



# 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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Please send your completed application form and all attachments to [air@mfe.govt.nz](mailto:air@mfe.govt.nz).

### 1 Applicant details

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### 2 Details of exceedance event

Containment	PM <sub>10</sub> (24-hour average)
Date of exceedance <i>(application must be received within 3 months from date of the exceedance)</i>	19 April 2023
Relevant airshed	Mount Maunganui Airshed
Monitoring station and technical specifications of monitor	Rata Street. Location: 50m south of Rata Street, Mount Maunganui Instrument specifications: Thermo model 5014i Beta Attenuation Monitor (BAM) with PM <sub>10</sub> size selective inlet.

<b>Summary of monitoring reading showing exceedance event</b>	PM <sub>10</sub> 51 µg/m <sup>3</sup> - 19 April 2023	
<b>Analysis of baseline data</b>	Refer to supporting documentation.	
<b>Source speciation or other analysis</b>	Refer to supporting documentation.	
<b>Explanation of any previous exceedance event/s from this monitoring station in the past 5 years</b>	<p>Due to anthropogenic activities within the Mount Maunganui Airshed, elevated PM<sub>10</sub> levels are common. Consequently, values above the NES PM<sub>10</sub> standard value have been recorded at the Rata Street site within the past four years.</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 specific weather pattern are considered to have been the cause of exceedances recorded on 9 and 10 June 2021, 21 April 2022 and 18 and 19 August 2022 at this monitoring station. The Minister approved the Bay of Plenty Regional Council's exceptional circumstances application for these five exceedances on 18 November 2021, 13 October 2022, and 2 December 2022, respectively.</p>	
<b>Monitoring readings covering exceedance event</b>	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> Not attached

### 3 Details of exceptional circumstances

<b>Exceptional circumstances leading to exceedance</b>	<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
<b>Explanation of circumstances leading to exceedance event</b>	An increased presence of sea spray particles originating from an elevated sea state and onshore winds is considered to have been the cause of the exceedance occurring on 19 April 2023 at the Rata Street air quality monitoring station within the Mount Maunganui Airshed in the Bay of Plenty region.			

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 responsible for the recorded exceedance. 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 the PM<sub>10</sub> exceedances on 19 April 2023. In reference to the requirements of page 44 of the Users’ Guide, these exceedances can credibly be considered an unplanned circumstance that could not reasonably be predicted or planned.

The events causing the exceedance of the PM<sub>10</sub> air standard on 19 April 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.

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...”*. These exceedances are considered to have been caused by sea salt from unusually high waves being transported by winds 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 PM<sub>10</sub> exceedance on 19 April 2023 is an increased ratio of sea salt particles within the local profile. This was generated by the elevated sea state and wind patterns associated with a weak complex depression system located to the northwest of the North Island, and then the presence of a sizable anticyclone system acting in a blocking fashion centred to the west of New Zealand. Both events pushed a north-easterly wind flow into the western area of the Bay of Plenty.

This connected series of meteorological events provided a means of particle generation and transportation and appears to be not uncommon as evidenced both by past external SEM analysis and our expanding data collection and consideration. It is unreasonable to expect the Bay of Plenty Regional Council to control an emission when it originates from a specific weather pattern.

The 2022 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 was a key contributor to two weather-related PM<sub>10</sub> exceedances in June 2021, another in April 2022 and a further two in August 2022, all of which were considered exceptional circumstances by the Minister.

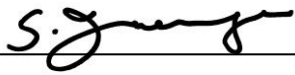
The April 2023 exceedance is a further instance of a specific combination of meteorological events resulting in an exceedance of the PM<sub>10</sub> standard. The Bay of Plenty Regional Council’s monitoring of air quality has led to an increasing body of historical data within the Mount Maunganui Airshed. This indicates that specific weather conditions can lead to increased salt spray and elevated PM<sub>10</sub> readings, sometimes resulting in exceedances of the NES PM<sub>10</sub> standard.

For several earlier exceedances at the Rata Street monitoring site, we commissioned Scanning Electron Microscope (SEM) analysis of filter samples to contribute to exceptional circumstances applications. However, the cost to the ratepayer of this external analysis and the subsequent staff processing and evaluation is considerable. Therefore, given our growing datasets and understanding of the contributing causes of PM<sub>10</sub> exceedances from specific meteorological events, we tend to commission such analysis only when the causes of an exceedance are more questionable. The meteorological conditions leading to this April 2023 exceedance displays clear parallels with five earlier exceedances in 2021 and 2022 and thus SEM analysis was not commissioned.

For the reasons outlined above we are requesting the exceedance be considered an exceptional event because the exceedance was not foreseeable, not likely to reoccur, beyond the reasonable control of the council and not within the intent of the RMA framework.


<b>Supporting evidence</b> (eg, meteorological report)	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> Not attached
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22 May 2023



Shane Iremonger

Science Team Leader



Reuben Fraser

General Manager, Regulatory Services

## Supporting documentation

### Background

The Rata Street monitoring station is an integral part of the wider ambient air quality monitoring network within the Mount Maunganui Airshed. Like all the sites within this network, it is operated by WaterCare Ltd under contract for the 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 monthly delivery QA/QC data batch.

Located at the northern-most position within the network (Figure 1) means that the Rata Street site is fully exposed to a wide range of anthropogenic and natural sources.



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

Previous exceedances recorded at the Rata Street site (Table 1) have been the result of activities to the south of the site associated with human activity, or sea spray events. Successful exceptional circumstances applications for PM<sub>10</sub> exceedances, also stemming from an increased ratio of sea salt particles, were made for the Rata Street site for exceedances on 9 and 10 June 2021, 21 April 2022 and for 18 and 19 August 2022. An earlier exceptional circumstances application was also approved for an exceedance related to Australian bushfire and dust events, recorded on 6 December 2019.

Table 1. Rata Street PM<sub>10</sub> exceedances.

Date	Location	PM <sub>10</sub> 24-hour average
6/12/2019	Rata Street	53µg/m <sup>3</sup>
31/01/2020	Rata Street	68 µg/m <sup>3</sup>
17/03/2020	Rata Street	87 µg/m <sup>3</sup>
9/06/2021	Rata Street	58µg/m <sup>3</sup>
10/06/2021	Rata Street	53µg/m <sup>3</sup>
14/07/2021	Rata Street	62µg/m <sup>3</sup>
21/4/2022	Rata Street	53µg/m <sup>3</sup>
18/08/2022	Rata Street	64µg/m <sup>3</sup>
19/08/2022	Rata Street	73µg/m <sup>3</sup>
1/12/2022	Rata Street	80 µg/m <sup>3</sup>
19/4/2023	Rata Street	51µg/m <sup>3</sup>

(Highlighted exceedances excluded, as caused by an exceptional circumstance)

The PM<sub>10</sub> exceedances can be seen in the full daily timeseries plot (Figure 2).

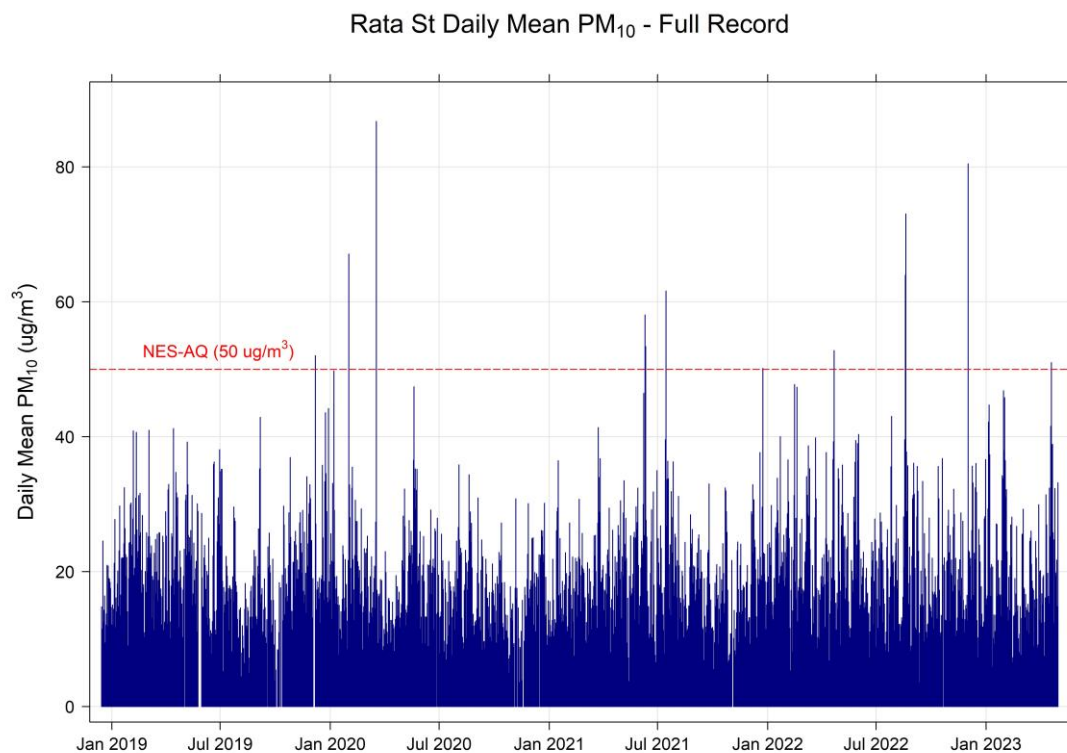


Figure 2. Rata Street PM<sub>10</sub> 24-hour timeseries, full record.

The Rata Street site has an elevated annual mean PM<sub>10</sub> value when compared with all sites within the Council's monitoring network (Table 2). The short record of data collected to date also demonstrates that the PM<sub>10</sub> levels at this site are at, or just below, the current NZAAQG annual value of 20 µg/m<sup>3</sup>.

Table 2. Annual PM10 statistics for the Bay of Plenty Region.

Site	Annual mean PM <sub>10</sub> (µg/m <sup>3</sup> )			
	2019	2020	2021	2022
Otumoetai	11	10	10	12
Kopeopeo	12	13	12	12
Sulphur Point	14	13	14	14
Edmund Rd	14	12	11	11
Moses Rd	14	15	16	15
Marina	16	14	15	15
Whareroa Marae	17	14	11	10
De Havilland Way	20	18	19	18
Rata St	20	18	19	21
Totara St	25	21	21	22
Rail Yard South	31	24	24	23

Like all ambient air quality monitoring sites located within urban areas, the full timeseries (Figure 3) from the Mount Maunganui Airshed exhibits considerable variability. The only real difference from other urban areas is the absence of a dominant wintertime domestic heating signature, such as that shown at the Council monitoring site 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.

### Mount Industrial Area - Daily Mean PM<sub>10</sub> from Aug 2018

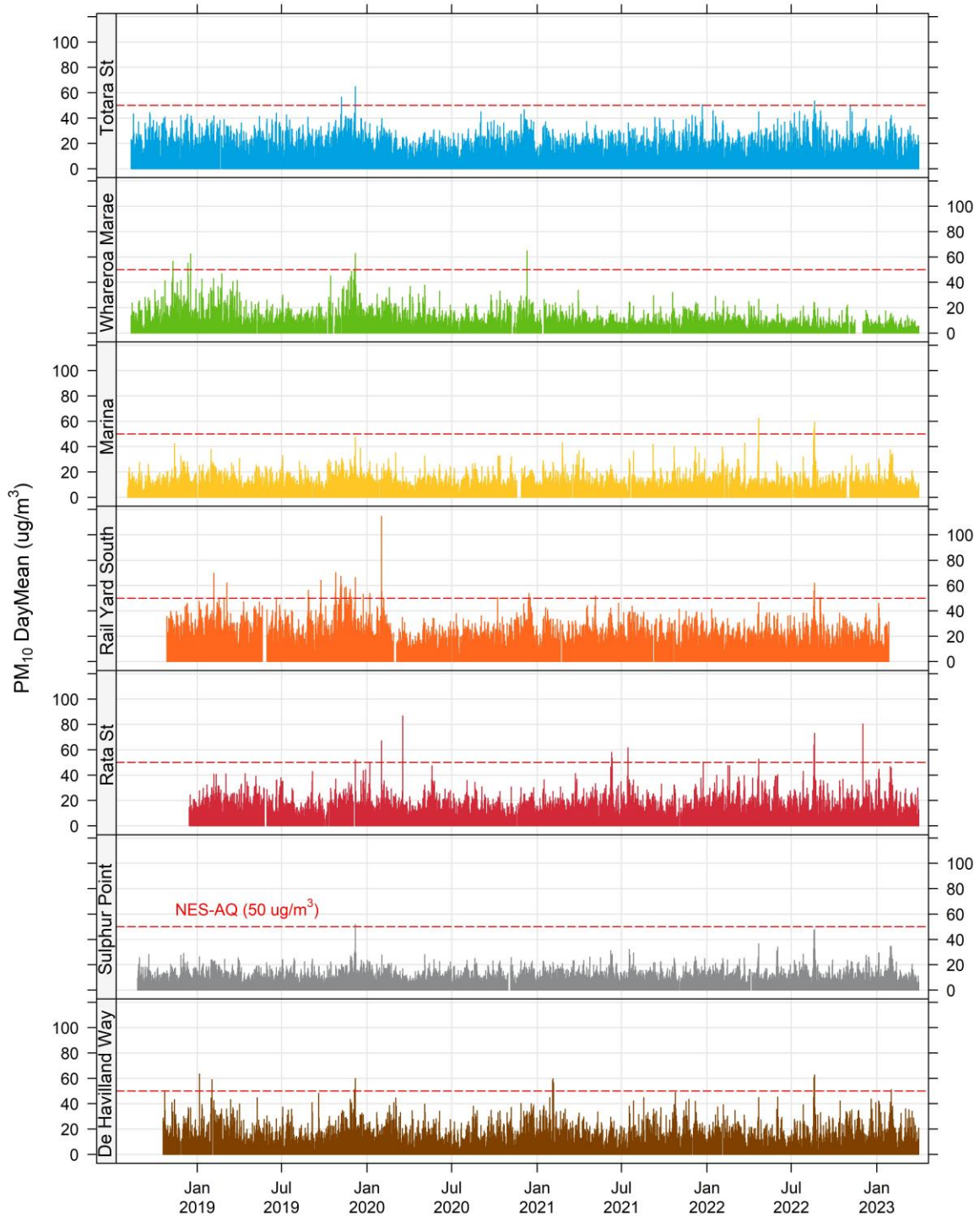


Figure 3. Full PM<sub>10</sub> data for all sites within the Mount Maunganui Airshed.

Polar plots for the mean and maximum statistics for the full record of data at Rata Street (Figure 4) show a dominant pattern whereby higher concentrations are experienced at the site when winds are from the southern quadrant, and typically when wind speeds are higher; this latter point aligns well with general particle transport theory. Other sectors of the compass do show occasions of elevated values, but winds from the coastal sector typically have low particle concentration loads in comparison.

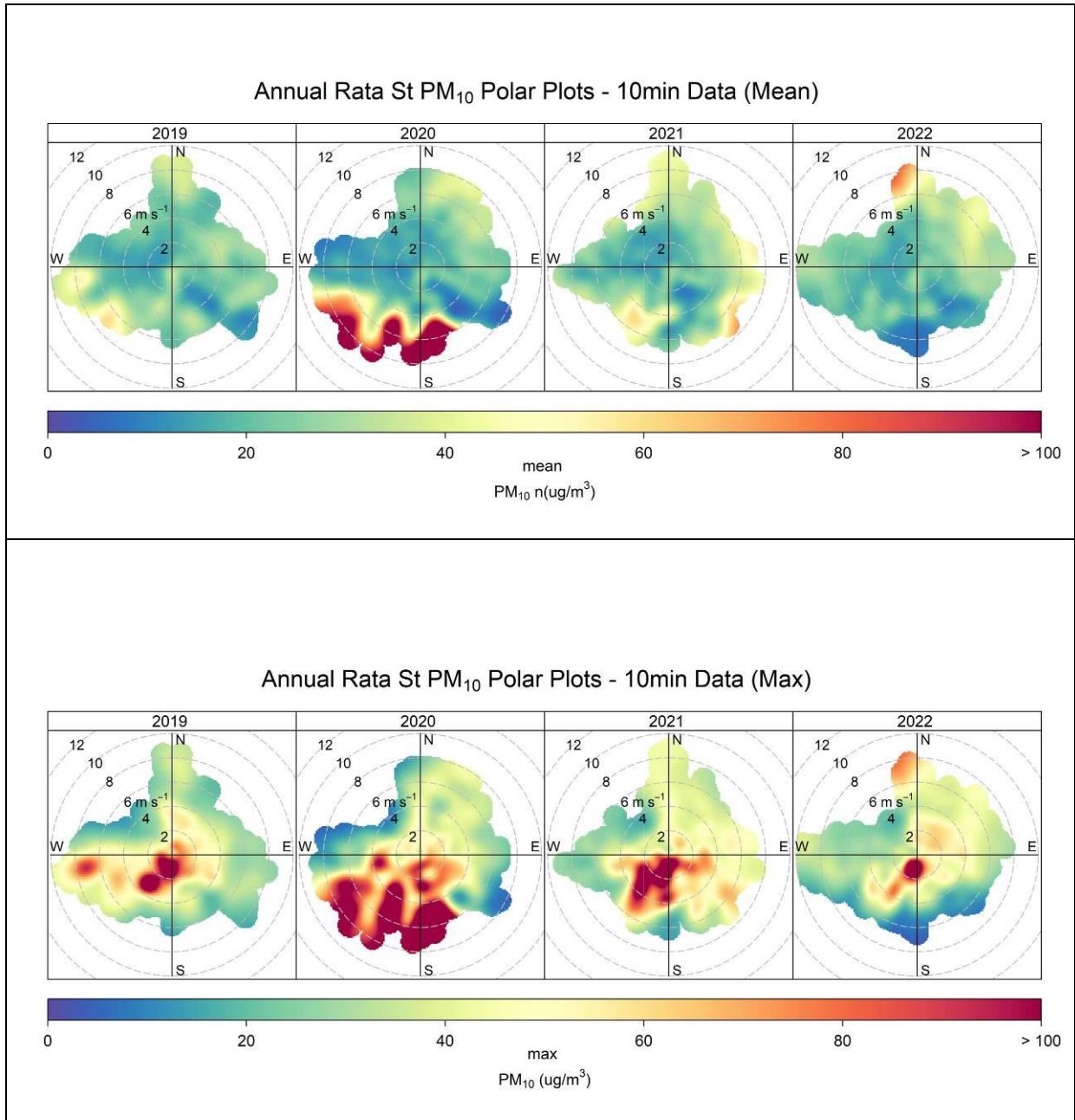


Figure 4. Annual polar plots for both the mean and maximum statistics for Rata Street.

The spatial aspect can be seen in Figure 5 when the 2020 polar plot (from Figure 4) is overlaid on a recent aerial image which also shows the boundary of the Mount Maunganui Airshed. Major anthropogenic particle sources are to the south/south-west and coastal sources are in an arc from the north through to the east.





Figure 5. The Rata Street 2020 polar plot overlaid on aerial imagery to show source locations.

### 19 April 2023 PM<sub>10</sub> exceedance event

The following information builds on the background information in the previous section and is more specific to the PM<sub>10</sub> exceedance event recorded at Rata Street monitoring station on 19 April 2023.

Wind direction for the two days was investigated and shown to be within the north-east quadrant (Figure 6). This is a band that is away from the industrial sources of PM<sub>10</sub>, and potential upwind sources are traffic roadways, residential areas, and the Bay of Plenty coastal environment.



Figure 6. Windrose for 19 April 2023.

The wind flow over the Bay of Plenty is shown in the following synoptic maps (Figure 7). They show several important features and drivers related to the exceedance event. Firstly, the presence of a depression located to the north of the Bay of Plenty for several days, and a substantial anticyclone to the south. The resulting wind flow over the Bay of Plenty is north-easterly with a substantial fetch which creates a sea state which will be discussed further in this section. The depression weakened after several days but the anticyclone's continued presence to the south saw a persistent north-east/easterly wind flow.

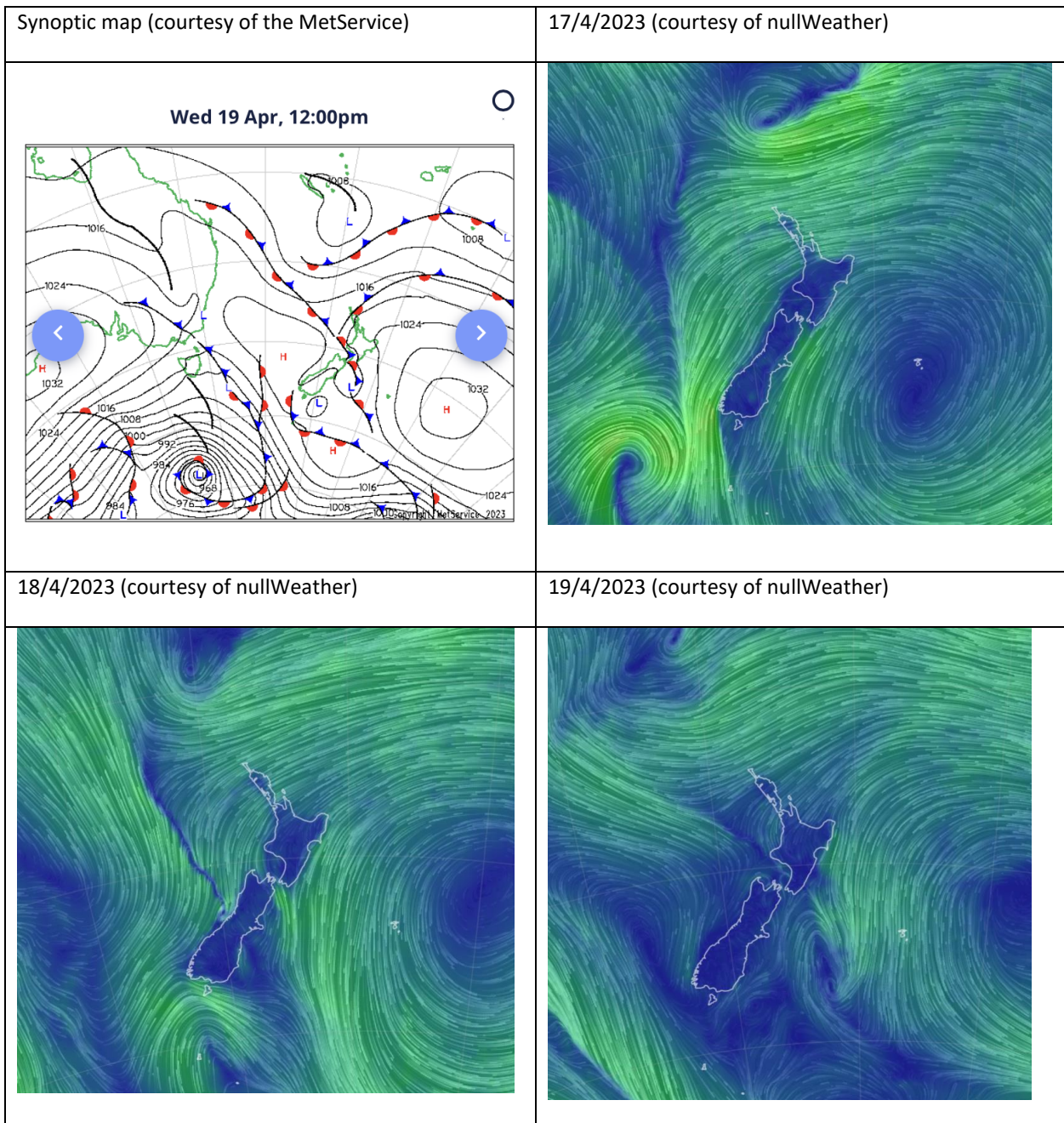


Figure 7. Synoptic and modelled maps for the period of interest.

PM<sub>10</sub> 24-hour datasets from the Mount Maunganui Airshed sites (Figure 8) show an increase in PM<sub>10</sub> 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), therefore the same general patterns of increasing concentrations may apply to all datasets, but site-specific concentrations will vary, which is commonly seen in widespread particulate event such as those associated with sea spray events.

## Mount Industrial Area - Operational Daily Mean PM<sub>10</sub> - 16th to 21st April 2023

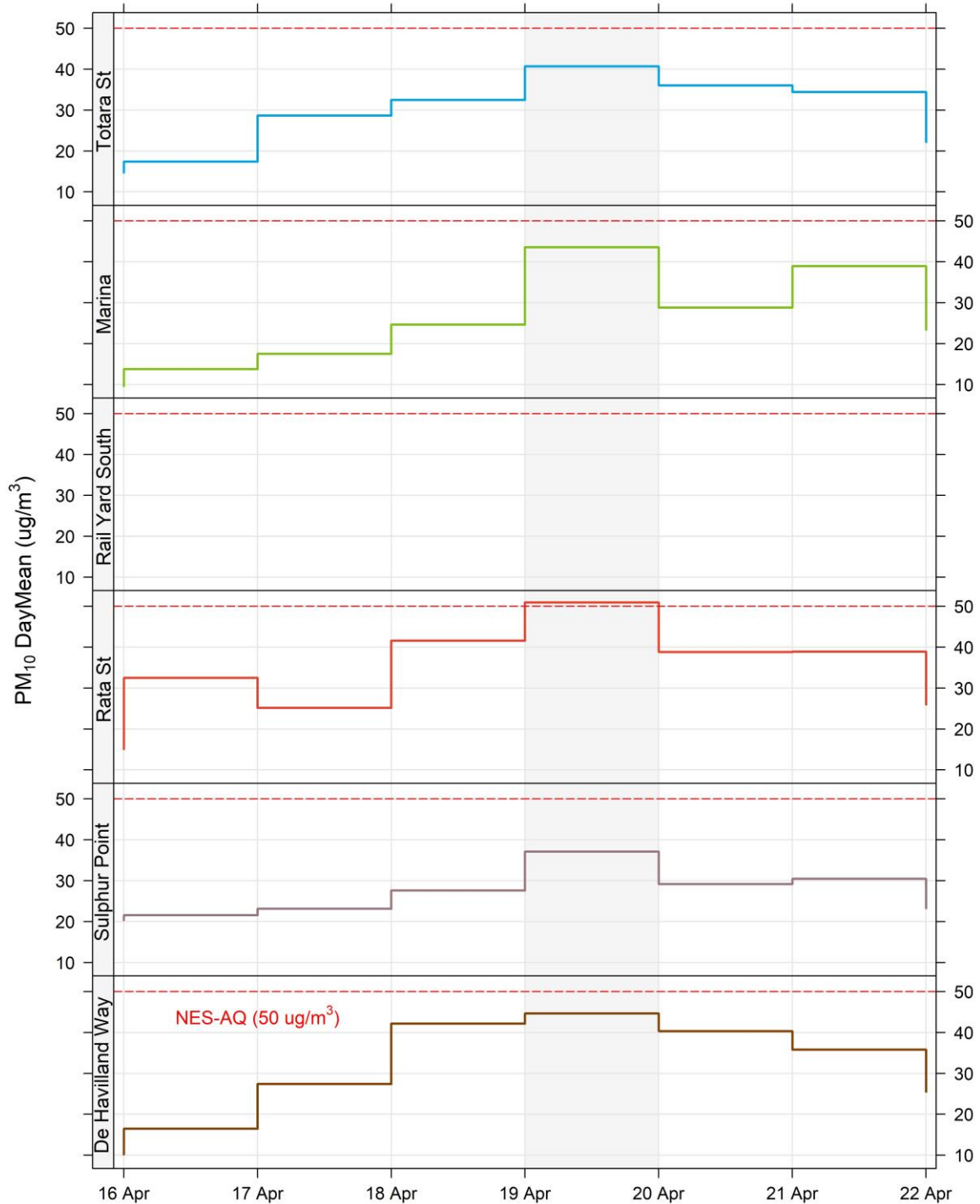


Figure 8. Daily PM<sub>10</sub> plots for the Airshed sites.

Rata Street's timeseries for the event is shown in Figure 9. The first plot shows an initial peak and then a sustained elevation of PM<sub>10</sub> concentrations for the several days. The north-easterly wind direction relates well with the location of the coastal environment. This north-easterly/increasing concentration relation is further demonstrated with the polar plots in Figure 10, with high values recorded when the north-easterly wind flow is present.

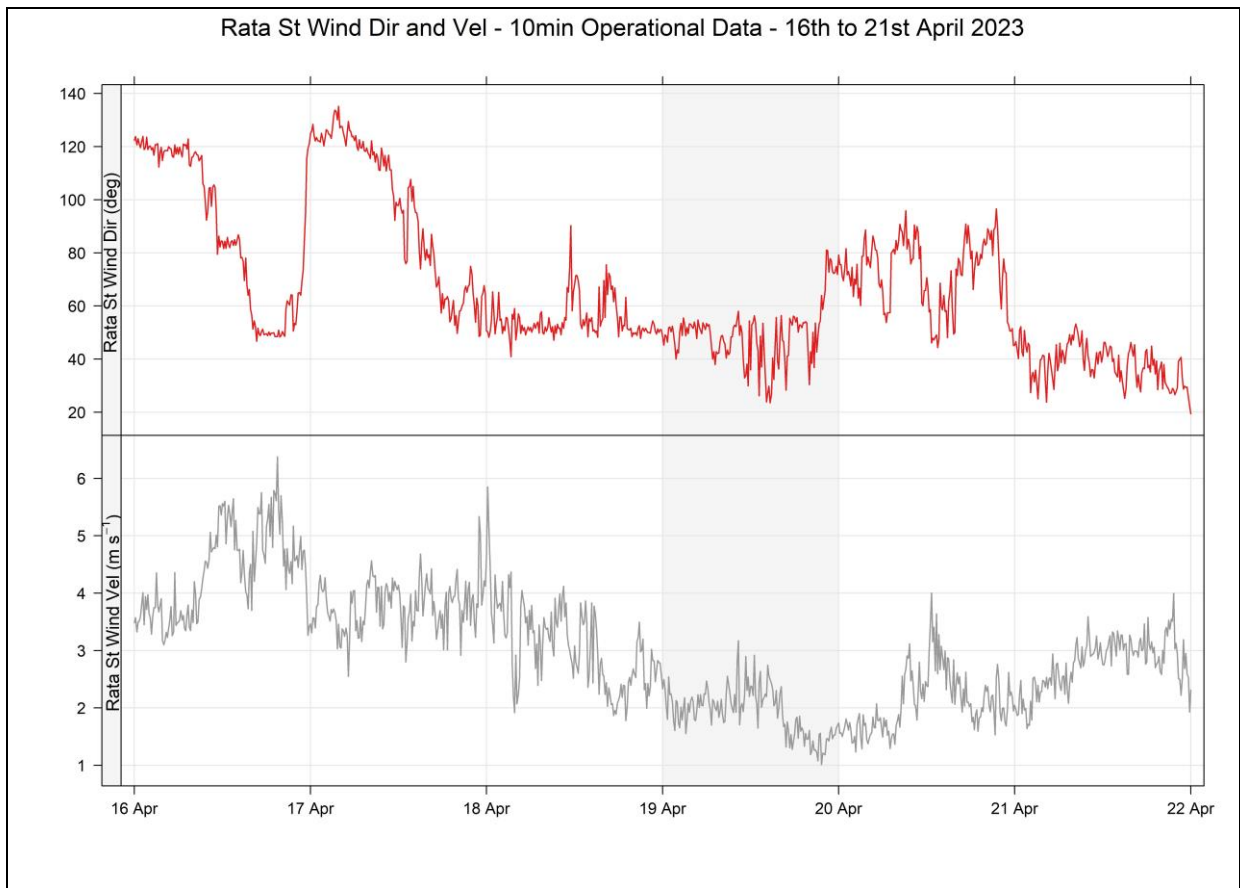


Figure 9. Wind speed and wind direction for 16<sup>th</sup> to 21<sup>st</sup> April 2023.

Operational PM<sub>10</sub> Polar Plots – Mon 17th to Fri 21st April 2023

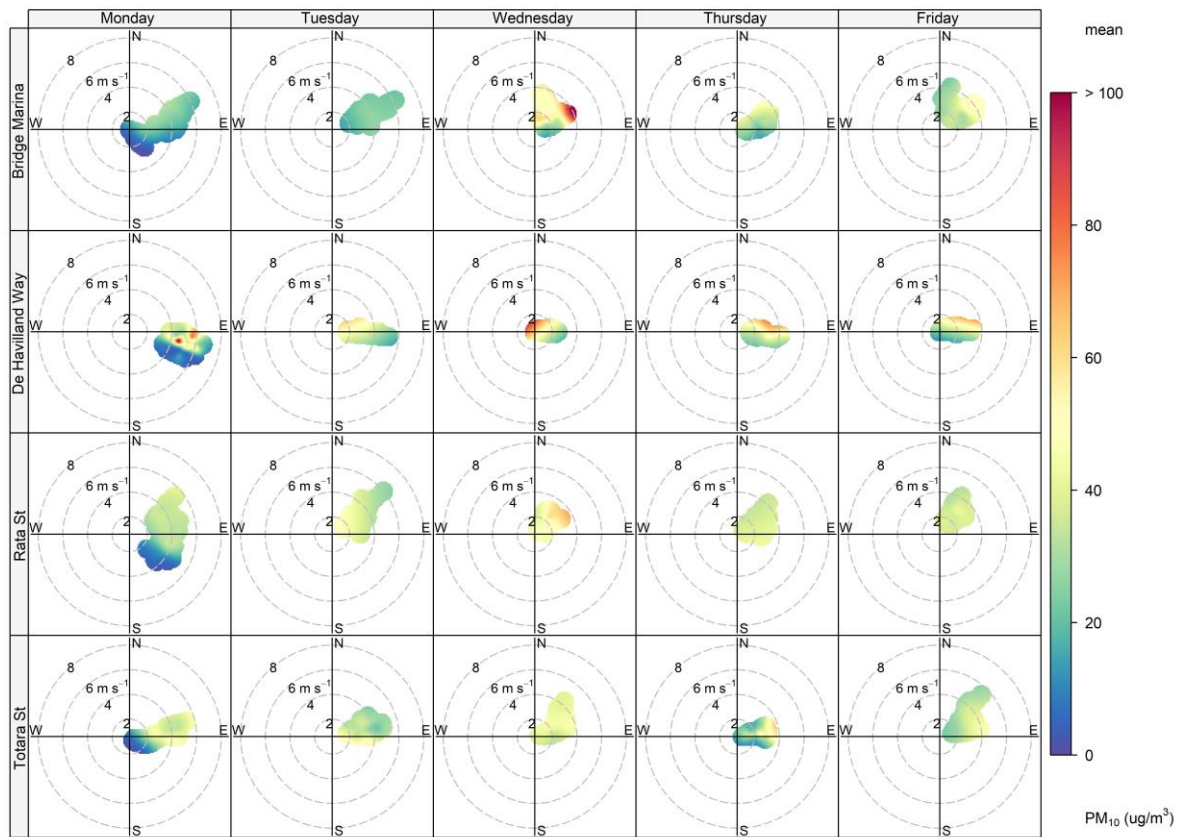


Figure 10. Polar plots for 19 April 2022 event and preceding days.

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 was recorded on the 22 April but not on the date that the exceedances were recorded. Secondly, wave parameters from a wave buoy located within the Bay of Plenty, approximately 10km off the coastline. As can be seen in Figure 11, during the time of the PM<sub>10</sub> exceedance, an elevated sea state event was present within the Bay of Plenty. This was notable/strong enough to result in areas of significant coastal shoreline erosion within the western Bay of Plenty. Wave heights were in a range of 2.5 to 5 metres 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 - 16th to 21st April 2023

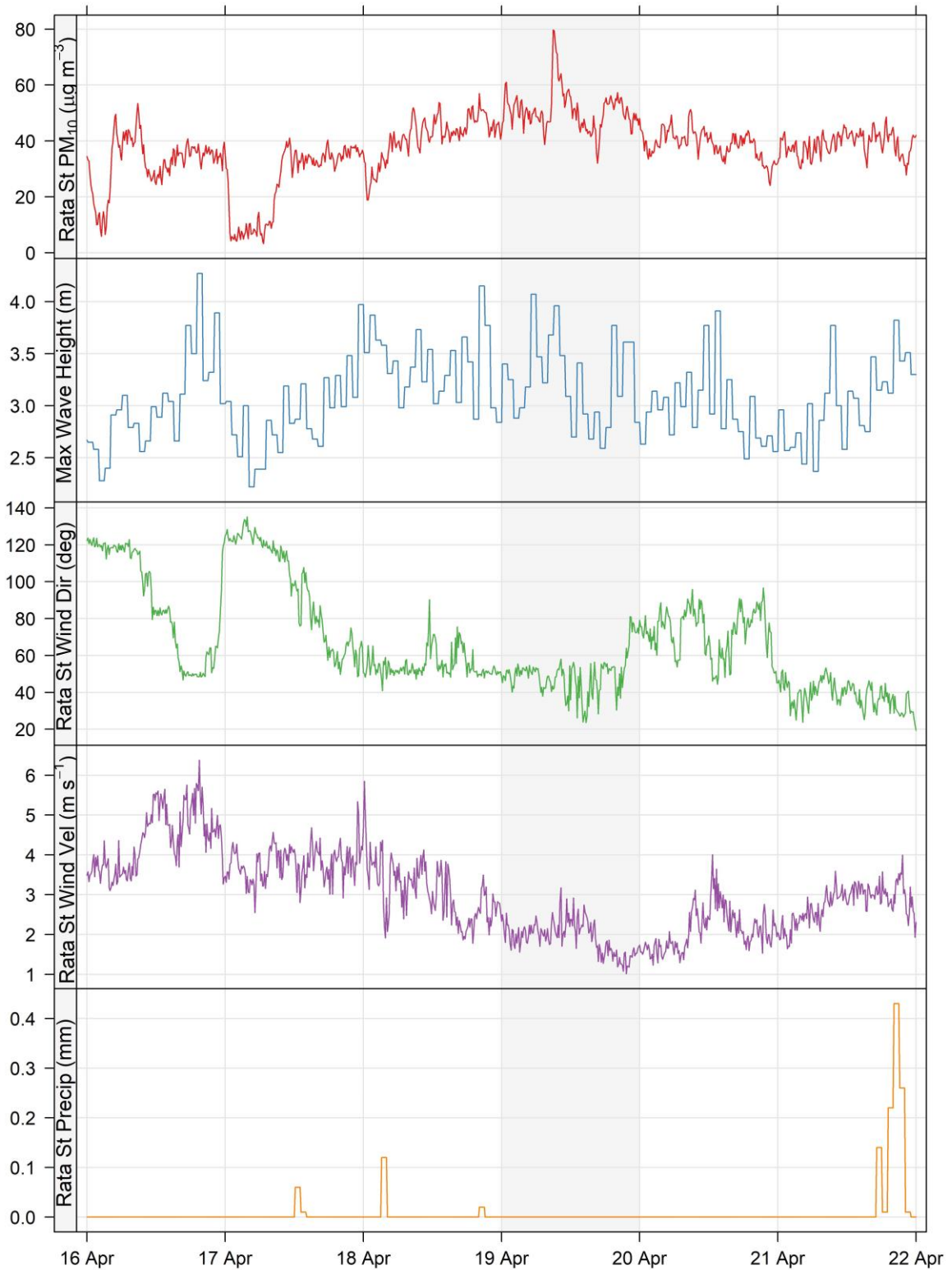


Figure 11. Air quality, precipitation, and wave data for the event.

Following air quality monitor warning alerts for elevated levels of PM<sub>10</sub>, Council officer observations were made in the neighbourhood to the east of the Rata Street site (Figure 12). These were focused on any potential anthropogenic particulate source activities that could have given rise to a period of several days of elevated PM<sub>10</sub> readings. No activities were identified and, furthermore, the Council's Pollution Hotline recorded no calls that could be related to such activities. However, observations along the Mount Maunganui beach front and Marine Parade showed sea spray blowing in a south-westerly direction over the Mount area towards the Rata Street monitor

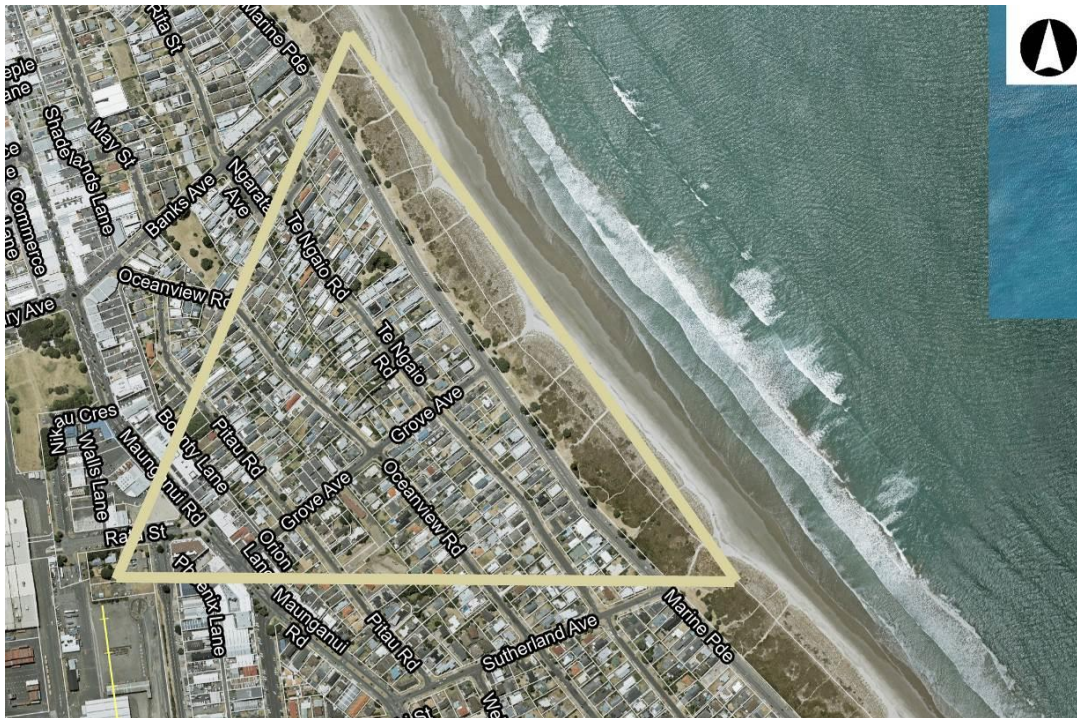


Figure 12. General area of Council officer observations.



Figure 13. Photograph taken by Council Officer of sea spray at Marine Parade, Mount Maunganui, being transported onshore.



## Conclusion

The information presented within this supporting document demonstrates a pattern of recorded ambient air quality, meteorological data, and Council Officer observations for 19 April 2023 (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 concentrations of PM<sub>10</sub> recorded at the Rata Street monitoring site that exceeded the 24-hour standard of 50µg/m<sup>3</sup> on 19 April 2023 and an increase in PM<sub>10</sub> concentrations in the preceding days, with the entire PM<sub>10</sub> “event” 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 Council commits significant resources to managing the air quality within the Mount Maunganui airshed.

A handwritten signature in black ink, appearing to read 'S. Jones', with a stylized, flowing script.