Northern Bus Garage
Noise, Vibration, and Dust Monitoring Report (November 2024)

Noise, Vibration, and Dust levels were monitored as part of the reconstruction of Northern Bus Garage, 4615 14th Street, NW, Washington, DC, for the month of November 2024.

The following memorandum identifies the monitoring points and instruments, presents the data, and provides a brief analysis of the results per monthly monitoring report attached by Geo Instruments for Clark Construction. The report is organized by medium: noise, vibration, and dust. Figures and graphs are attached. The red dashed line on each of the graphs represents the monitoring thresholds, which are summarized below for each instrument.

Noise Monitoring

Five noise monitors are positioned around the perimeter of the project site. (See Figure 1) Under DC regulations, the regulatory standard is 80 dBA, measured 25 ft from the property line (20 DCMR 2802.1). Because the noise monitoring devices are placed on the property line (rather than a 25 ft offset), the monitoring threshold for site activities is adjusted to 85 dBA (assuming the noise level will dissipate). Noise levels and vibration levels were measured automatically with Micromate and Geophone Instrument.

No operating issue with the monitoring instruments was identified.

Numerous noise level exceedances at all hours of the day and all days of the week. Mic5 recorded its loudest exceedance outside of working hours. Mic3 recorded over half of its exceedances out of working hours.
Please see table 1 (The "Work Hours" category includes all weekend shifts and evening shifts that were worked during the month).

Vibration Monitoring

Five vibration monitors are positioned around the perimeter of the project site. (See Figure 1) Vibration thresholds are based the WMATA Design Criteria. Monitors VM-1 and VM-2 are set at a lower vibration threshold due to their proximity to the historic façade, which is more sensitive to any movement. Noise levels and vibration levels were measured automatically with Micromate and Geophone Instrument.

Table 2

Instrument Type	Monitoring Threshold
Vibration Monitor (VM-1)	0.2 in/sec
Vibration Monitor (VM-2)	0.2 in/sec
Vibration Monitor (VM-3)	2.0 in/sec
Vibration Monitor (VM-4)	2.0 in/sec
Vibration Monitor (VM-5)	2.0 in/sec

No operating issue with the monitoring instruments was identified.

Graphs showing monitoring results are presented in Graphs 1 to 5.

There were 117 vibration exceedances in the month of November. Utility subcontractor is installing new water line. Installation includes hammering of roadway, excavating of trench, backfilling/vibratory rolling of new fill material. This operation took place in proximity to monitoring stations along 14th Street on the dates with exceedances (11/1, 11/4, 11/5, 11/6, 11/7, 11/8, 11/12, 11/13).

- VM1 – Exceedance with a reading of 0.27 in/sec on November 1 at 14:04.
- VM1 – Exceedance with a reading of 0.48 in/sec on November 4 at 10:12.
- VM1 – Exceedance with a reading of 0.30 in/sec on November 4 at 10:12.
- VM1 – Exceedance with a reading of 0.48 in/sec on November 4 at 10:14.
- VM1 – Exceedance with a reading of 0.20 in/sec on November 4 at 10:15.
- VM1 – Exceedance with a reading of 0.28 in/sec on November 4 at 10:16.
- VM1 – Exceedance with a reading of 0.25 in/sec on November 4 at 10:17.
- VM1 – Exceedance with a reading of 0.27 in/sec on November 4 at 10:18.
- VM1 – Exceedance with a reading of 0.25 in/sec on November 4 at 10:19.
- VM1 – Exceedance with a reading of 0.23 in/sec on November 4 at 10:20.
- VM1 – Exceedance with a reading of 0.26 in/sec on November 4 at 10:21.
- VM1 – Exceedance with a reading of 0.28 in/sec on November 4 at 10:22.
- VM1 – Exceedance with a reading of 0.50 in/sec on November 4 at 10:23.

- VM1 – Exceedance with a reading of 0.39 in/sec on November 4 at 10:24.
- VM1 – Exceedance with a reading of 0.30 in/sec on November 4 at 10:25.
- VM1 – Exceedance with a reading of 0.22 in/sec on November 4 at 10:26.
- VM1 – Exceedance with a reading of 0.27 in/sec on November 4 at 12:40.
- VM1 – Exceedance with a reading of 0.32 in/sec on November 4 at 12:48.
- VM1 – Exceedance with a reading of 0.31 in/sec on November 4 at 13:01.
- VM1 – Exceedance with a reading of 0.43 in/sec on November 4 at 13:22.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 4 at 13:24.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 4 at 14:00.
- VM1 – Exceedance with a reading of 0.23 in/sec on November 5 at 13:42.
- VM1 – Exceedance with a reading of 0.27 in/sec on November 5 at 16:26.
- VM1 – Exceedance with a reading of 0.25 in/sec on November 5 at 16:35.
- VM1 – Exceedance with a reading of 0.26 in/sec on November 6 at 08:36.
- VM1 – Exceedance with a reading of 0.42 in/sec on November 6 at 13:58.
- VM1 – Exceedance with a reading of 1.38 in/sec on November 6 at 14:00.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 08:59.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 09:40.
- VM1 – Exceedance with a reading of 0.20 in/sec on November 7 at 09:41.
- VM1 – Exceedance with a reading of 0.22 in/sec on November 7 at 09:42.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 09:44.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 10:04.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 10:06.
- VM1 – Exceedance with a reading of 0.25 in/sec on November 7 at 10:08.
- VM1 – Exceedance with a reading of 0.27 in/sec on November 7 at 10:13.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 10:51.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 10:53.
- VM1 – Exceedance with a reading of 0.25 in/sec on November 7 at 10:56.
- VM1 – Exceedance with a reading of 0.22 in/sec on November 7 at 10:58.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 11:00.
- VM1 – Exceedance with a reading of 0.25 in/sec on November 7 at 11:04.
- VM1 – Exceedance with a reading of 0.21 in/sec on November 7 at 13:42.
- VM1 – Exceedance with a reading of 0.25 in/sec on November 8 at 15:12.
- VM1 – Exceedance with a reading of 0.27 in/sec on November 8 at 15:14.
- VM2 – Exceedance with a reading of 0.22 in/sec on November 8 at 08:35.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 8 at 08:36.
- VM2 – Exceedance with a reading of 0.30 in/sec on November 8 at 08:37.
- VM2 – Exceedance with a reading of 0.36 in/sec on November 8 at 08:38.
- VM2 – Exceedance with a reading of 0.28 in/sec on November 8 at 08:39.
- VM2 – Exceedance with a reading of 0.25 in/sec on November 8 at 08:39.
- VM2 – Exceedance with a reading of 0.38 in/sec on November 8 at 08:40.
- VM2 – Exceedance with a reading of 0.78 in/sec on November 8 at 08:41.
- VM2 – Exceedance with a reading of 0.38 in/sec on November 8 at 08:42.
- VM2 – Exceedance with a reading of 0.26 in/sec on November 8 at 08:43.
- VM2 – Exceedance with a reading of 0.20 in/sec on November 8 at 08:43.
- VM2 – Exceedance with a reading of 0.26 in/sec on November 8 at 10:37.
- VM2 – Exceedance with a reading of 0.23 in/sec on November 8 at 10:38.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 8 at 11:17.
- VM2 – Exceedance with a reading of 0.23 in/sec on November 8 at 11:22.
- VM2 – Exceedance with a reading of 0.43 in/sec on November 8 at 11:23.
- VM2 – Exceedance with a reading of 0.22 in/sec on November 8 at 12:37.
- VM2 – Exceedance with a reading of 0.26 in/sec on November 8 at 14:12.
- VM2 – Exceedance with a reading of 0.30 in/sec on November 8 at 15:09.
- VM2 – Exceedance with a reading of 0.60 in/sec on November 8 at 15:26.
- VM2 – Exceedance with a reading of 0.24 in/sec on November 8 at 15:29.
- VM2 – Exceedance with a reading of 0.27 in/sec on November 8 at 16:07.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 08:13.
- VM2 – Exceedance with a reading of 0.28 in/sec on November 12 at 08:14.
- VM2 – Exceedance with a reading of 0.35 in/sec on November 12 at 08:15.
- VM2 – Exceedance with a reading of 0.20 in/sec on November 12 at 08:16.

- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 08:17.
- VM2 – Exceedance with a reading of 0.22 in/sec on November 12 at 08:18.
- VM2 – Exceedance with a reading of 0.20 in/sec on November 12 at 08:19.
- VM2 – Exceedance with a reading of 0.33 in/sec on November 12 at 09:08.
- VM2 – Exceedance with a reading of 0.78 in/sec on November 12 at 09:11.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 09:12.
- VM2 – Exceedance with a reading of 0.25 in/sec on November 12 at 09:16.
- VM2 – Exceedance with a reading of 0.22 in/sec on November 12 at 09:18.
- VM2 – Exceedance with a reading of 0.46 in/sec on November 12 at 09:19.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 09:37.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 10:41.
- VM2 – Exceedance with a reading of 0.31 in/sec on November 12 at 13:48.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 15:46.
- VM2 – Exceedance with a reading of 0.24 in/sec on November 12 at 15:47.
- VM2 – Exceedance with a reading of 0.25 in/sec on November 12 at 15:47.
- VM2 – Exceedance with a reading of 0.26 in/sec on November 12 at 15:48.
- VM2 – Exceedance with a reading of 0.24 in/sec on November 12 at 15:49.
- VM2 – Exceedance with a reading of 0.25 in/sec on November 12 at 15:50.
- VM2 – Exceedance with a reading of 0.33 in/sec on November 12 at 16:03.
- VM2 – Exceedance with a reading of 0.28 in/sec on November 12 at 16:03.
- VM2 – Exceedance with a reading of 0.32 in/sec on November 12 at 16:04.
- VM2 – Exceedance with a reading of 0.27 in/sec on November 12 at 16:05.
- VM2 – Exceedance with a reading of 0.32 in/sec on November 12 at 16:06.
- VM2 – Exceedance with a reading of 0.29 in/sec on November 12 at 16:06.
- VM2 – Exceedance with a reading of 0.31 in/sec on November 12 at 16:07.
- VM2 – Exceedance with a reading of 0.24 in/sec on November 12 at 16:17.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 16:19.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 16:21.
- VM2 – Exceedance with a reading of 0.30 in/sec on November 12 at 16:21.
- VM2 – Exceedance with a reading of 0.21 in/sec on November 12 at 16:22.
- VM2 – Exceedance with a reading of 0.26 in/sec on November 12 at 16:23.
- VM2 – Exceedance with a reading of 0.32 in/sec on November 12 at 16:24.
- VM2 – Exceedance with a reading of 0.32 in/sec on November 12 at 16:25.
- VM2 – Exceedance with a reading of 0.45 in/sec on November 12 at 16:26.
- VM2 – Exceedance with a reading of 0.23 in/sec on November 12 at 16:27.
- VM2 – Exceedance with a reading of 0.39 in/sec on November 12 at 16:36.
- VM2 – Exceedance with a reading of 0.25 in/sec on November 13 at 13:19.
- VM2 – Exceedance with a reading of 0.30 in/sec on November 13 at 14:09.
- VM2 – Exceedance with a reading of 0.20 in/sec on November 13 at 14:11.
- VM2 – Exceedance with a reading of 0.31 in/sec on November 13 at 14:18.
- VM2 – Exceedance with a reading of 0.39 in/sec on November 13 at 15:56.
- VM2 – Exceedance with a reading of 0.26 in/sec on November 13 at 16:03.
- VM2 – Exceedance with a reading of 0.27 in/sec on November 13 at 16:06.
- VM2 – Exceedance with a reading of 0.22 in/sec on November 13 at 16:07.
- VM2 – Exceedance with a reading of 0.28 in/sec on November 13 at 16:08.

Dust Monitoring Threshold Values and Exceedances:

Three dust monitors are positioned at the project site. (See Figure 2) EPA regulatory thresholds are based on a 24-hour monitoring period; the project has adopted thresholds to monitor site levels and provide an indication of when EPA standards might be exceeded. (See Table 3) Dust measurements were monitored using Aeroqual Dust Sentry Pro.

Table 3

Dust Monitoring Measurement	Monitoring Threshold
Particulates (PM2.5)	40 µg/m^3
Particulates (PM10)	50 µg/m^3

No operating issue with the monitoring instruments was identified.

Graphs showing monitoring results are presented in Graphs 6 to 11.

There were six (6) Air Quality exceedances in the month of November.

- DM2 – Exceedance of the PM2.5 limit on 11/13 at 15:48 with a reading of 53 µg/m^3.
    - Weather history shows sustained wind during this period.
- DM2 – Exceedance of the PM10 limit on 11/13 at 15:48 with a reading of 57 µg/m^3.
    - Weather history shows sustained wind during this period.
- DM1 – Exceedance of the PM2.5 limit on 11/20 at 08:00 with a reading of 52 µg/m^3.
    - Weather history shows sustained wind on this date.
- DM1 – Exceedance of the PM10 limit on 11/20 at 08:00 with a reading of 55 µg/m^3.
    - Weather history shows sustained wind on this date.
- DM3 – Exceedance of the PM2.5 limit on 11/21 at 15:34 with a reading of 69 µg/m^3.
    - Weather history shows wind gusts of 22 MPH during this period.
- DM3 – Exceedance of the PM10 limit on 11/21 at 15:34 with a reading of 73 µg/m^3.
    - Weather history shows wind gusts of 22 MPH during this period.

Figure 1: Vibration and Noise Monitor Location Plan

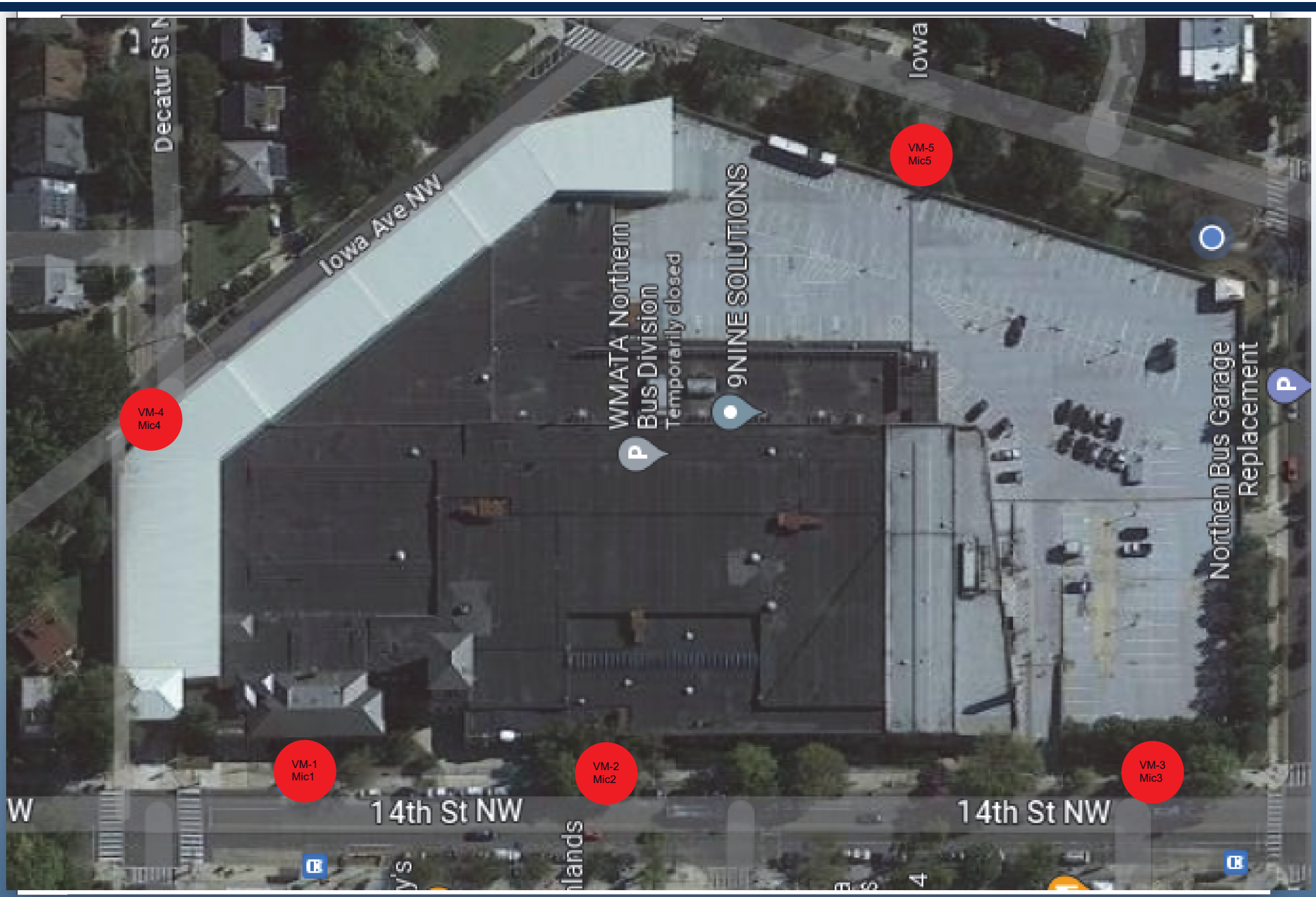


Figure 2: Dust Monitor Location Plan

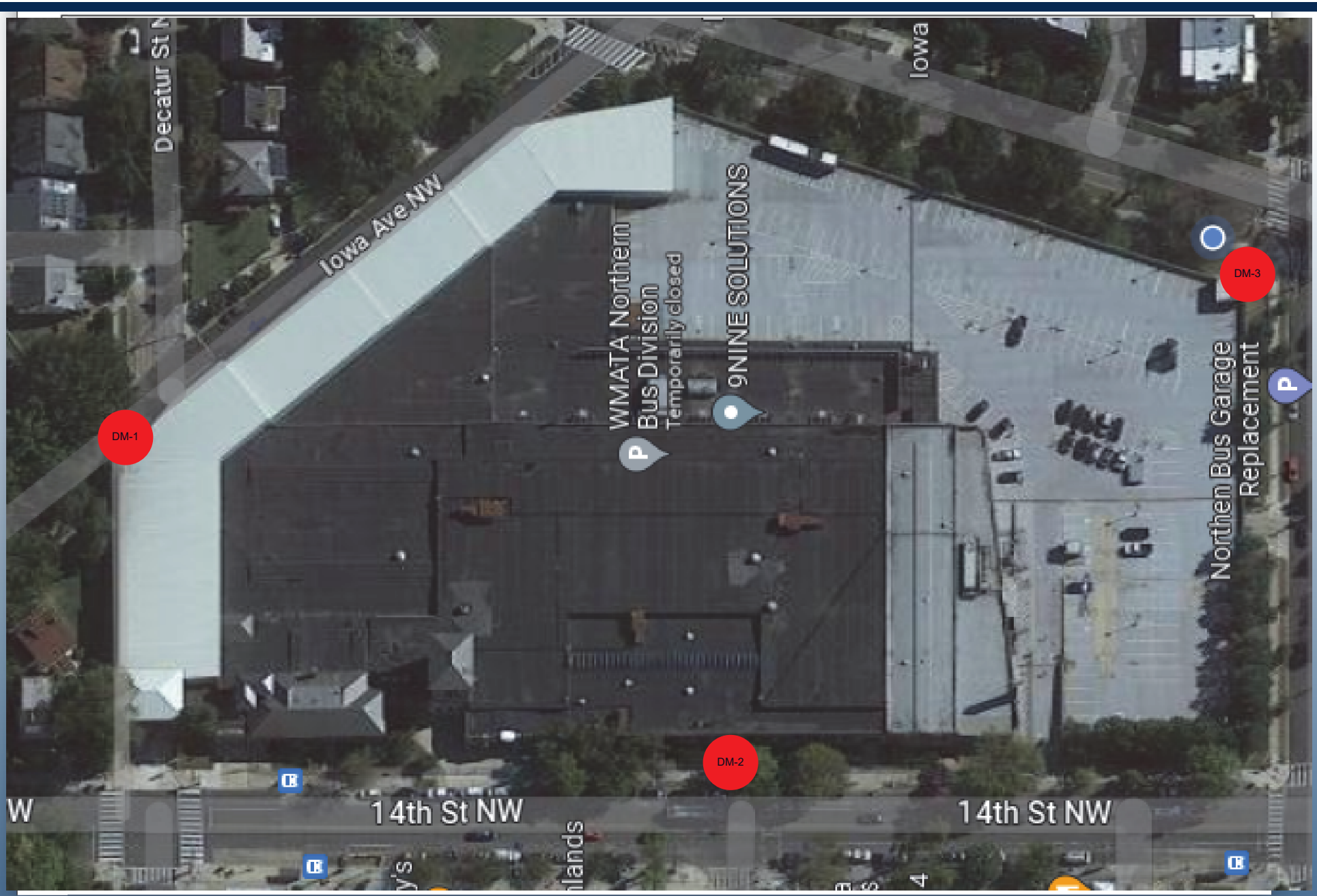


Table 1: Noise Summaries

VM1-MIC		
	Exceedance	Percentage
Work hours	387	74.42%
After hours	31	5.96%
Weekends	102	19.62%
Total	520	100%

VM1-MIC			
	Work hours	After hours	Weekends
Lmax (dBA)	110	104.7	107.4
Lmin (dBA)	93.9	55.5	51.2
L10 (dBA)	105	70	69
L90 (dBA)	98	58	56
Leq (dBA)	101	72.8	79.4

VM2-MIC		
	Exceedance	Percentage
Work hours	403	77.95%
After hours	35	6.77%
Weekends	79	15.28%
Total	517	100%

VM2-MIC			
	Work hours	After hours	Weekends
Lmax (dBA)	110.7	105	108.6
Lmin (dBA)	93.5	60.6	51.1
L10 (dBA)	102	91	67
L90 (dBA)	96	64	54
Leq (dBA)	98.9	88.9	80.1

VM3-MIC		
	Exceedance	Percentage
Work hours	404	44.74%
After hours	210	23.26%
Weekends	289	32.00%
Total	903	100%

VM3-MIC			
	Work hours	After hours	Weekends
Lmax (dBA)	108	105.4	108
Lmin (dBA)	65	56.5	54.3
L10 (dBA)	76	73	76
L90 (dBA)	67	62	57
Leq (dBA)	77.3	77	78.3

VM4-MIC		
	Exceedance	Percentage
Work hours	451	84.93%
After hours	27	5.08%
Weekends	53	9.98%
Total	531	100%

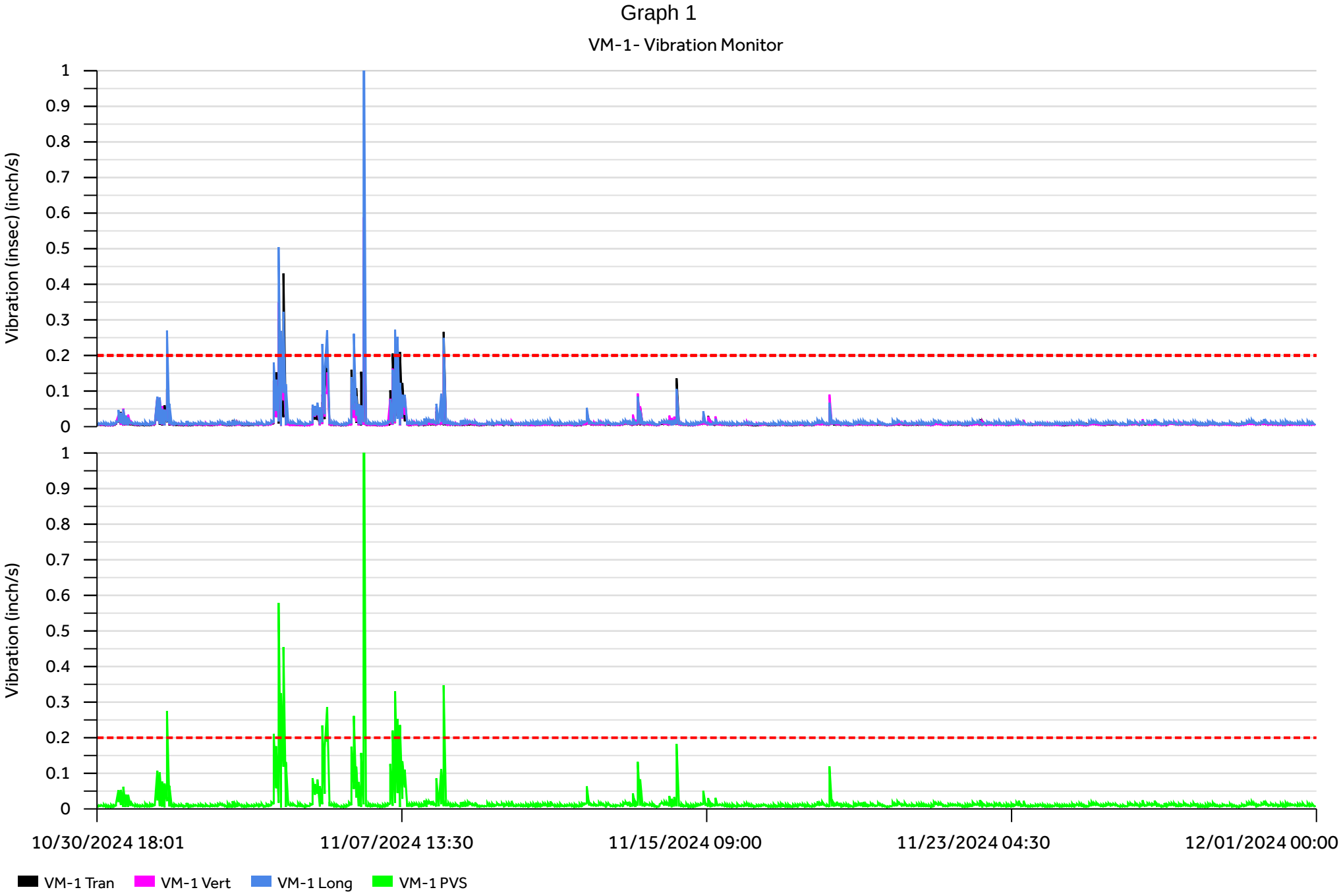
VM4-MIC			
	Work hours	After hours	Weekends
Lmax (dBA)	108.6	101.2	100.2
Lmin (dBA)	71.8	53.1	54.5
L10 (dBA)	86	69	69
L90 (dBA)	77	56	57
Leq (dBA)	82	73.3	74.6

VM5-MIC		
	Exceedance	Percentage
Work hours	267	67.77%
After hours	43	10.91%
Weekends	84	21.32%
Total	394	100%

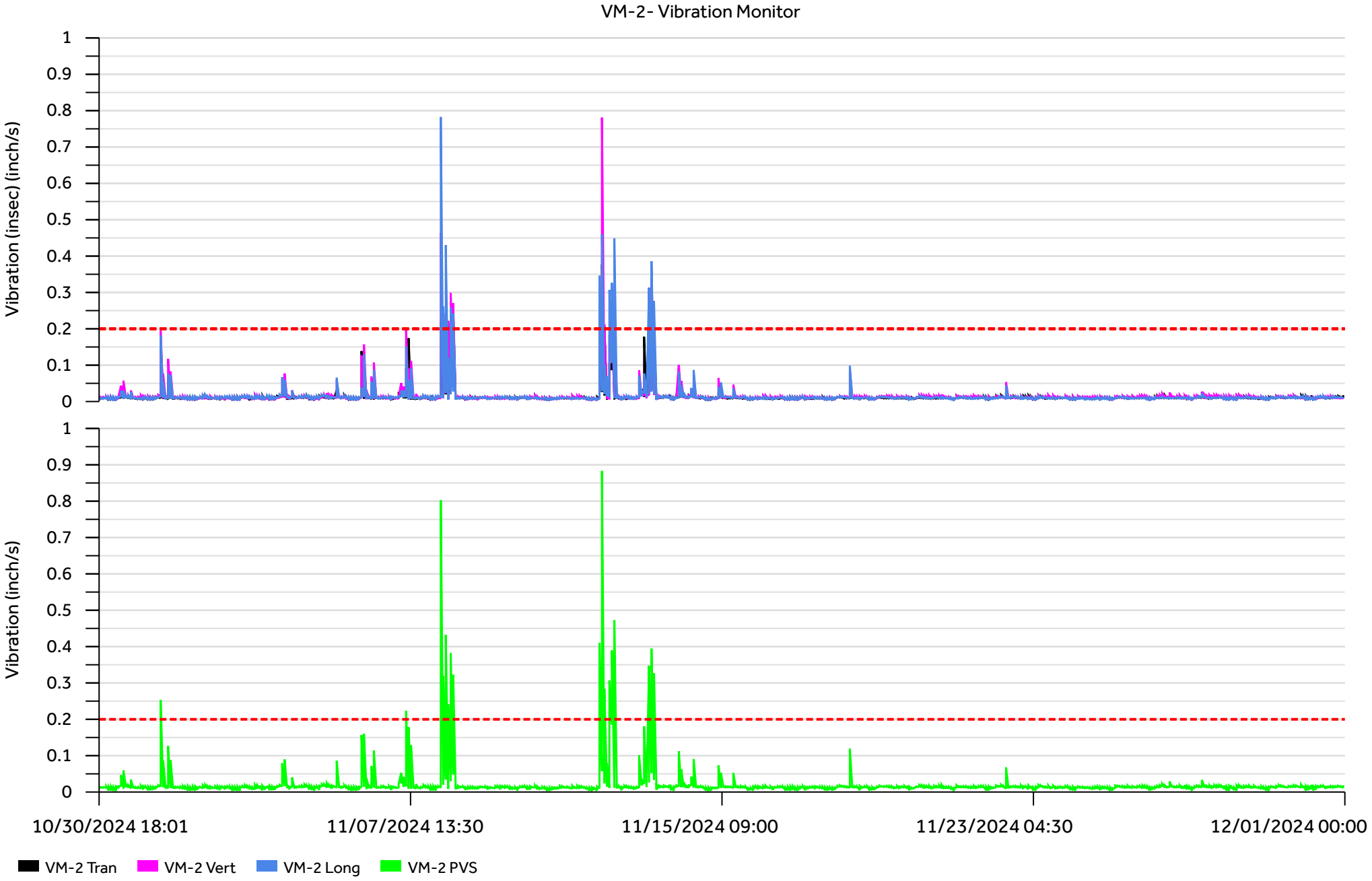
VM5-MIC			
	Work hours	After hours	Weekends
Lmax (dBA)	108	106.3	111.8
Lmin (dBA)	60.9	44.4	54.5
L10 (dBA)	84	68	68
L90 (dBA)	65	51	56
Leq (dBA)	80.1	74.6	84.8

Summary tables contain values for working hours, after hours, and weekend time periods:

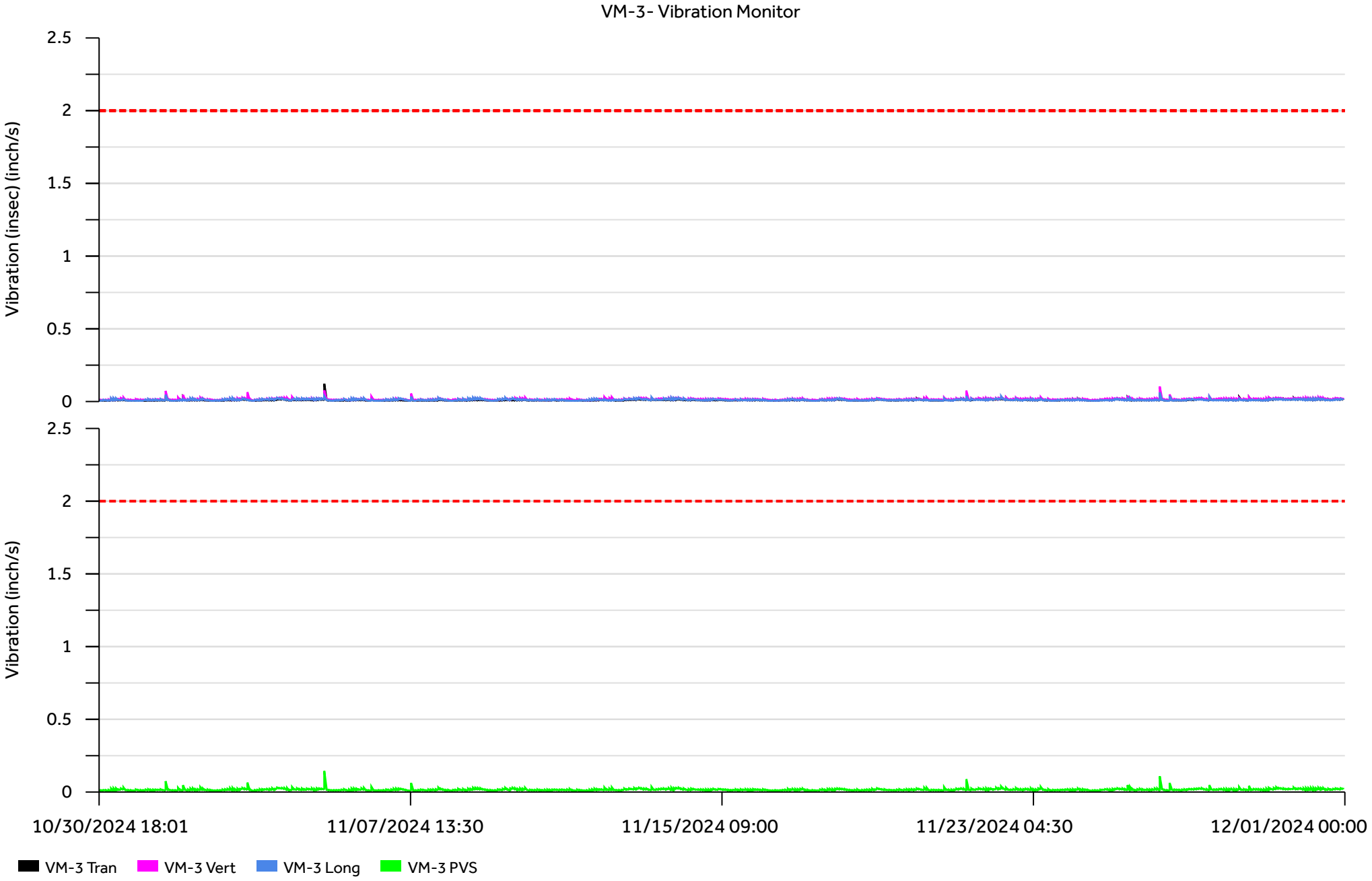
- Lmax: Highest Maximum Noise Level recorded for the month, in dBA.
- Lmin: Highest Minimum Noise Level recorded for the month, in dBA.
- L10: Highest noise level that was exceeded 10% of the time of all recording periods this month, in dBA.
- L90: Highest noise level that was exceeded 90% of the time of all recording periods this month, in dBA.
- Leq: Highest Equivalent Continuous Sound Level, or 'average' of all recording periods this month, in dBA.


Graph 1
VM-1- Vibration Monitor
Vibration (insec) (inch/s)
Vibration (inch/s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
VM-1 Tran
VM-1 Vert
VM-1 Long
VM-1 PVS

Graph 2

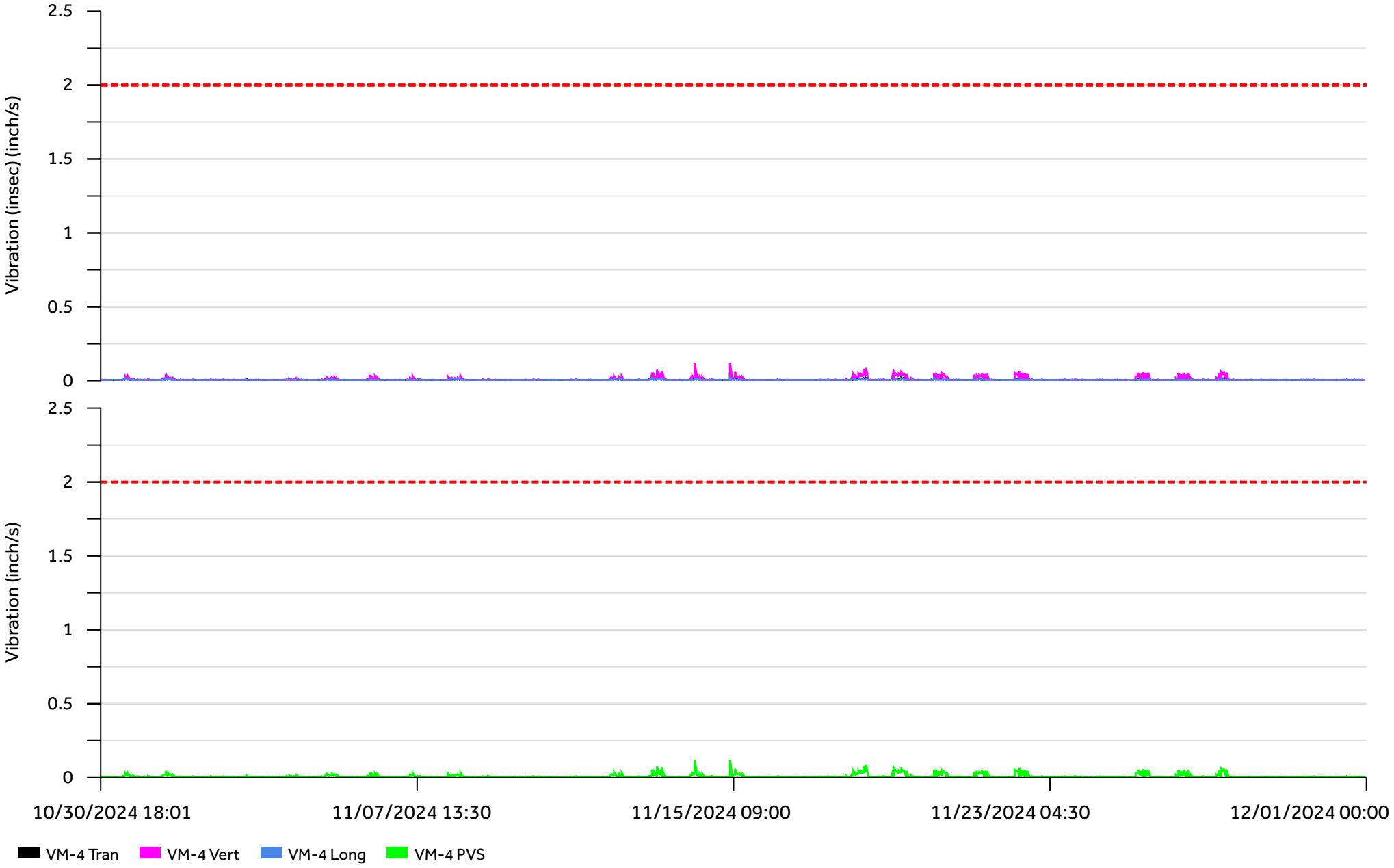

VM-2- Vibration Monitor
Vibration (insec) (inch/s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Vibration (inch/s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
VM-2 Tran
VM-2 Vert
VM-2 Long
VM-2 PVS

Graph 3

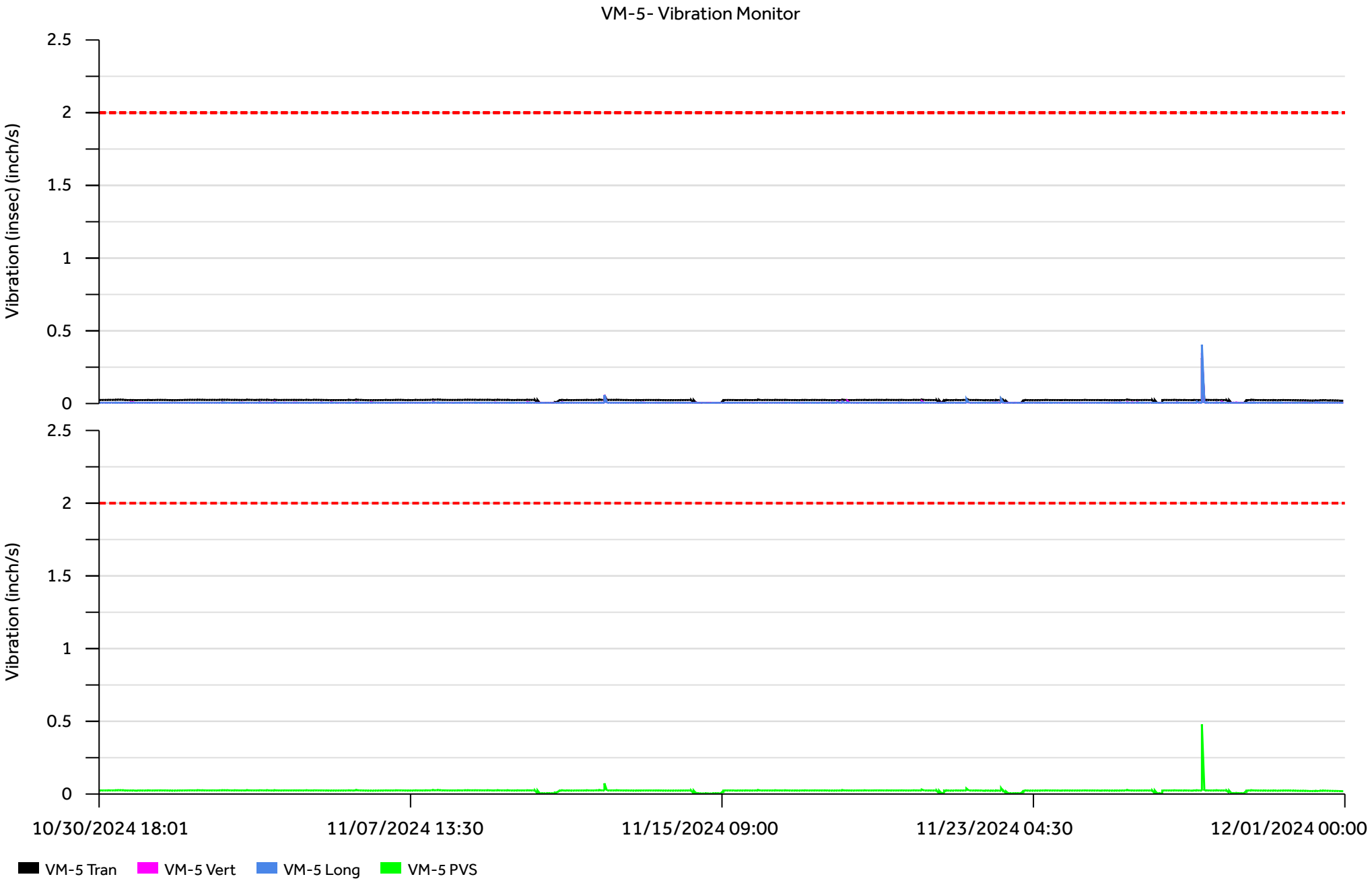

VM-3- Vibration Monitor
Vibration (insec) (inch/s)
2.5
2
1.5
1
0.5
0
Vibration (inch/s)
2.5
2
1.5
1
0.5
0
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
VM-3 Tran
VM-3 Vert
VM-3 Long
VM-3 PVS

Graph 4

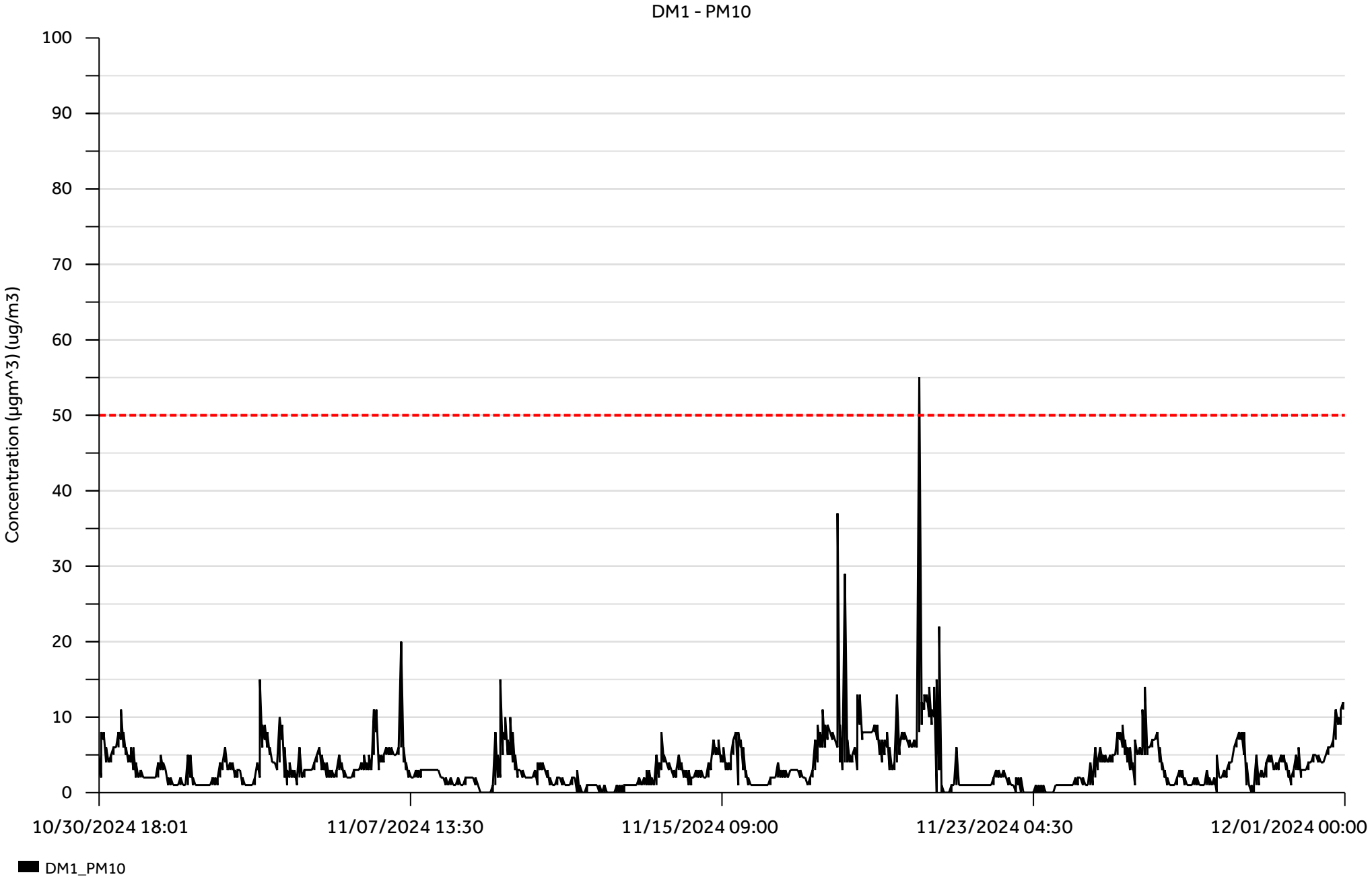
VM-4- Vibration Monitor



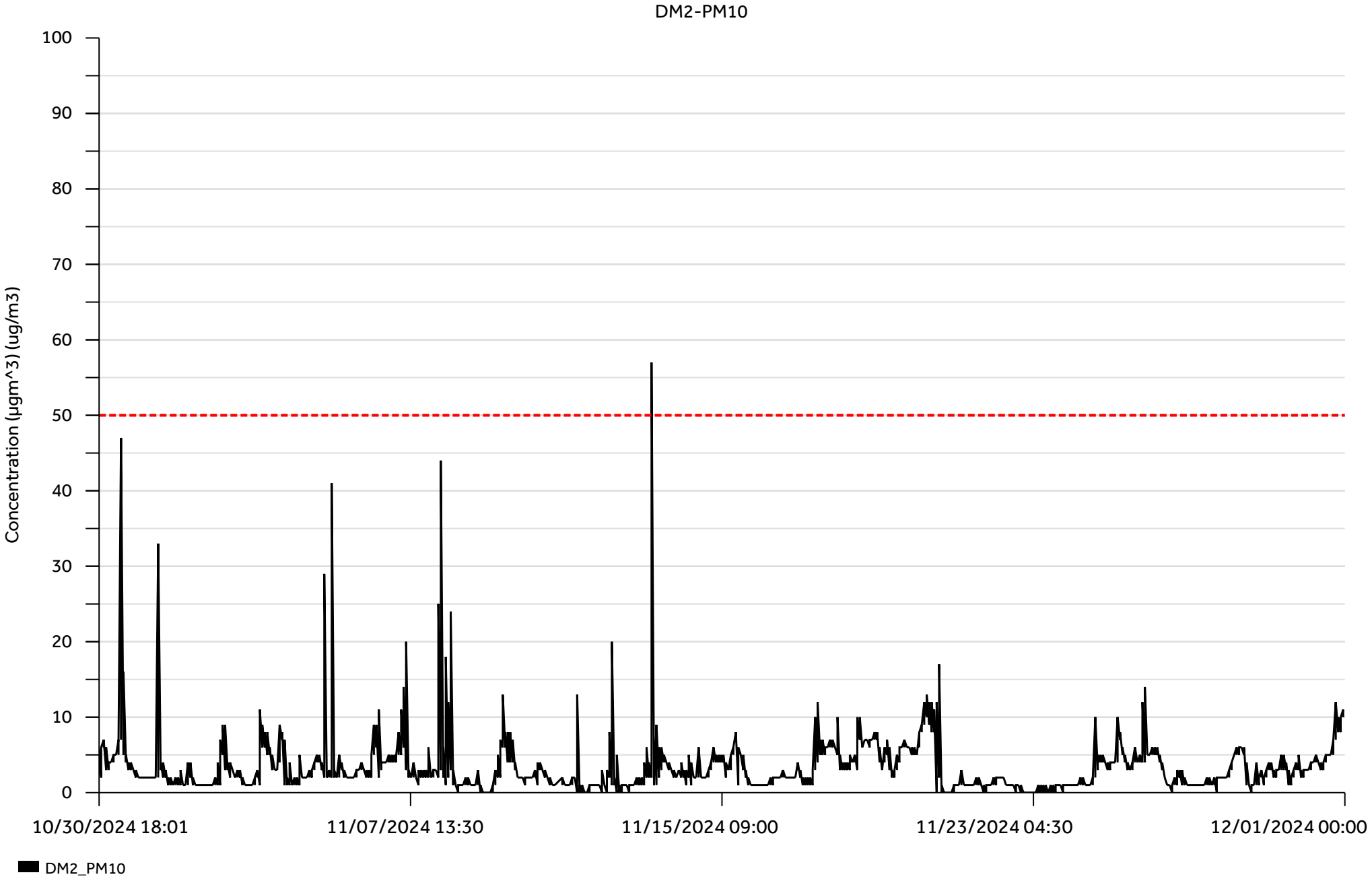
Graph 5


VM-5- Vibration Monitor
Vibration (insec) (inch/s)
2.5
2
1.5
1
0.5
0
Vibration (inch/s)
2.5
2
1.5
1
0.5
0
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
VM-5 Tran
VM-5 Vert
VM-5 Long
VM-5 PVS

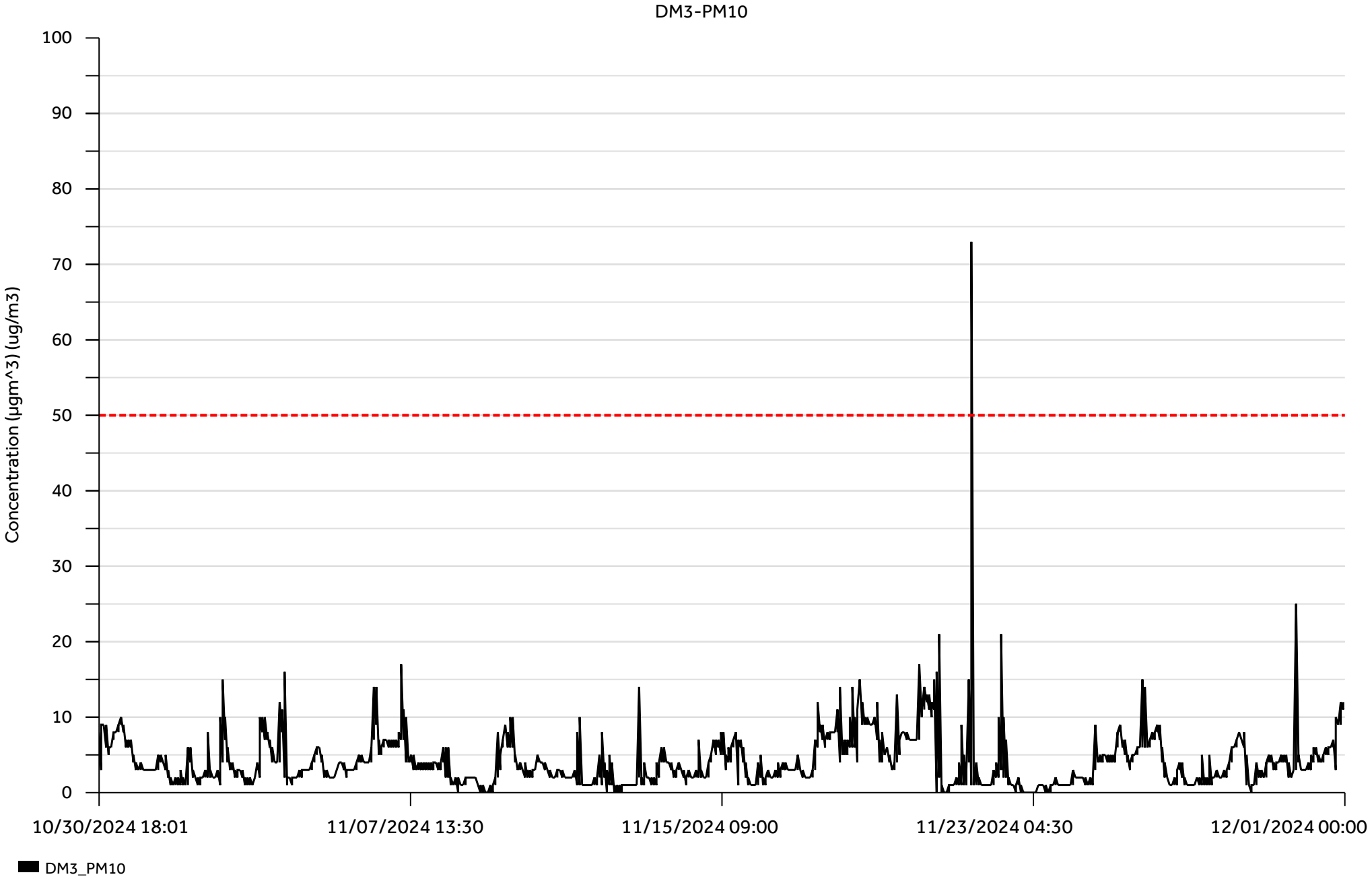
Graph 6


DM1 - PM10
Concentration (µgm^3) (ug/m3)
100
90
80
70
60
50
40
30
20
10
0
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
DM1_PM10

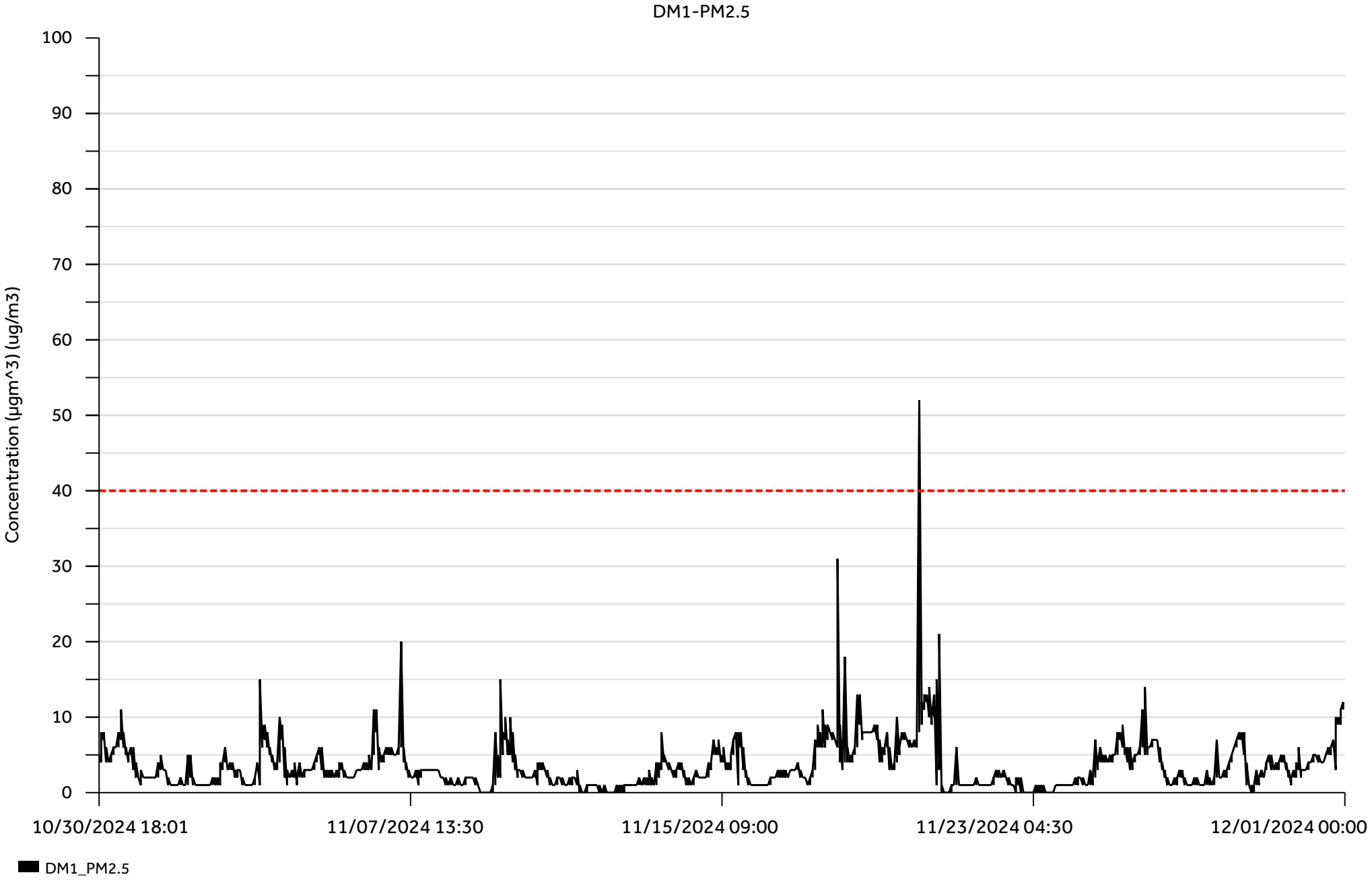
Graph 7


DM2-PM10
100
90
80
70
60
50
40
30
20
10
0
Concentration (µgm^3) (ug/m3)
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
DM2_PM10

Graph 8

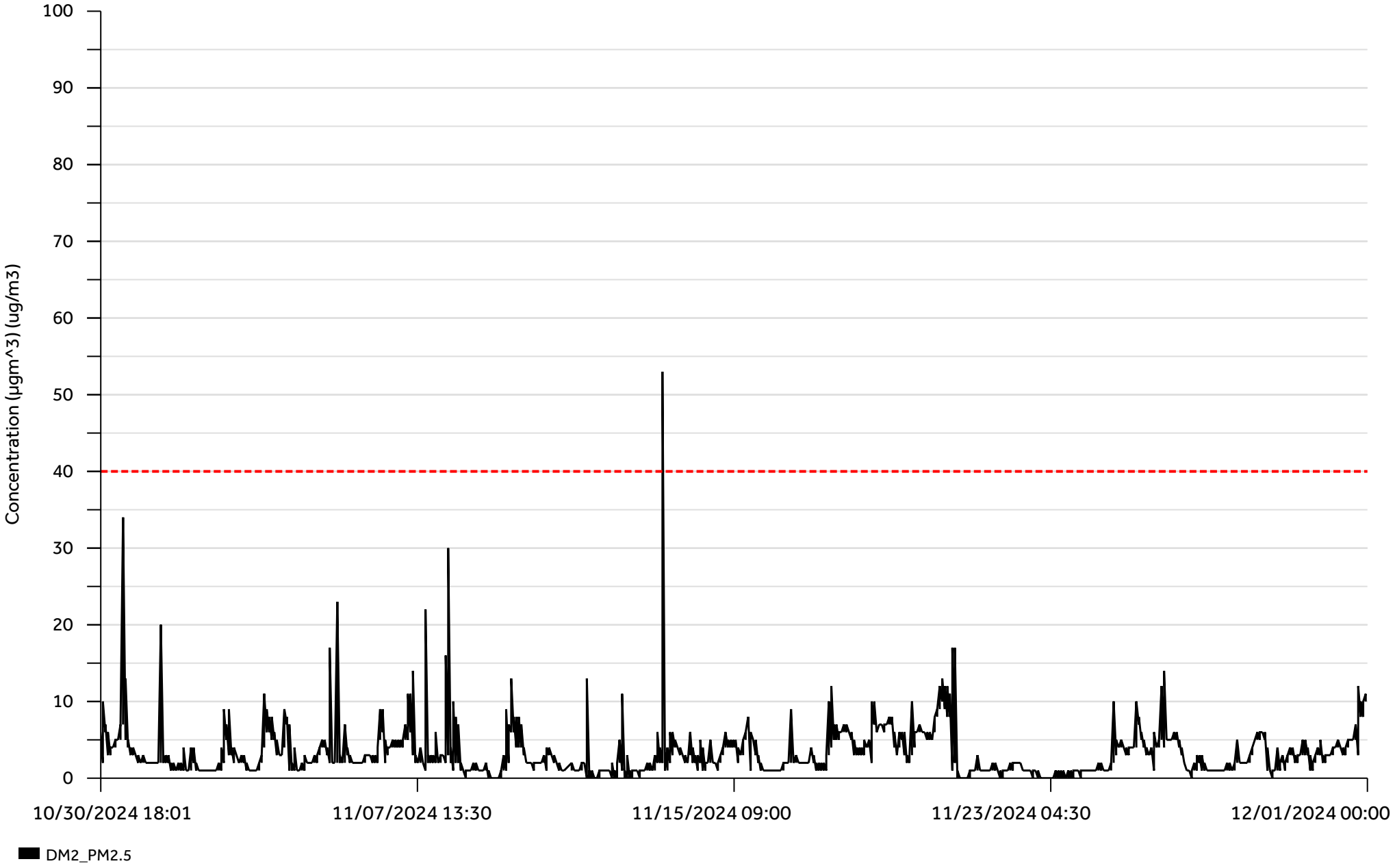

DM3-PM10
Concentration (µgm^3) (ug/m3)
100
90
80
70
60
50
40
30
20
10
0
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
DM3_PM10

Graph 9

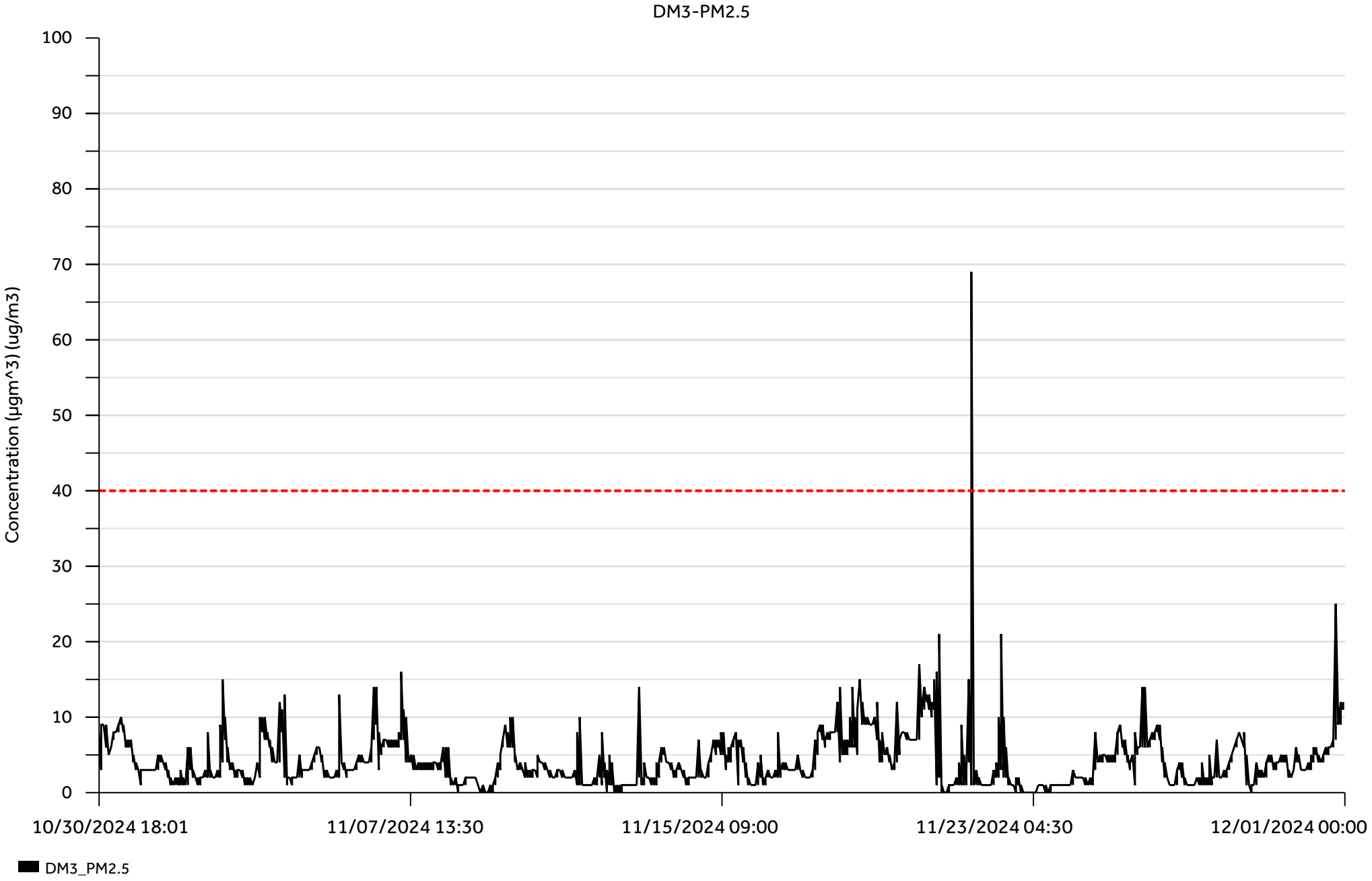

DM1-PM2.5
Concentration (µgm^3) (ug/m3)
100
90
80
70
60
50
40
30
20
10
0
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
DM1_PM2.5

Graph 10

DM2-PM2.5



Graph 11


DM3-PM2.5
100
90
80
70
60
50
40
30
20
10
0
Concentration (µgm^3) (ug/m3)
10/30/2024 18:01
11/07/2024 13:30
11/15/2024 09:00
11/23/2024 04:30
12/01/2024 00:00
DM3_PM2.5