

Ambient Air and Sound

Monthly Report

STONEY TRAIL AGGREGATE RESOURCE

BURNCO

LAFARGE



Volker Stevin
Contracting Ltd.

 **Heidelberg
Materials**

September 2023

Glossary

- L_{eq}** - Equivalent Continuous Sound Pressure Level. The total sound energy logged over the course of a measurement. (Uses logarithmic averaging).
- L_{eq24}** - Measured over the entire 24-period (00:00 – 23:59)
- L_{eqDay}** - Measured over the daytime period (07:00 – 22:00)
- L_{eqNight}** - 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_{2.5}** - 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. September 2023 – STAR PIT – Sound Monitoring Results¹

Day	Leq24	L _{eq} Min	L _{eq} Max	LeqDay	LeqNight
Friday 01-Sep-23	53.8	39.0	57.9	53.5	54.1
Saturday 02-Sep-23	40.1	37.5	41.7	40.6	37.5
Sunday 03-Sep-23	40.7	33.5	45.5	43.1	36.0
Monday 04-Sep-23	38.9	34.3	42.1	40.0	37.0
Tuesday 05-Sep-23	55.6	36.8	58.5	55.8	55.5
Wednesday 06-Sep-23	53.9	49.2	58.8	53.4	54.3
Thursday 07-Sep-23	57.5	54.7	59.3	57.6	57.4
Friday 08-Sep-23	58.8	50.9	63.8	58.3	59.7
Saturday 09-Sep-23	52.2	46.9	54.9	53.2	51.7
Sunday 10-Sep-23	No Data				
Monday 11-Sep-23	50.9	47.5	54.2	50.9	50.6
Tuesday 12-Sep-23	58.1	47.5	62.3	57.1	59.8
Wednesday 13-Sep-23	57.6	50.3	62.3	56.3	59.4
Thursday 14-Sep-23	58.5	52.0	63.1	56.3	61.1
Friday 15-Sep-23	54.5	47.7	59.6	51.0	55.7
Saturday 16-Sep-23	47.5	38.4	52.9	50.2	39.1
Sunday 17-Sep-23	40.0	31.1	44.2	43.1	34.5
Monday 18-Sep-23	54.9	32.1	58.8	55.3	54.3
Tuesday 19-Sep-23	54.4	44.0	59.8	56.0	51.7
Wednesday 20-Sep-23	55.8	51.2	58.3	56.3	55.7
Thursday 21-Sep-23	54.2	50.1	59.7	56.1	52.5
Friday 22-Sep-23	49.7	47.5	51.6	19.0	49.7
Saturday 23-Sep-23	49.9	37.6	53.2	50.9	47.6
Sunday 24-Sep-23	42.7	33.4	45.7	45.0	35.6
Monday 25-Sep-23	52.0	31.4	54.9	53.4	48.0
Tuesday 26-Sep-23	54.8	48.4	59.1	54.9	54.7
Wednesday 27-Sep-23	56.2	50.1	61.6	56.7	55.4
Thursday 28-Sep-23	56.3	53.6	58.0	53.6	56.8
Friday 29-Sep-23	56.1	48.9	60.7	55.9	56.2
Saturday 30-Sep-23	59.2	57.9	60.7	19.0	59.2
Sunday 01-Oct-23	55.6	41.5	60.7	55.7	55.0

¹ 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.

Table 1. September 2023 – STAR PIT – Sound Monitoring Results (cont)

Day	Leq24	L _{eq} Min	L _{eq} Max	LeqDay	LeqNight
Monthly Average	54.1	45.6	57.7	49.3	52.6
Monthly Maximum	59.2	57.9	61.6	56.7	59.2
Monthly Minimum	42.7	31.4	45.7	19.0	35.6

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.

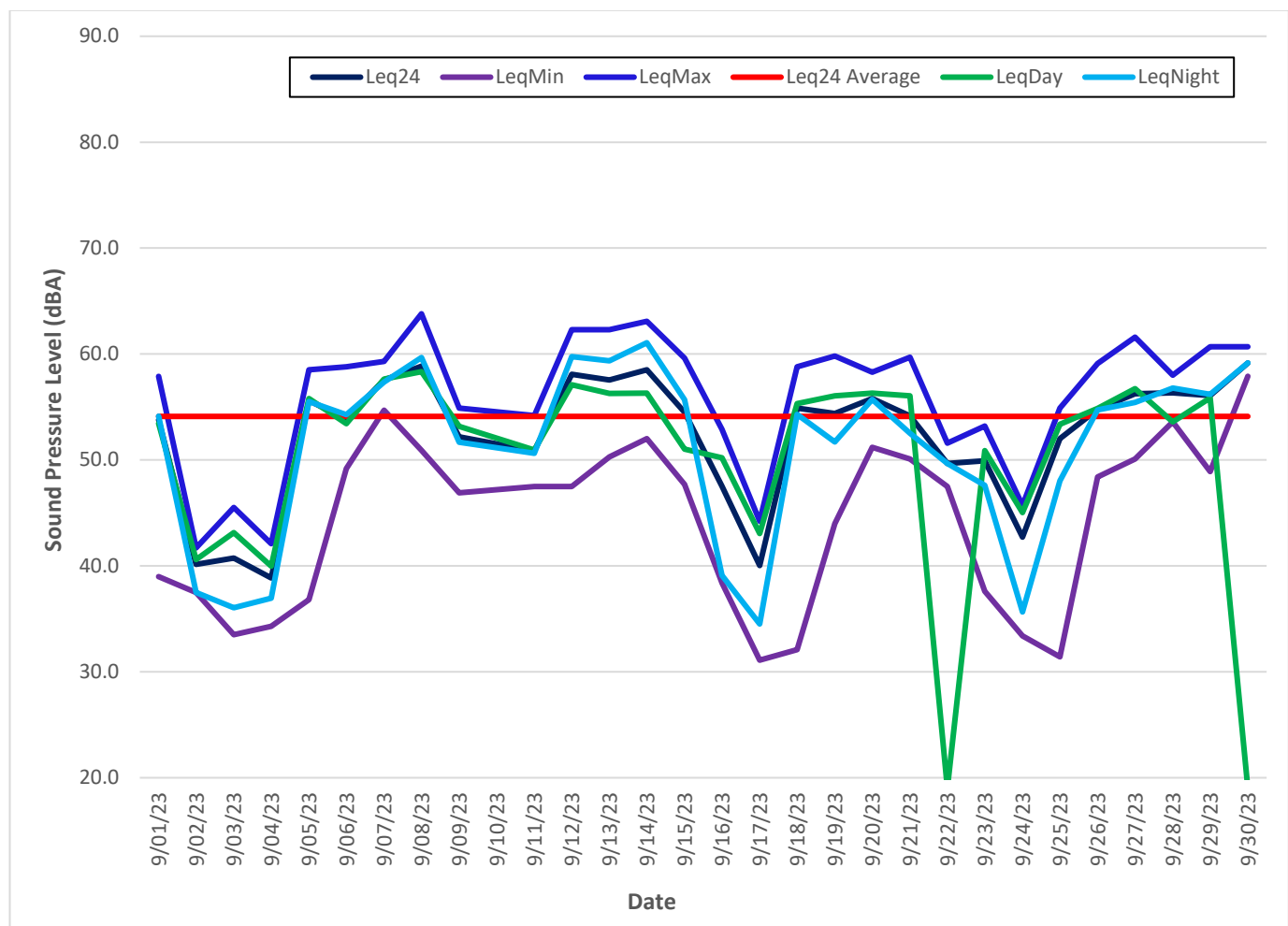


Figure 1. STAR PIT – September 2023 – Daily Sound Monitoring Results

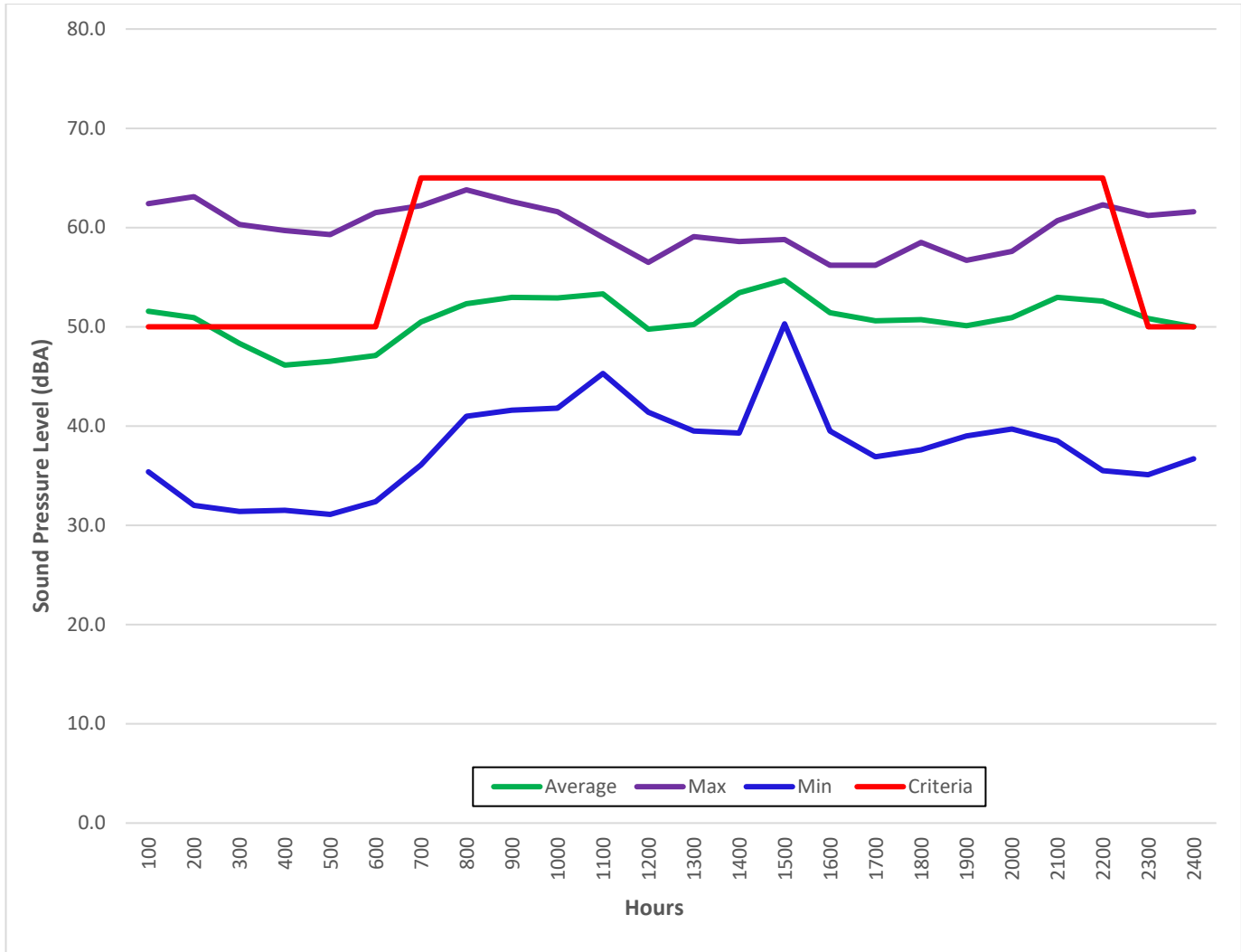


Figure 2. STAR PIT – September 2023 – Hourly Sound Monitoring Summary

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 September 1 to 30, 2023 there were 87 exceedances.

Table 2. STAR PIT – September 2023 – Sound Level Exceedances

Date	L_{eq} -1-hour (dBA)	Wind Speed (Km/hr)	Temperature (°C)	Wind Direction	Hourly Rainfall (mm)	Day/Night
Sep-01-2023 01:00	57.9	10.8	14.2	North-West	0.00	Night
Sep-01-2023 02:00	57.8	10.3	13.6	North-West	0.00	Night
Sep-01-2023 04:00	50.1	8.5	12.6	West	0.00	Night
Sep-06-2023 00:00	58.5	7.5	8.4	North-West	0.40	Night
Sep-06-2023 01:00	58.2	7.6	8.1	North-West	0.00	Night
Sep-06-2023 02:00	58.8	8.1	7.6	North-West	0.00	Night
Sep-06-2023 04:00	51.8	8.0	7.3	West	0.00	Night
Sep-06-2023 05:00	52.5	8.1	7.4	West	0.00	Night
Sep-06-2023 06:00	52.4	7.5	7.7	West	0.00	Night
Sep-07-2023 00:00	50.8	8.2	8.7	South-West	0.00	Night
Sep-07-2023 05:00	54.7	9.6	6.5	North-West	0.00	Night
Sep-07-2023 06:00	55.1	8.6	6.2	West	0.00	Night
Sep-07-2023 23:00	58.9	10.4	13.0	North	0.00	Night
Sep-08-2023 00:00	59.3	9.4	12.7	North	0.00	Night
Sep-08-2023 01:00	59.9	10.1	12.3	North	0.00	Night
Sep-08-2023 03:00	60.3	8.1	10.0	North-East	0.00	Night
Sep-08-2023 04:00	59.6	4.5	9.2	North	0.00	Night
Sep-08-2023 05:00	58.4	5.9	8.6	North-West	0.00	Night
Sep-08-2023 06:00	60.5	3.7	8.3	North-West	0.00	Night
Sep-09-2023 00:00	50.9	10.9	11.4	South	0.00	Night
Sep-09-2023 03:00	51.9	9.1	10.9	South-West	0.00	Night
Sep-09-2023 04:00	54.9	9.2	10.9	South	0.00	Night
Sep-09-2023 05:00	54.4	9.2	10.5	South	0.00	Night
Sep-12-2023 23:00	61.2	6.4	14.8	North	0.00	Night
Sep-13-2023 00:00	61.6	7.6	13.6	North-West	0.00	Night
Sep-13-2023 01:00	62.3	9.9	12.4	North-West	0.00	Night
Sep-13-2023 02:00	61.7	9.0	11.9	West	0.00	Night
Sep-13-2023 03:00	59.2	7.2	14.2	West	0.00	Night
Sep-13-2023 04:00	58.5	6.0	14.4	West	0.00	Night
Sep-13-2023 05:00	53.8	6.1	13.7	West	0.00	Night
Sep-14-2023 01:00	62.4	9.9	10.0	North	0.00	Night
Sep-14-2023 02:00	63.1	8.9	9.7	North-West	0.00	Night
Sep-14-2023 05:00	59.3	10.4	8.8	North-West	0.00	Night
Sep-14-2023 06:00	61.5	9.9	8.6	North-West	0.00	Night
Sep-14-2023 23:00	57.4	5.0	12.7	North	0.00	Night
Sep-15-2023 00:00	58.4	8.9	12.2	North	0.00	Night
Sep-15-2023 01:00	59.2	9.5	11.7	North	0.00	Night
Sep-15-2023 02:00	59.6	9.5	11.0	North	0.00	Night
Sep-15-2023 03:00	54.4	10.5	10.3	South	0.00	Night
Sep-15-2023 04:00	51.6	10.6	9.4	South-West	0.00	Night
Sep-15-2023 05:00	51.1	9.7	9.0	South-West	0.00	Night
Sep-15-2023 06:00	51.8	5.9	8.7	South	0.00	Night

Table 2. STAR PIT – September 2023 – Sound Level Exceedances (cont.)

Date	L _{eq1-hour} (dBA)	Wind Speed (Km/hr)	Temperature (°C)	Wind Direction	Hourly Rainfall (mm)	Day/Night
Sep-18-2023 23:00	57.6	6.4	7.8	North	0.50	Night
Sep-19-2023 00:00	58.8	2.5	7.8	North	0.00	Night
Sep-19-2023 01:00	51.9	9.9	7.4	South	0.00	Night
Sep-19-2023 06:00	51.1	9.5	5.3	West	0.00	Night
Sep-19-2023 23:00	55.1	8.1	6.4	North-West	0.00	Night
Sep-20-2023 00:00	54.5	8.6	6.6	North-West	0.00	Night
Sep-20-2023 01:00	56.2	6.5	6.5	North-West	0.00	Night
Sep-20-2023 02:00	58.3	7.6	6.0	North-West	0.00	Night
Sep-20-2023 03:00	57.7	9.3	5.2	North-West	0.00	Night
Sep-20-2023 04:00	52.5	9.2	4.5	North-West	0.00	Night
Sep-20-2023 05:00	51.2	10.7	4.0	North-West	0.00	Night
Sep-20-2023 23:00	56.1	10.5	5.1	North-West	0.00	Night
Sep-21-2023 00:00	53.2	7.9	5.2	West	0.20	Night
Sep-21-2023 01:00	52.0	8.5	5.5	West	0.00	Night
Sep-21-2023 02:00	53.5	8.5	5.8	West	0.00	Night
Sep-21-2023 03:00	53.6	7.0	5.8	West	0.00	Night
Sep-21-2023 04:00	50.7	6.3	5.6	West	0.00	Night
Sep-21-2023 05:00	50.1	5.9	5.6	West	0.00	Night
Sep-21-2023 06:00	50.7	7.1	5.3	West	0.00	Night
Sep-22-2023 02:00	50.3	10.3	8.5	South	0.00	Night
Sep-23-2023 00:00	51.6	10.8	12.2	South	0.00	Night
Sep-23-2023 01:00	52.0	9.8	12.2	South	0.00	Night
Sep-25-2023 23:00	53.1	7.8	11.0	South	0.00	Night
Sep-26-2023 00:00	52.2	8.3	10.2	South-West	0.00	Night
Sep-26-2023 23:00	57.4	7.6	6.2	West	0.00	Night
Sep-27-2023 00:00	57.0	9.5	6.1	West	0.00	Night
Sep-27-2023 01:00	54.3	7.8	6.2	West	0.00	Night
Sep-27-2023 02:00	52.8	8.1	5.8	West	0.00	Night
Sep-27-2023 03:00	56.2	10.0	5.4	West	0.00	Night
Sep-27-2023 04:00	59.7	10.1	4.6	North-West	0.00	Night
Sep-27-2023 05:00	56.2	10.5	4.1	West	0.00	Night
Sep-27-2023 06:00	50.1	9.7	3.2	West	0.00	Night
Sep-28-2023 02:00	58.0	9.8	3.7	North-West	0.00	Night
Sep-28-2023 03:00	58.0	10.4	3.5	North-West	0.00	Night
Sep-28-2023 23:00	56.1	10.5	2.0	North-West	0.20	Night
Sep-29-2023 00:00	53.9	9.5	1.8	North-West	0.00	Night
Sep-29-2023 01:00	51.7	8.1	1.7	North-West	0.00	Night
Sep-29-2023 02:00	52.7	7.2	1.6	North-West	0.00	Night
Sep-29-2023 03:00	53.0	10.5	18.5	South-West	0.00	Night
Sep-29-2023 06:00	57.3	10.8	18.7	South-West	0.00	Night
Sep-29-2023 23:00	57.6	4.8	21.2	South-West	0.00	Night
Sep-30-2023 00:00	60.7	7.6	19.2	North	0.00	Night
Sep-30-2023 01:00	60.7	4.2	17.6	North-East	0.00	Night
Sep-30-2023 02:00	57.9	6.2	17.7	South	0.00	Night
Sep-30-2023 03:00	58.3	5.1	16.3	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/m³ for TSP Daily, 29 µg/m³ for the PM2.5 Daily and 80 µg/m³ for the PM2.5 Hourly. As shown in Table 3, there were four (4) exceedances of the PM2.5 Daily. However, apart from September 30, 2023, these values are consistent with exceedances the CRAZ data.

Table 3. STAR PIT – September 2023 – Particulate Results

Date	TSP Daily Average	PM2.5 Daily Average	CRAZ NW PM2.5	PM2.5 Hourly Max
Friday 01-Sep-23	13.9	11.6	23.1	24.7
Saturday 02-Sep-23	7.2	4.7	11.8	8.7
Sunday 03-Sep-23	34.0	30.5	63.0	63.5
Monday 04-Sep-23	74.3	73.3	149.2	101.7
Tuesday 05-Sep-23	33.4	32.5	60.2	74.2
Wednesday 06-Sep-23	10.1	9.2	15.7	20.6
Thursday 07-Sep-23	18.0	6.4	9.3	9.4
Friday 08-Sep-23	16.7	5.0	10.1	13.0
Saturday 09-Sep-23	6.9	5.2	11.9	5.9
Sunday 10-Sep-23	No Operations			
Monday 11-Sep-23	7.6	3.1	10.9	3.6
Tuesday 12-Sep-23	30.1	5.5	7.9	19.2
Wednesday 13-Sep-23	17.1	3.7	7.8	8.8
Thursday 14-Sep-23	39.9	4.8	10.3	16.2
Friday 15-Sep-23	15.3	4.9	13.5	8.9
Saturday 16-Sep-23	13.2	3.5	10.3	3.8
Sunday 17-Sep-23	7.4	5.0	19.0	10.8
Monday 18-Sep-23	16.9	6.1	16.2	8.4
Tuesday 19-Sep-23	4.1	2.2	8.0	5.1
Wednesday 20-Sep-23	2.3	1.8	6.8	3.4
Thursday 21-Sep-23	4.0	2.9	11.0	3.9
Friday 22-Sep-23	7.7	4.3	12.7	4.7
Saturday 23-Sep-23	22.0	12.1	10.5	26.9
Sunday 24-Sep-23	6.3	4.3	9.8	14.9
Monday 25-Sep-23	9.0	1.5	8.5	2.7
Tuesday 26-Sep-23	6.1	1.2	5.5	3.2
Wednesday 27-Sep-23	7.5	1.4	2.3	2.9
Thursday 28-Sep-23	5.1	4.0	4.4	6.2
Friday 29-Sep-23	26.9	13.4	5.3	34.5
Saturday 30-Sep-23	96.4	30.8	18.3	44.2
Monthly Average	19.3	10.2	19.1	19.1

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

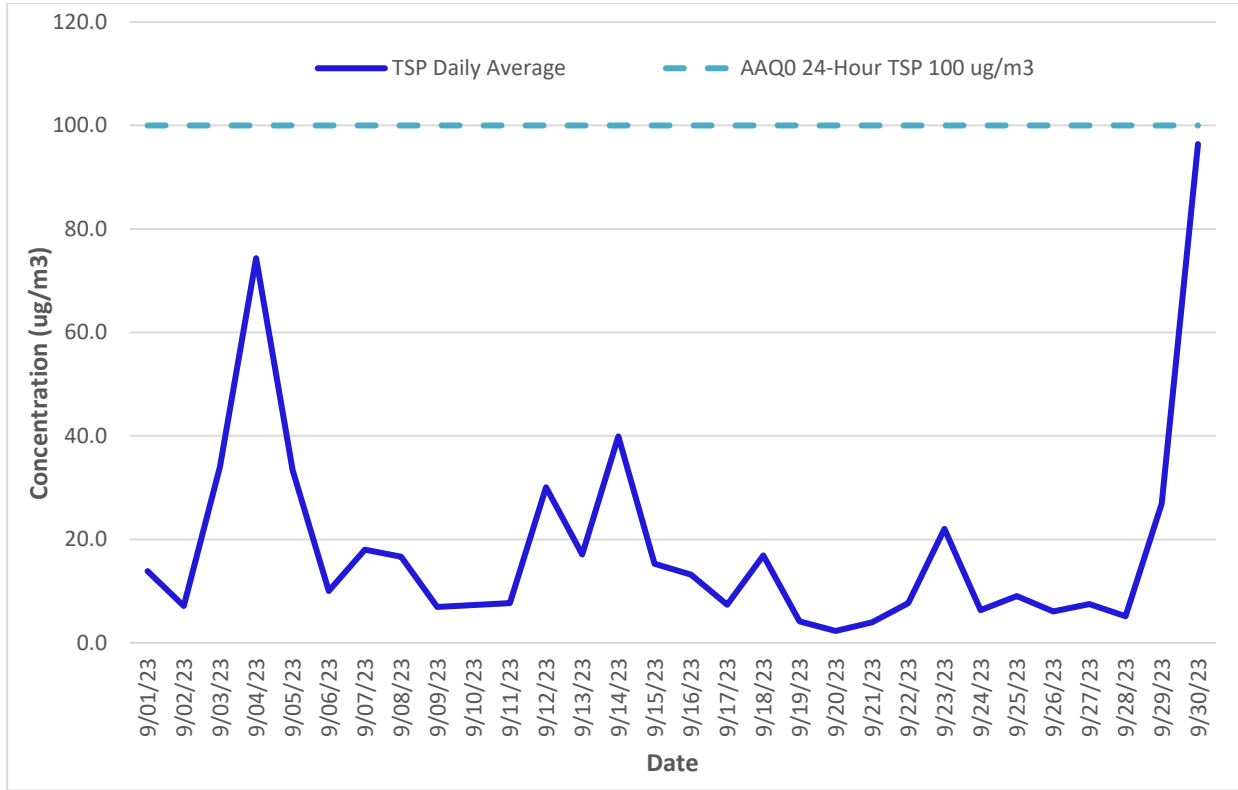


Figure 3. STAR PIT – September 2023 – TSP Daily Particulate Monitoring Results

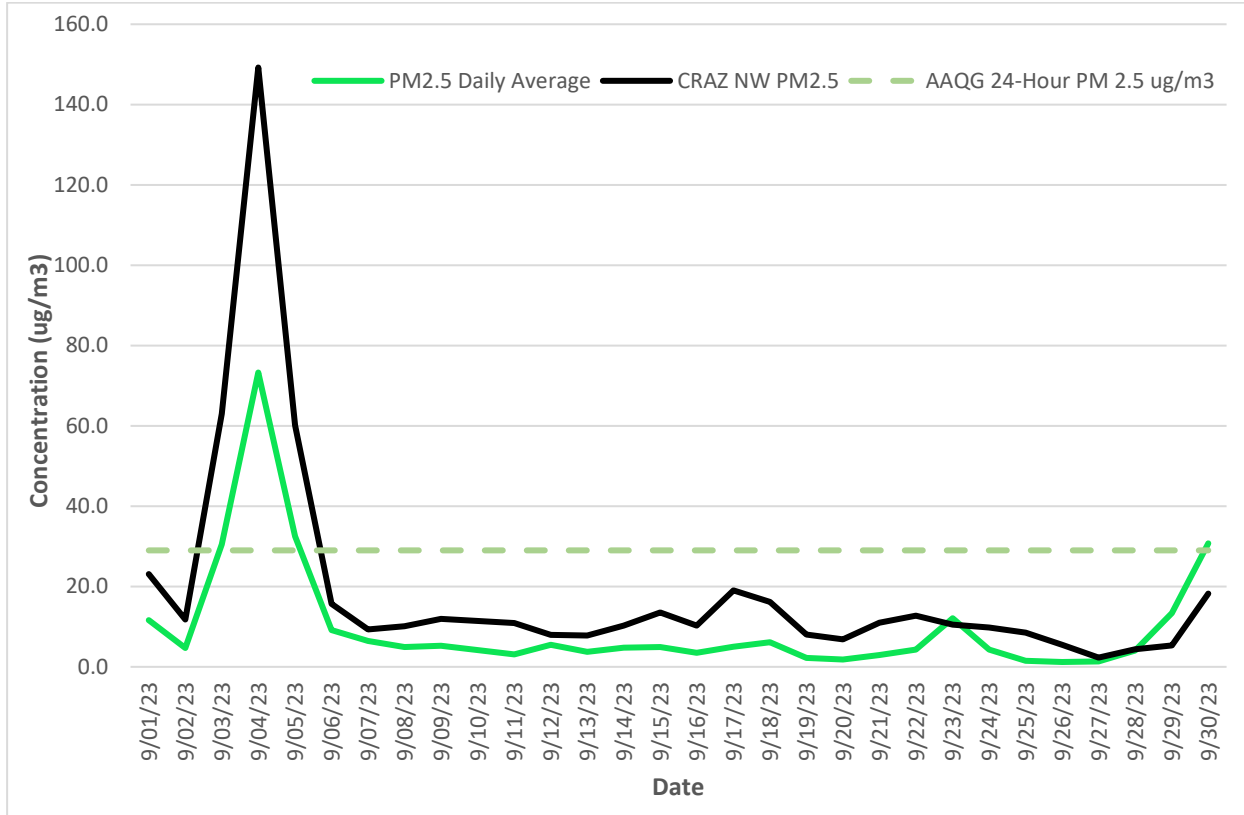


Figure 4. STAR PIT – September 2023 – PM 2.5 Daily Particulate Monitoring Results

As shown in Table 4, from September 1 to 30, 2023 there were 4 exceedances of the 80 $\mu\text{g}/\text{m}^3$ for the PM2.5 Hourly. As shown in Figure 4, for the PM2.5 daily values from the CRAZ data also had very high PM 2.5 values on September 4, 2023. Therefore, it is not anticipated that the cause of the exceedance is from the STAR PIT.

Table 4. STAR PIT – September 2023 – Particulate Exceedances

Date	PM2.5	Wind Speed (Km/hr)	Temperature (°C)	Wind Direction	Hourly Rainfall (mm)	Day/Night
Sep-04-2023 05:00	80.84	6.5	9.5	West	0.80	Night
Sep-04-2023 06:00	97.45	5.4	8.7	North	0.90	Night
Sep-04-2023 07:00	96.60	6.7	8.2	North	0.00	Night
Sep-04-2023 08:00	101.73	5.7	8.1	North	1.60	Day
Sep-04-2023 09:00	82.35	5.5	8.0	North	2.00	Day

4.0 METEOROLOGICAL DATA

4.1 TRAILER

As indicated in Table 5 & Figure 5, the primary wind direction for September 2023 was from the northwest and southeast with moderate to high windspeeds (between 4 – 20 km/hr). The monthly values for the temperature and precipitation can be found in Table 6.

Table 5. STAR PIT Trailer – September 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	0.00%	0.42%	0.14%	0.28%	0.14%	0.00%	0.00%	0.14%	1.11%
4-8	0.97%	2.09%	1.81%	3.06%	2.23%	1.25%	3.89%	3.06%	18.36%
8-12	2.36%	1.95%	0.97%	5.56%	4.87%	2.78%	9.32%	6.95%	34.77%
12-16	0.56%	1.95%	0.56%	3.48%	3.34%	5.70%	2.92%	5.84%	24.34%
16-20	0.00%	1.11%	0.42%	2.92%	1.11%	5.42%	0.42%	1.81%	13.21%
20-24	0.00%	0.70%	0.00%	0.83%	0.00%	2.78%	0.00%	0.00%	4.31%
>24	0.00%	0.28%	0.00%	0.00%	0.00%	3.62%	0.00%	0.00%	3.89%
Grand Total	3.89%	8.48%	3.89%	16.13%	11.68%	21.56%	16.55%	17.80%	100.00%

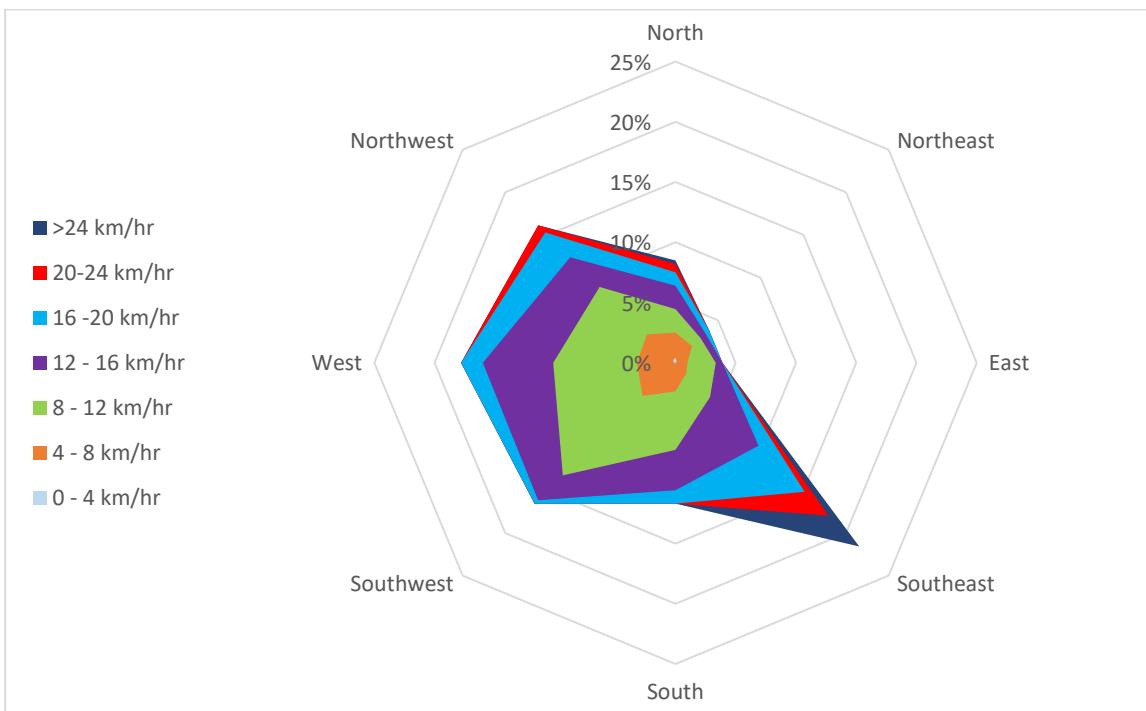


Figure 5. STAR PIT Trailer – September 2023 - Wind Rose

Table 6. STAR PIT Trailer – September 2023 – Wind Data Results

Parameter	Monthly Average	1-Hour	
		Maximum	Minimum
Temperature (°C)	12.9	27.2	1.6
Precipitation (mm)	0.0	9.9	0.0
Total Monthly Precipitation (mm)		28.8	

4.2 OFFICE

As indicated in Table 7 & Figure 6, the primary wind direction for September 2023 was from the west and south with moderate to high windspeeds (between 4 – 24 km/hr). The monthly values for the temperature and precipitation can be found in Table 8.

Table 7. STAR PIT Office – September 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%	0.56%	0.14%	0.42%	0.00%	0.14%	0.28%	0.42%	2.08%
4-8	0.69%	2.22%	2.08%	2.92%	1.67%	0.56%	3.33%	2.50%	15.97%
8-12	2.36%	2.36%	1.11%	3.61%	3.89%	2.50%	4.03%	1.67%	21.53%
12-16	0.14%	2.92%	2.08%	1.94%	6.25%	2.36%	3.33%	3.33%	22.36%
16-20	0.00%	1.94%	0.28%	1.11%	5.97%	1.53%	2.36%	4.44%	17.64%
20-24	0.00%	0.56%	0.00%	0.28%	2.92%	1.39%	0.56%	5.83%	11.53%
>24	0.00%	1.81%	0.00%	0.83%	1.94%	0.42%	0.28%	3.61%	8.89%
Grand Total	3.33%	12.36%	5.69%	11.11%	22.64%	8.89%	14.17%	21.81%	100.00%

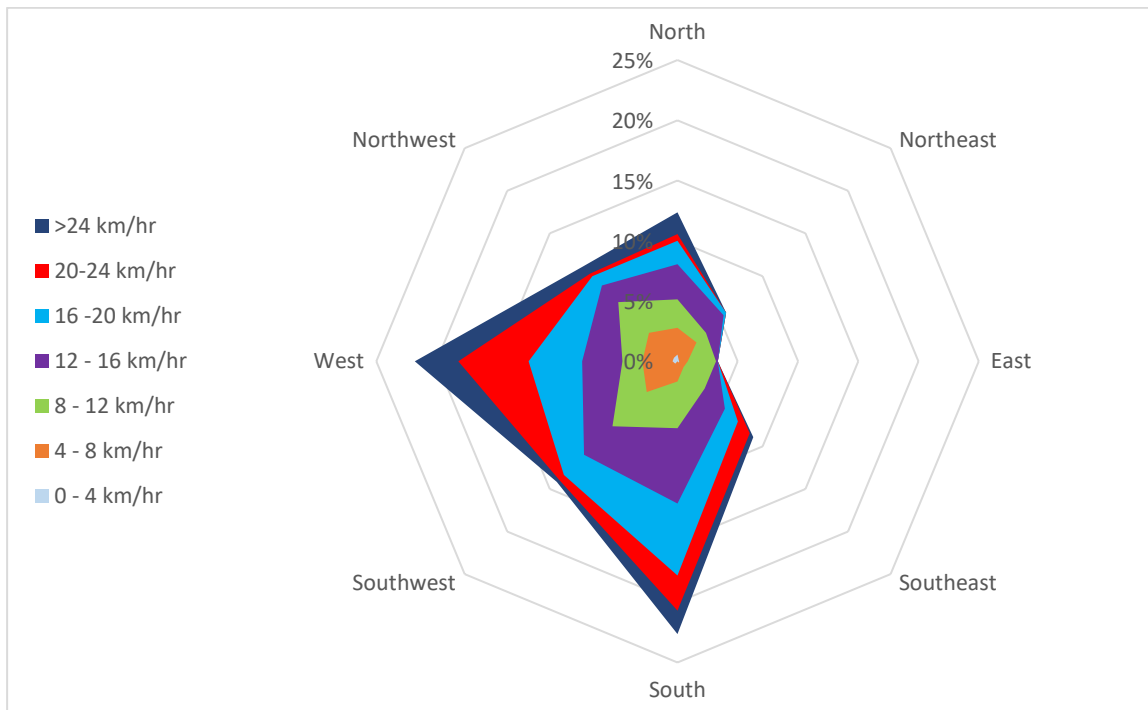


Figure 6. STAR PIT Office – September 2023 - Wind Rose

Table 8. STAR PIT Office – September 2023 – Wind Data Results

Parameter	Monthly Average	1-Hour	
		Maximum	Minimum
Temperature (°C)	12.7	25.9	1.8
Precipitation (mm)	0.0	3.2	0.0
Total Monthly Precipitation (mm)		12.9	

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