



**MARLBOROUGH
DISTRICT COUNCIL**

Annual Air Quality Monitoring Report – Blenheim 2012

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Executive Summary

In 2012 air quality monitoring was carried out in two sites in Blenheim. The contaminant monitored was PM₁₀, which is the main air pollutant of concern in urban areas of New Zealand. PM₁₀ refers to particles in the air less than 10 microns in diameter. Solid fuel burning for domestic home heating is the main contributor to winter time PM₁₀ in Blenheim. Concentrations of PM₁₀ are measured in Redwoodtown and at Middle Renwick Road (MRR). Problems with monitoring equipment during 2012 resulted in data loss at Redwoodtown during June and the relocation of the MRR equipment to Redwoodtown for July and most of August.

Concentrations of PM₁₀ at both sites were compared to the National Environmental Standard for Air Quality (NES) of 50 µg m⁻³ (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 PM₁₀ exceeded 50 µg m⁻³ (24-hour average) at the Redwoodtown site on eight occasions during 2012. This resulted in seven breaches of the NES and represents the greatest number of breaches since 2006. The maximum measured concentration was 59 µg m⁻³ and is lower than the 2011 high of 82 µg m⁻³.

An evaluation of trends in PM₁₀ concentrations in Blenheim previously showed a decrease from 2005-2009, and an increase in 2010 and 2011. Results for 2012 show average concentrations similar to those measured in 2009.

The annual average PM₁₀ concentration for the Bowling Club site was 19 µg m⁻³ and is marginally less than the annual average guideline for PM₁₀ of 20 µg m⁻³. It is larger than previous annual average concentrations, which typically have been in the range of 14-17 µg m⁻³.

The maximum PM₁₀ concentration measured at the MRR site was 40 µg m⁻³ for 2012 and is similar to other recent years. Although measurements at this site ceased June concentrations of PM₁₀ in excess of the NES are not common at MRR. Previously exceedences of 50 µg m⁻³ have occurred in 2000, 2003 and 2008. No estimate of annual average concentration for this site was made for 2012. An evaluation of trends at the MRR site suggests a decrease in annual average PM₁₀ concentrations at this site since 2000.

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1. Introduction

During 2012 air quality monitoring was carried out for PM₁₀, which is the main air pollutant of concern in urban areas of New Zealand. PM₁₀ refers to particles in the air less than 10 microns in diameter. In 2012 concentrations of PM₁₀ were measured at the Redwoodtown site, which comprises the main site for reporting PM₁₀ relative to National Environmental Standards. A second long term monitoring site in Blenheim is Middle Renwick Road (MRR). The latter site was not monitored during July and most of August 2012 owing to instrument failure at Redwoodtown and the need to move the sampling equipment from MRR to the priority site in Redwoodtown.

Historical air quality monitoring for Marlborough includes monitoring of PM₁₀ at the MRR monitoring site, intermittent monitoring of PM₁₀ at the Redwoodtown Bowling Club site, survey PM₁₀ monitoring in Renwick during 2000 and 2002, monitoring for PM₁₀ in Picton during 2008 and 2009, visibility surveys and passive sampling for nitrogen oxides and sulphur oxides. From 2007 to early 2008, PM₁₀ 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 PM₁₀ concentrations during 2004.

In 2004 the Ministry for the Environment introduced National Environmental Standards (NES) for ambient air quality (Ministry for Environment, 2004). Table 1.1 shows the contaminant, the concentration, averaging period and allowable exceedances as required by the NES. The NES for PM₁₀ is set at 50 µg m⁻³ with one allowable exceedence per year. Compliance with this target is required by 2016 in Blenheim. All other areas in Marlborough must remain compliant with the NES.

Air quality monitoring data in other urban areas of New Zealand indicates that it would seem unlikely that concentrations of NES contaminants other than PM₁₀ 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.

Table 1.1: National Environmental Standards for ambient air quality (Ministry for Environment, 2004)

Contaminant	NES values		
	Concentration	Averaging Period	Allowable exceedences per year
Carbon monoxide	10 mg m ⁻³	8-hour	1
Particles (PM ₁₀)	50 µg m ⁻³	24-hour	1
Nitrogen dioxide	200 µg m ⁻³	1-hour	9
Sulphur dioxide ^b	350 µg m ⁻³	1-hour	9
Sulphur dioxide ^b	570 µg m ⁻³	1-hour	0
Ozone	150 µg m ⁻³	1-hour	0

Table 1.2: Ambient air quality guidelines for New Zealand (Ministry for Environment, 2002)

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

Notes:

^a All values apply to the gas measured at standard conditions of temperature (0° C) and pressure (1 atmosphere).

^b The sulphur dioxide guideline values do not apply to sulphur acid mist.

^c The hydrogen sulphide value is based on odour nuisance and may be unsuitable for use in geothermal areas.

^d 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 (Ministry for Environment, 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 exceedences if trends are not curbed
Action	More than 100% of the guideline	Exceedences of the guideline are a cause for concern and warrant action, particularly if they occur on a regular basis

In 2012 the emission inventory for Blenheim (Wilton, 2005) was updated to provide a more recent estimate of the sources of PM₁₀ and other contaminant emissions (Wilton, 2012a). The results of the inventory indicated that domestic home heating was the main source of PM₁₀ emissions, contributing to around 92% of the daily wintertime PM₁₀ (Wilton, 2012). Motor vehicles contributed to 2% of PM₁₀ emissions, outdoor burning contributed to 5% and industry contributed to 1% of total wintertime emissions.

2. Methodology

Two air quality monitoring methods were used to measure PM₁₀ concentrations in Marlborough. At the Redwoodtown Bowling Club site in Blenheim, a Met One beta attenuation monitor (BAM) was used until June when this instrument ceased to operate. Two high volume samplers were used in Redwoodtown for July to provide a continuous record and a new 5014I BAM was installed at the site in August. Both methods are NES compliant, although the high volume sampler is not commonly used for NES reporting owing to practical difficulties in obtaining continuous operation (hence the need to use two samplers).

At the MMR site a gravimetric high-volume sampler, a method compliant with the NES reference method specifications, was used. High-volume sampling was carried out on a one day in three sampling regime with samples collected over a 24-hour period from midnight to midnight. Although compliant in terms of the principles of operation, the high volume sampler is difficult to operate continuously because of the requirement for filter change at midnight. Consequently this method as used at the MMR site was not compliant with the NES.

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.

2.1. Air quality monitoring sites

Figure 2.1 shows the MRR site, which provides a historical record of PM₁₀ in Blenheim and is located to the north-west of Blenheim, the Redwoodtown Bowling Club site which has been operational since 2002, and the metrological monitoring site.

In 2007 a site at the Croquet Club was established for the purposes of evaluating the relationship between Brooklyn Street area PM₁₀ and PM₁₀ concentrations measured at the Bowling Club. This was considered important because PM₁₀ concentrations of the magnitude measured during 2004 at Brooklyn Street had not been measured at the Bowling Club and because the reductions required in PM₁₀ 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 PM₁₀ 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 and Baynes, 2009).



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

2.1.1. Middle Renwick Road (MRR) monitoring site

The MRR air quality monitoring site was established in 2000 at the back yard area of a Council site at 106 Middle Renwick Road. An aerial picture of the MMR site and its surrounds are shown in Figure 2.2, and Figure 2.3 shows the high volume sampler located at the MRR monitoring site. Table 2.1 provides site details for the site.



Figure 2.2: Aerial photo of the MRR air quality monitoring site (red arrow points to monitoring location).



Figure 2.3: PM₁₀ monitor at the MRR air monitoring site

Table 2.1: Site summary details for the MRR air quality monitoring site.

Site name	Blenheim – 106 Middle Renwick Road
Site contact details	Marlborough District Council
Description of site	Empty sealed back yard area
Site category	Residential neighbourhood
Purpose of site and sources	To measure ambient air concentrations of PM ₁₀ at the historical air quality monitoring site in Blenheim. Main source during the winter months is solid fuel burning for domestic heating.
Proposed duration of monitoring	Ongoing
Contaminants monitored	PM ₁₀
Site co-ordinates	E 2589778 N 5964037
Date of site installation	January 2000
Meteorological characteristics of area	Low wind speeds occur regularly during the winter months. Temperature inversions are likely.
Sample frequency	One day in three from May 2005 One day in six prior to this during the summer and one day in three during the winter.
Inlet height	1.5 metres
Averaging period	24-hour

2.1.2. Redwoodtown – Bowling Club 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 2.4 and 2.5 show the surrounding area and the location of the monitoring site within the Bowling Club grounds. Summary site details are given in Table 2.2.



Figure 2.4: Aerial photo of the Redwoodtown – Bowling Club air quality monitoring site (note: pink dot depicts monitoring site).



Figure 2.5: PM₁₀ monitor at the Redwoodtown – Bowling Club air quality monitoring site.

Table 2.2: 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 ₁₀ 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 ₁₀
Site co-ordinates	2589778E, 5964037N
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

Marlborough District Council staff operated the high volume PM₁₀ samplers, including filter changing.

Flow calibrations were carried out every month, normally during the morning. Filters were couriered to Hill Laboratories, who undertook filter weighing in accordance with the New Zealand and Australia standard for high volume sampling. Hill Laboratories hold IANZ accreditation, for high volume PM₁₀ sampling.

Transportation of filters occurs at the end of each month, with filters stored and transported in snaplock bags at ambient temperature. Quality assurance methods include the analysis of one field blank per site per month. Field blanks outside of the "acceptable" range (± 8 mg per filter) are noted in a report from Hills Laboratory.

Operation of the BAM is also carried out by MDC staff. Ten minute data is recorded by the instrument and logged by an iQuest iRIS 350 datalogger. Results are telemetered hourly to MDC and stored in the hilltop database.

3. Air quality monitoring in Blenheim

3.1. PM₁₀ concentrations at the MRR site

Figure 3.1 shows daily average PM₁₀ concentrations measured at the MRR site during 2012 excluding the period from June to August when the monitoring equipment was relocated to Redwoodtown. The maximum measured 24-hour average PM₁₀ concentration was 40 $\mu\text{g m}^{-3}$ and was measured on 15 June. The corresponding concentration at Redwoodtown was 51 $\mu\text{g m}^{-3}$.

Concentrations of PM₁₀ have exceeded 50 $\mu\text{g m}^{-3}$ at this site on only a few years. In 2008 the maximum concentration recorded was 51 $\mu\text{g m}^{-3}$. The only other years that concentrations above 50 $\mu\text{g m}^{-3}$ have been recorded at this site are 2000 (56 $\mu\text{g m}^{-3}$) 2003 (75 $\mu\text{g m}^{-3}$) and 2008 (51 $\mu\text{g m}^{-3}$).

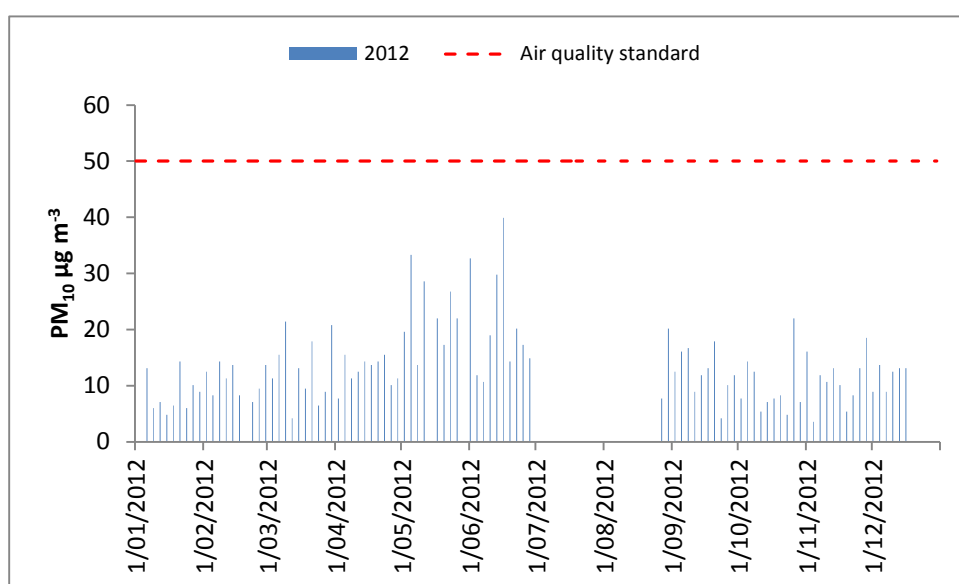


Figure 3.1: Daily winter PM₁₀ concentrations measured at the MRR site during 2012.

Figure 3.2 shows changes in PM₁₀ concentrations relative to MfE air quality indicator categories (shown in Table 1.3) at the MRR site from 2000 to 2012. The majority of the PM₁₀ concentrations measured in 2012 were less than 66% of the air quality guideline, that is, within the “acceptable” and “good” air quality categories.

Monthly variations in PM₁₀ concentrations compared to air quality indicators for 2012 are shown in Figure 3.3. No data are reported for July, August and December because there was not enough monitoring conducted during these months to report a monthly average concentration. Figure 3.4 shows the number of days when the NES was exceeded, the maximum concentration and the second highest concentration for 2012 and for previous years.

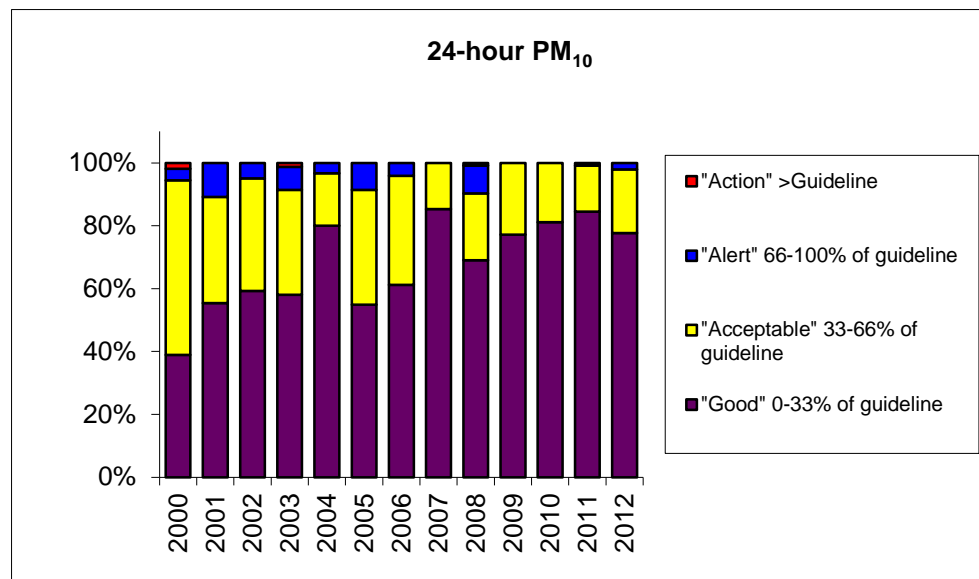


Figure 3.2: Comparison of PM₁₀ concentrations measured at the MRR site from 2000 to 2012 to air quality indicator categories.

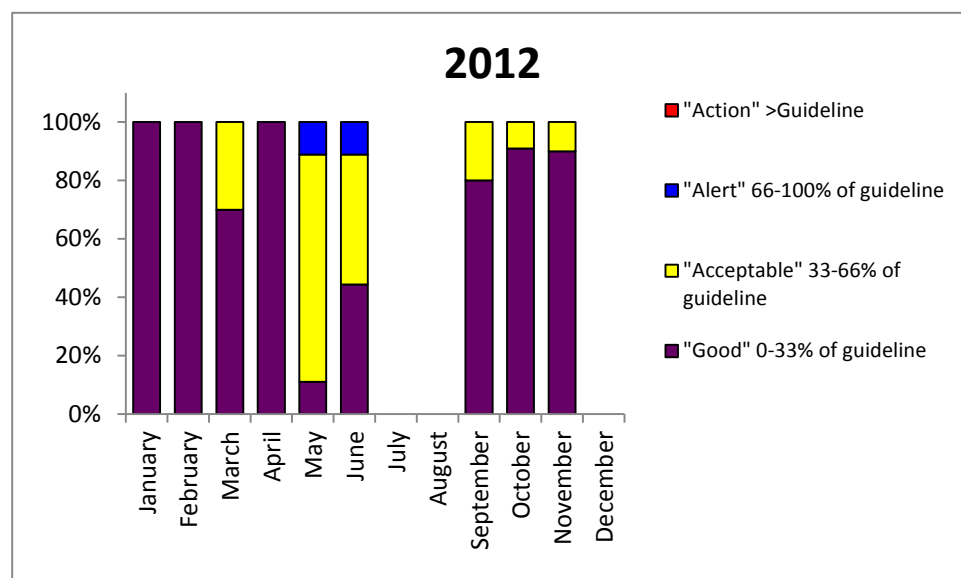


Figure 3.3: Comparison of daily PM₁₀ concentrations each month during 2012 to air quality indicator categories at the MRR site.

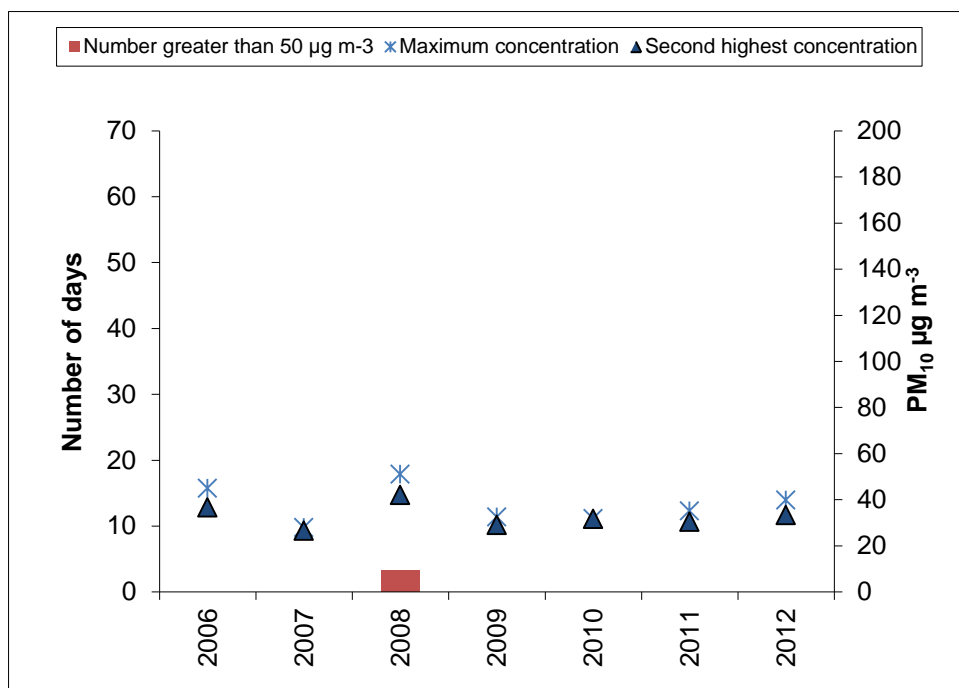


Figure 3.4: Number of days when the NES was exceeded, the maximum concentration and the second highest concentration from 2006 to 2012 at the MRR site.

The estimated annual average PM₁₀ concentration for the MRR site for 2011 is 15 µg m⁻³. This is higher than the preceding three annual average PM₁₀ concentrations for this site which were around 10-13 µg m⁻³. The highest annual average concentration for this site was 18 µg m⁻³ and was measured in 2000. Figure 3.5 shows a decrease in annual average PM₁₀ concentrations at the MRR monitoring site since 2000. The Ministry for the Environment's annual average PM₁₀ guideline is 20 µg m⁻³. There is currently no NES for annual average PM₁₀ concentrations.

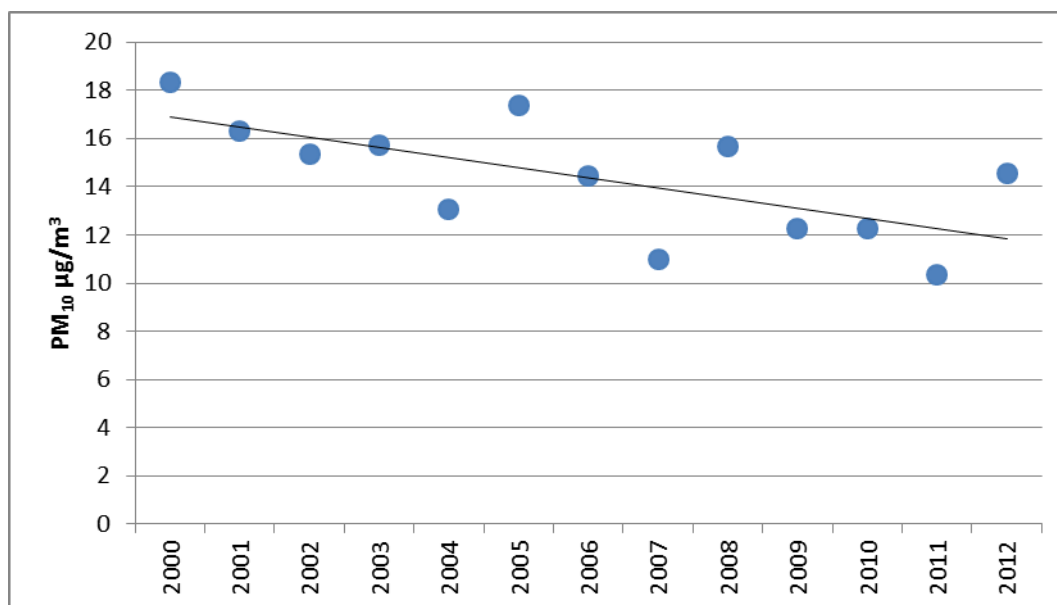


Figure 3.5: Annual average PM₁₀ concentration from 2000 to 2012 at the MRR site.

Table 3.1: Summary of PM₁₀ concentrations measured at the MRR monitoring site from 2000 to 2012

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
"Good" 0-33% of guideline	39%	55%	59%	58%	80%	55%	61%	85%	69%	77%	81%	84%	78%
"Acceptable" 33-66% of guideline	56%	34%	36%	33%	17%	37%	35%	15%	21%	23%	19%	15%	20%
"Alert" 66-100% of guideline	4%	11%	5%	7%	3%	9%	4%	0%	8%	0%	0%	1%	2%
"Action" >Guideline	2%	0%	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Percentage of valid data	15%	20%	22%	22%	16%	25%	33%	32%	31%	32%	29%	32%	26%
Annual average ($\mu\text{g m}^{-3}$)	18	16	15	16	13	17	14	11	16	12	12	10	15
Measured PM ₁₀ concentrations above 50 $\mu\text{g m}^{-3}$	1	-	-	1	-	-			1				
Extrapolated PM ₁₀ concentrations above 50 $\mu\text{g m}^{-3}$									3				
99.7 %ile concentration ($\mu\text{g m}^{-3}$)	53	46	40	67	46	47	42	27	48	31	32	34	38
Annual maximum ($\mu\text{g m}^{-3}$)	56	48	41	75	49	49	45	28	51	32	32	35	40
Number of records	54	74	81	81	60	93	121	116	113	118	106	116	97

3.2. PM₁₀ concentrations at Redwoodtown – Bowling Club

In 2012 eight exceedences of 50 $\mu\text{g m}^{-3}$ were measured at the Redwoodtown air quality monitoring site (Figure 3.6). This constitutes seven breaches of the NES (which allows one exceedence of 50 $\mu\text{g m}^{-3}$ per year). This represents the greatest number of NES breaches recorded at the site since continuous monitoring commenced in 2006. The Blenheim airshed was compliant with the NES during 2009 but prior to this it had been non-compliant since the NES was introduced.

The highest PM₁₀ concentration during 2012 occurred on 12 June and reached 59 $\mu\text{g m}^{-3}$. This is lower than the 2011 maximum of 82 $\mu\text{g m}^{-3}$. The second highest concentration measured during 2012 was 57 $\mu\text{g m}^{-3}$. Despite recording the greatest number of exceedences since 2006, PM₁₀ concentrations measured during 2012 were not as significant as 2011 concentrations when several very high measurements were recorded. In 2012 a number of exceedences were just over the 50 $\mu\text{g m}^{-3}$ limit. A small reduction in PM₁₀ emissions should result in these days achieving compliance.

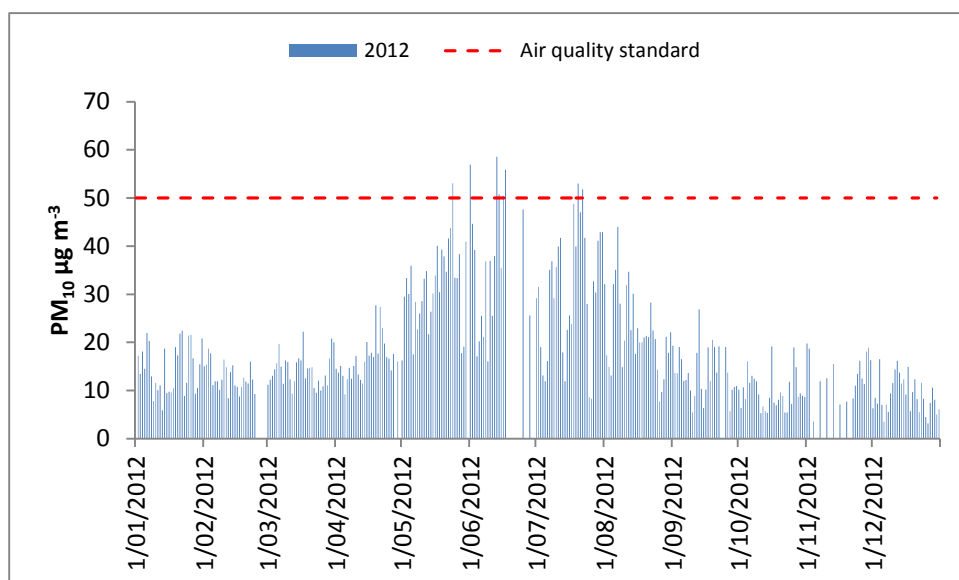


Figure 3.6: 24-hour average PM₁₀ concentrations measured at the Redwoodtown – Bowling Club site during 2012.

Figure 3.7 compares daily PM₁₀ concentrations measured from 2006 to 2012 to the MfE air quality indicator categories (shown in Table 1.3). The proportion of PM₁₀ concentrations within the “good” air quality category is similar to other years. However, the proportion of concentrations within the “alert” or “action” categories (greater than 66% of the guideline) at 13% is more similar to 2011 when a slightly higher proportion (15%) was observed. Prior to this values of 7% in 2010 11% and 9% in 2008 and 2009 and 7% in 2007 occurred.

Monthly variations in the distribution of PM₁₀ concentrations for 2012 are shown in Figure 3.8. No data are reported for June or November because more than 25% of data for each month are missing.

Figure 3.9 shows the number of days when the NES was exceeded, the maximum concentration and the second highest concentration for 2012 and for previous years. It is important to note, that this comparison 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.

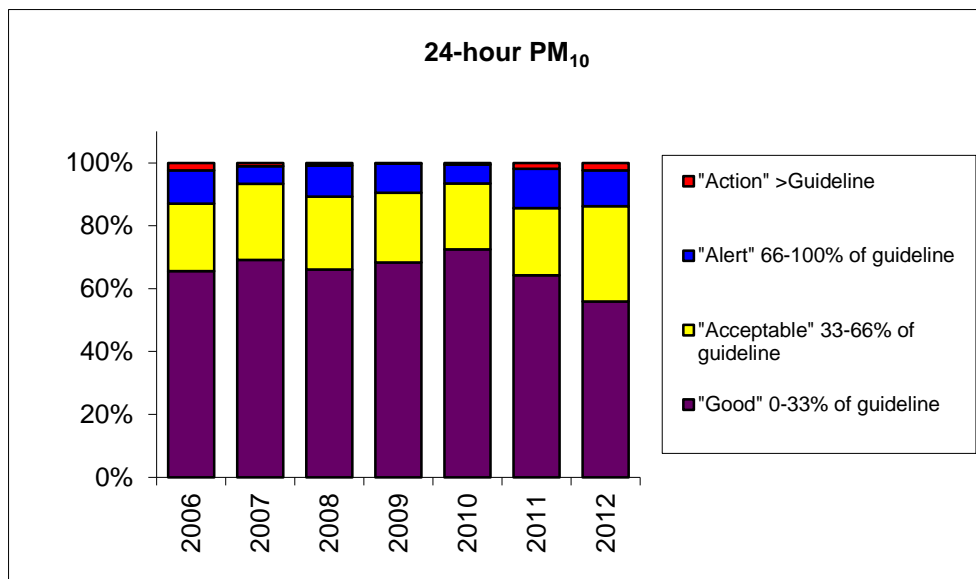


Figure 3.7: Comparison of PM₁₀ concentrations measured at Redwoodtown – Bowling Club site during 2006 to 2012 to air quality indicator categories.

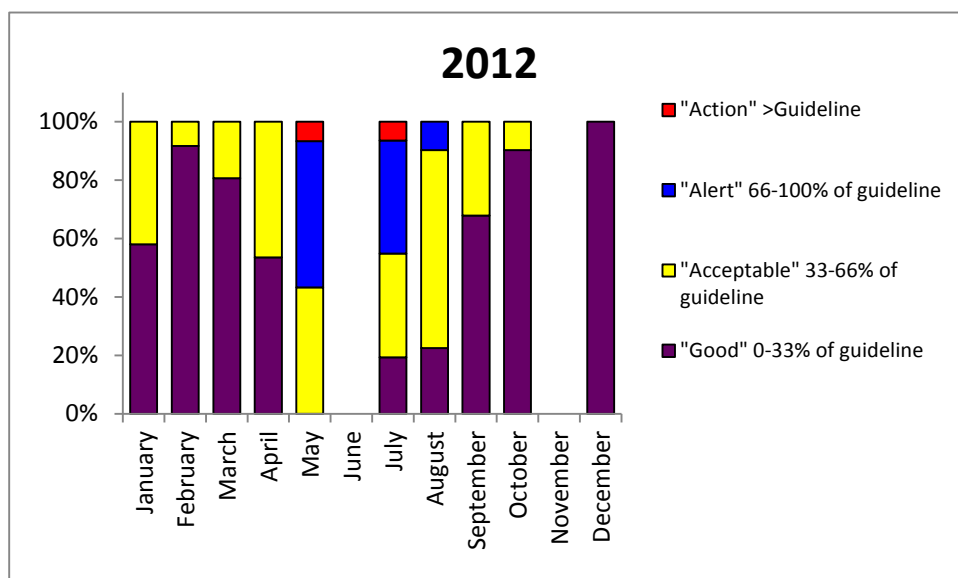


Figure 3.8: Comparison of daily PM₁₀ concentrations each month during 2012 to air quality indicator categories.

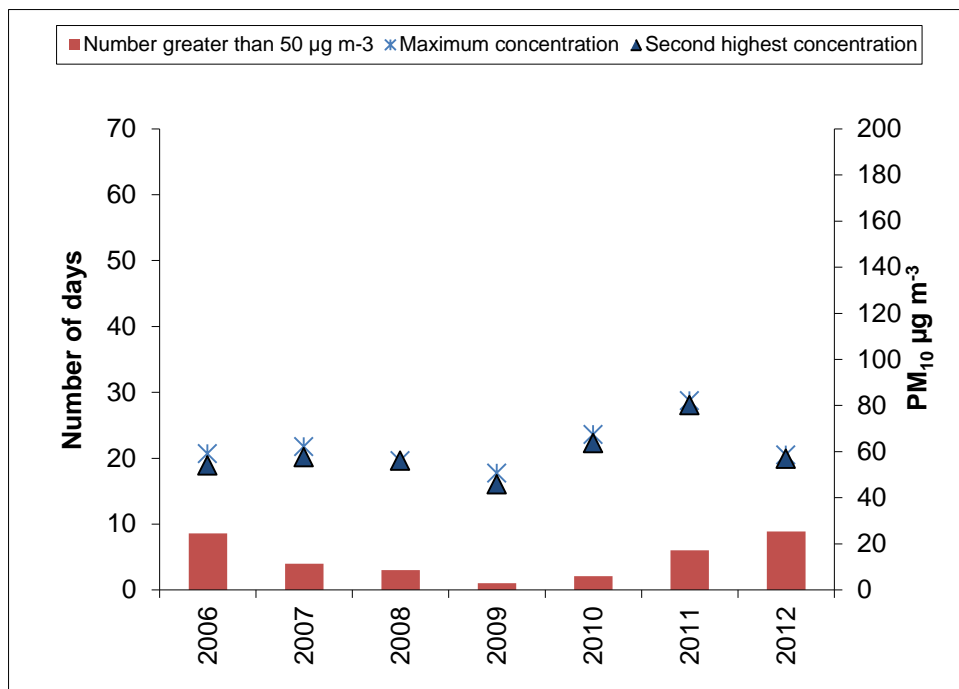


Figure 3.9: Number of days when 50 µg m⁻³ was exceeded, the maximum concentration and the second highest concentration from 2006 to 2012.

In 2012, the annual average PM₁₀ concentration was 19 µg m⁻³. This is higher than other years, although this may in part occur as a result of the use of a gravimetric sampling method (which tend to measure slightly higher PM₁₀ concentrations) during July and August. The Ministry for the Environment specifies an annual average guideline for PM₁₀ of 20 µg m⁻³. The NES does not currently include an annual average concentration for PM₁₀.

Summary statistics for PM₁₀ monitoring results from the Redwoodtown Bowling Club site since monitoring commenced in 2002 are provided in Table 3.2. It is noted that the monitoring period has varied from year to year. From 2005 monitoring was conducted from January to December and in 2004 air quality monitoring took place at a site in Brooklyn Street.

Table 3.2: Summary of PM₁₀ concentrations measured at Redwoodtown – Bowling Club site from 2002-2012

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

3.3. PM₁₀ and meteorology in Blenheim

Figure 3.10 shows variations in meteorological conditions and hourly average PM₁₀ concentrations on the six of the eight days when the 24-hour average exceeded 50 µg m⁻³ at the Redwoodtown air quality monitoring site. Exceedences on 19 and 21 July are not showing owing to lack of hourly average PM₁₀ data on these days. Concentrations on these were measured using a high volume sampler which gives a 24-hour average only.

The high pollution episodes shown in Figure 3.10 are relatively similar in that they are characterised by low wind speeds throughout the day, a westerly wind direction and PM₁₀ concentrations peaking in the early evening.

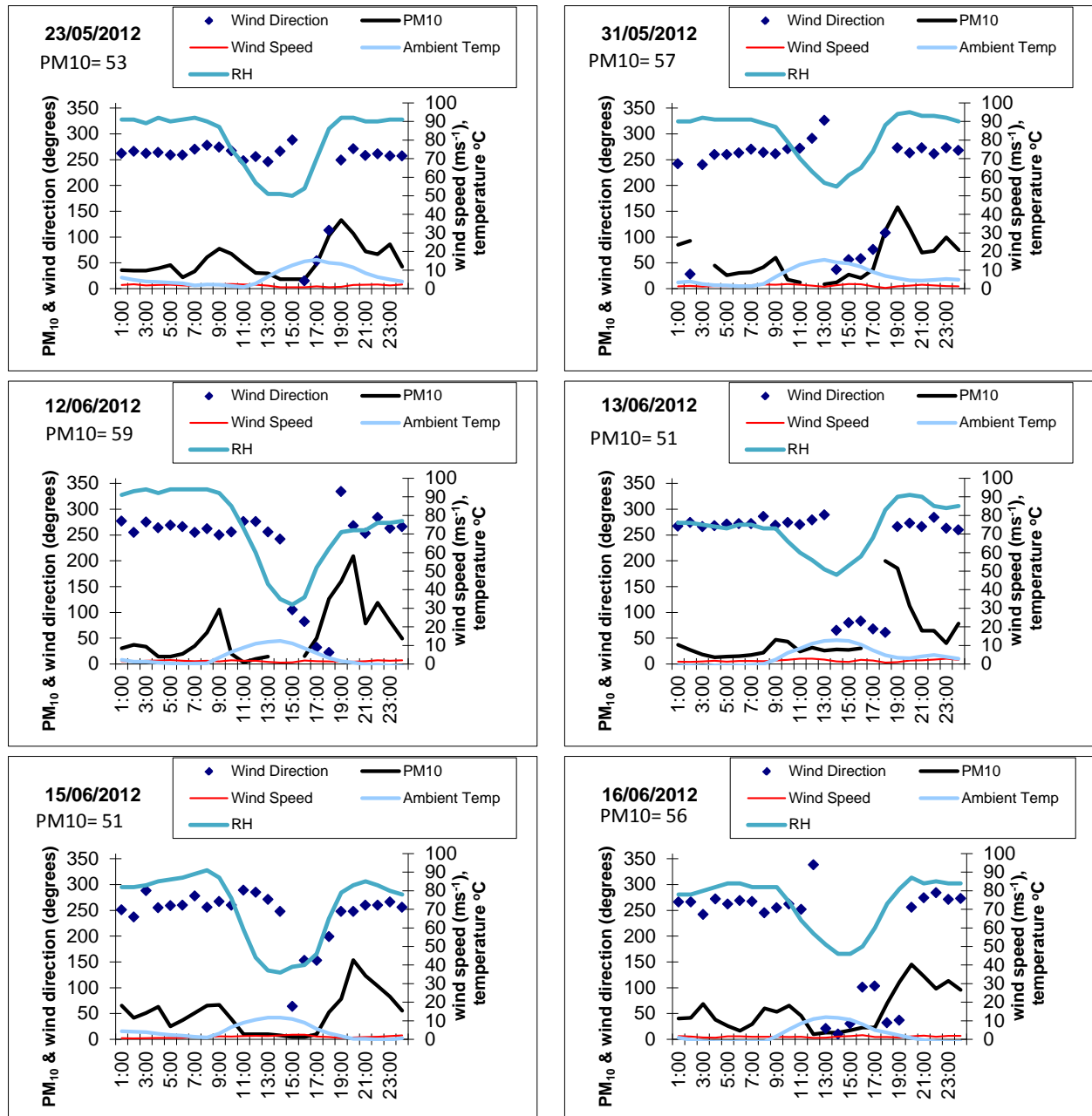


Figure 3.10: Hourly average wind speed, wind direction and temperature on days when PM₁₀ concentrations exceeded 50 µg m⁻³ (24 hour average) at Blenheim.

4. Trends in PM₁₀ concentrations in Blenheim

To quantify the impact of meteorological conditions and therefore further assess the likelihood of changes in PM₁₀ concentrations since 2005, a trends assessment was updated in 2012 (Wilton, 2012b). The objective of that work was to identify meteorological conditions giving rise to concentrations of PM₁₀ in excess of the NES and to provide a tool for comparing year to year PM₁₀ concentrations whilst minimising the impact of variability in meteorological conditions. Figure 4.1 shows trends in PM₁₀ concentrations from 2006 to 2012 using PM₁₀ data adjusted for the impact of meteorological conditions. Results suggest a decrease in concentrations from 2006 to 2009. In 2010 and 2011 the upper quartile concentrations increased markedly and average concentrations just slightly. In 2012 average concentrations were similar to 2009, maximum and second highest concentrations similar to 2007 but 75th percentile concentrations were higher than 2011. It is uncertain whether changes in emissions, the spatial distribution of emissions or meteorological conditions not quantified in the trends assessment are responsible for the changes in PM₁₀ from 2010 – 2012.

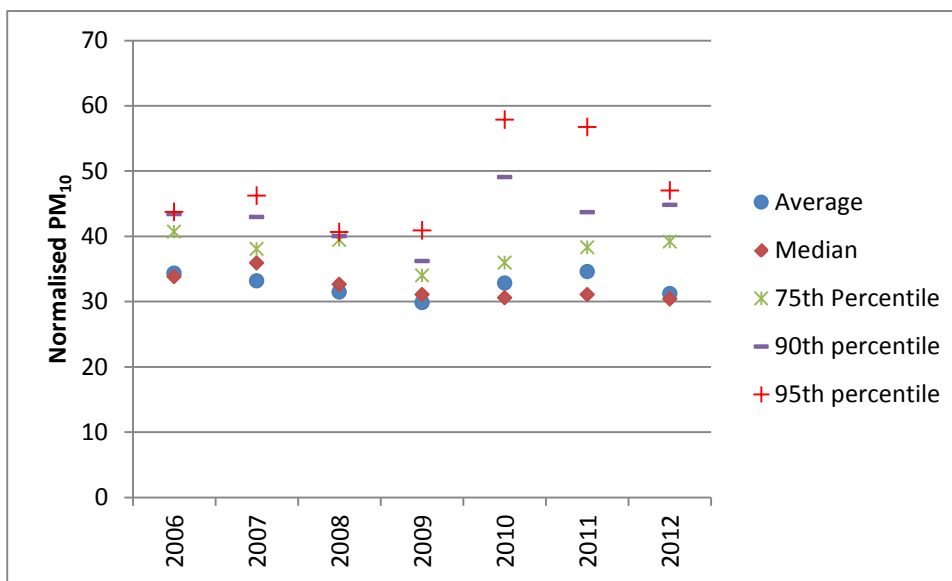


Figure 4.1: Trends in PM₁₀ concentrations after adjusting for meteorological conditions

5. Summary

Eight exceedences of $50 \mu\text{g m}^{-3}$ were recorded at the Redwoodtown monitoring site during 2012 resulting in seven breaches of the NES. This is the greatest number since continuous monitoring commenced in 2005. However, maximum, second highest and average concentrations were lower than those measured in 2011. The annual average PM_{10} concentration for 2012 at Redwoodtown was higher than previous years (at $19 \mu\text{g m}^{-3}$ compared with around $16 \mu\text{g m}^{-3}$).

Concentrations of PM_{10} were also measured at the historical Middle Renwick Road monitoring site. In 2012 there were no exceedences of $50 \mu\text{g m}^{-3}$ at this site, although no monitoring was carried out during July and most of August. This is consistent with historical monitoring of PM_{10} in this location. An evaluation of annual average concentrations measured at this site since 2000 suggests a downward trend in concentrations.

The NES for PM_{10} was reviewed by the Ministry for the Environment in 2011. A new date of 2016 was given for compliance with $50 \mu\text{g m}^{-3}$ (24-hour average, one allowable exceedence) for areas with fewer than 10 breaches. Blenheim is required to meet this target date. Prior to 2010 PM_{10} concentrations appeared to be reducing. However, increases in the frequency of exceedences and the magnitude of concentrations have been observed from 2010 to 2012. Management intervention is required to ensure the NES for PM_{10} is met by 2016.

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