



# Auckland Air Quality Report

## Monthly update

Research and  
Evaluation Unit

RIMU

Auckland  
Council  
Te Kaunihera o Tāmaki Makaurau

### 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 – Pakuranga. The monthly update is prepared using validated data which is generally available one month after raw data is collected. This update covers data to 28 February 2022.

### Summary

- No breach of national air quality standards has occurred this year (1 Jan to 28 Feb 2022).
- All monitoring sites recorded particulate matter ( $PM_{2.5}$  and  $PM_{10}$ ) concentrations higher than the previous year.
- All monitoring sites, except Penrose and Henderson, registered lower average nitrogen dioxide ( $NO_2$ ) concentrations compared to the previous year.
- The highest concentrations of air contaminants were measured at Auckland city centre monitoring sites.

## Glossary of terms

Term	Meaning
<b>Aerodynamic diameter</b>	Used to describe the behaviour of a particle as it moves around in the air; it compares the behaviour with that of a spherical particle of unit density.
<b>Air pollutant/contaminant</b>	Any substance in the air that could harm humans, animals, vegetation, or other parts of the environment when present in high enough concentrations.
<b>Air pollution</b>	The presence of one or more air pollutants in high enough concentrations to cause harm.
<b>Air quality</b>	Is the degree to which air is suitable or clean enough for humans, animals, or plants to remain healthy.
<b>Air quality index (AQI)</b>	Score out of 100, based on dividing a pollutant concentration by a relevant standard. It can be used to approximate relative impact of different pollutants.
<b>Ambient air</b>	The external air environment (does not include the air environment inside buildings or structures)
<b>Black carbon (BC)</b>	Is an air pollutant made up of tiny soot-like particles discharged into the atmosphere from combustion processes.
<b>CO</b>	Carbon monoxide, a type of air pollutant.
<b>Exceedance</b>	An exceedance defines a period of time during which the concentration of a pollutant is greater than the appropriate air quality criteria.
<b>Ground-level ozone (<math>O_3</math>)</b>	At ground level, ozone is considered an air pollutant that can seriously affect the human respiratory system. It is a major component of photochemical smog.
<b>Monitoring site</b>	A facility for measuring the concentration of one or more pollutants in the ambient air; also referred to as 'monitoring station'
<b>NESAQ</b>	National Environmental Standard for Air Quality.
<b>NO<sub>2</sub></b>	Nitrogen dioxide, a type of air pollutant
<b>PM</b>	Particulate matter is made up of a mixture of various sizes of solid and liquid particles suspended in air.
<b>PM<sub>10</sub></b>	Particulate matter with an aerodynamic diameter of 10 micrometres or less; a type of air pollutant.
<b>PM<sub>2.5</sub></b>	Particulate matter with an aerodynamic diameter of 2.5 micrometres or less; a type of air pollutant.
<b>SO<sub>2</sub></b>	Sulphur dioxide, a type of air pollutant
<b>µg/m<sup>3</sup></b>	Microgram of pollutant (1 millionth of a gram) per cubic metre of air, referenced to temperature of 0°C (273.15 K) and absolute pressure of 101.325 kilopascals (kPa)
<b>n/a</b>	Not applicable

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 air quality monitoring programme 1 January 2022 to 28 February 2022**

<b>Number of Continuous Monitoring Sites</b>	10	
<b>Location of Monitoring Sites</b>	Queen Street, Customs Street, Khyber Pass Road, Penrose, Henderson, Takapuna, Glen Eden, Pakuranga, Papatoetoe, and Patumahoe	
<b>Standard Contaminants Monitored</b>	$\text{PM}_{10}$ , CO, $\text{NO}_2$ , $\text{O}_3$ , and $\text{SO}_2$	
<b>Other Key Contaminants Monitored</b>	$\text{PM}_{2.5}$ , and Black Carbon	
<b>Number of Exceedances Of NESAQ In 2022</b>	0	
<b>Number of Exceedances of Auckland Ambient Air Quality Targets In 2022</b>	0	
<b>Maximum <math>\text{PM}_{10}</math> 24-Hours Mean (Jan - Feb 2022)</b>	$32.8 \mu\text{g}/\text{m}^3$ (65.6% of NESAQ)	<i>Recorded at Queen Street on 13 February 2022</i>
<b>Maximum <math>\text{PM}_{2.5}</math> 24-Hours Mean (Jan - Feb 2022)</b>	$13.3 \mu\text{g}/\text{m}^3$ (53.2% of Auckland target)	<i>Recorded at Queen Street on 24 January 2022</i>
<b>Maximum <math>\text{NO}_2</math> 1-Hour Mean (Jan - Feb 2022)</b>	$119.0 \mu\text{g}/\text{m}^3$ (59.5% of NESAQ)	<i>Recorded at Customs Street on 20 January 2022</i>
<b>Maximum <math>\text{SO}_2</math> 1-Hour Mean (Jan - Feb 2022)</b>	$18.0 \mu\text{g}/\text{m}^3$ (5.1% of NESAQ)	<i>Recorded at Penrose on 30 January 2022</i>
<b>Maximum <math>\text{O}_3</math> 1-Hour Mean (Jan - Feb 2022)</b>	$56.0 \mu\text{g}/\text{m}^3$ (37.3% of NESAQ)	<i>Recorded at Patumahoe on 28 January 2022</i>
<b>Maximum CO Running 8-Hour Mean (Jan - Feb 2022)</b>	$0.46 \text{ mg}/\text{m}^3$ (4.6% of NESAQ)	<i>Recorded at Khyber Pass Rd on 16 February 2022</i>
<b>Written Reports Framework</b>	Monthly Updates, Annual Report, Trends Report, and State of The Environment Report	

**Table 2. General changes in concentration of key contaminants monitored for the last 14, 26 and 38 months.**

↑ indicates an increase

↓ indicates a decrease

↗ Increase but not significant

↘ Decrease but not significant

	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 14 months	Last 26 months	Last 38 months	Last 14 months	Last 26 months	Last 38 months	Last 14 months	Last 26 months	Last 38 months	Last 14 months	Last 26 months	Last 38 months	Last 14 months	Last 26 months	Last 38 months	Last 14 months	Last 26 months	Last 38 months	Last 14 months	Last 26 months	Last 38 months	Last 14 months	Last 26 months	Last 38 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	n/a	↙	↙	Customs Street	
Glen Eden	↗	↘	↘	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	↗	↙	↙	↙	↗	↙	↙	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	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	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	n/a	Papatoetoe	
Patumahoe	↗	↘	↘	↗	↗	↘	↘	n/a	n/a	n/a	n/a	n/a	↗	↘	↘	n/a	n/a	n/a	n/a	n/a	↗	↘	↘	↙	↙	↙	Patumahoe
Penrose	↗	↘	↙	↘	↘	↙	↘	↘	↘	n/a	↗	↗	↘	↘	↘	↙	↙	Penrose									
Takapuna	↗	↗	↙	↗	↗	↘	↘	↘	↘	n/a	n/a	↗	↘	↘	↙	↙	Takapuna										
Queen Street	↗	↗	↗	↗	↗	↗	↘	↘	↘	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: 14 months (1 Jan 2021 to 28 Feb 2022), 26 months (1 Jan 2020 to 28 Feb 2022), and 38 months (1 Jan 2019 to 28 Feb 2022)

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.

No PM<sub>2.5</sub> data for Glen Eden (due to instrument failure), Customs Street and Pakuranga. No NO<sub>2</sub> data for Patumahoe (due to instrument failure).

No BC data for Henderson (due to instrument failure). Weather changes significantly affect concentrations of air contaminants ([see this report](#))

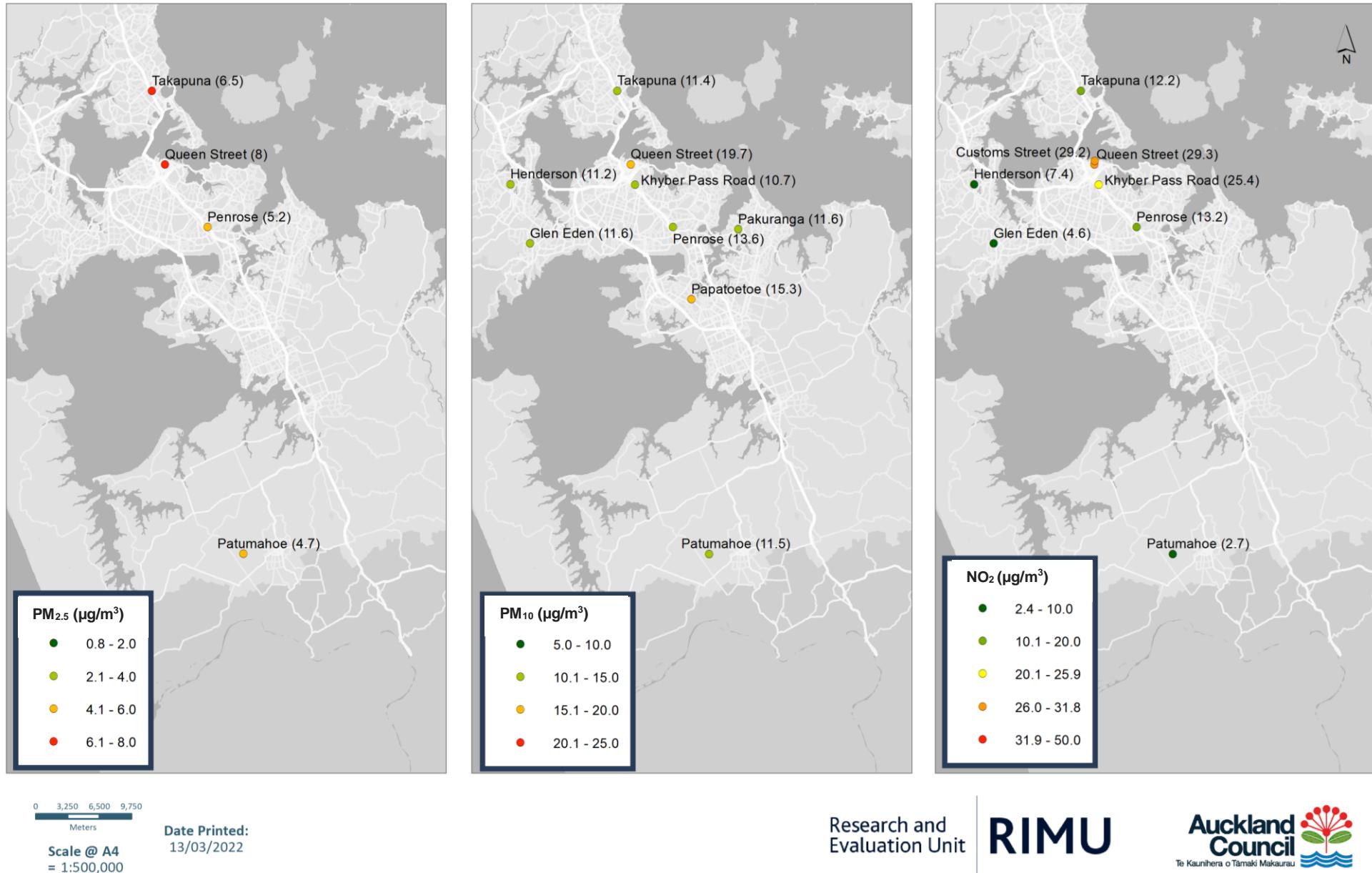


Figure 1. Maps a, b and c show the air quality monitoring sites and their last 12- months (1 March 2021 to 28 February 2022) average PM and NO<sub>2</sub> concentrations – in brackets. Auckland city centre monitoring sites recorded the highest PM and NO<sub>2</sub> concentrations.

## Section B. Key air contaminants across the 10 air quality monitoring sites (1 January 2022 to 28 February 2022)

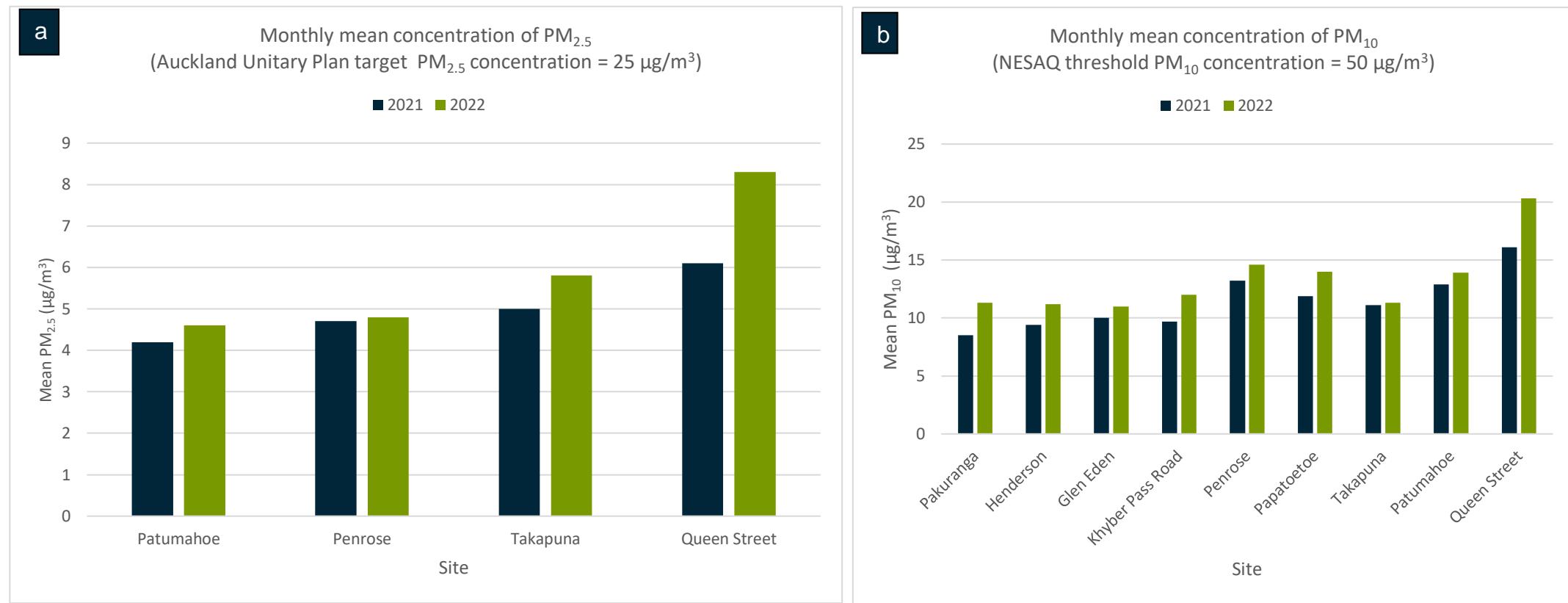


Figure 2. Monthly mean concentration of particulate matter. As in the previous year, the highest concentrations of both PM<sub>10</sub> and PM<sub>2.5</sub> were recorded at Queen St. Plots a and b represent PM<sub>2.5</sub> and PM<sub>10</sub> respectively. The average particulate matter concentration in all the monitoring sites is higher than the same period of the previous year. PM<sub>10</sub> and PM<sub>2.5</sub> have multiple sources including motor vehicles, sea salt, marine diesel, and soils (windblown soil, road dust, and dust generated by earthworks, construction, and road works).

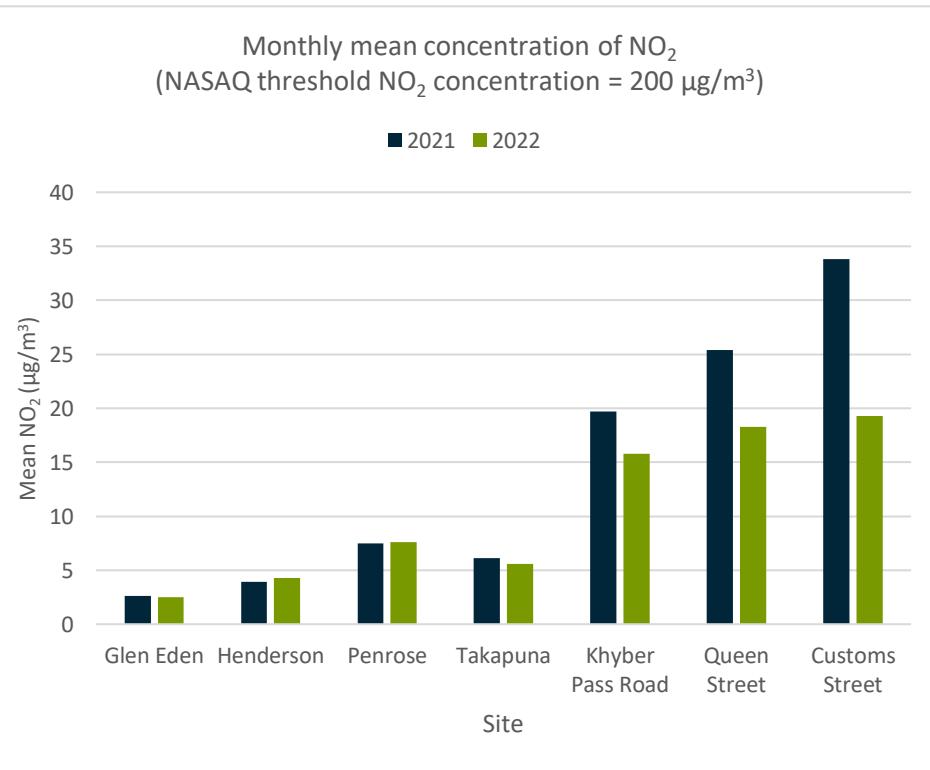


Figure 3. Monthly mean concentration of NO<sub>2</sub> across monitoring sites. Auckland city centre monitoring sites recorded the highest concentrations. All monitoring sites, except Penrose and Henderson, recorded lower average NO<sub>2</sub> concentrations compared to 2021. The main source of NO<sub>2</sub> is motor vehicles.

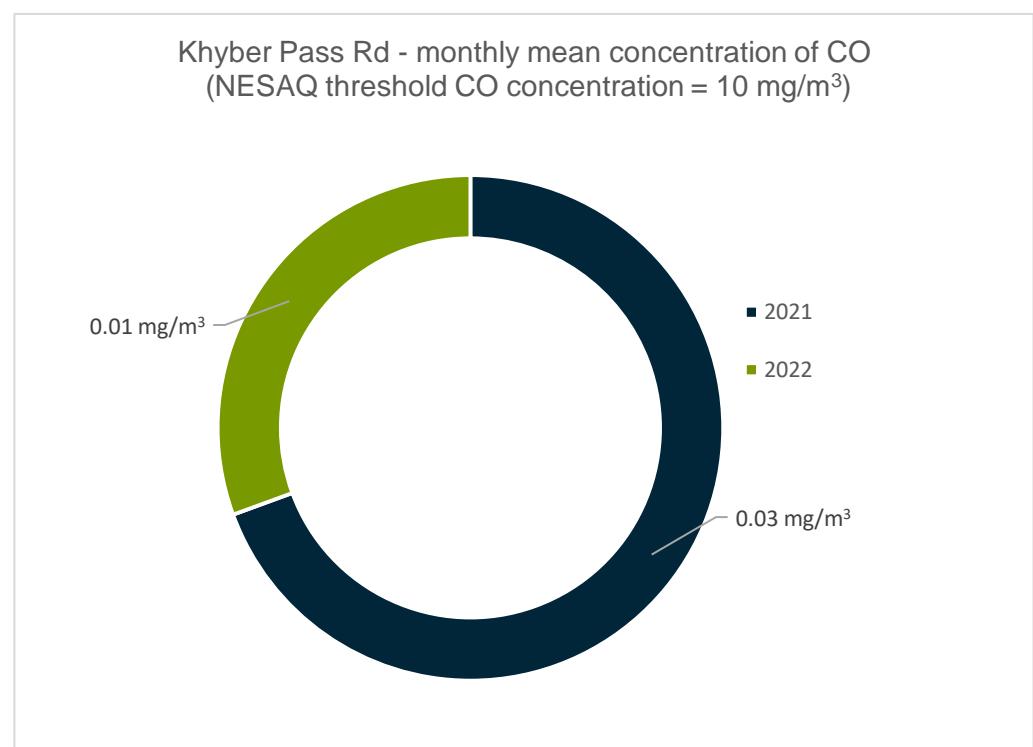


Figure 4. Monthly mean concentration of CO. The mean CO concentration is 78% less than the previous year. The main source of CO is motor vehicles. Note: currently, CO is only monitored at Khyber Pass Road.

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

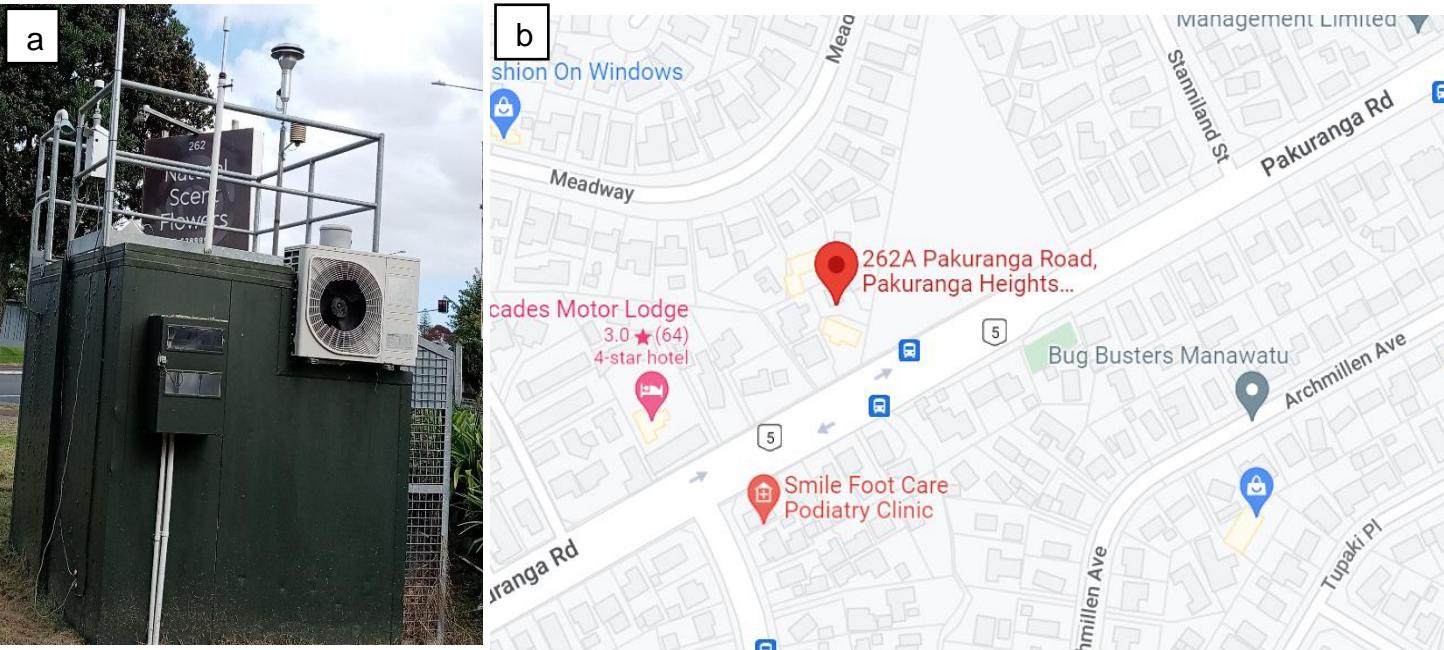


Figure 5. The Pakuranga air quality monitoring site is located at Bell Reserve, adjacent to 262A Pakuranga Rd, Pakuranga, Manukau. Image a shows the air quality monitoring shed viewed from the north. Image b is an aerial view of the monitoring site and surroundings taken in March 2022 (Source: Google Maps). Air quality monitoring at this site commenced on 26<sup>th</sup> May 1998. PM<sub>10</sub>, PM<sub>2.5</sub>, and meteorological parameters are monitored at this site. The main sources of air contaminants are motor vehicles, biomass burning, and soils. Due to PM<sub>2.5</sub> instrument failure from August 2021 to February 2022, only PM<sub>10</sub> data is presented in this report.

### Key findings:

- Overall, Pakuranga average PM<sub>10</sub> concentration is 2 % less than Auckland's average and 19 % more than Patumahoe (a rural site).
- Deseasonalised trend analysis result shows there is a downward long-term trend in PM<sub>10</sub> average concentrations over the monitoring period

(1 January 2006 to 28 February 2022).

Monthly mean PM<sub>10</sub> concentration (Jan 2006 to Feb 2022)  
 (Overall mean; Pakuranga = 14.4 µg/m<sup>3</sup>,  
 Patumahoe = 11.9 µg/m<sup>3</sup>, Auckland = 14.7 µg/m<sup>3</sup>)

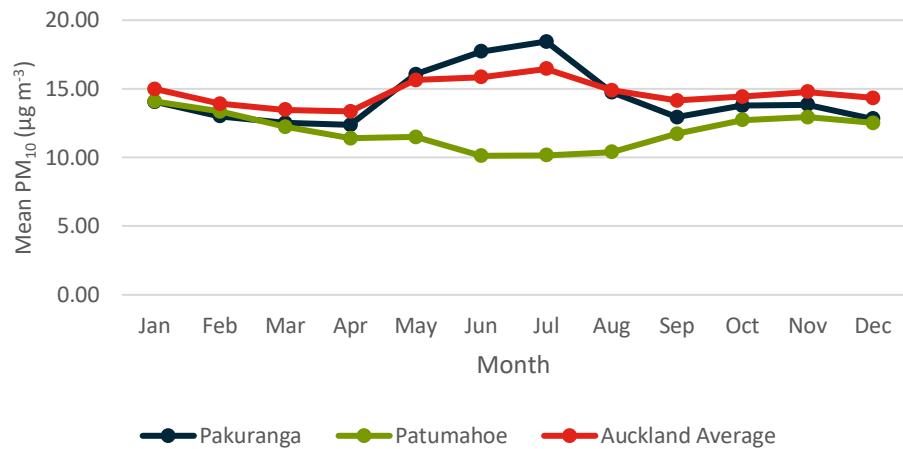


Figure 6. Temporal variation in monthly PM<sub>10</sub> concentrations – Pakuranga compared to Patumahoe (rural site) and Auckland average. Overall, Pakuranga average PM<sub>10</sub> concentration is 2 % less than Auckland's average and 19 % more than Patumahoe (a rural site).

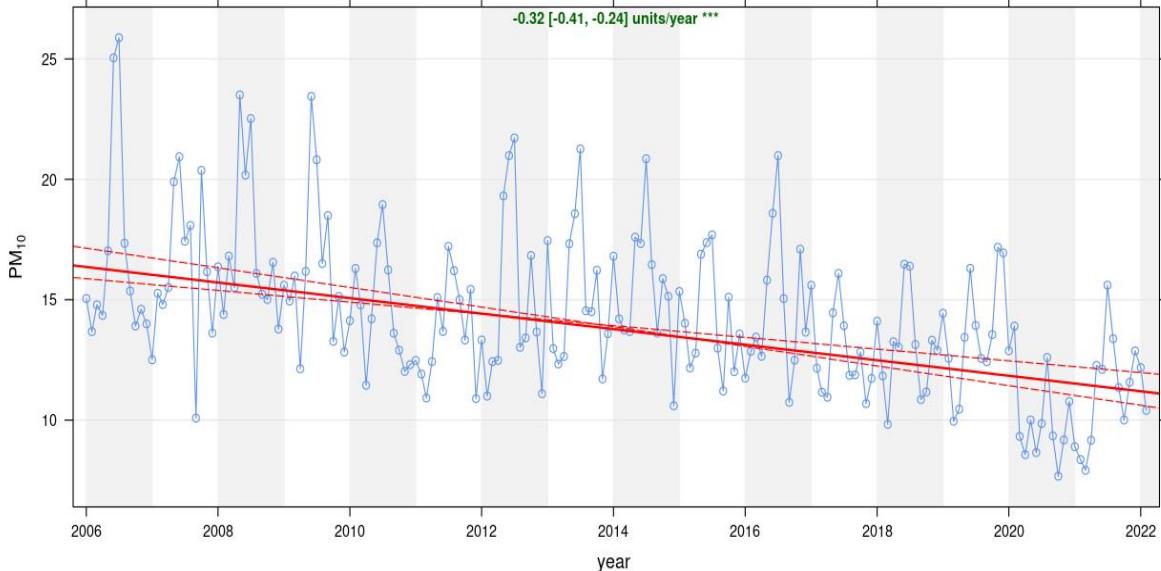


Figure 7. Trends in PM<sub>10</sub> at Pakuranga. The plot shows the deseasonalised monthly mean concentrations of PM<sub>10</sub>. The solid red line shows the trend estimate and the dashed red lines show the 95% confidence intervals for the trend based on resampling methods. The overall trend is shown at the top-left as - 0.32 (µg/m<sup>3</sup>) per year and the 95% confidence intervals in the slope from -0.41 – (- 0.24) µg/m<sup>3</sup>/year. The \*\*\* show that the trend is significant to the 0.001 level.

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