should you require further information about this Communication Update, please do not hesitate to contact Matthew Lawson, Manager, Health Hazards and Vector Borne Diseases Program at Ext. 5823 or [matthew.lawson@hamilton.ca](mailto:matthew.lawson@hamilton.ca).

**APPENDICES AND SCHEDULES ATTACHED**

Appendix "A" to Board of Health Communication Update: (2023-10-19) Green for Life Environmental September 2023 Ambient Air Monitoring Assessment Survey, Stoney Creek, Ontario (Ministry of the Environment, Conservation and Parks)

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<sup>7</sup> Vaverkova M.D. 2019 Landfill Impacts on the Environment – Review Available from: <https://www.mdpi.com/2076-3263/9/10/431>

**Ministry of the Environment,  
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October 5, 2023

## MEMORANDUM

**RE: GFL Environmental September 2023 Ambient Air Monitoring Assessment Survey,  
Stoney Creek, Ontario**

*This memorandum serves as an update to the previously issued memorandum dated September 1, 2023, which reported the results of air monitoring surveys that took place in August 2023. This update reports on air monitoring measurements completed in September 2023.*

At the request of the Hamilton District Office of the Ontario Ministry of the Environment, Conservation and Parks, the Technical Support Section of West Central Region (WCR) conducted an odour and air quality monitoring assessment of the Green for Life (GFL) Environmental Stoney Creek Regional Facility (the Facility) in Stoney Creek, Ontario on September 1, 14, 15, 22, 28 and 29, 2023.

Complaints had been received from nearby locations regarding odour impacts on their properties. The purpose of the monitoring survey was to address complaints and identify any potential air quality impacts from the Facility at nearby residences. The Technical Support Section (TSS) was on-site on September 1, 14, 15, 22, 28 and 29, 2023. The results collected during these sampling days are presented in this memo.

### **Summary of Activities**

The Technical Support Section deployed their mobile air monitoring vehicle equipped with a portable Gas Chromatograph/Mass Spectrometer (GC/MS) unit for the measurement of volatile organic compounds (VOCs), the HAPSITE ER Chemical Identification System (HAPSITE). The HAPSITE is a discrete sampling system that draws a known volume of air (250 mL) into the GC/MS over two minutes, followed by analysis for approximately ten minutes. Once the analysis is complete, another discrete sample is taken. The HAPSITE was calibrated to identify and quantify the following VOCs:

- Benzene
- Trichloroethylene
- Toluene
- Tetrachloroethylene

- Chlorobenzene
- Ethylbenzene
- Styrene
- 1,2,4-trimethylbenzene
- Naphthalene

As the concentrations measured by the HAPSITE are based on samples collected over a two-minute period, the results are not directly comparable to air standards with longer averaging times. However, these measurements can be used for reference purposes to gain an understanding of the range of concentrations being measured compared to various air standards and benchmarks.

Other compounds that were measured during the air monitoring surveys in September include nitrogen oxides (NO<sub>x</sub>), including nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>), total reduced sulphur compounds (TRS) and sulphur dioxide (SO<sub>2</sub>) which are measured continuously with individual analyzers. Due to the power capabilities of the air monitoring vehicle, and the length of time of each air monitoring event, it was not possible to monitor for all contaminants on every occasion. Based on previous observations of elevated contaminant concentrations and likely contaminants of interest, priority was given to TRS and SO<sub>2</sub> measurements. While TRS compounds can include dimethyl disulphide, dimethyl sulphide, hydrogen sulphide and mercaptans, for the purpose of conversion from ppb to µg/m<sup>3</sup> it was assumed that TRS was composed entirely of hydrogen sulphide to allow for comparison to the applicable TRS air standards, which are expressed in µg/m<sup>3</sup>.

The Technical Support Section used a St. Croix Sensory Nasal Ranger (Nasal Ranger) for the measurement and quantification of odour strength in ambient air. The Nasal Ranger measures and quantifies odour strength via the "Dilution-to-Threshold" (D/T) ratio in ambient air. All odour measurements were reported in D/T, which is a measure of the number of dilutions needed to make the odorous ambient air "not detectable". The operator records the D/T ratio from the Nasal Ranger and described the odour at each sampling location. The D/T ratios used by the Nasal Ranger are as follows ranging from least odorous to most odorous: No odour, <2, 2, 4, 7, 15, 30 and >60. Results are presented in ranges.

The method for odour measurement with the Nasal Ranger involves starting with highest dilution setting and noting if an odour is detected using the Nasal Ranger. If no odour is detected, then successive dilutions are performed at progressively lower dilution settings until an odour is detected. If the lowest dilution setting is reached and an odour is still not detected with the Nasal Ranger, then a dilution ratio of <2 is recorded which means an odour was detected by the operator without equipment but was not quantifiable by the Nasal Ranger.

Staff were trained before the start of the odour assessment. The pre-calibration involves determining an individual's olfactory sensitivity by using several odour pens, which contain different amounts of a standard odorant, n-butanol. The combination of standard presentation methods and statistical analysis makes this test a reliable method of measuring individual olfactory sensitivity. Individuals who have a hypersensitive odour threshold or conversely individuals who have an underwhelming odour threshold would not qualify to use the Nasal Ranger with accuracy.

Data from the on-site meteorological tower STN29247 was used to determine wind data.



The GFL Facility and surrounding area are shown in Figure 1.

### **Survey Results**

Odour measurements and wind roses generated from station STN29247 for each of the sampling days are shown in Figures 2-7. Figures 8-11 plot the running 10-minute TRS average concentration time series. A summary of 10-minute TRS exceedance locations is shown in Figure 12. In the summary below, only compounds with significant concentrations are reported.

#### **September 1, 2023 (9:50 – 12:33)**

##### *VOC Measurements*

Toluene, ethylbenzene and 1,3-dimethylbenzene were detected at 10:55. All three VOCs were well below their respective O. Reg. 419/05 Guidelines. A summary of measured concentrations is provided in Table 1 below.

##### *TRS Measurements*

Other compounds were not detected except for Total Reduced Sulphur (TRS) which measured a maximum 10-minute concentration of  $4.9 \mu\text{g}/\text{m}^3$  which is below the 10-minute odour-based O. Reg. 419/05 Standard of  $13 \mu\text{g}/\text{m}^3$ . A summary of measured concentrations is provided in Table 1 below.

##### *Odour Survey*

Raw sulphur, rotten egg, leachate, herb and garbage odours were also detected throughout the sampling period. The odour levels could not be quantified using the nasal ranger ( $D/T < 2$ ). Odours were detected north of the leachate pond when winds were blowing from the southwest and southeast where the leachate pond and the GFL facility were upwind and likely sources.

Figure 2 summarizes the odour survey for this day.

**Table 1: Summary of Measurements on Sept 1, 2023**

Contaminant	Sample @10:55	Limit or Benchmark	Emergency Screening Value (ESV) Thresholds		
			1-hr ESV	8-hr ESV	Odour Threshold
	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$
Toluene	27.68	2000 (24-hr Odour) <sup>B</sup>	793090	396545	7336
Ethylbenzene	11.52	1900 (10-min Odour) <sup>B</sup>	150781	75391	2239
1,3-dimethylbenzene (m-Xylene)	10.97	3000 (10-min Odour) <sup>B</sup>	130000	65000	350
Total Reduced Sulphur <sup>A</sup>	4.9	13 (10-min Odour) <sup>C</sup>	---	---	---

**Notes:**

A - Maximum running 10-minute concentration between 9:50-12:33. Conversion of TRS from ppb to  $\mu\text{g}/\text{m}^3$  assumed TRS was composed entirely of hydrogen sulphide

B – Guideline value when section 19 or 20 applies under O. Reg 419/05 – Air Pollution – Local Air Quality  
The concentrations measured are over a two-minute period and are therefore not directly comparable to standards with longer averaging periods. However, they can be compared for reference purposes to gain an understanding of the range of concentrations being measured compared to these guidelines.

C – O. Reg. 419/05 10-minute TRS Standard

**September 14, 2023 (19:00) to September 15, 2023 (00:30)**

*VOC Measurements*

No VOCs were detected in this period.

*TRS Measurements*

A maximum 10-minute TRS concentration of  $55.6 \mu\text{g}/\text{m}^3$  was measured on September 15, 2023, from 00:17 to 00:27 which exceeds the 10-minute TRS O. Reg. 419/05 Standard of  $13 \mu\text{g}/\text{m}^3$ . The maximum measured concentration occurred approximately 275m from the nearest residence. A total of four (4) exceedances of the TRS 10-minute O. Reg. 419/05 Standard were measured over this 5.5-hour period. Exceedances were generally measured northeast of the GFL facility, including residential areas. Winds were blowing from the west to southwest where the GFL facility was upwind and a potential source of odours. A summary of measured TRS exceedances is shown in Table 8. Figure 8 plots the running 10-minute TRS average concentration time series.

*Odour Survey*

**Table 2: Odour Survey Sept 14 – Sept 15, 2023**

Date	Time	Odour Observations	D/T Ratio	General Comments
14-Sep-23	19:19	Yes	2 - 4	Masking agent - Febreeze, sweet smell
	19:55	No	-	No odour detected
to	20:15	No	-	No odour detected
	20:30	Yes	2 - 4	Rotten Eggs, Sulphur odour
15-Sep-23	20:52	Yes	2 - 4	Masking agent - Febreeze, sweet smell

Date	Time	Odour Observations	D/T Ratio	General Comments
	21:18	No	-	No odour detected
	21:45	No	-	No odour detected
	22:00	No	-	No odour detected
	22:20	No	-	No odour detected
	23:16	No	-	No odour detected
	23:45	No	-	No odour detected
	00:00	Yes	4 - 7	Rotten Eggs, Sulphur odour
	00:17	Yes	4 - 7	Rotten Eggs, Sulphur odour

Winds were blowing from the west to southwest where the GFL facility and leachate pond was upwind and a potential odour source. The odour survey is summarized in Figure 3.

**September 15, 2023 (04:45 - 09:57)**

*VOC Measurements*

No VOCs were detected in this period.

*TRS Measurements*

A maximum 10-minute TRS concentration of 39.5 µg/m<sup>3</sup> was measured on September 15, 2023, from 05:12 to 05:22, in a residential area, which exceeds the 10-minute TRS O. Reg. 419/05 Standard of 13 µg/m<sup>3</sup>. A total of twelve (12) exceedances of the TRS 10-minute O. Reg. 419/05 Standard were measured over this 5-hour period. Exceedances were measured at many locations surrounding the GFL facility, including residential areas. It is possible the relatively low wind speeds resulted in temporary stagnant conditions resulting in the inability for contaminants to disperse. A summary of measured TRS exceedances is shown in Table 8. Figure 8 plots the rolling 10-minute TRS average concentration time series.

*Odour Survey*

**Table 3: Odour Survey Sept 15, 2023**

Date	Time	Odour observations	D/T Ratio	General Comments
15-Sep-23	4:50	Yes	4 - 7	Strong Odour - Leachate - Rotten Eggs - Very low wind speeds (Calm)
	5:12	Yes	2 - 4	Odour - Leachate - Rotten Eggs
	5:30	Yes	2	Odour - Leachate - Rotten Eggs
	5:49	Yes	2 - 4	Odour - Leachate
	6:04	Yes	2 - 4	Odour - Leachate - Rotten Eggs
	6:27	Yes	<2	Odour - Leachate
	6:43	Yes	<2	Odour - Leachate
	7:06	Yes	<2	Whiffs - very faint leachate
	7:22*	Yes	4 - 7	Odour - Leachate - Rotten Eggs - sweet
	7:24	Yes	<2	Odour - Leachate

Date	Time	Odour observations	D/T Ratio	General Comments
	7:30	Yes	<2	Odour - Leachate
	7:56	Yes	4 - 7	Odour - Leachate + Deodorizer Smell is Sweet / Mouthwash / Fluoride - As Deodorizer Fan System Rotates the intensity of each smell changes
	8:13	Yes	2 - 4	Odour - Leachate + Deodorizer Smell is Sweet / Mouthwash / Fluoride
	8:38	No	-	No odour detected
	8:55	No	-	No odour detected
	9:20	No	-	No odour detected
	9:44	No	-	No odour detected

Winds were relatively calm during this period. Winds were generally blowing from the northwest where the GFL facility was upwind of a few locations and was the likely source. However, a few locations were upwind of the GFL facility. It is possible the relatively low wind speeds resulted in temporary stagnant conditions resulting in the inability for odours to disperse. The odour survey is summarized in Figure 4.

**September 22, 2023 (0:00 – 05:16)**

*VOC Measurements*

No VOCs were detected in this period.

*TRS Measurements*

A combination of mobile and stationary TRS concentrations were measured in this sampling period. Their results are presented here separately. Figure 9 plots the rolling 10-minute TRS average concentration time series (combination of stationary and mobile measurements). A summary of measured TRS exceedances is shown in Table 8.

- *Stationary TRS Measurements*
  - Stationary TRS concentrations consist of 1-minute TRS measurements when the monitoring van was parked (the same approach used for other sampling days) and can be compared directly to the O. Reg. 419/05 Standard.
  - A maximum 10-min TRS concentration of 266.5 µg/m<sup>3</sup> was measured on September 22, 2023, from 04:40 to 04:50 which exceeds the 10-minute TRS O. Reg. 419/05 Standard of 13 µg/m<sup>3</sup>. A total four (4) exceedances of the TRS 10-minute O. Reg. 419/05 Standard were measured. These exceedances were measured on First Road W, immediately adjacent to the western boundary of the GFL facility and approximately 500m from the nearest residence. Relatively low wind speeds likely resulted in temporary stagnant conditions resulting in the inability for contaminants to disperse.
- *Mobile TRS Measurements*

- Mobile TRS concentrations consist of 1-minute TRS measurements while the monitoring van was in motion. Mobile TRS concentrations cannot be compared directly to the O. Reg. 419/05 Standard but are included for context to highlight areas where elevated concentrations were measured.
- A maximum 10-minute TRS concentration of 108 µg/m<sup>3</sup> was measured on September 22, 2023 from 04:54 to 05:02 which is greater than 13 µg/m<sup>3</sup> (8 continuous minutes is sufficient data recovery for a 10-min period). A total of six (6) TRS 10-minute concentrations were above 13 µg/m<sup>3</sup>. Elevated concentrations were measured all around the GFL facility including residential areas. Relatively low wind speeds likely resulted in temporary stagnant conditions resulting in the inability for contaminants to disperse.

*Odour Survey*

**Table 4: Odour Survey Sept 22, 2023**

Date	Time	Odours observations	D/T Ratio	General Comments
22-Sep-23	0:10	No	-	Complainant House #1
	0:20	Yes	<2	Complainant House #2 - Sour smell
	0:30	Yes	4 - 7	Inside GFL Facility - Reference only - Rotten eggs
	0:40	Yes	4 - 7	Inside GFL Facility - Reference only - Rotten eggs
	0:55	Yes	4 - 7	Inside GFL Facility - Reference only - Rotten eggs
	1:28	Yes	<2	GFL mist machine - deodorizer/ sweet
	1:43	No	-	Complainant House #3
	1:54	No	-	Complainant House #4
	2:06	No	-	Complainant House #5
	2:13	No	-	Complainant House #6
	2:30	No	-	Complainant House #7
	2:52	Yes	<2	GFL mist machine - deodorizer/ sweet
	3:15	Yes	<2	Sour smell
	3:32	Yes	2 - 4	Sour smell
	4:08	Yes	<2	Sour smell
	4:25	Yes	2 - 4	Leachate/ waste
	4:43	Yes	4 - 7	Rotten Eggs
4:51	Yes	7 - 15	Rotten Eggs	
4:58	Yes	2 - 4	Rotten Eggs	

Winds were calm during this period. It is possible the relatively low wind speeds resulted in temporary stagnant conditions resulting in the inability for odours to disperse. The odour survey is summarized in Figure 5.

**September 28, 2023 (10:30 – 14:30)**

*VOC Measurements*

No VOCs were detected in this period.

*TRS Measurements*

A maximum 10-minute TRS concentration of 17.2 µg/m<sup>3</sup> was measured on September 28, 2023 from 13:58 - 14:08, which exceeds the 10-minute TRS O. Reg. 419/05 Standard of 13 µg/m<sup>3</sup>. The maximum was measured approximately 250m from the nearest residence. A total of two (2) exceedances of the TRS 10-minute O. Reg. 419/05 Standard were measured over this six-hour period. Both exceedances were measured southwest of the leachate pond which is a potential source of odours. Relatively low wind speeds likely resulted in temporary stagnant conditions resulting in the inability for contaminants to disperse. A summary of measured TRS exceedances is shown in Table 8. Figure 10 plots the rolling 10-minute TRS average concentration time series.

*Odour Survey*

**Table 5: Odour Survey Sept 28, 2023**

Date	Time	Odour observations	D/T Ratio	General Comments
28-Sep-23	10:30	No	-	No odour detected
	10:45	No	-	No odour detected
	11:00	No	-	No odour detected
	11:05	No	-	No odour detected
	11:20	No	-	No odour detected
	11:45	No	-	No odour detected
	12:15	No	-	No odour detected
	12:35	No	-	No odour detected
	12:55	No	-	No odour detected
	13:00	No	-	No odour detected
	13:15	No	-	No odour detected
	13:30	No	-	No odour detected
	13:45	Yes	7 - 15	Perfume/ landfill gas
14:05	Yes	7 - 15	Perfume/ landfill gas	

Winds were calm during this period. It is possible the relatively low wind speeds resulted in temporary stagnant conditions resulting in the inability for odours to disperse. The odour survey is summarized in Figure 6.

**September 29, 2023 (04:00 – 9:15)**

*VOC Measurements*

No VOCs were detected in this period.

*TRS Measurements*

A maximum 10-minute TRS concentration of 42.5 µg/m<sup>3</sup> was measured on September 29, 2023, from 06:22 – 06:32, which exceeds the 10-minute TRS O. Reg. 419/05 Standard of 13 µg/m<sup>3</sup>. This measured exceedance occurred approximately 100m from the nearest residence. A total of seven (7) exceedances of the TRS 10-minute O. Reg. 419/05 Standard were measured over this approximately 5-hour period. Exceedances were measured southwest of the leachate pond and southeast of the GFL facility which are both potential sources. Further, relatively low wind speeds likely resulted in temporary stagnant conditions resulting in the inability for contaminants to disperse away. A summary of measured TRS exceedances is shown in Table 8. Figure 11 plots the running 10-minute TRS average concentration time series.

*Odour Survey*

**Table 7: Odour Survey Sept 29, 2023**

Date	Time	Odour observations	D/T Ratio	General Comments
29-Sep-23	4:00	No	-	No odour detected
	4:23	Yes	<2	Deodorizer + Leachate
	4:39	No	-	No odour detected
	5:05	Yes	<2	Leachate
	5:22	Yes	<2	Leachate
	5:37	Yes	2 - 4	Leachate, Sour, Garbage
	5:54	Yes	<2	Leachate, Burnt
	6:12	Yes	<2	Leachate, Deodorizer
	6:27	Yes	4 - 7	Leachate, Deodorizer, Burnt, Rotten Eggs
	6:44	Yes	<2	Leachate, Deodorizer, Burnt
	7:20	No	-	No odour detected
	7:37	Yes	<2	Faint Leachate
	7:59	Yes	<2	Leachate, Deodorizer
	8:15	Yes	2 - 4	Leachate, Deodorizer, Rotten Eggs
	8:45	Yes	<2	Solvent, Burnt, Chemical
9:06	Yes	<2	Solvent, Burnt, Chemical	

Winds were calm during this period. It is possible the relatively low wind speeds resulted in temporary stagnant conditions resulting in the inability for odours to disperse. The odour survey is summarized in Figure 7.

Table 8 summarizes the 10-minute TRS measured concentrations that exceeded the O. Reg. 419/05 Standard in September 2023. The locations of these exceedances are also displayed in Figure 12.

**Table 8: Summary of 10-minute TRS Exceedances – September 2023**

Date	Time (Time Ending)	10-minute Average Measured TRS Concentrations Exceeding the 10-min O. Reg. 419/05 Standard ( $\mu\text{g}/\text{m}^3$ ) *
14-Sep-23 – 15-Sep-23	20:45	13.6
	23:59	26.6
	00:09	24.5
	00:27	55.6
15-Sep-23	05:02	30.6
	05:12	38.9
	05:22	39.5
	05:32	30.5
	05:42	20.2
	06:00	35.8
	06:10	35.5
	06:20	13.8
	06:48	21.4
	06:58	17.2
	07:21	39.1
07:31	36.7	
22-Sep-23	04:17	75.3
	04:27	82.7
	04:40	172.3
	04:50	<b>266.5 **</b>
28-Sep-23	14:08	17.2
	14:18	14.2
29-Sep-23	05:39	18.6
	05:49	15.3
	06:32	42.5
	06:42	41.2
	06:52	18.7
	08:14	23.7
08:24	14.3	

\* 10-minute TRS O. Reg. 419/05 Standard =  $13 \mu\text{g}/\text{m}^3$ 

\*\* Maximum 10-minute average TRS concentration



## **Conclusion**

The WCR Technical Support Section completed an air monitoring assessment in the vicinity of the GFL Stoney Creek Regional Facility on September 1, 14, 15, 22, 28 and 29, 2023. Odours were identified each day and were described as raw sulphur, leachate, herb, garbage, solvent, chemical, burnt, rotten eggs and odour masking agents (Febreeze, sweet, mouthwash, fluoride, perfume). The Nasal Ranger identified dilution ratios as high as D/T < 15. Over the course of all sampling days, the survey suggests that the leachate pond and the GFL facility are likely sources of odours.

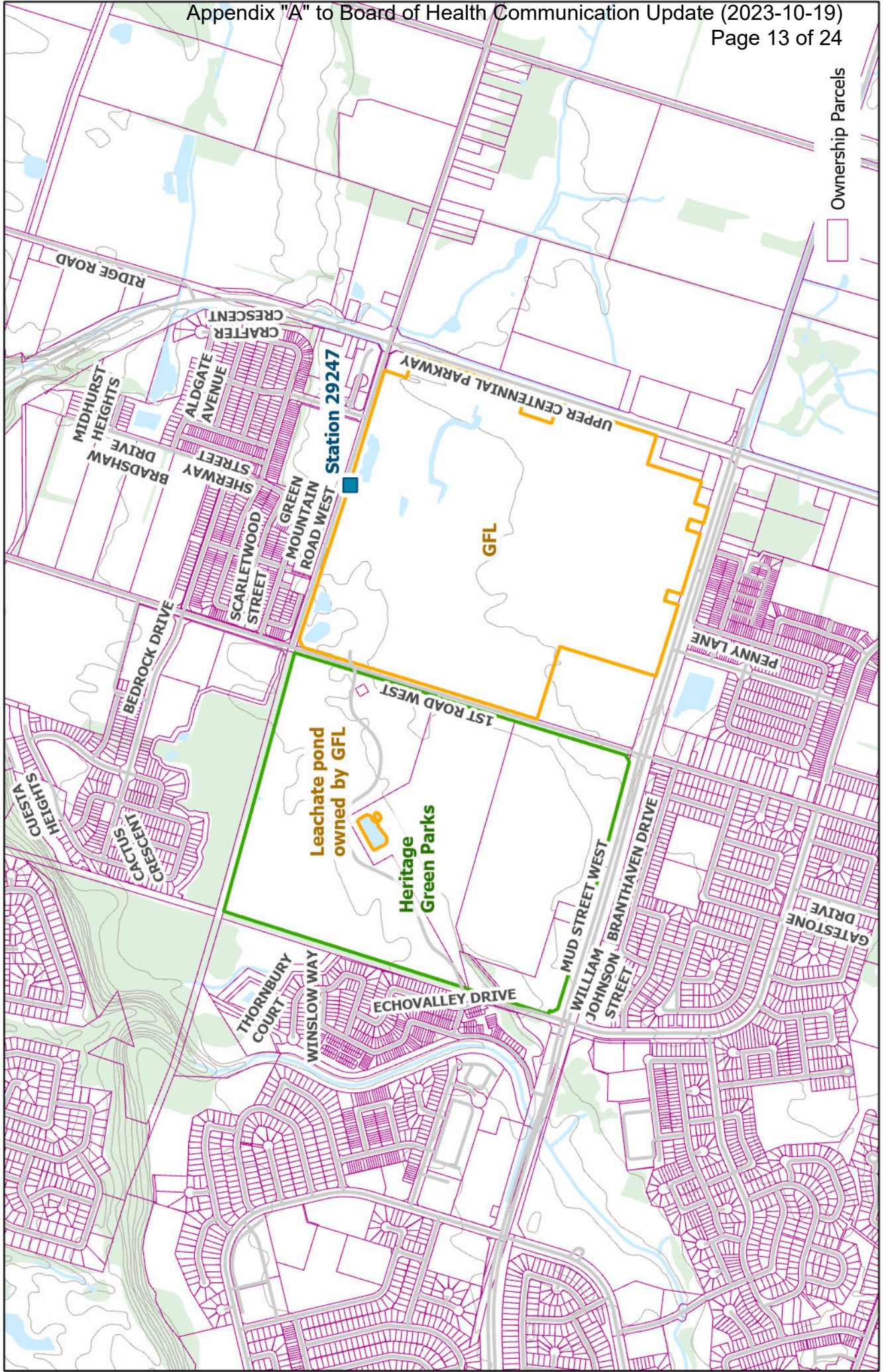
Toluene, ethylbenzene and 1,3-dimethylbenzene were detected at 10:55 on September 1, 2023. Although not directly comparable to criteria due to differing averaging periods, these compounds were well below their respective O. Reg. 419/05 Guidelines.

The maximum 10-minute TRS concentration of 266.5 µg/m<sup>3</sup> was measured on September 22, 2023 from 04:40 to 04:50, which was above the TRS 10-minute odour-based O. Reg. 419/05 Standard of 13 µg/m<sup>3</sup>. The maximum measured concentration occurred along the GFL western property line approximately 500m from the nearest residence. A total of twenty-nine (29) 10-minute TRS O. Reg. 419/05 Standard exceedances were measured over the following dates; September 14, 15, 22, 28 and 29, 2023. TRS exceedances were measured at many locations surrounding the GFL facility, including residential areas.

Measured 10-minute TRS exceedances have been widespread around the GFL facility including residential areas with the highest 10-minute TRS concentrations measured immediately west of the GFL facility. Considering the location of measured TRS exceedances, GFL operations and wind conditions during exceedances, the GFL facility and leachate pond are the most likely TRS source and cause of exceedances. Although 24-hour measurements were not collected during the ministry's air monitoring assessments, considering elevated 10-minute TRS concentrations were measured on some days, continuous TRS monitoring should be evaluated to ensure the 24-hour TRS O. Reg 419/05 Standard, based on health effects, is not being exceeded.

Considering the frequency, magnitude and widespread nature of 10-minute TRS exceedances measured during the select days that the monitoring vehicle collected measurements, it is likely that exceedances occurred at other times when air monitoring was not being done. Therefore, it would be reasonable to perform ongoing TRS monitoring in the general area around the GFL facility to gain a better understanding of TRS concentrations. Any continuous TRS monitoring plan should be developed in consultation with MECP and follow the guidance provided in MECP's *Operations Manual for Air Quality Monitoring in Ontario*.

## Figures

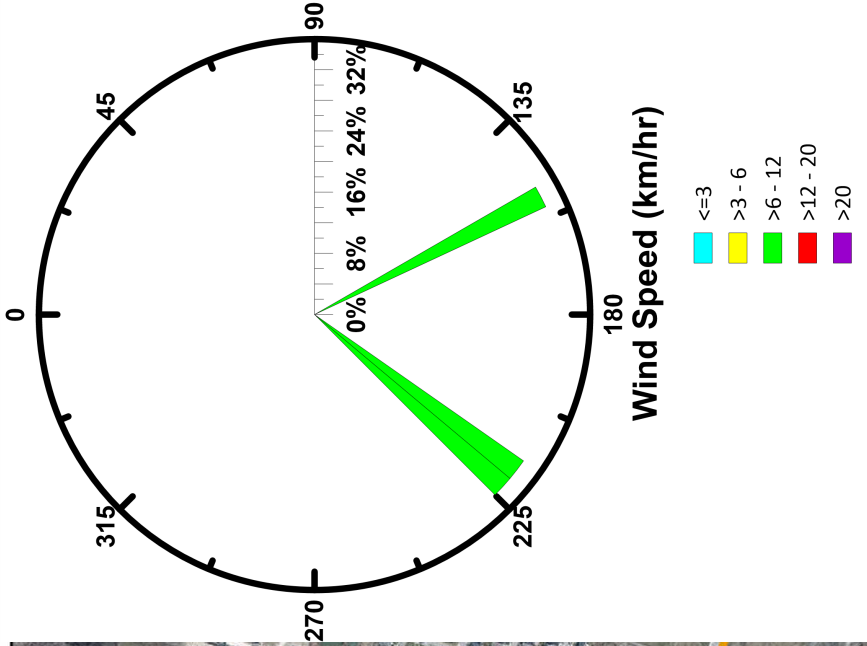
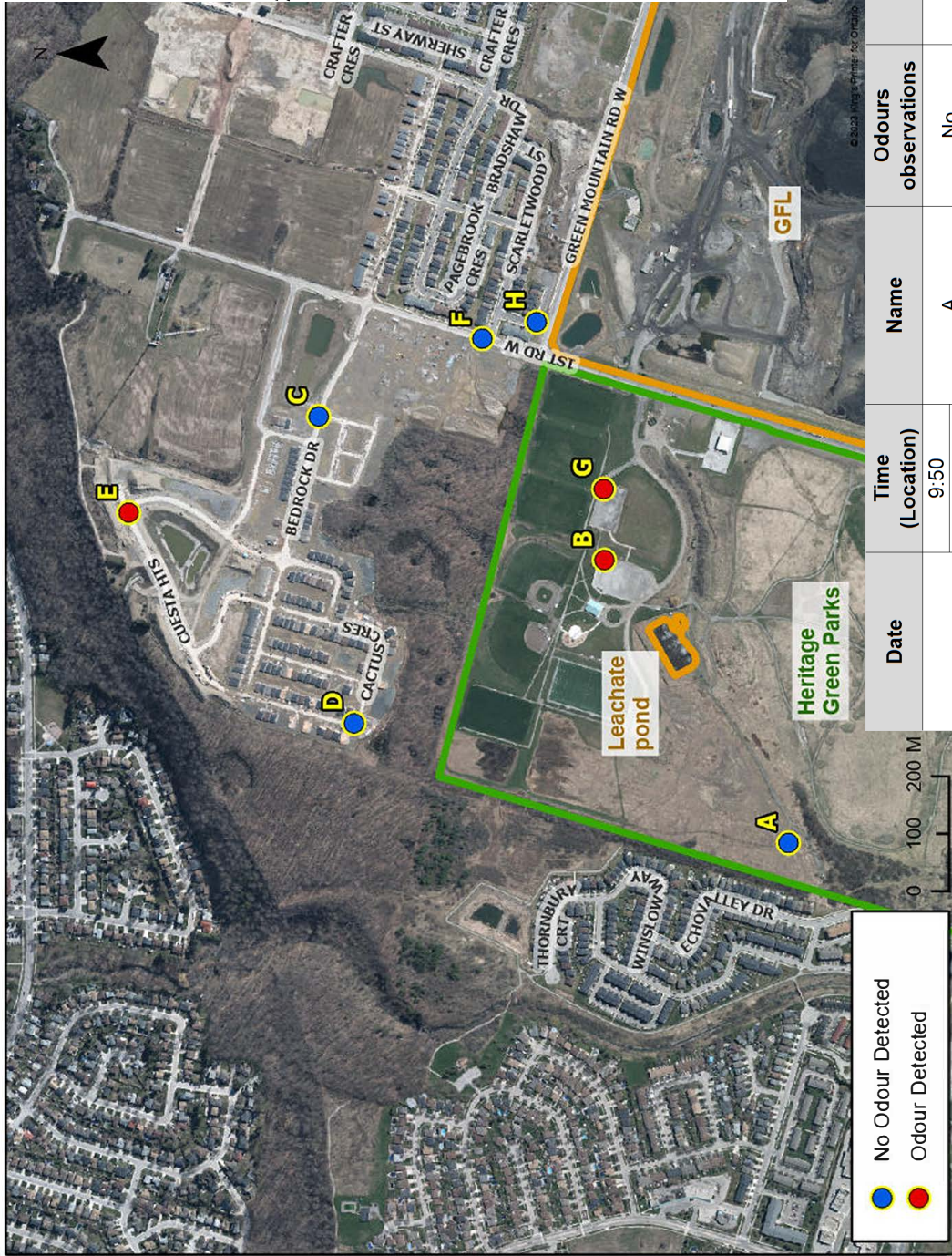


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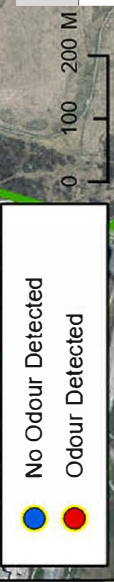
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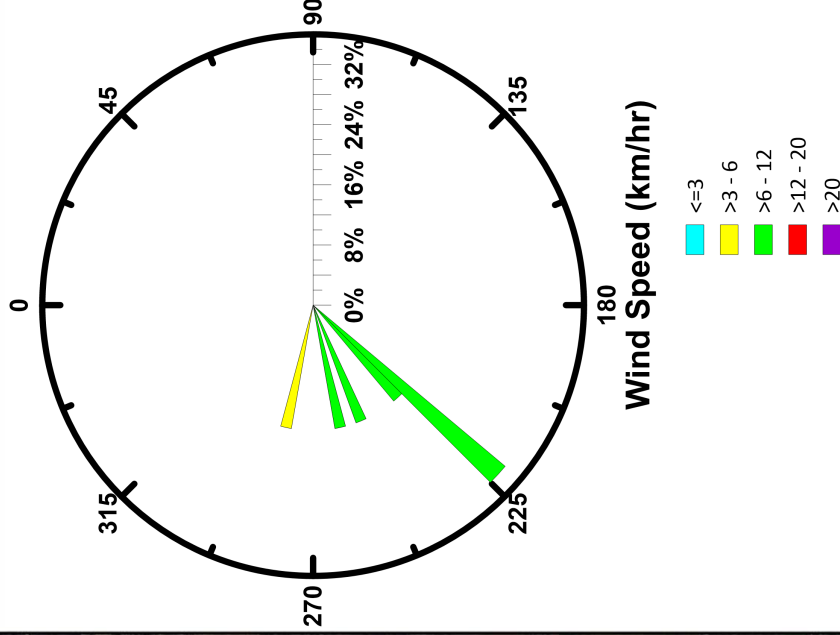
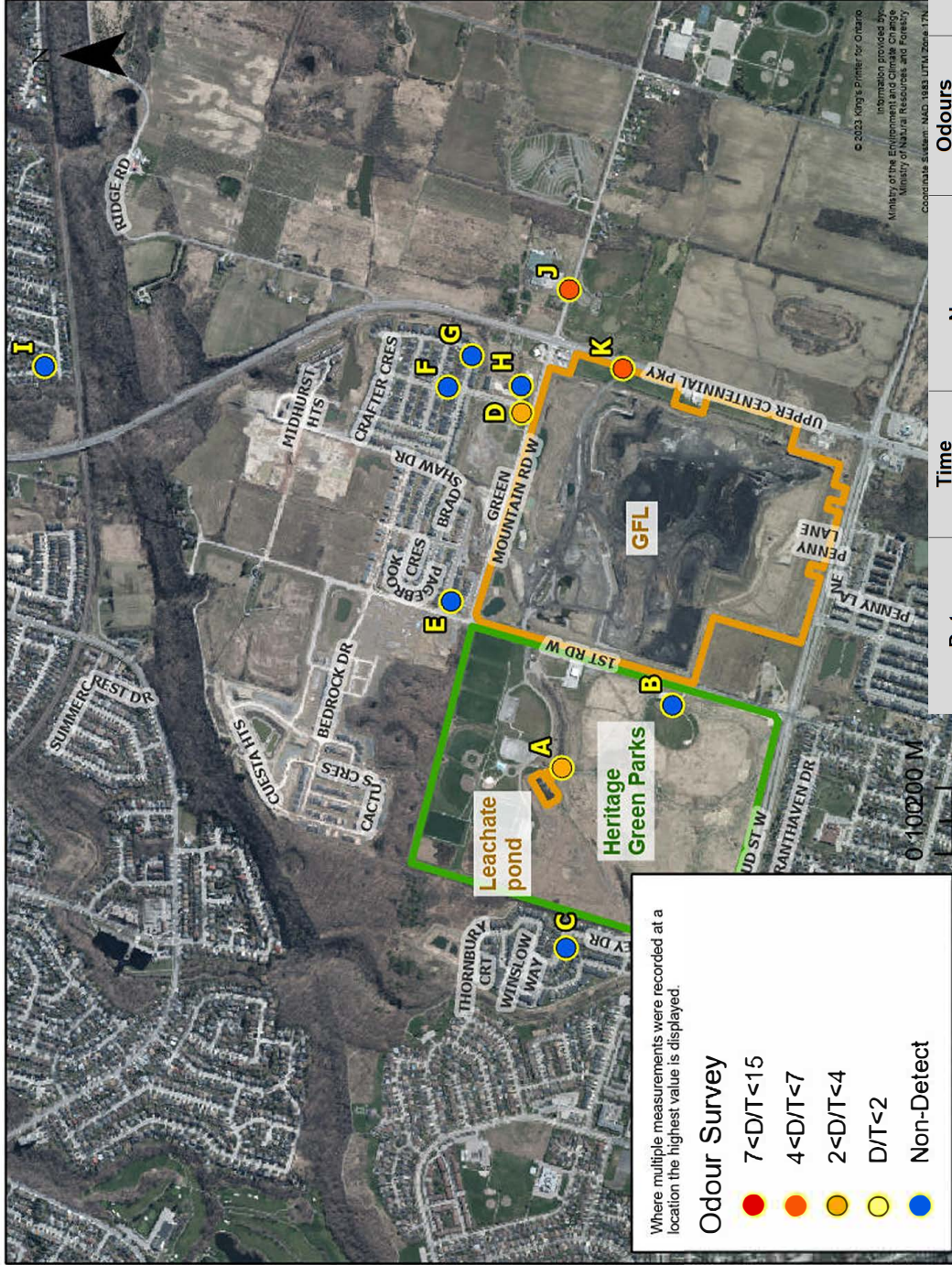
Coordinate System: NAD 1983 UTM Zone 17N  
Projection: Transverse Mercator  
Datum: North American 1983

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Date	Time (Location)	Name	Odours observations	D/T Ratio	General Comments
01-Sep-23	9:50	A	No	-	Non Detect Odour - Very Low wind Speeds
	10:06		No	-	No odour detected
	10:20		No	-	No odour detected
	10:39	B	Yes	D/T<2	Odour detected with nose only - Raw Sulfur, Rotten Egg, Leachate, Herb smell.
	10:55		No	D/T<2	Same odour as above. Odour seems stronger when wind gusts
	11:13	C	No	-	No odour detected
	11:28	D	No	-	No odour detected
	11:44	E	Yes	D/T<2	Garbage odour
	11:59	F	No	-	Non Detect Odour
	12:17	G	Yes	D/T<2	Odour detected with nose only - Raw Sulfur, Rotten Egg, Leachate, Herb Smell
	12:33	H	No	-	No odour detected





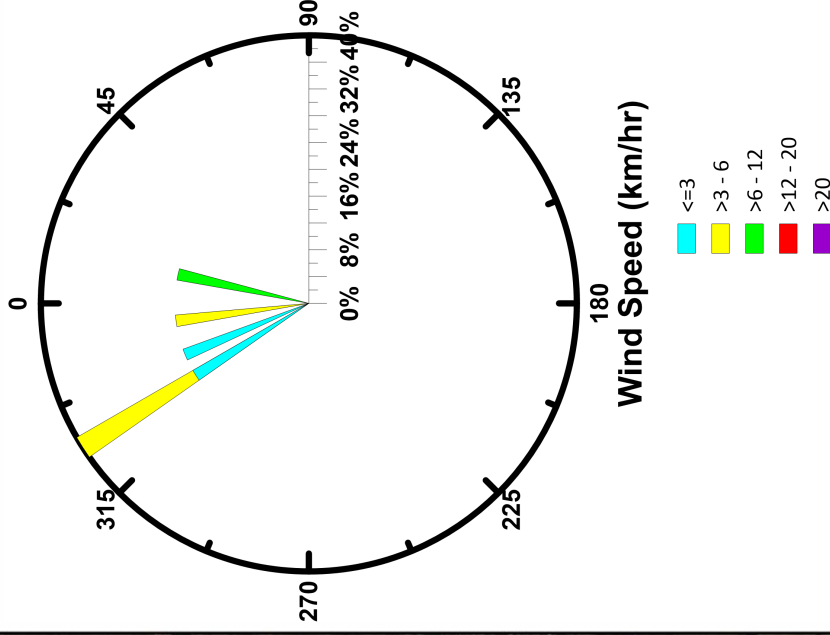
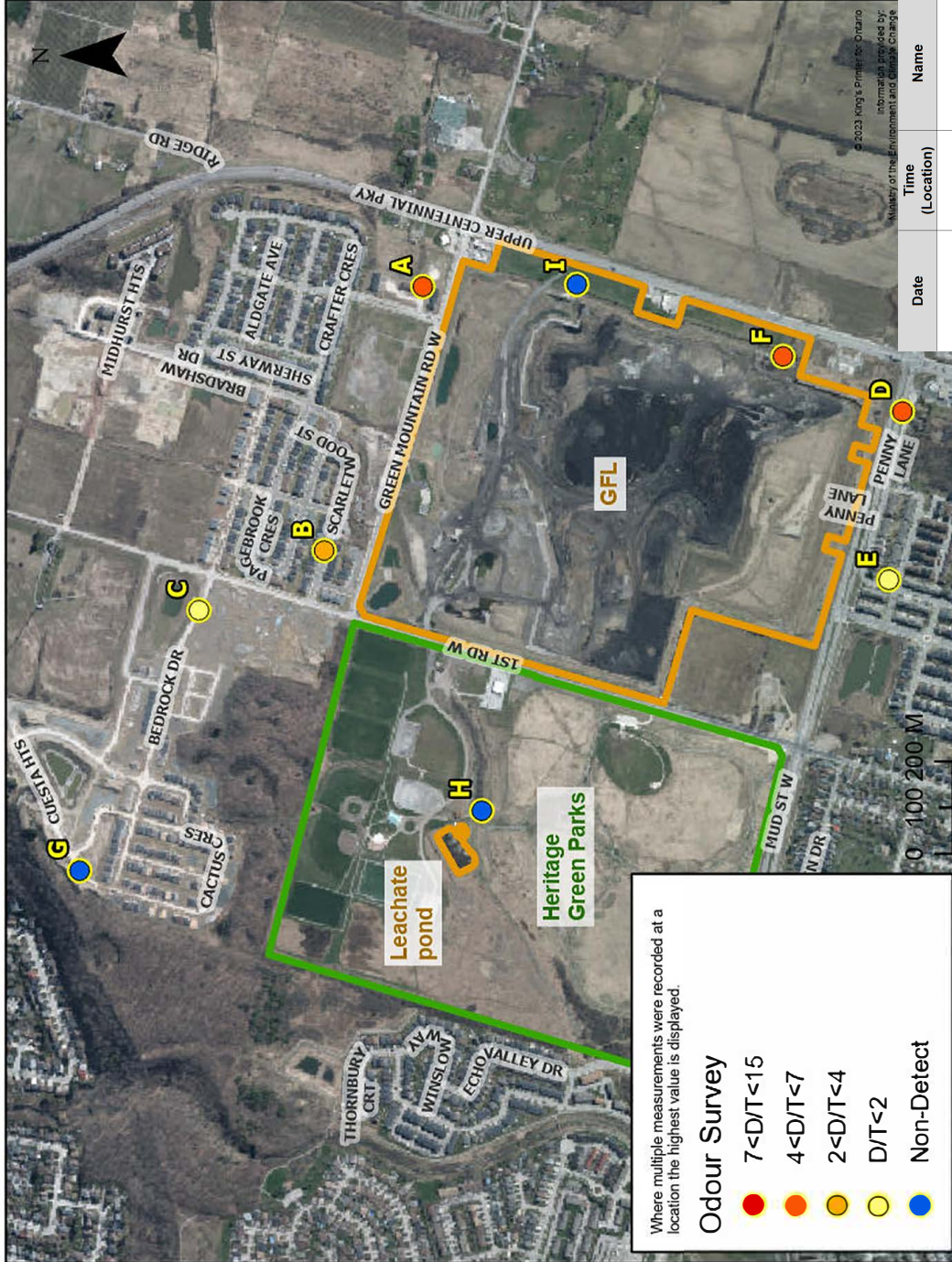
Date	Time (Location)	Name	Odours observations	D/T Ratio	General Comments
14-Sep-23	19:19	A	Yes	2<D/T<4	Masking agent - Febreeze, sweet smell
	19:55	B	No	-	No odour detected
	20:15	C	No	-	No odour detected
14-Sep-23	20:30	D	Yes	2<D/T<4	Rotten Eggs, H2S odour
	20:52	D	Yes	2<D/T<4	Masking agent - Febreeze, sweet smell
Overnight to	21:18	E	No	-	No odour detected
	21:45	F	No	-	No odour detected
15-Sep-23	22:00	G	No	-	No odour detected
	22:20	H	No	-	No odour detected
	23:16	I	No	-	No odour detected
	23:45	I	No	-	No odour detected
	00:00	J	Yes	4<D/T<7	Rotten Eggs, H2S odour
	00:17	K	Yes	4<D/T<7	Rotten Eggs, H2S odour

Where multiple measurements were recorded at a location the highest value is displayed.

**Odour Survey**

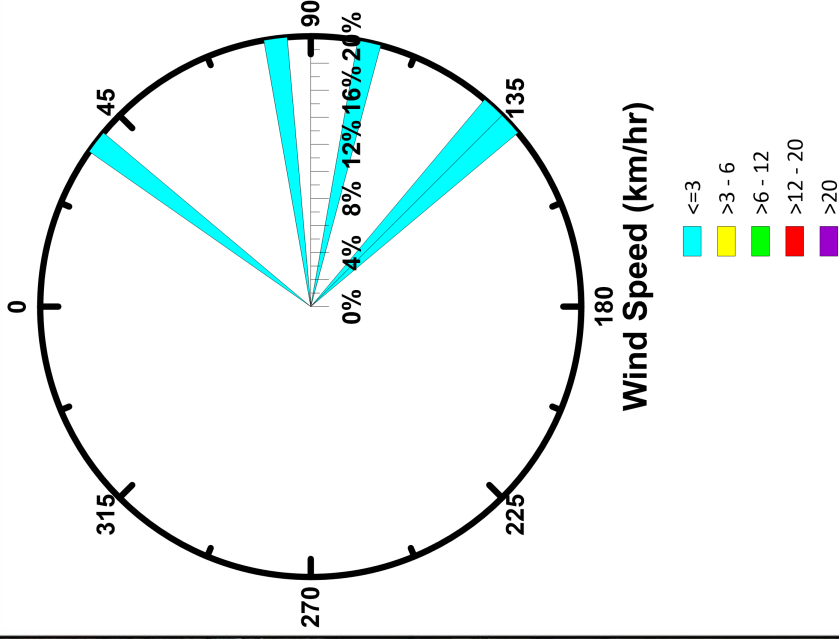
- 7<D/T<15
- 4<D/T<7
- 2<D/T<4
- D/T<2
- Non-Detect

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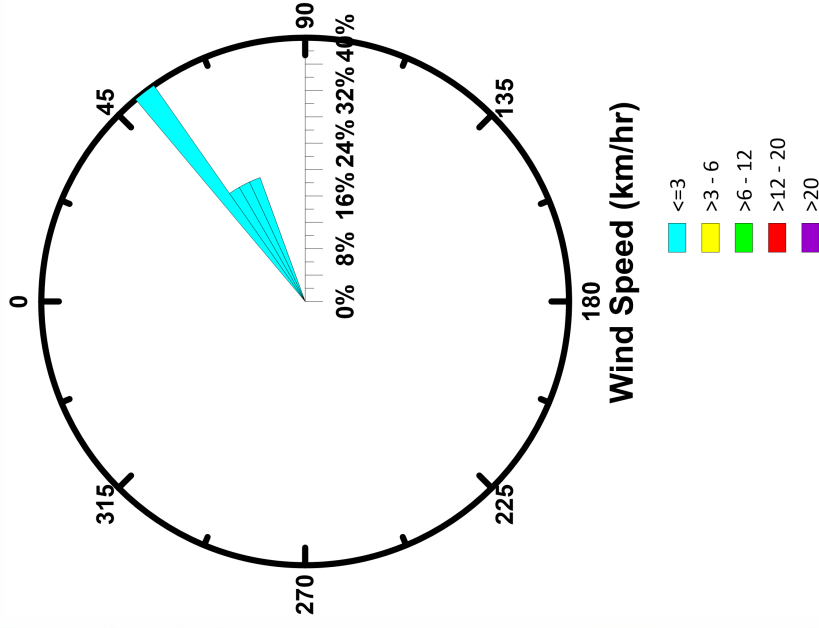
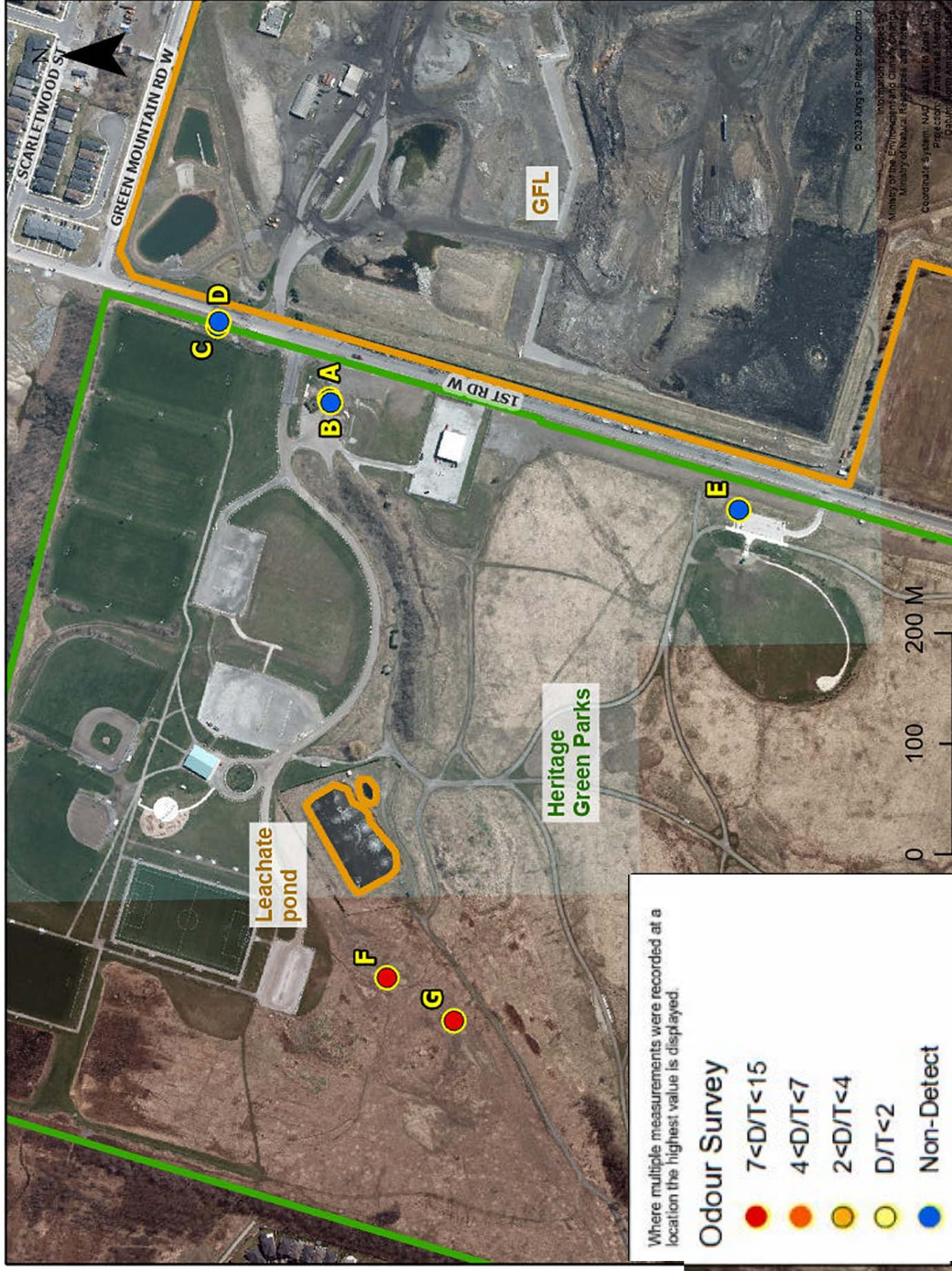
Due to equipment limitations, wind directions with wind speeds <math>< 3\text{km/hr}</math> are unreliable

Date	Time (Location)	Name	Odours observations	D/T Ratio	General Comments
15-Sep-23	4:50	A	Yes	4 <math>D/T < 7</math>	Strong Odour - Leachate - Rotten Eggs - Very low wind speeds (Calm)
	5:12		Yes	2 <math>D/T < 4</math>	Odour - Leachate - Rotten Eggs
	5:30	B	Yes	D/T < 2	Odour - Leachate - Rotten Eggs
	5:49		Yes	2 <math>D/T < 4</math>	Odour - Leachate
	6:04		Yes	2 <math>D/T < 4</math>	Odour - Leachate - Rotten Eggs
	6:27	C	Yes	D/T < 2	Odour - Leachate
	6:43		Yes	D/T < 2	Odour - Leachate
	7:06		Yes	D/T < 2	Whiffs - very faint leachate
	7:22*		Yes	4 <math>D/T < 7</math>	Odour - Leachate - Rotten Eggs - sweet
	7:24		Yes	D/T < 2	Odour - Leachate
	7:30	E	Yes	D/T < 2	Odour - Leachate
		F	Yes	4 <math>D/T < 7</math>	Odour - Leachate + Deodorizer Smell is Sweet / Mouthwash / Fluoride - As Deodorizer Fan System Rotates the intensity of each smell changes
		G	Yes	2 <math>D/T < 4</math>	Odour - Leachate + Deodorizer Smell is Sweet / Mouthwash / Fluoride
		H	No	-	No odour detected
		I	No	-	No odour detected
			No	-	No odour detected



Due to equipment limitations, wind directions with wind speeds <3km/hr are unreliable

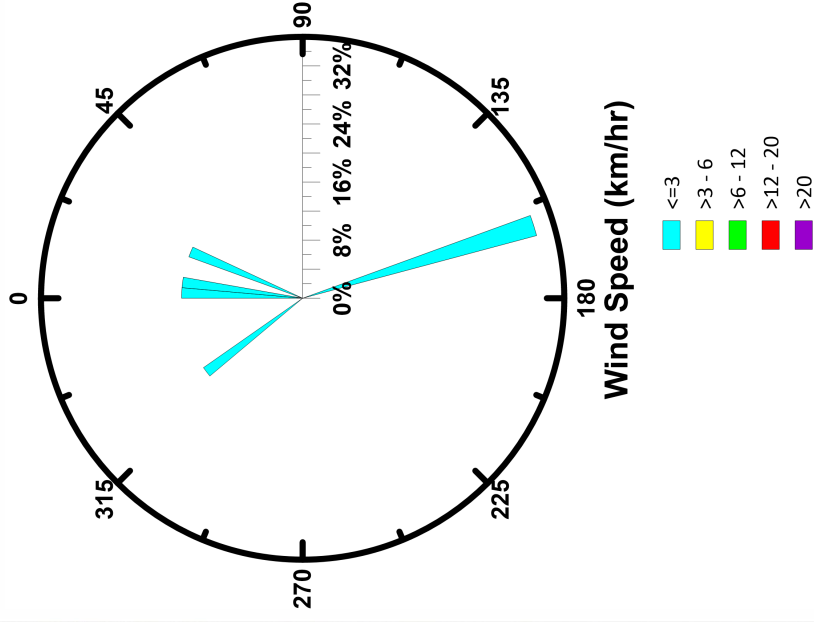
Date	Time (Location)	Name	Odours observations	D/T Ratio	General Comments
22-Sep-23	0:10	A	No	-	Complainant House #1
	0:20	B	Yes	D/T<2	Complainant House #2 - Sour smell
	0:30	C	Yes	4<D/T<7	Inside GFL Facility - Reference only - Rotten eggs
	0:40	D	Yes	4<D/T<7	Inside GFL Facility - Reference only - Rotten eggs
	0:55	E	Yes	4<D/T<7	Inside GFL Facility - Reference only - Rotten eggs
	1:28	F	Yes	D/T<2	GFL mist machine - deodorizer/ sweet
	1:43	G	No	-	Complainant House #3
	1:54	H	No	-	Complainant House #4
	2:06	I	No	-	Complainant House #5
	2:13	J	No	-	Complainant House #6
	2:30	K	No	-	Complainant House #7
	2:52	L	Yes	D/T<2	GFL mist machine - deodorizer/ sweet
	3:15	M	Yes	D/T<2	Sour smell
	3:32	N	Yes	2<D/T<4	Sour smell
	4:08	O	Yes	D/T<2	Sour smell
	4:25	P	Yes	2<D/T<4	Leachate/ waste
	4:43	Q	Yes	4<D/T<7	Rotten Eggs
	4:51	R	Yes	7<D/T<15	Rotten Eggs
	4:58	S	Yes	2<D/T<4	Rotten Eggs



Due to equipment limitations, wind directions with wind speeds <3km/hr are unreliable

Date	Time (Location)	Name	Odours observations	D/T Ratio	General Comments
28-Sep-23	10:30		No	-	No odour detected
	10:45	A	No	-	No odour detected
	11:00		No	-	No odour detected
	11:05		No	-	No odour detected
	11:20	B	No	-	No odour detected
	11:45		No	-	No odour detected
	12:15	C	No	-	No odour detected
	12:35		No	-	No odour detected
	12:55		No	-	No odour detected
	13:00		No	-	No odour detected
	13:15		No	-	No odour detected
	13:30		No	-	No odour detected
	13:45	F	Yes	7<D/T<15	Perfume/ landfill gas
	14:05	G	Yes	7<D/T<15	Perfume/ landfill gas

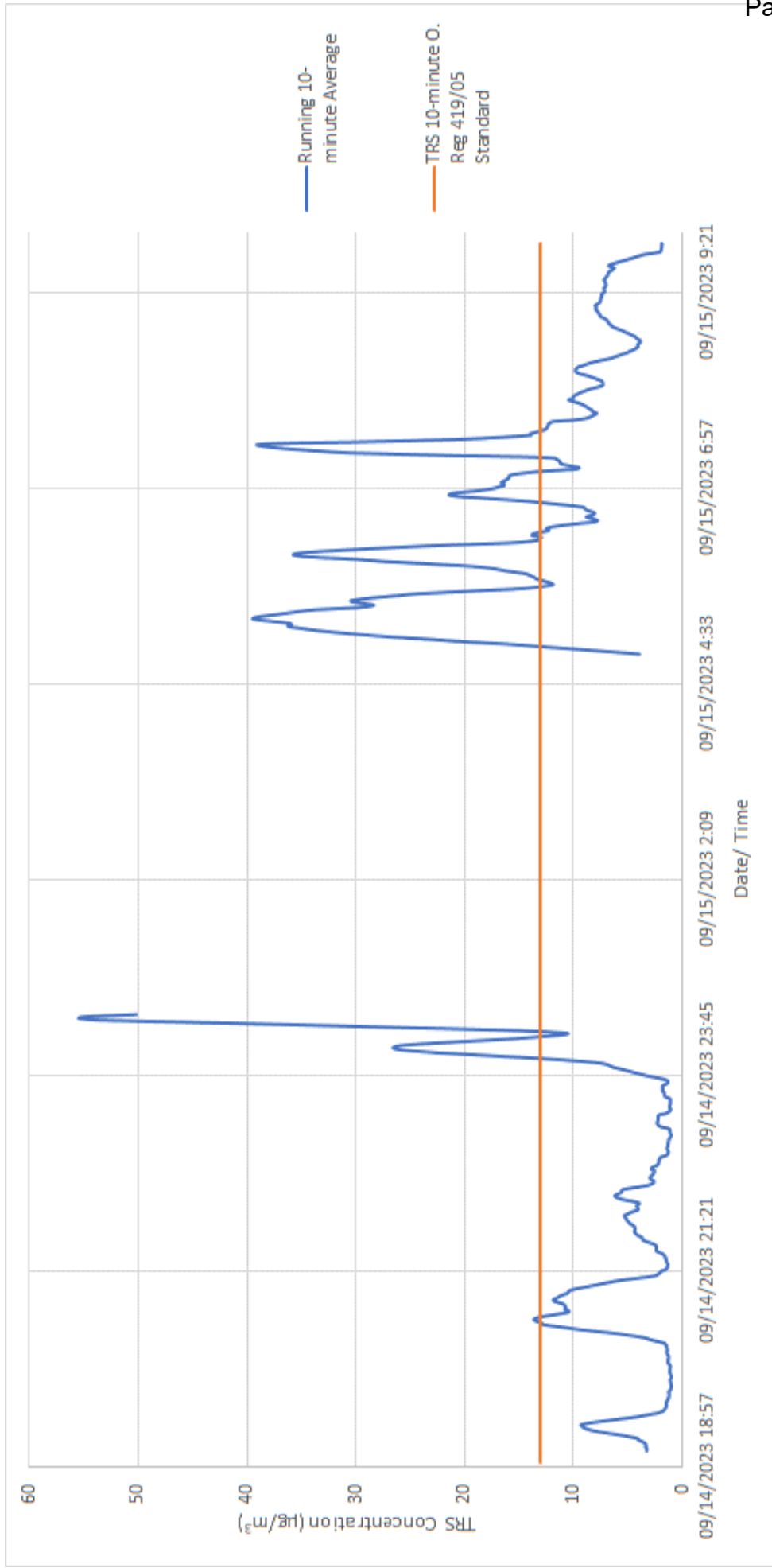




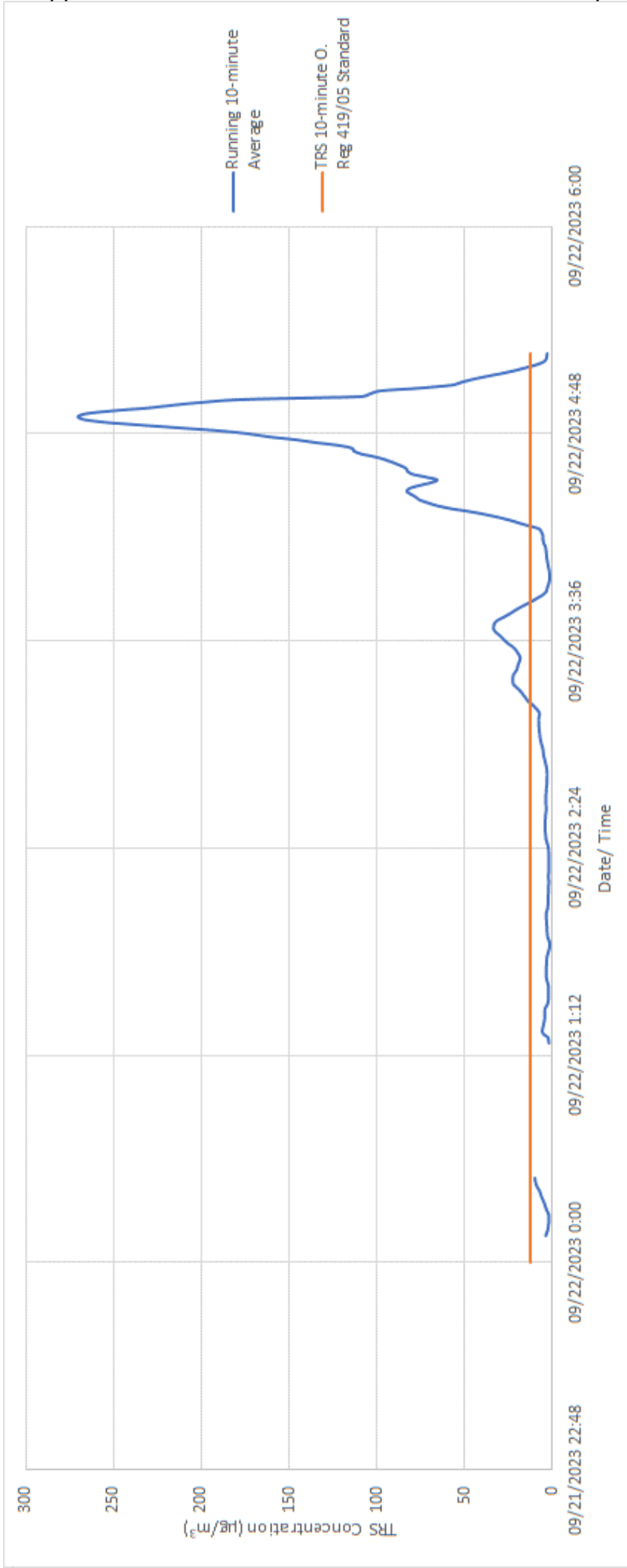
Due to equipment limitations, wind directions with wind speeds <3km/hr are unreliable

Date	Time (Location)	Name	Odours observations	D/T Ratio	General Comments
29-Sep-23	4:00	A	No	-	No odour detected
	4:23	B	Yes	<2	Deodorizer + Leachate
	4:39	B	No	-	No odour detected
	5:05	C	Yes	<2	Leachate
	5:22	C	Yes	<2	Leachate
	5:37	D	Yes	2<D/T<4	Leachate, Sour, Garbage
	5:54	E	Yes	<2	Leachate, Burnt
	6:12	E	Yes	<2	Leachate, Deodorizer
	6:27	F	Yes	4<D/T<7	Leachate, Deodorizer, Burnt, Rotten Eggs
	6:44	F	Yes	<2	Leachate, Deodorizer, Burnt
7:20	G	No	-	No odour detected	
7:37	H	Yes	<2	Faint Leachate	
7:59	I	Yes	<2	Leachate, Deodorizer	
8:15	I	Yes	2<D/T<4	Leachate, Deodorizer, Rotten Eggs	
8:45	J	Yes	<2	Solvent, Burnt, Chemical	
9:06	J	Yes	<2	Solvent, Burnt, Chemical	

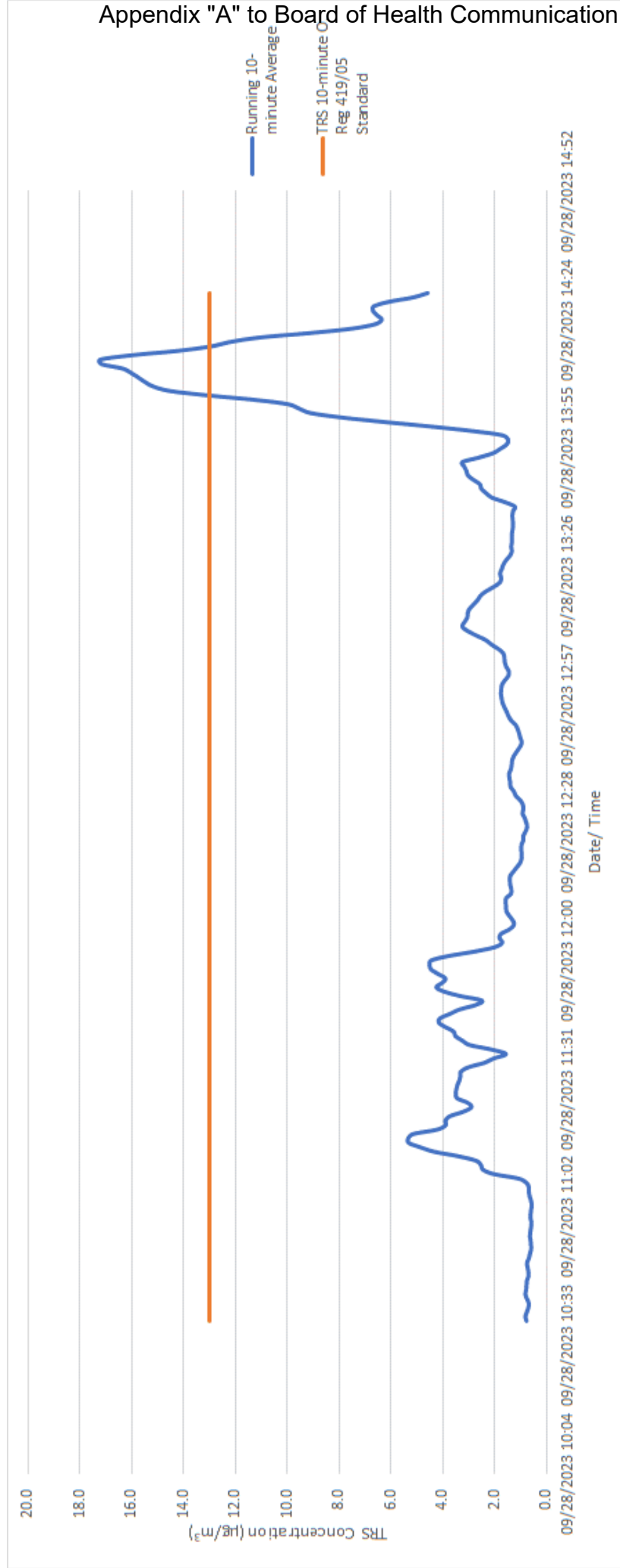
# Figure 8 – GFL Environmental - September 14-15, 2023 Ambient Air Monitoring Assessment Survey Running 10-minute Average TRS Concentrations



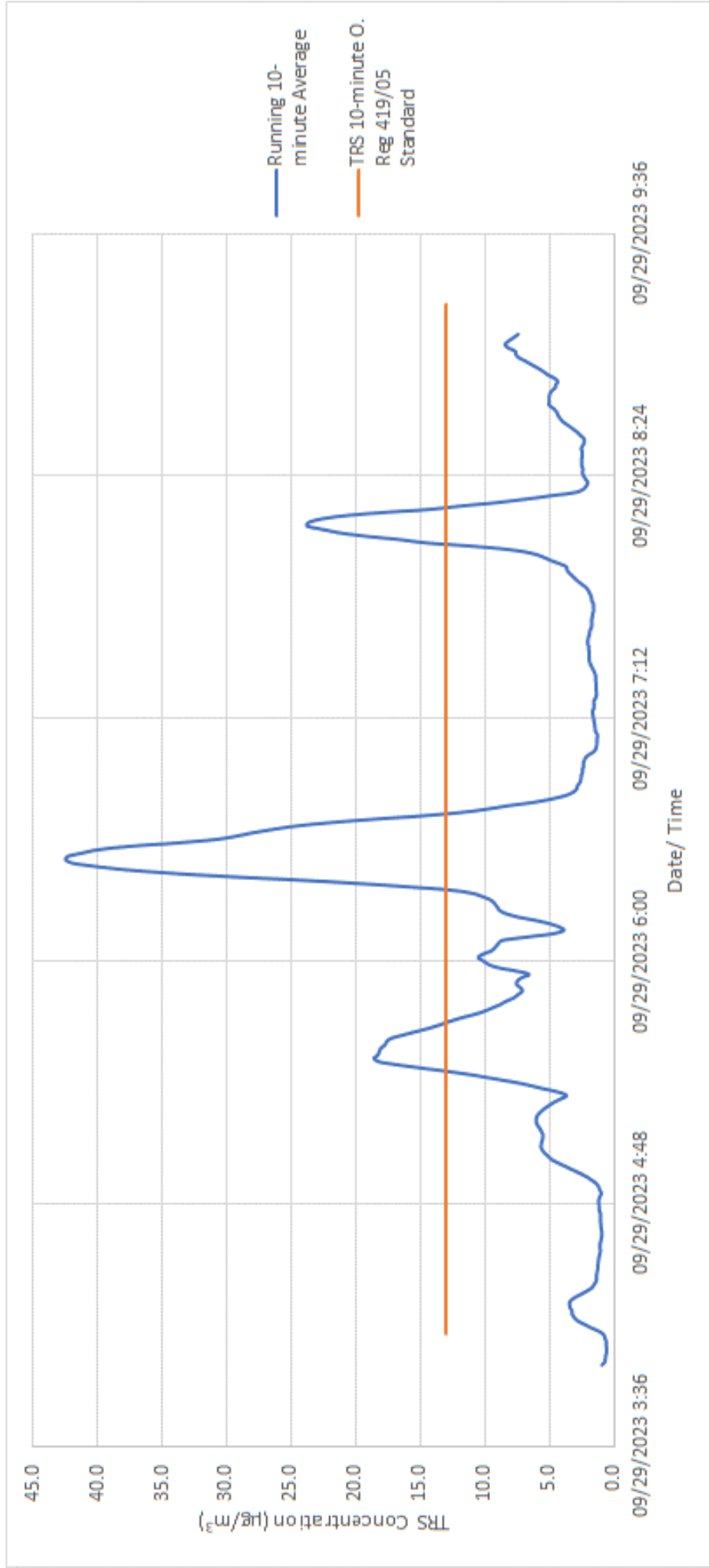
# Figure 9 – GFL Environmental - September 22, 2023 Ambient Air Monitoring Assessment Survey Running 10-minute Average TRS Concentrations



# Figure 10 – GFL Environmental - September 28, 2023 Ambient Air Monitoring Assessment Survey Running 10-minute Average TRS Concentrations



# Figure 11 – GFL Environmental - September 29, 2023 Ambient Air Monitoring Assessment Survey Running 10-minute Average TRS Concentrations





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Multiple exceedances that were measured in the same location are displayed immediately adjacent to each other. In these cases, locations are approximate.