

## **Reduction of air pollution levels seen in the Auckland Council air quality monitoring network for the lockdown (Level 4 Alert) period (26 March-27 April)**

This document provides an initial overview of key changes measured in the Auckland Council air quality monitoring network over the full Alert Level 4 lockdown period

### **Summary**

- Traffic pollutant nitrogen dioxide (NO<sub>2</sub>) levels declined across all the sites, immediately on day one of the Level 4 alert and stayed lower throughout the lockdown period with the largest drop at Takapuna (58%) and Henderson (57%).
- Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) levels did not show such a consistent pattern due to contribution from non-traffic sources (e.g., dust or sea salt), resulting in reduction at some sites and little change at other sites.
- The city centre (Queen Street) showed a marked drop in NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> levels, by 33%, 12% and 11%, respectively.

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).

As the nation came into lockdown from midnight 25 March, air pollution levels (averaged over a 24-hour period) dropped on 26 March across the region at eight monitoring sites in Glen Eden, Henderson, Pakuranga, Papatōetoe, Patumahoe, Penrose, Queen Street, and Takapuna. Hourly data showed bigger drops at some locations, but a 24-hour average provides a more comparable figure. Of interest, we saw decreases in PM<sub>10</sub> and PM<sub>2.5</sub> (particulate matter with diameters less than 10 and 2.5 microns) and nitrogen dioxide (NO<sub>2</sub>). Nitrogen dioxide is primarily associated with traffic (vehicle emissions) while particulate matter has a number of sources such as traffic, road dust, sea salt and smoke from home heating fires (particularly during winter).

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 compared pollution levels averaged over the whole period (from 26 March to 27 April) to the same period (i.e., from 26 March to 27 April) of previous years (up to five years from 2015 depending on the availability of the data). The comparison with previous years provides a better demonstration of the scale of changes due to the lockdown and now data for the whole period gives us more certainty around the changes seen.

In the first two weeks of lockdown (26 March to 8 April), pollution levels dropped across all sites in the first few days, then remained at that new lower level rather than continuing to decline. In week three (9 - 15 April), NO<sub>2</sub> declined further. In contrast, PM<sub>10</sub> and PM<sub>2.5</sub> increased. This was likely due to unsettled windy weather after the Easter weekend, which diluted traffic pollutant NO<sub>2</sub> and increased the contribution of dust or sea salt to PM<sub>10</sub> and PM<sub>2.5</sub>. While changes for PM<sub>10</sub> and PM<sub>2.5</sub> were similar at Queen Street to other sites, NO<sub>2</sub> at Queen Street did not show the same decline, possibly due to less wind dispersing NO<sub>2</sub> in this area. For the remainder of the period (16 - 27 April), weather improved with some dry and light wind days. Subsequently, NO<sub>2</sub> levels bounced

back a little with little change at Queen Street and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) levels dropped somewhat closer to week two levels.

Over the whole period, NO<sub>2</sub> levels decreased across all the sites, between 33% at Queen Street and 58% at Takapuna. Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) levels did not show such a consistent pattern due to contribution from non-traffic sources (e.g., dust or sea salt). PM<sub>10</sub> levels reduced by more than 10% at five sites (Pakuranga, Papatoetoe, Penrose, Queen Street, and Takapuna), and showed little change (less than 10%) at other three sites (Glen Eden, Henderson, and Patumahoe). PM<sub>2.5</sub> levels dropped by 11% at Queen Street and showed little change at the rural site (Patumahoe). The city centre (Queen Street) showed a marked drop in NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> levels, by 33%, 12% and 11%, respectively.

Produced by the Research and Evaluation Unit (RIMU), May 2020. For any queries please contact [RIMU@aucklandcouncil.govt.nz](mailto:RIMU@aucklandcouncil.govt.nz)

Table 1. Changes of pollution levels in the level 4 lockdown period (from 26 March to 27 April) vs the same period (i.e., from 26 March to 27 April) of previous years.

Pollutant	Queen St	Takapuna	Penrose	Henderson	Glen Eden	Pakuranga	Papatoetoe	Patumahoe
NO <sub>2</sub>	-33.2%	-57.7%	-46.6%	-57.2%	-47.5%	No data	No data	-39.2%
PM <sub>10</sub>	-11.7%	-14.6%	-14.2%	-1.7%	-3.0%	-31.6%	-10.3%	8.7%
PM <sub>2.5</sub>	-10.9%	No data	No data	No data	No data	No data	No data	-0.6%

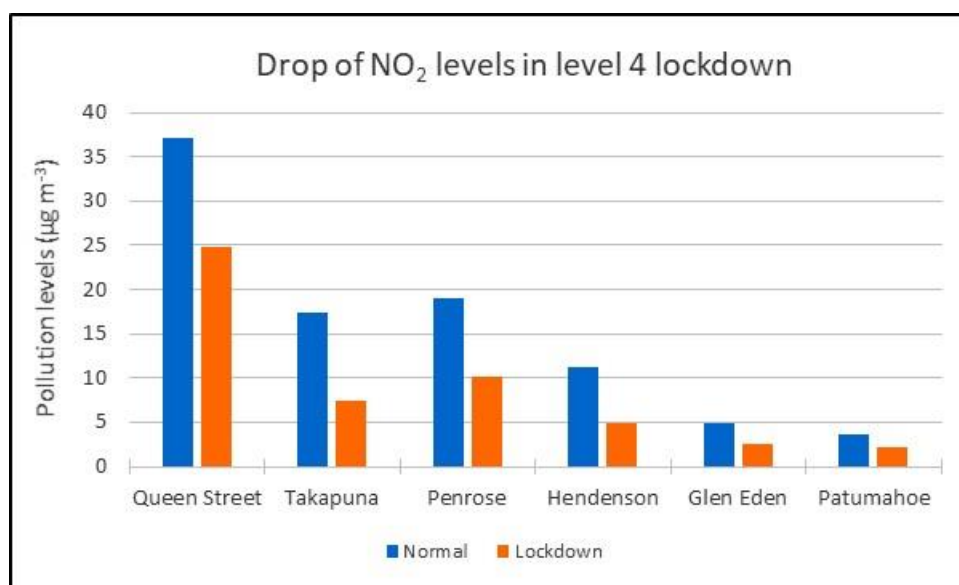


Figure 1. NO<sub>2</sub> levels averaged over the level 4 lockdown period (from 26 March to 27 April) vs the same period (i.e., from 26 March to 27 April) of previous years.

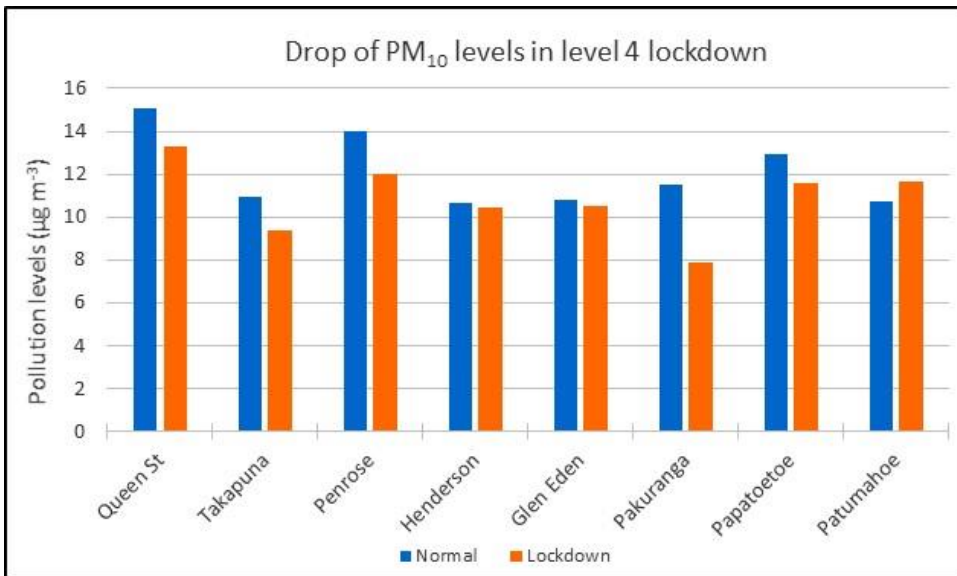


Figure 2. PM<sub>10</sub> levels averaged over the level 4 lockdown period (from 26 March to 27 April) vs the same period (i.e., from 26 March to 27 April) of previous years.

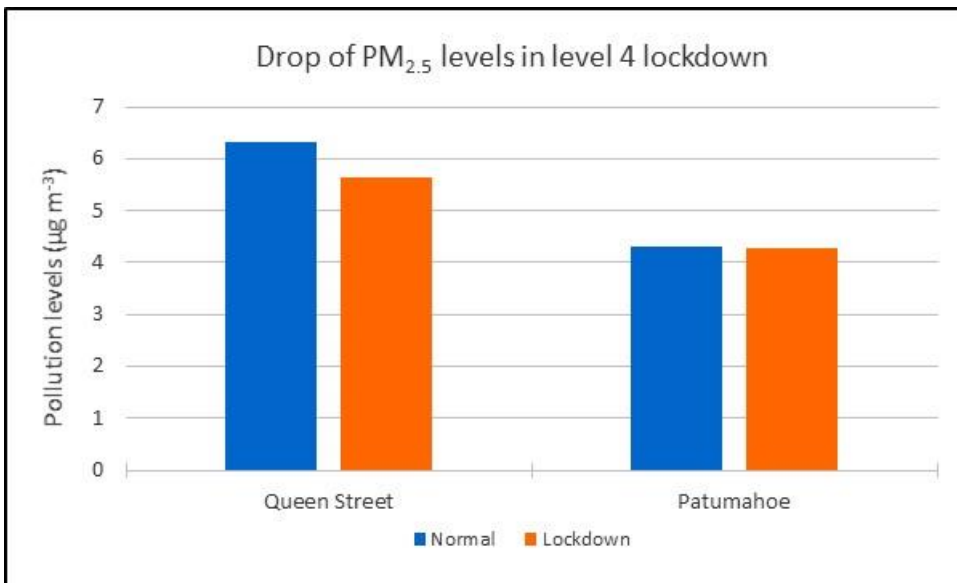


Figure 3. PM<sub>2.5</sub> levels averaged over the level 4 lockdown period (from 26 March to 27 April) vs the same period (i.e., from 26 March to 27 April) of previous years.

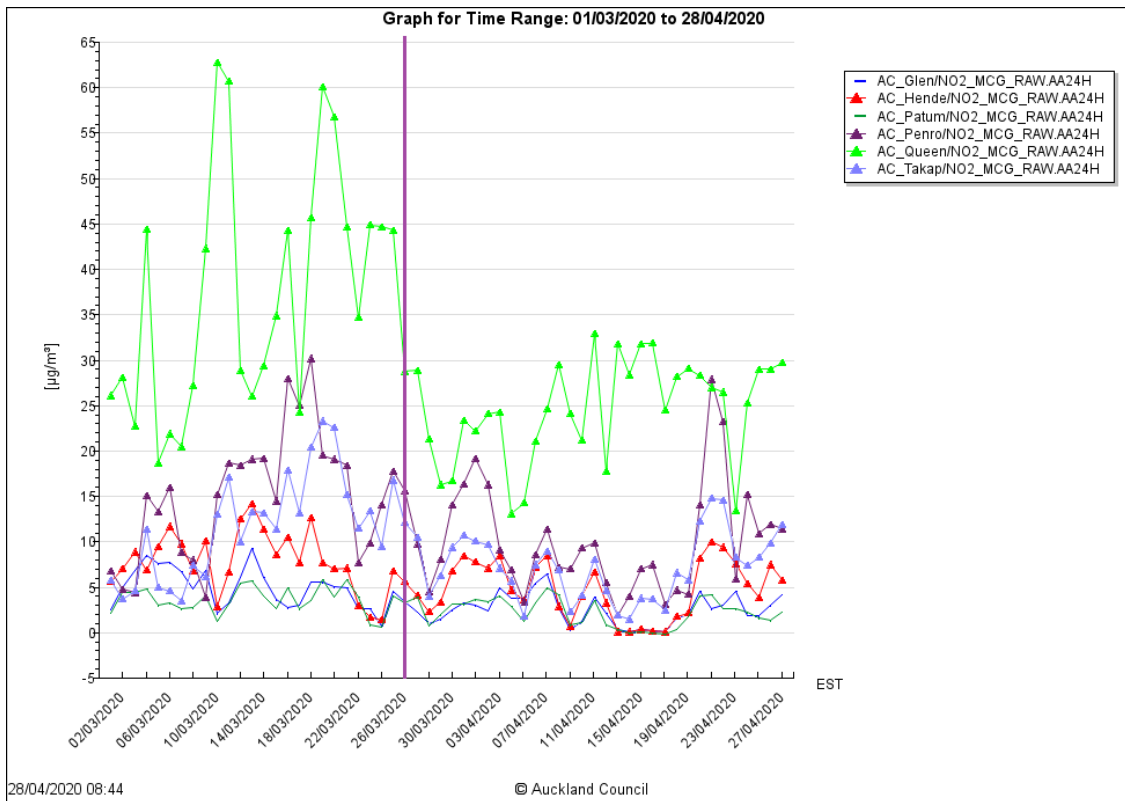


Figure 4. NO<sub>2</sub> 24-hour levels from 1 March to 27 April 2020.

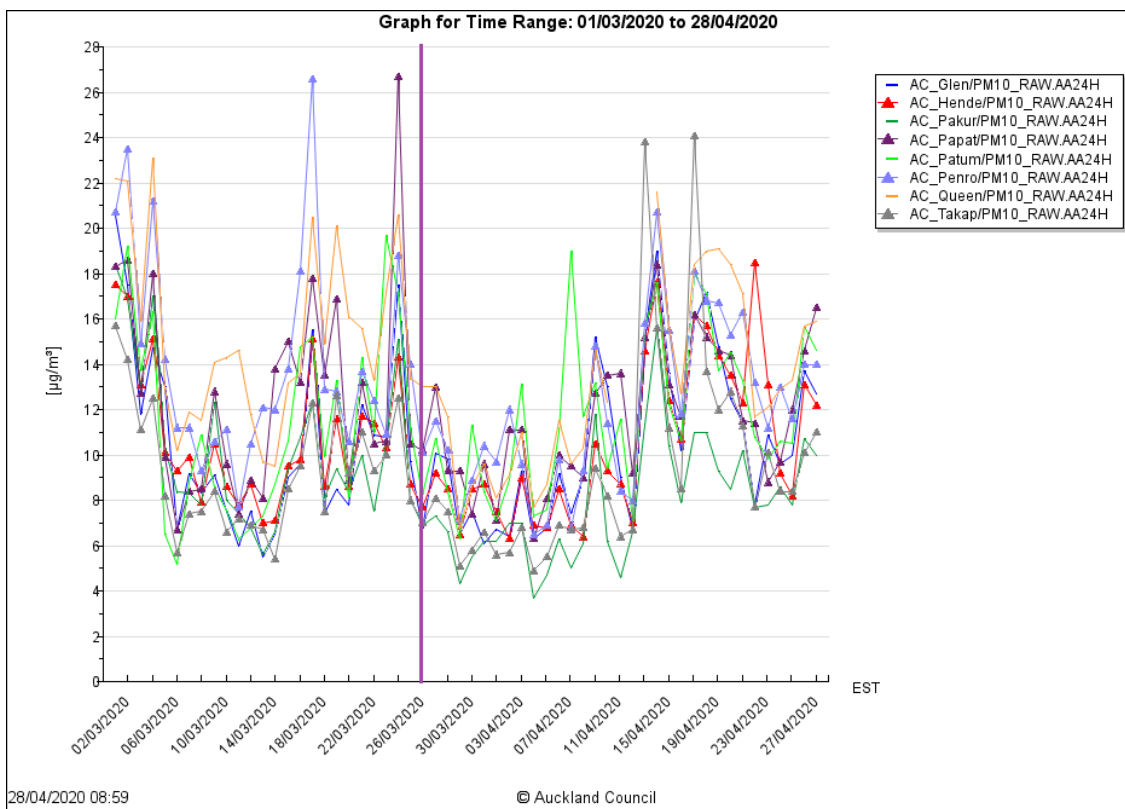


Figure 5. PM<sub>10</sub> 24-hour levels from 1 March to 27 April 2020.

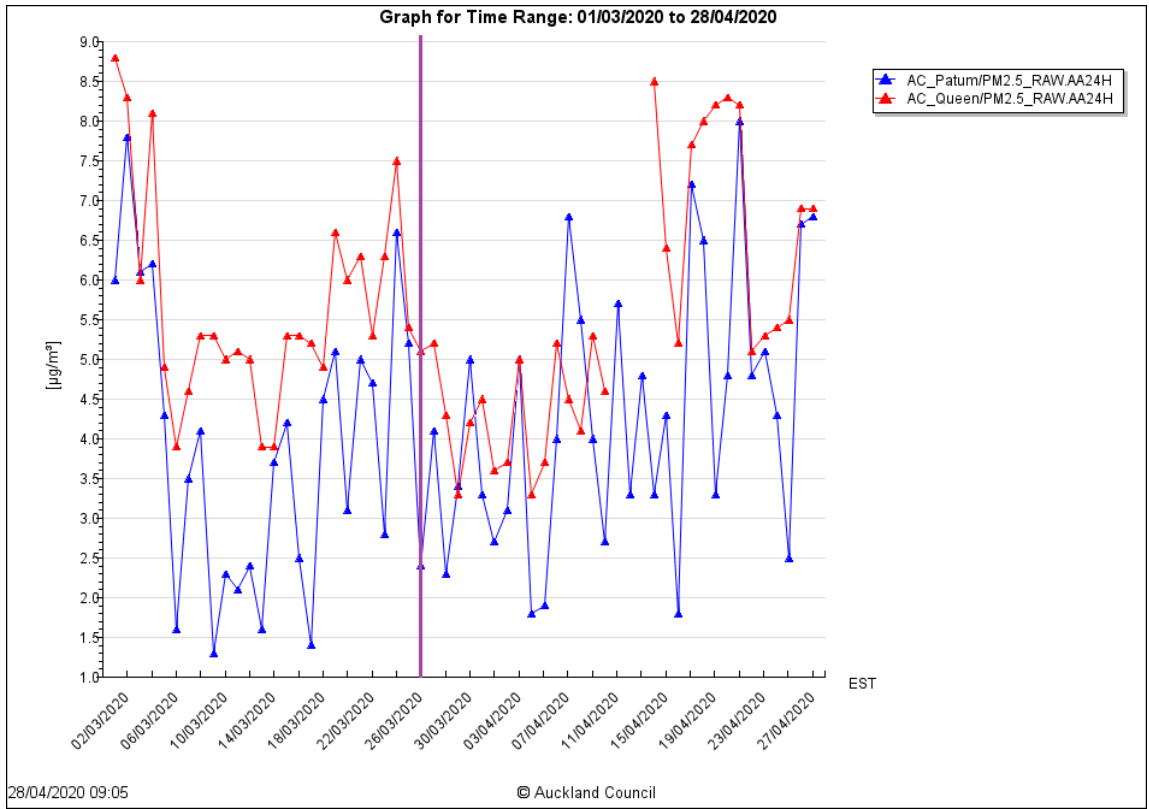


Figure 6. PM<sub>2.5</sub> 24-hour levels from 1 March to 27 April 2020. There was a data break at Queen Street in 11-12 April due to monitor malfunction.