

Resource Management (National Environmental Standards for Air Quality) Regulations 2004 – Regulation 16A Exceptional Circumstances

APPLICATION FORM

Before completing this form please read section 3.8 of the [2011 User's Guide to the revised National Environmental Standards for Air Quality](#).

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1 Applicant details

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2 Details of exceedance event

Containment	PM10 (24-hour average)
Date of exceedance <i>(application must be received within 3 months from date of the exceedance)</i>	18 and 19 August 2022
Relevant airshed	Mount Maunganui Airshed

Monitoring station and technical specifications of monitor	<p>Rata Street. Location: 50m south of Rata Street, Mount Maunganui</p> <p>Instrument specifications: Thermo model 5014i Beta Attenuation Monitor (BAM) with PM10 size selective inlet.</p>																			
	<p>Totara Street. Location: Corner of Waimarie Street and Totara Street, Mount Maunganui.</p> <p>Instrument specifications: Thermo model 5014i Beta Attenuation Monitor (BAM) with PM10 size selective inlet.</p>																			
	<p>Railyard South. Location: 100m north of Hull Road (Port access end), Mount Maunganui.</p> <p>Instrument specifications: Thermo model 5014i Beta Attenuation Monitor (BAM) with PM10 size selective inlet.</p>																			
	<p>Aerodrome Road. Location: Location: opposite 6 De Havilland Way in the suburb of Tauranga Airport, Mount Maunganui.</p> <p>Instrument specifications: Thermo model 5014i Beta Attenuation Monitor (BAM) with PM10 size selective inlet.</p>																			
	<p>Bridge Marina. Location: At the northern end of 101 Te Awanui Drive SH 2, Tauranga.</p> <p>Instrument specifications: Thermo model 5014i Beta Attenuation Monitor (BAM) with PM10 size selective inlet.</p>																			
Summary of monitoring reading showing exceedance event	<p>The following exceedances of the PM10 standard were recorded within the Mount Maunganui Airshed on the 18th and 19th August 2022:</p> <table><tr><th>Monitoring station</th><th>18 August 2022</th><th>19 August 2022</th></tr><tr><td>Rata Street</td><td>64 µg/m³</td><td>73 µg/m³</td></tr><tr><td>Railyard South</td><td>56 µg/m³</td><td>62 µg/m³</td></tr><tr><td>Aerodrome Road</td><td>61 µg/m³</td><td>63 µg/m³</td></tr><tr><td>Bridge Marina</td><td>54 µg/m³</td><td>59 µg/m³</td></tr><tr><td>Totara Street</td><td>n/a</td><td>54 µg/m³</td></tr></table> <p>However, in line with the guidance in the “Multiple monitors within an airshed” section (p36) of the “2011 Users’ Guide to the revised National Environmental Standards for Air Quality 2011: Updated 2014”, only the highest recorded value per day is to be recorded as an exceedance (highlighted), irrespective of how many monitors record the exceedance at the same time.</p>		Monitoring station	18 August 2022	19 August 2022	Rata Street	64 µg/m ³	73 µg/m ³	Railyard South	56 µg/m ³	62 µg/m ³	Aerodrome Road	61 µg/m ³	63 µg/m ³	Bridge Marina	54 µg/m ³	59 µg/m ³	Totara Street	n/a	54 µg/m ³
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Analysis of baseline data	Refer to supporting documentation.																			
Source speciation or other analysis	Refer to supporting documentation.																			

Explanation of any previous exceedance event/s from this monitoring station in the past 5 years	<p>Due to anthropogenic activities within the Mount Maunganui Airshed, elevated PM10 levels are common. Consequently, values above the NES PM10 standard value have been recorded at all five of these monitoring sites within the past three years. Given the number of sites involved, the reasons are variable with a mixture of Port- and industry-related activities, along with occasions when natural source events have been identified.</p> <p>However, a strong influence can be seen in the monitoring record from the nearby marine environment when sea state conditions are conducive. Sea spray (sea salt) particles related to a weather pattern were considered to have been the cause of exceedances recorded on 9 and 10 June 2021 at Rata Street monitoring station. In November 2021, the Minister approved the Bay of Plenty Regional Council's exceptional circumstances application for these exceedances.</p> <p>A further application for an exceedance event, also for sea spray at Rata Street, in April 2022, is currently being considered by the Minister.</p>	
Monitoring readings covering exceedance event	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> Not attached

3 Details of exceptional circumstances

Exceptional circumstances leading to exceedance	<input type="checkbox"/> Localised impact on a monitor	<input type="checkbox"/> Anthropogenic extreme event	<input checked="" type="checkbox"/> Natural disaster or natural extreme event	<input type="checkbox"/> Other
Explanation of circumstances leading to exceedance event	<p>An increased presence of sea spray particles originating from an elevated sea state and long fetch onshore winds is considered to have been the cause of the exceedance events occurring on 18 and 19 August 2022 at five air quality monitoring stations within the Mount Maunganui Airshed, in the Bay of Plenty region.</p>			

Reasons why these circumstances were beyond the reasonable control of the regional council

Meteorological conditions conducive to elevated wave heights, and the transport and inland deposition of sea spray particles were the cause of the recorded breaches of 18 and 19 August 2022. These conditions are well beyond the reasonable control of the Bay of Plenty Regional Council.

Page 43 of the "2011 Users' Guide to the revised National Environmental Standards for Air Quality 2011: Updated 2014 guide" (the Users' Guide) states: *"Generally, unforeseeable emergencies and natural disasters cannot be prevented or controlled and are likely to satisfy this criterion."*

All evidence that we have examined points to sea spray particles being the source of these two PM10 breaches. In reference to the requirements of page 44 of the Users' Guide, these breaches can credibly be considered an unplanned, unforeseeable circumstance that could not reasonably be predicted or planned for.

The events causing the breaches of the PM10 air standard on 18-19 August can be considered exceptional due to their nature as a weather event responsible for the exceedance. The events created a situation where salt spray particles were formed in abundance and then transported under suitable wind patterns, so a conducive weather event that directly led to the exceedance.

In terms of foreseeability, those responsible for planned events or other predictable anthropomorphic sources of particulate matter, which may reasonably be supposed to result in an exceedance, can make advance preparations to address their effects with containment or suppression measures.

In contrast, while we can predict that certain meteorological conditions may result in an increased concentration of sea spray over our network of air quality monitors, there is no certainty that this will result in an exceedance of the Standard. Furthermore, there is no way to control natural processes such as the weather, which have a demonstrated history of causing PM10 exceedances in the Mount Maunganui and Bay of Plenty Airsheds, as well as in other regions.

In terms of frequency and likelihood of reoccurrence, Page 45 of the Users' Guide states that: *"The majority of exceptional circumstances are likely to be related to a natural disaster or extreme weather event..."*. The breaches detailed in this application are considered to have been caused by sea salt from unusually high waves being transported by wind as part of a weather event. Weather events are cited in the Users' Guide as an example of exceptional events.

The RMA framework is based on the principle of sustainable management when making resource management decisions. There is no evidence that this event is related to poor resource management of air as a resource. It is considered that the source of the PM10 breaches on 18-19 August 2022 is an increased ratio of sea salt particles within the local profile. This was generated by the elevated sea state and wind patterns associated a long fetch steady northerly/north-easterly wind pattern pushing into the Bay of Plenty. This connected series of meteorological events provided a means of particle generation and transportation. It is unreasonable to expect the Bay of Plenty Regional Council to control this emission when it originates from a specific weather pattern.

The recent HAPINZ 3.0 report indicates that sea spray is a source of particulate matter within New Zealand. In the Mount Maunganui Airshed, sea spray has been identified as a source through a variety of monitoring programmes and has been a key contributor to two weather-related PM10 breaches in June 2021, both of which were considered exceptional circumstances by the Minister in November 2021. Please refer also to the application currently under consideration by the Minister for a further, weather-related, PM10 breach, in April 2022.

For the reasons outlined above we are requesting the breaches be considered an exceptional event because the breaches were caused by natural weather events, beyond the reasonable control of the council, not foreseeable and unable to be predicted or planned for, not likely to reoccur and not within the intent of the RMA framework.

It should also be noted that through conversations with other Regional Councils, the Bay of Plenty Regional Council is aware that Auckland Council also experienced several exceedances during this period. Both Northland Regional Council and Hawkes Bay Regional Council recorded several days of elevated PM10 data values (with similar temporal patterns of increase, although they did not have overall levels that would result in exceedances of the 24-hour Standard), hence indicating a wide-spread inter-regional particulate matter event.

Supporting
evidence
(eg, *meteorological
report*)

☒ Attached

☐ Not attached



9 September 2022

Date

Signed: Reuben Fraser

General Manager, Regulatory Services
Bay of Plenty Regional Council Toi Moana

Supporting documentation

Background

The monitoring stations involved within this application are an integral part of the wider ambient air quality monitoring network within the Mount Maunganui Airshed (Figure 1). Like all the sites within this network, it is operated by WaterCare Ltd under contract for the Bay of Plenty Regional Council. Quality assessed and controlled data is provided from WaterCare on a following month basis. The data used in this supporting document is part of that quality-controlled dataset.



Figure 1. Ambient air quality monitoring sites within the Mount Maunganui Airshed.

Previous exceedances recorded within the Mount Maunganui Airshed (Table 1) have been the result of a range of activities associated with human activity, and also sea spray events. Several successful exceptional circumstances applications for PM₁₀ exceedances have been lodged with the Ministry and historically, these have had a primary focus on sea spray events. In addition, an exceptional circumstances application was also approved for an exceedance related to Australian bushfire and dust events, recorded on 6 December 2019, for several sites within the Airshed.

Table 1. Previous PM₁₀ exceedances within Mount Maunganui Airshed (exceptional circumstance events approved by the Minister are **highlighted**).

Exceedance No.	Date	Location	PM ₁₀ 24-hour average
1	9/11/2018	Whareroa	57µg/m ³
2	11/12/2018	Whareroa	55µg/m ³
3	17/12/2018	Whareroa	62µg/m ³
4	5/01/2019	De Havilland	63µg/m ³
5	1/02/2019	De Havilland	59µg/m ³

6	5/02/2019	Rail Yard South	70µg/m ³
7	5/03/2019	Rail Yard South	62µg/m ³
8	27/08/2019	Rail Yard South	56µg/m ³
9	28/08/2019	Rail Yard South	51µg/m ³
10	23/09/2019	Rail Yard South	64µg/m ³
11	24/10/2019	Rail Yard South	54.7µg/m ³
12	25/10/2019	Rail Yard South	70µg/m ³
13	4/11/2019	Rail Yard South	59µg/m ³
14	5/11/2019	Rail Yard South	67µg/m ³
15 ¹	6/11/2019	Rail Yard South	61µg/m ³
16	13/11/2019	Rail Yard South	58µg/m ³
17	16/11/2019	Rail Yard South	59µg/m ³
18	24/11/2019	Rail Yard South	54µg/m ³
19	25/11/2019	Rail Yard South	57µg/m ³
20	28/11/2019	Rail Yard South	51µg/m ³
21	4/12/2019	Aerodrome Road	51µg/m ³
22	6/12/2019	Multiple stations	Exceptional Circumstances
23	23/12/2019	Rail Yard South	53.2µg/m ³
24	6/01/2020	Rail Yard South	54µg/m ³
25 ²	31/01/2020	Rail Yard South	113.8µg/m ³
26	1/02/2020	Rail Yard South	55µg/m ³
27	17/03/2020	Rata Street	87µg/m ³
28	7/10/2020	Rail Yard South	51µg/m ³
29	9/12/2020	Whareroa	65µg/m ³
30	13/12/2020	Rail Yard South	54µg/m ³
31	2/02/2021	De Havilland	Exceptional Circumstances
32	3/02/2021	De Havilland	Exceptional Circumstances
33	4/02/2021	De Havilland	Exceptional Circumstances
34	5/05/2021	Rail Yard South	52µg/m ³
35	9/06/2021	Rata Street	Exceptional Circumstances
36	10/06/2021	Rata Street	Exceptional Circumstances
37	14/07/2021	Rata Street	62µg/m ³
38	6/09/2021	Boat Ramp	63µg/m ³
39	7/09/2021	Boat Ramp	100µg/m ³
40	21/12/2021	Totara Street	51µg/m ³
41 ³	21/04/2022	Bridge Marina	62.8µg/m ³
42 ⁴	18/08/2022	Rata Street	64µg/m ³
43 ⁵	19/08/2022	Rata Street	73µg/m ³

¹ Also 6/11/2019 Totara Street 57µg/m³

² Also 31/01/2020 Rata Street 68 µg/m³

³ Also 21/04/2022 Boat Ramp (Ballance) 55µg/m³ and Rata Street 53µg/m³

⁴ Also 18/08/2022 Aerodrome Road 61 µg/m³, Bridge Marina 54 µg/m³, and Railyard South 56 µg/m³.

⁵ Also 19/08/2022 Aerodrome Road 63 µg/m³, Bridge Marina 59 µg/m³, Railyard South 62 µg/m³ and Totara Street 54µg/m³.

The PM₁₀ exceedances can be seen in a full daily timeseries plot, including the sites of interest (Figure 2).

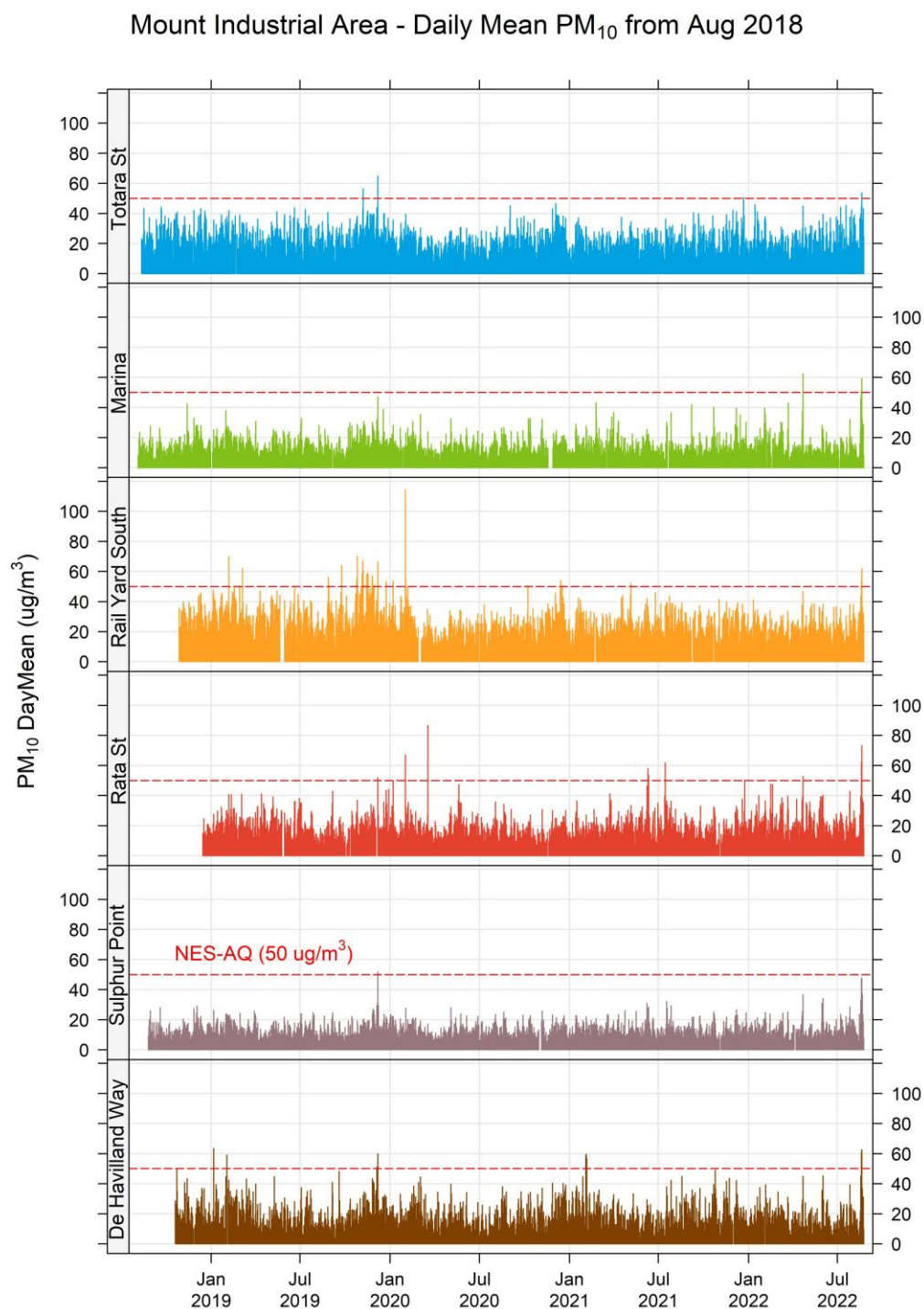


Figure 2. PM₁₀ 24-hour timeseries, full record.

As expected, Mount Maunganui sites have an elevated annual mean PM₁₀ value when compared with all sites within the Council's monitoring network (Table 2), given the level of human activity within this area. The short record of data collected to date also demonstrates that the PM₁₀ levels are at, or just below, the current NZAAQG annual value of 20 µg/m³.

Table 2. Annual PM10 statistics for the Bay of Plenty region network. (Mount Maunganui Airshed sites are shaded).

	Annual mean PM10 (µg/m3)		
Site	2019	2020	2021
Otumoetai	11	10	10
Kopeopeo	12	13	12
Edmund Rd	14	12	11
Moses Rd	14	15	16
Sulphur Point	14	13	14
Marina	16	14	15
Whareroa Marae	17	14	11
De Havilland Way	20	18	19
Rata St	20	18	19
Totara St	25	21	21
Rail Yard South	31	24	24

Like all ambient air quality monitoring sites located within urban areas, the full timeseries (Figure 2) from the Mount Maunganui Airshed exhibits much variability. The only real difference from other urban areas is the absence of a dominant wintertime domestic heating signature, such as that at the Edmund Rd and Moses Rd Council monitoring sites in Rotorua. Analysis shows that the opposite is often the case with the Mount Maunganui sites, where an elevated summer pattern can be statistically defined, which is a result of climatic/meteorological drivers, coupled with anthropogenic activity.

18 – 19 August 2022 PM10 exceedance events

The following information builds on the background information in the previous section and is more specific to the PM10 exceedance events recorded at several sites within the Mount Maunganui Airshed on 18-19 August 2022.

Wind direction for the two days was investigated and shown to be within the north-east quadrant (Figure 3). This is a band that is away from the industrial sources of PM10, and potential upwind sources are traffic roadways, residential areas, and the Bay of Plenty coastal environment (Figure 4).

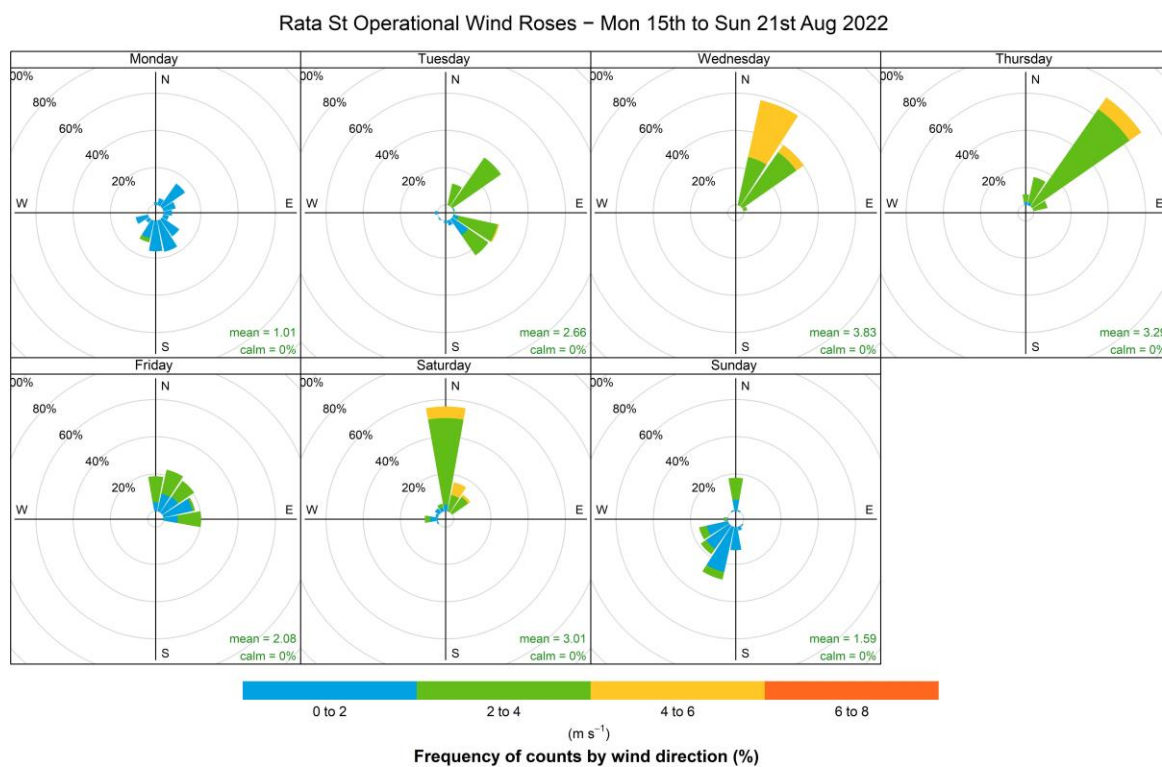


Figure 3. Wind roses for the period of interest, recorded at the Rata Street site.



Figure 4. Windrose for 18th August 2022, located on the Rata Street site, but applicable to all sites for this event.

The wind flow on a larger scale, over the Bay of Plenty is shown in the following synoptic maps (Figure 5). They show several important features and drivers related to the exceedance events. Firstly, the presence of an anticyclone located to the north of the Bay of Plenty for several days, and a complex cold frontal system to the west of the North Island. This pattern results in a significant northerly wind flow over the Bay of Plenty. This pattern also results in a substantial fetch which creates a sea state which will be discussed further in this section. This pattern persisted for a number of days before, during and after the exceedance event.

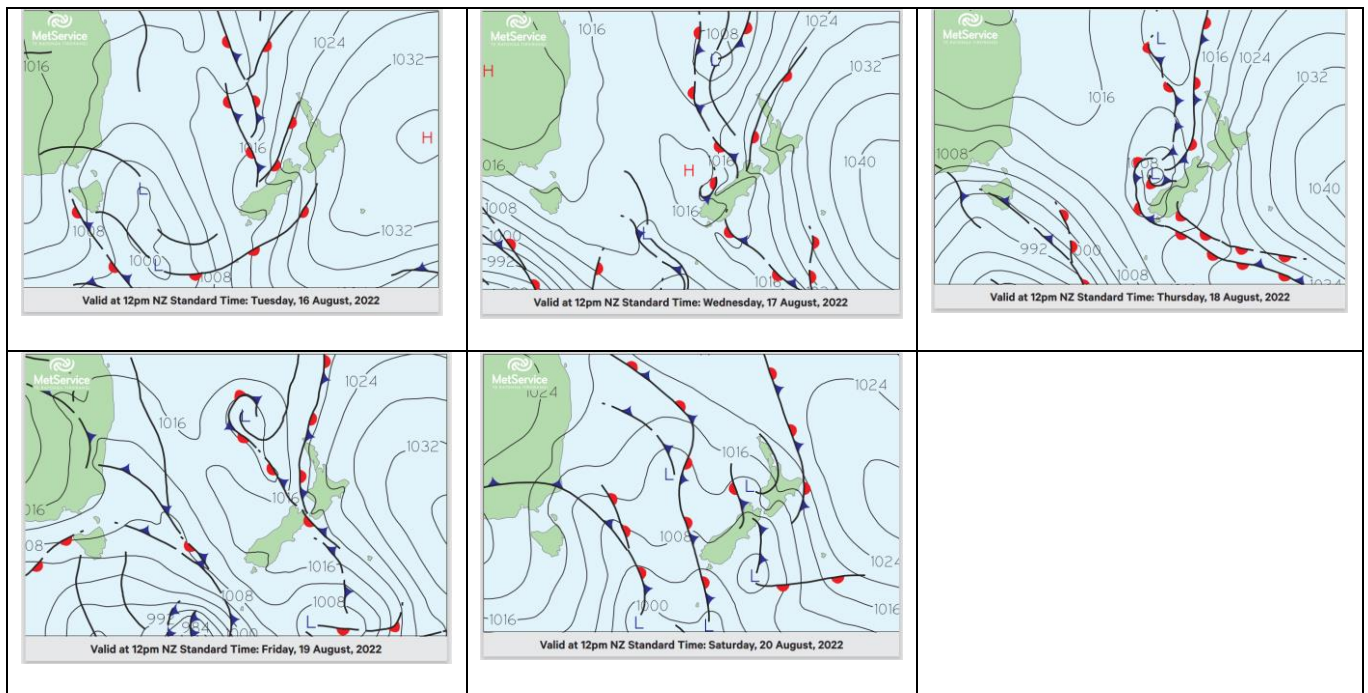


Figure 5. Synoptic maps for the period of interest (courtesy of the NZ MetService).

PM10 24-hour datasets from the Airshed sites (Figure 6) show an increase in PM 10 concentration over a period leading up to and including the date of the exceedance. It should be noted that individual site locations are not equidistant from the coastline (as shown in Figure 1), but, given the wide scale nature of the meteorology driving this event, this spatial aspect is not relevant.

Mount Industrial Area - Operational Daily Mean PM₁₀ - 14th to 22nd Aug 2022

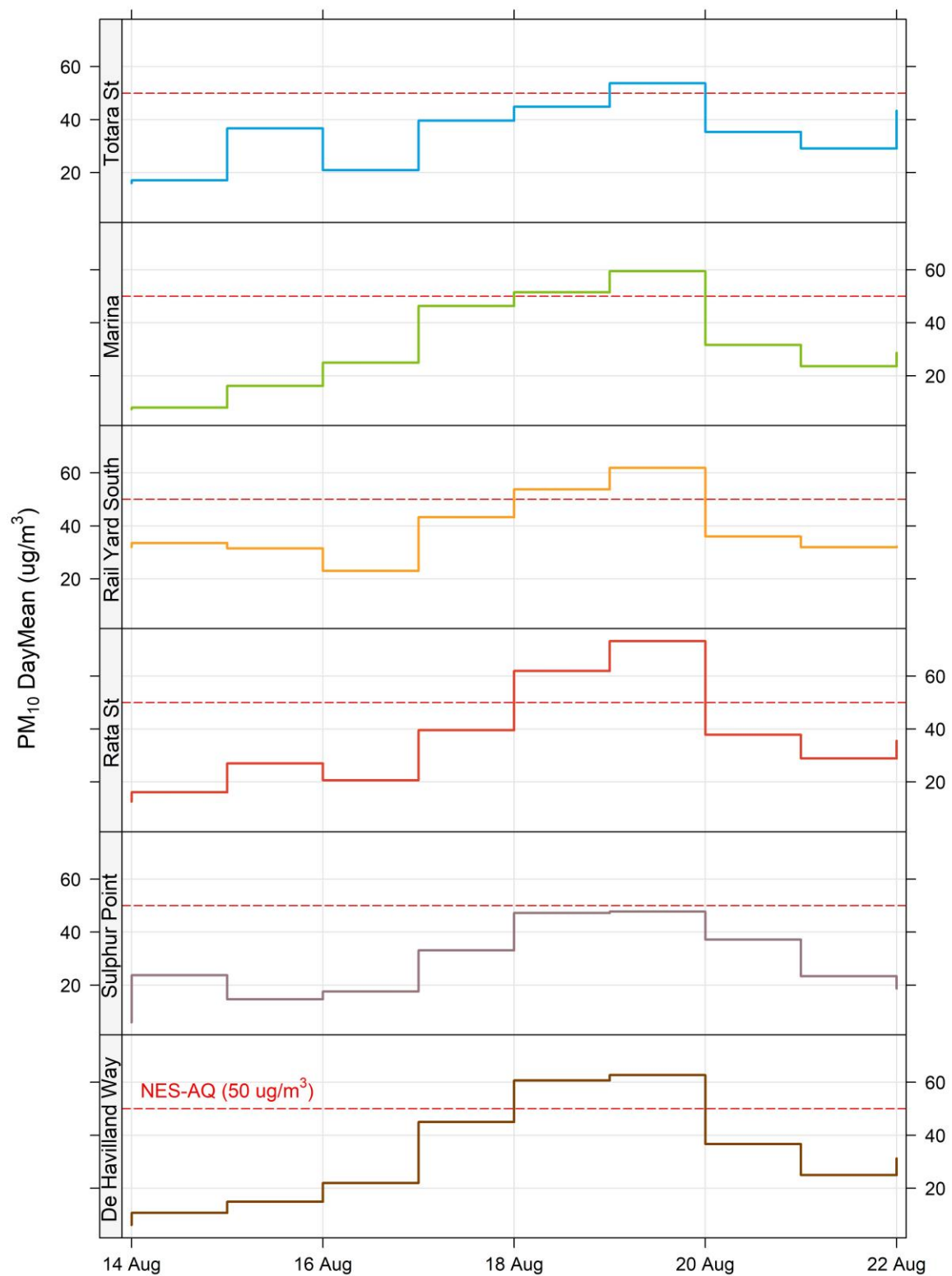


Figure 6. Daily PM10 plots for the Airshed sites.

Rata Street timeseries wind data for the event is shown in Figure 7 (given the close proximity of all the monitoring sites within the Mount Maunganui Airshed, the wind patterns were the same for each, and the Rata Street data is considered sufficiently indicative of the entire monitoring network for this application). The north-easterly wind direction relates well with the location of the coastal environment and the source of particulate for this event. The recorded windspeed values are not extreme but are sufficient to transport sea spray, which is generated by the present wave energy, across the Mount Maunganui Airshed. The recorded north-easterly/increasing concentration (Figure 6 and 7) relationship is further demonstrated with the polar plots for all exceedance sites in Figure 8, with high values recorded when the north-easterly quadrant wind flow is present.

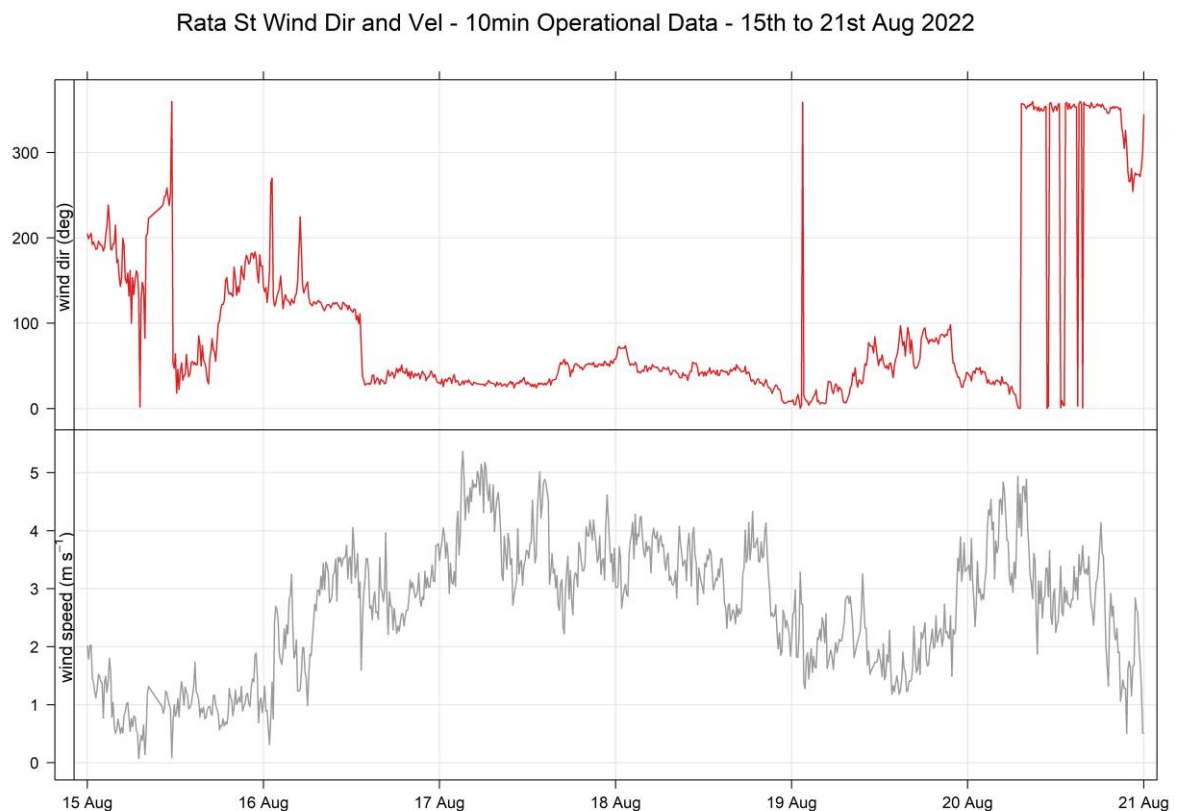


Figure 7. Rata Street wind speed and wind direction for 15th to 22nd August 2022.

Operational PM₁₀ Polar Plots – Tue 16th to Sat 20th Aug 2022

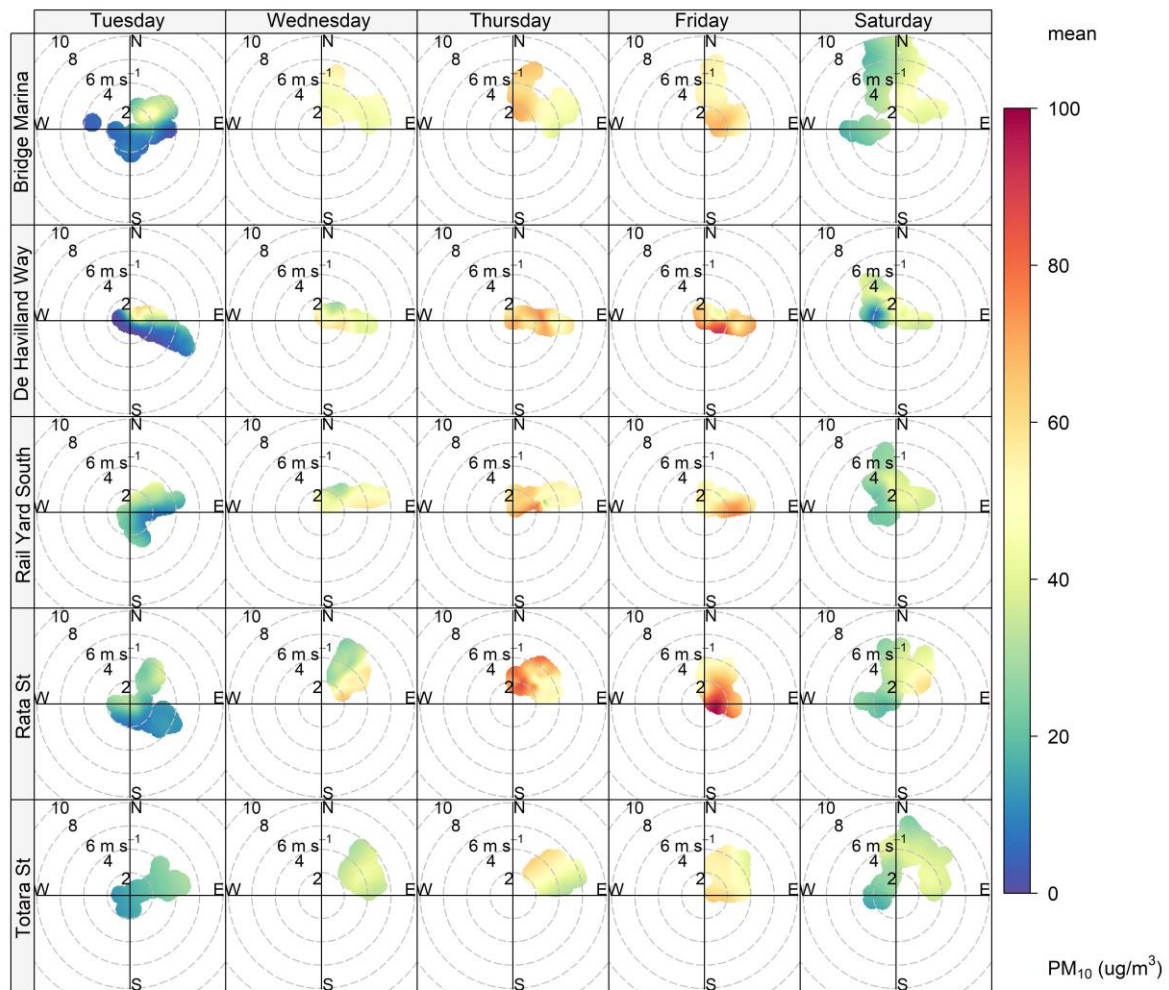


Figure 8. Polar plots, (all sites) for the 18/19 August 2022 event and preceding/following days.

In addition to traditional air quality datasets, several other parameters have been checked as part of this investigation.

Firstly, precipitation, which is recorded by acoustic techniques at each of the sites within the Airshed. Rainfall theoretically has a “scavenging” effect on airborne particulate matter and would typically reduce its recorded volume. However, on this occasion, the rainfall recorded on 18 August was described as light, misty showers, and this precipitation situation was also supported by Council officer observations within the Airshed on the same day.

Secondly, wave parameters from a wave buoy located within the Bay of Plenty, approximately 10km off the coastline were also scrutinised. As can be seen in Figure 9, during the time of the PM₁₀ exceedance, an elevated sea state event was present within the Bay of Plenty (which was sufficient to result in areas of significant coastal shoreline erosion within the western Bay of Plenty). Wave heights were in a range of 3 to >7m for a period of more than three days. It is this elevated sea state that generated a source of natural sea spray particles that persisted and accumulated over several days leading into and during the day of the exceedance).

Rata St & Pukehina Wave Buoy - 15th to 21st Aug 2022

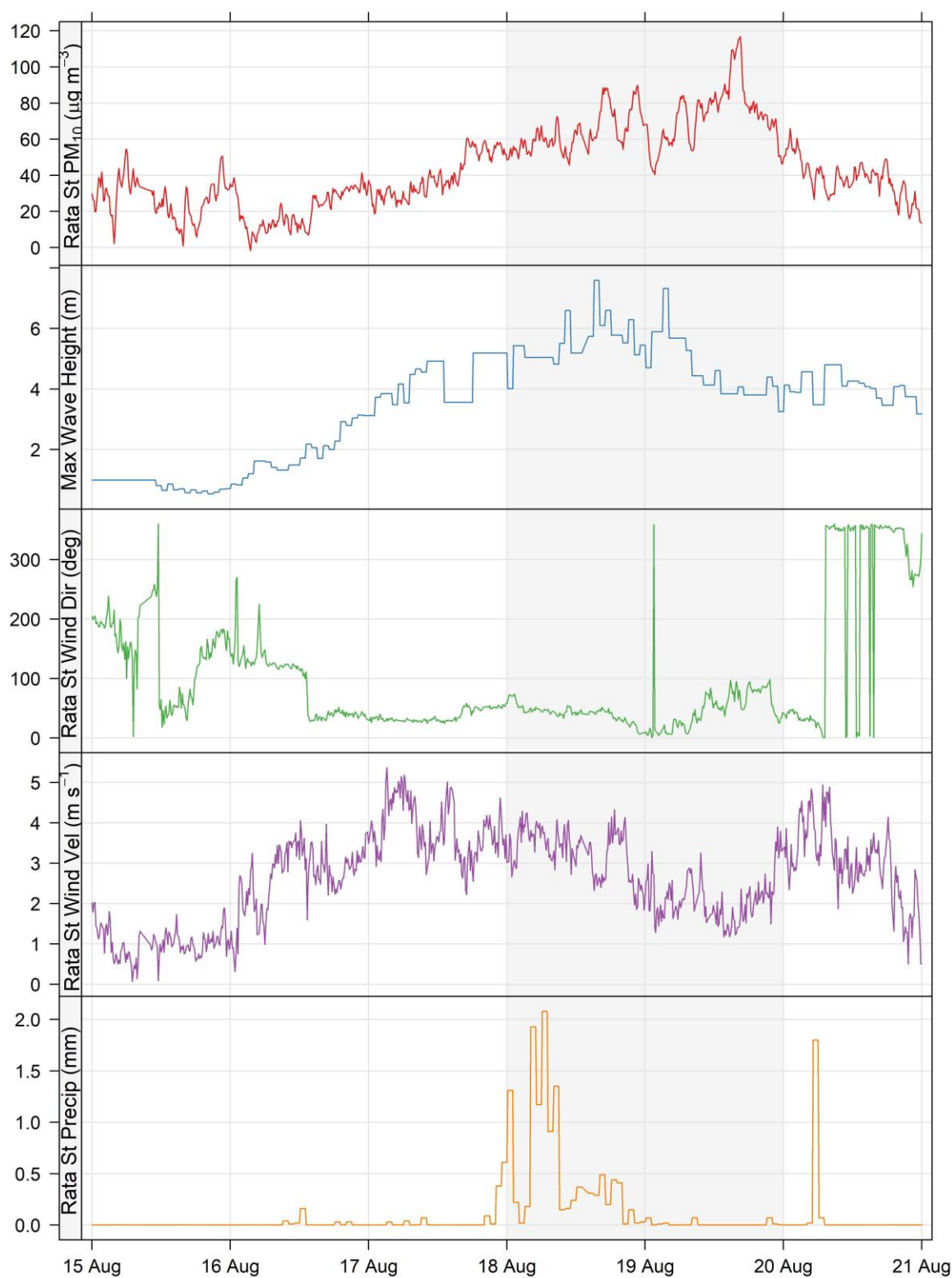


Figure 9. Air quality, precipitation, and wave data for the event.

It should be noted that other sites within the Bay of Plenty air monitoring network also showed increases in particulate concentration (Figure 10) over the same time period, but the recorded 24-hour averages didn't equate to an exceedance of the Standard. However, this pattern signals the event was region-wide rather than one attributed to a localised source. The Kopeopeo site is located in Whakatāne, approximately 80km to the east of the Mount Maunganui Airshed and the Otumoetai site in Tauranga, is approximately 6km to the south-east.

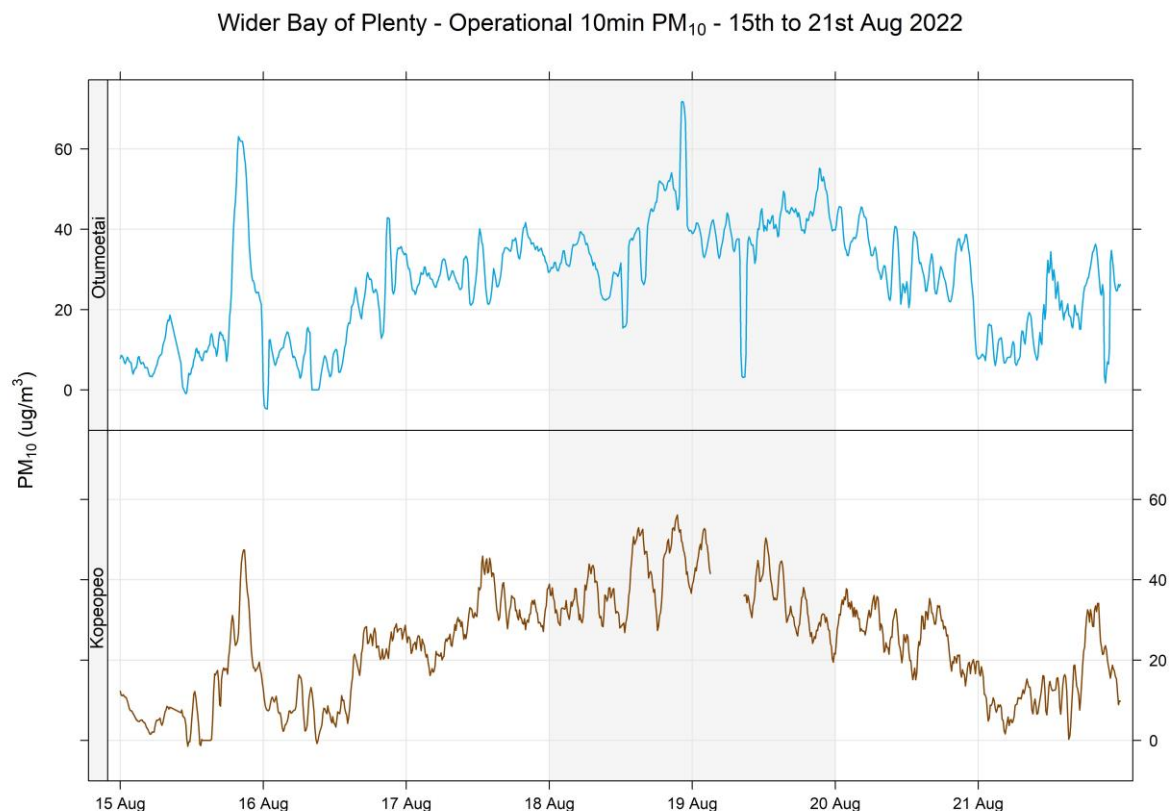


Figure 10. PM10 data from two other sites in the Bay of Plenty Regional Council monitoring network.

In addition, Council Officer observations were made during and after the event within the Airshed. These were focussed on any potential particulate source activities that could have given rise to a period of several days of elevated PM10 readings. No activities were identified and, furthermore, the Council's Pollution Hotline recorded no calls that could be related to such activities either.

Conclusion

The information presented within this supporting document demonstrates a pattern of recorded ambient air quality, meteorological data, and Council Officer observations for the 18/19 August 2022 (and preceding days) that is in line with the influencing factor of a natural coastal environment source (sea spray derived particles). This presence of natural particles resulted in recorded concentrations of PM10 at several monitoring sites that exceeded the 24-hour standard of 50µg/m³ on the 18 and 19th August 2022. In addition, there was an increase in PM10 concentrations in the preceding days, with the entire PM10 “event” over this entire time being the result of an elevated sea state.

This phenomenon appears to be not uncommon as our datasets (and analysis) continue to grow and develop as the Bay of Plenty Regional Council commits significant resources to managing the air quality within the Mount Maunganui airshed. It is worth noting that increases in concentrations that mirrored what was recorded in the Mount Airshed were also recorded at the Council monitoring sites at Otumoetai in Tauranga, and 80km east along the Bay of Plenty coastline in Whakatāne.

The Auckland Council is also investigating the event, as PM10 exceedances were recorded on some of their monitors. Additionally, both the Hawkes Bay and Northland Regional Councils recorded a build-up in PM10 concentration over the same timeframe, but these did not result in exceedances of the Standard. Nevertheless, given the broad geographical range of the elevated PM10 concentrations that were recorded, the description of this as a multi-regional sea spray event would be appropriate.



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