

2.3 ANNUAL AIR QUALITY REPORT

Information Only - No Decision Required

Report To:	Regulatory Committee
Meeting Date:	28 November 2019
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Report Number:	RRCCCC19-11-3

1 Summary

- 1.1 The Council is involved in monitoring air quality and has a fixed monitoring station within the Richmond Airshed set up under the National Environmental Standards for Air Quality 2004 (Air Quality NES). There were 4 exceedances of the daily standard for particulate matter (PM₁₀) over the winter of 2019. The Richmond airshed is accordingly non-compliant with the Air Quality NES.
- 1.2 The Richmond Airshed trend analysis has shown that the reductions in PM₁₀ concentrations have fallen behind the predictions model and additional measures to improve air quality are likely to be required to meet the 2020 Air Quality NES for PM₁₀.
- 1.3 There were 208 air quality complaints for the winter of 2019. Of these, 147 complaints related to outdoor horticultural burning and the objectionable nature of smoke and impacts on health and visual amenity, and a further 45 related to odours.
- 1.4 The Ministry for the Environment (MfE) has been reviewing the Air Quality NES for a number of years with a focus on home heating. MfE's progress has been delayed, however an Air Quality NES consultation document is expected next year with a focus on PM_{2.5} alongside other government initiatives to balance between clean air and warm homes.
- 1.5 If Council is required to move to monitoring and reporting on PM_{2.5} (through an amended Air Quality NES), it is also likely that targeted management of the Richmond airshed would be required to meet any PM_{2.5} requirements, if a daily standard is introduced.
- 1.6 There are ongoing concerns from the community regarding the discharges to air rules for both outdoor rural burning, and home heating in the Richmond airshed. Rule review is intended to be completed as part of developing the Tasman Environment Plan (TEP), our second generation resource management plan. Staff have been implementing a work programme to develop an evidence base through monitoring and research to inform this rule review. This work is being completed alongside education and behaviour change initiatives.
- 1.7 If these timeframes for TEP rule drafting and release of an amended Air Quality NES do not align, the Council will need to consider its options (e.g. delay reviewing the home

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heating rules, or continue with rule review). MfE timelines for the amended Air Quality NES are unclear, however staff anticipate such a decision could be needed in late 2020 or early 2021. In the interim, staff will continue to engage in the Air Quality NES review process and are implementing additional management measures in the Richmond airshed to help improve air quality (airshed woodburner compliance and education).

2 Draft Resolution

That the Regulatory Committee receives the Annual Air Quality Report RRCCCC19-11-3.

ANNUAL AIR QUALITY REPORT**3 Purpose of the Report**

- 3.1 To update Council on the winter 2019 results for air quality monitoring for particulate pollution in the Richmond airshed, assess compliance with the requirements of the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (Air Quality NES), and outline the wider air quality work programme completed over 2019 and going forward.

4 Background and Discussion**Legislative Requirements**

- 4.1 Good air quality is important for people's health and wellbeing and for the environment. Air quality in the Richmond airshed is monitored for fine particles called particulate matter (PM). The tiny particles can cause a range of human health effects from minor irritation through to disease and premature death, and amenity and nuisance effects to the community. The health impacts are experienced mostly by the young and the old and those with pre-existing medical conditions.
- 4.2 The National Environmental Standards for Air Quality (Air Quality NES) are regulations made under the Resource Management Act 1991 which aim to set a guaranteed minimum level of health protection for all New Zealanders. The Air Quality NES came into effect in 2004 and was amended in 2011. It includes a standard for PM₁₀ (particles with a diameter less than 10 micron) for outdoor air quality of 50 µg/m³ (micrograms per cubic metre) based on a 24 hour averaging period. The Air Quality NES does not apply to indoor air quality.
- 4.3 The Air Quality NES has been under review for the last couple of years and staff are actively engaging in that process. Key drivers for the review include focusing on PM_{2.5} (of which about 80% is from biomass combustion in Richmond) to align the Air Quality NES with recent scientific findings on health impacts of fine particulate pollution and international best practice. A key aim of the review is to achieve a more integrated approach to air quality, focusing on a balance between clean air and warm homes. MfE has previously signaled that amendments to the Air Quality NES will be focused on home heating in conjunction with other government initiatives such as the healthy homes standards for rental properties (including insulation requirements). An Air Quality NES consultation document outlining proposed amendments was anticipated mid to late 2019, however this has been delayed due to MfE's staff resourcing constraints.
- 4.4 In order to achieve the Air Quality NES requirements, Council regulates the use of solid fuel burners and outdoor burning through its Resource Management Act 1991 and Building Act 2004 functions. Council also undertakes education (including the Good Wood scheme, and best practices regarding the operation of wood burners and lighting outdoor fires) and uses enforcement action (illegal and objectionable discharges) as necessary.

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Air Quality Monitoring and Assessment

4.5 Particulate matter has been monitored in the Richmond airshed since 2000, and the Air Quality NES standard for PM has been exceeded every winter (where results are available). Particulate matter consists of solid and liquid particles suspended in the air and is usually measured in two sizes:

- PM₁₀ refers to particles that have a diameter of less than 10 microns (coarse component)
- PM_{2.5} refers to particles that have a diameter of less than 2.5 microns (fine component) and is a subset of PM₁₀

Concentrations of PM_{2.5} have been measured in Richmond since October 2015.

4.6 Table 1 presents the current air quality standards and guidelines for PM concentrations. The PM standard under the Air Quality NES is a concentration limit set to protect human health and incorporate a number of allowable exceedances, and is based on the World Health Organization (WHO) guideline. The WHO guidelines include both short term (daily) and long-term (annual) averages of pollutant concentrations. There are currently no national standards for PM_{2.5}, therefore the WHO guidelines are used for assessing the PM_{2.5} results. It is anticipated that under the Air Quality NES amendments, a new standard for PM_{2.5} will be introduced.

Table 1: Particulate Matter Standards and Guidelines

Particle Size	Averaging Period	WHO Air Quality Guideline	Ambient Air Quality Guideline	National Environmental Standard	Permissible Exceedances per Year
PM ₁₀	24-hour	50 µg/m ³	50 µg/m ³	50 µg/m ³	3 by 2016 1 by 2020
PM ₁₀	Annual	20 µg/m ³	20 µg/m ³		
PM _{2.5}	24-hour	25 µg/m ³			3
PM _{2.5}	Annual	10 µg/m ³			

Note: µg/m³ = micrograms per cubic meter. For example, 50 µg/m³ refers to the weight of the particles in micrograms contained in one cubic meter of air.

Monitoring Instruments

4.7 The Richmond air quality monitoring equipment is located at the Plunket Rooms at 56 Oxford Street, central Richmond. There are three instruments currently used to measure PM in Richmond. These comprise of a Thermo FH62 Beta Attenuation Monitor (BAM) and a Partisol gravimetric air quality sampler (R&P Model 2000) which operate from a storeroom at the Plunket Rooms. In October 2018, a new continuous particle monitor (Thermo Scientific Model 5028i) instrument, which uses beta attenuation technology and measures PM₁₀ (channel A) and PM_{2.5} (channel B) simultaneously, was installed in a dedicated portacom building at 56 Oxford Street. The PM monitoring methods for ambient air quality comply with the requirements of Schedule 2 of the Air Quality NES.

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4.8 Over the 2018-2019 monitoring period, three instruments were used for measuring PM₁₀ in Richmond, in order to get some long term co-location data for the historic data and the new instrument. From 2019, the intention was to use the new instrument (5028i BAM) for reporting Richmond air quality results. However, there have been some issues with setup of the new instrument including a faulty detector that required replacement, and a flow rate issue that was identified during our data validation process. All PM₁₀ data from channel A on this new instrument is invalid until August 2019 and has not been used. The detector fault has since been repaired. The continuous PM_{2.5} data from the new instrument on channel B is considered valid. It was fortunate that we were running the two other existing instruments and are still able to report PM₁₀ data for this period.

Photo 1: Richmond Particulate Monitoring instruments 2019 showing new portacom and BAM 5028 in foreground and old FH62 BAM and Partisol in background.



- 4.9 The FH62 BAM is over ten years old and once we have a year of co-located measurements, this will be replaced by the newer dual channel continuous particulate monitor BAM (Thermo 5028i) instrument for both PM₁₀ and PM_{2.5}. The PM₁₀ BAM data in this report has been adjusted for gravimetric equivalence for 2019. The BAM has historically under measured PM₁₀ concentrations relative to the reference method sampler (Partisol) by around 16% for concentrations of around 50 ug/m³. The PM₁₀ BAM data was not adjusted for 2017 and 2018, as recommended by Environet in May 2018 (Comparison of BAM and gravimetric PM₁₀ concentrations and update of trends assessment for Richmond).
- 4.10 In Motueka, a Partisol gravimetric air quality sampler (Thermo 2025i) located at Parklands School in Pah Street was used to undertake a trial for PM₁₀ over the winter period (May-September 2019).
- 4.11 A summary of the particulate data collected using different sampling regimes over the summer and winter periods is shown in Table 2.

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Table 2: Instruments and Equipment for Particulate Monitoring in 2018/ 2019

Instrument	Particle Size	Sampling Period	Sampling Frequency
Partisol Richmond - Satellite (R& P Model 2000)	PM ₁₀	24-hour average	1 day in 2 (2 Sep-6 Sep 2019) 1 day in 6 (12 Sep 2018–15 May 2019) 1 day in 4 (19 May-31 Aug 2019)
BAM Richmond (Thermo FH62)	PM ₁₀	Continuous	1 Sept 2018- 31 Aug 2019 Data adjusted by 16%
BAM Richmond Channel A (Thermo Scientific 5028i)	PM ₁₀	Continuous	5 Dec 2018- 31 Aug 2019 Invalid Data for period to 21 August
BAM Richmond Channel B (Thermo Scientific 5028i)	PM _{2.5}	Continuous	13 Oct 2018- 31 Aug 2019
Partisol Richmond - Hub (R& P Model 2000)	PM _{2.5}	24-hour average	1 day in 6 (9 Sep 2018 – 12 May 2019) 1 day in 4 (21 May-29 Aug 2019)
Partisol Motueka (Thermo 2025i)	PM ₁₀	24-hour average	Daily (2 May 2019 – 7 Sep 2019) Motueka Trial Winter 2019

Analysis of Richmond PM₁₀ Results and Meteorology

- 4.12 Based on the weather records from the Tasman District Council 189 Queen Street meteorological monitoring site, the winter of 2019 had above average temperatures for most of the winter. June was the driest winter month with below normal rainfall. For much of the winter, the average wind speeds were around normal levels, although during August the wind speeds were significantly (25%) higher than normal.
- 4.13 There were some notable periods of sustained low wind speeds in late June and again in late July (see Figure 1). The low wind speed at the end of June also coincided with low temperatures and led to a period of poor air quality. The monthly wind speed was below average in June 2019 compared with the mean of previous years. The calm wind speed leads to conditions that enable particulates to accumulate and worsen the air quality, as there is a buildup of air pollution and less dispersion during settled weather.
- 4.14 Daily 24-hour average PM₁₀ concentrations measured using the BAM in Richmond over the monitoring year period (1 September 2018 to 31 August 2019) are shown in Figure 2. The data for winter 2019 shows the typical seasonal pattern, with peak PM concentrations, breaching the standard, occurring during the end of June, and is mainly associated with biomass combustion (wood smoke) from the use of wood burners for home heating, and cool calm conditions not dispersing the smoke. The exception is the peak in summer from the Pigeon Valley Fire (see Photo 2).

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Figure 1: Daily average wind speed (km/hr) measured in Richmond (Winter 2019)

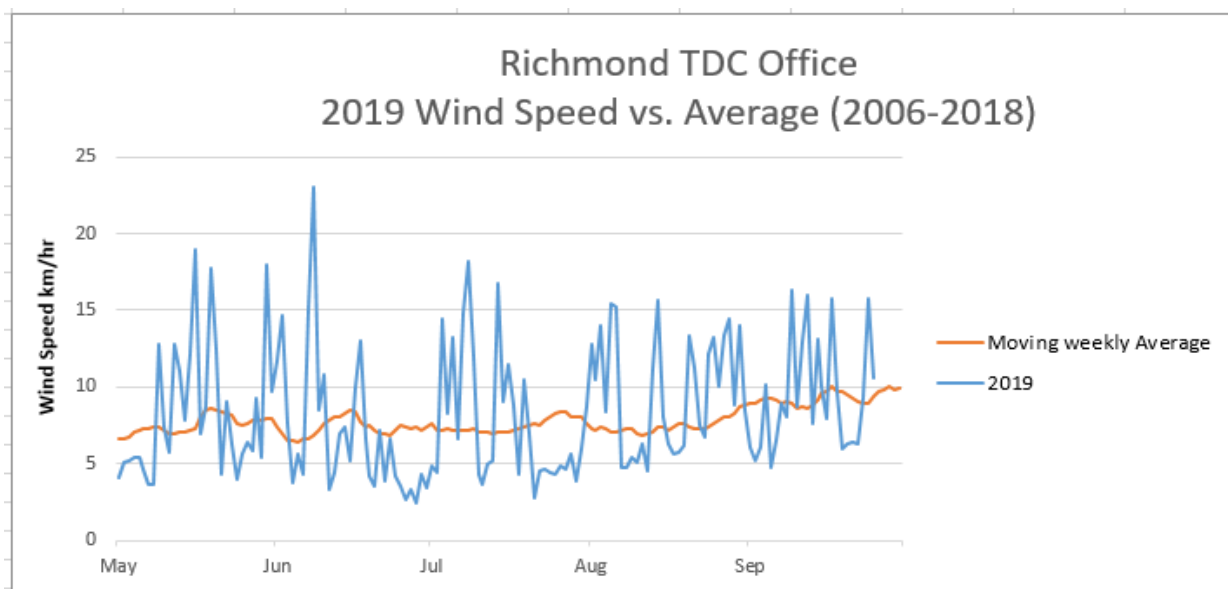


Figure 2: Richmond daily PM₁₀ concentrations in µg/m³ (1 Sep 2018 – 1 Sep 2019)

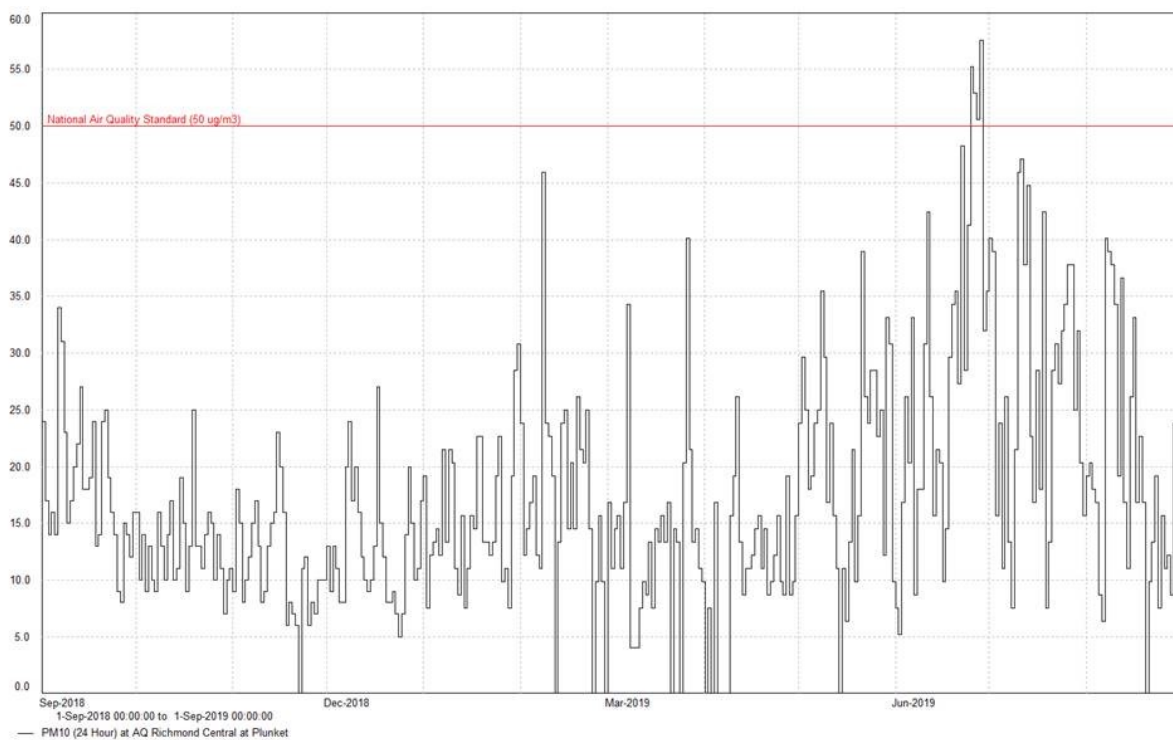


Photo 2: Smoke from Pigeon Valley Fire February 2019- Taken from Seaton Valley Road

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- 4.15 During summer, there was a heatwave and drought which helped lead to conditions that resulted in a prolonged wildfire in Pigeon Valley in February 2019. Impacts from the fire, which commenced on 6 February 2019 were detected in Richmond on 8 February 2019 with a peak hourly PM₁₀ concentrations of 202 µg/m³. However, the daily PM₁₀ standard of 50 µg/m³ was not breached at the monitoring station in Richmond, with maximum PM₁₀ recorded of 46 µg/m³ on 8 February 2019.
- 4.16 Table 3 shows the PM₁₀ daily average data for the year, starting 1 September 2018. The summary of annual average PM₁₀ concentrations for Richmond for 2018/2019 is 18 µg/m³, which meets the annual ambient air quality guideline value of 20 µg/m³. The winter (May-Aug) average was 24 µg/m³ and the average for the non-winter months (Sept – April) was 15 µg/m³. The maximum PM₁₀ was 58 µg/m³.

Table 3: Richmond Daily Average PM₁₀ concentrations in µg/m³ in 2018/2019

Richmond at Plunket Rooms												
01-09-2018 to 31-08-2019												
PM ₁₀ daily average												
Method:	FH62 BAM											
Valid Data:	96.1%											
Data Capture Rate:	97.2%											
Units	µg/m ³											
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Minimum	8	7	6	5	8	10	4	8	6	5	8	6
Mean	18	13	12	13	16	19	14	13	22	29	27	20
Maximum	34	25	23	27	31	46	40	26	39	58	47	40
Lowest							4					
Highest										58		
Exceedances (>50 µg/m ³)	0	0	0	0	0	0	0	0	0	4	0	0
Annual Mean	18											
Note: Year starts in September												

- 4.17 There were a total of 4 exceedance days of the daily Air Quality NES concentration of 50 µg/m³ (24-hour average) in the 12 month period (1 September 2018 to 31 August 2019)

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as shown in Table 4. The Air Quality NES for PM₁₀ allows 3 or fewer permissible exceedances per 12 month period until 31 August 2020. A total of 4 exceedance days meant there was one breach of the Air Quality NES in the Richmond airshed. The exceedances in PM₁₀ have occurred under cool, calm settled conditions at the end of June with 24-hour average wind speeds of less than 1.0 m/s and evening temperatures of around five degrees (°C).

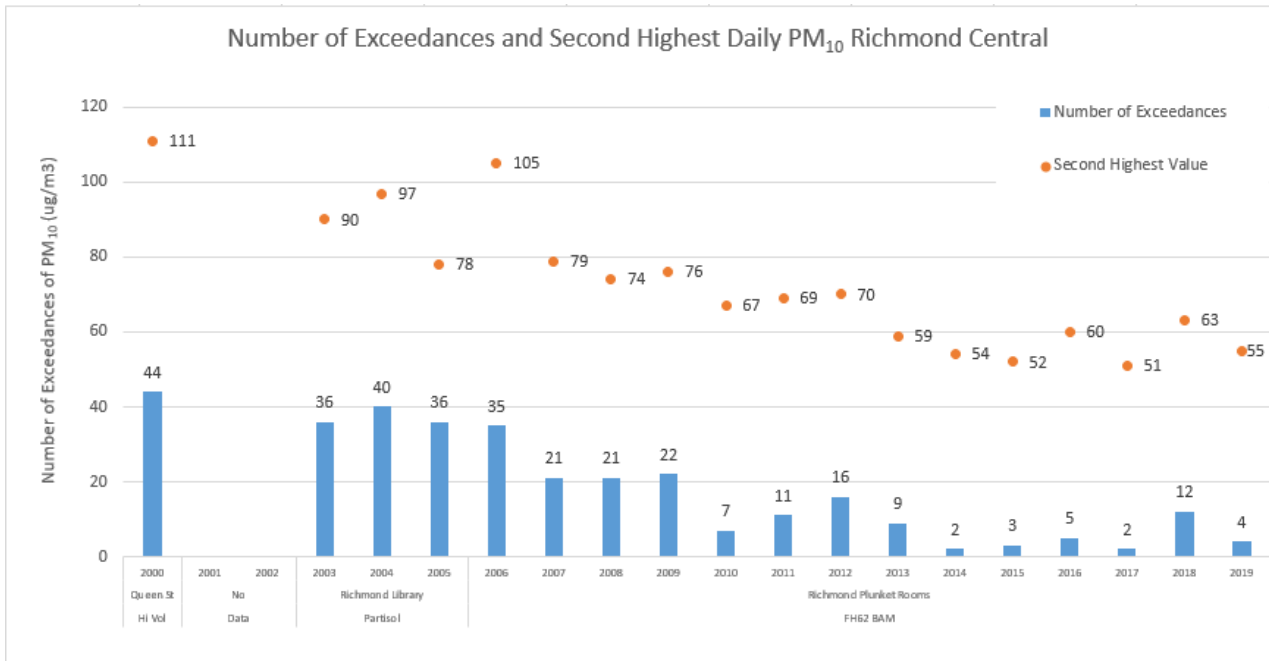
Table 4: Exceedances of 24-hour PM10 in Richmond in 2019.

Date	BAM 24-hour PM ₁₀ adjusted µg /m ³	Partisol 24-hour PM ₁₀ µg /m ³	24-hour wind speed m/s	24-hour temp °C	4-hour Temp (8pm-12pm) °C
25 June 2019	55		1.0	7.2	5.5
26 June 2019	53		0.8	6.7	5.2
27 June 2019	51		0.9	7.0	5.3
28 June 2019	56	58	0.7	5.9	4.9

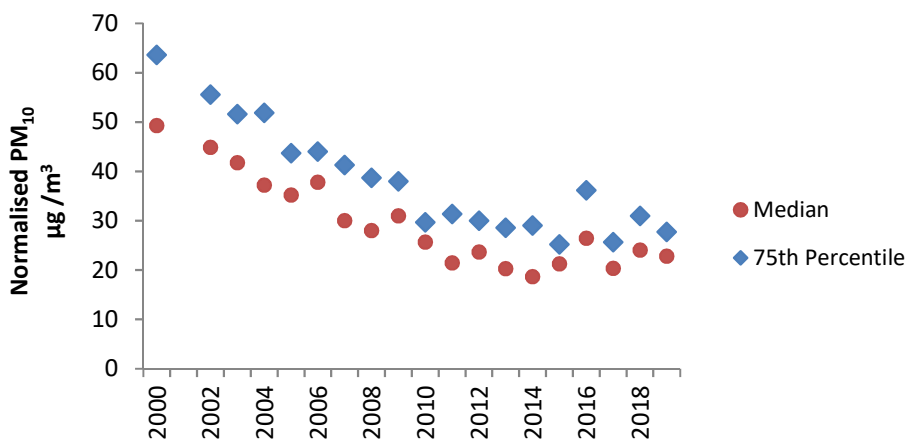
- 4.18 The exceedance on the 28 June 2019 was publically notified in the local paper (Newsline) and on the Council website online. As part of our data quality assessment, the winter 2019 data was adjusted to account for instrument variations (See Section 4.9). This resulted in three additional exceedance days on 25-27 June and a revised public notification was reissued in Newsline on 4 October 2019.
- 4.19 The number of PM₁₀ exceedances of the daily standard has reduced from 44 in 2000 to 4 in 2019 and is less than the 12 recorded in Richmond in 2018 (see Figure 4). The second highest PM value indicates no difference over the last seven years, which suggests predicted reductions in PM₁₀ concentrations is not occurring. The data gaps (Figure 4) relate to when the air quality monitoring was undertaken historically at different locations and using different instruments. In addition, no air quality monitoring for PM₁₀ was undertaken over the period 2001 and 2002.
- 4.20 Figure 5 shows the changes in PM₁₀ concentrations for the period 2000-2019 for median and upper quartile (75th percentile) PM₁₀ data, which has been adjusted for the impact of meteorological conditions. The normalisation is based on the past data from 2000-2009 and accounts for 24-hour average wind speed and average temperature between 8pm and midnight. High pollution potential days are defined as the 24-hour period when the weather conditions fall within the criteria of high pollution nodes 1-5. These nodes are defined in the NIWA Envirolink report TSDC60 “Assessing long-term trends in PM₁₀ concentrations in Richmond” and include 24 hour wind speed of less than 3.8 m/s and 5m/s and four-hour average evening temperature of less than 6.8 degrees C. Additional high pollution criteria include wind speeds of between 5-7 m/s and temperatures of less than 5.7 degrees C.
- 4.21 The normalised PM₁₀ data allows the trends over time of PM₁₀ concentrations to be evaluated with the effects of year-to-year variations in temperature and wind speed minimized. The trend evaluation suggests a downward trend for the first ten years and no significant decrease in median PM₁₀ concentrations in Richmond from 2010 to 2019. There were 68 high pollution potential days in winter 2019, and 4 exceedances of the

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standard, which is 6% of the high pollution potential days that resulted in an exceedance. This is comparable to the 3-year period 2013-2015, which also had an average of 6% proportion of the high pollution potential days which resulted in an NES exceedance. In 2007-2009, there were NES breaches in 33% of the high pollution days.

Figure 4: Number of Exceedances of 24-Hour PM₁₀ for Richmond (2000 to 2019)


Note: PM₁₀ was not monitored in 2001 and 2002, and the gaps between the three data sets indicate monitoring was undertaken using different instruments and/or monitoring locations.

Figure 5: Richmond Winter PM₁₀ normalised for meteorological conditions (2000 to 2019)


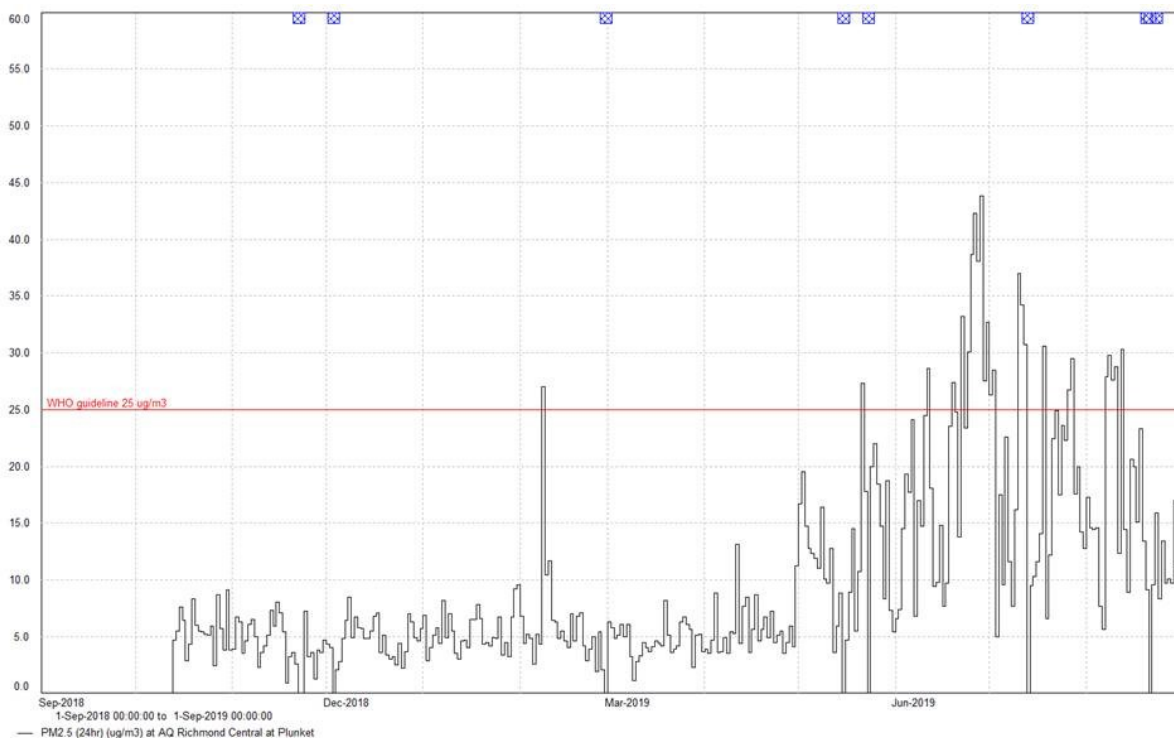
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Analysis of Richmond PM_{2.5} Results

4.22 Over the 2018/2019 season, PM_{2.5} concentration was measured in Richmond using two instruments. From September 2018, a one day in six sampling regime was resumed using the gravimetric method (Partisol 2000 Hub), and was increased to one day in three over the winter. The second instrument used is the new dual BAM (5028i) which commenced in October 13, 2018. Based on the comparison of the data between the two methods (64 samples), no adjustment factors have been applied to the data.

4.23 The daily 24-hour average PM_{2.5} concentrations available for Richmond from the continuous BAM is shown in Figure 6. The data shows PM_{2.5} breached the current WHO daily guideline value of 25 µg/m³ a total of 25 times, with one exceedance in February, associated with the Pigeon Valley Fire, and the remaining exceedances over the winter period from May to August 2019. The data for winter 2019 shows the typical seasonal pattern, with peak PM concentrations occurring in winter and is associated with the use of wood for home heating.

Table 5 summarises the PM_{2.5} daily average data for the year, starting 1 September 2018. The annual average PM_{2.5} concentrations for Richmond for 2018/2019 is 9.8 µg/m³, which just meets the WHO annual air quality guideline value of 10 µg/m³. The winter (May-Aug) average was 17 µg/m³ and the average for the non-winter months (Sept – April) was 6 µg/m³. The month of June had the most exceedances (10) of the WHO daily guideline value of 25 µg/m³.

Figure 6: Richmond Daily PM_{2.5} concentrations in µg/m³ (1 Sep 2018 – 31 Aug 2019)



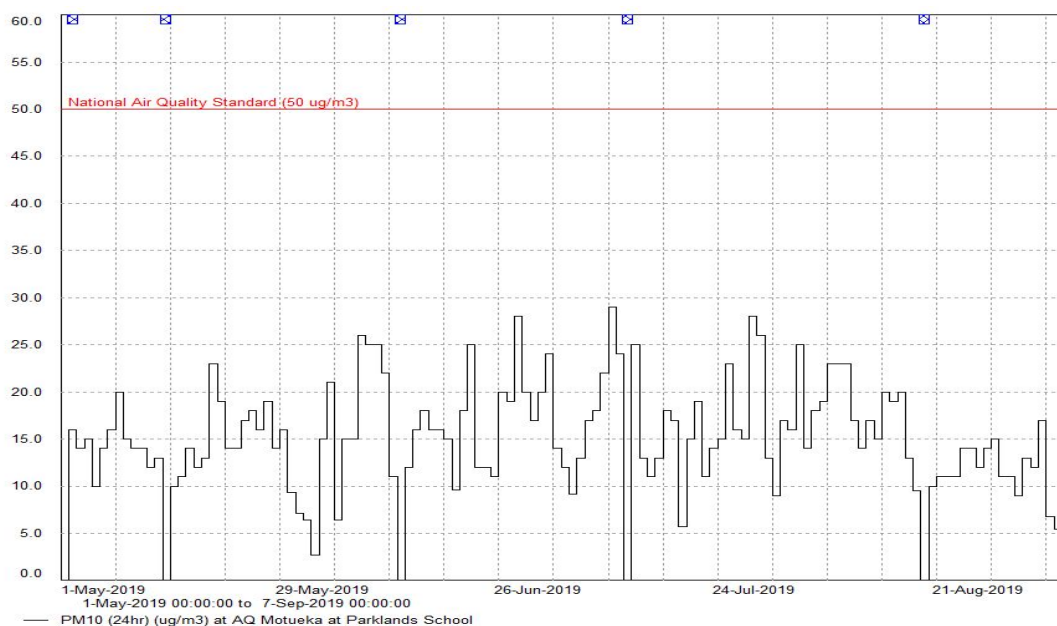
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Table 5: Daily Average PM_{2.5} measured in Richmond in 2018/2019

Richmond at Plunket Rooms												
01-09-2018 to 31-08-2019												
PM _{2.5} daily average												
Method:	Partisol / 5028i BAM											
Valid Data:	87.9%											
Data Capture Rate:	89.0%											
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Minimum	5.2	2.2	0.9	2.1	2.9	1.9	1.1	3.5	3.6	6.6	5.0	5.6
Mean	7.8	5.3	4.6	4.8	5.4	6.1	4.7	5.7	12.8	21.7	19.1	15.9
Maximum	11	9.1	8.0	8.5	9.6	27.0	8.2	13.1	27.3	43.8	37.0	30.3
Lowest			0.9									
Highest										43.8		
Exceedances (>25)	0	0	0	0	0	1	0	0	1	10	8	5
Annual Mean	9.8											

4.24 The maximum daily PM_{2.5} concentration measured in Richmond was 44 µg/m³ on 28 June 2019, which is on the same date as the PM₁₀ maximum for the year. The PM_{2.5} data is similar to the last full record obtained in 2017, when there was a total of 24 breaches of the WHO daily guideline value over the winter 2017 season.

Air Quality Monitoring in Motueka PM₁₀ Results 2019

4.25 Over the winter 2019 season, daily PM₁₀ concentration was measured in Motueka over the winter period (May to August) at a temporary site at Parklands School. This work also coincided with part of a wider study undertaken over the winter to measure air quality in Motueka (refer to paragraphs 4.48 and 4.49). The daily 24-hour average PM₁₀ concentrations for Motueka from the winter sampling is shown in Figure 7.

Figure 7: Motueka PM₁₀ concentrations in µg/m³ (2 May 2019 – 7 Sep 2019)


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- 4.26 A review of the available PM₁₀ data collected using the Partisol instrument at Parklands School, Motueka has shown that there were no exceedances of the Air Quality NES (24-hour average) standard of 50 µg/m³ during winter 2019 at that location. The maximum PM₁₀ recorded was 29 µg/m³ on 11 July. During this same time period, there were four exceedances of the Air Quality NES standard in Richmond. Further assessment of the Motueka data will be undertaken following receipt of the outputs of the wider study. The Air Quality NES only requires the identification and monitoring of airsheds where air quality standards are likely to be breached.
- 4.27 Table 6 summarises the PM₁₀ daily average data for the winter, based on the gravimetric method (Partisol) measured at Parklands School. The winter (May-August) average PM₁₀ concentration for Motueka 2019 is 16 µg/m³, with the maximum of 29 µg/m³. The data is consistent with previous short term air quality sampling undertaken in Motueka in 2006, 2014 and 2018 where no exceedances of the Air Quality NES have been recorded. The highest reading previously in Motueka was 43 µg/m³ in winter 2006.

Table 6: Daily Average PM₁₀ concentrations in µg/m³ measured in Motueka

Motueka at Parklands School
 01-05-2019 to 31-08-2019
 PM₁₀ daily average
 Method: Partisol
 Valid Data: 95.9%
 Data Capture Rate: 97.6%

	May	Jun	Jul	Aug
Minimum	7	3	6	9
Mean	14	16	17	16
Maximum	23	28	29	25
Lowest		3		
Highest			29	
Exceedances (>50)	0	0	0	0
Winter Mean	16			

Compliance and Investigations

- 4.28 During the six month period from 1 April to 30 September 2019, Council received 208 air quality related complaints, 45 of these related to odour; 4 were dust related; 9 were discharge of pesticide/herbicide complaints and 147 complaints related to smoke.

Odour

- 4.29 Thirty of the odour complaints related to a strong fish/cooked fish offal smell in the Trewavas St and eastern Motueka area. Staff believe this is directly related to the Talley's Group Ltd fishmeal plant operating at Port Motueka. Talley's were granted a new suite of resource consents on the 21 February 2019, the consents allow for some fairly extensive upgrades to production and waste systems at the factory. Council staff have been working alongside Talley's with the associated issues and complaints while they 'bed' in the upgrades and new consents. Talley's have engaged odour experts and installed temporary odour mitigation in the form of a Waylex spray to mask the current odour, with a large bio-filter system programmed for installation in April 2020.

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- 4.30 Ten odour complaints were received in the Richmond area. A number of these related to Higgins Contractors Nelson Ltd who operate an asphalt plant in Beach Road, Richmond. They hold a discharge to air consent for activities on site. A distinctive burnt bitumen odour was being generated from the asphalt plant when they were in production mode, this odour was at times noticeable as far away as Queen St. An Abatement Notice was served on Higgins Contractors Nelson Ltd on the 24 July 2019 directing them to comply with the conditions specified in their discharge of air resource consent. To date there has been full compliance with the abatement notice and nil complaints.
- 4.31 Four other odour complaints in the Richmond area related to the Council sewerage plant at Bell Island, and three complaints to animal and compost odours. Five odour complaints were received within the Waimea/Moutere area, all of these related to composting or the odour from decomposing mussel shells.

Smoke

- 4.32 147 complaints related to smoke and the cross boundary effect of smoke. These complaints can be broken down by area:

<i>Golden Bay</i>	<ul style="list-style-type: none"> • 5 rural outdoor burning
<i>Murchison</i>	<ul style="list-style-type: none"> • 1 rural outdoor burning
<i>Motueka, Lower Moutere and Riwaka</i>	<ul style="list-style-type: none"> • 12 urban outdoor burning and smokey chimneys • 34 rural outdoor burning • 4 were general air quality complaints
<i>Waimeas, Wakefield, Upper Moutere, Mapua</i>	<ul style="list-style-type: none"> • 4 urban outdoor burning and smokey chimneys • 27 rural outdoor burning • 12 were industrial related
<i>Richmond</i>	<ul style="list-style-type: none"> • 11 household smokey chimney • 7 outdoor burning • 8 industrial smoke complaints • 2 general air quality complaints

- 4.33 The issues regarding the effects of smoke on air quality from poor outdoor burning practices and wood burner use are well documented nationally and internationally. Attachment 1 provides a summary of the outdoor burning issues within the Tasman district as detailed in last year's report (REP18-11-01).

Enforcement (smoke related)

- 4.34 Staff were required to undertake enforcement action over the year, namely:
- 4 abatement notices were issued requiring compliance with our TRMP rules.
 - 6 infringement notices were served for breach of our outdoor burning rules.
 - 3 formal warnings were given.

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- 12 letters were sent out in an educational capacity advising of our rules and expectations.
- Numerous verbal warnings, best practice advice and communications around Council expectations in relation to both wood burner and outdoor burning were given.

Burning Prohibited Items

4.35 The majority of rural outdoor burn operators are now removing all prohibited items such as treated timber posts and irrigation piping from their burn piles prior to burning. Compliance enforcement action for the burning of prohibited items includes an infringement fine; an Abatement Notice to cease the burning of prohibited items and an Abatement Notice to remove and dispose of the contaminated ash and topsoil to landfill. This year only 1 property received an abatement notice in relation to burning prohibited items, and an additional property received a formal request in writing to dispose of burnt and partially burnt prohibited items.

Richmond Airshed

- 4.36 The Richmond airshed contains a total of 5,904 properties. Of these properties, Council records identify that there are a total of 2,404 properties that have either a compliant wood burner; a compliant wood pellet burner; or an alternative heating source. These figures are based on current available information.
- 4.37 Within the airshed, 1000 properties are known to be subject to our TRMP Rule 36.3.7.5. This means the property has sold since January 2007 and owners are required to upgrade their wood burner if they use a non-compliant model. Staff have undertaken significant work on updating our Richmond airshed database information and focusing on these properties in this past year. It has been accurately identified that 166 of these properties do have non-compliant wood burners on site. Additionally, 52 of these properties also have a heat pump or alternative heating source which they use; 11 of these properties have capped their chimneys and 47 of these property owners have advised council that they are not using their wood burners (however they do wish to keep the option of wood burner replacement open). This leaves 119 properties that Council believe are using non-compliant wood burners within the Richmond airshed.
- 4.38 Staff are in the process of targeting these 119 properties via an initial educational letter to engage with these property owners. This will enable these property owners to have sufficient time to either update their wood burner or install an alternative heating source prior to the 2020 winter. There will then be targeted enforcement of those properties who continue to operate a non-compliant wood burner next year.
- 4.39 To assist with this compliance work, an online form for email use is being designed as well as a 'QR code' which can be added to letters for properties requiring a standard letter. This use of technology will allow the information to feed directly into our MAGIQ system and reduce the manual data update requirements into the airshed database.
- 4.40 It is acknowledged that gaps in our information regarding home heating methods at a property level within the airshed (approximately 1,970 properties) still exist. This has come about because building consents for wood burners were only required in 1998, and council records of wood burners prior to this date is not easily accessible or nonexistent. Some of these older style burners (15+ years old) are currently allowed to be operated in the

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airshed but do not meet the Air Quality NES emission and efficiency standards. Targeting replacement of these old burners in the airshed through the home heating rule review (or possibly via an amended Air Quality NES) is one option which would ultimately help to improve Richmond's air quality. Staff are keen to get a better handle on property-specific home heating information however this will require additional effort over and above 'business as usual activities' to enable a full and accurate dataset. However there will be significant benefits to completing this work to enable targeted compliance, particularly if the Council is required to enforce a phase-out of old non-compliant wood burners.

Air Quality Work Programme

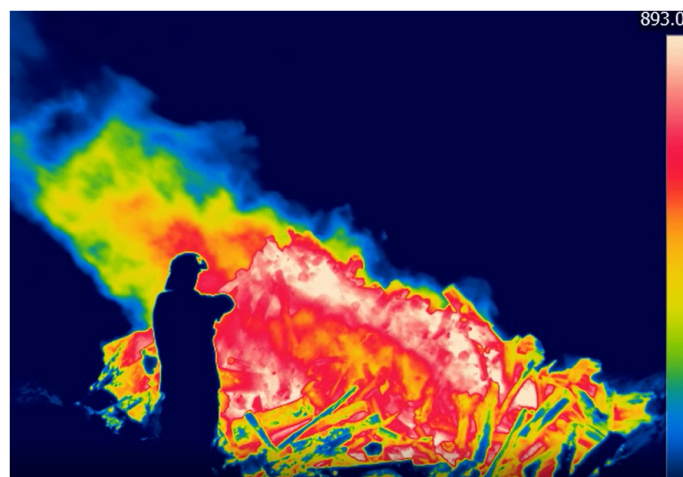
- 4.41 As outlined in last year's air quality report (REP18-11-01) a work programme was developed for 2019 to ensure more active management of our air quality resource. Projects that have commenced this year are outlined below.

Monitoring and research

- ***Outdoor burning trial (May 2019)***

- 4.42 Working in partnership with Scion (a crown research institution) and a local contractor (Riverstone Balage Ltd), staff undertook an outdoor burning trial in May to monitor the effectiveness of best practice outdoor burning (funded by an Envirolink Medium Advice Grant/TDC). The trial assessed three types of burn methods, being:
- (a) permitted activity burn – a large burn pile thrown together with no 'hot base'
 - (b) current best practice burn – a well-built fire pile with a hot base to which fuel is added
 - (c) trench and fan – a fire pile built within a trench with a hot base to which fuel is added, and a large fan blowing air into the base of the fire.
- 4.43 The first trial monitored the effectiveness of each burn, individually over three consecutive mornings, with the burn piles scaled down for research purposes. A number of parameters were monitored: concentration of smoke discharge ($PM_{2.5}$); carbon monoxide; smoke plume height; fire temperature using thermocouples; fire temperature interior, flame and discharge using infrared camera (as shown in Photo 3); fuel consumption rate; burn time and general background meteorology.

Photo 3: Example of infrared camera measuring a fire temperature of 893 degrees Celsius with the trench and fan method



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4.44 The second trial consisted of burning the three different types of burn methods simultaneously, with piles spaced 80m apart. The burn piles were ignited at the same time but managed dependent on their method using 'real life conditions' e.g. the size of the burn piles were reflective of that found out in the field, and the contractor was advised to manage the burns as he would in the field. This trial was undertaken to gain a visual and time comparison under identical weather conditions as shown in the photos over page.

Photo 4: permitted activity burn.



Photo 5: Current best practice burn



ANNUAL AIR QUALITY REPORT**Photo 6: trench and fan burn (exemplar best practice)**

- 4.45 At the time of writing, staff are yet to receive a final report from Scion summarizing the results of the trial however this will be made public once available. Observed results from staff highlighted many inefficiencies with the permitted activity burn method and the improvements that are made by employing best practice methods (reduced smoke discharge, efficient burning). In particular, the use of a trench and fan method (exemplar best practice) was incredibly efficient, with minimal smoke discharge, extremely hot fire and flame, a quick burn able to burn considerably more wood fuel and minimal residual ash.
- 4.46 Information gained from this trial will be used to form a package of information/education material for orchardists and rural land managers including a video clip of the second trial. This research supports the Council's best practice expectations and assist with the future TRMP discharge to air rule review. Jane Stuart has given presentations on this trial at the National Air Quality Working Group meeting (October) and the November NZPI Environmental Compliance Conference (November) which has been well received by other regional/unitary council staff.
- ***Riwaka, Brooklyn and Motueka air quality study (winter 2019)***
- 4.47 National Institute of Water and Atmospheric Research (NIWA) was commissioned to undertake wintertime particulate matter monitoring in the Riwaka, Brooklyn and Motueka area using temporary outdoor air quality sensors (called ODINs – outdoor dust information nodes (Photo 7)) to understand if there is an air quality issue associated with wood burning (outdoor horticultural burning and/or home heating). These ODIN instruments are not currently recognized methods under the Air Quality NES schedule 2 as being suitable for assessing compliance with the regulations, however provide a method to identify if there is an air quality issue which warrants further investigation.
- 4.48 At the time of writing, a draft report was pending and staff will be able to provide a verbal update at the committee meeting. If the results of the study indicate that there is an air quality issue that requires further investigation, then likely next steps would involve further

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monitoring next winter to establish a baseline, and following that consideration if there is a requirement to establish and monitor a new airshed in the area.

Photo 7: An example of the outdoor dust information nodes (ODINs)



- ***Riwaka/Motueka webcam***

4.49 A new webcam was recently installed above Riwaka to enable observations of outdoor burning and nuisance smoke in the Riwaka/Brooklyn/Motueka area and complements the existing Richmond/Waimea Plains webcams. The camera images require some adjustment prior to being available online.

Richmond Airshed

- ***Richmond airshed emission inventory***

4.50 The emissions inventory identifies and estimates sources of emissions within the airshed and is used to assist with air quality management in the airshed. Completion of the inventory has been delayed until the relevant 2018 Census data has been released however staff are in the process of purchasing a bespoke dataset from StatsNZ to enable completion of this work. Previous inventories were undertaken in 2000, 2005 and 2010.

- ***Richmond katabatic winds study***

4.51 Staff were recently successful in applying for an Envirolink Small Advice Grant to enable a University of Canterbury student to study the effect of 'katabatic winds' on the dispersion of smoke in the Richmond airshed. This research will take place over winter 2020.

Education and Advocacy

- ***Good Wood Scheme***

4.52 Council continues to implement the Good Wood Scheme in partnership with Nelson City Council, which requires participating wood retailers to supply dry firewood according to best practice guidelines.

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- ***Updated best practice pamphlets***

4.53 Updated best practice pamphlets on home heating and outdoor burning are available online and in service centres.

- ***Best Little Woodshed competition***

4.54 In January the Council launched its inaugural Best Little Woodshed competition in tandem with Nelson City Council (who have run this competition for several years). The competition was for entries showing great examples of wood storage ideas that residents have come up with to keep their wood dry for winter. The competition promoted the principles of buying or collecting wood early (e.g. summer/early autumn) and storing it correctly to ensure that it is dry and will burn efficiently come winter. Unfortunately the competition period was during the time of the Pigeon Valley fire event and consequently staff stopped activity promoting the competition. Nonetheless, eight entries were received and councilors judged Ricky Hovenden's (Wakefield) shed as the overall winner (Photo 8 below). Staff intent to run this competition as an annual event alongside NCC.

Photo 8: Best Little Woodshed "Judges Choice Award" overall winner



- ***Home heating education programme (autumn/winter 2020)***

4.55 Working with a local behaviour change consultant, a home heating education programme is being scoped for implementation in autumn/winter 2020. Given budget constraints, this will target quick but effective wins such as reinforcing key messages of storage of firewood, correct operation of woodburners and not to burn prohibited materials such as treated timber, plastics and other household waste. Although these are obvious messages, they need to be reinforced every year as people's behaviour to burning can change from year to year and have a significant impact on air quality.

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- ***Warmer Healthier Homes Nelson Marlborough***

4.56 Since 2014, Warmer Healthier Homes (WHH) has operated across Te Tau Ihu (top of the south) assisting homeowners and community members most in need to improve insulation measures, heating and overall efficiency by retrofitting into existing owner-occupied homes. WHH administers central government funding (from the Energy Efficiency and Conservation Authority (EECA)) and local third-party funding to subsidise home insulation to residents who meet the required criteria. The positive effects of improved insulation in homes are well documented – better insulation means a warmer, drier and healthier home that will be easier and cheaper to heat. This results in improved air quality outcomes as less wood is required to be burned for home heating, resulting in reduced levels of smoke.

4.57 Both Nelson City and Marlborough District Councils contribute as third-party funders which enables qualifying residents in these districts to receive up to 100% insulation subsidies. Given that the Council does not contribute funding, there is a funding restriction in the Tasman district and qualifying residents can only receive the 67% EECA subsidy, or an additional subsidy for those households who meet a WHH health criteria which is funded by Nelson Marlborough District Health Board. Following a meeting with Leeson Baldey (WHH chair) in May, staff will enquire as to whether Council wishes to review its position through the forthcoming long term plan processes. There are recognized benefits of this programme which contributes to community wellbeing and improved air quality. It is estimated that there are approximately 2000 households which meet the qualifying criteria in the Tasman region. WHH would like to present to councilors and staff can arrange for this.

4.58 In the early 2010s, the Council administered the 'Warm Tasman Scheme' which was a voluntary rate offered to help people upgrade their insulation and woodburner, in partnership with EECA subsidies. This scheme is no longer available but there are a number of people who still have this voluntary targeted rate for their property. Nationally, there are several other regional/unitary councils which provide insulation and/or woodburner subsidy schemes including Nelson, Marlborough, Canterbury and Bay of Plenty. Tasman discontinued this assistance because of the associated administrative costs and because more favourable terms could be secured through banks.

Air Quality Policy Planning

4.59 There are known issues with the TRMP's discharges to air rules, particularly in relation to the effectiveness of the outdoor burning rules (refer to Appendix 1 and REP18-11-01) and the implementation of the Richmond airshed home heating rules (see paragraph 4.65 below). Council has historically undertaken a programme of 'rolling review' plan changes with the TRMP. In respect of the discharges to air rules, the Council had historically agreed that a rule review would coincide with the outcome of the Air Quality NES review. This made sense in terms of efficiencies in staff resourcing, TRMP administration and associated costs.

4.60 However, in September 2019 the Council agreed to a full review of the suite of Tasman's resource management plans. Given the steps to prepare a second generation plan, it is hoped that the lead in time and preparatory work (e.g. Section 35 efficiency and effectiveness review, issues and options paper) will give time to enable drafting of the discharges to air rules to coincide with release of an amended Air Quality NES. National

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environmental standards (NES) prevail over any plan rules unless an NES explicitly allows councils to have more stringent rules.

- 4.61 If these timeframes do not align and an amended Air Quality NES is further delayed, the Council will be in a position to progress without the regulations, but will need to consider its options (e.g. delay reviewing the home heating rules, or continue with rule review). A number of other councils have been in a similar situation and have chosen to commence rule reviews in the absence of an amended Air Quality NES.
- 4.62 The work programme undertaken over the last year, in addition to future work planned, will ensure that there is an evidence base of monitoring and research, leading into rule review.

2020 Work Programme

- 4.63 In addition to the projects outlined above which are earmarked for 2020 implementation, staff are scoping several other projects (subject to budget), being:
- Building on the success of the outdoor burning trial, initial discussions are underway with Scion to develop a project to investigate if bad outdoor burning practices spread European canker spores through smokey fires and ash. The TRMP's permitted outdoor burning rule, because of biosecurity risk, allows for the burning of diseased horticultural waste during the winter months in 'Fire Sensitive' areas but these are located in or around settlements. A first phase project will involve a literature review to understand if similar work has already been completed (to be completed this financial year), and if not, a second phase project would involve an outdoor trial (to be completed 2020/2021 financial year). This is an across-council collaboration between compliance, environmental policy, environmental information and biosecurity staff and staff will be seeking Envirolink funding to cover any non-staff costs.
 - Installation of webcam(s) overlooking the Wakefield and Brightwater area.
 - Motueka air quality monitoring (subject to results of the 2019 air quality study).
 - Since 2007, new dwellings in the Richmond airshed have only been allowed to install pellet fires (as a new discharge) and installation numbers have been low (there were a total of 81 pellet fires in the airshed at the end of August 2019). However, since the rule was made operative technology has since improved and ultra-low emission burners (ULEBs) are on par with pellet fires for Air Quality NES emissions and efficiency standards. Staff occasionally field complaints from residents who wish to install ULEBs but are captured under this discharges rule of only allowing a pellet fire. There is benefit in undertaking research into management options to inform the review of the Richmond airshed home heating rules as it is quite a complex matter. What could be perceived as a 'simple' rule fix to allow a choice between burners (wood and pellet fires) could create unintended consequences in an already polluted airshed particularly as latent demand for ULEBs is difficult to quantify and could result in an increase in annual exceedances.

ANNUAL AIR QUALITY REPORT**5 Options**

- 5.1 There are no options considered as this is an information only report, however once the timeframe of the Air Quality NES review relative to the development of the Tasman Environment Plan (our second generation resource management plan) is clear, staff will bring options to Council to determine how to best progress review of the discharge to air rules. Any further work discussed that requires additional funding will be brought to Council as part of the Long Term Plan process.

6 Strategy and Risks

- 6.1 Tasman District Council has not achieved the current requirements of the Air Quality NES and there is uncertainty if the 2020 target can be achieved (no more than 1 exceedance in a 12 month period after 1 September 2020). Both human behaviour in relation to burning and weather conditions influence the levels of air pollutants and in a worse case year, the targets are likely to be exceeded.
- 6.2 There are implications if the Council continues to exceed the Air Quality NES. These may include adverse reputational effects and the potential for legal challenge on any future proposed TEP discharge to air rules by interested parties seeking more stringent or relaxed control of air quality. Tasman also has an ageing population so the proportion of population at greatest risk from poor air quality is increasing.
- 6.3 In addition, an investigation may be undertaken by MfE for non-complying councils and an airshed action plan and/or a progress report to monitor whether councils are on track to meet the targets may be requested by the Minister.

7 Policy / Legal Requirements / Plan

- 7.1 This report provides the results of the air quality monitoring undertaken in Richmond over the winter 2019, as required by the Air Quality NES and Section 35 of the Resource Management Act.
- 7.2 The Richmond airshed is non-compliant with the Air Quality NES.
- 7.3 As previously noted, staff have been implementing a work programme to develop an evidence base through monitoring and research, which will ensure a robust review of the discharges to air rules as part of development of the Tasman Environment Plan (TEP). Further advice on this will be provided to Council when preliminary background work has been completed and the results of the Air Quality NES review or MfE timeframe for progression are known.

8 Consideration of Financial or Budgetary Implications

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- 8.1 The outcome of the Air Quality NES review may have implications on the air quality budget if additional monitoring for PM_{2.5} is required for compliance purposes.
- 8.2 Aside from the Environmental Information budget for air quality monitoring, there are no specific budgets for air quality work. Staff have been undertaking a range of projects on the basis that funding can be made available through either existing budgets or Envirolink funding administered by MBIE (if the criteria can be met).
- 8.3 However, through the next long term plan process staff will seek additional funding as part of a more strategic and proactive air quality work programme which will enable further research, monitoring and compliance, and support wider initiatives such as Warmer Healthier Homes Nelson Marlborough.

9 Significance and Engagement

- 9.1 At this stage while there is high public interest in air quality, the receipt of this report is of low significance and no public consultation is required, although the monitoring results are publically available.

10 Conclusion

- 10.1 There were 4 exceedances of the National Standard for daily PM₁₀ of 50 µg/m³ for particulate matter over the winter of 2019, which is 1 more than permissible by the 1 September 2016 requirement. The Richmond airshed is non-compliant with the National Standard and is therefore classified as a 'polluted' airshed. Since 2012, daily PM₁₀ concentrations have fluctuated with no overall declining trend as anticipated.
- 10.2 There has been approximately 208 air quality complaints for the winter of 2019, primarily relating to outdoor horticultural burning and the objectionable nature of smoke and impacts on health and visual amenity.
- 10.3 The Air Quality NES is currently under review and staff have been engaging in this process. Staff have also been implementing a work programme to develop an evidence base through monitoring and research, which will ensure a robust review of the discharges to air rules as part of development of the Tasman Environment Plan (TEP). Staff will provide further advice as progress on the Air Quality NES is known and how this may align with plan review timeframes.

11 Next Steps / Timeline

- 11.1 Staff will continue to monitor air quality in Richmond, with a sampling regime measuring PM₁₀ and PM_{2.5}.
- 11.2 Staff will actively participate in the review of the Air Quality NES and ensure that Tasman's interests are represented in that process.
- 11.3 An ongoing work programme is being delivered which will ensure Council is actively managing air quality. The key focus is on better understanding of the effect of rural

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outdoor burning on urban areas (with a focus on Richmond and Motueka), home heating in the Richmond airshed, and education.

12 Attachments

1. Tasman Outdoor Burning Issues