

Supporting Evidence for Richmond 7 December 2019 Exceedance

Monitoring Equipment

The Richmond air quality monitoring equipment is located at the Plunket Rooms at 56 Oxford Street, central Richmond. There are three instruments currently used to measure particulate matter (PM) in Richmond. These comprise of a Thermo FH62 Beta Attenuation Monitor (BAM) and a Partisol gravimetric air quality sampler (R&P Model 2000) which operate from a storeroom at the Plunket Rooms. A new continuous particle monitor (Thermo Scientific Model 5028i) instrument, which uses beta attenuation technology, and measures both PM10 (channel A) and PM2.5 (channel B) simultaneously, was installed in a dedicated portacom building at 56 Oxford Street. The PM monitoring methods for ambient air quality comply with the requirements of Schedule 2 of the Air Quality NES.

Exceedance Event

The 24-hr PM10 record for Richmond for 2019 is presented in Figure 1. The PM10 value for 7th December exceedance is an unusual occurrence for Summer. The previous elevated summer reading in February 2019 was associated with the Pigeon Valley Fire in Tasman region.

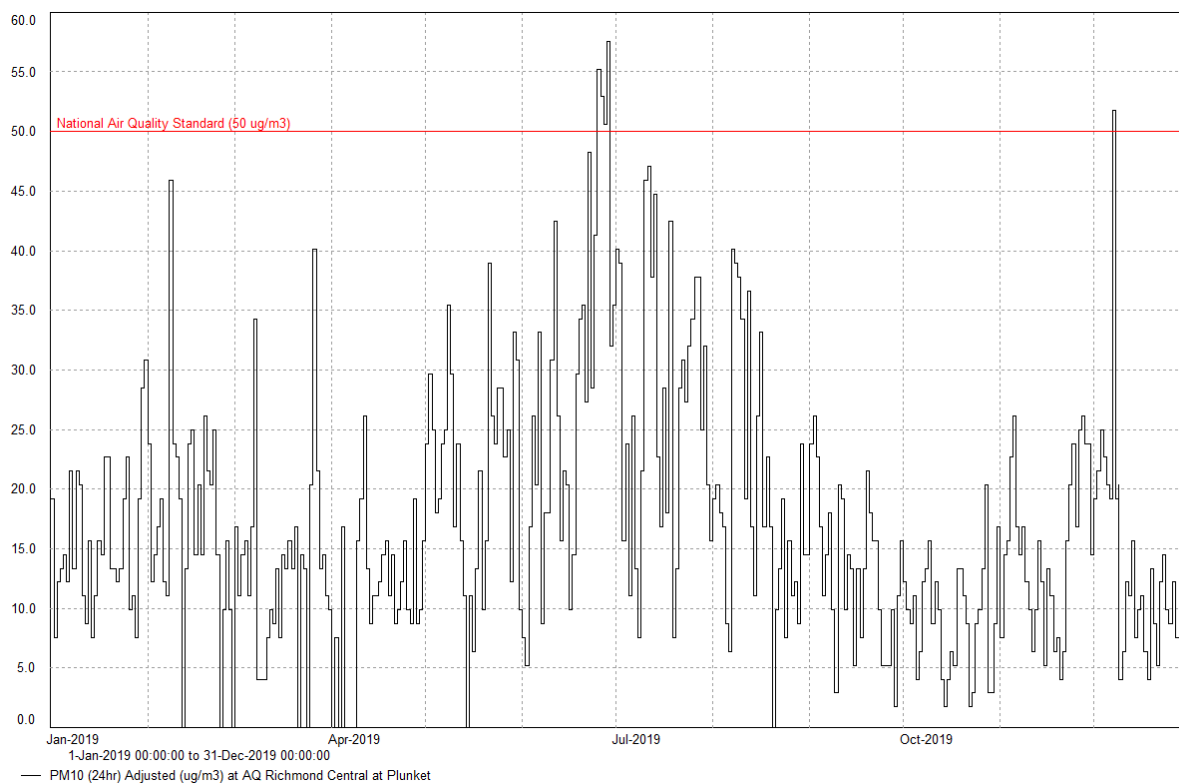


Figure 1: 24-hour PM10 average for Richmond Airshed for 2019

The exceedance of $52 \mu\text{g m}^{-3}$ on 7th December 2019 was recorded using the FH62 BAM and has been adjusted for gravimetric equivalence (See Figures 2 and 3). The PM2.5 value recorded using the collocated BAM 5028i was $19 \mu\text{g m}^{-3}$ on 7th December 2019 and proportion of PM2.5 to PM10 was 36%.

The PM10 exceedance in December 7th is unusual as this event occurred in the summer and coincided with high wind speeds from the northeast. (See Figure 4 wind rose attached). The meteorological data is from the station located at Richmond Race Course. The PM10

data correlates with the wind speed, which is consistent with the source of PM10 being from a wind derived source – Given the widespread elevated PM10 across the region, and exceedances elsewhere across New Zealand, this event is attributed to the particulate matter entrained in wind from the Australian dust storms and fires. The ratio of PM2.5 to PM10 is also consistent with the PM10 being attributed to Australian dust (crustal matter) as identified in the GNS report for Auckland.

Figure 2: Richmond PM10 , wind speed and direction for 7th December (Exceedance date)

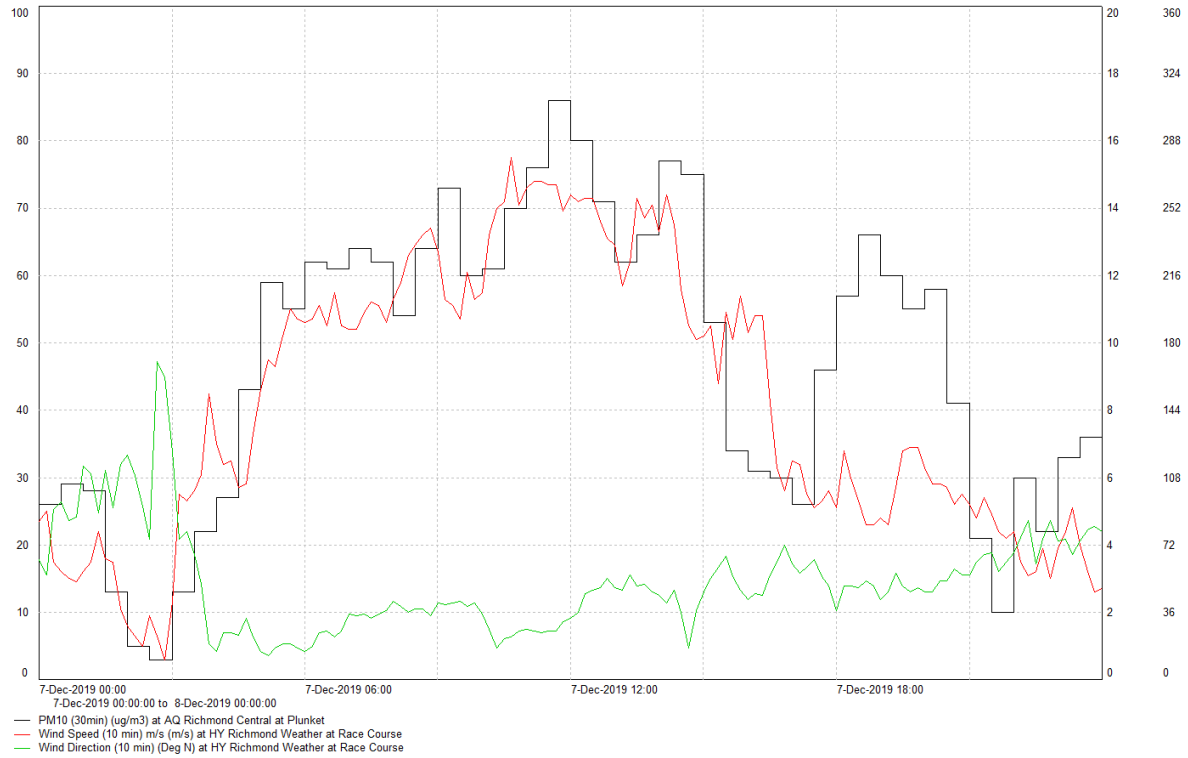


Figure 3: 24-hour PM10 and PM2.5 data for Richmond Airshed for 4-12 December 2019

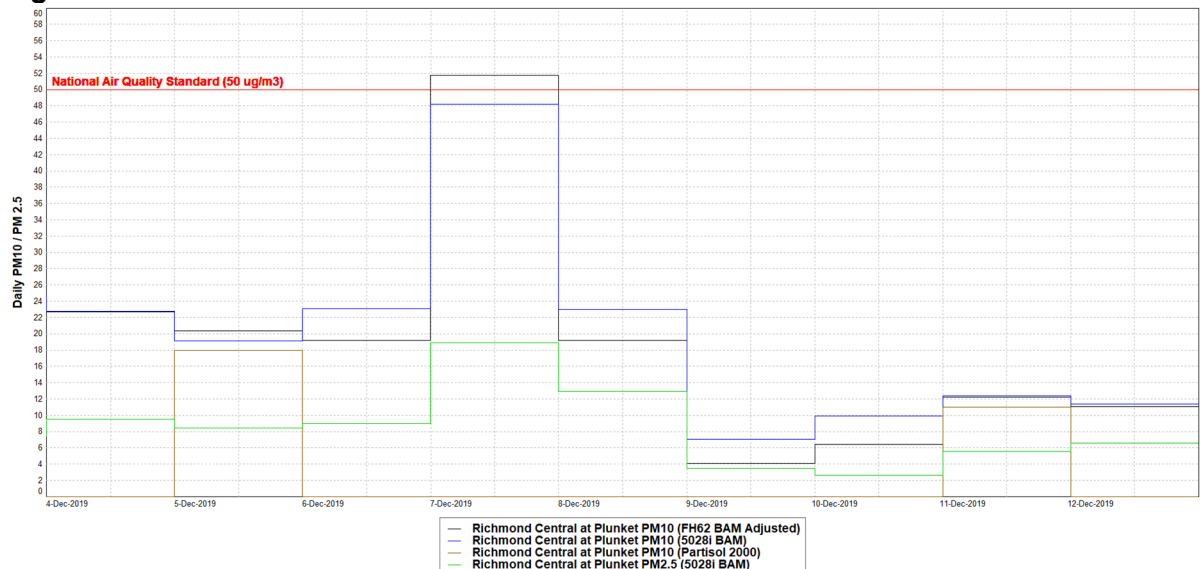
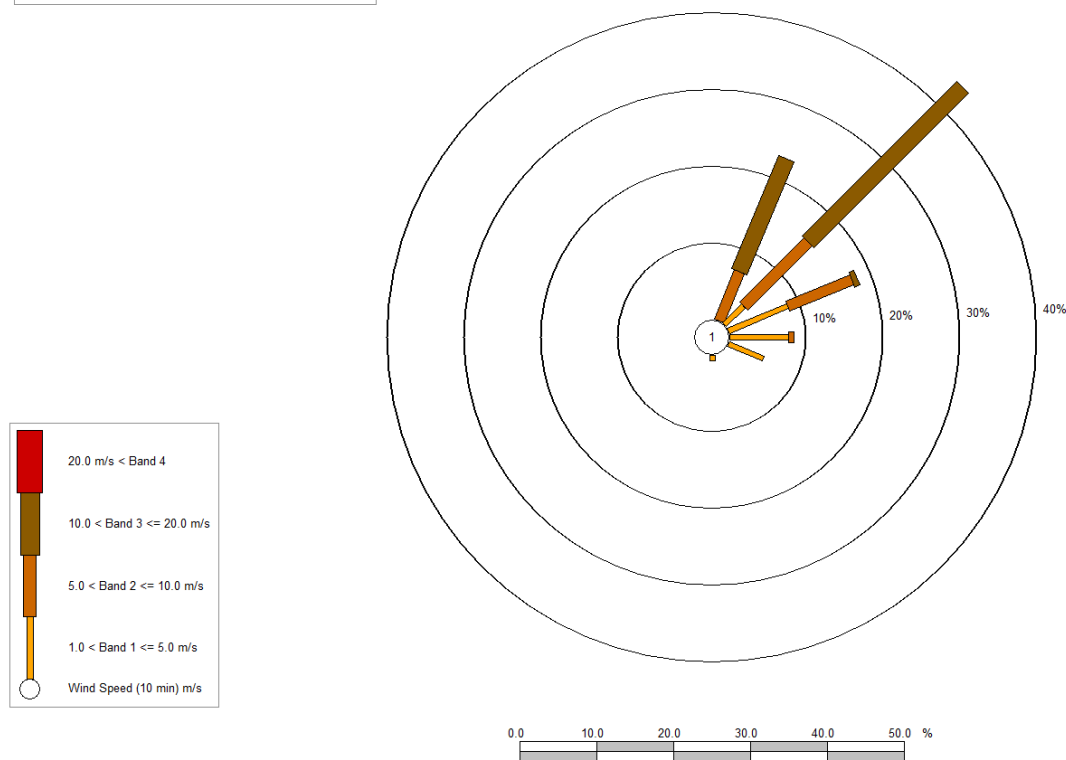


Figure 4: Wind Rose for 7 December 2019

Wind Direction (10 min) at HY Richmond Weather at Race Course
 Wind Speed (10 min) m/s at HY Richmond Weather at Race Course
 From 7-Dec-2019 00:00:00 to 8-Dec-2019 00:00:00



Previous Exceedances

Table 1 below shows the number of PM10 (24-hour average) exceedances for the last five years at Richmond. The previous exceedances at this site are in winter and usually under cool calm conditions.

Table 1: Richmond Previous exceedance events for PM10 24-hour average for last 5 years

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	0	0	0	0	0	2	1	0	0	0	0	0
2016	0	0	0	0	0	2	3	0	0	0	0	0
2017	0	0	0	0	0	2	0	0	0	0	0	0
2018	0	0	0	0	0	4	8	0	0	0	0	0
2019	0	0	0	0	0	4	0	0	0	0	0	1

Note The FH62 BAM has historically under measured PM10 concentrations relative to the reference method sampler (Partisol) by around 16% for concentrations of around 50µg m-3. The PM10 BAM data was not adjusted for 2017 and 2018, as recommended by Environet in May 2018 (Comparison of BAM and gravimetric PM10 concentrations and update of trends assessment for Richmond).