



**MARLBOROUGH  
DISTRICT COUNCIL**

# **Annual Air Quality Monitoring Report – Blenheim 2019**

**Technical Report No: 20-002  
April 2020**





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## Executive Summary

The main air pollutant of concern in urban areas of New Zealand is particulate. The main measures of particulate are PM<sub>10</sub> (particles less than 10 microns in diameter) and PM<sub>2.5</sub> (particles less than 2.5 microns in diameter). Both size fractions were measured at the Redwoodtown monitoring site during 2019. Historically monitoring for PM<sub>10</sub> had also been carried out at Middle Renwick Road (MRR). This monitoring ceased in 2019. The main source of particulate in Blenheim during the winter is solid fuel burning for domestic home heating.

Monitoring data for PM<sub>10</sub> were compared to the National Environmental Standard for Air Quality (NES) of 50 µg m<sup>-3</sup> (24-hour average) and to the Ministry for the Environment's air quality guidelines and indicator categories. Comparisons are made with historical data to determine the likelihood of trends in concentrations.

Concentrations of PM<sub>10</sub> exceeded 50 µg/m<sup>3</sup> in Redwoodtown on only one occasion during 2019 resulting in no breaches of the NES for PM<sub>10</sub> (the NES allows for one exceedance per year). In 2018 Blenheim breached the NES on six occasions. The maximum measured concentration during 2019 was 57 µg/m<sup>3</sup> and compares with a 2018 maximum concentration of 61 µg m<sup>-3</sup>. The annual average PM<sub>10</sub> concentrations for 2019 was 18 µg/m<sup>3</sup>.

Concentrations of PM<sub>2.5</sub> exceeded 25 µg/m<sup>3</sup> (24-hour average reporting guideline and WHO guideline) on 33 occasions. The annual average PM<sub>2.5</sub> concentration was 11.5 µg/m<sup>3</sup>. This compares with the current WHO guideline for PM<sub>2.5</sub> of 10 µg/m<sup>3</sup>. This compares to concentrations of PM<sub>2.5</sub> exceeding the 25 µg/m<sup>3</sup> (24-hour average reporting guideline and WHO guideline) on 61 occasions in 2018 and an annual average 2018 PM<sub>2.5</sub> concentration of 13 µg/m<sup>3</sup>. The reason for this reduction in the 2019 is likely because of meteorological conditions rather than any reduction in anthropogenic sources.

Management measures to reduce PM<sub>10</sub> concentrations to meet the NES have been included in the Proposed Marlborough Environment Plan (MEP) (notified June 2016). Measures are based on a 2012 assessment which predicted concentrations would reduce from 2012–2018 in the absence of regulation.

However there is an absence of a downward trend from 2012-2019. Potential reasons for the reductions not occurring include higher than anticipated emissions from newer burners and underestimated population increase in the airshed area from 2006-2013 period. The MEP became operative in February 2020 and as yet it is still to be seen whether the measures included will achieve the PM<sub>10</sub> concentrations required by the NES.

In February 2020 the Ministry for the Environment announced a review of the NES with the most significant proposed change being national standards for PM<sub>2.5</sub> rather than for PM<sub>10</sub>. This is likely to have implications for the compliance of the Blenheim airshed with the NES. Data obtained in the last three years of monitoring PM<sub>2.5</sub> have shown that the Blenheim airshed currently breaches both the proposed PM<sub>2.5</sub> 24hr-average standard and the proposed annual standard.



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# 1. Introduction

The main air contaminant of concern in Blenheim and other urban areas of New Zealand is particulate or particles in the air. The main indicator of particulate used has been PM<sub>10</sub>, particles in the air less than 10 microns in diameter and this size fraction forms the basis of the National Environmental Standard (NES). For the past decade, however, the scientific community has been of the view that the smaller of these particles, those less than 2.5 microns in diameter are a stronger indicator of health.

Table 1.1 shows the contaminant, the concentration, averaging period and allowable exceedances as required by the NES (Ministry for Environment, 2004). The NES for PM<sub>10</sub> is set at 50 µg m<sup>-3</sup> with one allowable exceedance per 12-month period. Compliance with this target was required by September 2016 in Blenheim. All other areas in Marlborough must remain compliant with the NES. There is currently no NES or national guideline values for PM<sub>2.5</sub>. A monitoring and reporting value of 25 µg/m<sup>3</sup> (24-hour average) is used for comparison of short term concentrations and the WHO guideline of 10 µg/m<sup>3</sup> is used for comparison of annual averages.

This report summarises concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> that were measured in Blenheim during 2019. The Ministry for the Environment are in the process of reviewing the NES for particulate, however, with a focus on the most appropriate form and averaging period. It is likely that the revised NES will be for the PM<sub>2.5</sub> size fraction and annual average concentrations. A likely implication is the need for PM<sub>2.5</sub> monitoring either in addition to or instead of PM<sub>10</sub> monitoring. The implications for the current PM<sub>10</sub> requirements are unclear at this stage.

Air quality monitoring in the Marlborough Region includes monitoring of PM<sub>10</sub> at the MRR monitoring site from 2000 to 2018, intermittent monitoring of PM<sub>10</sub> at the Redwoodtown Bowling Club site, survey PM<sub>10</sub> monitoring in Renwick during 2000 and 2002, monitoring for PM<sub>10</sub> in Picton during 2008 and 2009, visibility surveys and passive sampling for nitrogen oxides and sulphur oxides. From 2007 to early 2008, PM<sub>10</sub> concentrations were measured at the Croquet Club in Redwoodtown in addition to the main monitoring site at the Bowling Club. A site on Brooklyn Street in Redwoodtown was temporarily used to measure PM<sub>10</sub> concentrations during 2004.

Air quality monitoring data in other urban areas of New Zealand indicates that it would seem unlikely that concentrations of NES contaminants other than PM<sub>10</sub> would be in breach in Blenheim. Concentrations of other contaminants even in large urban areas are typically within the NES and guideline concentrations. Because emissions of other contaminants in Blenheim are far lower than large urban areas such as Christchurch, it would seem unlikely that concentrations of other key urban air pollutants would be in breach of the NES or air quality guidelines. The exception to this may be benzo(a)pyrene concentrations, which appear to occur well in excess of guideline concentrations in Christchurch.

The Ministry for the Environment also provides guidelines for ambient air quality (Ministry for Environment, 2002). Table 1.2 shows the ambient air quality guidelines and Table 1.3 details the air quality indicator categories to assist in the presentation and management of air quality in New Zealand. Air quality monitoring data in this report are presented relative to air quality guidelines and these indicator categories. These categories provide a useful perspective on the overall air quality and provide a valuable tool for evaluating trends in concentrations over time.

In February 2020 the Ministry for the Environment announced a review of the NES with the most significant proposed change being national standards for PM<sub>2.5</sub> rather than for PM<sub>10</sub>. This is likely to have implications for the compliance of the Blenheim airshed with the NES.

**Table 1.1: National Environmental Standards for Ambient Air Quality (MfE, 2004)**

Contaminant	NES values		
	Concentration	Averaging Period	Allowable exceedances / year
Particles (PM <sub>10</sub> )	50 µg m <sup>-3</sup>	24-hour	1
Nitrogen dioxide	200 µg m <sup>-3</sup>	1-hour	9
Sulphur dioxide	350 µg m <sup>-3</sup>	1-hour	9
Sulphur dioxide	570 µg m <sup>-3</sup>	1-hour	0
Ozone	150 µg m <sup>-3</sup>	1-hour	0

**Table 1.2: Ambient air quality guidelines for New Zealand (MfE, 2002)**

Contaminant	2002 guideline values	
	Concentration	Averaging Period
Carbon monoxide	30 mg m <sup>-3</sup>	1-hour
	10 mg m <sup>-3</sup>	8-hour
Particles (PM <sub>10</sub> )	50 µg m <sup>-3</sup>	24-hour
	20 µg m <sup>-3</sup>	Annual
Nitrogen dioxide	200 µg m <sup>-3</sup>	1-hour
	100 µg m <sup>-3</sup>	24-hour
Sulphur dioxide <sup>b</sup>	350 µg m <sup>-3</sup>	1-hour
	120 µg m <sup>-3</sup>	24-hour
Ozone	150 µg m <sup>-3</sup>	1-hour
	100 µg m <sup>-3</sup>	8-hour
Hydrogen sulphide <sup>c</sup>	7 µg m <sup>-3</sup>	1-hour
Lead <sup>d</sup>	0.2 µg m <sup>-3</sup> (lead content of PM <sub>10</sub> )	3-month moving, calculated monthly
Benzene (year 2002)	10 µg m <sup>-3</sup>	Annual
Benzene (year 2010)	3.6 µg m <sup>-3</sup>	Annual
1,3-Butadiene	2.4 µg m <sup>-3</sup>	Annual
Formaldehyde	100 µg m <sup>-3</sup>	30-minutes
Acetaldehyde	30 µg m <sup>-3</sup>	Annual
Benzo(a)pyrene	0.0003 µg m <sup>-3</sup>	Annual
Mercury (inorganic) <sup>d</sup>	0.33 µg m <sup>-3</sup>	Annual
Mercury (organic)	0.13 µg m <sup>-3</sup>	Annual
Chromium VI <sup>d</sup>	0.0011 µg m <sup>-3</sup>	Annual
Chromium metal and chromium III	0.11 µg m <sup>-3</sup>	Annual
Arsenic (inorganic) <sup>d</sup>	0.0055 µg m <sup>-3</sup>	Annual
Arsine	0.055 µg m <sup>-3</sup>	Annual

Notes for Table 1.2:

- <sup>a</sup> All values apply to the gas measured at standard conditions of temperature (0° C) and pressure (1 atmosphere).
- <sup>b</sup> The sulphur dioxide guideline values do not apply to sulphur acid mist.
- <sup>c</sup> The hydrogen sulphide value is based on odour nuisance and may be unsuitable for use in geothermal areas.
- <sup>d</sup> The guideline values for metals are for inhalation exposure only; they do not include exposure from other routes such as ingestion. These other routes should be considered in assessments where appropriate.

**Table 1.3: Environmental Performance Indicator categories for air quality (MfE, 2002)**

Category	Value relative to guideline	Comment
Excellent	Less than 10% of the guideline	Of little concern: if maximum values are less than a tenth of the guideline, average values are likely to be much less
Good	Between 10% and 33% of the guideline	Peak measurements in this range are unlikely to affect air quality
Acceptable	Between 33% and 66% of the guideline	A broad category, where maximum values might be of concern in some sensitive locations but generally they are at a level which does not warrant urgent action
Alert	Between 66% and 100% of the guideline	This is a warning level, which can lead to exceedances if trends are not curbed
Action	More than 100% of the guideline	Exceedances of the guideline are a cause for concern and warrant action, particularly if they occur on a regular basis

An emission inventory for Blenheim was updated in 2017 to provide a more recent estimate of the sources of PM<sub>10</sub> and other contaminant emissions (Wilton, 2017). The results of the inventory indicated that domestic home heating was the main source of PM<sub>10</sub> emissions, contributing to around 90% of the daily wintertime PM<sub>10</sub>. Motor vehicles contributed to 1% of PM<sub>10</sub> emissions, outdoor burning contributed to 8% and industry contributed to 1% of total wintertime emissions.

## 2. Methodology

Air quality monitoring of particulate in Blenheim during 2019 was carried out at the Redwoodtown Bowling Club site in Blenheim. Two 5014i beta attenuation monitors (BAM) were used to measure PM<sub>10</sub> and PM<sub>2.5</sub>.

Prior to 2016, meteorological data, including wind speed, wind direction were obtained from a NIWA site on the outskirts of Blenheim. Ambient temperature data was collected at the Bowling Club site in Redwoodtown. All meteorological data (wind speed, temperature and wind direction) are now monitored at the Redwoodtown monitoring site.

### 2.1. Air quality monitoring sites

Figure 2.1 shows the Redwoodtown Bowling Club site which has been operational since 2002, the NIWA metrological monitoring site, which was used for meteorological data prior to 2016 and the MRR site, which was discontinued in 2019 and provides a historical record of PM<sub>10</sub> in Blenheim.

In 2007 a site at the Croquet Club was established for the purposes of evaluating the relationship between Brooklyn Street area PM<sub>10</sub> and PM<sub>10</sub> concentrations measured at the Bowling Club. This was considered important because PM<sub>10</sub> concentrations of the magnitude measured during 2004 at Brooklyn Street had not been measured at the Bowling Club and because the reductions required in PM<sub>10</sub> concentrations in Blenheim had been dependent on the Brooklyn Street results. The results from work undertaken in 2007 and reported in the

'2007 Air Quality Monitoring Report' (Wilton, 2008) indicated that the Brooklyn Street site was likely to be affected by localised sources of PM<sub>10</sub> and should not be used for air quality management purposes. Details of the Croquet Club site are outlined in '2008 Air Quality Monitoring Report' (Wilton & Baynes, 2009).



Figure 2.1: Location of air quality sites and NIWA metrological site in Blenheim

### 2.1.1. Redwoodtown monitoring site

In 2010 air quality monitoring took place at the main air quality monitoring site at the Blenheim Bowling Club on Weld Street in Redwoodtown. Figures 2.2 and 2.3 show the surrounding area and the location of the monitoring site within the Bowling Club grounds. Summary site details are given in Table 2.1.



**Figure 2.2: Aerial photo of the Redwoodtown air quality monitoring site (note: blue arrow depicts monitoring site).**





Figure 2.3: PM<sub>10</sub> monitor at the Redwoodtown – Bowling Club air quality monitoring site.

**Table 2.1: Site summary details for the Redwoodtown – Bowling Club air quality monitoring site.**

Site name	Redwoodtown – Bowling Club
Site contact details	Marlborough District Council
Description of site	The site is located at the Blenheim Bowling Club, which is to the south-east of central Blenheim. The surrounding area includes a bowling green, gravel petanque area and paved areas.
Site category	Residential neighbourhood
Purpose of site and sources	To measure worst-case ambient air concentrations of PM <sub>10</sub> in Blenheim. The main source during the winter months is solid fuel burning for domestic heating. The site is downwind of a large residential area for meteorological conditions conducive to poor air quality.
Proposed duration of monitoring	Ongoing
Contaminants monitored	PM <sub>10</sub> and PM <sub>2.5</sub>
Site co-ordinates	E1679764 N5402328
Date of site installation	Monitoring from 2000-2003. Permanent site since 2005.
Meteorological characteristics of area	Low wind speeds occur regularly during the winter months. Temperature inversions are likely.
Sample frequency	Continuous
Inlet height	3.5 metres
Averaging period	24-hour and hourly

## 2.2. Quality assurance

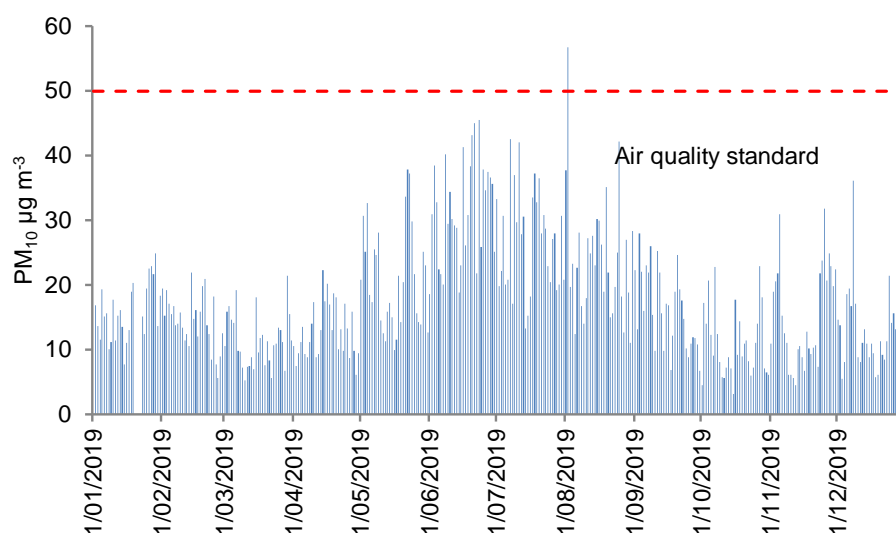
Operation of the BAM is carried out by Marlborough District Council (MDC) staff. Ten minute data is recorded by the instrument and logged by an iQuest iRIS 350 datalogger. The BAM filter spot is moved on every eight hours. Results are telemetered hourly to MDC and stored in the hilltop database. Annual calibrations are carried out by Lear Siegler.

### 3. Air quality monitoring in Blenheim

#### 3.1. PM<sub>10</sub> concentrations

During 2019 there was one exceedance of 50  $\mu\text{g}/\text{m}^3$  at the Redwoodtown air quality monitoring site (Figure 3.1). The NES allows one exceedance of 50  $\mu\text{g}/\text{m}^3$  per year before a breach occurs. Thus, the NES was not breached in Blenheim during 2019. In 2018 the NES was breached on six occasions.

The maximum PM<sub>10</sub> concentration for 2019 was 57  $\mu\text{g}/\text{m}^3$  (1 August). This is the lowest maximum concentration since 2014 when 56  $\mu\text{g}/\text{m}^3$  was recorded.



**Figure 3.1: 24-hour average PM<sub>10</sub> concentrations measured at the Redwoodtown – Bowling Club site during 2019.**

Daily PM<sub>10</sub> concentrations measured from 2006 to 2019 relative to the MfE air quality indicator categories (shown in Table 1.3) are illustrated in Figure 3.2. Similarly, monthly variations in the distribution of PM<sub>10</sub> concentrations for 2019 are shown in Figure 3.3. The distribution of PM<sub>10</sub> concentrations by season are similar to other years with the winter months showing the greatest proportion of days in the “acceptable”, “alert” and “action” categories and fewer days in the “good” category.

Figure 3.4 compares the number of days when 50  $\mu\text{g}/\text{m}^3$  was exceeded in 2019 to previous years along with the maximum concentration and the second highest concentration. It is important to note, that comparisons between years does not take into account year to year variations in the impact of meteorology. This issue is examined further in section 4 of this report.



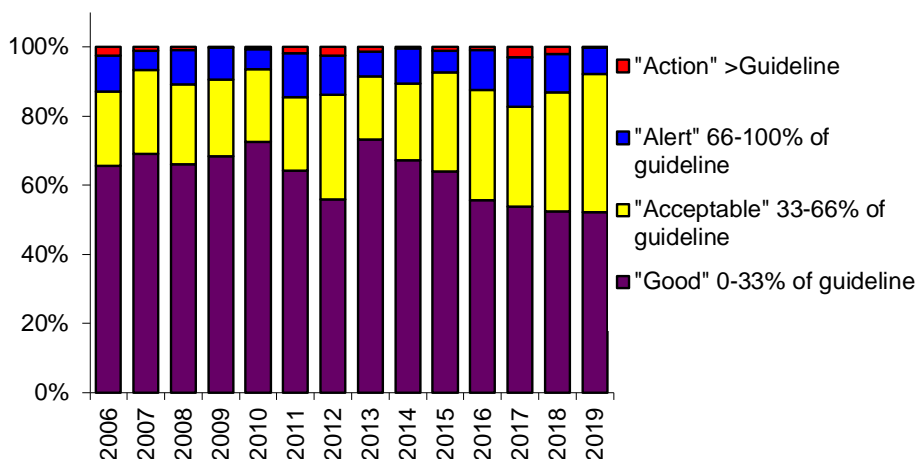


Figure 3.2: Comparison of PM<sub>10</sub> concentrations measured at Redwoodtown from 2006 to 2019 to air quality indicator categories.

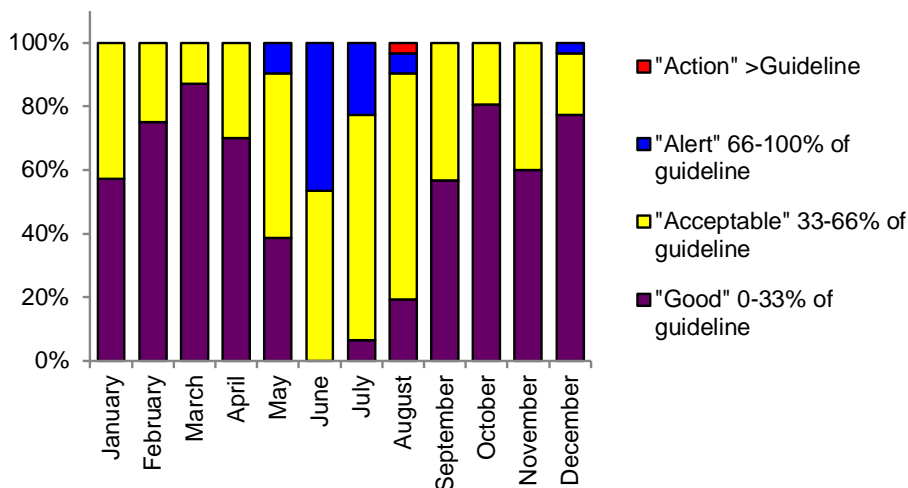
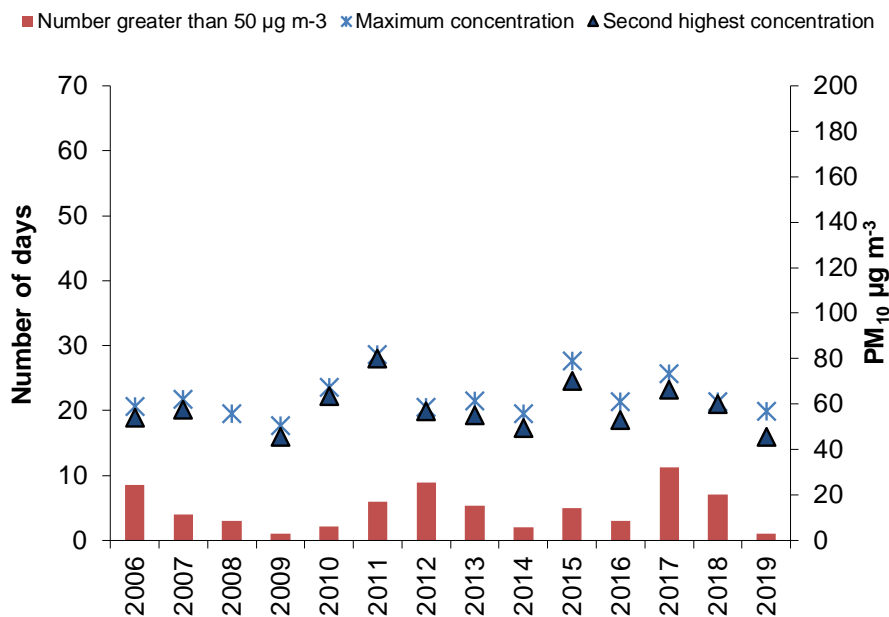


Figure 3.3: Comparison of daily PM<sub>10</sub> concentrations each month during 2019 to air quality indicator categories.



**Figure 3.4: Number of days when 50 µg m<sup>-3</sup> was exceeded, the maximum concentration and the second highest concentration from 2006 to 2019.**

The annual average PM<sub>10</sub> concentration for 2019 was 18 µg m<sup>-3</sup>. This is at the upper end of the normal range for this monitoring site (14-19 µg/m<sup>3</sup>). The Ministry for the Environment specifies an annual average guideline for PM<sub>10</sub> of 20 µg m<sup>-3</sup>. The NES does not currently include an annual average concentration for PM<sub>10</sub>.

Summary statistics for PM<sub>10</sub> monitoring results from the Redwoodtown Bowling Club site from 2002 to 2019 are provided in Table 3.1. Data from 2016 has been adjusted for gravimetric equivalency. From 2005 monitoring was conducted from January to December and in 2004 air quality monitoring took place at a site in Brooklyn Street.

**Table 3.1: Summary of PM<sub>10</sub> concentrations measured at Redwoodtown from 2002-2019**

	2002	2003	2004	2005	2006*	2007*	2008*	2009*	2010*	2011*	2012*	2013*	2014*	2015*	2016**	2017**	2018	2019
Monitoring method	Hi-vol	Hi-vol	Hi-vol	Hi-vol	BAM	BAM	BAM	BAM	BAM	BAM	BAM/Hi-vol	BAM	BAM/Hi-vol	BAM/Hi-vol	BAM	BAM	BAM	BAM
"Good" 0-33% of guideline	18%	22%	46%	63%	66%	69%	66%	68%	72%	64%	56%	72%	67%	64%	56%	54%	53%	52%
"Acceptable" 33-66% of guideline	62%	30%	22%	17%	21%	24%	23%	22%	21%	21%	31%	18%	22%	29%	32%	29%	34%	40%
"Alert" 66-100% of guideline	10%	26%	20%	17%	10%	6%	10%	9%	6%	13%	11%	7%	10%	6%	12%	14%	11%	7%
"Action" >Guideline	10%	22%	12%	3%	3%	1%	1%	0%	1%	2%	2%	1%	0%	1%	1%	3%	2%	0%
Percentage of valid data	14%	7%	22%	32%	68%	99%	99%	98%	96%	87%	91%	98%	70%	91%	95%	99%	99%	99%
Annual average ( $\mu\text{g m}^{-3}$ )	-	-	22	18	17	15	17	15	14	16	19	14	16	17	18	20	19	18
Measured PM <sub>10</sub> concentrations above 50 $\mu\text{g m}^{-3}$	5	6	10	3	6	5	3	1	2	6	8	5	1	4	3	11	7	1
Extrapolated PM <sub>10</sub> concentrations above 50 $\mu\text{g m}^{-3}$	16	34	31	9	10	4	3	1	2	6	9	5	2	5	3	11	7	1
Second highest PM <sub>10</sub> concentration ( $\mu\text{g m}^{-3}$ )					54	58	56	46	64	80	57	55	51	70	53	66	60	46
Annual maximum ( $\mu\text{g m}^{-3}$ )	58	60	81	58	59	62	56	46	67	82	59	61	56	79	61	74	61	57
Number of records	50	27	82	115	247	360	363	357	352	319	331	351	254	331	346	361	360	362

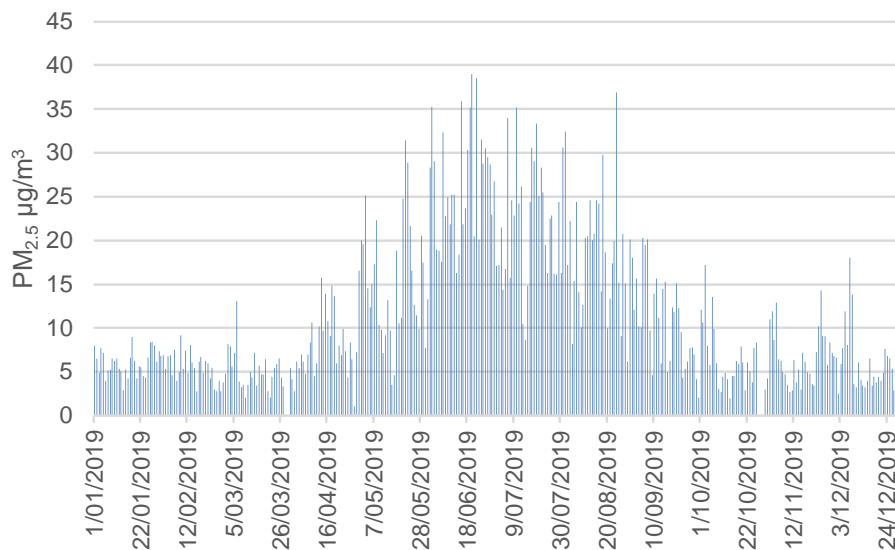
\*not adjusted for gravimetric equivalency

\*\*adjusted for gravimetric equivalency

### 3.2. PM<sub>2.5</sub> concentrations

While there is currently no NES for PM<sub>2.5</sub> it is generally accepted as the main air quality indicator for particulate in terms of health impacts. Most significant in terms of impacts on health is the annual exposure. The current WHO annual average PM<sub>2.5</sub> guideline is 10 µg/m<sup>3</sup>. However, a 2013 review of WHO guidelines noted that recent long-term studies show associations between PM<sub>2.5</sub> and mortality levels at concentrations well below the current annual WHO air quality guideline level for PM<sub>2.5</sub> (10 µg/m<sup>3</sup>) and recommended a review of that value. During 2019 an annual average PM<sub>2.5</sub> concentration of 11.5 µg/m<sup>3</sup> was measured at Redwoodtown and compares with an annual average concentration of 13 µg/m<sup>3</sup> for 2018.

Shorter term exposures are also of concern from a health viewpoint. During 2019 there were 33 exceedances of the 24-hour average reporting guideline for PM<sub>2.5</sub> of 25µg/m<sup>3</sup> at the Redwoodtown air quality monitoring site (Figure 3.11). This compares with 61 exceedances for 2018. The Blenheim airshed currently breaches both the proposed PM<sub>2.5</sub> 24hr-average standard of 25 µg/m<sup>3</sup> and the proposed annual standard of 10 µg/m<sup>3</sup>.



**Figure 3.5: 24-hour average PM<sub>2.5</sub> concentrations measured at the Redwoodtown – Bowling Club site during 2019.**

### 3.3. Particulate concentrations and meteorology in Blenheim

Daily variations in PM<sub>10</sub> and PM<sub>2.5</sub> concentrations and meteorological conditions on 1 August when the 24-hour average PM<sub>10</sub> concentrations exceeded 50 µg m<sup>-3</sup> at the monitoring site are shown in Figure 3.6. Data are consistent with historical high pollution days with peak PM<sub>10</sub> concentrations occurring during the evening and typically a smaller peak occurring mid-morning. The key meteorological conditions associated with the elevated concentrations on high pollution days are low wind speeds and south-westerly wind direction.

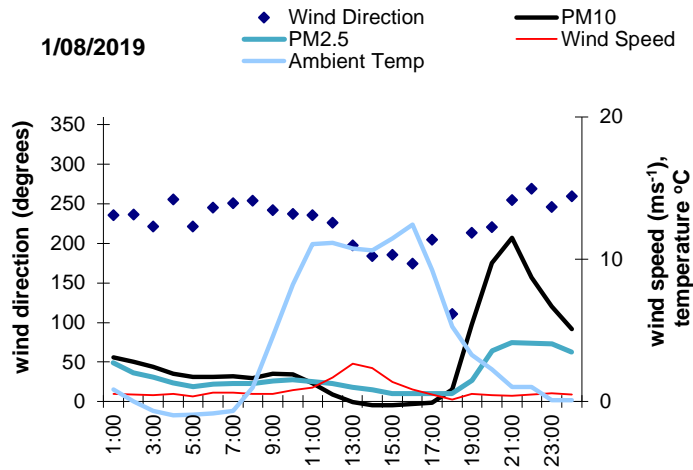
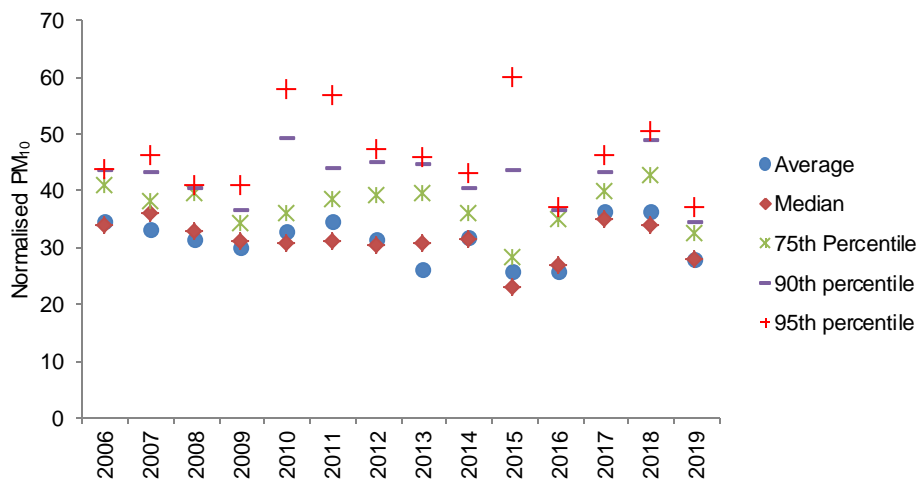


Figure 3.6: Hourly average PM<sub>10</sub>, PM<sub>2.5</sub>, wind direction and temperature on 1 August when PM<sub>10</sub> concentrations exceeded 50 µg m<sup>-3</sup> (24 hour average).

## 4. Trends in PM<sub>10</sub> concentrations in Blenheim

To quantify the impact of meteorological conditions and therefore further assess the likelihood of changes in PM<sub>10</sub> concentrations since 2005, a trends assessment was updated in 2012 (Wilton, 2012). The objective of that work was to identify meteorological conditions giving rise to concentrations of PM<sub>10</sub> in excess of the NES and to provide a tool for comparing year to year PM<sub>10</sub> concentrations whilst minimising the impact of variability in meteorological conditions. The trends assessment provided a tool for updating the trends analysis with time. Figure 4.1 shows trends in PM<sub>10</sub> concentrations updated with the 2019 PM<sub>10</sub> data adjusted for the impact of meteorological conditions.

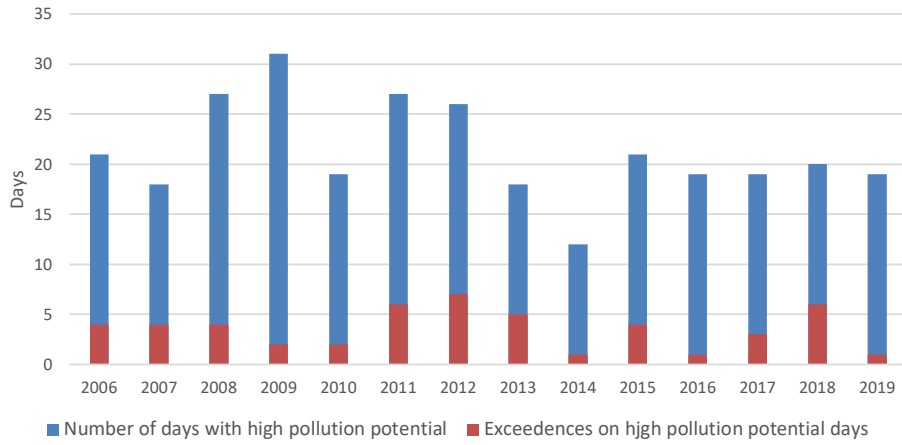
Results for 2019 are more similar to 2016 than 2017 and 2018. Whilst the conclusion of no improvements in PM<sub>10</sub> concentrations in Blenheim is supported by these results the potential that 2017 and 2018 results represented a trend of increasing concentrations is not supported by the 2019 results. The data is not indicative of an overall improvement or degradation in PM<sub>10</sub> concentrations in Blenheim. No trend is evident.



**Figure 4.1: Trends in PM<sub>10</sub> concentrations after adjusting for meteorological conditions**

To examine the potential for trends further, an evaluation was done of the number of high pollution potential days during 2019 compared with previous years as well as the number of exceedances that occurred on those days (Figure 4.2). It was noted that for 2017 that eight exceedances occurred on days that did not qualify as high pollution potential because they did not meet the minimum hours of temperature less than five degrees. These days had very low wind speeds and otherwise would have been classed as high pollution potential days.

Figure 4.2 shows that 2019 had a similar number of high pollution potential days to the 2015-2018 period, the proportion of these that experienced PM<sub>10</sub> concentrations in excess of 50 µg/m<sup>3</sup> was on the lower end scale at 5% and is the same as for 2016. In contrast however, 2018 experienced the highest proportion at 30%. If the high pollution criteria for 2017 were extended to include the eight days when the NES was exceeded the number of pollution potential days would have increased to 27 and the proportion that resulted in exceedances would have increased to 41%.



**Figure 4.2: Prevalence of high pollution potential days and the number resulting in exceedences of  $50 \mu\text{g}/\text{m}^3$  (24-hour average)  $\text{PM}_{10}$ .**

## 5. Summary

There were no breaches of the NES for PM<sub>10</sub> in Blenheim during 2019 with just one exceedence of 50 µg/m<sup>3</sup> measured. The exceedence concentration of 57 µg/m<sup>3</sup> (24-hour average) compares with a 2018 value of 61 µg/m<sup>3</sup>. The annual average concentrations for 2019 was 18 µg/m<sup>3</sup> and compares with a 2018 value of 19 µg/m<sup>3</sup>. Whilst the number of NES breaches for 2019 for Blenheim were lower than for 2018 no trend in the data is evident.

Monitoring of PM<sub>2.5</sub> in Blenheim suggests that both annual and 24-hour average concentrations exceed the WHO guidelines for PM<sub>2.5</sub>.

The NES for PM<sub>10</sub> was reviewed by the Ministry for the Environment in 2011. A new date of September 2016 was given for compliance with 50 µg m<sup>-3</sup> (24-hour average, one allowable exceedence) for areas with fewer than 10 breaches. Blenheim was required to meet this target date which effectively meant Blenheim was unable to breach the NES for PM<sub>10</sub> from winter 2017. During 2018 the NES was breached on six occasions. A location is required to be breach free for five years before it is no longer considered a polluted airshed.

Management measures to reduce PM<sub>10</sub> concentrations to meet the NES have been included in the in the Proposed Marlborough Environment Plan (notified June 2016). Measures are based on a 2012 assessment which predicted concentrations would reduce from 2012 – 2018 in the absence of regulation. Potential reasons for the reductions not occurring include higher than anticipated emissions from newer burners and underestimated population increase in the airshed area from 2006-2013 period. The MEP became operative in February 2020 and as yet it is still to be seen whether the measures included will achieve the PM<sub>10</sub> concentrations required by the NES.



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