9.5 2016 AIR QUALITY REPORT

Information Only - No Decision Required

Report To:	Environment and Planning Committee
Meeting Date:	17 November 2016
Report Author:	Anna MacKenzie, Resource Scientist – Contaminants, Environment & Planning
Report Number:	REP16-11-05

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). There were five exceedances of the NESAQ for particulate matter (PM_{10}) over the winter of 2016. This is a surprising outcome given that it was warmer and windier than average. These exceedances are correlated with complaints and webcam images of outdoor burning occurring in the orchards around the Richmond airshed. The trend in annual concentrations of PM_{10} has improved over the last ten years, which is due to regulations on household burners, education, and enforcement. The maximum PM_{10} concentration for 2016 was 66 µg/m^3.

1.2 There were 41 exceedances of the global world health organisation (WHO) daily guideline value for the finer fraction of particulate matter ($PM_{2.5}$) over the period from May to August 2016, with a peak concentration of 46 µg/m^3.

1.3 A source apportionment study for Richmond has shown 52% of particulate matter is from biomass combustion, attributed to solid fuel appliances in Richmond. Metals arsenic and lead were also found to be present in the particulate matter and associated with burning treated wood and painted timber as fuel for heating.

1.4 A second source of arsenic in PM_{10} was also identified and was not associated with the domestic fires. The annual average arsenic concentrations for 2014 in Richmond was 19 ng/m^3, which exceeded the ambient air quality guideline value (5.5ng/m^3).

1.5 The Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NESAQ) are currently under review and Tasman District Council will need to review its air quality management provisions when the outcome is known. Based on current trends, during normal winter weather, Tasman District Council may not achieve the current requirements of the NESAQ which is no more than one exceedance per year by 2020.

2 Draft Resolution

That the Environment and Planning Committee

1. receives the 2016 Air Quality Report report REP16-11-05.

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3 Purpose of the Report

3.1 To update Council on the results for air quality monitoring for particulate pollution in Richmond undertaken during 2016 and assess compliance with the requirements of the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NESAQ).

3.2 To provide Council with an update on the review of the NESAQ currently underway and the issues in the region relating to air quality.

4 Background and Discussion

4.1 Good air quality is important for people's health and well-being. Air Quality monitoring in the Richmond area is monitored for fine particles called particulate matter (PM). The tiny particles penetrate into the lungs and bloodstream and damage respiratory and cardiovascular systems and can cause a range of human health effects from minor irritation through to disease and death.

4.2 Particulate matter has been monitored in the Richmond airshed since 2000, and the New Zealand standard for PM has been exceeded every winter. Particulate matter consists of solid and liquid particles suspended in the air. PM is usually measured in two sizes:

- PM_{10} 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 PM_{10}

4.3 This report presents data from the following

- Air quality monitoring PM10 data for Richmond over the winter 2016, temporal trends in PM10 and local meteorology.
- Air quality monitoring PM2.5 data for Richmond collected over the period October 2015 - September 2016.
- Particulate matter source apportionment study based on PM10 data from Richmond collected over the period June 2013 - September 2015.
- Air Pollution complaints for the period November 2015 – October 2016

4.4 The air quality monitoring equipment is located at the Plunket Rooms at 56 Oxford Street, central Richmond and comprises a Beta Attenuation Monitor (BAM) and two Partisol gravimetric air quality samplers. The BAM data in this report has been adjusted by 16 % for gravimetric equivalency. The air quality equipment is maintained by a local contractor (EIL). Watercare Services Limited undertake the quarterly audits and annual calibration on the instruments and analysis of the filters.

4.5 The National Environmental Standard of 50 µg/m3 for PM10 was introduced in 2005 and is a daily average concentration based on the World Health Organisation (WHO) guideline for short-term exposure. Up until 31 August 2016, an unlimited number of exceedances were allowed. From 1 September 2016, the daily average concentration of PM10 in the

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Richmond airshed should not exceed 50 µg/m3 on more than three days each year, with a target of one or fewer exceedances by 2020.

4.6 In 2015, the Parliamentary Commissioner for the Environment report on Air Quality recommended that some changes to the NESAQ should be considered. The change in focus should be towards long term exposure to air pollution (annual averages) rather than counting daily peaks and a move from managing PM10 to managing PM2.5 which is much smaller in size and internationally has been shown to be more highly correlated with adverse health effects.

4.7 In 2016, the World Health Organisation (WHO) have started to update the Global air quality guidelines and it is likely that both the short and long term guidelines for PM2.5 and potentially for PM10 will be reviewed. The WHO have indicated that a short term (hourly) guideline for PM2.5 may be considered.

4.8 The New Zealand air quality regulations are also currently under review and it is anticipated they should be updated by late 2017. The current scientific understanding is that the chronic health impacts of PM over the longer term is more important than the short term, and that the smaller particle size of PM2.5 has more impact on health than the larger PM10 size. It is anticipated that the regulations will change from the current focus on the short term exposure for PM10 and will include a long term standard (annual average) for PM2.5.

4.9 Table 1 presents the current standards, guidelines and targets for PM concentrations. The air quality standards are concentration limits set to protect health and incorporate a number of allowable exceedances. The air quality guidelines are concentration limits recommended to protect health and the environment and do not specify allowable exceedances.

Particle Size	Averaging Time	WHO Air Quality Guideline	Ambient Air Quality Guideline	National Environmental Standard	NESAQ Target exceedance
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			
$PM_{2.5}$	annual	10 µg/m^3			

Table 1: Particulate Matter Standards and Guidelines

4.10 In order to achieve the National Environmental Standard, Tasman District Council regulates the use of solid fuel burners and outside burning through its Resource Management and Building Act requirements. It also undertakes education (good wood and good burner operation) and uses enforcement action (illegal and objectionable discharges) where necessary.

4.11 Particulate Matter PM_{10} has been measured in the Richmond airshed using a Beta attenuation monitor (BAM) which is an equivalent method and is run continuously. PM_{10} is also measured using a Partisol instrument, which is a reference method, and is operated on a one day in six cycle. Air quality information from the BAM, along with weather conditions

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such as wind speed and temperature, is uploaded to the Council website and the Land Air Water Aotearoa (LAWA) website.

4.12 Figure 1 presents the BAM PM_{10} monitoring results (midnight to midnight) over the monitoring period (October 2015 to September 2016). The data for 2016 shows the typical seasonal pattern, with peak PM concentrations occurring over the winter period (June to August 2016)

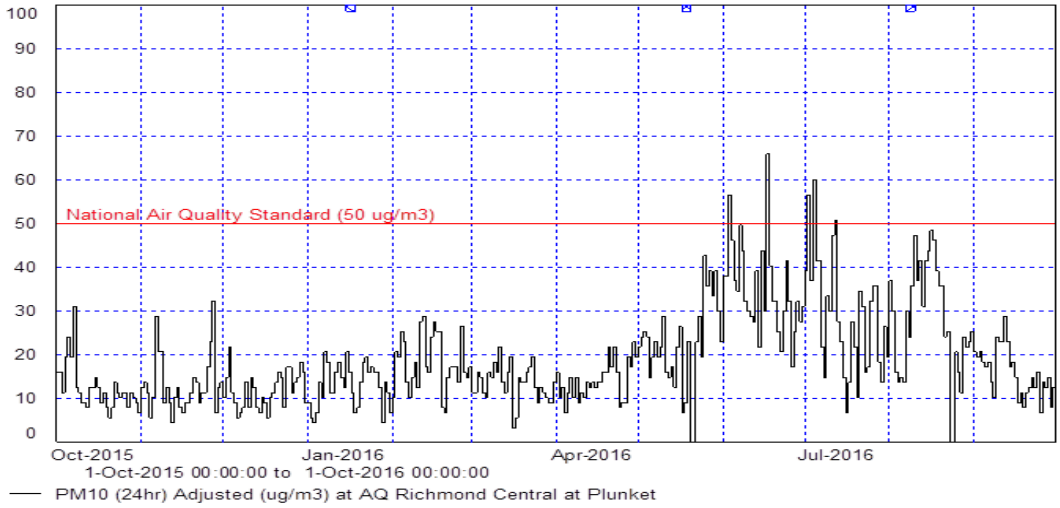

Figure 1: PM_{10} BAM adjusted concentrations in Richmond for 2015/2016

4.13 Over the last winter the NES for PM_{10} was exceeded five times which is above the maximum number of three permitted under the NESAQ for the post September 2016 target. An exceedance occurs when the concentration of smoke (PM_{10}) is greater than 50 micrograms per cubic meter (50 µg/m^3) when averaged over a 24-hour period. The 2016 monitoring result in Richmond is currently an acceptable result in terms of the existing target, as there are unlimited exceedances permitted. However, from next winter this level of exceedance would be unacceptable.

4.14 The maximum PM_{10} concentration for 2016 was 66 µg/m^3 on the 17 June 2016 and the second highest PM_{10} concentration (used because by 2020 one exceedance is still allowed) was 60 µg/m^3 (See Figure 2). The highest and second highest concentrations are similar to those recorded in 2013, and are above the lowest concentrations of 58 µg/m^3 and 60 µg/m^3 recorded in the last two years. The data gaps in the two figures (Figure 2 and 3) relate to when the air quality monitoring was undertaken historically at different locations and using different instruments. In addition, no air quality monitoring for PM_{10} was undertaken over the period 2001 and 2002.

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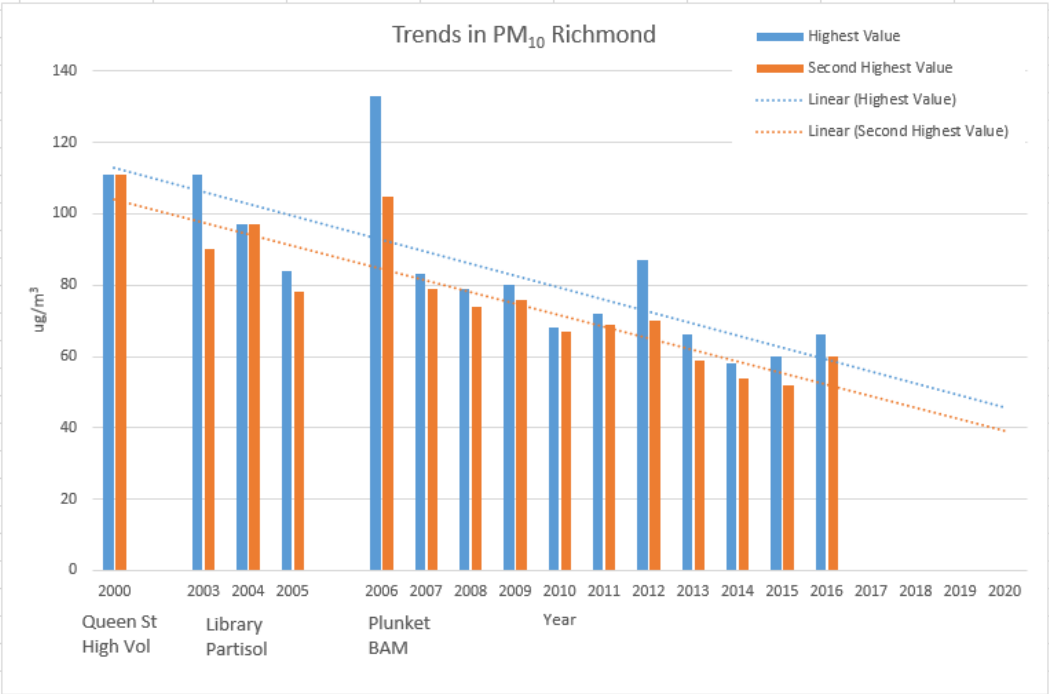

Figure 2: Trends in PM_{10} adjusted concentrations in Richmond

4.15 Table 2 summarises the dates of the short term 24-hour PM_{10} exceedances and includes meteorological data on wind speed and air temperature collected from the Tasman District Council weather station. A previous air quality study on long term trends in PM_{10} in Richmond, 2010 has indicated that the worst air quality in Richmond generally occurs with 24-hour average wind speeds below 3.8 m/s and 4-hour average temperature (8.00 pm to midnight) of less than 6.8°C. The five exceedances all occurred on days with low 24-hour wind speeds of less than 1.4 m/s, and evening temperatures of between 6.2 and 9.3 °C.

Date	**24-hour PM_{10} µg /m^3**	**24-hour wind speed m/s**	**24-hour temp °C**	**4-hour Temp (8pm-12pm) °C**
3/06/2016	57	1.0	7.5	6.2
17/06/2016	66	1.4	7.8	7.3
2/07/2016	57	1.3	7.3	8.8
4/07/2016	60	1.4	9.8	9.3
12/07/2016	51	1.1	5.2	6.3

Table 2: Exceedances of 24-hour PM_{10} in Richmond in 2016.

4.16 There is evidence to suggest that some of the dates when the large orchard burning occurred on the plains correlated with dates that air quality breaches occurred in the Richmond airshed. Throughout June and July there were numerous outdoor fires on the Waimea Plains, the largest involved the burning of two large orchard blocks totaling approximately 20 hectares from mid-June through until 12 July, at a distance of 6km from the PM_{10} monitoring site in Oxford Street From webcam images (see photo 1) and wind data, it appears that the smoke from the rural fires is initially transported by the north and

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northeasterly winds away from the airshed, and then the evening katabatic wind down the Wai-iti valley transports the contaminants back over Richmond. Further investigations into the rural burning issues is required.

Photo 1: Webcam image 5:21pm on 3rd June 2016 showing the smoke from the Swamp Road fire.

4.17 Figure 3 shows the results for the 24 hour PM_{10} exceedances over the last 16 years, showing a general trend of ongoing improvement in the number of exceedances. The highest recorded concentration of 133 µg /m^3 occurred in winter 2006. The trend in number of exceedances in the PM_{10} 24-hour average has shown an improvement over time in Richmond, with the total number of annual exceedances reducing from 46 exceedances in 2000 down to five exceedances in 2016. The winter of 2014 had the minimum number of exceedances with only two days with PM_{10} exceedances.

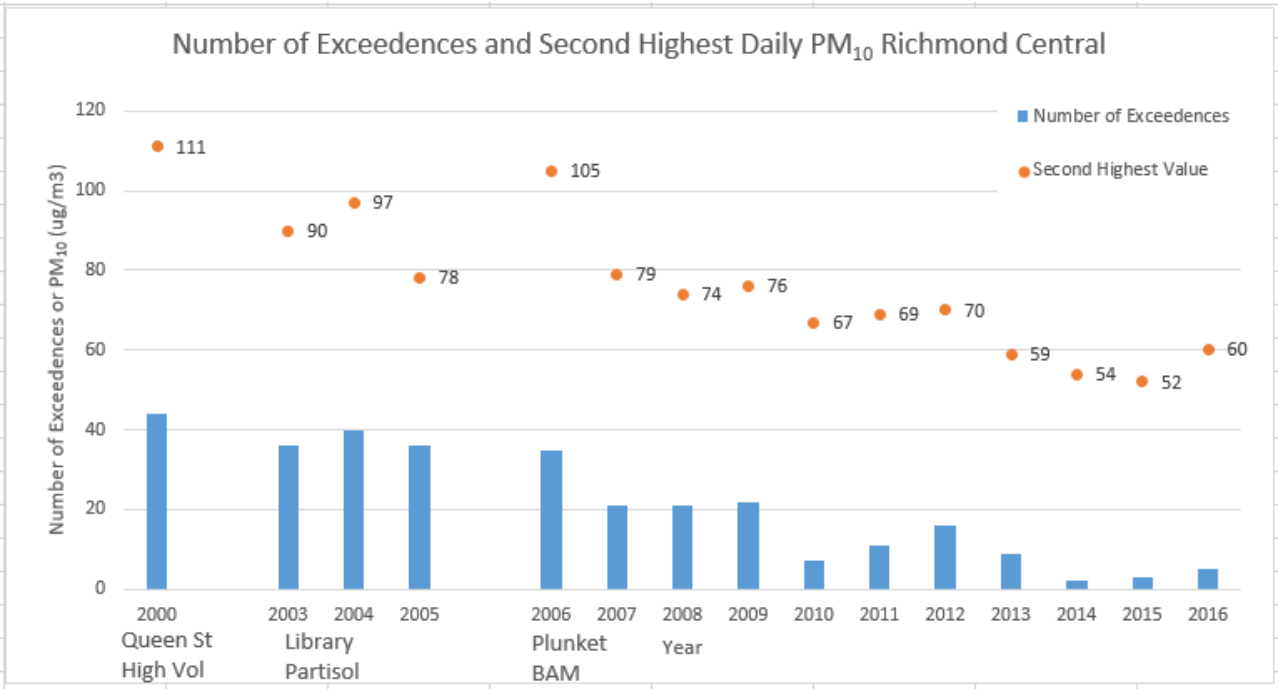

Figure 3: Number of Exceedances of 24-Hour PM_{10} for Richmond

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4.18 Richmond and Nelson City are both part of a wider regional airshed. They are both subject to similar climatic influences, to similar smoke sources and to leakage between the airsheds. Comparable records exist for the two areas for the past 13 years (between 2003 and 2016). During 2003 Richmond Airshed had 40 exceedances of the NESAQ while Nelson A Airshed had 68 exceedances. By 2013 Richmond and Nelson had both dropped to nine exceedances. Over this past year (2016) Richmond had five exceedances while Nelson A had one exceedance (See Figure 4 below). The trend at Nelson's St Vincent Street shows a more dramatic improvement in air quality since 2003 than the Richmond airshed.

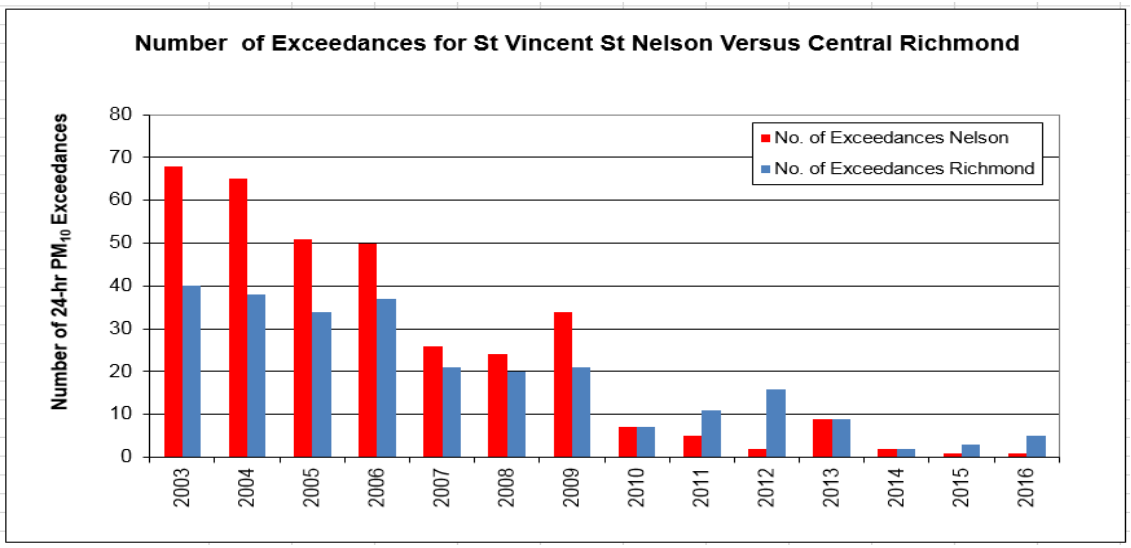

Figure 4: Comparative number of exceedances between Richmond and Nelson Airsheds

4.19 Annual monitoring data for PM_{10}, averaged over the period September 2005 to September 2016, is shown in Table 3. The annual mean PM_{10} concentration has shown an improvement over the eleven-year period with 25 µg/m^3 in 2005/06 reducing to 19 µg/m^3 for 2015/2016. The annual PM_{10} concentration for 2015/16 complies with the ambient air quality guideline of 20 µg/m^3.

Richmond at Plunket Rooms												
01-09-2005 to 30-09-2016												
Method:	BAM											
Units	µg/m^3											
Year	*2005/06	*2006/07	*2007/08	*2008/09	*2009/10	*2010/11	*2011/12	*2012/13	*2013/14	*2014/15	*2015/16	All
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	133	83	79	80	68	72	87	66	58	60	66	133
Mean	25	20	22	22	21	19	19	20	17	18	19	20
* Year starts in September												

Table 3: Annual mean PM_{10} for Richmond between 2005 and 2016

4.20 The annual data has also been categorised according to percentage relative to the standard of 50 µg/m^3, with less than 66% of the standard being considered "acceptable" air quality, and less than 33% as "good" air quality, in line with the Ministry for the Environment categories shown in the Good Practice Guide for Air Quality Management, 2009. The results in Figure 5 show that since 2007, the air quality has been good to acceptable for at least 80% or the time.

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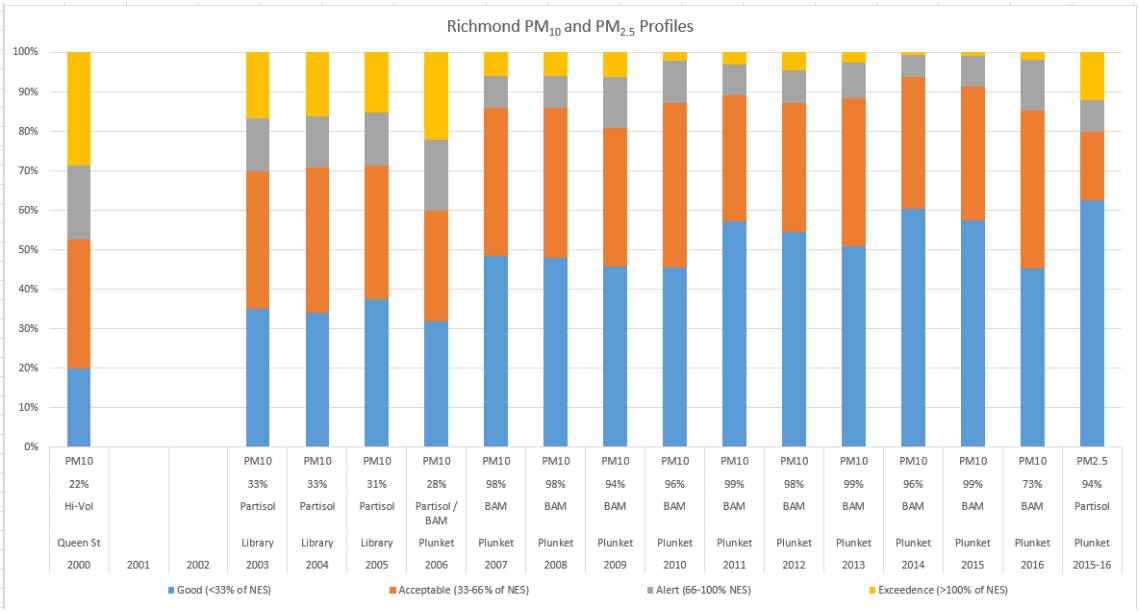

Figure 5: Proportion of PM_{10} daily averages belonging to different air quality categories

4.21 Particulate Matter $PM_{2.5}$ has been measured using a Partisol 2025i sampler and were collected on a daily (midnight to midnight) sampling regime for the period 1 October 2015 - 30 September 2016 (See Figure 6 and Table 4). The concentrations of $PM_{2.5}$ regularly breached the current WHO daily guideline value of 25 µg/m^3 over the period from May to August 2016, with 41 breaches of the guideline. The $PM_{2.5}$ annual mean for 2015/16 of 10.4 µg/m^3 also marginally exceeds the WHO annual guideline of 10 µg/m^3. Based on current evidence, the WHO suggests there is increased risk in both the short and long-term exposure at levels below the existing $PM_{2.5}$ guideline values, and a short term exposure (e.g. 1- hour) may be considered by the organisation. The maximum $PM_{2.5}$ of 46 µg/m3 was recorded on both 17 June 2016 and 2 July 2016, both dates for which NESAQ exceedances for PM_{10} were recorded (See Table 2), reflecting the high proportion of fine particles within the measured particulate material.

4.22 A comparison between the $PM_{2.5}$ concentrations and PM_{10} concentrations measured using the BAM showed an annual average of 55% of the PM was composed of the finer $PM_{2.5}$ fraction. There $PM_{2.5}$ fraction showed seasonal variations with 82% of PM in the winter months comprising the finer fraction compared to only 40 % in summer and 50% in the spring and autumn. This is consistent with much of the $PM_{2.5}$ being produced directly from combustion processes.

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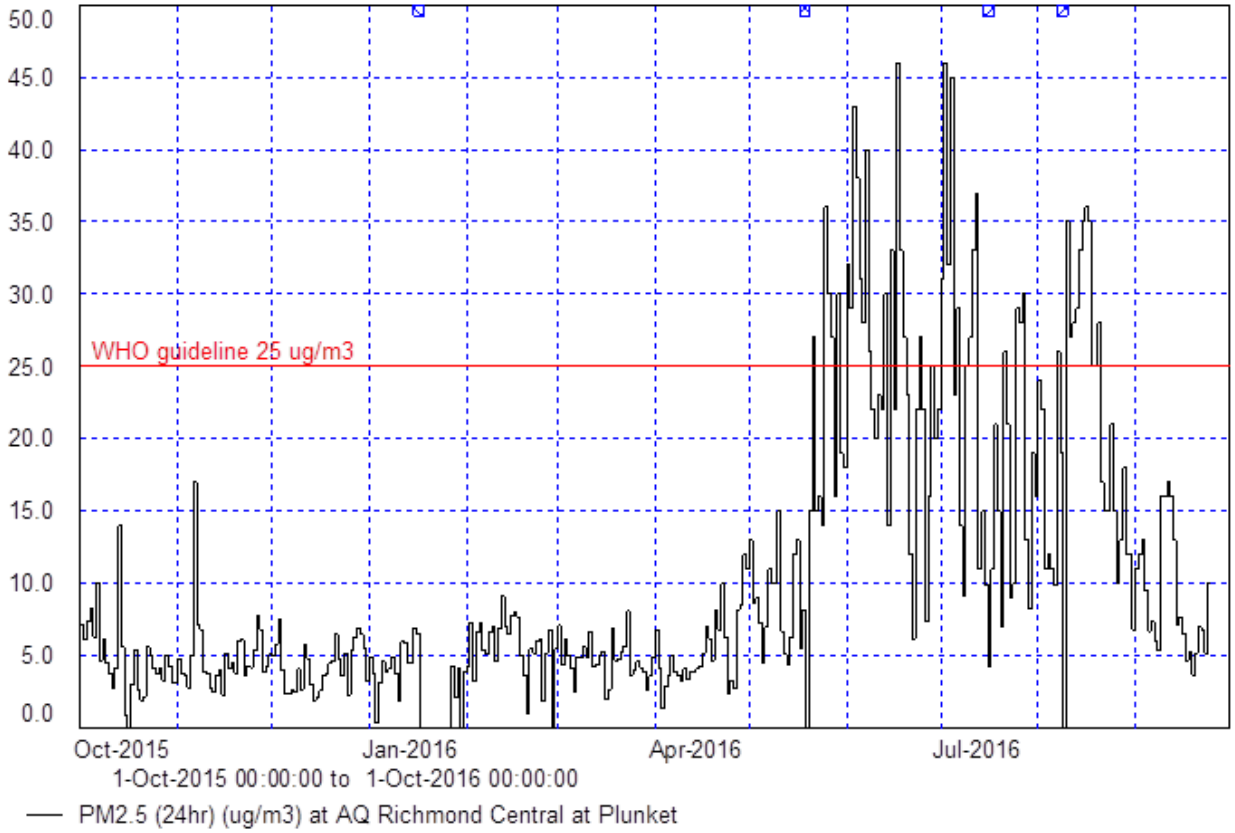

Figure 6: Partisol PM $_{2.5}$ concentrations in Richmond for 2015/16

Richmond at Plunket Rooms												
01-10-2015 to 24-09-2016												
$PM_{2.5}$ daily average												
Method:	Partisol											
Valid Data:	96.4%											
Data Capture Rate:	96.7%											
Units	µg/m^3											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Minimum	0.9	2.3	1.9	0.4	0.2	2.0	1.4	4.4	6.2	4.3	6.8	3.7
Mean	5.0	5.0	4.3	4.2	5.6	4.7	5.4	13.9	25.4	21.1	20.5	9.1
Maximum	14.0	17.0	7.5	6.9	9.1	8.1	12.0	36.0	46.0	46.0	36.0	17.0
Lowest					0.2							
Highest										46.0		
Exceedances	0	0	0	0	0	0	0	5	14	12	10	0
Annual Mean	10.4											

Table 4: Partisol $PM_{2.5}$ concentrations in Richmond for 2015/16

4.23 The ground level PM concentrations recorded by the monitoring equipment are strongly influenced by a number of factors and not just the rate of discharge of smoke and other small particles emitted into the air due to combustion activities such as household solid fuel heaters, vehicles and industry. Sources of variability include the concentration of small particles present from natural sources such as dust, sea salt, and pollen and the amount of turbulent mixing and removal as a result of wind and rain.

4.24 Weather conditions influence smoke concentrations by encouraging greater home heating discharges (cold weather), mixing or trapping discharges through variations in both

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horizontal and vertical wind speed and removal of smoke particles in water droplets during rain. This means that even where the rate of smoke discharge is constant or falling differing winter weather between years can result in significant variations in the smoke concentrations measured. During still, cold, dry winters smoke levels tend to be much higher than windy, warm, wet winters.

4.25 Based on the weather records from the Tasman District Council 189 Queen Street meteorological monitoring site, the winter of 2016 was fairly warm for air temperature with above average air temperatures (See Figure 7). The monthly average temperature for July was the warmest on record (8.8 °C). The warmer air temperatures are likely to have resulted in less use of solid fuel heaters than occurred during the same months of 2015 and may have increased vertical air movement.

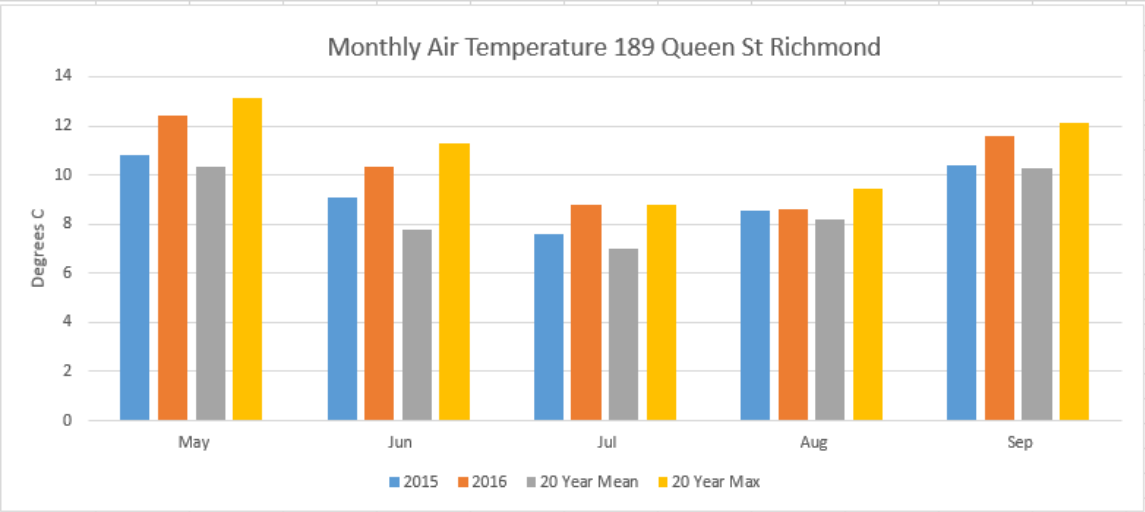

Figure 7: Winter 2016 Monthly Air Temperatures

4.26 The monthly wind speed for the winter of 2016 was slightly below average for the months of May, June and August. However, during July 2016 the average wind speed was 1.7 km/hr higher than the ten-year average (See Figure 8). The higher wind speed, combined with the warmer temperature for July 2016, is likely to have resulted in decreased concentrations of PM, as the smoke tends to blow away rather than build up overnight.

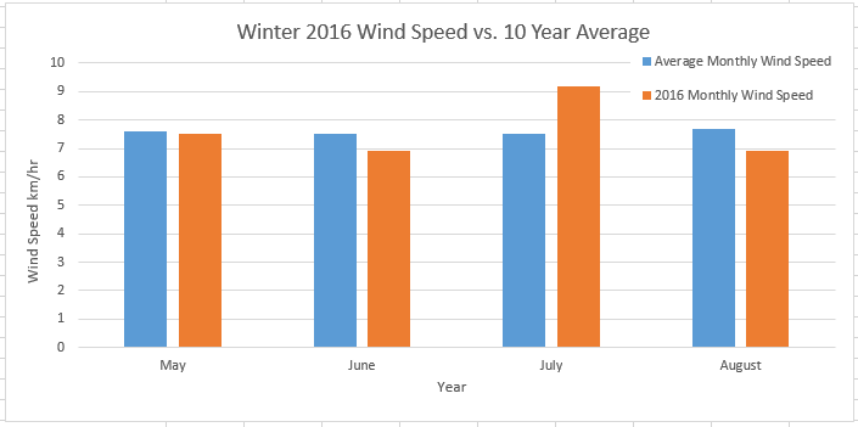

Figure 8: Winter 2016 Monthly Wind Speeds

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4.27 A report by the Institute of Geological and Nuclear Sciences Limited (GNS Science) was prepared for Tasman District Council in 2016 to determine the sources of PM_{10} in the Richmond airshed and is available for review. The PM_{10} air quality filters which had been collected over the period June 2013 to September 2015 were analysed using X-ray fluorescence spectroscopy to determine the elemental concentrations in the samples. The sources of PM_{10} in the air were identified using mathematical models. The sources of the PM_{10} for Richmond (see Figure 9) were biomass combustion (52%), motor vehicles (17%), marine aerosol (16%), secondary sulphate (13%), and copper chrome arsenate (CCA) (2%).

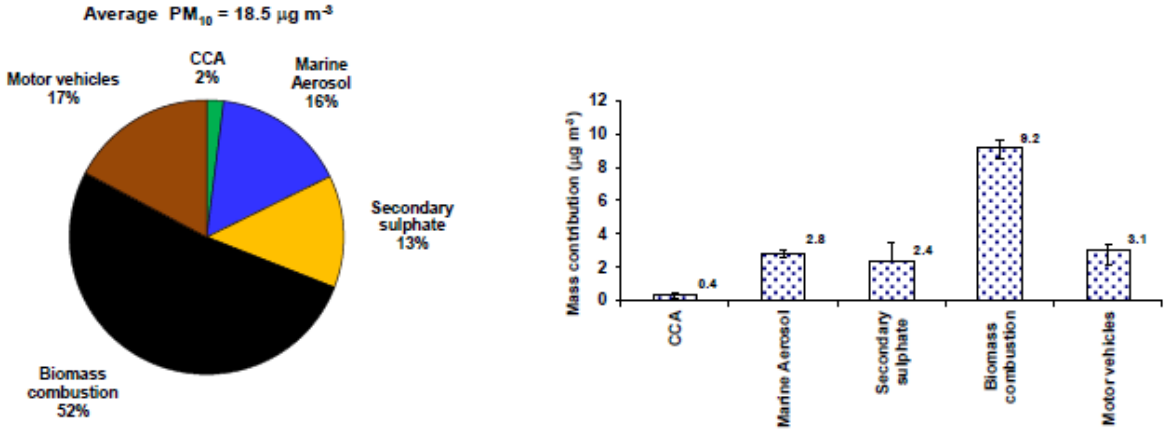

Figure 9: Average source contributions to PM_{10} in Richmond (from GNS Science report)

4.28 The main source of PM_{10} in Richmond is from the biomass combustion profile based on high black carbon and potassium in the results. The source is from people burning solid fuel for domestic heating and industrial emissions. Arsenic and lead were also associated with the combustion profile which is indicative of copper chrome arsenate treated wood and lead painted timber being burnt. A second source of arsenic in PM_{10} was also identified and was not associated with the domestic fires. The annual average arsenic concentrations for 2014 was 19 ng/m^3, which exceeded the ambient air quality guideline value (5.5ng/m^3). The annual average arsenic concentration in Richmond is elevated compared to other New Zealand urban locations. The biomass combustion was seasonal, with peak contributions occurring in the late autumn and winter (May - August). The peak combustion contributions occurred under low wind speeds from the southwest.

4.29 The motor vehicle source is identified by the presence of black carbon from fuel combustion and re-entrained road dust emissions. Peak motor vehicle contributions occurred under winds from the north to north west, associated with SH6 located north of the monitoring site. Weekly variations in the PM_{10} contributions from vehicles were observed, with more vehicle use during weekdays, but little seasonality from this source.

4.30 The marine aerosol source was identified from the predominance of sodium and chloride in the profile and the source attributed to the Tasman Sea. The PM contribution was dominant in the spring and summer when there were high winds from a northeasterly direction. The source contribution from natural marine sea salt is lower in Richmond than in other New Zealand cities (Wellington and Auckland), linked to calmer weather conditions.

4.31 Secondary sulphate occurs from gas to particle conversions and can possibly be attributed to emissions of sulphur dioxide from shipping activities. Secondary sulphate can include

natural emissions (marine phytoplankton and volcanic sources). The Richmond data did not show any seasonality suggesting there may be a localised emission source.

4.32 A Copper, Chrome Arsenate (CCA) source was identified which contributes about 2% of the total PM10 in Richmond which peaked under high wind speeds from the north east. The CCA source was intermittent with no seasonality observed. The origins of the source are being investigated further.

4.33 For air quality management purposes, the contribution of different sources to the PM showed that biomass combustion was responsible for 71% of PM10 on high pollution days. Previously, emissions inventory work by Environet Ltd in 2010 had estimated 89% of PM10 emissions was from domestic heating, however their inventory did not include natural source contributions. The current wood burner rules may have less impact on the air quality improvements than previously assumed. The focus on fire emissions which are responsible for NES exceedances will continue to be a priority for Council to control. In order to understand the sources of particulates in the fine fraction (PM2.5), further analysis is being commissioned on the daily PM2.5 filters collected in Richmond over the period 2015-2016 and the results should be complete in 2017.

4.34 During the winter of 2016 Tasman District Council compliance staff were actively promoting good wood burner operation and following up complaints. Nine smoke complaints from chimneys were processed within the Richmond Airshed. The low number suggests that a large proportion of the Richmond population are now operating their wood burners efficiently and are using “good wood”, therefore reducing smoke emissions and complaints.

4.35 The majority of smoke related complaints related to outdoor burning. There were a total of twenty-seven smoke related complaints within the urban areas. Richmond and Motueka are zoned fire ban, however Mapua and Ruby Bay remain zoned fire sensitive.

4.36 A total of sixty complaints related to rural outdoor fires. Motueka and Riwaka residents complained 27 times in relation to rural based fires – the majority of these being orchard waste and occurring through the cooler months of Autumn through winter until Spring. Thirty-three complaints of nuisance smoke from rural outdoor fires were received from the Richmond and Moutere Waimea area. The orchards burn diseased canker wood through the winter months. Weather conditions were often perfect for burning, however the inversion layer resulted in the smoke being kept low over the townships and rural areas and blanketing these areas throughout the evening through until early morning.

4.37 Richmond residents again voiced their concerns around the strict rules imposed on them within the Richmond Airshed while adjoining rural properties outside the Richmond Airshed ‘boundaries’ are permitted to have outdoor burns. As has already been mentioned this smoke has a detrimental effect on the Airshed air quality especially throughout the winter months, highlighting ongoing difficulties of managing air discharges when no physical boundaries exist and smoke can be blown in any direction depending on the wind.

5 Options

5.1 The National Environmental Standard for PM_{10} along with its achievement dates of 2016 and 2020 is set by law and Tasman District Council is required to meet it. Based on the best information available to it, Council has developed rules to manage air quality. Air quality monitoring to date suggests that the current rules have achieved a significant improvement in air quality however it is uncertain that the target can be achieved, particularly during a

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cold, dry and still winter. At this stage we are not suggesting any review of the existing TRMP provisions until we see the new NESAQ.

5.2 The main source of PM_{10} in Richmond is from biomass combustion. The existing rules relate to installation of domestic burners and require non-compliant appliances to be changed when a house is sold, and will continue to have an impact on reducing air pollution in Richmond. However, tighter restrictions on outdoor burning for areas in and around Richmond and Motueka should be considered once the new NESAQ is released. This would be a separate discussion with Council via the Policy team. Enforcement of the current requirement to operate without causing a nuisance for neighbours will need to be maintained.

5.3 Based on the data for $PM_{2.5}$ for 2016, Richmond will require more stringent management to reach a guideline of 25 $\mu g/m^3$ for $PM_{2.5}$ (as recommended by WHO) than to reach a target of 50 $\mu g/m^3$ for PM_{10}. At this stage we are not suggesting any changes to present rules, although this needs to be addressed once the revised NESAQ is released. The information gathered on source apportionment of $PM_{2.5}$ will enable Tasman District Council to be well positioned to engage with the Central Government during the NESAQ review process.

6 Strategy and Risks

6.1 Based on current trends, during normal winter weather Tasman District Council may not achieve the current requirements of the NESAQ. Weather influences the levels of air pollutants and on 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 2016, as required by the NESAQ and Section 35 of the Resource Management Act.

7.2 The 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 from 1 September 2016 which will come into effect next winter. Further advice on this will be provided to Council when the results of NESAQ review are known.

8 Consideration of Financial or Budgetary Implications

8.1 The current air quality monitoring equipment for PM_{10} (BAM) is planned for replacement in the next financial year. The unit is already 10 years old and is no longer supported by the manufacturer with either parts or software upgrades. This equipment replacement cost has already been included in the Annual Plan budget.

8.2 The outcome of the NESAQ review may have implications on the air quality budget if additional monitoring for $PM_{2.5}$ is required for compliance purposes. Currently the Partisol equipment is run on a one day in six cycle and changes to daily sampling will have additional filter, analysis, audit and calibration costs which may need to be considered.

9 Significance and Engagement

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

10 Conclusion

10.1 The 2016 monitoring data has shown the air quality for particulate matter has been acceptable for 80% of the time. There were five exceedances of the National Environmental Standard for particulate matter (PM_{10}) over the winter of 2016, this is a surprising outcome given that it was warmer and windier than average. These exceedances are correlated with complaints and webcam images of outdoor burning occurring in the orchards around the Richmond airshed. The trend in annual concentrations of PM_{10} has improved over the last ten years, which is due to regulations on household burners, education and enforcement. The maximum PM_{10} concentration for 2016 was 66 µg/m^3. The annual PM_{10} concentration for 2015/16 was 19 µg/m^3 and complies with the ambient air quality guideline of 20 µg/m^3.

10.2 There were 41 exceedances of the global world health organisation (WHO) daily guideline value for the finer fraction of particulate matter ($PM_{2.5}$) over the period from May to August 2016, with a peak concentration of 46 µg/m^3. The $PM_{2.5}$ annual mean for 2015/16 of 10.4 µg/m^3 also marginally exceeds the WHO annual guideline of 10 µg/m^3.

10.3 A source apportionment study for Richmond has shown 52% of particulate matter is from biomass combustion, attributed to solid fuel appliances in Richmond. Metals arsenic and lead were also found to be present in the particulate matter and associated with burning treated wood and painted timber as fuel for heating.

10.4 A second source of arsenic in PM_{10} was also identified and was not associated with the domestic fires. The annual average arsenic concentrations for 2014 in Richmond was 19 ng/m^3, which exceeded the ambient air quality guideline value (5.5ng/m^3).

10.5 The Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NESAQ) are currently under review and Tasman District Council will review its air quality management provisions at this time. Based on current trends, during normal winter weather Tasman District Council may not achieve the current requirements of the NESAQ.

11 Next Steps / Timeline

11.1 Staff will maintain the continuous record of PM_{10} concentrations in Richmond with the calibration measurement of both PM_{10} and$PM_{2.5}$ to be recorded on a one day in six rotation. Staff will work to see that Tasman's interests are represented in the review of the NESAQ.

12 Attachments

Nil