



**REPORT**

**METRO VANCOUVER ANNUAL AIR PERMIT REPORTING**

*Neptune Bulk Terminal Ltd*

Prepared for:

**Neptune Bulk Terminal Ltd.**

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**Envirochem Project No.: 8005-24**

**Reporting Period: 2023**

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## 1.0 BACKGROUND

To meet Metro Vancouver Air Permit GVA0081 (issued September 23<sup>rd</sup>, 2016) requirements, Neptune Bulk Terminals Ltd. (Neptune) has implemented a procedure for periodic permit reporting requirements to Metro Vancouver including this annual reporting.

Fulfilling these requirements requires processing and checking large amounts of data. The procedures in this report provide an efficient means of processing large amounts of data and ensuring that all calculations and outputs generated are completed accurately. In order to increase the efficiency of this process, Neptune has implemented a data management system which allows for uploading of data to the Neptune database and generation of outputs. Envirochem Services Inc. (Envirochem) has been retained to calculate, tabulate and report these requirements to Metro Vancouver and ensure that:

- Raw data being collected and used for generating outputs is valid,
- Correct methodologies are used to generate these outputs, and
- Any outputs being generated undergo quality assurance/quality control (QA/QC) before being submitted electronically to Metro Vancouver.

All of the procedures contained within this report detail methodologies in conformance with Section 3 Schedules A and B of the current version of the permit (September 23<sup>rd</sup>, 2016).

This report includes annual ambient air quality monitoring reporting requirements.

## 2.0 AMBIENT AIR QUALITY MONITORING PROGRAM

### 2.1 WIND MONITORING DATA ANALYSIS

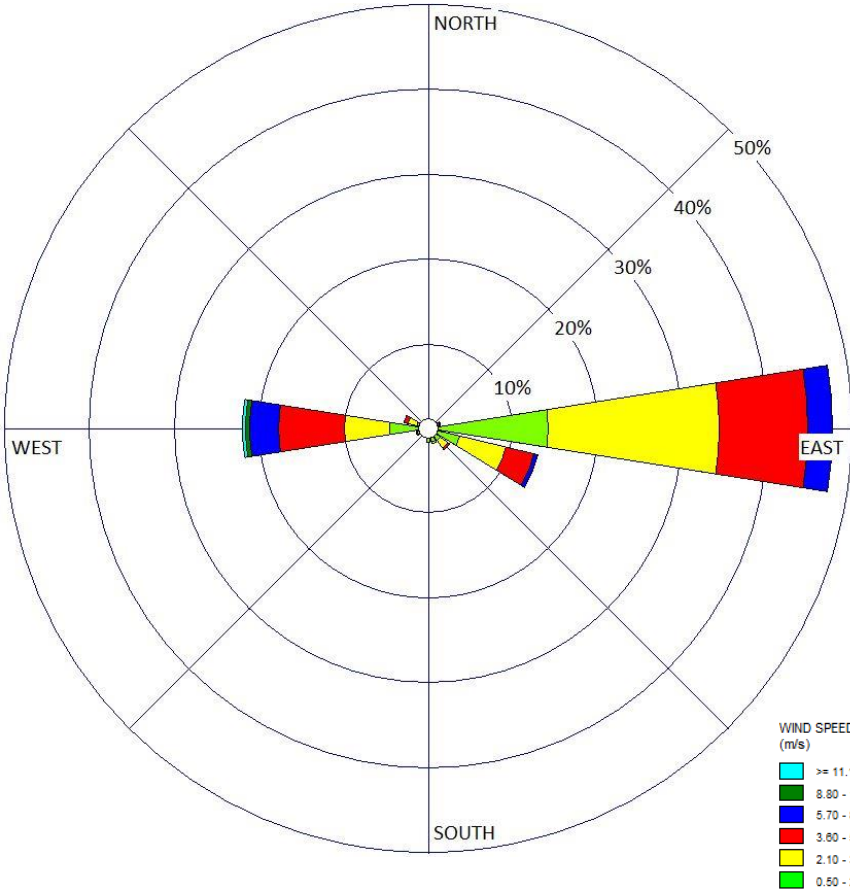
#### 2.1.1 METHODOLOGY

Envirochem retrieves wind data from Neptune's database at the following locations: On-site (Electrical Substation), Neptune Office Building (340 Brooksbank Ave.), and Neighborhood Pole (618 2<sup>nd</sup> St. East). Due to an electrical supply issue caused by construction adjacent to the monitor, the wind sensor at Neighbourhood Pole (618 E 2nd St) has not been operational since September 22<sup>nd</sup>, 2023, which has been communicated with Metro Vancouver staff.

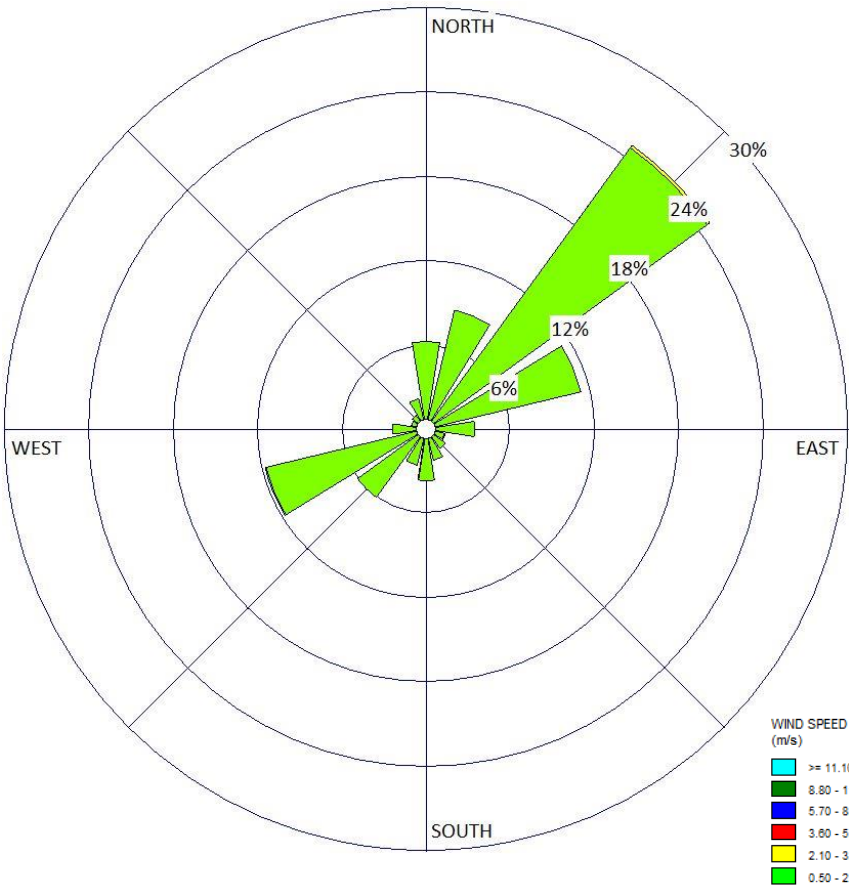
- Using wind data, wind roses for each wind instrument location are prepared for the preceding year. The wind roses are shown in **Figure 1**.
- Envirochem submits these figures to Metro Vancouver for each preceding calendar year as part of the annual air quality monitoring program report.

#### 2.1.2 RESULTS

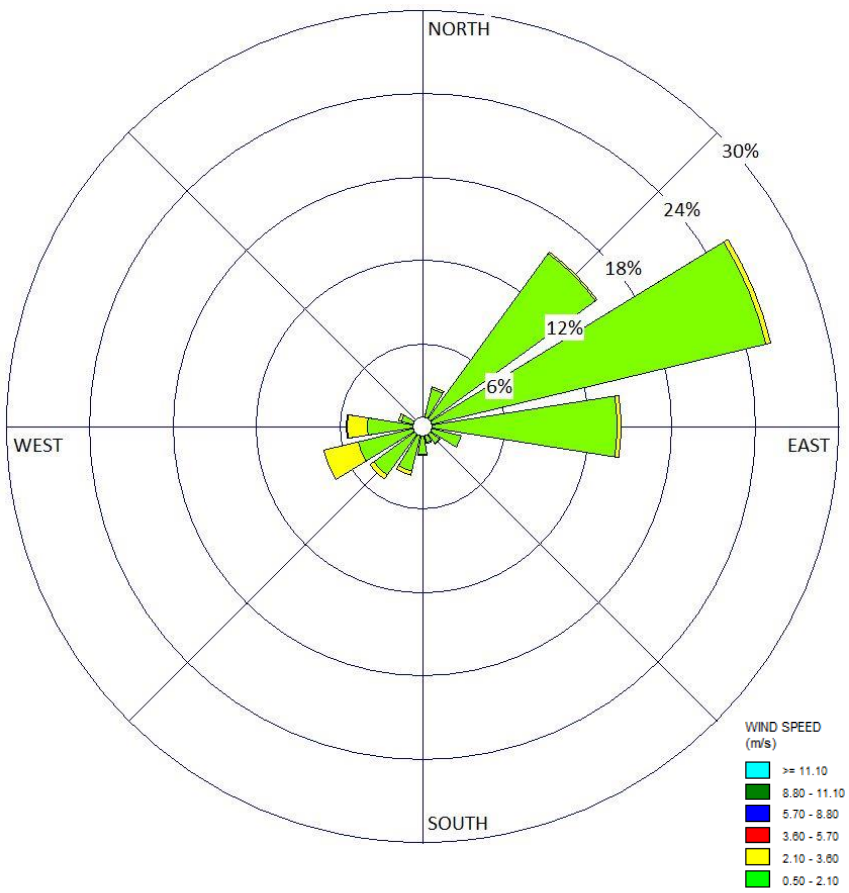
Wind roses are presented in **Figure 1** below representing the distribution of wind direction and wind speed at Neptune on-site (Neptune Electrical Substation) and off-site monitors (Neighbourhood Pole and roof of Neptune Office Building) for 2023. Please note that the wind rose presented for Neighbourhood Pole (618 E 2nd St) is not based on a full year of data and is based on the period of operation during 2023.



On-Site (Electrical Substation)



Neighbourhood Pole (618 2nd St. East)\*



Neptune Office Building (340 Brooksbank)

Figure 1: Windroses (direction wind blowing from) at on-site and off-site monitoring stations for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023

*Note:* Scales are not consistent between wind roses.

*\*Due to an electrical supply issue caused by construction adjacent to the monitor, the wind sensor at Neighbourhood Pole (618 E 2nd St) has been non-operational since September 22, 2023 as communicated with Metro Vancouver staff.*

## 2.2 PARTICULATE MONITORING DATA ANALYSIS

### 2.2.1 METHODOLOGY

Neptune is conducting continuous PM<sub>2.5</sub> and PM<sub>10</sub> monitoring. Ambient Air Monitoring data for PM<sub>2.5</sub> and PM<sub>10</sub> are stored in Neptune's database. These data are retrieved and verified by Envirochem. QA/QC is performed on the raw data and any invalid data are flagged. Neptune's data management system is then updated accordingly.

The vetted monitoring data are used to summarize the results of on-site and off-site monitoring. Envirochem retrieves the preceding calendar year's 24-hr rolling averages for PM<sub>2.5</sub> and PM<sub>10</sub> at each instrument location from Neptune's database.

Using the wind and hourly average concentration data, six pollution roses are prepared (both PM<sub>2.5</sub> and PM<sub>10</sub> at each location) and corresponding frequency distributions are prepared for the preceding year.

### 2.2.2 TREND ANALYSES

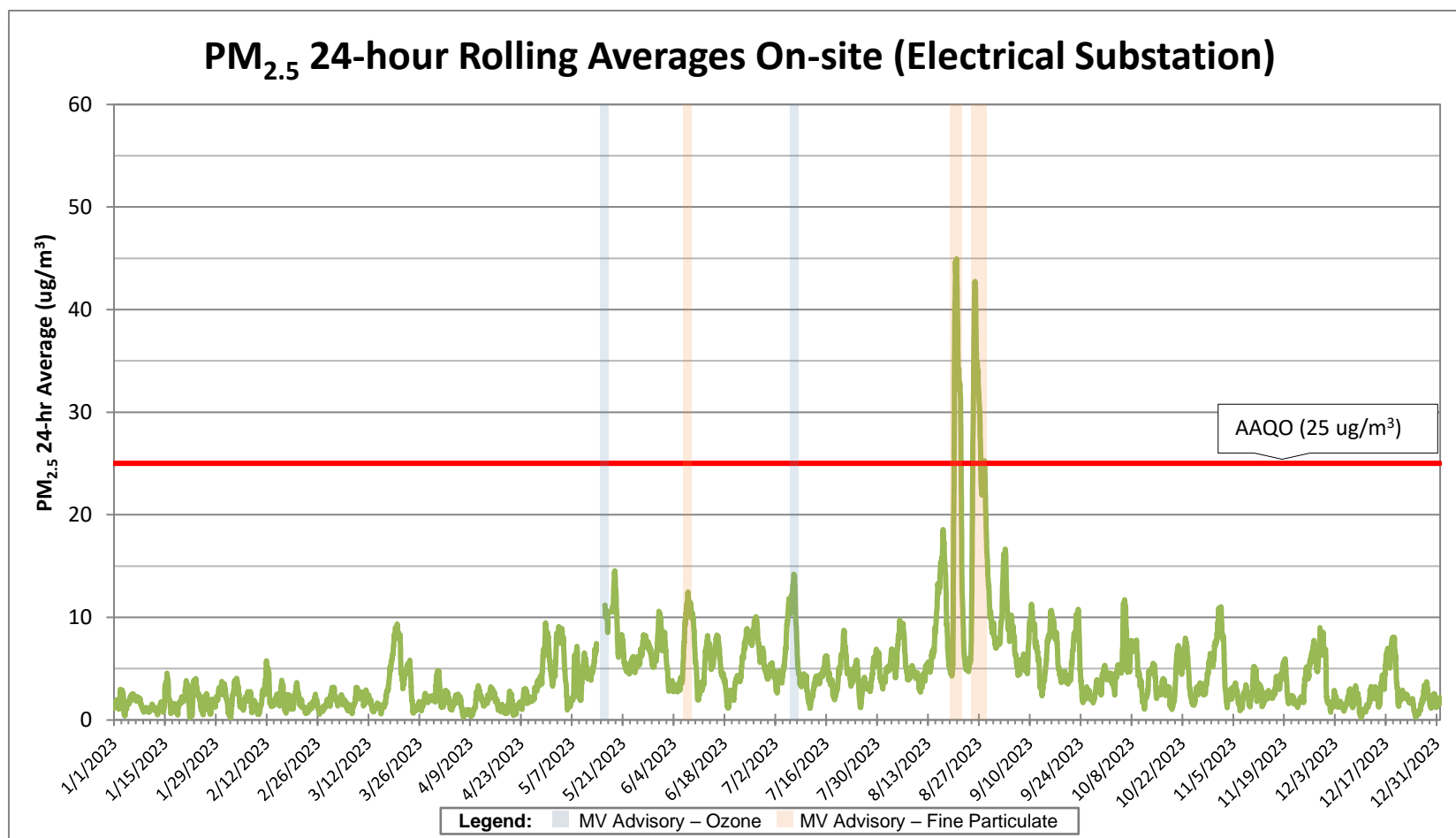
Using Neptune's data management system, Envirochem:

- Converts and tabulates the vetted PM<sub>2.5</sub> and PM<sub>10</sub> data to 24-hour rolling averages and performs QA/QC;
- Submits the graphs (**Figure 2 - Figure 7**) to Metro Vancouver.

The trend analyses represent 24-hour rolling averages of PM<sub>2.5</sub> and PM<sub>10</sub> data measured on-site (Electrical Substation), at the Neptune Office Building (340 Brooksbank Ave.), and at 618 2<sup>nd</sup> St. East. Any gaps in the trend analyses are due to missing or invalid data.

Due to an electrical supply issue caused by construction adjacent to the monitor, PM<sub>2.5</sub> and PM<sub>10</sub> units at Neighbourhood Pole (618 E 2nd St) have been non-operational since September 22, 2023 as communicated with Metro Vancouver staff.

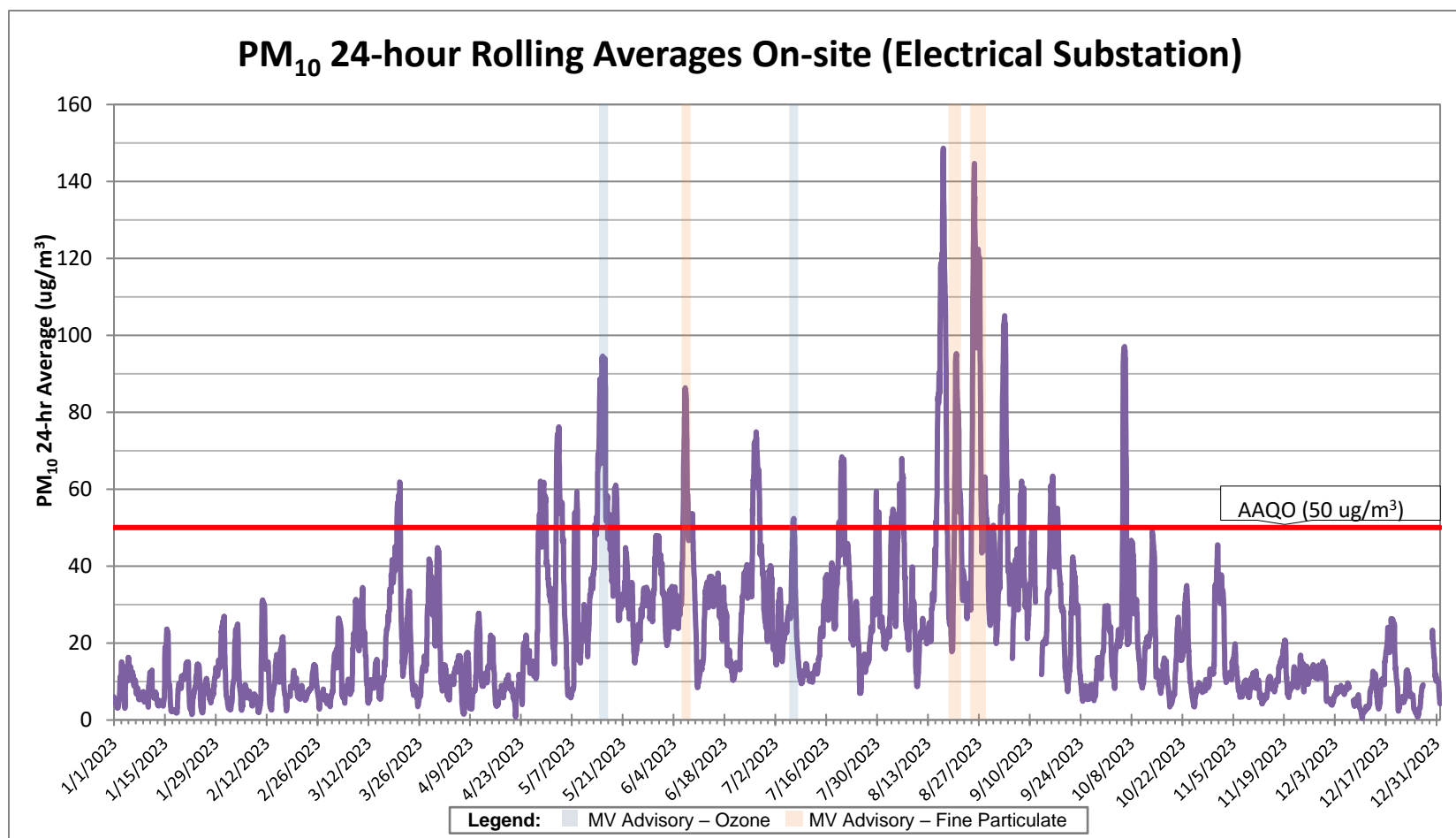
The on-site and off-site PM<sub>2.5</sub> and PM<sub>10</sub> ambient air quality monitors showed a few AAQO exceedances in 2023. The exceedances in June and August were primarily caused by wildfire smoke. Exceedances were discussed in detail in the quarterly ambient air quality monitoring reports. Outside of this period, some exceedances of the PM<sub>10</sub> objective at the on-site air quality monitor were observed in March, April, June, July, September, and October. These exceedances were likely due to other off-site sources in the area. All exceedances were discussed in more detail in the quarterly ambient air quality monitoring reports.



**Figure 2: 24-hour rolling averages of PM<sub>2.5</sub> from on-site monitor (Electrical Substation) for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023**

**Note 1:** Blank spaces indicate no data available.

**Note 2:** Highlighted periods indicate dates where Metro Vancouver Air Quality Advisories were in effect.

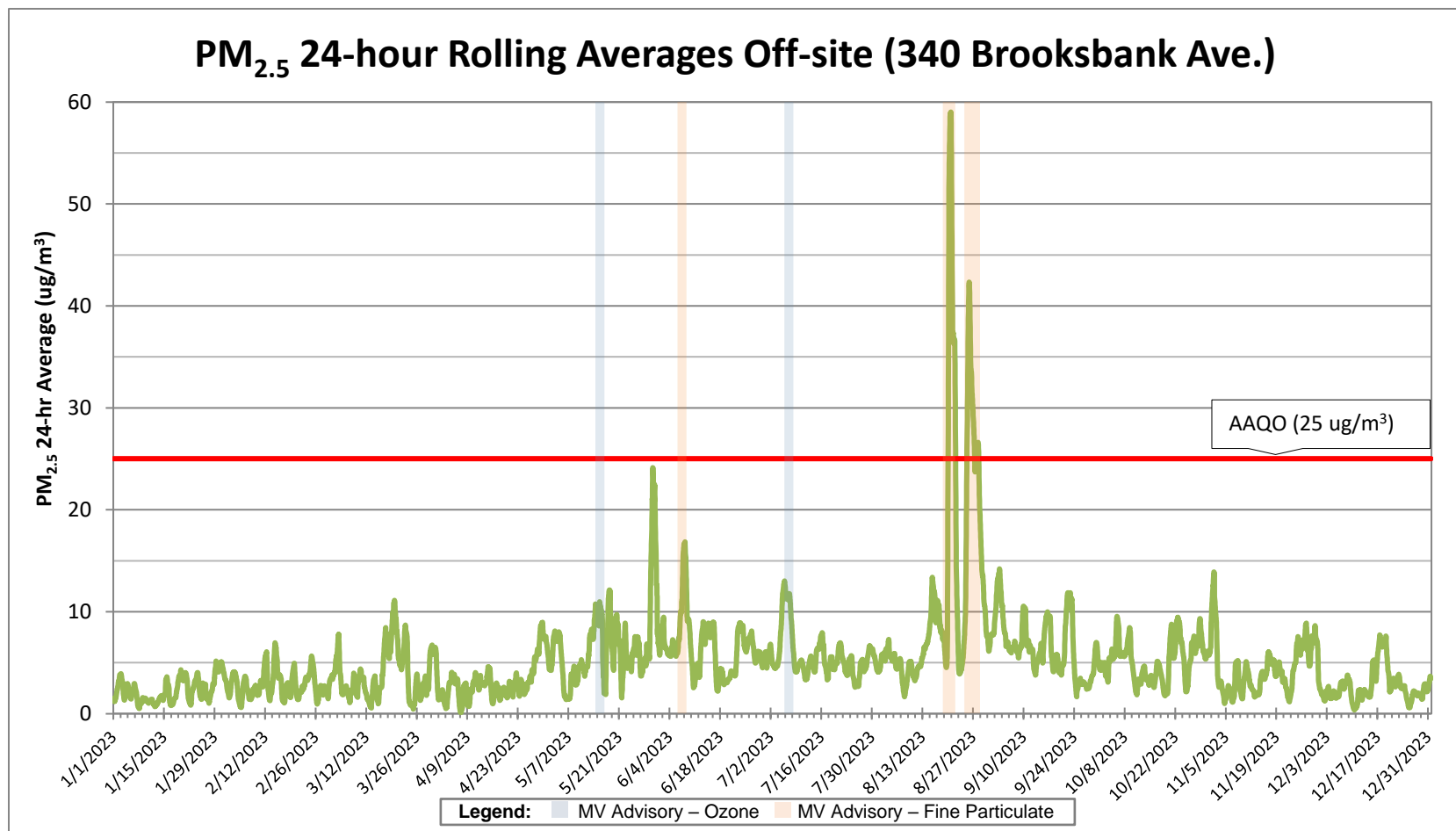


**Figure 3: 24-hour rolling averages of PM<sub>10</sub> from on-site monitor (Electrical Substation) for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023**

**Note 1:** Blank spaces indicate no data available.

**Note 2:** Highlighted periods indicate dates where Metro Vancouver Air Quality Advisories were in effect.

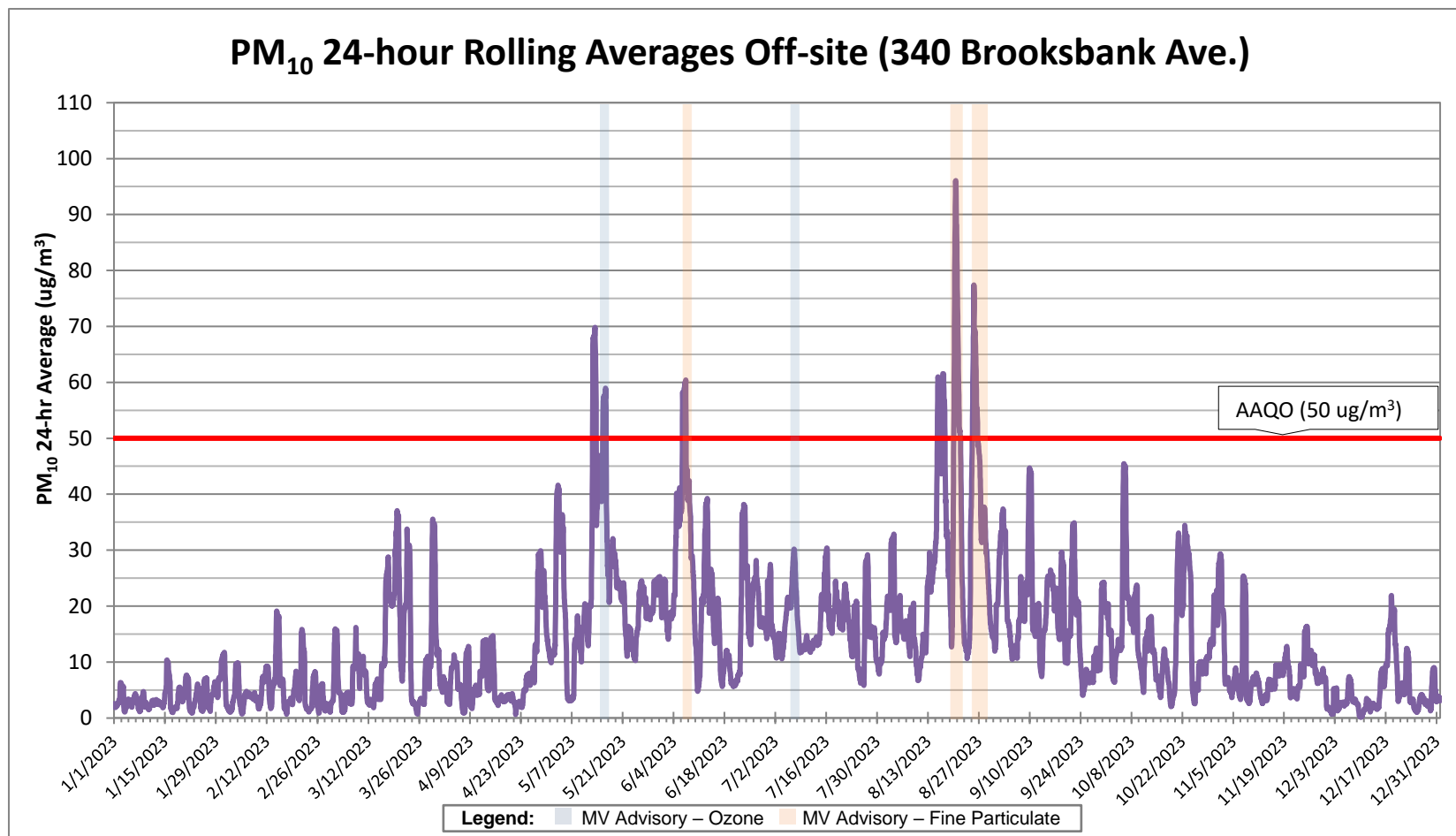




**Figure 4: 24-hour rolling averages of PM<sub>2.5</sub> from off-site monitor at the Neptune Office Building (340 Brooksbank Ave.) for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023**

**Note 1:** Blank spaces indicate no data available.

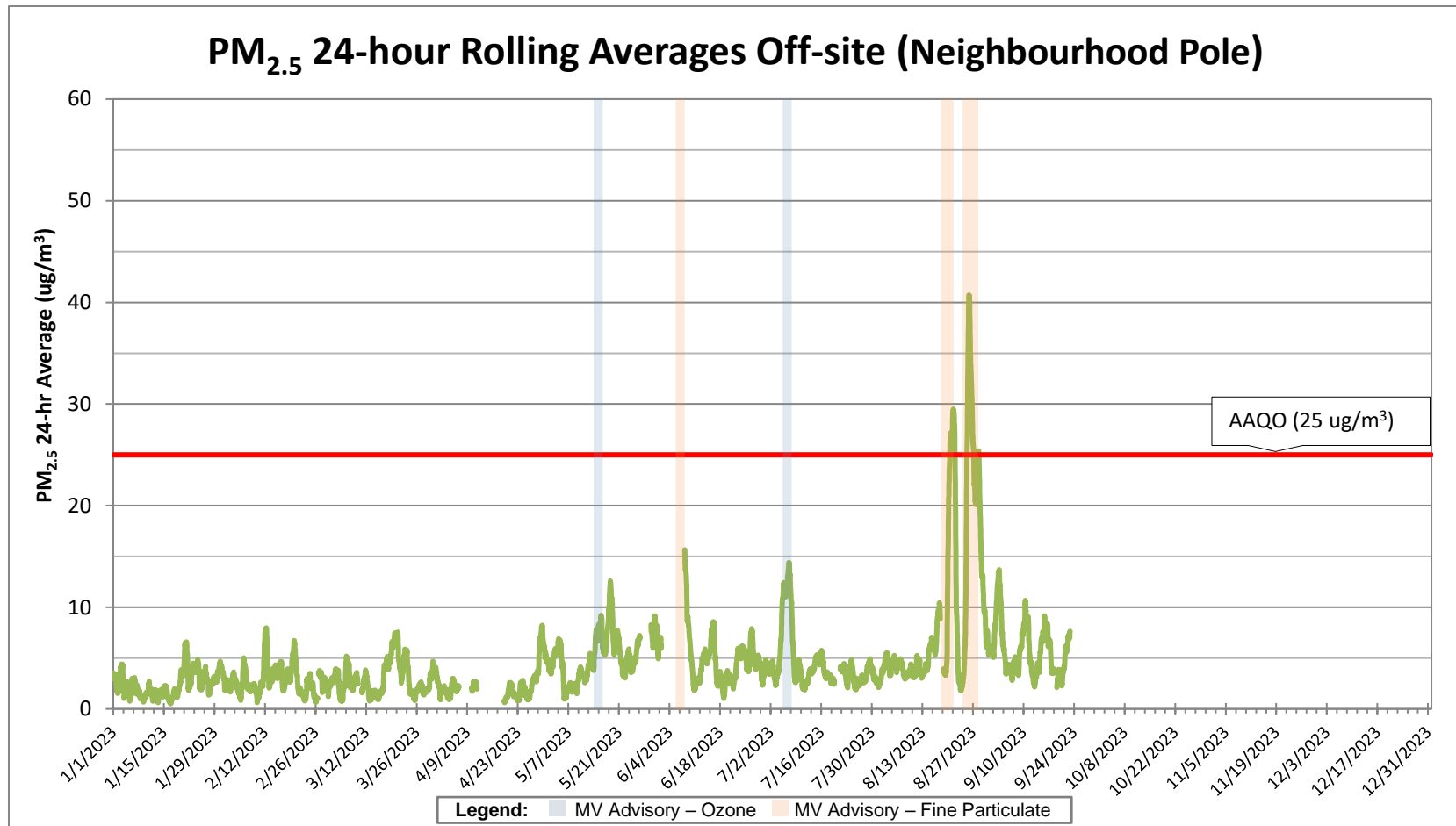
**Note 2:** Highlighted periods indicate dates where Metro Vancouver Air Quality Advisories were in effect.



**Figure 5: 24-hour rolling averages of PM<sub>10</sub> from off-site monitor at the Neptune Office Building (340 Brooksbank Ave.) for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023**

**Note 1:** Blank spaces indicate no data available.

**Note 2:** Highlighted periods indicate dates where Metro Vancouver Air Quality Advisories were in effect.

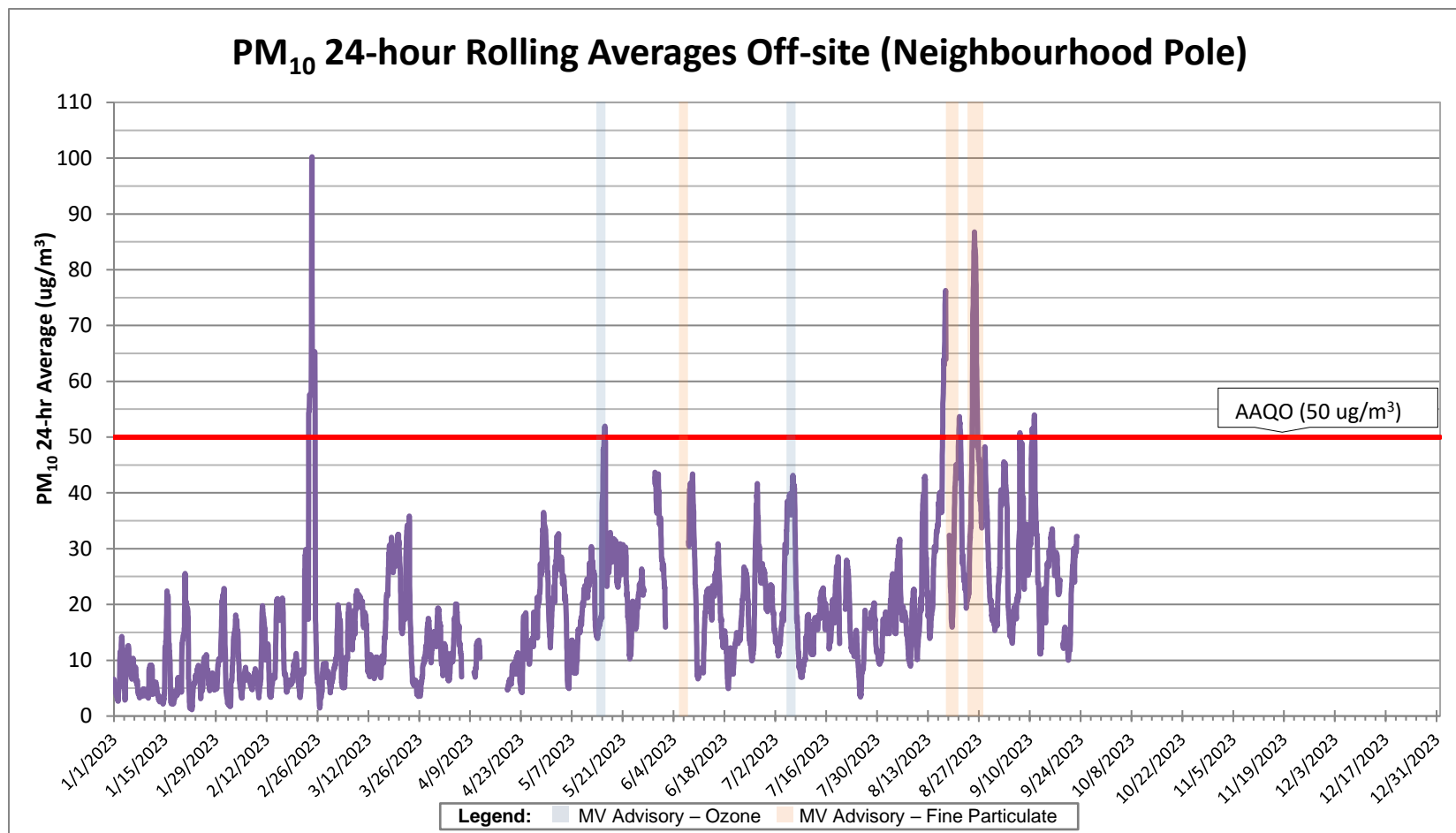


**Figure 6: 24-hour rolling averages of PM<sub>2.5</sub> from off-site monitor at 618 2<sup>nd</sup> St. East for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023**

**Note 1:** Blank spaces indicate no data available.

**Note 2:** Highlighted periods indicate dates where Metro Vancouver Air Quality Advisories were in effect.

**Note 3:** Due to an electrical supply issue caused by construction adjacent to the monitor, the PM monitors at Neighbourhood Pole (618 E 2nd St) has been non-operational since September 22, 2023 as communicated with Metro Vancouver staff



**Figure 7: 24-hour rolling averages of PM<sub>10</sub> from off-site monitor at 618 2<sup>nd</sup> St. East for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023**

**Note 1:** Blank spaces indicate no data available.

**Note 2:** Highlighted periods indicate dates where Metro Vancouver Air Quality Advisories were in effect

**Note 3:** Due to an electrical supply issue caused by construction adjacent to the monitor, the PM monitors at Neighbourhood Pole (618 E 2nd St) has been non-operational since September 22, 2023 as communicated with Metro Vancouver staff.

### 2.2.3 POLLUTION ROSES AND FREQUENCY DISTRIBUTION ANALYSES

Pollution roses are shown in **Figure 8** and the frequency distributions are shown in **Figure 9**. The pollution roses and frequency distributions represent the distribution of wind direction temporally correlated with  $PM_{2.5}$  and  $PM_{10}$  concentrations at the on-site (Electrical Substation) and off-site monitors (roof of Neptune Office Building (340 Brooksbank Ave, and pole mounted monitors at 618 2<sup>nd</sup> St. East) for 2023.

It should be noted that there was heavy construction and demolition in the neighbourhood immediately surrounding the neighbourhood pole monitor (618 2<sup>nd</sup> St. East) during 2023 and the  $PM_{2.5}$  and  $PM_{10}$  units at Neighbourhood Pole (618 E 2nd St) have not been operational due to an electrical supply issue caused by construction adjacent to the monitor since September 22<sup>nd</sup>, 2023 as communicated with Metro Vancouver staff.

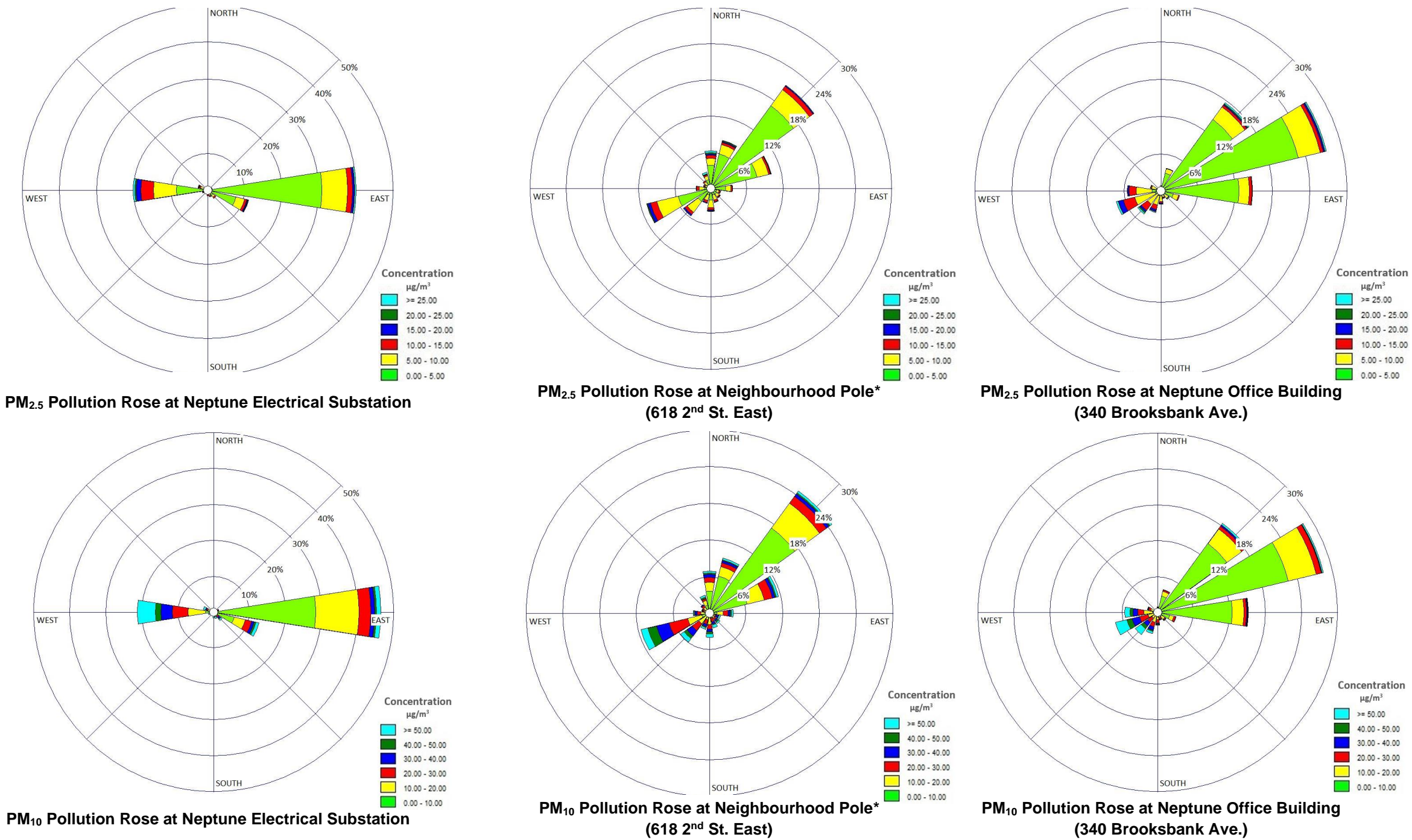


Figure 8: Pollution roses (direction wind blowing from) at on-site and off-site monitoring stations for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023

Note: Scales are not consistent between wind roses.

\*Due to an electrical supply issue caused by construction adjacent to the monitor, the PM and wind sensors at Neighbourhood Pole (618 E 2nd St) has been non-operational since September 22, 2023 as communicated with Metro Vancouver staff

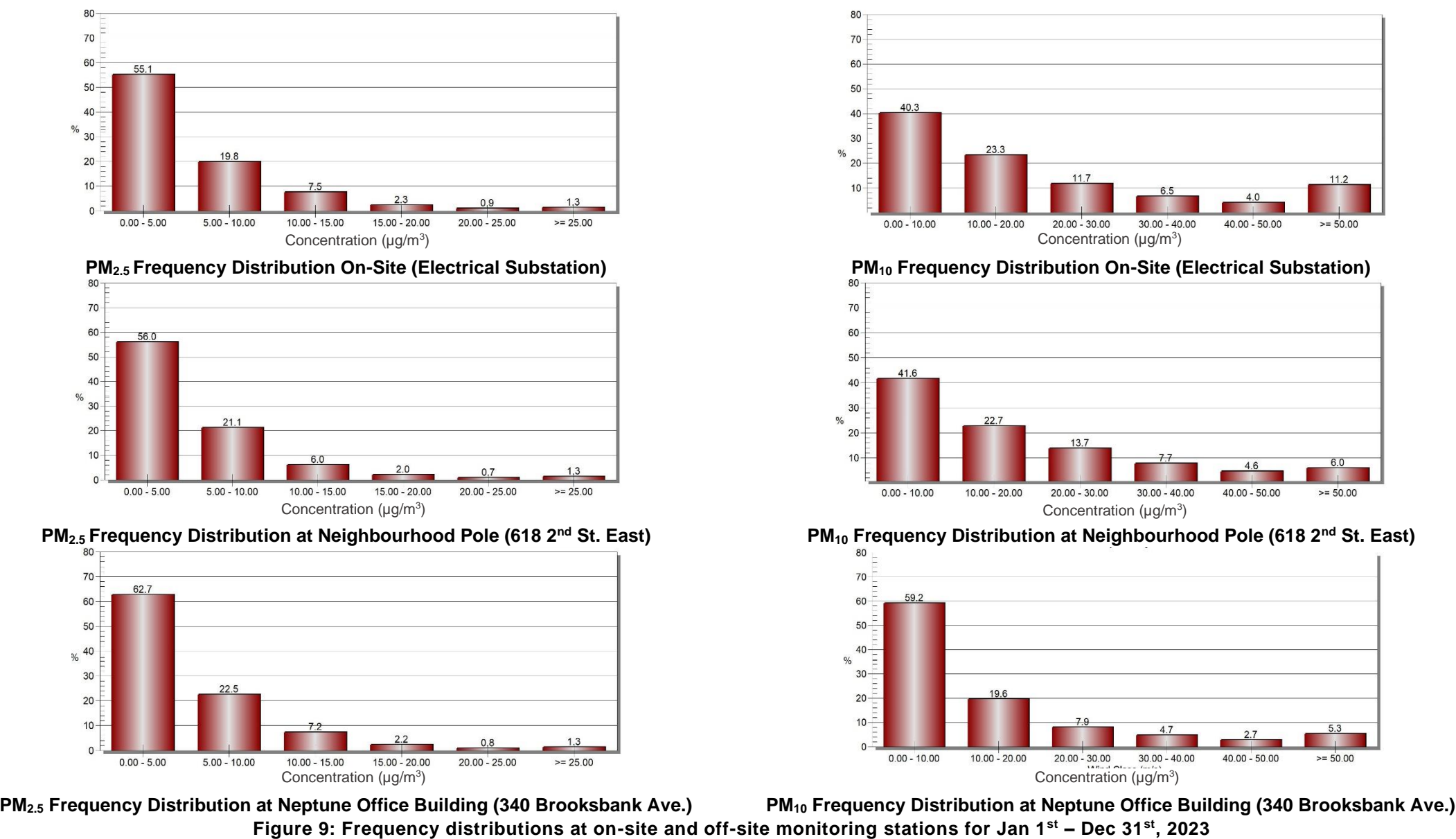


Figure 9: Frequency distributions at on-site and off-site monitoring stations for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2023