

Change in air pollution levels during Alert Level 3 COVID-19 (28 April-13 May) seen in the Auckland Council air quality monitoring network

Summary:

- Pollutant concentrations increased across all sites as the alert level was eased from Level 4, with the largest rise of NO₂ (99%) at Henderson, PM₁₀ (47%) at Glen Eden and PM_{2.5} (17%) at Queen Street, compared to the Level 4 lockdown period.
- The city centre (Queen Street) showed a marked increase in NO₂ (18%), PM₁₀ (24%) and PM_{2.5} (17%).
- The traffic pollutant nitrogen dioxide (NO₂) stayed below normal levels (of previous years), reflecting below-normal traffic activities.
- Particulate matter (PM₁₀ and PM_{2.5}) rose to above or near normal levels, possibly due to irregular wet and windy weather conditions which increased the contribution of non-traffic sources (e.g., dust or sea salt) to particulate matter.

Air pollution in the Auckland region has been monitored by Auckland Council since the late 1990s at representative monitoring sites across the region. Data from our monitoring network is used to assess compliance with the National Environmental Standards for Air Quality (NES-AQ). Nitrogen dioxide (NO₂) is primarily associated with traffic (vehicle emissions) while PM₁₀ and PM_{2.5} (particulate matter with diameters less than 10 and 2.5 microns) have a number of sources such as traffic, road dust, sea salt and smoke from home heating fires (particularly during winter).

As the nation moved into Alert Level 3 from Level 4 from midnight 27 April, air pollution levels (averaged over a 24-hour period) increased across the region at eight monitoring sites. Hourly data showed large increases at some locations, but a 24-hour average provides a more comparable figure. In addition to emissions, other variables, such as weather conditions, can contribute to the changes of pollution levels. To remove the influence of meteorological conditions, we also compared pollution levels averaged over the alert level 3 period (28 April - 13 May) to the same period (i.e., 28 April - 13 May) of previous years (up to five years from 2015).

In the whole Level 3 period (28 April – 13 May), pollution levels increased across all sites in comparison to the period of the Level 4 restrictions (26 March - 27 April). NO₂ rose between 18% at Queen Street and 99% at Henderson. PM₁₀ increased between 12% at Patumahoe and 46% at Glen Eden. PM_{2.5} was up 17% at Queen Street and 15% at Patumahoe. The city centre (Queen Street) showed a marked increase in NO₂ (18%), PM₁₀ (24%) and PM_{2.5} (17%).

Compared to the same period of previous years, NO₂ stayed below normal levels, ranging from 52% of normal levels at Glen Eden to 80% of normal levels at Penrose. This reflects that traffic has not returned to normal under Level 3 restrictions. Particulate matter (PM₁₀ and PM_{2.5}) rose to above or near normal levels, ranging from 75% of normal levels at Pakuranga to 117% of normal levels at Glen Eden. This was likely due to irregular wet and windy weather conditions, which increased the contribution of non-traffic sources (e.g., dust or sea salt) to particulate matter.

Produced by the Research and Evaluation Unit (RIMU). May 2020.

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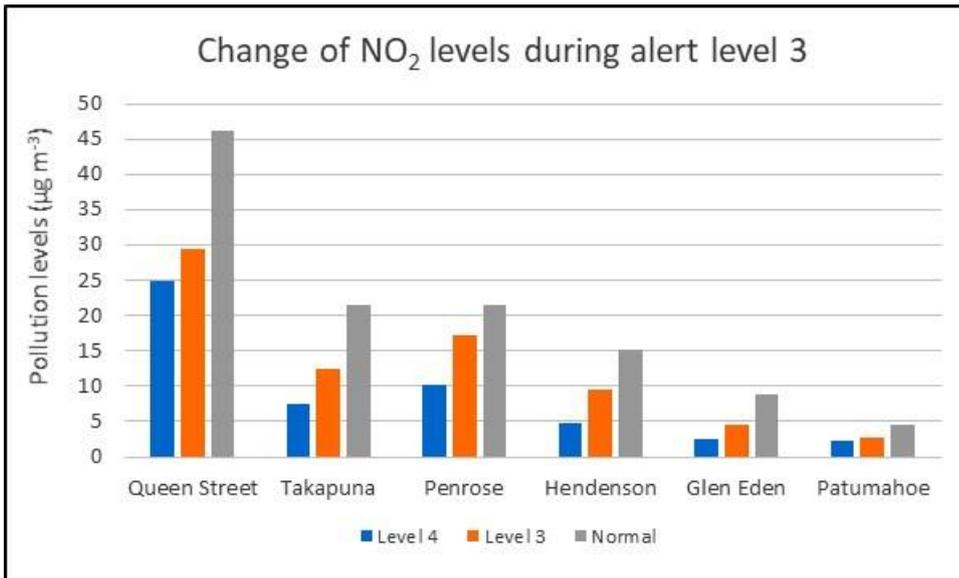


Figure 1. NO₂ levels averaged over the alert level 3 period (28 April – 13 May), in comparison with those of the level 4 period (26 March - 27 April) and of the same period (i.e., 28 April – 13 May) of previous years (normal levels).

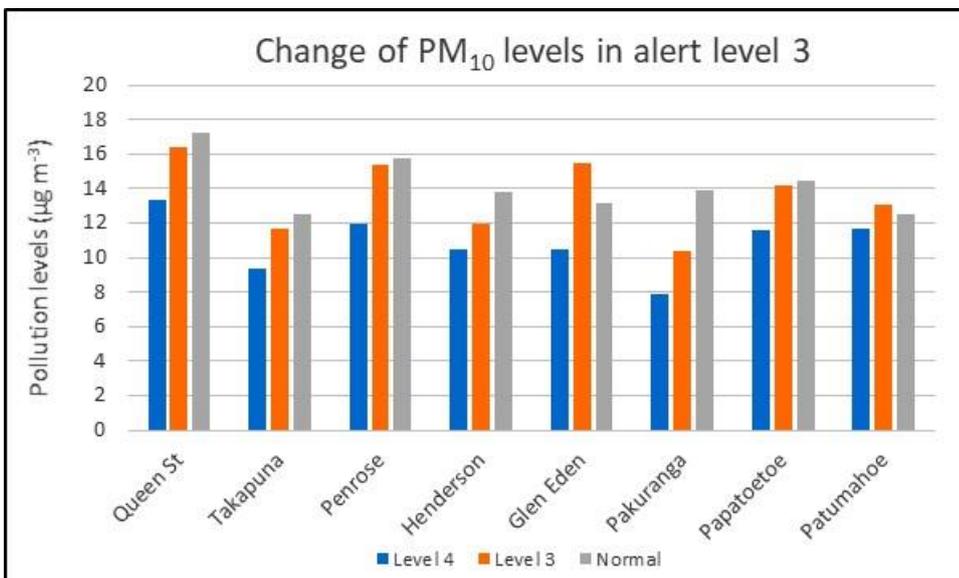


Figure 2. PM₁₀ levels averaged over the alert level 3 period (28 April – 13 May), in comparison with those of the level 4 period (26 March - 27 April) and of the same period (i.e., 28 April – 13 May) of previous years (normal levels).

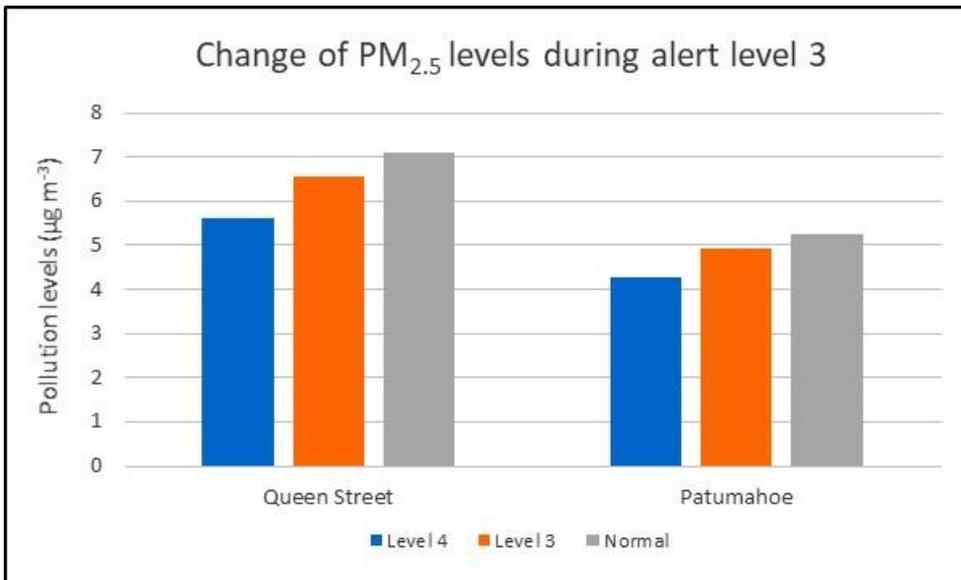


Figure 3. PM_{2.5} levels averaged over the alert level 3 period (28 April – 13 May), in comparison with those of the level 4 period (26 March - 27 April) and of the same period (i.e., 28 April – 13 May) of previous years (normal levels).

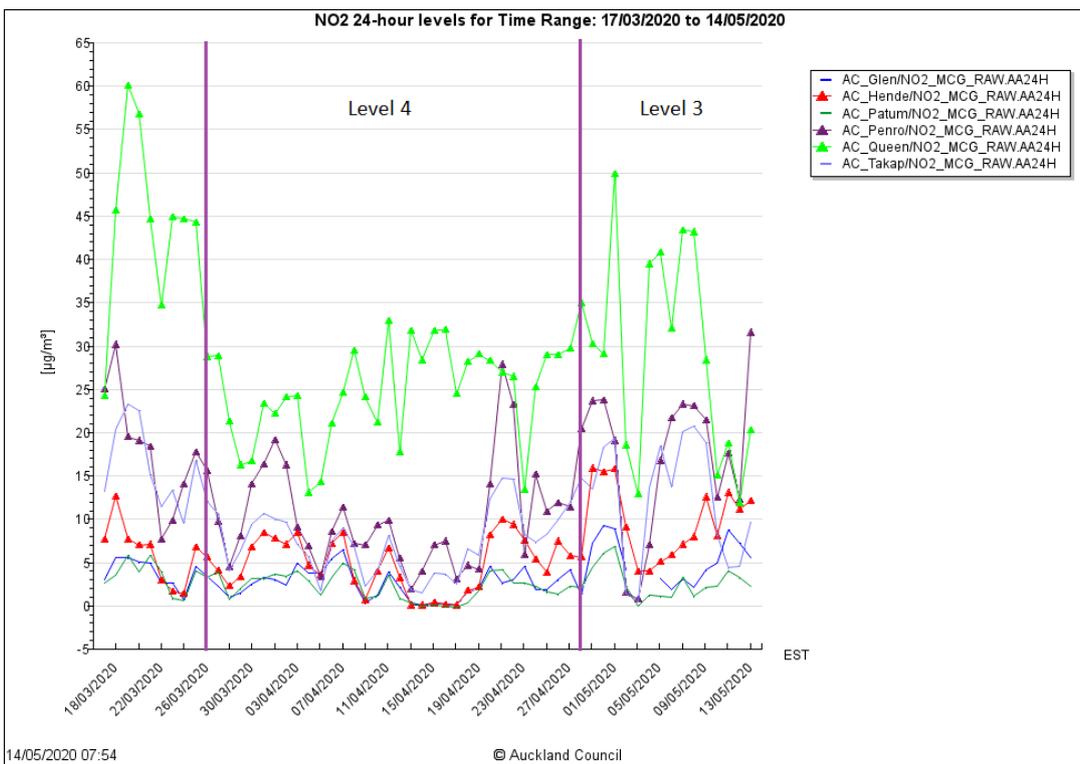


Figure 4. NO₂ 24-hour levels from 17 March to 13 May 2020, covering the alert level 4 (26 March - 27 April) and level 3 (28 April – 13 May) periods.

