

9.8 AIR QUALITY REPORT

Information Only - No Decision Required

Report To:	Environment and Planning Committee
Meeting Date:	29 November 2018
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Report Number:	REP18-11-8

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 (NESAQ).
- 1.2 There were a total of 12 exceedance days of the NESAQ threshold concentration of 50 $\mu\text{g}/\text{m}^3$ (24-hour average) in the 12 month period (1 September 2017 to 31 August 2018). The Richmond airshed is non-compliant with the National Standard from 28 June 2018. The trend in annual concentrations of PM_{10} suggests no decrease in PM_{10} concentrations in Richmond from 2010 – 2018. The 2018 winter has been particularly bad for breaches with a maximum daily PM_{10} concentration of 76 $\mu\text{g}/\text{m}^3$ recorded on 5 July 2018. This compares with two exceedances of the NESAQ in the preceding 12 months.
- 1.3 The Ministry for the Environment and Statistics NZ released 'Our Air 2018' in October as part of their environmental reporting series. The report outlines national air quality data trends out to 2017. The Richmond airshed is reported on in relation to high levels of $\text{PM}_{2.5}$ for 2016, and arsenic associated with the burning of treated timber.
- 1.4 Hunter Laminates 2014 Ltd was prosecuted by Council for the industrial burning of treated timber from 2013 – 2016. This industrial source has ceased, however the Richmond airshed continues to have an ongoing issue with the discharge to air of arsenic from the burning of treated timber in domestic fires.
- 1.5 There were 121 air quality complaints for the winter of 2018, primarily relating to outdoor horticultural burning and the objectionable nature of smoke and impacts on health and visual amenity.
- 1.6 The NESAQ is currently under review and Council will need to review its Tasman Resource Management Plan discharge to air rules once the outcome of the NESAQ review is known. It is anticipated that a NESAQ consultation document will be available mid-2019, with a focus on $\text{PM}_{2.5}$ (of which about 80% is from biomass combustion in Richmond) alongside other government initiatives to balance between clean air and warm homes. In the interim, staff have initiated a work programme to develop an evidence base through monitoring and research. This is alongside education and behaviour change initiatives, which will ensure more active management of our air quality resource.

AIR QUALITY REPORT**2 Draft Resolution**

That the Environment and Planning Committee receives the Air Quality Report REP18-11-01

3 Purpose of the Report

- 3.1 To update Council on the results for air quality monitoring for particulate pollution in Richmond airshed undertaken during winter 2018, assess compliance with the requirements of the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NESAQ), and outline the proposed 2019 work programme for air quality.

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.
- 4.2 The National Environmental Standards for Air Quality (NESAQ) 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 NESAQ came into effect in 2004 and were amended in 2011. It includes a standard for PM₁₀ (particles with a diameter less than 10 µg/m³ (micrometres per cubic metre)) for outdoor air quality of 50 µg/m³ based on a 24 hour averaging period.
- 4.3 The NESAQ is under review 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 NESAQ with recent scientific findings on health impacts of fine particulate pollution. 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. It anticipated that amendments to the NESAQ will be in conjunction with other government initiatives such as the recently introduced healthy homes standards for rental properties which includes insulation requirements. Associate Minister for the Environment, Hon Nanaia Mahuta, has

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signaled that a NESAQ consultation document outlining proposed amendments will be released mid-2019.

- 4.4 In order to achieve the NESAQ requirements, Council regulates the use of solid fuel burners and outdoor burning through its Resource Management Act 1991 and Building Act 2004 requirements. 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.

Air Quality Monitoring and Assessment

- 4.5 Particulate matter has been monitored in the Richmond airshed since 2000, and the NESAQ standard for PM has been exceeded every winter. 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 This report presents data from the following:

- Annual air quality monitoring for PM₁₀ and PM_{2.5} for Richmond over the period 1 September 2017 to 31 August 2018, including meteorological information such as wind speed and air temperature undertaken to determine compliance with the NESAQ.
- Daily air quality monitoring for PM₁₀ for Motueka over a six week trial period from 22 July 2018 to 31 August 2018 to contribute to our understanding of the air quality in the town.
- Evaluation of the particulate matter monitoring method comparison for the period 2015 to 2017 and an updated trends assessment based on air quality monitoring data collected over the period for 2012 to 2017 to help with understanding of additional management requirements which may be needed after the upcoming review of the NESAQ (Environet report May 2018).
- Further assessment of arsenic data from the GNS report "Apportionment of PM_{2.5} and PM₁₀ sources in the Richmond airshed, Tasman District" (Trompeter and Davy November 2017) and GNS Letter "Elemental arsenic copper and chromium concentrations at Richmond" February 2017 for the prosecution sentencing of Hunter Laminates 2014 Ltd.
- Air pollution complaints for the period 1 April to 30 September 2018.

- 4.7 Table 1 presents the current air quality standards and guidelines for PM concentrations. The air quality standards are concentration limits set to protect human health and incorporate a number of allowable exceedances. The air quality guidelines are concentration limits recommended to protect human health and the environment. There are currently no national standards for PM_{2.5}, therefore the World Health Organisation (WHO) guidelines are used for assessing the results. It is anticipated that under the NESAQ amendments, a new annual standard for PM_{2.5} will be introduced.

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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			

Air Quality Monitoring Instruments and Methods

- 4.8 The air quality monitoring equipment is located at the Plunket Rooms at 56 Oxford Street, central Richmond. The instruments and methods used to monitor air quality have been previously described to the Environment and Planning Committee in REP17-11-03 (dated 9 November 2017).

The particulate data has been collected using different sampling regimes over the summer and winter periods and is summarized in Table 2 below.

Table 2: Instruments and Equipment for Particulate Monitoring in 2017/ 2018

Instrument	Particle Size	Sampling Period	Sampling Frequency
Partisol (R& P Model 2000)	PM ₁₀	24-hour average	1 day in 6 (1 Sept 2017 – 10 July 2018) 1 day in 2 (14 July-31 Aug 2018)
BAM (Thermo FH62)	PM ₁₀	Continuous	1 Sept 2017- 31 Aug 2018
Partisol (Thermo 2025i)	PM ₁₀	24-hour average	Daily (14 July 2018 – 18 July 2018)
Partisol (Thermo 2025i)	PM ₁₀	24-hour average	Daily (22 July 2018 – 31 August 2018) Motueka Trial
Partisol (Thermo 2025i)	PM _{2.5}	24-hour average	1 day in 6 (1 Sept 2017 – 4 July 2018)

- 4.9 A review of the particulate monitoring methods by Emily Wilton (air quality consultant) has confirmed there is no requirement to adjust the Beta Attenuation Monitor (BAM) data from 2017, as has been the previous practice for air quality data reported in Richmond (Environet report, May 2018). The BAM data in this report has been adjusted by 16% for the period up to 2016, with the BAM under reporting compared to the gravimetric reference method. From 2017, there is no longer a reason to correct for gravimetric equivalence, and in line with the “Good Practice Guide for Air Quality Monitoring and Data Management 2009”, the data has not been adjusted. The relationship this season is for the Partisol to be 3% lower than the BAM. The reason for this change in trend line is not known.

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- 4.10 As reported at the Environment and Planning Committee meeting in July 2018 (REP18-06-09), Council received a letter from Associate Minister for the Environment Hon Nanaia Mahuta in May. The letter is a standard template response following our reporting of 2017 winter air quality results in the Richmond airshed and breaching the 'no more than three' exceedances allowed under the NESAQ. The Minister has the requirement to respond where councils are not meeting the standards. Although we reported four exceedances in winter 2017, the data for 2017 has shown that the airshed only had two 'real' exceedances as the result of no longer requiring a calibration adjustment of the BAM. However, we still have an air quality issue to manage as demonstrated by the number of exceedances in the Richmond airshed over winter 2018 (see paragraph 4.18).
- 4.11 In 2018, during routine annual calibration on the BAM, there have been issues identified with the flow rate on this instrument, which may affect the results for particulate matter on the BAM. The existing BAM is over ten years old and is being replaced by a newer dual channel continuous particulate monitor BAM (Thermo 5028i) instrument. The dual instrument will measure both PM₁₀ and PM_{2.5} once fully operational. Based on the co-located partisol data, the 2018 BAM data is considered reliable; however, this will be reassessed once we have a full year of co-located measurements with the newer model BAM.

Air Quality Monitoring Arsenic Data

- 4.12 Further updates on the assessment of the existing GNS Science arsenic data on air quality filters was undertaken as part of the summary of facts for sentencing for the Tasman DC v Hunter Laminates 2014 Ltd case. As part of the source apportionment studies, a total of 613 particulate matter filters were analysed for elements over the period June 2013 to October 2016. The filters indicated elevated levels of copper, chromium and arsenic (CCA) attributed to the burning of treated timber (Ancelet & Davy 2016). In the PM₁₀ filters, there was an exceedance of the ambient air quality guideline value (5.5 ng/m³ (nanograms per cubic metre)) with an annual average arsenic concentration of 14 ng/m³ in 2014, with approximately half of this attributed to an industrial discharge. The peak arsenic concentration in PM₁₀ was 116 ng/m³.
- 4.13 The arsenic on the PM_{2.5} filters were analysed for the period October 2015-October 2016, and the arsenic concentration of 7.2 ng/m³ attributed to the CCA source and 4.4 ng/m³ was attributed to biomass combustion for PM_{2.5} (Trompetter and Perry 2017). The average arsenic on the PM_{2.5} filters was 13 ng/m³ and peak concentration of 171 ng/m³. The industrial discharge ceased in August 2016, and analysis of the filters following the issue of the Abatement Notice to cease the discharge showed an average arsenic concentration of 4 ng/m³ for PM_{2.5}, with peak of 12 ng/m³.
- 4.14 The arsenic on the filters attributed to burning of CCA treated timber in domestic fires is seasonal, with average arsenic of 6 ng/m³ and concentrations of about 30 ng/m³ measured over the winter period on the PM₁₀ filters. This is consistent with previous arsenic monitoring undertaken as part of the source apportionment studies in Tahunanui (Nelson), where an average arsenic of 7 ng/m³ was measured in the year starting September 2008-2009, and a maximum of 48 ng/m³.

Air Quality Monitoring Analysis of PM₁₀ Results and meteorology

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4.15 Based on the weather records from the Tasman District Council 189 Queen Street meteorological monitoring site, the winter of 2018 was slightly warmer temperatures than the average (see Figure 1). The monthly wind speeds were below average in June and July compared with the mean of previous years (see Figure 2). The calm wind speed is likely to lead 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.

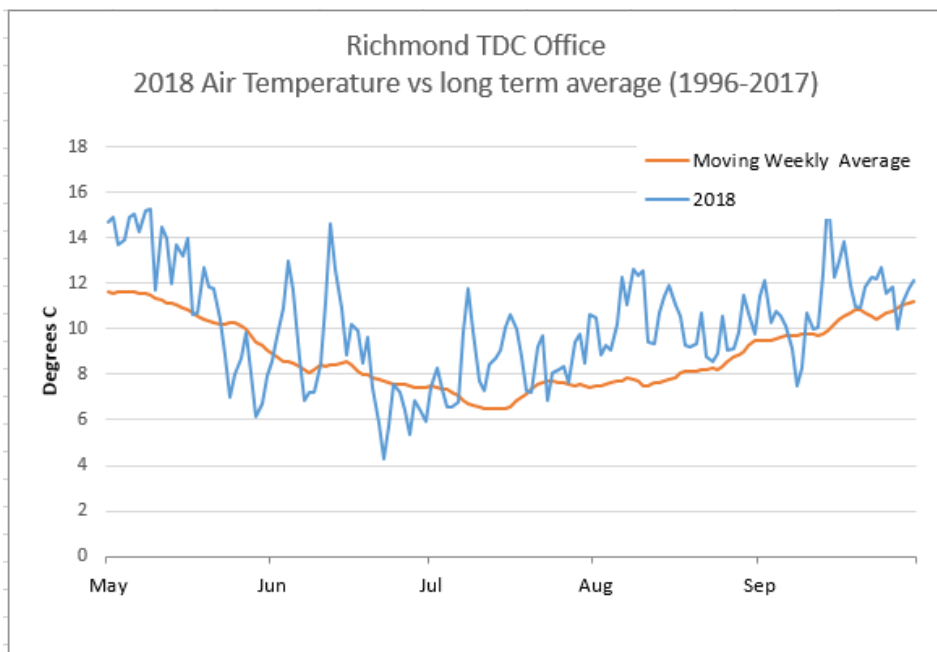


Figure 1: Daily average air temperature (°C) measured in Richmond (Winter 2018)

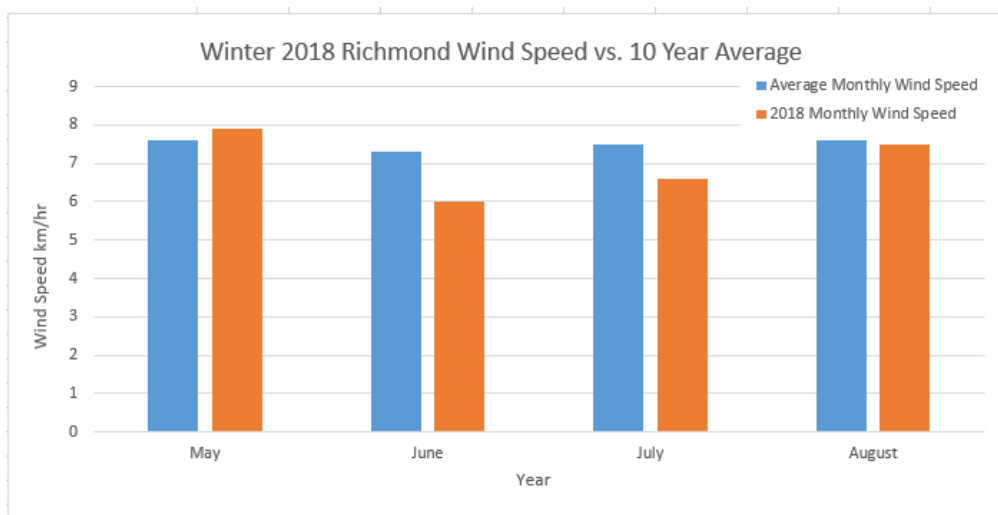


Figure 2: Monthly winter wind speed (km/hr) measured in Richmond

4.16 Daily 24-hour average PM₁₀ concentrations measured using the BAM in Richmond over the monitoring year period (1 September 2017 to 31 August 2018) are shown in Figure 3. The data for winter 2018 shows the typical seasonal pattern, with peak PM concentrations, breaching the standard, occurring during the months of June and July. Previous source

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apportionment and emissions inventories for the Richmond airshed have shown that biomass combustion (wood smoke) is the main source of particulate matter in Richmond, followed by vehicle emissions, marine aerosol and secondary sulphate for PM₁₀. The wood smoke is attributed to the use of wood burners for home heating and there is a possible contribution from rural burning.

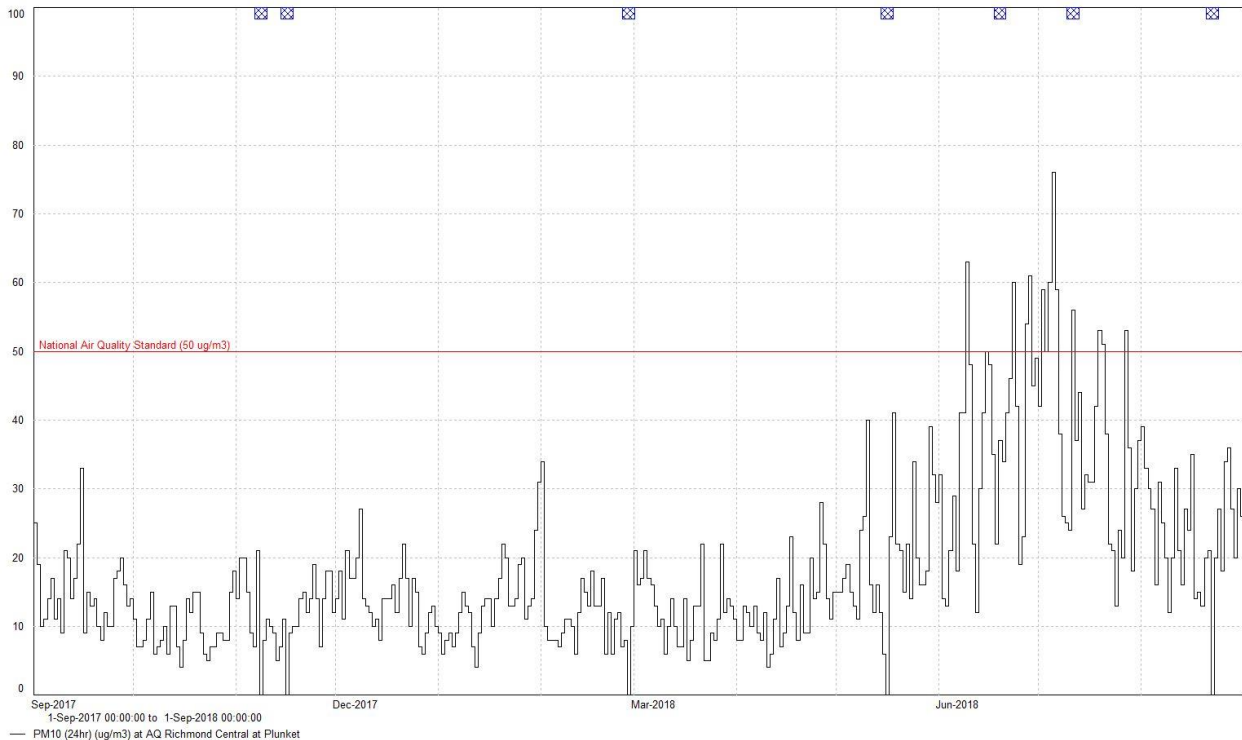


Figure 3: Daily average PM₁₀ concentrations measured in Richmond (1 Sep 2017 – 1 Sep 2018)

4.17 Table 3 shows the PM₁₀ daily average data for the year, starting 1 September 2017. The summary of annual average PM₁₀ concentrations for Richmond for 2017/2018 is 18 µg/m³, which meets the annual ambient air quality guideline value of 20 µg/m³. The winter (May-Aug) average was 30 µg/m³ and the average for the non-winter months (Sept – April) was 13 µg/m³. The maximum PM₁₀ was 76 µg/m³.

Table 3: Daily Average PM₁₀ measured in Richmond in 2017/2018

Richmond at Plunket Rooms 01-09-2017 to 31-08-2018												
PM ₁₀ daily average												
Method:	BAM											
Valid Data:	98.6%											
Data Capture Rate:	99.7%											
Units	µg/m ³											
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Minimum	8	4	5	6	4	6	5	4	6	12	13	12
Mean	15	10	13	14	13	12	12	13	21	36	38	24
Maximum	33	18	21	27	31	34	22	28	41	63	76	39
Lowest					4							
Highest											76	
Exceedances (>50 µg/m ³)	0	0	0	0	0	0	0	0	0	4	8	0
Annual Mean	18											

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4.18 There were a total of 12 exceedance days of the daily NESAQ threshold concentration of $50 \mu\text{g}/\text{m}^3$ (24-hour average) in the 12 month period (1 September 2017 to 1 August 2018) as shown in Table 4. The NESAQ for PM_{10} allows 3 or fewer permissible exceedances per 12 month period until 31 August 2020. A total of 12 exceedance days meant there were nine breaches of the NESAQ in the Richmond airshed. All 12 exceedances were publically notified in the local Newsline paper and on the Council website online. A copy of the exceedance notice is provided in Attachment 1.

Table 4: Exceedances of 24-hour PM_{10} in Richmond in 2018

Date	BAM 24-hour PM_{10} $\mu\text{g} / \text{m}^3$	Partisol 24-hour PM_{10} $\mu\text{g} / \text{m}^3$	24-hour wind speed m/s	24-hour temp $^{\circ}\text{C}$	4-hour Temp (8pm-12pm) $^{\circ}\text{C}$
9 June 2018	63		1.0	7.2	6.8
23 June 2018	60		1.0	5.7	9.7
27 June 2018	54		1.2	5.4	4.3
28 June 2018	61	61	0.9	6.9	5.1
2 July 2018	59		1.3	8.3	7.7
4 July 2018	60	59	1.2	6.6	5.3
5 July 2018	76		0.7	6.6	5.7
6 July 2018	59		1.2	6.8	7.0
11 July 2018	56		1.1	7.3	6.8
19 July 2018	53		1.3	7.3	6.6
20 July 2018	51	52	1.2	7.2	6.3
27 July 2018	53		1.3	7.7	7.2

4.19 The number of PM_{10} exceedances of the daily standard has reduced from 44 in 2000 to two in 2017, and is up to 12 in 2018. The number of exceedances measured in Richmond since 2000 and the value of the second highest PM_{10} concentration are shown in Figure 4. The gaps in the data are due to sampling at different locations and missing sample periods. The second highest value indicates no difference over the last six years, which suggests predicted reductions in PM_{10} concentrations may not be occurring.

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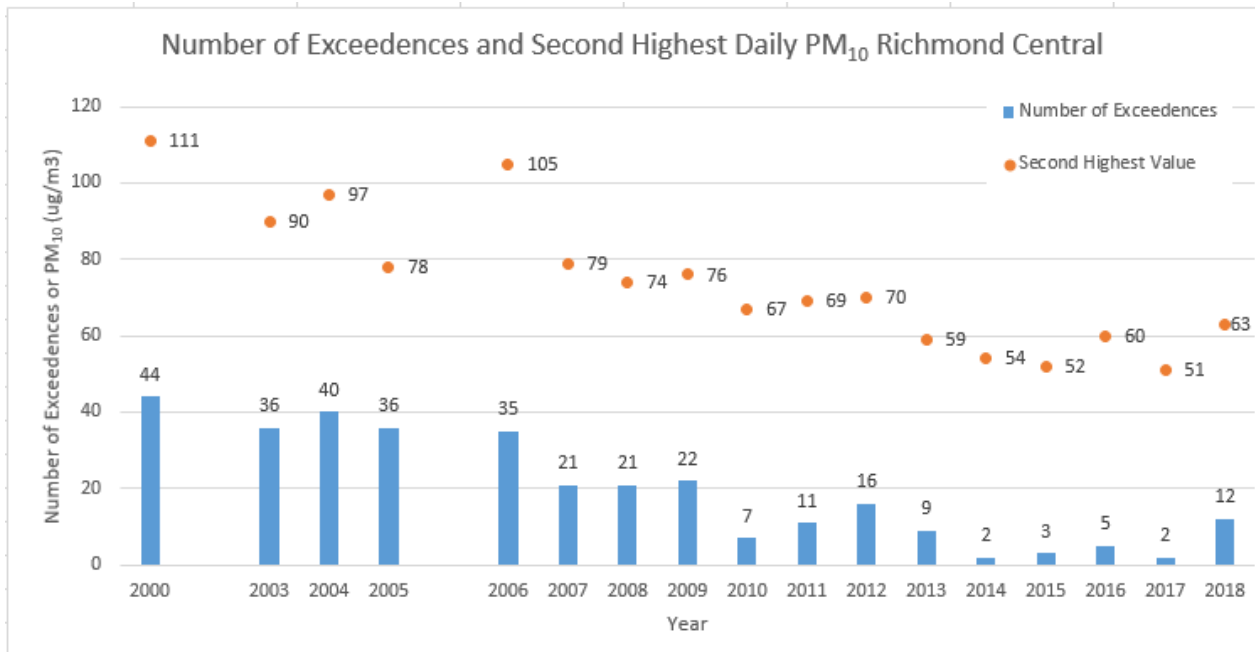


Figure 4: Number of Exceedences of 24-Hour PM₁₀ for Richmond (2000 to 2018)

- 4.20 Further information on wind speed and direction for each of the exceedance dates was assessed. The exceedences in PM₁₀ have occurred under calm settled conditions, with 24-hour average wind speeds of less than 1.3 m/s. The predominant wind directions were from the south-west and north to north-east.
- 4.21 Previous studies have found the meteorological variables which have impact on 24-hour average PM₁₀ concentrations in Richmond are wind speeds below 3.8 m/s and 4-hour average temperature (8.00 pm to midnight) of less than 6.8 degrees Celsius (NIWA report “Assessing long-term trends in PM₁₀ emissions in Richmond” dated February 2010).
- 4.22 There were 73 high pollution potential days in winter 2018, and 12 exceedences of the standard, which is 16% of the high pollution potential days that resulted in an exceedance. This is comparable to the 3-year period 2010-2012, which had an average of 15% proportion of the high pollution potential days which resulted in an NES exceedance.
- 4.23 Figure 5 shows the changes in PM₁₀ concentrations for the period 2000-2018 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. The normalised PM₁₀ data is adjusted to allow the temporal trends in 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 PM₁₀ concentrations in Richmond from 2010 to 2018.

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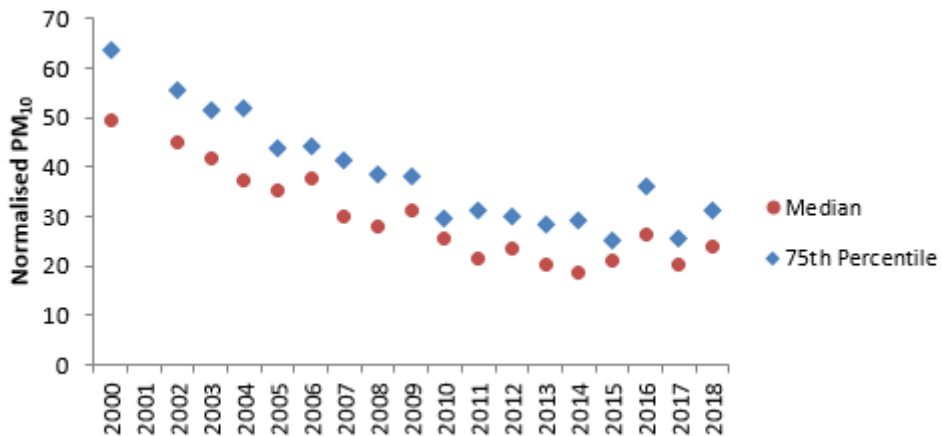


Figure 5: Concentrations of PM₁₀ with adjustments to minimize the impact of meteorological conditions (normalised PM₁₀) for Richmond (2000 to 2018)

4.24 An updated trends assessment of the predicted PM₁₀ concentrations compared to the air plan projections was undertaken using data for the period 2012 to 2017 (Environet May 2018). The report has suggested that the reductions in PM₁₀ concentrations have fallen behind the predictions and additional measures may be required to meet the 2020 NESAQ standard for PM₁₀. The gap between the projected reduction and meteorology adjusted PM₁₀ data may be increasing and existing air quality management measures may not be adequate (See Figure 6).

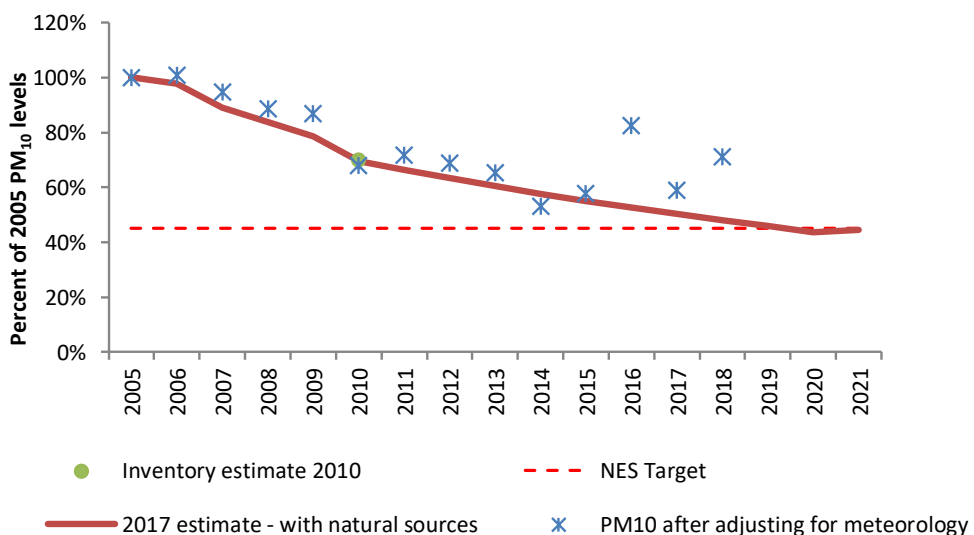


Figure 6: Comparison of projected PM₁₀ for Richmond with normalised PM₁₀ concentrations (From Environet 2018 pers comm)

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- 4.25 Over the 2018 season, the PM_{2.5} concentration was measured in Richmond on a one-day in 6 cycle during the period 1 September 2016 – 4 July 2018, when the PM_{2.5} record was temporarily stopped to enable the instrument to be used for another survey. The PM_{2.5} record for Richmond resumed from September 2018 and will be monitored continuously (hourly) when the new dual BAM instrument is operational. The Richmond site has a less than 75% data capture rate for the year, so no annual PM_{2.5} statistics can be reported.
- 4.26 The PM_{2.5} data available for the period is shown in Figure 7. The concentrations of PM_{2.5} breached the current WHO daily guideline value of 25 µg/m³ over the period from May to July 2018, with 5 breaches of the guideline recorded. The maximum daily PM_{2.5} concentration measured in Richmond was 47 µg/m³ on 4 July 2018. The PM_{2.5} data should be interpreted with caution due to the limited data set for winter. The maximum PM_{2.5} is similar to the 44 µg/m³ recorded in June 2017, when there was a total of 24 breaches over the winter 2017 season.
- 4.27 An update on the trends assessments has suggested that additional management measures would be required to be compliant with an annual average PM_{2.5} NES.

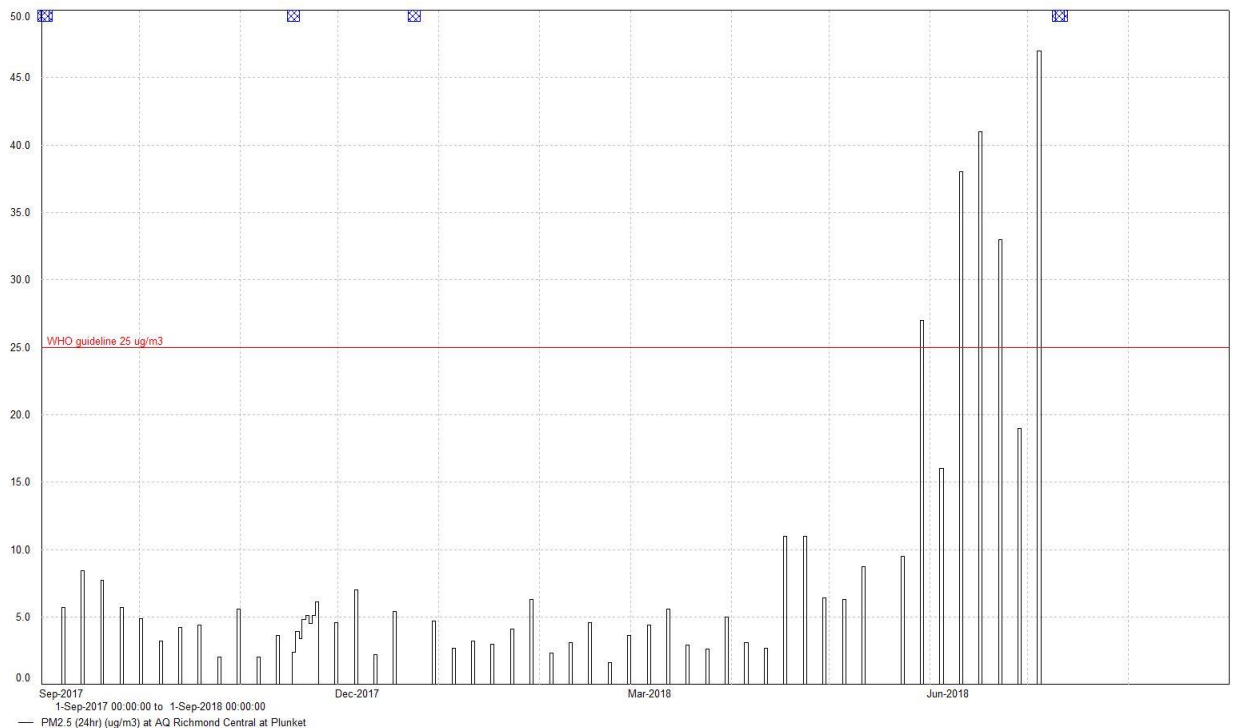


Figure 7: Daily average PM_{2.5} concentrations measured in Richmond (1 Sep 2017 – 1 Sep 2018)

Motueka Air Quality Monitoring Analysis of PM₁₀ Results and meteorology

- 4.28 A temporary PM₁₀ monitoring site was set up at Parklands School at 19 Pah St in Motueka. A Partisol gravimetric sampler (Thermo 2025i) operated daily over the period 22 July 2018 to 31 August 2018. An initial review has shown that there were no exceedances of PM₁₀ in the six week trial. The maximum PM₁₀ recorded was 23 µg/m³. During this same time period there was one exceedance of the NESAQ standard in Richmond with 53 µg/m³ on 27 July and a corresponding reading of 21 µg/m³ in Motueka. A full assessment of the Motueka data will be included following the additional air quality review work planned for

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next winter. The NESAQ only requires airsheds to be monitored where air quality standards are likely to be breached.

Our Air 2018 (Ministry for the Environment/Statistics NZ Report)

- 4.29 As part of MfE's environmental reporting series, 'Our Air 2018' was released in October which summarises the state of air quality in New Zealand. The report provides national data (out to 2017) on PM pollution and gaseous pollutants, how air pollution and climate effect each other (e.g. impacts of black carbon and sulphur dioxide) and quality of life issues (e.g. night skies/light pollution; noise pollution; odours). It states that nationally air quality is generally good and the overall trend is getting slightly better, but some activities in some parts of the country are putting air quality under pressure. The two leading causes of air pollution in New Zealand is burning wood and coal for home heating in winter in some areas, and vehicle emissions in some regions all year round.
- 4.30 Figure 13 in the report (see Attachment 2) illustrates exceedances of 24-hour average PM_{2.5} WHO guideline in most recent 3 year period (2014-16). This figure identifies the Richmond airshed as being ranked third highest for exceedances during 2016 (from a sample of 17 airsheds). However, this ranking is not based on a full national dataset as not all regional councils are currently monitoring PM_{2.5} in their airsheds and some caution should be taken when interpreting these results. Nonetheless, there remains an air quality issue in the Richmond airshed that needs to be actively managed.
- 4.31 The Richmond airshed is specifically mentioned under the section regarding 'other home heating emissions' and arsenic, with the report noting that "*At locations further south, where winter PM levels are higher due to wood burning (e.g. Richmond, in the Tasman district), annual average arsenic concentrations for 2014 were about three times the guideline (Ancelet & Davy, 2016).*" This information regarding arsenic concentrations in the Richmond airshed has been reported to Council previously, noting that approximately 50% of this was attributed to an illegal industrial discharge as a result of burning treated timber which Council has successfully prosecuted (see Paragraph 4.44 below) and is not reflected in the MfE reporting. However, there remains the need for ongoing education to prevent burning of treated timber for home heating over winter time.

Air Quality Complaints and Compliance

- 4.32 During the period from 1 April to 30 September 2018, Council received 121 smoke and air quality related complaints, which can be broken down as:

Richmond and Waimea Plains

- 25 urban outdoor burning and smokey chimneys
- 27 rural outdoor burning
- 7 industrial discharge

Motueka, Moutere and district

- 13 urban outdoor burning and smokey chimney
- 35 rural outdoor burning

Takaka and district

- 1 urban outdoor burning
- 7 rural outdoor burning

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Six additional complainants were solely concerned about health impacts from poor air quality.

Outdoor Burning

4.33 Complainants in relation to outdoor burns are becoming increasingly concerned about their air quality and the health impact from the smoke – the complainant is often not personally affected at their property but is concerned about the visual effect, the perceived decline in air quality and the subsequent effects on public health from the particulate matter in smoke.

4.34 While a proportion of these complainants are non-New Zealand born residents who are shocked that we allow wide scale outdoor burning especially during the colder winter months (a practice which appears to be banned in a number of northern hemisphere countries), there is also an increasing number of long term ‘locals’, who would like to see a change in the established practice of outdoor burning especially during winter. Comments received include:

- *Why is it fires that produce this kind of pollution are allowed in Motueka/Riwaka?*
- *How are orchardists allowed to pollute the atmosphere?*
- *I would like to know, are we living in a third world when we can pollute like this? Killing us with smog ... this is ostrich mentality*
- *I would like to think that TDC would move towards being more environmentally responsible, it is no longer socially acceptable to ruin our environs.*

It is also noted that the Motueka community ‘Facebook’ page was very active with people voicing their concerns regarding the amount of smoke in the area and impact on their health.

4.35 The main complaint issue is the burning of orchard waste during late autumn and winter. This is a long established waste management practice used within orchard replacement programmes and for the disposal of pruning waste and diseased wood. It is a seasonal practice occurring after harvest and pruning, and prior to ground fumigation and replanting in spring. With calm fine days, the conditions on the ground are often perfect for burning, resulting in minimal cross boundary contamination of smoke from individual properties and fires are usually compliant with the TRMP permitted activity conditions for outdoor burning. However, the temperature inversion layer that forms on these cool and calm days restricts the height at which the smoke can rise causing it to spread horizontally over a wide area and unable to disperse. This smoke haze is very visible on the Waimea Plains and the Motueka and Riwaka areas from May through to September, as shown in Photos 1 and 2.

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Photo 1: Smoke caught under the temperature inversion layer (forming 'gravity waves') on the Waimea Plains, 9 June 2018 (9.18am, southern webcam)



Photo 2: Smoke haze over Motueka, 3 July 2018 (11.35am)

- 4.36 Overall, contractors controlling these large outdoor burns are doing their best to ensure an efficient burn process, they are aware of weather conditions, inversion layers and the smoke discharge and are working alongside Fire and Emergency New Zealand and Council to ensure compliance. Despite their best efforts, there is no way to escape the winter inversion layer and the fact that the smoke cannot disperse.
- 4.37 Compliance have attended a number of instances this winter where badly built fires using partially wet material was causing the fire to smoulder producing excessive white smoke or alternatively a change in wind direction has caused smoke issues at neighbouring properties (as shown in Photo 3). In these instances the owner has been required to extinguish the fire or follow the 'best practice guidelines' when building and lighting fires.

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Photo 3: Example of a badly built and smoldering fire during burning of tree debris caused from ex-tropical cyclone Gita, 23 May 2018

Burning Prohibited Items

- 4.38 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 3 properties received abatement notices in relation to burning prohibited items with a fourth property investigated by Worksafe for the burning of an asbestos contaminated demolished building.

Nelson Pine Industries

- 4.39 Over the years, Council receives a number of queries in relation to Nelson Pine Industries (NPI) and the visible discharges from their stacks. NPI hold resource consent to discharge contaminants from a medium density fibreboard (MDF) and laminated veneer lumber (LVL) factory. NPI are fully compliant with all air discharge conditions for the site in particular formaldehyde and PM₁₀. Modelling undertaken for the consent renewal in 2011 showed that the industrial emissions from NPI would not contribute significantly to any exceedances within the Richmond airshed.

Richmond Airshed

- 4.40 The Richmond airshed contains 5831 properties. 2073 of these properties have either a compliant wood burner or an alternative heating source.
- 4.41 Seventy properties are possibly non-compliant, however a number of these properties use alternative heating as they wish to keep their wood burner but do not use it.
- 4.42 We have no information on the heating source of 3500 properties within the airshed, this is because building consents were not required for wood burners prior to 1998. We suspect a large number of these wood burners have been removed. Updating our Richmond airshed database is one of our top priorities going into 2019.

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- 4.43 Richmond residents have been particularly vocal about the visible smoke on the Waimea Plains this past winter, the calm and cold weather conditions resulted in a very definite inversion layer visible for most of the day (as shown in Photo 4). We have a number of residents closely monitoring the outdoor burns, the NPI discharge (which is operating within its resource consent conditions) and the PM₁₀ readings (published on Council's website). There is a perception that the combined discharges from rural burning and NPI is drifting over Richmond under the prevailing south-south westerly katabatic winds and contributing to the high PM₁₀ levels within the airshed. The 2019 work programme identifies projects which will help us to better understand these complex air quality issues (as detailed below).



Photo 4: Outdoor burning on Waimea Plains and the effect of the temperature inversion layer, 11 July 2018 (12.30pm, northern webcam)

Prosecution – Hunter Laminates 2014 Ltd

- 4.44 As was reported last year, Council prosecuted Hunter Laminates 2014 Ltd for the industrial burning of treated timber 2013 – 2016. The company initially pleaded guilty to the charge however went into liquidation earlier this year prior to sentencing in August. Judge Dwyer indicated that had he been able to impose a fine it would be in the final order of \$270,000.

Air Quality Policy Planning and 2018-2019 Work Programme

- 4.45 In recent years, it has been agreed (via the Environmental Policy Team's annual work programme) that a review of the TRMP air discharge rules should coincide with the outcome of the NESAQ review. This makes sense in terms of efficiencies in staff resourcing, TRMP administration and associated costs.
- 4.46 Both weather conditions and people's behaviour to burning (home heating and outdoor burning) can change from year to year and have a significant impact on air quality. The weather is outside of our control, however we can focus our efforts on behaviour change alongside existing regulatory controls while we await the outcome of the NESAQ review.
- 4.47 Over the course of this year staff have initiated a work programme for 2018 and 2019 which will ensure more active management of our air quality resource. This involves gathering an evidence base of information (monitoring and research) to help inform any future TRMP air discharges review and being more proactive with our education and

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advocacy work regarding best practice burning and encouraging behaviour change, as outlined below.

Outdoor Burning

4.48 The continued number of complaints regarding outdoor burning in rural areas and the visible smoke haze on the Waimea Plains, Motueka and Riwaka areas over winter time highlights that there are issues with the effectiveness of the TRMP outdoor burning rules and 'Fire Sensitive Areas'¹. It is unlikely that any NESAQ amendments will address our rural outdoor burning issues and will need to be addressed via a TRMP plan change in the coming years. Initial background work includes:

- Staff are working with NIWA (National Institute of Water and Atmospheric Research) to scope out a 2019 winter monitoring project in Motueka using temporary outdoor air quality sensors (called ODINs – outdoor dust info nodes) to understand if there is an air quality issue associated with wood burning (outdoor horticultural burning and/or home heating).
- It is proposed to install webcams to observe outdoor burning and nuisance smoke in the Riwaka/Motueka area (and possibly Brightwater/Wakefield). This will complement the existing Richmond/Waimea Plains webcams.
- As noted above, the Richmond airshed experienced an increased number of exceedances during winter 2018. A number of residents and staff have queried the influence which emissions from outdoor burning and industry from outside the airshed boundary could have on airshed PM₁₀ levels. Advice was sought from the University of Canterbury (through Envirolink funding) to undertake precursory analysis of the 2018 winter data and recommend methodology options to undertake PM₁₀ dispersion modelling to assess the effect of rural burning on the Richmond airshed. It is hoped to undertake this modelling work during 2019 or 2020, subject to funding.

Richmond Airshed

4.49 One of the TRMP air discharge rules specific to the Richmond airshed requires that new build properties can only install a pellet fire (or other clean air heat sources such as heat pumps). A handful of residents have complained that the rule prohibits the installation of MfE authorized wood burners which have emission and efficiency ratings on par with pellet fires. The TRMP rules were made operative in 2007 and technological improvements have been made since then that the TRMP currently does not reflect. It is anticipated that this issue will be resolved with forthcoming amendments to the NESAQ which the TRMP will give effect to.

4.50 In addition to the proposed PM₁₀ dispersion modelling listed above, other projects being scoped (subject to budget and resourcing) for the Richmond airshed includes:

¹ Fire Sensitive Areas are located on the outskirts of Richmond and Motueka, and within the urban areas of all other townships in the district. Most outdoor burning is prohibited in Fire Sensitive Areas between the months of June to August (inclusive) with the exceptions of the burning of diseased horticultural waste for biosecurity purposes and the use of kilns/forges. The purpose of the rule is to restrict wood burning during the winter months when air pollution is at its seasonally worst.

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- Updating the Richmond airshed database to identify the currently unknown heating source of a large number of residential properties. Staff are currently scoping survey options.
- Updating the Richmond Airshed Emissions Inventory once the 2018 Census data has been released, which is used to determine the sources of emissions and to assist with the management of air quality in the airshed.
- Staff are partnering with the University of Canterbury in 2019 to support third year environmental science students to undertake a research assignment on an air quality topic such as the influence of katabatic winds on the Richmond airshed.

Education and Best Practice

4.51 Non-regulatory methods such as education and implementation of best practice burning plays a key role in improving air quality, alongside regulatory methods such as the TRMP rules. Projects for this year and next include:

- Jane Stuart (Compliance Officer) has worked closely with a local contractor, Aaron Baigent, over this winter to support his trials of using a better burning method for burning orchard waste. Aaron used a custom-made fan attached to a pipe to force air into the base of the fire (Photos 5 and 6) which resulted in a very hot burning fire that is more efficient and cleaner (as reported in Newsline, September 28th edition). Staff are keen to see other contractors and orchardists adopt better burning methods like this technique. A second burn trial is planned for autumn 2019 to compare types of burning methods for both vegetation waste and stumps. This could be an ideal opportunity for a demonstration event in partnership with Fire and Emergency New Zealand for local contractors and horticulturalists, subject to further scoping.



Photo 5: The setup of the outdoor burning trial – a tractor mounted fan attached to a pipe which blows air into the base of the fire, located in a trench.

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Photo 6: Adding more wood to the fire during the trial burn.

- Richard Popenhagen at Nelson City Council coordinated a workshop on 8th August to provide training to NCC and TDC building inspectors on the correct installation of modern wood burners (low emission and ultra-low emission burners) which was well received by both teams.
- Staff are scoping behaviour change programmes for 2019 focusing on promoting best practices for wood burner operation and the burning of vegetation waste by the horticultural industry.
- 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.
- Council's three air quality pamphlets are in the process of being updated (TRMP rules summary, best practice guide on outdoor burning, best practice guide on wood burner operation).
- New air quality website pages have been developed in conjunction with the launch of the new Council website.

5 Options

- 5.1 The National Environmental Standard for PM₁₀ along with its achievement dates of no more than three exceedances from 1 September 2016, and no more than one exceedance after 2020, is set by law and the Council is required to meet it. MfE is currently reviewing the NESAQ and it is anticipated a consultation document will be released mid-2019 which will outline the proposed amendments and likely to focus on requirements to monitor PM_{2.5}. Air quality monitoring to date has shown that there was an improvement in air quality between 2000 and 2010, but no significant decrease since 2010. There were 12 exceedances of the National Standard over winter 2018. The trend analysis has shown that the reductions in PM₁₀ concentrations have fallen behind the predictions model and additional measures to improve air quality may be required to meet the 2020 NESAQ standard for PM₁₀. If Council is required to move to monitoring and reporting on PM_{2.5}

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(through an amended NESAQ), it is also likely that targeted management of the Richmond airshed would be required to meet any PM_{2.5} requirements (as noted in the 2017 annual air quality report REP17-11-03).

- 5.2 At this stage, it is not recommended that a review of the TRMP discharge to air rules is undertaken until the outcome of the NESAQ review is known. A work programme is in place, subject to staff resourcing and budgets, to start to building an evidence base of information (monitoring and research) to help inform any future TRMP air discharges review and being more proactive with our education and advocacy work regarding best practice burning and encouraging behaviour change. It is anticipated that this package of work will ensure that Council is in a good position moving into any required TRMP amendments as the result of forthcoming changes to the NESAQ which is likely to focus on home heating. Tighter restrictions on outdoor burning for areas in and around Richmond and Motueka (and possibly other areas) should be considered once the new NESAQ is released.
- 5.3 Further arsenic analysis of filters following the Tasman District Council vs Hunter Laminates prosecution has not been undertaken. The source apportionment data for Richmond has shown that there is a domestic source of arsenic, attributed to the winter burning of treated wood for home heating. The monitoring data following the abatement notice in mid-August 2016 showed no further industrial arsenic peaks in the Richmond airshed, up to early October 2016. Further education into the risks from domestic burning of treated timber is recommended and possible future monitoring to assess any improvements in air quality may be undertaken, if budgeted.

6 Strategy and Risks

- 6.1 Tasman District Council has not achieved the current requirements of the NESAQ and there is uncertainty if the 2020 target can be achieved. Weather influences the levels of air pollutants and in a worse case year, the targets are likely to be exceeded.

7 Policy / Legal Requirements / Plan

- 7.1 This report provides the results of the air quality monitoring undertaken in Richmond over the winter 2018, as required by the NESAQ and Section 35 of the Resource Management Act.
- 7.2 The Richmond airshed is non-compliant with the NESAQ. An investigation may be undertaken for non-complying councils and an airshed action plan and/or a progress report to monitor whether councils are on track to meet their targets may be requested by the Minister.
- 7.3 Council may need to reconsider its rules in relation to outdoor burning in winter in order to comply with the legal target of no more than three exceedances which came into effect on 1 September 2016. Further advice on this will be provided to Council when preliminary background work has been completed and the results of the NESAQ review are known.

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- 8.1 The outcome of the NES review may have implications on the air quality budget if additional monitoring for PM_{2.5} is required for compliance purposes. The proposed new BAM monitor will monitor both PM₁₀ and PM_{2.5} continuously. The Partisol equipment is run on a one day in three cycle, with samples of both PM₁₀ and PM_{2.5} collected. If there is a requirement to undertake daily sampling, then there will be additional filter, analysis, audit and calibration costs which may need to be considered.
- 8.2 Further monitoring of arsenic on filters could be undertaken to confirm the magnitude of the arsenic in Richmond, however the cost for additional analysis is of the order of \$50,000 for sampling and analysis of one year of filters, and a further \$20,000 for data reporting. This cost has not currently been budgeted for in the Long Term Plan.
- 8.3 Aside from the Environmental Information budget for air quality monitoring, there are no specific budgets for the work being scoped for 2019. Staff will be scoping these 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).

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 12 exceedances of the National Standard for daily PM₁₀ of 50 µg/m³ for particulate matter over the winter of 2018, which is 9 more than permissible by 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 and the 2018 winter has been particularly bad for breaches with a maximum daily PM₁₀ concentration of 76 µg/m³ recorded on 5 July 2018.
- 10.2 Ministry for the Environment and Statistics NZ released 'Our Air 2018' in October as part of the environmental reporting series. The report outlines national air quality data trends out to 2017, and the Richmond airshed is reported on in relation to high levels of PM_{2.5} for 2016, and arsenic associated with the burning of treated timber. However, some caution needs to be applied in interpreting these results given the robustness of the datasets. Nonetheless, there remains an air quality issue in the Richmond airshed that Council needs to address.
- 10.3 The industrial source of arsenic in the Richmond airshed ceased in August 2016 and Hunters Laminates 2014 Ltd were prosecuted for the discharge. There is an ongoing source of arsenic from the domestic burning of treated timber in the Richmond airshed and there is option for future education and possible further monitoring in the airshed, subject to budget approval.

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- 10.4 There has been approximately 121 air quality complaints for the winter of 2018, primarily relating to outdoor horticultural burning and the objectionable nature of smoke and impacts on health and visual amenity.
- 10.5 The NESAQ is currently under review and Council will need to review its TRMP discharge to air rules once the outcome of the NES review is known. It is anticipated that a NES consultation document will be available mid-2019, and with a focus on PM_{2.5} alongside other government initiatives to balance between clean air and warm homes. In the interim, staff have initiated a work programme to develop an evidence base of monitoring and research, and education and behaviour change initiatives, which will ensure more active management of our air quality resource.

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 NESAQ and ensure that Tasman's interests are represented in that process.
- 11.3 A work programme has been developed for 2019 (as listed above) which will ensure Council is actively managing air quality. The key focus will be better understanding of the effect of rural outdoor burning on urban areas (with a focus on Richmond and Motueka), and education and behaviour change programmes for wood burning.

12 Attachments

1. Example of a Public Notice for Air Quality Exceedances
2. Figure 13 from 'Our Air 2018' Report (MfE, October 2018)