



20 December  
2021

# Auckland Air Quality Report

Monthly update

Research and  
Evaluation Unit

RIMU



## Introduction

Auckland Council continuously collects air quality data to assess compliance with national standards and provide information to aid policy development and evaluation. The data the council collects enables us to quantify ambient air quality in the region and note spatial and temporal variations. This report presents a monthly update on air quality in Auckland. It has three sections: sections A and B present tables and graphics illustrating air quality status in the Auckland region based on the data collected from continuous monitoring sites across the region. For this edition, section C focuses on one monitoring site – Papatoetoe. The monthly update is prepared using validated data which is generally available one month after raw data is collected. This update covers data to October 31.

## Summary

- No breach of national air quality standards has occurred this year (January to October).
- Overall, air quality has slightly improved in Auckland over the last two years. A key contributor has been the COVID-19 restrictions.
- The highest monthly concentrations of air contaminants this year were found at Queen St and Customs St.
- Over the past two years, there has been a downward trend in nitrogen dioxide (NO<sub>2</sub>) concentration in the Auckland city centre. This was also mainly due to COVID-19 restrictions.

What we monitor		Why we monitor
<b>Air</b>	Particulate matter (PM) - PM <sub>10</sub> and PM <sub>2.5</sub>	Tiny particles (particulate matter) from polluting sources such as vehicles and smoke get into the air. Breathing them may cause health problems.
	Nitrogen dioxide (NO <sub>2</sub> )	Vehicles are the main source of NO <sub>2</sub> in Auckland. It can irritate the lungs, increasing susceptibility to asthma and lowering resistance to respiratory infections.
	Other Pollutants	Air pollutants ozone, sulphur dioxide, carbon monoxide, black carbon and volatile organic compounds (VOCs) like benzene cause adverse health effects at elevated concentrations.
<b>Greenhouse gas emissions</b>	Carbon dioxide equivalent (CO <sub>2</sub> e)	The climate is warming due to increased greenhouse gas (GHG) levels in the atmosphere caused by human activities. Reducing GHG emissions will limit temperature rise.

Data can be viewed on the [environmental data portal](#) , [LAWA](#) or requested from [environmentaldata@aucklandcouncil.govt.nz](mailto:environmentaldata@aucklandcouncil.govt.nz). Full state and trends analyses and reports are prepared every few years (last report; [Trends in Auckland's air quality 2006-2018](#)).

See the [frequently asked questions](#) about the Auckland air quality monitoring programme.

## Section A – Data tables

**Table 1. Summary information about Auckland’s air quality monitoring programme – 1 January to 31 October 2021**

<b>Number of continuous monitoring sites</b>	<b>10</b>
<b>Location of monitoring sites</b>	Queen St, Customs St, Khyber Pass Rd, Penrose, Henderson, Takapuna, Glen Eden, Pakuranga, Papatoetoe, and Patumahoe
<b>Standard contaminants monitored</b>	PM <sub>10</sub> (fine particles < 10 microns in diameter), carbon monoxide (CO), nitrogen dioxide (NO <sub>2</sub> ), ozone (O <sub>3</sub> ), and sulphur dioxide (SO <sub>2</sub> )
<b>Other key contaminants monitored</b>	PM <sub>2.5</sub> (fine particles < 2.5 microns in diameter), and black carbon
<b>Number of exceedances of National Environmental Standards for Air Quality (NESAQ) in 2021</b>	0
<b>Number of exceedances of Auckland Ambient Air Quality Targets in 2021</b>	1 (PM <sub>2.5</sub> ) (24 June 2021 at Pakuranga)
<b>Maximum PM<sub>10</sub> 24-hour mean (Jan - Oct)</b>	41.5 µg m <sup>-3</sup> (83% of NESAQ) ↔ recorded at Queen St on 25 September 2021
<b>Maximum PM<sub>2.5</sub> 24-hour mean (Jan - Oct)</b>	26.5 µg m <sup>-3</sup> (106% of Auckland target) ↔ recorded at Pakuranga on 24 June 2021
<b>Maximum NO<sub>2</sub> 1-hour mean (Jan - Oct)</b>	200 µg m <sup>-3</sup> (100% of NESAQ) ↔ recorded at Customs St on 15 March 2021
<b>Maximum SO<sub>2</sub> 1-hour mean (Jan - Oct)</b>	25.2 µg m <sup>-3</sup> (7% of NESAQ) ↔ recorded at Penrose on 20 October 2021
<b>Maximum O<sub>3</sub> 1-hour mean (Jan - Oct)</b>	72 µg m <sup>-3</sup> (48% of NESAQ) ↔ recorded at Patumahoe on 26 September 2021
<b>Maximum CO running 8-hour mean (Jan - Oct)</b>	Approximately 2 mg m <sup>-3</sup> (20% of NESAQ) ↔ recorded at Khyber Pass Rd on 1 July 2021
<b>Written reports framework</b>	<a href="#">Monthly updates</a> , <a href="#">state of the environment report</a> , <a href="#">trends report</a> (next report Mar 2022)

**Table 2. General changes in concentration of key contaminants monitored for the last 10, 22 and 34 months.**

● indicates an increase      ● indicates a decrease      ● indicates no significant change      n/a implies not applicable.

	PM <sub>10</sub>			PM <sub>2.5</sub>			NO <sub>2</sub>			Black carbon			Ozone			CO			SO <sub>2</sub>			Air Quality Index (AQI)			
Site	Last 10 months	Last 22 months	Last 34 months	Last 10 months	Last 22 months	Last 34 months	Last 10 months	Last 22 months	Last 34 months	Last 10 months	Last 22 months	Last 34 months	Last 10 months	Last 22 months	Last 34 months	Last 10 months	Last 22 months	Last 34 months	Last 10 months	Last 22 months	Last 34 months	Last 10 months	Last 22 months	Last 34 months	Site
Customs Street	n/a	n/a	n/a	●	●	n/a	●	●	n/a	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	n/a	n/a	n/a	n/a	Customs Street
Glen Eden	●	●	●	●	●	●	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	●	Glen Eden
Henderson	●	●	●	n/a	n/a	n/a	●	●	●	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	●	Henderson
Khyber Pass Road	●	●	●	n/a	n/a	n/a	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	Khyber Pass Road
Pakuranga	●	●	●	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Pakuranga
Papatoetoe	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Papatoetoe
Patumahoe	●	●	●	●	●	●	●	●	●	n/a	n/a	n/a	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	●	●	●	Patumahoe
Penrose	●	●	●	●	●	●	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	●	●	●	●	Penrose
Takapuna	●	●	●	●	●	●	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	●	Takapuna
Queen Street	●	●	●	●	●	●	●	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	●	Queen Street
	PM <sub>10</sub>			PM <sub>2.5</sub>			NO <sub>2</sub>			Black carbon			Ozone			CO			SO <sub>2</sub>			Air Quality Index (AQI)			

## Notes

Effective dates: 10 months (1 Jan 2021 to 31 Oct 2021), 22 months (1 Jan 2020 to 31 Oct 2021), and 34 months (1 Jan 2019 to 31 Oct 2021)

PM<sub>10</sub> is monitored at Glen Eden, Henderson, Khyber Pass Rd, Pakuranga, Papatoetoe, Patumahoe, Penrose, Takapuna, and Queen St.

PM<sub>2.5</sub> is monitored at Customs St, Glen Eden, Pakuranga, Patumahoe, Penrose, Takapuna, and Queen St.

NO<sub>2</sub> is monitored at Customs St, Glen Eden, Henderson, Khyber Pass Rd, Patumahoe, Penrose, Takapuna, and Queen St.

Black carbon is monitored at Customs St, and Henderson.

CO is monitored at Khyber Pass Rd.

Ozone is monitored at Patumahoe.

SO<sub>2</sub> is monitored at Customs St, and Penrose.

In Aug, Sep, and Oct due to malfunction of PM<sub>2.5</sub> sensors there is no PM<sub>2.5</sub> data for Glen Eden, Customs Street and Pakuranga sites.

Weather changes significantly affect concentrations of air contaminants ([see October report](#))

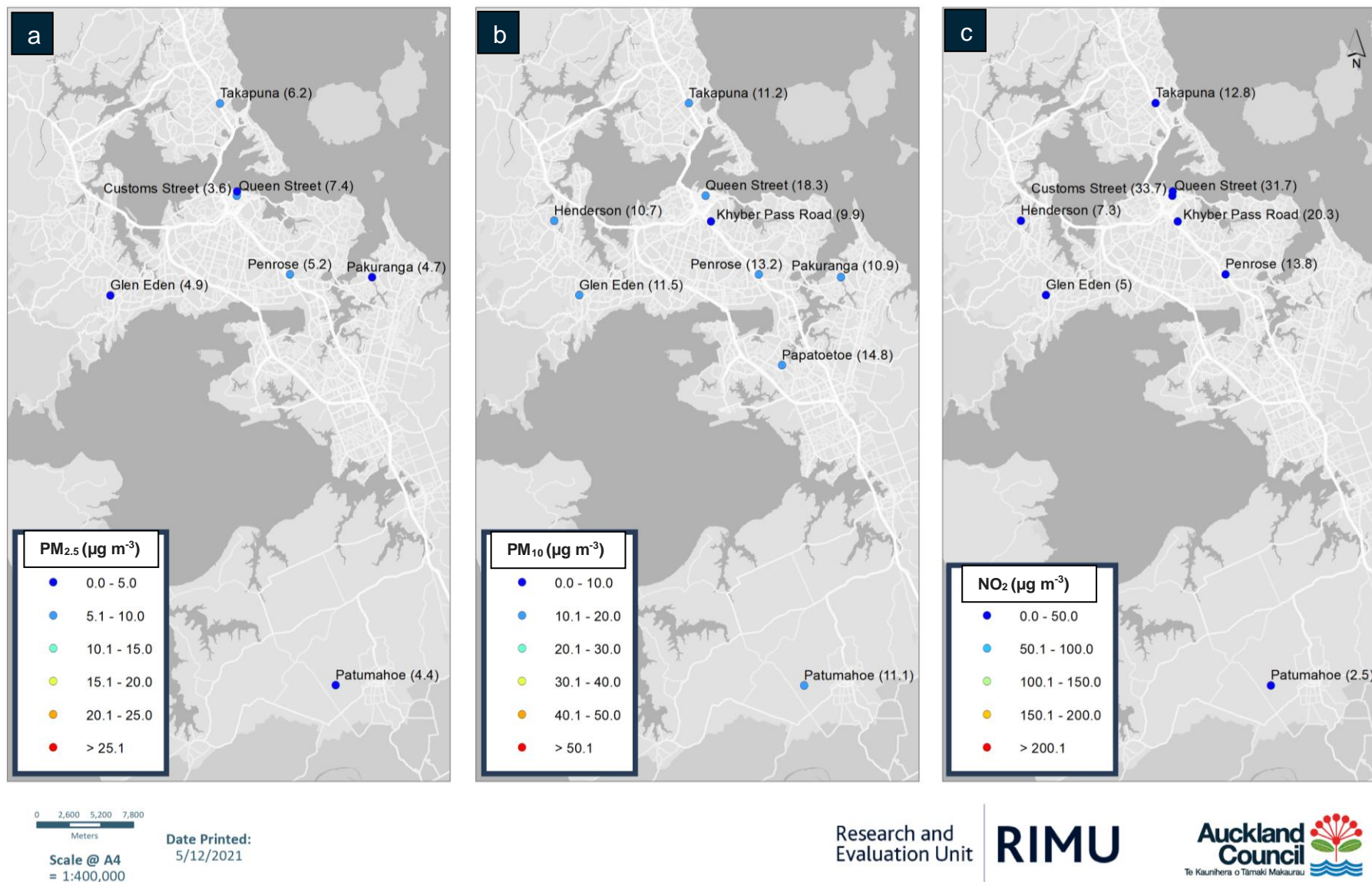


Figure 1. Maps a, b and c show the air quality monitoring sites and their monthly average contaminants concentration (January to October 2021) in brackets. Auckland city centre monitoring sites have the highest concentration of air contaminants.



Section B. Key air contaminants across the 10 air monitoring sites (1 January to 31 October)

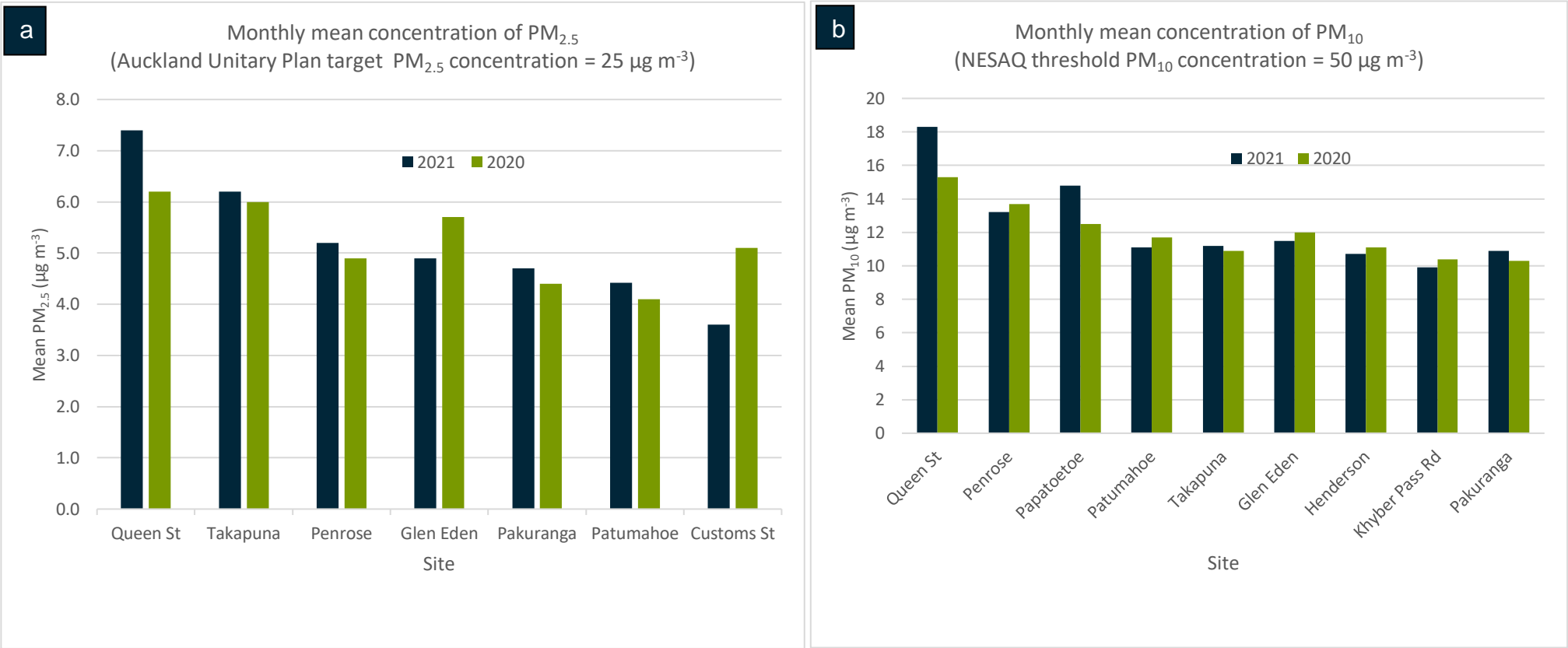


Figure 2. Monthly mean concentration of particulate matter. As in the previous year, highest concentrations of both PM<sub>10</sub> and PM<sub>2.5</sub> were recorded at Queen St. Plots a and b represent PM<sub>2.5</sub> and PM<sub>10</sub> respectively. The average particulate matter concentration in Queen St is higher than the same period of the previous year. This may be due to the various construction activities. PM<sub>10</sub> and PM<sub>2.5</sub> (particulate matter with diameters less than 10 and 2.5 microns) have several sources such as traffic, road dust, sea salt and smoke from home heating fires during winter.

Monthly mean concentration of NO<sub>2</sub>  
(NASAQ threshold NO<sub>2</sub> concentration = 200 µg m<sup>-3</sup>)

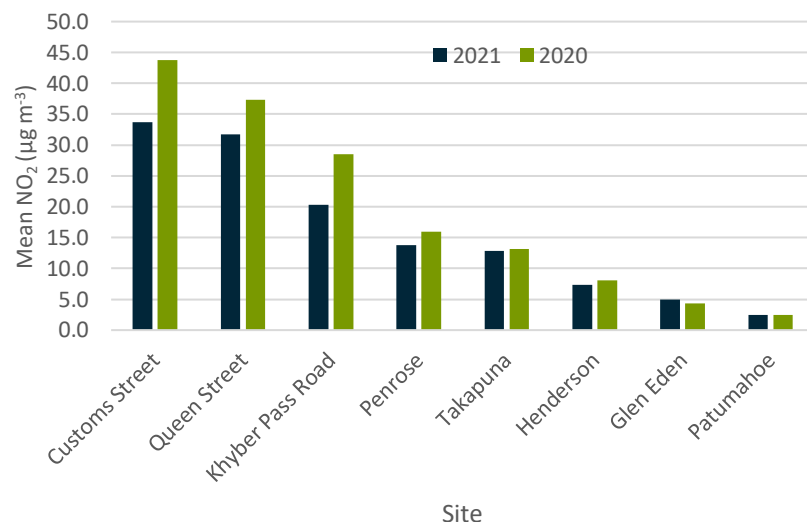


Figure 3. Monthly mean concentration of NO<sub>2</sub> across monitoring sites. Auckland City Centre monitoring sites recorded the highest concentrations while the lowest concentrations occurred at the rural monitoring site. Most sites have recorded lower average NO<sub>2</sub> concentrations compared to the previous year. Motor vehicles are the main sources of NO<sub>2</sub> in Auckland.

Khyber Pass Rd - monthly mean concentration of CO  
(2021 mean = 0.09 mg m<sup>-3</sup>, 2020 mean = 0.076 mg m<sup>-3</sup>)  
NESAQ threshold CO concentration = 10 mg m<sup>-3</sup>)

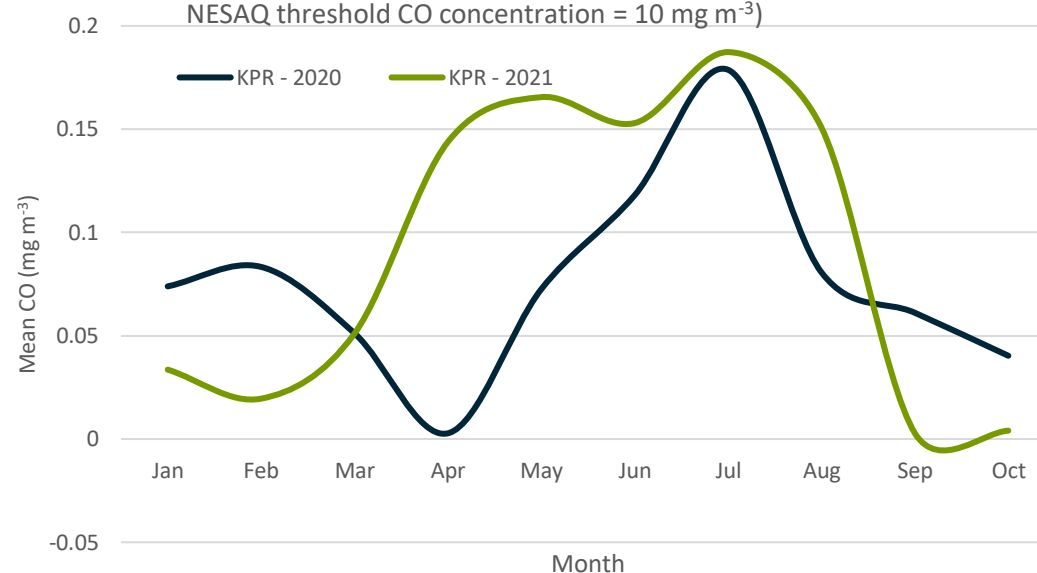


Figure 4. Monthly mean concentration of CO. Overall the mean concentration of CO is 20% more than the previous year. Motor vehicles are the main sources of CO in Auckland. Note: currently, CO is only monitored at Khyber Pass Road.

## Section C. Focus on a monitoring site: Papatoetoe

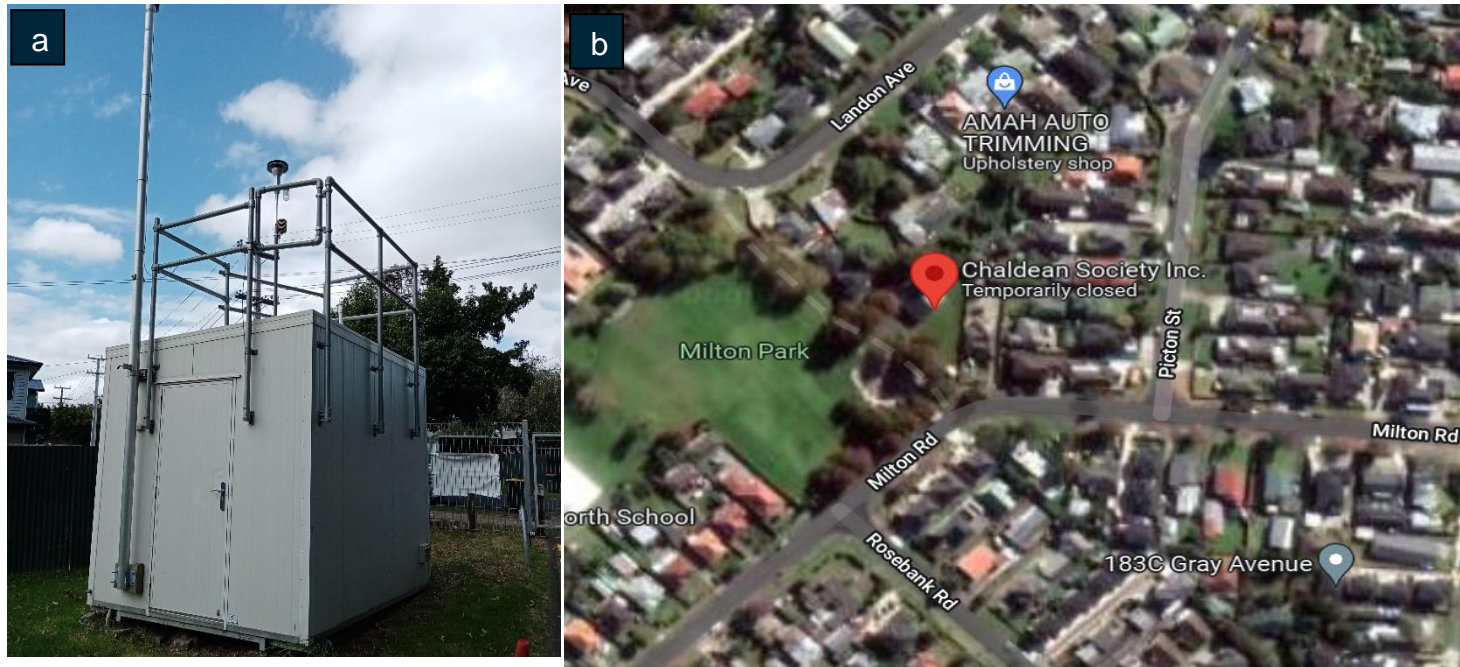


Figure 5. The Papatoetoe air quality monitoring station is located next to Milton Park, Papatoetoe (40 Milton Road). Image a shows the air quality monitoring shed viewed from the south. Image b is an aerial view of the monitoring site and surroundings taken in December 2021 (Source: Google Maps). Air quality monitoring at this site commenced in December 2017. PM<sub>10</sub> and meteorological parameters are monitored at this site. The main sources of air contaminants are motor vehicles, biomass burning, and soils.

### Key findings:

- Overall, Papatoetoe's average PM<sub>10</sub> concentration is 9% more than Auckland average and 14% more than Patumahoe (a rural site).
- Deseasonalised trend analysis result shows there is no trend in PM<sub>10</sub> concentrations over the monitoring period.



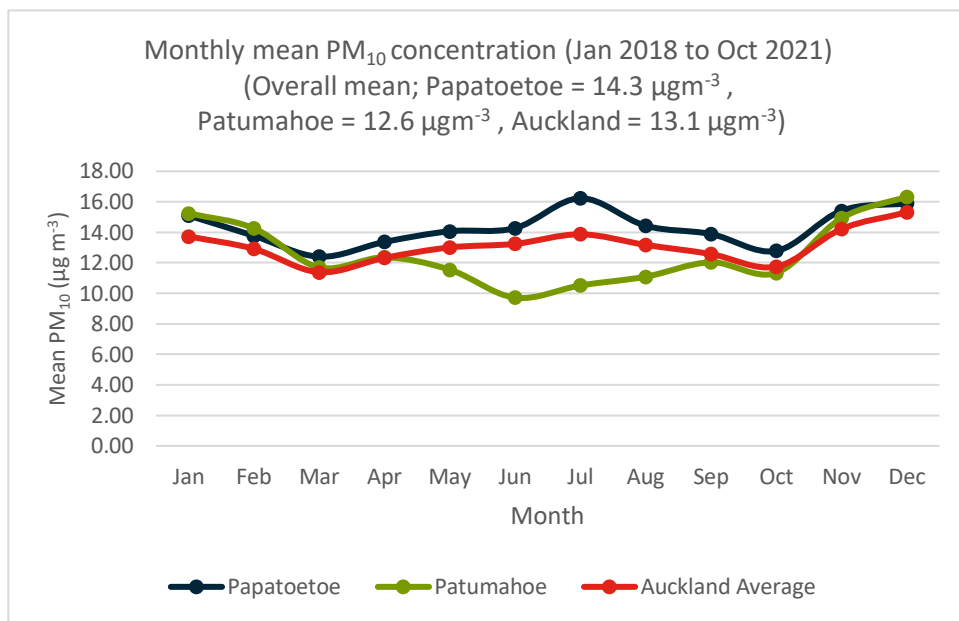


Figure 6. Temporal variation in monthly PM<sub>10</sub> concentrations – Papatoetoe compared to Patumahoe (rural site) and Auckland average. Overall, Papatoetoe’s average PM<sub>10</sub> concentration is 9% more than Auckland average and 14% more than Patumahoe (a rural site).

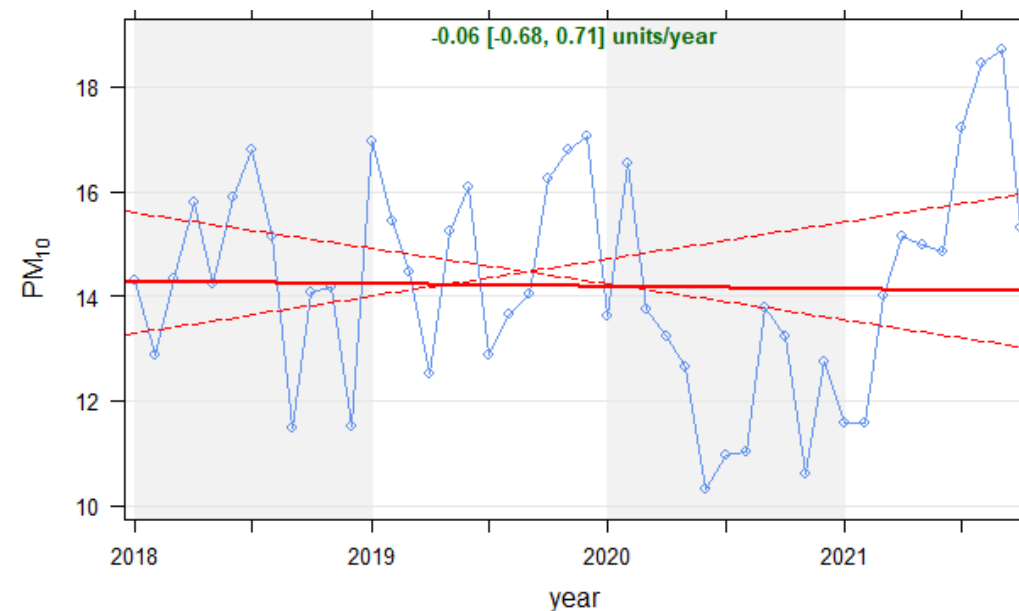


Figure 7. Deseasonalised trend in PM<sub>10</sub> concentrations showing that there is no significant trend (95 % confidence interval) over the monitoring period.

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