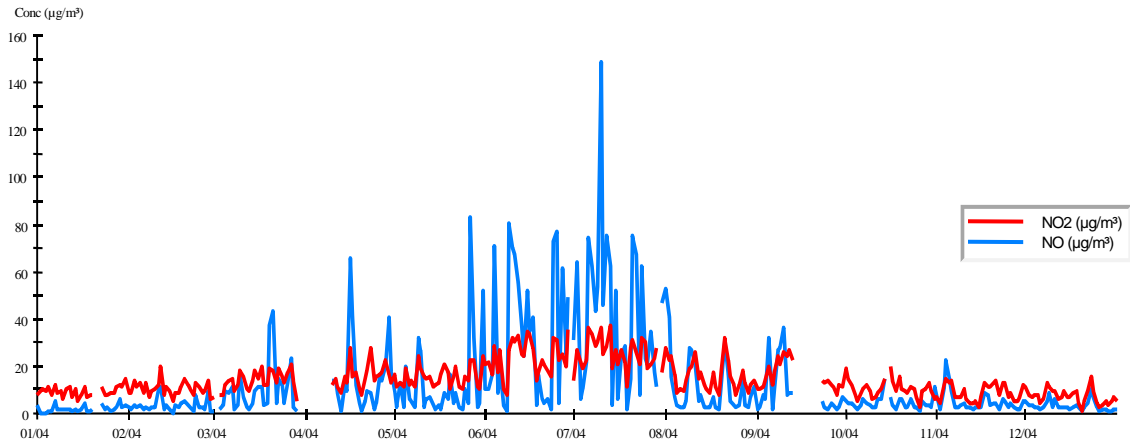
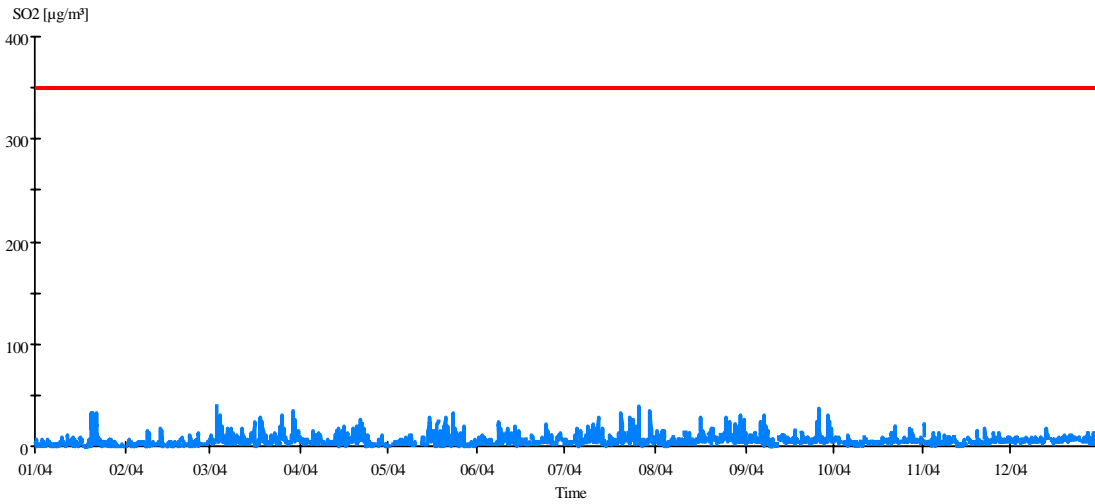


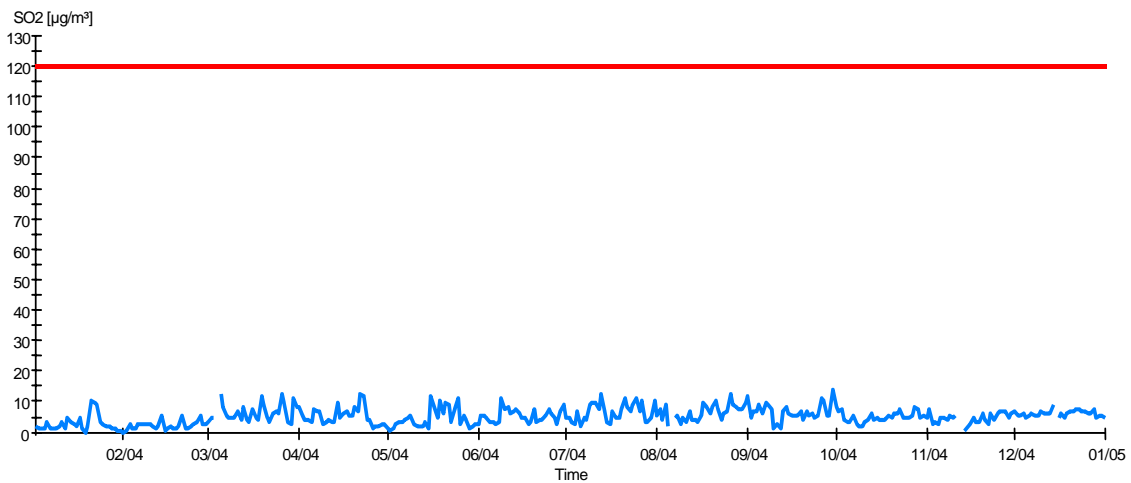
**Figure 28: MFE Burnside NO<sub>2</sub> and NO 24-hour fixed average January–December 2004**



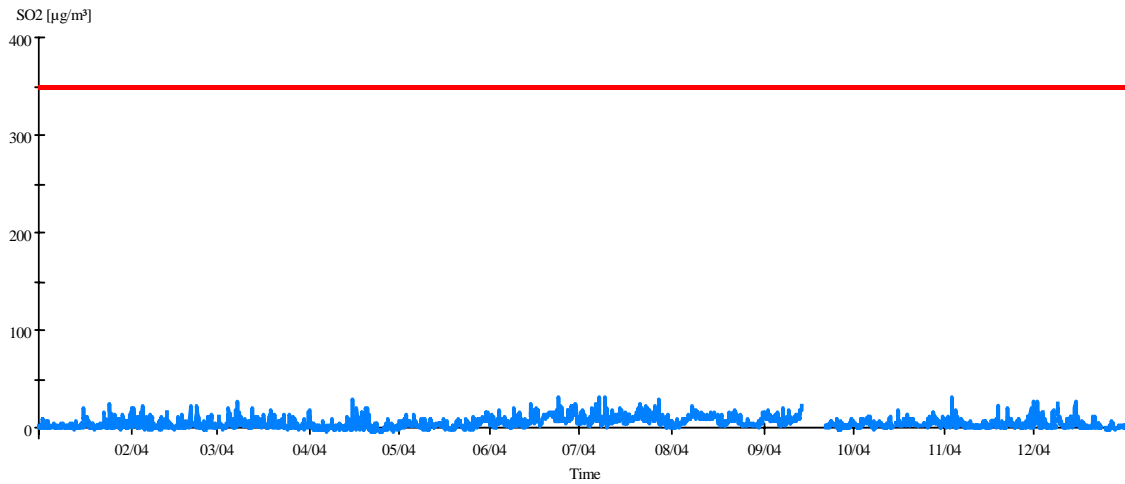
**Figure 29: MFE Gavin Street SO<sub>2</sub> 1-hour fixed average January–December 2004**



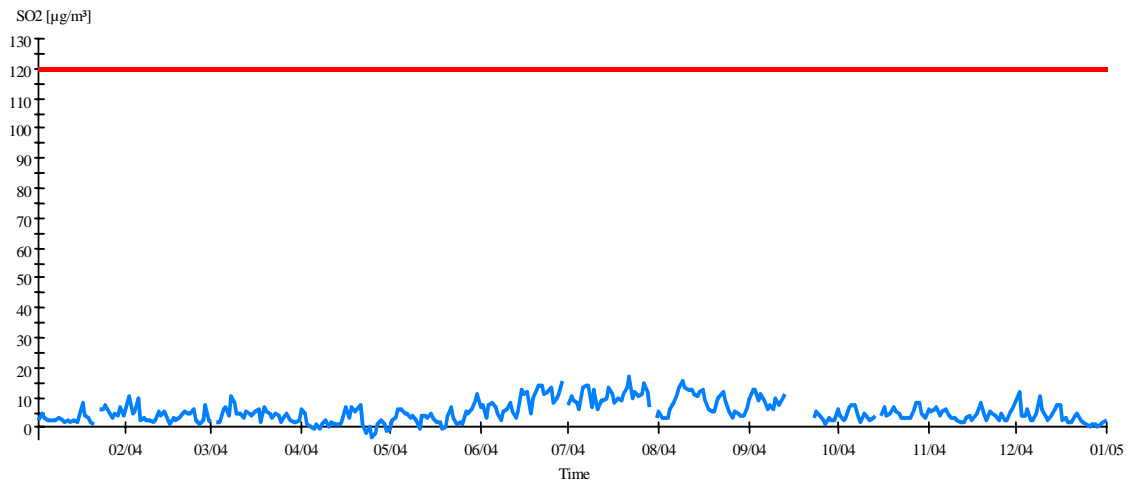
**Figure 30: MFE Gavin Street SO<sub>2</sub> 24-hour fixed average January–December 2004**



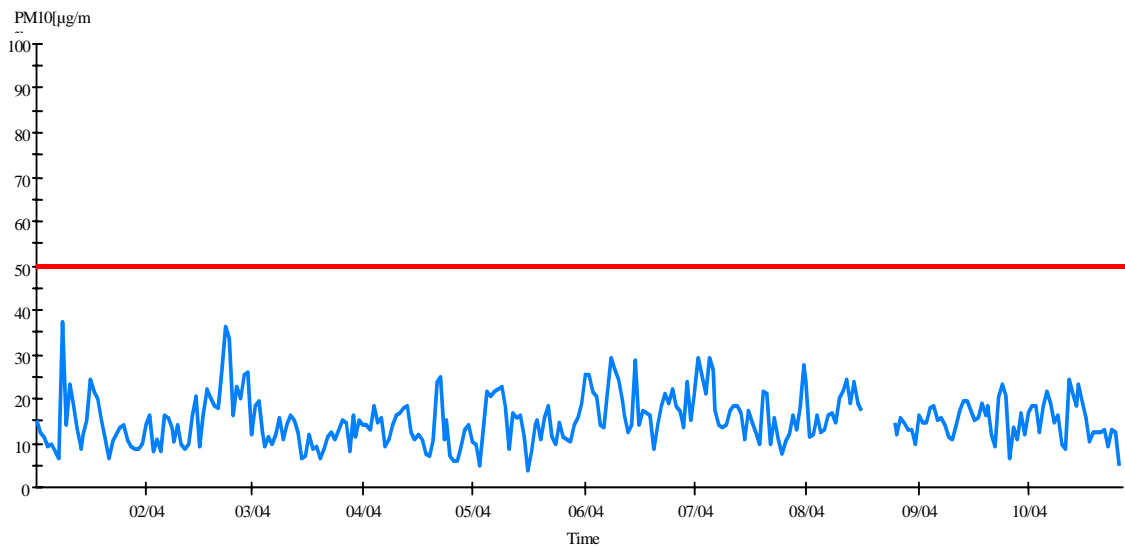
**Figure 31: MFE Burnside SO<sub>2</sub> 1-hour fixed average January–December 2004**



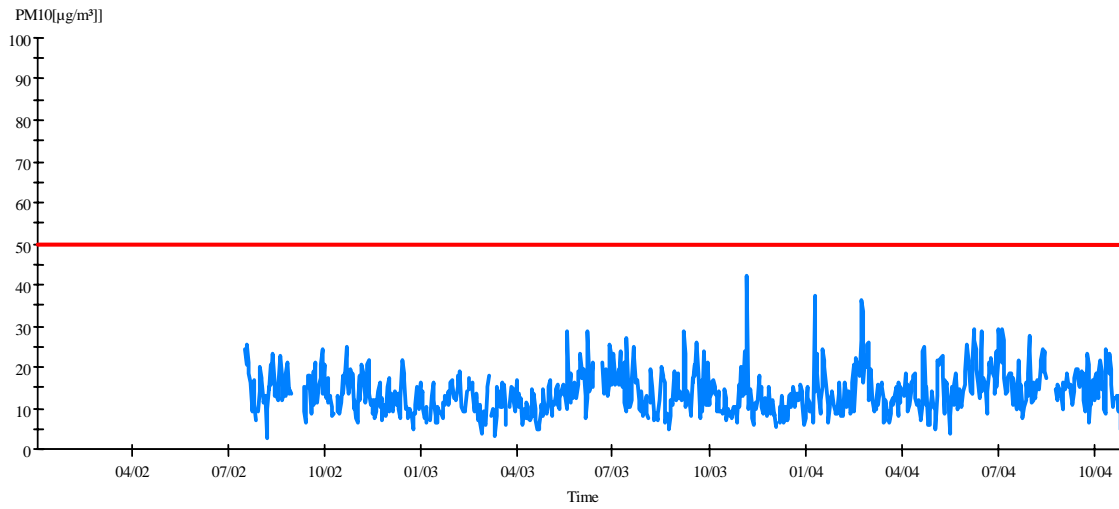
**Figure 32: MFE Burnside SO<sub>2</sub> 24-hour fixed average January–December 2004**



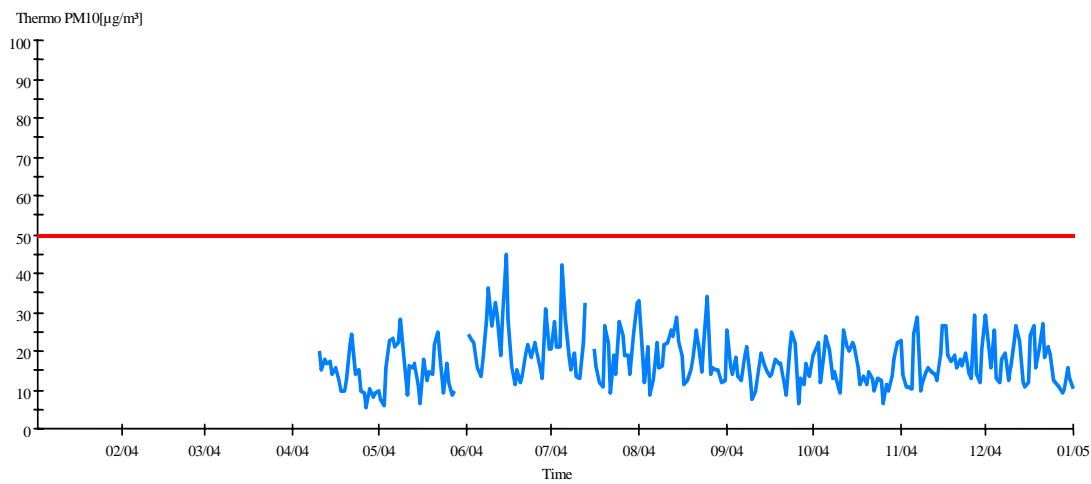
**Figure 33: MFE Kelly Street PM<sub>10</sub> 24-hour fixed average 1 January–26 October 2004**



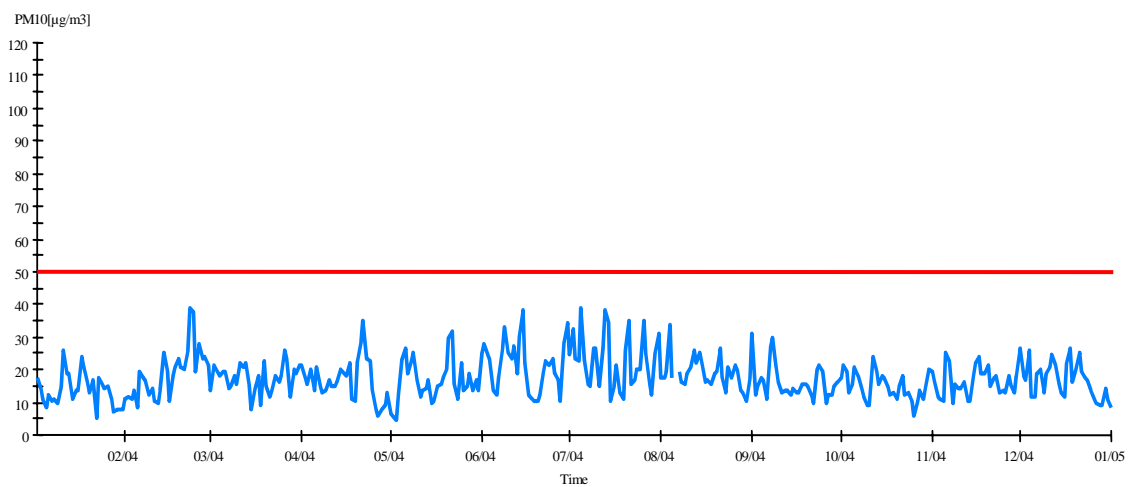
**Figure 34: MFE Kelly Street PM<sub>10</sub> 24-hour fixed average 1 January 2002–26 October 2004**



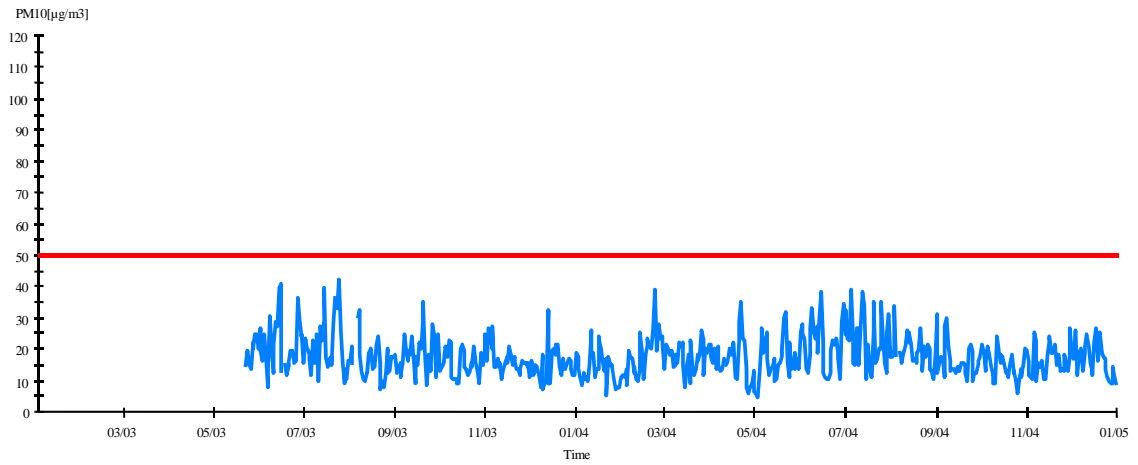
**Figure 35: MFE Kowhai PM<sub>10</sub> 24-hour fixed average January–December 2004**



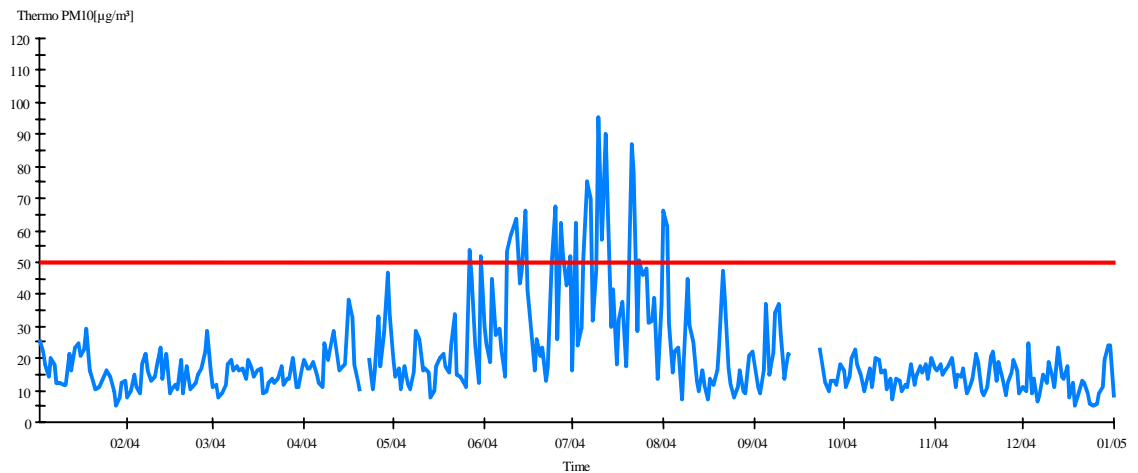
**Figure 36: MFE Gavin Street PM<sub>10</sub> 24-hour fixed average January–December 2004**



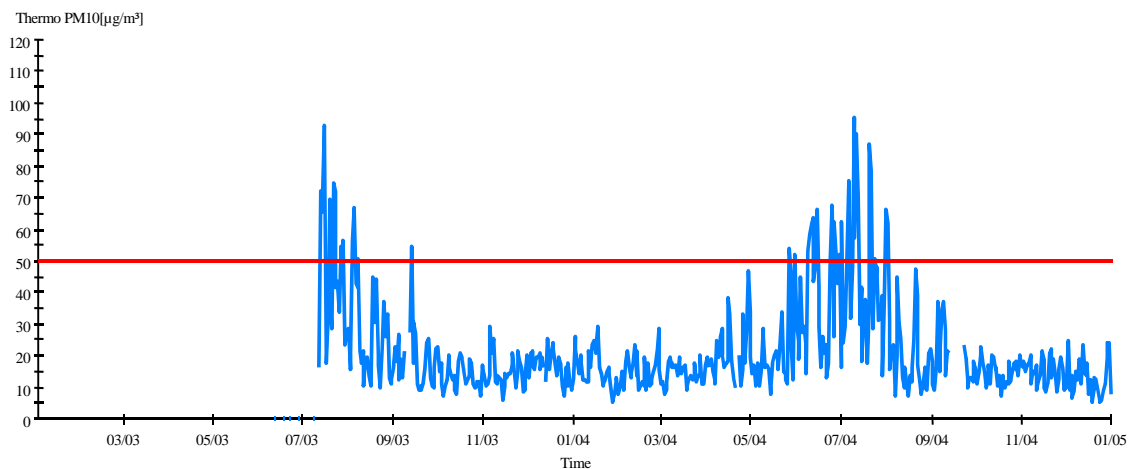
**Figure 37: MFE Gavin Street PM<sub>10</sub> 24-hour fixed average 1 January 2003–31 December 2004**



**Figure 38: MFE Burnside PM<sub>10</sub> 24-hour fixed average January–December 2004**



**Figure 39: MFE Burnside PM<sub>10</sub> 24-hour fixed average 1 January 2003–31 December 2004**



## 7.9 Analysis of PM<sub>10</sub> exceedences at Greers Road, Burnside

The following figures provide further analysis of PM<sub>10</sub> exceedences at Greers Road, Burnside. Figure 40 shows a comparison of relative PM<sub>10</sub> concentrations from different sites in Christchurch over the winter period May to August 2004. The Beta Gauge PM<sub>10</sub> data from Greers Road, Burnside compares well with tapered element oscillating microbalance (TEOM) PM<sub>10</sub> data from Coles Place, St. Albans and shows that PM<sub>10</sub> concentrations are consistent across the city suggesting the incidents are not directly related to very localised sources of PM<sub>10</sub> but are perhaps more related to prevailing meteorological conditions such as temperature inversions.

Figure 41 provides an example of the diurnal trends in air pollution over a 48-hour period during the winter months. Figures 42 to 44 present the meteorological conditions that influence the diurnal trend. It is apparent when comparing wind speed (Figure 42) and PM<sub>10</sub> concentrations (Figure 41) that low wind speeds coincide with PM<sub>10</sub> peaks and conversely higher wind speeds coincide with low PM<sub>10</sub> concentrations. Reduced air mixing, caused by low wind speeds, results in poor dispersion of pollution while an unstable atmosphere caused by high wind speeds is conducive to pollution dispersion.

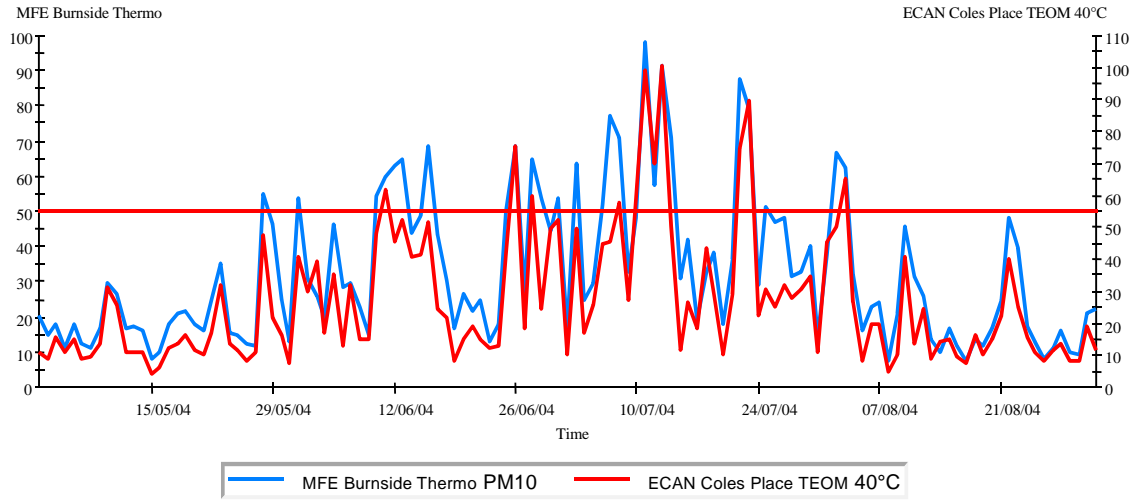
Low temperatures, often coinciding with still atmospheric conditions, can cause temperature inversions. This can contribute to higher PM<sub>10</sub> concentrations being measured as pollution is trapped at ground level. A comparison of temperatures measured at 1.5 and 10 m (Figure 43) does not indicate the presence or absence of a temperature inversion as the inversion height may be greater than 10 m, however, a diurnal trend is apparent. As the temperature drops during the evening, Christchurch residents light their heating appliances causing particle emissions to increase and PM<sub>10</sub> levels to peak just before midnight. As the fires die down and the atmosphere becomes more unstable toward morning, concentrations of PM<sub>10</sub> drop off.

A pollution rose for the same 48-hour period (Figure 44) describing the relationship between wind direction and PM<sub>10</sub> concentrations shows no obvious pattern.

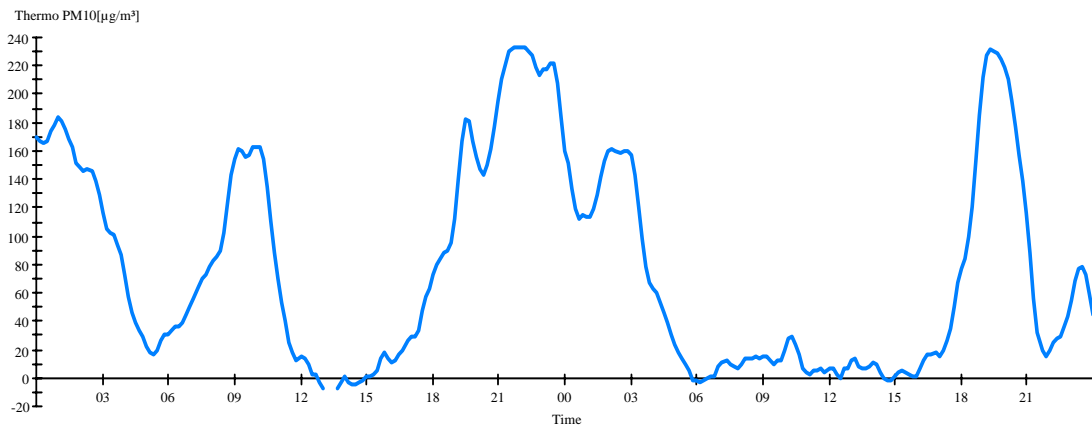
Temperature inversions occur when the ground temperature falls below the surrounding air temperature. Air in contact with the ground is cooled to a lower temperature than the air layers above it. As an inversion continues, air becomes stagnant and pollution becomes trapped in the mixing layer close to the ground.

TEOM PM<sub>10</sub> data from Coles Place, St Albans has been provided courtesy of Environment Canterbury.

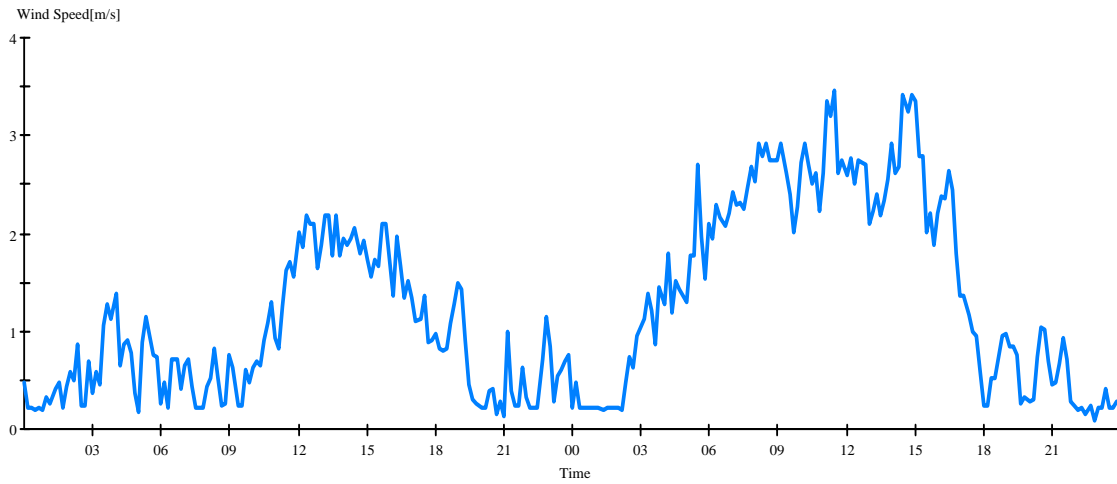
**Figure 40: Christchurch PM<sub>10</sub> comparison, beta gauge versus TEOM, 24-hour fixed average 1 May–30 August 2004**



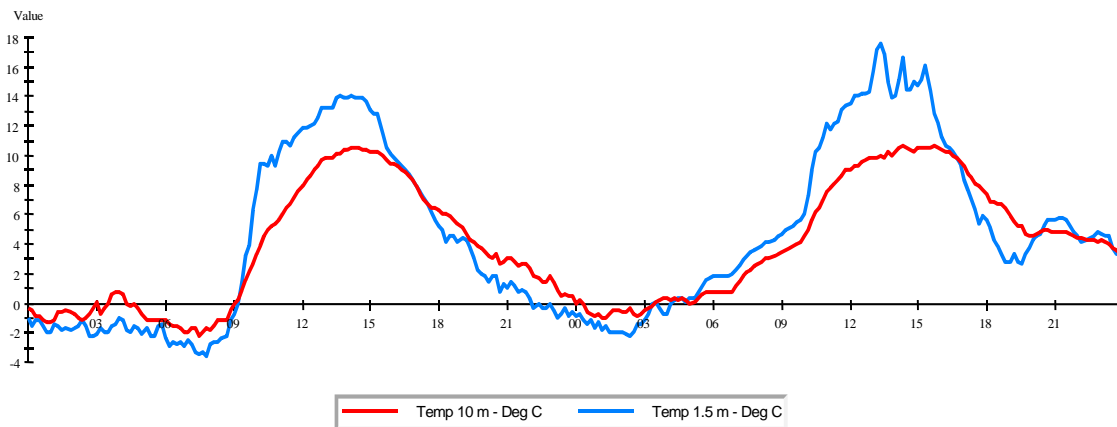
**Figure 41: MFE Burnside PM<sub>10</sub>, typical winter diurnal trend, 24-hour fixed average 9–10 July 2004**



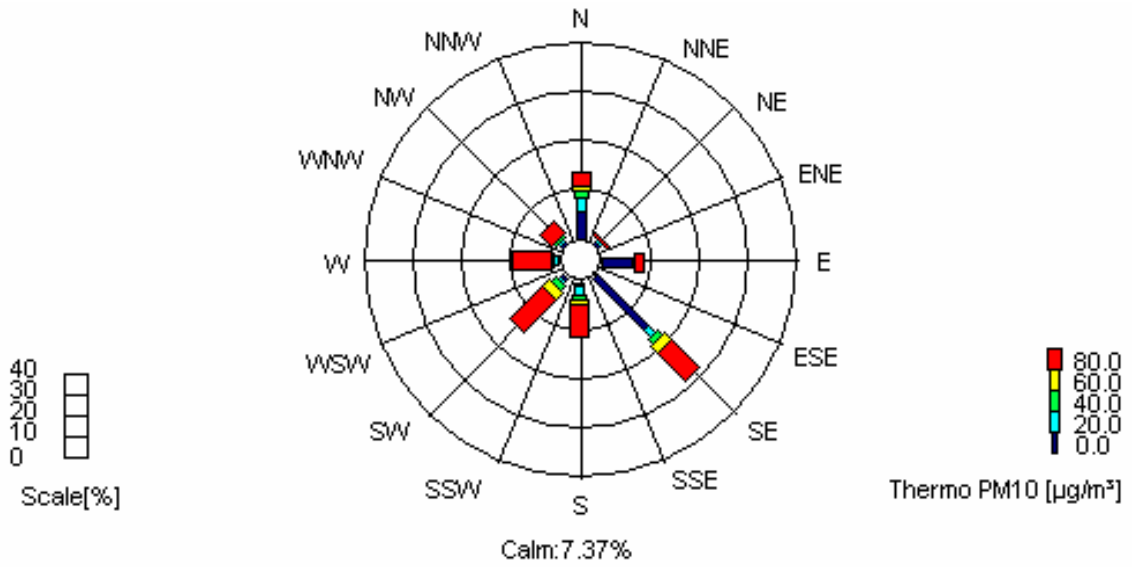
**Figure 42: MFE Burnside wind speed, typical winter diurnal trend, 24-hour fixed average 9–10 July 2004**



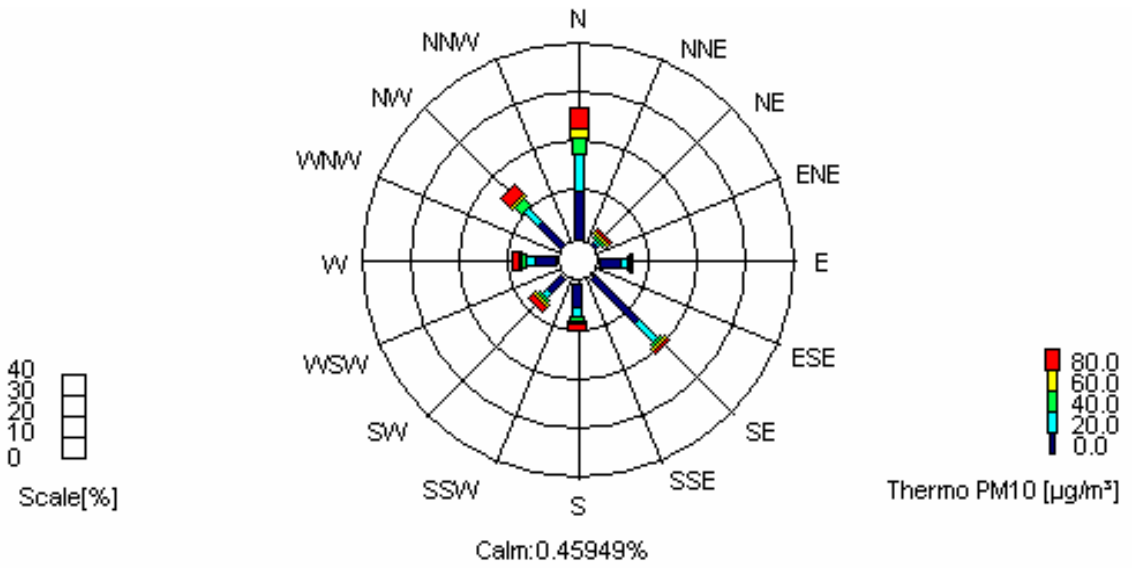
**Figure 43: MFE Burnside ambient temperature, typical winter diurnal trend, 24-hour fixed average 9–10 July 2004**



**Figure 44: MFE Burnside pollution rose, 24-hour average 9–10 July 2004**



**Figure 45: MFE Burnside pollution rose 24-hour average June 2004**



**Figure 46: MFE Burnside pollution rose 24-hour average July 2004**

