

Ambient Air and Sound

Monthly Report

**STONEY TRAIL AGGREGATE RESOURCE**

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**BURNCO**

**LAFARGE**



**Volker Stevin**  
Contracting Ltd.

**Heidelberg**  
Materials

November 2023

# Glossary

- L<sub>eq</sub>** - Equivalent Continuous Sound Pressure Level. The total sound energy logged over the course of a measurement. (Uses logarithmic averaging).
- L<sub>eq24</sub>** - Measured over the entire 24-period (00:00 – 23:59)
- L<sub>eqDay</sub>** - Measured over the daytime period (07:00 – 22:00)
- L<sub>eqNight</sub>** - Measured over the nighttime period (22:00 – 07:00)
- SPL (dBA)** - Sound Pressure Level in dBA (A-weighted, which is corrected for human hearing)
- TSP** - Total Suspended Particulate Matter. Includes particulates with a diameter of greater than 10 micrometers and smaller.
- PM<sub>2.5</sub>** - Particulate Matter with a diameter of 2.5 micrometers and smaller.

## 1.0 SOUND LEVEL MEASUREMENT RESULTS

The results of the sound monitoring at the STAR Pit can be found in Table 1. Table 1 provides the daily averaged  $L_{eq24}$ ,  $L_{eqDay}$  and  $L_{eqNight}$  sound levels in addition to the minimum and maximum  $L_{eq24}$  values.

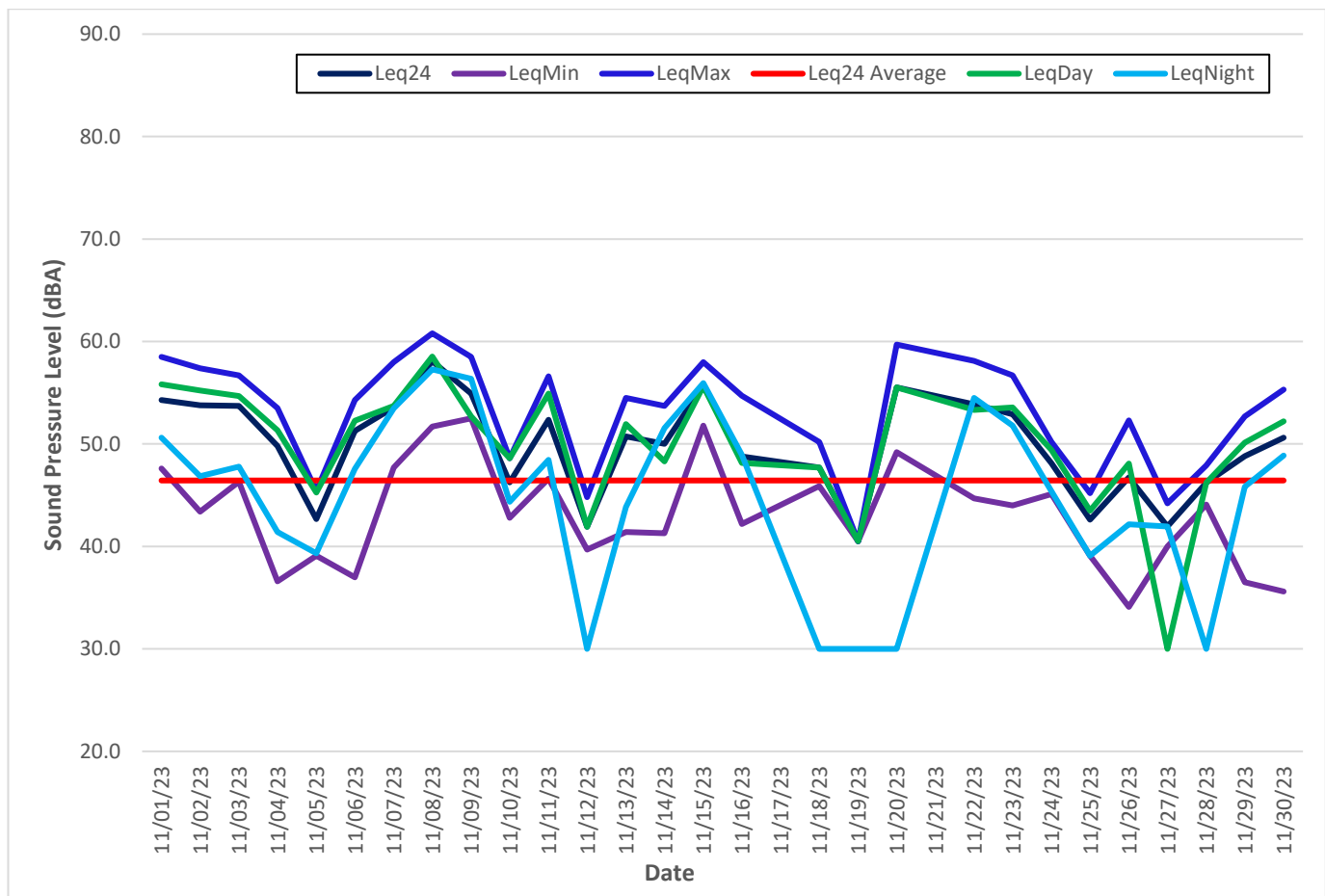
**Table 1. November 2023 – STAR PIT – Sound Monitoring Results<sup>1</sup>**

| Day                 | Leq24   | L <sub>eq</sub> Min | L <sub>eq</sub> Max | LeqDay | LeqNight |
|---------------------|---------|---------------------|---------------------|--------|----------|
| Wednesday 01-Nov-23 | 54.3    | 47.6                | 58.5                | 55.8   | 50.6     |
| Thursday 02-Nov-23  | 53.8    | 43.4                | 57.4                | 55.2   | 46.9     |
| Friday 03-Nov-23    | 53.7    | 46.3                | 56.7                | 54.7   | 47.8     |
| Saturday 04-Nov-23  | 49.8    | 36.6                | 53.5                | 51.3   | 41.4     |
| Sunday 05-Nov-23    | 42.7    | 39.1                | 45.4                | 45.3   | 39.3     |
| Monday 06-Nov-23    | 51.3    | 37.0                | 54.3                | 52.3   | 47.6     |
| Tuesday 07-Nov-23   | 53.6    | 47.7                | 58.0                | 53.7   | 53.5     |
| Wednesday 08-Nov-23 | 58.1    | 51.7                | 60.8                | 58.5   | 57.3     |
| Thursday 09-Nov-23  | 54.9    | 52.5                | 58.5                | 52.7   | 56.4     |
| Friday 10-Nov-23    | 46.3    | 42.8                | 48.6                | 48.6   | 44.4     |
| Saturday 11-Nov-23  | 52.4    | 46.6                | 56.6                | 54.9   | 48.5     |
| Sunday 12-Nov-23    | 41.9    | 39.7                | 44.8                | 41.9   | N/A      |
| Monday 13-Nov-23    | 50.7    | 41.4                | 54.5                | 51.9   | 43.8     |
| Tuesday 14-Nov-23   | 50.0    | 41.3                | 53.7                | 48.3   | 51.6     |
| Wednesday 15-Nov-23 | 55.7    | 51.8                | 58.0                | 55.6   | 55.9     |
| Thursday 16-Nov-23  | 48.8    | 42.2                | 54.7                | 48.2   | 48.9     |
| Friday 17-Nov-23    | No Data |                     |                     |        |          |
| Saturday 18-Nov-23  | 47.7    | 45.9                | 50.2                | 47.7   | N/A      |
| Sunday 19-Nov-23    | 40.5    | 40.5                | 40.5                | 40.5   | N/A      |
| Monday 20-Nov-23    | 55.5    | 49.2                | 59.7                | 55.5   | N/A      |
| Tuesday 21-Nov-23   | 48.7    | 45.5                | 51.1                | 48.7   | N/A      |
| Wednesday 22-Nov-23 | 53.9    | 44.7                | 58.1                | 53.3   | 54.5     |
| Thursday 23-Nov-23  | 52.9    | 44.0                | 56.7                | 53.6   | 51.8     |
| Friday 24-Nov-23    | 48.1    | 45.1                | 50.2                | 49.4   | 45.4     |
| Saturday 25-Nov-23  | 42.6    | 39.1                | 45.2                | 43.5   | 39.1     |
| Sunday 26-Nov-23    | 46.7    | 34.1                | 52.3                | 48.1   | 42.2     |
| Monday 27-Nov-23    | 42.0    | 40.0                | 44.2                | N/A    | 42.0     |
| Tuesday 28-Nov-23   | 46.2    | 44.1                | 47.9                | 46.2   | N/A      |
| Wednesday 29-Nov-23 | 48.8    | 36.5                | 52.7                | 50.1   | 45.8     |
| Thursday 30-Nov-23  | 50.6    | 35.6                | 55.3                | 52.2   | 48.9     |
| Monthly Average     | 46.4    | 39.2                | 49.7                | 48.3   | 43.9     |
| Monthly Maximum     | 50.6    | 45.1                | 55.3                | 52.2   | 48.9     |
| Monthly Minimum     | 42.0    | 34.1                | 44.2                | 43.5   | 39.1     |

<sup>1</sup> It should be noted that all measured sound levels provided in Table 1 are for instances in which the wind speeds were below 11 km/hr and rainfall was below 3mm/hr, as both conditions will impact the validity of the measured results. As such, it is possible that there will time periods/days in which there is no valid data.

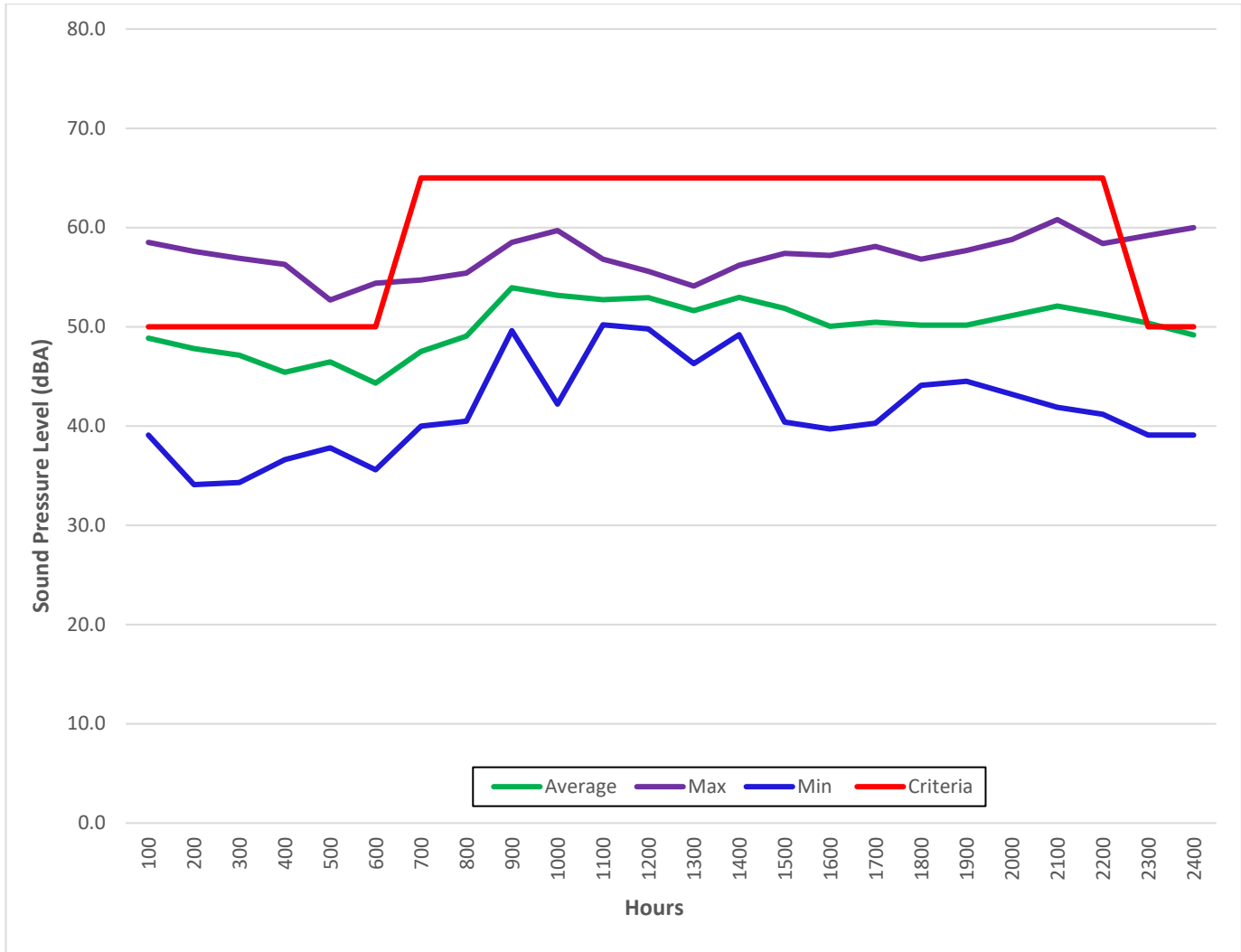
Figure 1 provides the graphical representation of the results found in Table 1. Figure 2 illustrates the hourly average, maximum and minimum  $L_{eq}$  dBA values for the entire month. In addition, the City of Calgary’s Community Standards Bylaw values have been included.

Lastly, it is important to note that the monitoring stations are located inside the perimeter berms, adjacent to operations and not beyond the site boundaries. Measurements are intended to help monitor and measure the internal operations performance and are not representative of the lower offsite levels.



**Figure 1. STAR PIT – November 2023 – Daily Sound Monitoring Results<sup>2</sup>**

<sup>2</sup> Values of 30 were given to dates in which there was no data. This was to allow for the creation of the graph. The values within Table 1 are correctly calculated ignoring the dates of no data (due to wind or rain).



**Figure 2. STAR PIT – November 2023 – Hourly Sound Monitoring Summary**

## 2.0 SOUND LEVEL EXCEEDANCES

As per the development permit, the permissible sound level for this site is 50 dBA  $L_{eq}$ -1Hour. As shown in Table 2, from November 1 to 30, 2023 there were 28 exceedances.

**Table 2. STAR PIT – November 2023 – Sound Level Exceedances**

| Date              | $L_{eq1-hour}$ (dBA) | Wind Speed (Km/hr) | Temperature (°C) | Wind Direction | Hourly Rainfall (mm) | Day/Night |
|-------------------|----------------------|--------------------|------------------|----------------|----------------------|-----------|
| Nov-01-2023 01:00 | 51.4                 | 8.9                | 1.2              | South-West     | 0.00                 | Night     |
| Nov-01-2023 02:00 | 51.0                 | 8.9                | 0.8              | South-West     | 0.00                 | Night     |
| Nov-01-2023 06:00 | 51.4                 | 8.1                | -0.5             | South-West     | 0.00                 | Night     |
| Nov-06-2023 23:00 | 50.8                 | 9.1                | 1.6              | South          | 0.00                 | Night     |
| Nov-07-2023 23:00 | 58.0                 | 10.6               | 0.6              | West           | 0.00                 | Night     |
| Nov-08-2023 00:00 | 56.1                 | 3.4                | 0.0              | South          | 0.00                 | Night     |
| Nov-08-2023 01:00 | 52.0                 | 7.5                | -0.4             | South-West     | 0.00                 | Night     |
| Nov-08-2023 03:00 | 51.7                 | 10.0               | 0.3              | West           | 0.00                 | Night     |
| Nov-08-2023 23:00 | 59.2                 | 2.9                | 0.1              | North-East     | 0.00                 | Night     |
| Nov-09-2023 00:00 | 60.0                 | 3.5                | -0.3             | North          | 0.00                 | Night     |
| Nov-09-2023 01:00 | 58.5                 | 2.3                | -0.3             | North          | 0.00                 | Night     |
| Nov-09-2023 02:00 | 56.1                 | 8.9                | -0.6             | South          | 0.00                 | Night     |
| Nov-09-2023 03:00 | 52.6                 | 10.3               | -1.0             | South          | 0.00                 | Night     |
| Nov-14-2023 23:00 | 52.6                 | 6.2                | 2.6              | South          | 0.00                 | Night     |
| Nov-15-2023 00:00 | 53.7                 | 7.0                | 1.9              | North          | 0.00                 | Night     |
| Nov-15-2023 23:00 | 56.5                 | 6.6                | -4.2             | North          | 0.00                 | Night     |
| Nov-16-2023 00:00 | 55.3                 | 6.5                | -4.3             | North          | 0.00                 | Night     |
| Nov-16-2023 01:00 | 54.7                 | 3.3                | -4.6             | North-West     | 0.00                 | Night     |
| Nov-22-2023 01:00 | 58.1                 | 10.8               | 1.9              | North          | 0.00                 | Night     |
| Nov-22-2023 02:00 | 57.6                 | 8.6                | 0.4              | North          | 0.00                 | Night     |
| Nov-22-2023 03:00 | 56.9                 | 4.6                | -0.1             | North-East     | 0.00                 | Night     |
| Nov-22-2023 04:00 | 56.3                 | 1.9                | -0.1             | South-West     | 0.00                 | Night     |
| Nov-22-2023 05:00 | 51.2                 | 5.3                | 0.0              | South          | 0.00                 | Night     |
| Nov-23-2023 04:00 | 53.9                 | 7.4                | -2.8             | West           | 0.00                 | Night     |
| Nov-23-2023 05:00 | 52.7                 | 8.3                | -2.7             | West           | 0.00                 | Night     |
| Nov-23-2023 06:00 | 54.4                 | 10.8               | -2.8             | North-West     | 0.00                 | Night     |
| Nov-30-2023 03:00 | 51.1                 | 4.3                | -3.8             | North-West     | 0.00                 | Night     |
| Nov-30-2023 04:00 | 50.5                 | 3.6                | -3.9             | West           | 0.00                 | Night     |

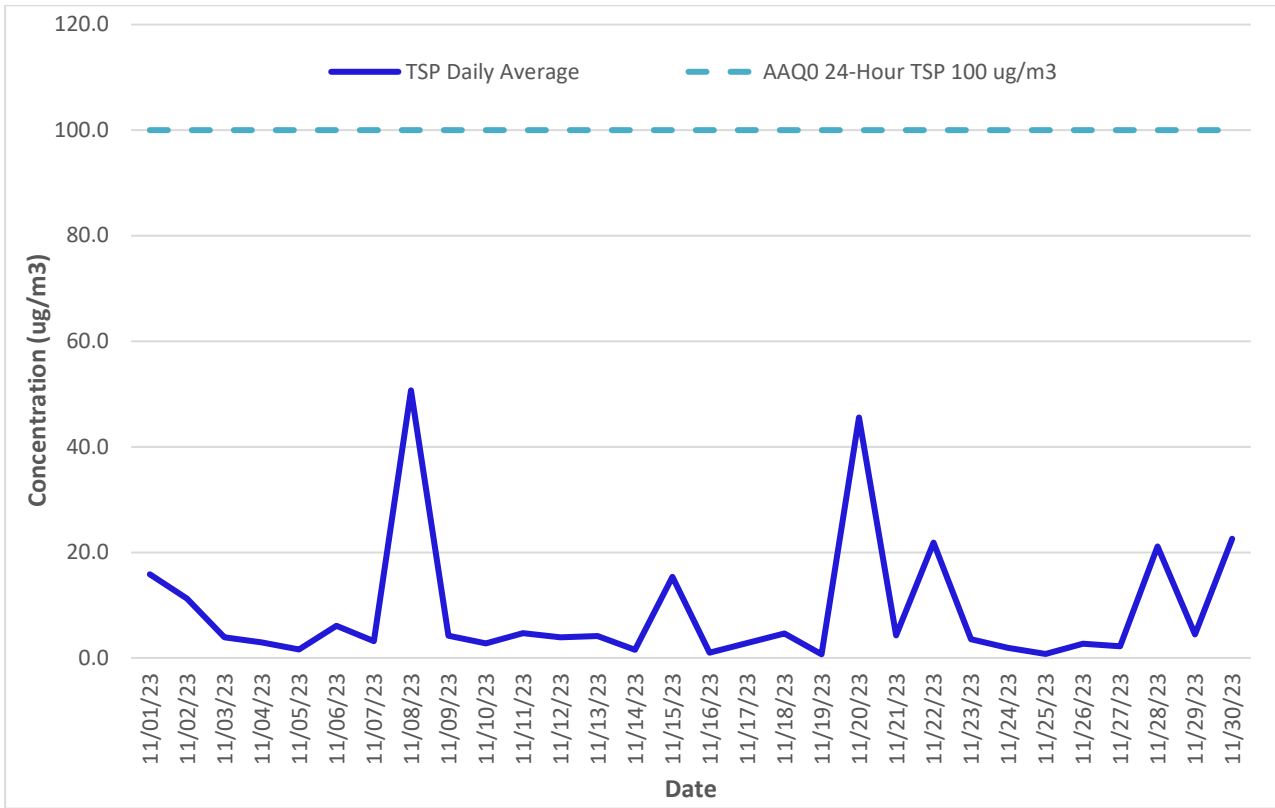
### 3.0 PARTICULATE RESULTS

As per development permit the air quality threshold values of particulate matter for this site are of 100 µg/m<sup>3</sup> for TSP Daily, 29 µg/m<sup>3</sup> for the PM2.5 Daily and 80 µg/m<sup>3</sup> for the PM2.5 Hourly. As shown in Table 3, there were no exceedances.

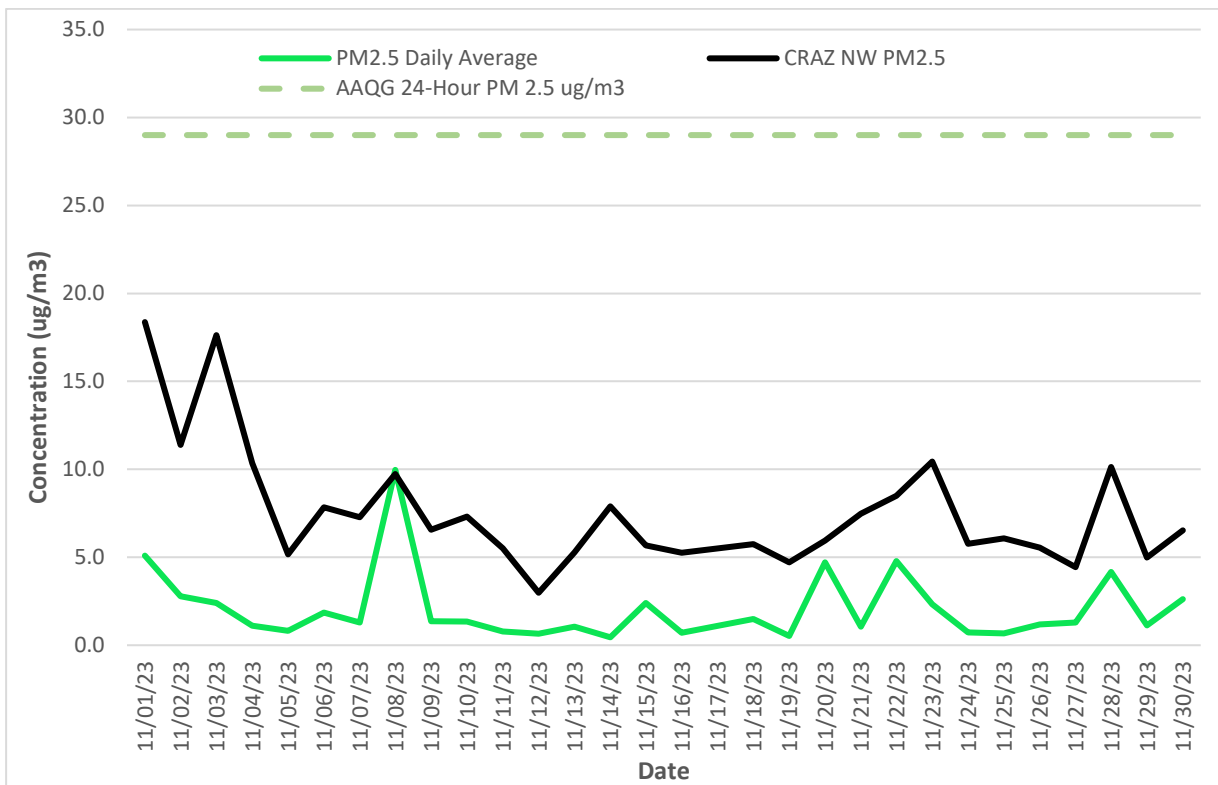
**Table 3. STAR PIT – November 2023 – Particulate Results**

| Date                | TSP Daily Average | PM2.5 Daily Average | CRAZ NW PM2.5 | PM2.5 Hourly Max |
|---------------------|-------------------|---------------------|---------------|------------------|
| Wednesday 01-Nov-23 | 15.8              | 5.1                 | 18.4          | 10.8             |
| Thursday 02-Nov-23  | 11.2              | 2.8                 | 11.4          | 3.3              |
| Friday 03-Nov-23    | 3.9               | 2.4                 | 17.6          | 3.6              |
| Saturday 04-Nov-23  | 2.9               | 1.1                 | 10.3          | 2.8              |
| Sunday 05-Nov-23    | 1.6               | 0.8                 | 5.2           | 1.3              |
| Monday 06-Nov-23    | 6.1               | 1.9                 | 7.8           | 5.1              |
| Tuesday 07-Nov-23   | 3.2               | 1.3                 | 7.3           | 2.5              |
| Wednesday 08-Nov-23 | 50.7              | 10.0                | 9.7           | 19.1             |
| Thursday 09-Nov-23  | 4.2               | 1.4                 | 6.6           | 1.9              |
| Friday 10-Nov-23    | 2.7               | 1.3                 | 7.3           | 1.6              |
| Saturday 11-Nov-23  | 4.7               | 0.8                 | 5.5           | 1.9              |
| Sunday 12-Nov-23    | 3.9               | 0.7                 | 3.0           | 1.1              |
| Monday 13-Nov-23    | 4.2               | 1.1                 | 5.3           | 2.1              |
| Tuesday 14-Nov-23   | 1.5               | 0.5                 | 7.9           | 0.6              |
| Wednesday 15-Nov-23 | 15.4              | 2.4                 | 5.7           | 11.4             |
| Thursday 16-Nov-23  | 1.0               | 0.7                 | 5.3           | 1.3              |
| Friday 17-Nov-23    | No Data           |                     |               |                  |
| Saturday 18-Nov-23  | 4.6               | 1.5                 | 5.7           | 1.9              |
| Sunday 19-Nov-23    | 0.7               | 0.5                 | 4.7           | 0.5              |
| Monday 20-Nov-23    | 45.6              | 4.7                 | 5.9           | 10.2             |
| Tuesday 21-Nov-23   | 4.3               | 1.1                 | 7.5           | 1.2              |
| Wednesday 22-Nov-23 | 21.8              | 4.8                 | 8.5           | 17.0             |
| Thursday 23-Nov-23  | 3.5               | 2.3                 | 10.4          | 5.9              |
| Friday 24-Nov-23    | 1.9               | 0.7                 | 5.8           | 0.9              |
| Saturday 25-Nov-23  | 0.8               | 0.7                 | 6.1           | 0.7              |
| Sunday 26-Nov-23    | 2.7               | 1.2                 | 5.5           | 1.4              |
| Monday 27-Nov-23    | 2.2               | 1.3                 | 4.4           | 1.4              |
| Tuesday 28-Nov-23   | 21.1              | 4.2                 | 10.1          | 11.2             |
| Wednesday 29-Nov-23 | 4.5               | 1.1                 | 5.0           | 4.3              |
| Thursday 30-Nov-23  | 22.6              | 2.6                 | 6.5           | 10.1             |
|                     |                   |                     |               |                  |
| Monthly Average     | 9.3               | 2.1                 | 7.6           | 4.7              |

Figure 3 & Figure 4 illustrate the values in Table 3 and compares the TSP & PM 2.5 values to the AAAQO & AAAQG criteria, respectively.



**Figure 3. STAR PIT – November 2023 – TSP Daily Particulate Monitoring Results**



**Figure 4. STAR PIT – November 2023 – PM 2.5 Daily Particulate Monitoring Results**



As previously discussed, there were no exceedances of the particulate limits in the month of November 2023.

**Table 4. STAR PIT – November 2023 – Particulate Exceedances**

| Date           | PM2.5 | Wind Speed<br>(Km/hr) | Temperature (°C) | Wind Direction | Hourly Rainfall (mm) | Day/Night |
|----------------|-------|-----------------------|------------------|----------------|----------------------|-----------|
| No Exceedances |       |                       |                  |                |                      |           |

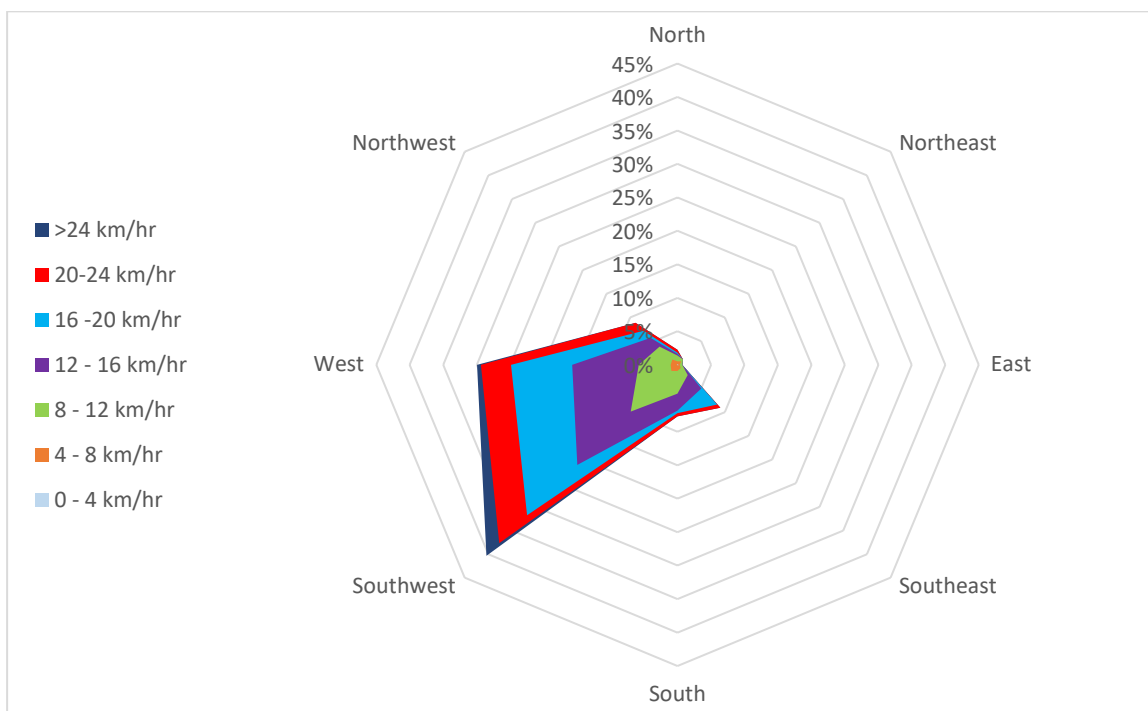
## 4.0 METEOROLOGICAL DATA

### 4.1 TRAILER

As indicated in Table 5 & Figure 5, the primary wind direction for November 2023 was from the west and southwest with moderate to high windspeeds (between 8 – 24 km/hr). The monthly values for the temperature and precipitation can be found in Table 6.

**Table 5. STAR PIT Trailer – November 2023 – Wind Data Results**

| Count of Direction | Column Labels |              |              |              |              |              |               |               | Grand Total    |
|--------------------|---------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|----------------|
| Row Labels         | East          | North        | Northeast    | Northwest    | South        | Southeast    | Southwest     | West          | Grand Total    |
| 0-4                | 0.14%         | 0.07%        | 0.03%        | 0.10%        | 0.04%        | 0.15%        | 0.02%         | 0.12%         | 0.67%          |
| 4-8                | 0.18%         | 0.45%        | 0.72%        | 1.01%        | 0.89%        | 0.54%        | 1.27%         | 0.91%         | 5.98%          |
| 8-12               | 0.39%         | 0.84%        | 0.40%        | 2.73%        | 3.39%        | 1.45%        | 8.60%         | 4.77%         | 22.58%         |
| 12-16              | 0.00%         | 0.26%        | 0.00%        | 1.84%        | 2.54%        | 2.88%        | 11.27%        | 9.93%         | 28.73%         |
| 16-20              | 0.00%         | 0.17%        | 0.00%        | 1.51%        | 0.38%        | 3.36%        | 10.63%        | 9.14%         | 25.21%         |
| 20-24              | 0.00%         | 0.43%        | 0.00%        | 1.67%        | 0.45%        | 0.65%        | 5.89%         | 4.50%         | 13.59%         |
| >24                | 0.00%         | 0.00%        | 0.00%        | 0.00%        | 0.00%        | 0.00%        | 2.68%         | 0.58%         | 3.25%          |
| <b>Grand Total</b> | <b>0.72%</b>  | <b>2.23%</b> | <b>1.16%</b> | <b>8.86%</b> | <b>7.68%</b> | <b>9.04%</b> | <b>40.36%</b> | <b>29.95%</b> | <b>100.00%</b> |



**Figure 5. STAR PIT Trailer – November 2023 - Wind Rose**

**Table 6. STAR PIT Trailer – November 2023 – Wind Data Results**

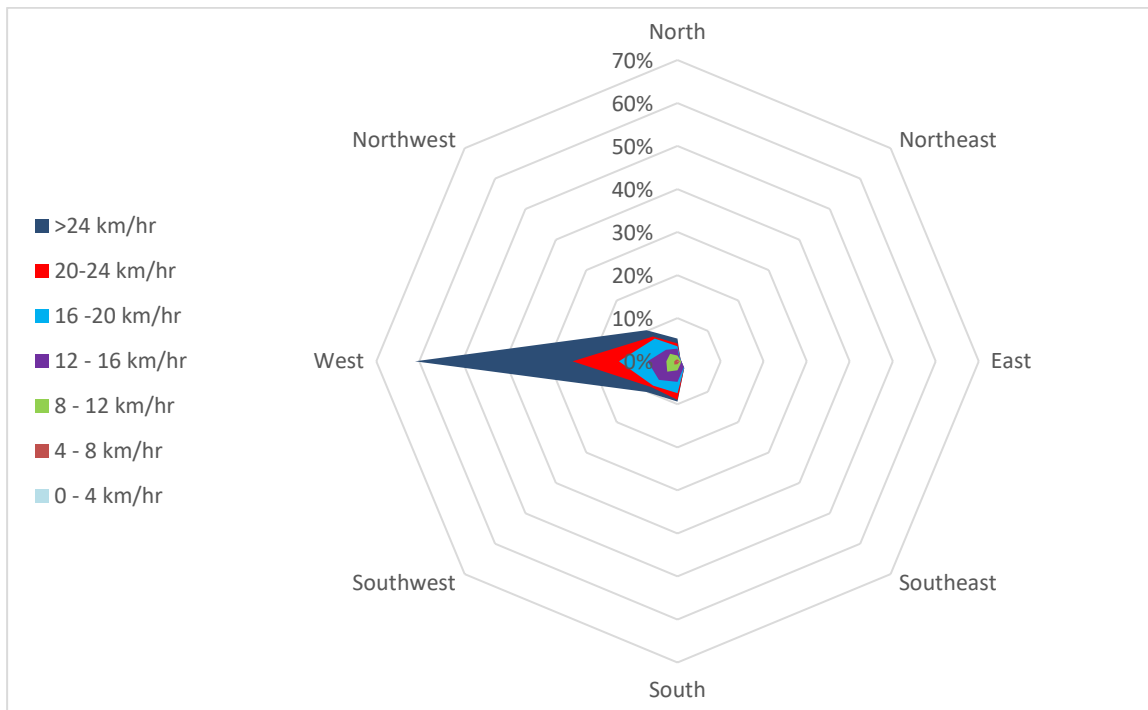
| Parameter                        | Monthly Average | 1-Hour  |         |
|----------------------------------|-----------------|---------|---------|
|                                  |                 | Maximum | Minimum |
| Temperature (°C)                 | 2.4             | 14.9    | -7.8    |
| Precipitation (mm)               | 0.0             | 0.4     | 0.0     |
| Total Monthly Precipitation (mm) |                 | 1.1     |         |

## 4.2 OFFICE

As indicated in Table 7 & Figure 6, the primary wind direction for November 2023 was from the west with high windspeeds (between 12 – +24 km/hr). The monthly values for the temperature and precipitation can be found in Table 8.

**Table 7. STAR PIT Office – November 2023 – Wind Data Results**

| Count of Direction | Column Labels |              |              |               |              |              |               |               | Grand Total    |
|--------------------|---------------|--------------|--------------|---------------|--------------|--------------|---------------|---------------|----------------|
| Row Labels         | East          | North        | Northeast    | Northwest     | South        | Southeast    | Southwest     | West          | Grand Total    |
| 0-4                | 0.04%         | 0.03%        | 0.03%        | 0.04%         | 0.02%        | 0.02%        | 0.05%         | 0.05%         | 0.28%          |
| 4-8                | 0.49%         | 0.41%        | 0.31%        | 0.45%         | 0.64%        | 0.41%        | 1.02%         | 0.70%         | 4.43%          |
| 8-12               | 0.32%         | 0.86%        | 0.36%        | 1.97%         | 1.41%        | 0.50%        | 2.35%         | 1.85%         | 9.62%          |
| 12-16              | 0.00%         | 1.63%        | 0.00%        | 1.36%         | 2.71%        | 1.12%        | 2.73%         | 4.35%         | 13.89%         |
| 16-20              | 0.00%         | 0.52%        | 0.28%        | 3.64%         | 2.62%        | 0.13%        | 1.91%         | 6.68%         | 15.78%         |
| 20-24              | 0.00%         | 0.68%        | 0.00%        | 0.67%         | 1.55%        | 0.00%        | 0.51%         | 10.77%        | 14.18%         |
| >24                | 0.00%         | 1.12%        | 0.00%        | 2.07%         | 0.41%        | 0.00%        | 1.60%         | 36.61%        | 41.82%         |
| <b>Grand Total</b> | <b>0.85%</b>  | <b>5.25%</b> | <b>0.97%</b> | <b>10.21%</b> | <b>9.37%</b> | <b>2.19%</b> | <b>10.16%</b> | <b>61.01%</b> | <b>100.00%</b> |



**Figure 6. STAR PIT Office – November 2023 - Wind Rose**

**Table 8. STAR PIT Office – November 2023 – Wind Data Results**

| Parameter                        | Monthly Average | 1-Hour  |         |
|----------------------------------|-----------------|---------|---------|
|                                  |                 | Maximum | Minimum |
| Temperature (°C)                 | 2.4             | 14.7    | -8.1    |
| Precipitation (mm)               | 0.0             | 0.1     | 0.0     |
| Total Monthly Precipitation (mm) |                 | 0.1     |         |

## 5.0 CALIBRATION RECORDS

### Record of Calibration Results

| Description                  | Location | Date               | Time  | Pre / Post | Calibration Level | Calibrator Model | Serial Number |
|------------------------------|----------|--------------------|-------|------------|-------------------|------------------|---------------|
| Pre-Measurement Calibration  | STAR PIT | September 24, 2023 | 13:15 | Pre        | 93.9 dBA          | B&K 4231         | 2575493       |
| Post-Measurement Calibration | STAR PIT | November 24, 2023  | 09:00 | Pre        | 93.9 dBA          | B&K 4231         | 2575493       |