



# memorandum

TO [REDACTED] FROM [REDACTED]  
Living Earth DATE 21 July 2022  
RE Living Earth AQMesh monitor

Living Earth operate a composting plant at 40 Metro Place, Bromley, Christchurch (the Site). An AQMesh air quality monitor supplied by [REDACTED] (Team Traffic) was installed outside the Living Earth Site on 21 June 2022. The location of the monitor is shown in **Figure 1**. The windrows visible in **Figure 1** to the south, northwest and northeast of the monitor were removed by the end of January 2022, as shown in **Figure 2**. The remaining oversize tailings piles located to the east of the site are currently progressively being removed.



Figure 1: Location of the monitor



**Figure 2: Site photo from the start of July 2022 showing monitor location and removal of windrows**

The purpose of this monitoring is to measure the concentration of particulate matter at the site boundary and determine how much of it can be attributed to Living Earth. Any dust from the Site is expected to be primarily PM<sub>10</sub> or larger rather than smaller size fractions. Combustion emissions from sources such as domestic wood burners and internal combustion engine vehicles will mostly consist of smaller particles (PM<sub>1</sub>, PM<sub>2.5</sub>) and gaseous emissions (CO, NO<sub>2</sub>).

The monitoring data from 21 June 2022 to 8 July 2022 has been analysed. No exceedances of the NESAQ or WHO guidelines were recorded for CO, NO<sub>2</sub>, or PM<sub>2.5</sub> within the monitoring period, as shown in **Table 1**.

Table 1: Comparison of pollutant concentrations to guidelines					
Pollutant	Standard	Limit	Number of exceedances	Permitted number of exceedances	Max conc.
CO	NESAQ (8 hour)	10 mg/m <sup>3</sup>	0	1 per 12-month period	2 mg/m <sup>3</sup>
	NAAQG (1 hour)	30 mg/m <sup>3</sup>	0	-	2 mg/m <sup>3</sup>
NO <sub>2</sub>	NESAQ (1 hour)	200 µg/m <sup>3</sup>	0	9 per 12-month period	38 µg/m <sup>3</sup>
	NAAQG (24 hour)	100 µg/m <sup>3</sup>	0	-	5 µg/m <sup>3</sup>
PM <sub>10</sub>	NESAQ (24 hour)	50 µg/m <sup>3</sup>	1	1 per 12-month period	60 µg/m <sup>3</sup>
PM <sub>2.5</sub>	WHO (24 hour)	25 µg/m <sup>3</sup>	0	-	24 µg/m <sup>3</sup>

There was one exceedance of the 24-hour NESAQ guideline for PM<sub>10</sub> of 50 µg/m<sup>3</sup>. This occurred on 29 June 2022, when the 24-hour average PM<sub>10</sub> concentration was 60 µg/m<sup>3</sup>. **Figure 3** shows that the 24-hour PM<sub>10</sub> concentration did not exceed 40 µg/m<sup>3</sup> on any other days in the monitoring period.

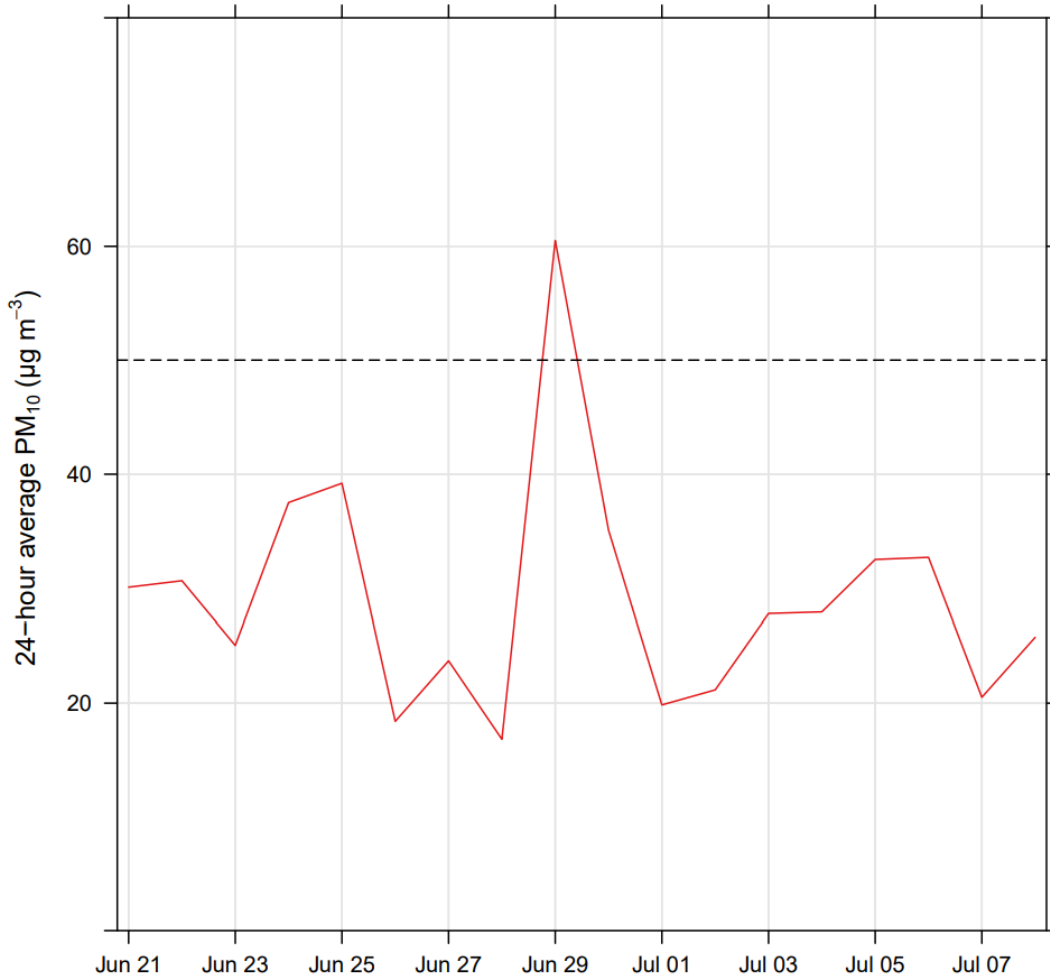
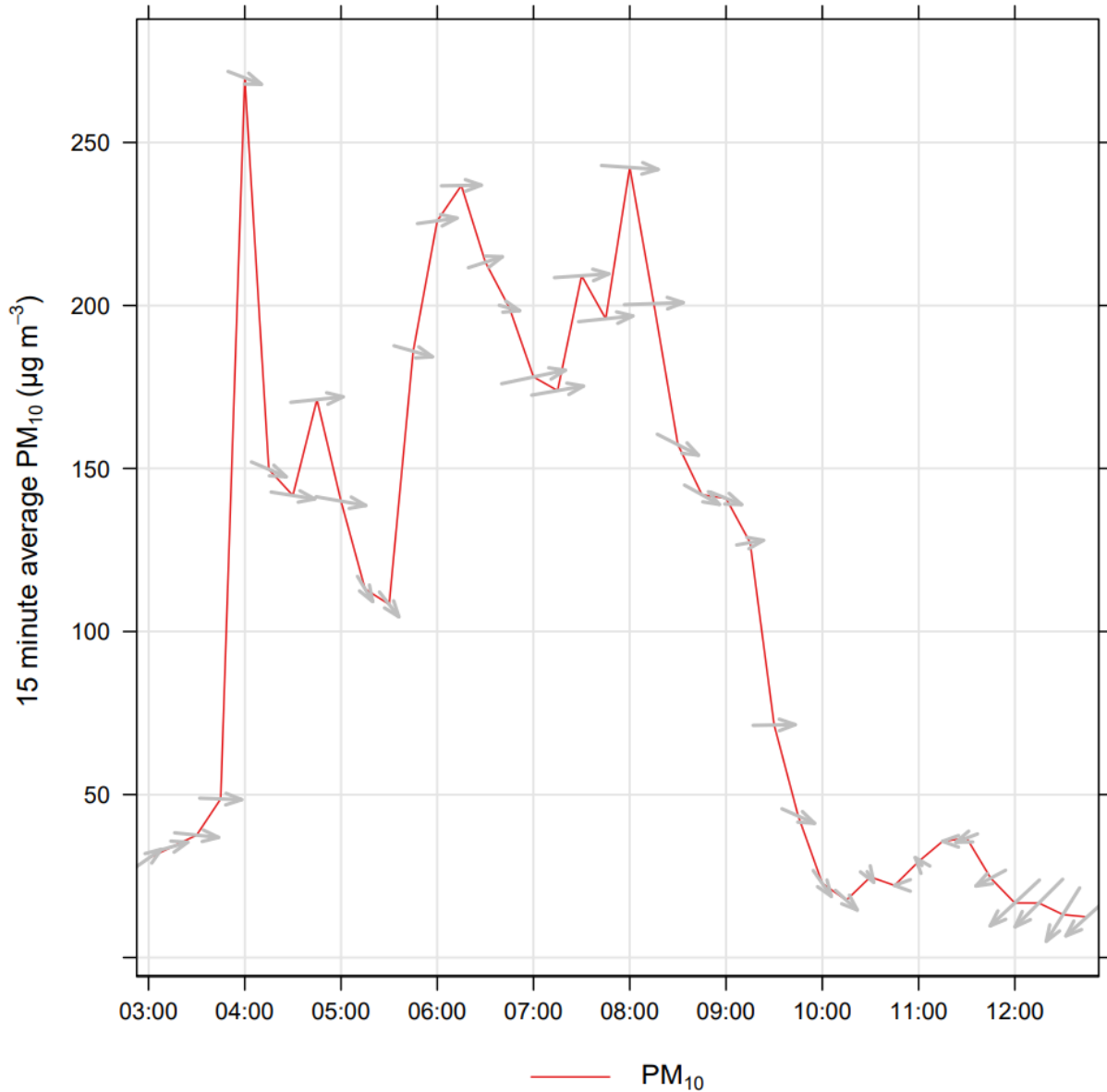


Figure 3: 24-hour average concentrations of PM<sub>10</sub> over the monitoring period.

The PM<sub>10</sub> concentration on 29 June was highest between 4 am and 9:45 am, as shown in **Figure 4**. At the time of the high concentrations, the wind was coming from the west to northwest directions. Based on the location of the monitor, Living Earth is unlikely to be the source of this particulate matter.



**Figure 4: PM<sub>10</sub> concentration on the morning of 29 June 2022. The direction of the arrows indicate wind direction and the length of the arrows indicate wind speed.**

Figure 5 shows that the highest maximum PM<sub>10</sub> concentrations occurred when the wind was blowing from the west at a speed of approximately 2 m/s.

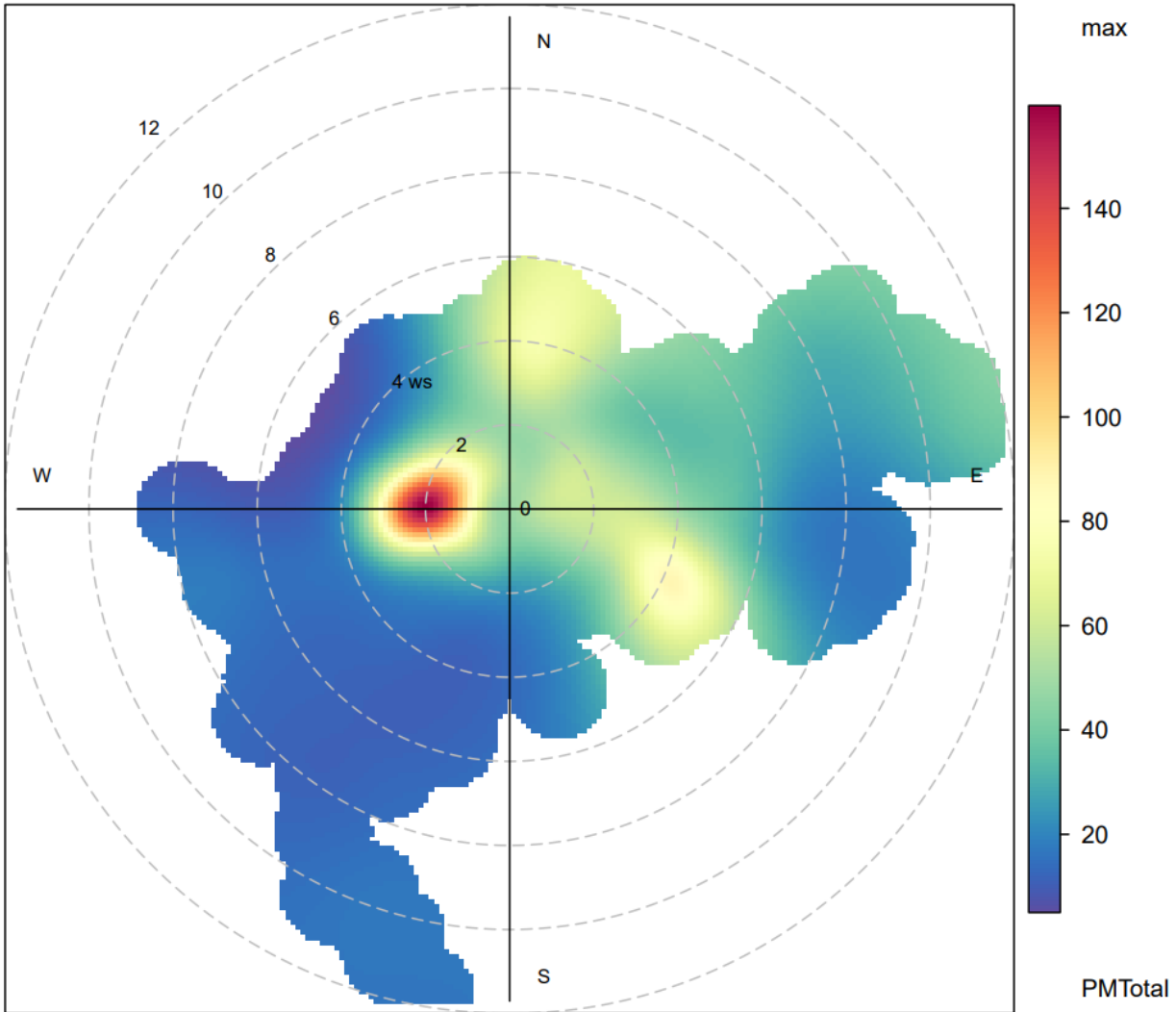
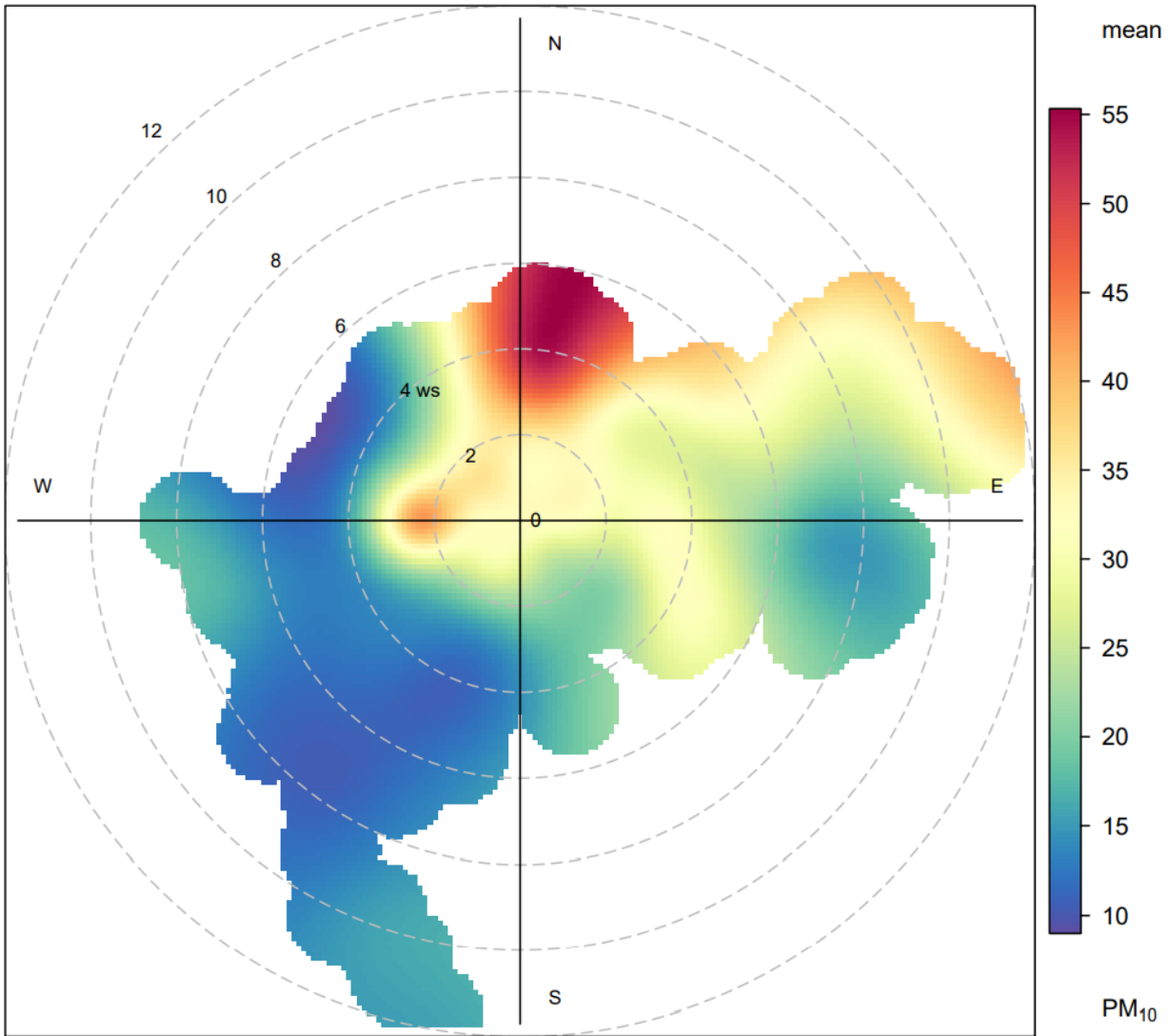


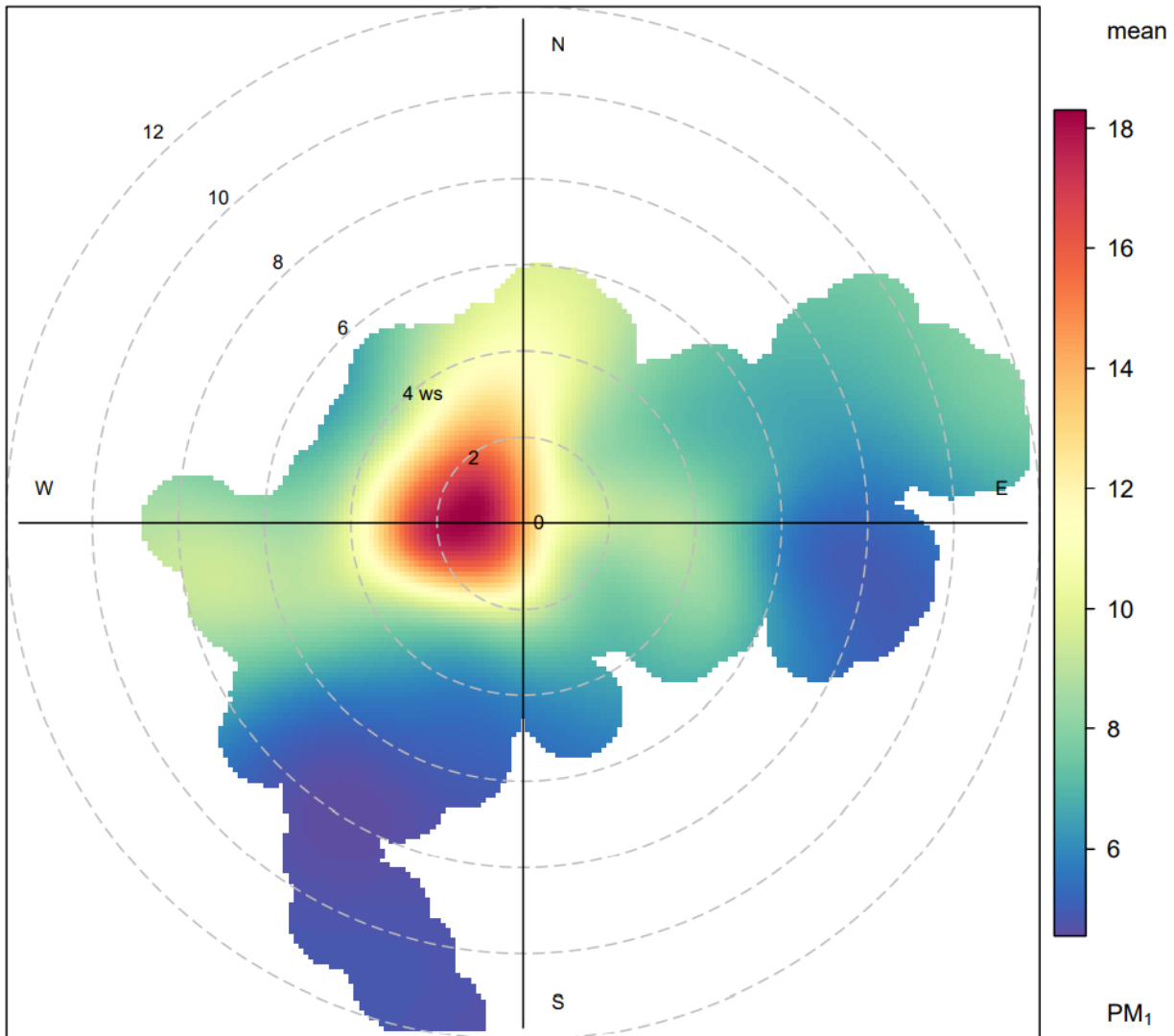
Figure 5: Maximum 15-minute PM<sub>10</sub> concentration by wind speed and direction.

**Figure 6** indicates that the average  $PM_{10}$  concentrations are highest for winds from the north, which may be caused by dust emissions from Living Earth’s screening shed. Some  $PM_{10}$  also comes from the north-east, which may be originating from the removal of the oversize tailings piles from Living Earth’s yard area. The concentration is generally higher at higher wind speeds.

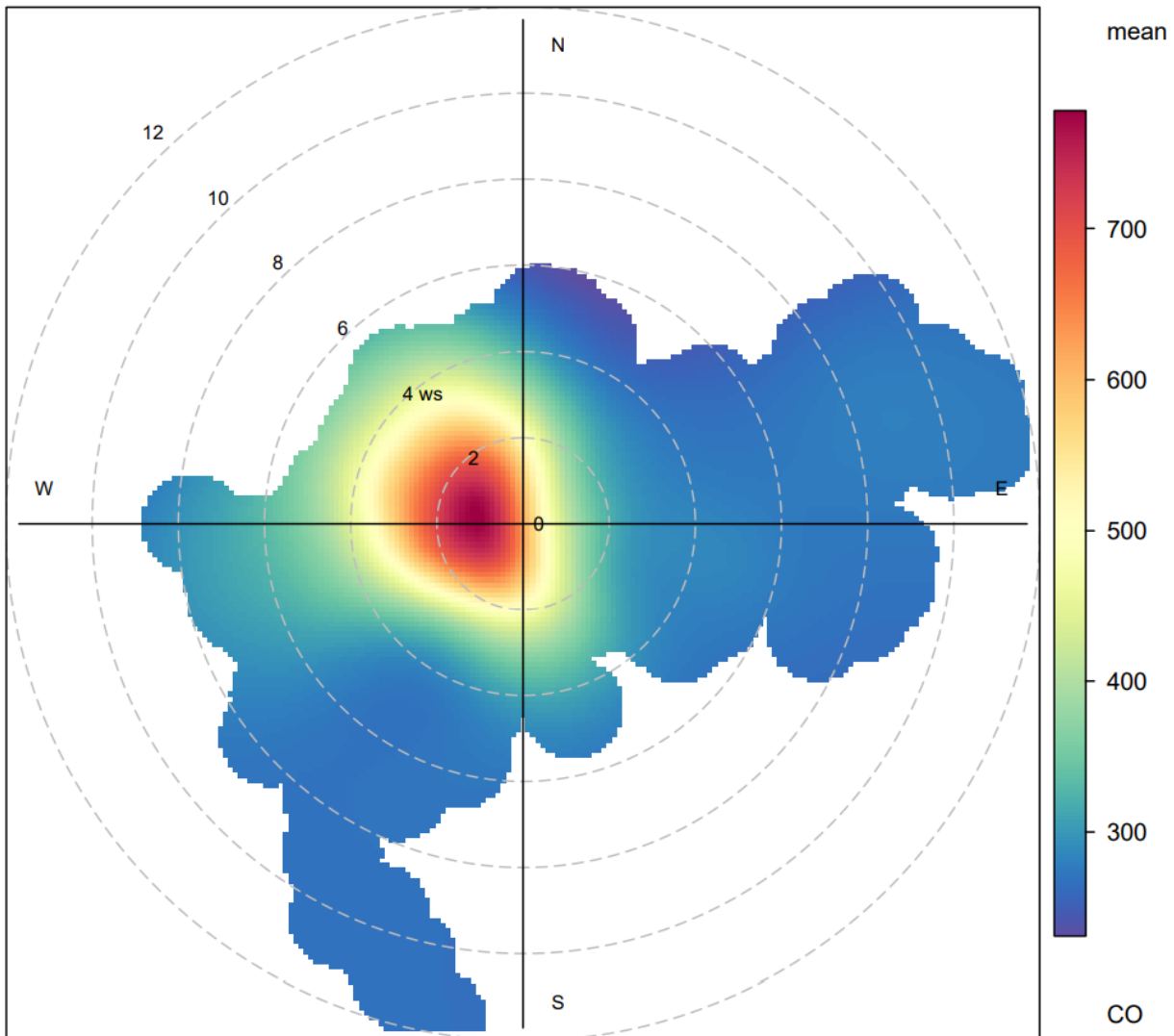


**Figure 6: Mean 15-minute  $PM_{10}$  concentration by wind speed and direction.**

**Figure 7** shows that the highest average PM<sub>1</sub> concentrations are from the west. Living Earth is unlikely to be the source of these emissions, based on its location, and the small particle size. The source of these emissions is likely to be combustion. This is backed up by **Figure 8**, which shows that the highest average carbon monoxide concentrations also come from the west. Carbon monoxide and particulate matter are both products of combustion.



**Figure 7: Mean 15-minute PM<sub>1</sub> concentration by wind speed and direction.**



**Figure 8: Mean 15-minute carbon monoxide concentration by wind speed and direction.**

### Conclusion

From the data gathered to date it appears that the AQMesh sensor is successfully measuring particulate matter of size  $PM_{10}$  and smaller that originates from Living Earth's site. PDP note that, based on knowledge of Living Earth's operations, Living Earth will also generate particulate larger than  $PM_{10}$  (i.e. dust) however due to its large aerodynamic size, it will not be measured by the monitor but will deposit close to Living Earth's site and will be captured in the array of dust deposition gauges Living Earth currently monitor.

Analysis of the particulate fractions measured indicate that, as expected, Living Earth does not produce fine particulate ( $PM_1$ ) and the  $PM_1$  measured originates from the west and is likely to be due to woodsmoke or vehicle emissions.

It appears, based on **Figure 6**, that the  $PM_{10}$  measured by the monitor largely originates from the screening plant located to the NNE of the monitor, either by the screening plant itself or by traffic movements close to the plant. There is also a suggestion of  $PM_{10}$  contribution from windrows located to the east which are currently being removed from the site. Observations of the removal process were that the piles were quite dry creating dust when loaded onto a truck using a front-end loader.



There has been one potential exceedance of the NESAQ PM<sub>10</sub> air quality guidelines recorded in the 17 days of data currently available. This exceedance is not attributable to Living Earth.

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Living Earth and Team Traffic. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the memorandum. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This memorandum has been prepared by PDP on the specific instructions of Living Earth for the limited purposes described in the memorandum. PDP accepts no liability if the memorandum is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

© 2022 Pattle Delamore Partners Limited

Prepared by



**Katherine Gray**

Air Quality Engineer

Reviewed and approved by



**Steve Pearce**

Technical Director – Environmental Management