Report No:	REP11-10-06
File No:	C301
Date:	20 September 2011
Information Only - no decision required	

REPORT SUMMARY

Report to: Environment & Planning Committee

Meeting Date: 6 October 2011

Report Author Trevor James, Resource Scientist

Subject: **AIR QUALITY IN RICHMOND - AN UPDATE 2011**

EXECUTIVE SUMMARY

Air quality in Richmond for the last winter continued to exceed national standards but the general trend is for reducing PM_{10} concentrations. The 24-hour average standard for particulate matter smaller than 10 microns (PM_{10}) was exceeded 11 times with a maximum 24-hour concentration of 72 µg/m^3. Annual averages fell below guidelines for the first time. Real trends, corrected for wind speed and ambient air temperature, showed a clear continuing general trend for declining PM_{10} concentrations.

Monitoring in "Richmond East", near the intersection of Hill Street and Reservoir Creeks, failed to pick up any particulate issues, probably due to clean catabatic winds blocking the expected plume from the area around lower Churchill Avenue/ Polglase Tce/ Mason Place/ Griffen Street/ lower Marlborough Crescent/ Hill Street from Churchill Street to Sutton Street, Sutton Street/ Tuffnell Street/ SE end of William Street/ Warren Kelly Street.

RECOMMENDATION

That the report be received.

DRAFT RESOLUTION

THAT the Environment & Planning Committee receives the Air Quality in Richmond - An Update 2011 REP11-10-06.

Trevor James
Resource Scientist

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1. Purpose

The purpose of this report is to present results for air quality monitoring for the 2011 year-to-date and compare these results to previous years.

2. Results from Richmond Central Site

At the Richmond Central site there were eleven measured exceedences of the National Environmental Standard (NES) for air quality for 24-hour average PM_{10} this last winter (see Figure 1 and 2). Figure 1 shows a plot of 24-hour average PM_{10} for the year to date. The highest recorded maximum concentration (72 $\mu g/m^3$) this winter was on 4 July.

Air quality in Richmond, while poorer than last year, is in keeping with the general improving air quality trend over the last decade. With the warm and wet start to the winter, the first exceedence was in late June, the latest in the season on record. July and August had average air temperatures closer to the long-term average (Figure 5). The last exceedence for the winter was recorded on 23 August. This was almost the latest on record (latest exceedence was on 25 August, 2003).

The mean PM_{10} 24-hour average for days when there was an exceedence was 60, which is similar to the past three years. This analysis includes only those days when there was an exceedence. These days are generally amongst the coldest and most calm of the winter period. Another way of representing the data is grouped into the following categories: good, acceptable, alert and exceeding the NES limit (Figure 4).

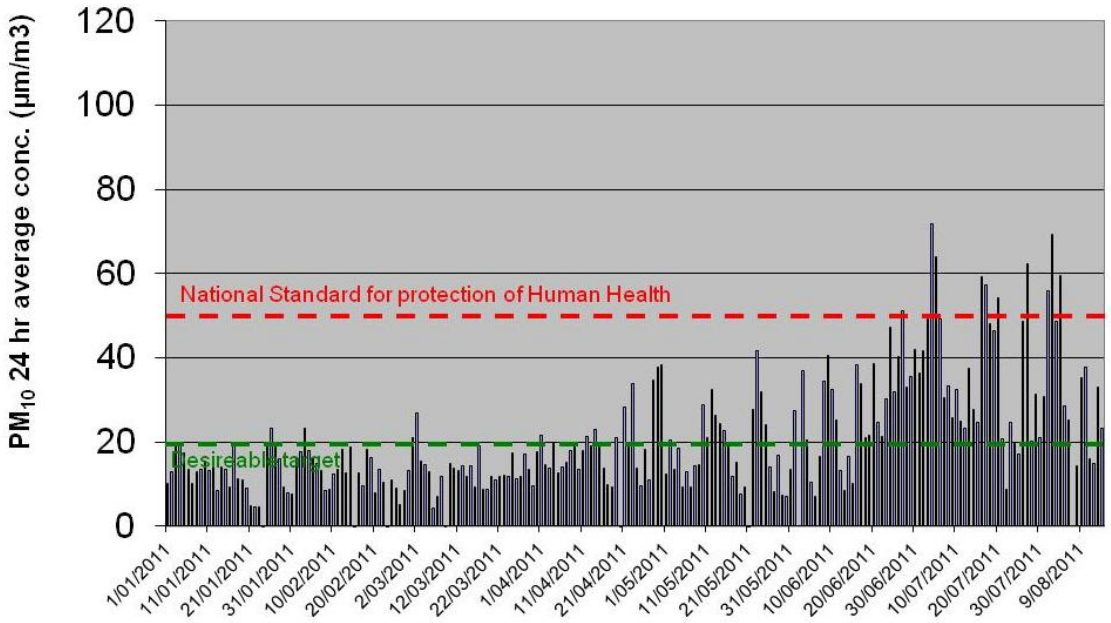

Figure 1: PM_{10} 24-hour Average for Richmond Central - 2011 year to mid September

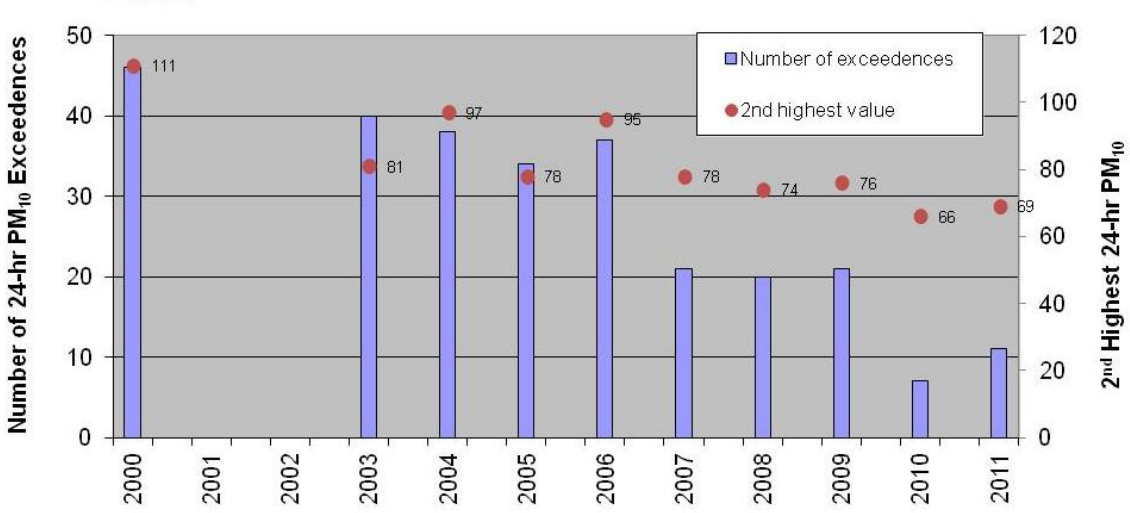

Figure 2: Total number of days per year that the NES was exceeded and second-highest exceedence (Note: no monitoring occurred in 2001-02).

Over the eight years of record, there appears to be a slight downward trend in the annual daily average concentration, and this year the average was 19 µg/m^3 which is below the guideline ((20 µg/m^3; Ministry for the Environment),see Figure 3). This is a very pleasing result. Note that annual averages are not part of the national standard for assessing PM_{10}.

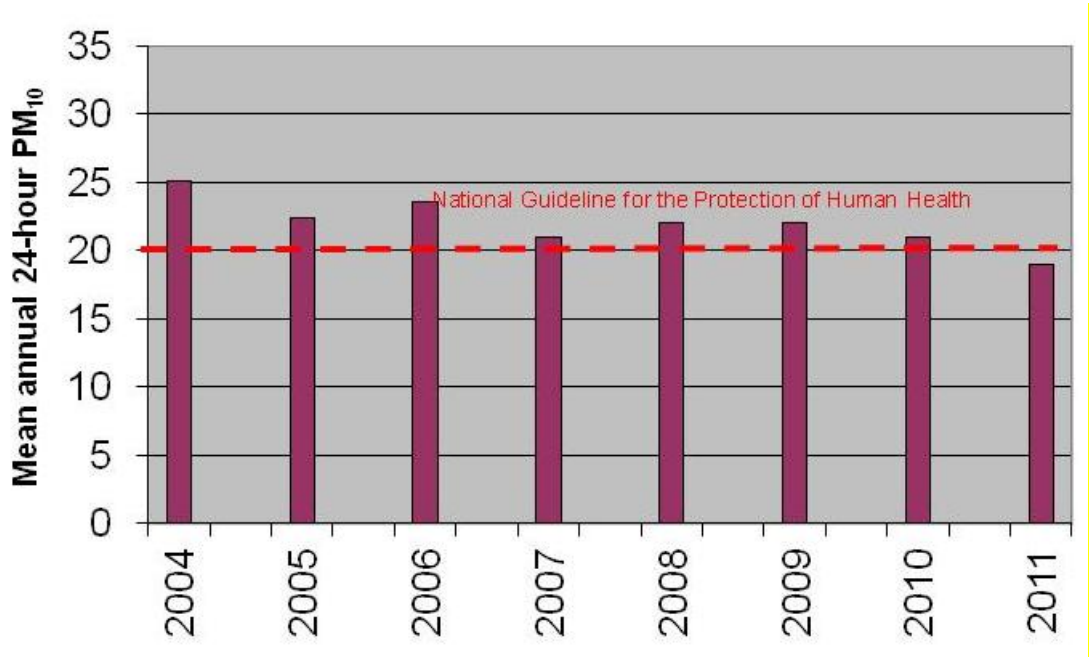

Figure 3 Annual (year-round) daily average PM_{10} concentration

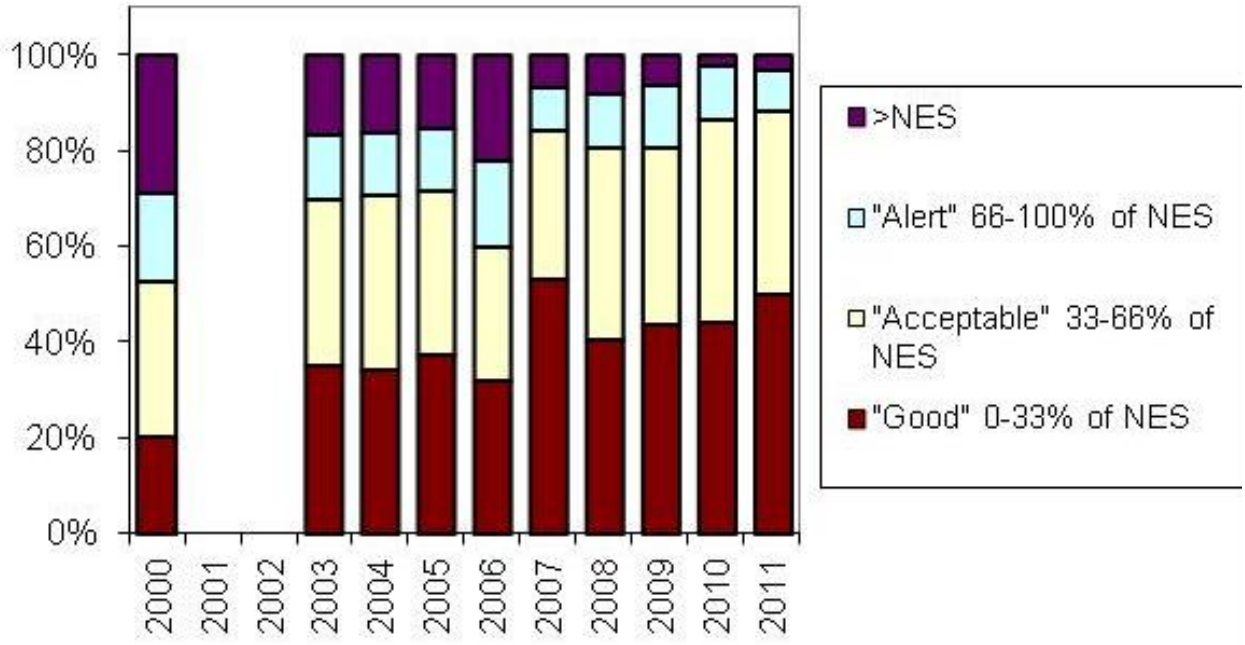

Figure 4 Ministry for the Environment indicator graphs (>NES = percent of samples breaching the National Environmental Standard for Air Quality).

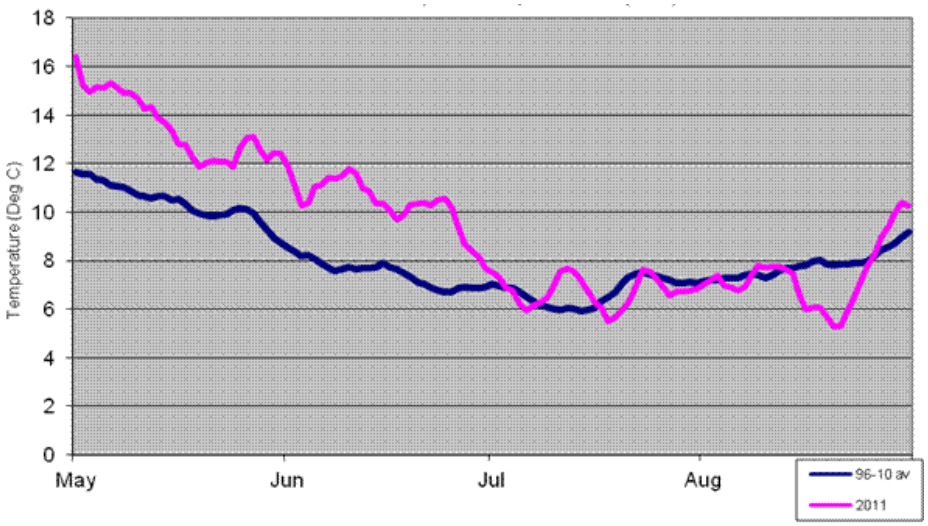

Figure 5 Ambient air temperature as a weekly moving average of daily averages; Historical (1996-2010) versus 2011. Data from Tasman District Council office.

True Trends in PM_{10} over Time

Because of the variability of air quality from year to year due to different meteorological conditions, it is important to assess trends only for particular days when the critical meteorological factors are similar. Under a project by NIWA and Environet Ltd the most critical factors were assessed as being wind speed (worst air quality generally occurs with wind speeds below 3.8m/sec) and air temperature (8.00 pm to midnight)[1]. This project provided this Council with a spreadsheet tool to assess and update trends simply and effectively that "normalises" data based on these critical meteorological factors. The normalising process adjusts the PM_{10} data in any high pollution node by the difference between the average PM_{10} concentration for that node and the average PM_{10} in the baseline node. The baseline node reflects meteorological conditions that are not overly conducive to elevated PM_{10}. This adjusted PM_{10} data was computed as median and 75th percentile metrics (middle number and the value below which 75% of the data falls) for each year.

When plotted over the years of monitoring, both median and 75th percentile show a clear general downward trend (Figure 6).

PM_{10} concentrations are predicted to continue to fall at a similar rate until 2014 when the rate of fall will ease and is likely to almost "flat-line" after 2016 and not push below the AQNES in 2020. This is based on data up to August 2011. This information is similar to previous predictions but the update is yet to be verified through the publication process.

[1] Wilton, E; Rijkenberg, M; Bluett, J: Assessing long-term trends in PM_{10} emissions and concentrations in Richmond, 2009. NIWA Client report 2010-015.

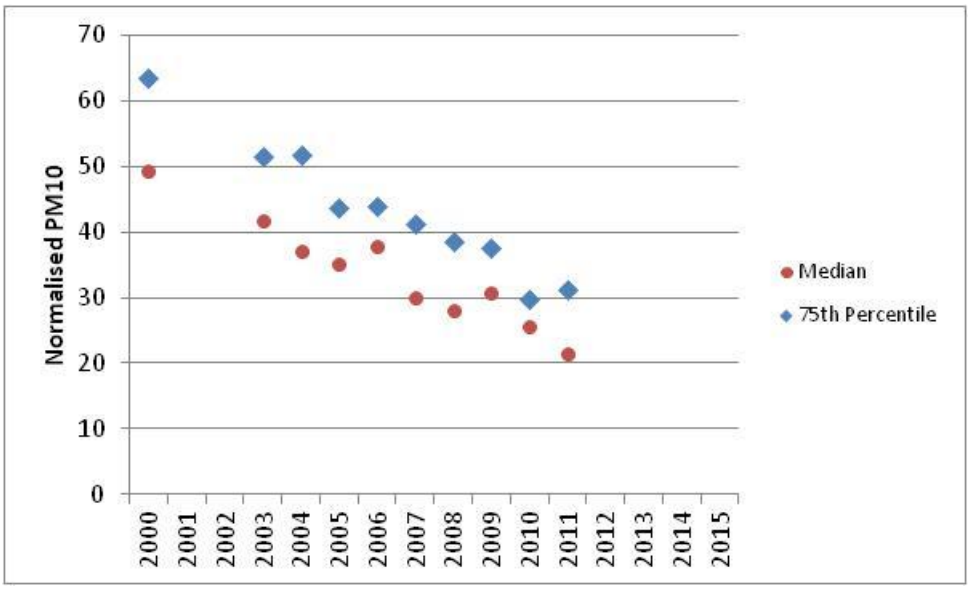

Figure 6 Trends in PM_{10} metrics (median and 75th percentile) across the monitoring record for days of similar meteorological conditions.

Deviations from the National Standard Straight Line Path for Richmond

The revised national standard for air quality[2] requires that there are no more than three exceedences in any year from 31 August 2016, and from 31 August 2020 onwards there can only be a maximum of one exceedence per year.

Any of the second-highest 24-hour average PM_{10} results above this line after 2005 must be highlighted. The second-highest value is plotted in respect of this standard because the NES allows for one breach each year in 2020. For the Richmond Central site all results were below the straight line path (see Figure 7).

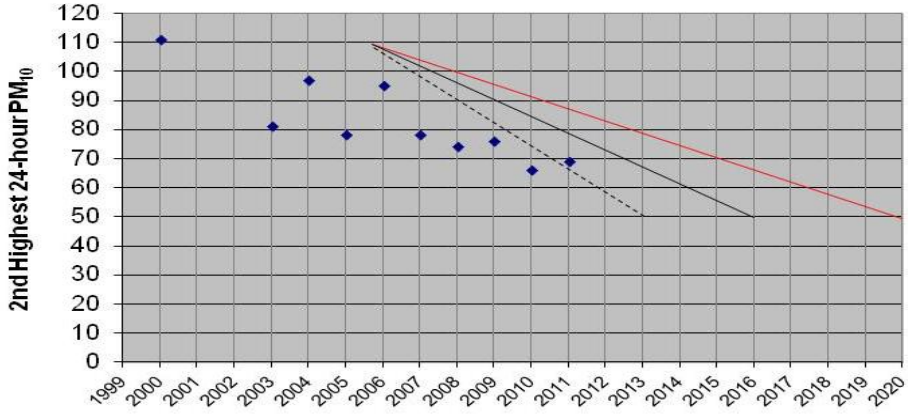

Figure 7 Second highest 24-hour concentrations compared to the straight line path set down by the now-revoked 2005 NES (dashed line), the 2016 target (solid black line), and 2020 target (red line).

[2] Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (SR 2004/309) (as at 01 June 2011)

3. Monitoring at Shetland Place, Richmond East

Monitoring at Shetland Place was set up to collect 24-hour average PM_{10} data for a hotspot identified in the mobile monitoring of 2008 (the mobile monitoring made passes over the area four times per evening during the monitoring nights). The site met all the criteria for siting of air quality monitoring devices, namely there were no individual discharges directly affecting the location, no shielding by trees and secure from vandalism. It is not always possible to find such a location in the older parts of town where nearly every house has a burner. Sites in the area one block to the south were investigated but no obvious choices emerged. The chosen site was the home of a staff member. This made the sampling more cost-effective as the filter changes were carried out by this person.

On average the 24-hour average concentration of PM10 was 40% lower than the Richmond Central site (Figure 8).

Unfortunately it appears that the location of the site missed the plume by being one block too far north. Part of the reason for this was the plot provided by NIWA showed the hotspot to extend in this area (see Figure 9). However, it is evident now that the plot has not been overlaid over the map accurately.

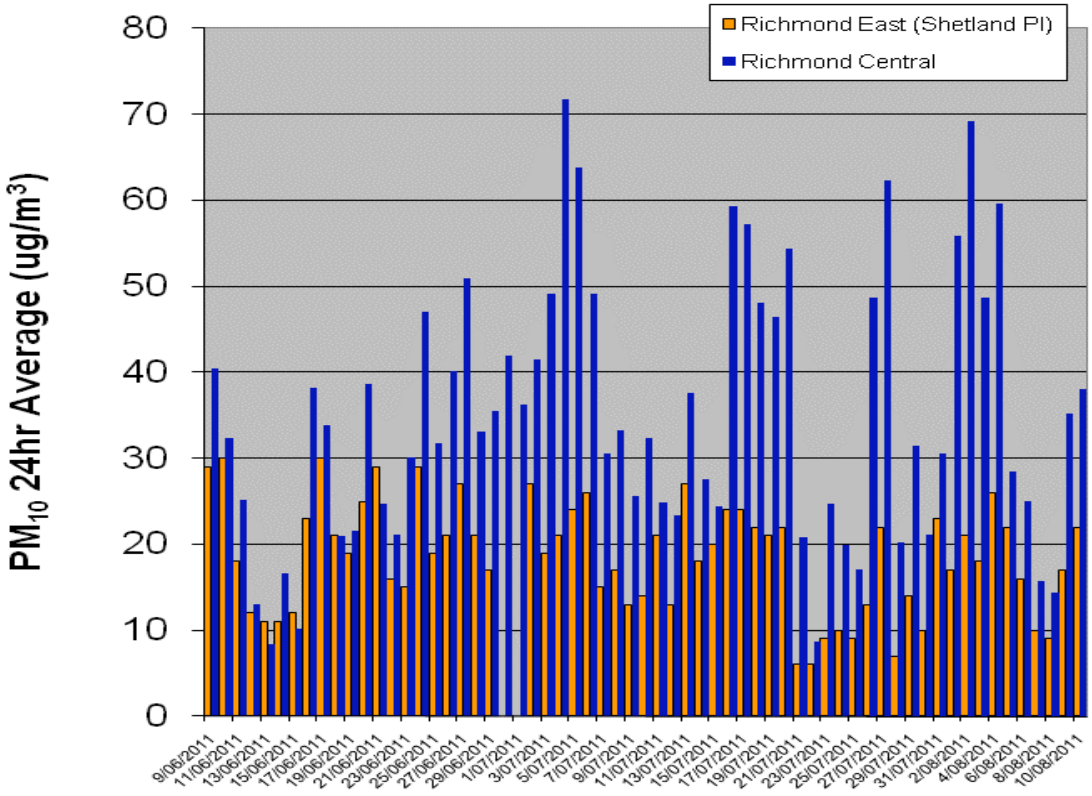

Figure 8 Comparison of 24 hour average PM_{10} for Richmond Central and Richmond East June-August 2011.

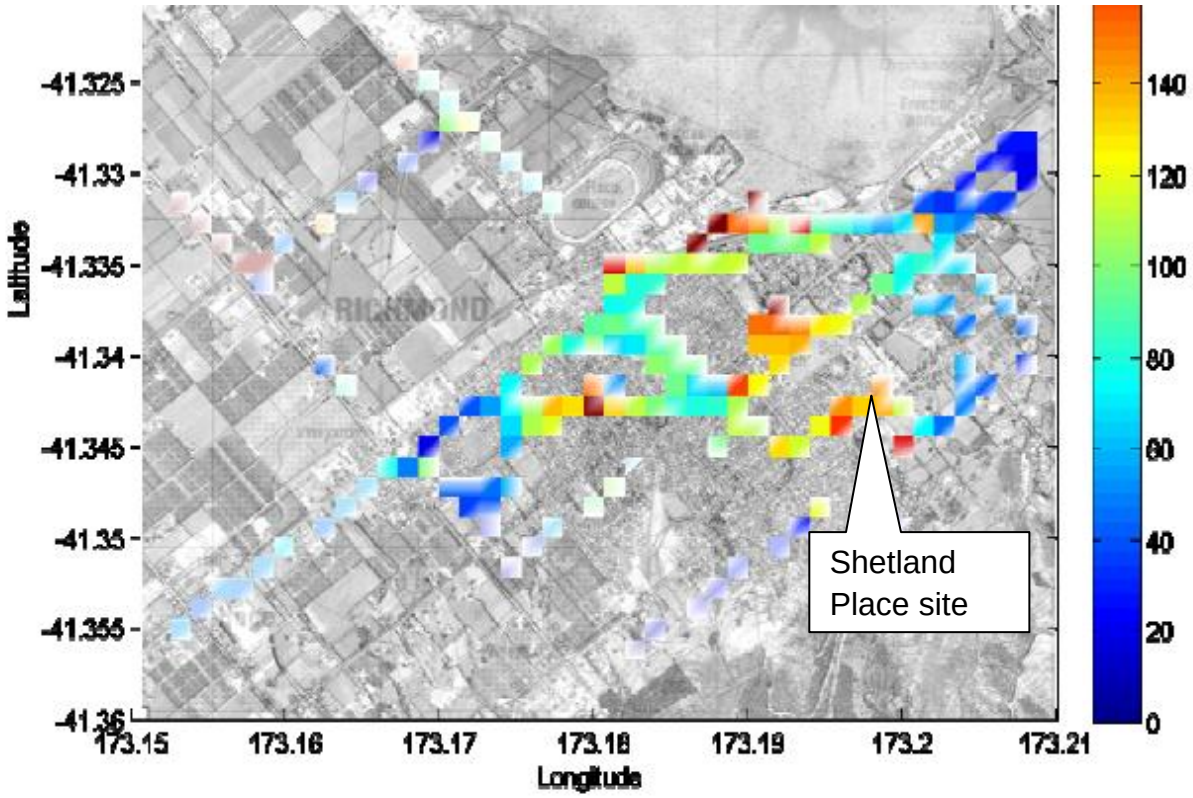

Figure 9: PM_{10} concentrations over Richmond township. The concentrations are averages over 120m^2 grids over six nights when sampling was undertaken within the period of (21-27 July, 2008). The colour scale is PM_{10} concentration in µg m^{-3}.

4. Further Monitoring and Analysis

At this stage it is undecided whether it is worth continuing to rotate the Partisol monitor around the main air pollution hotspots in Richmond and Brightwater (near Starveall Street).

A report on the meteorological model and 3-D air quality dispersion model has been delayed but should be available very soon. Once we have possession of this information further decisions can be made regarding Partisol deployment.

5. Actions to Improve Air Quality

Compliance with Tasman Resource Management Plan rules for emissions from domestic home-heating burners will be included in future a EPC agenda. In order to meet compliance with the NES, it appears to be important that we continue to make progress with this programme.

6. Draft Resolution

THAT the Environment & Planning Committee receives the report entitled "AIR QUALITY IN RICHMOND - AN UPDATE 2011" REP11-10-06.

Trevor James
Resource Scientist