



Clean, unpolluted air is essential to the wellbeing of our communities and the environment. Taranaki enjoys a relatively high standard of air quality. Presently, it is one of only two regions in New Zealand not considered at risk of exceeding current national air quality standards. This means Taranaki does not have a gazetted airshed and Ministry for the Environment (MfE) monitoring is not compulsory in Taranaki, as it is in other parts of New Zealand.

As a region with significant industry, it is important good air quality is maintained and protected. In New Zealand, the Resource Management (National Environmental Standards for Air Quality) Regulations (NES) set a level of protection for

people from air pollutants, dioxins and other toxins in the air. The NES prescribe standards and controls for a range of contaminants and prohibit certain activities, such as the burning of tyres.

To ensure our communities have clean, unpolluted air, the Council monitors air quality at a range of locations throughout the region and works with communities to raise awareness around air quality issues. Air discharges from industry and agriculture are regulated and, with no widespread change in the nature of regional emissions, there are no significant pressures upon the quality of air in the region.

Air quality monitored at

**30**  
sites

for 25 years

**319**

discharge to  
air consents

in 2020

**214**

air quality incidents

involving mostly smoke,  
dust or odour in 2019/2020

97% of air consent  
holders achieve

**HIGH** or  
**GOOD**

performance grade

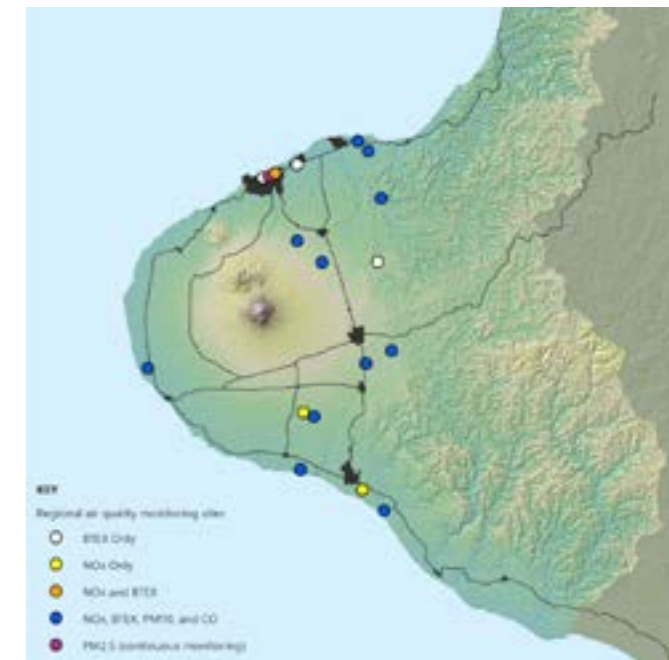
## What we know

Air quality data has been gathered and maintained for more than 25 years at up to 30 representative sites, including urban, industrial, rural, coastal and pristine areas. This helps guide community decisions around which discharges need to be controlled or reduced through good practices and regulation.

The Council measures key indicators of ambient air quality, including inhalable particulates; chemicals such as nitrogen oxides, benzene, carbon monoxide, sulphur oxides and formaldehyde; and suspended particulates and deposition. Air quality is also monitored as part of resource consent compliance programmes to ensure resource consent conditions and regional air plan rules are met in industry and agriculture.

Results are compared with MfE national ambient air quality guidelines and NES as appropriate.

In general, we use screening methods to monitor air quality at locations that have the most potential for adverse impacts because of surrounding land use. This methodology is useful for giving an indication of the state of the region's air quality and for determining whether there is any justification for further investigation using much more expensive techniques, as stipulated in the NES. Consistently good results from our air quality monitoring programme confirm the screening approach is justified and cost-effective.



Regional air quality monitoring site locations.

### Particulate matter

Air quality is influenced by particles in the air that are small enough to inhale. Health impacts include respiratory irritation, shortness of breath, or worsening conditions such as asthma and heart disease. These particles come from activities such as transportation (petrol and diesel fuels), industrial processes and burning coal or wood in domestic fires. They can also come from natural sources including sea salt, dust, pollens and volcanic activity.

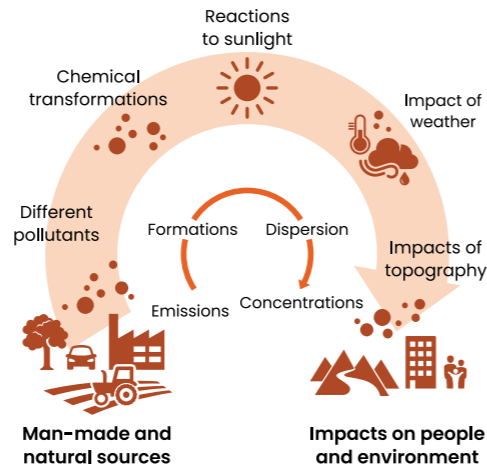
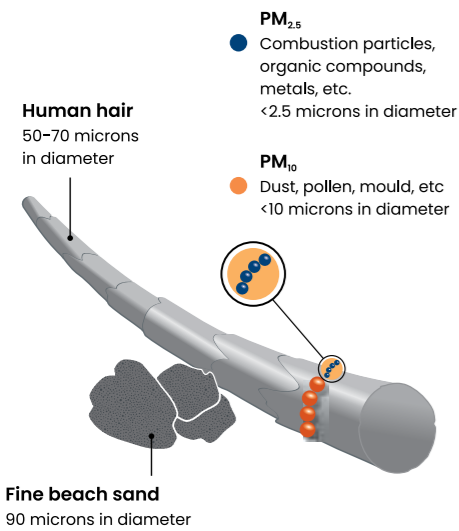
Particulate matter (PM) is measured in terms of size. PM<sub>10</sub> refers to particles measuring 10 microns or less in diameter per cubic metre of air, which includes particles less than 2.5 microns (PM<sub>2.5</sub>). In the past, PM<sub>10</sub> has been the standard against which national air quality has been measured however many developed countries have moved to levels of greater protection of PM<sub>2.5</sub>.

In Taranaki, airborne concentrations of PM<sub>2.5</sub> are monitored at one continual site and PM<sub>10</sub> is monitored at 14 sites. Both are compared to national standards set by MfE, as well as international guidelines. Monitoring suggests air quality in Taranaki is generally good. For PM<sub>10</sub> the majority of results lie in the MfE's grades of 'excellent' or 'good', and to date

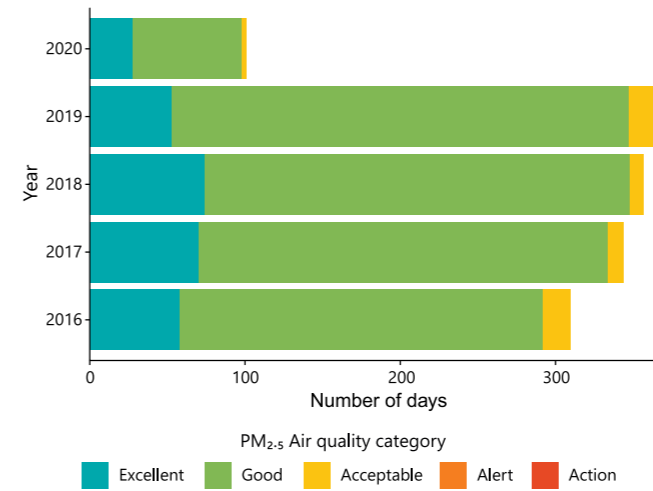
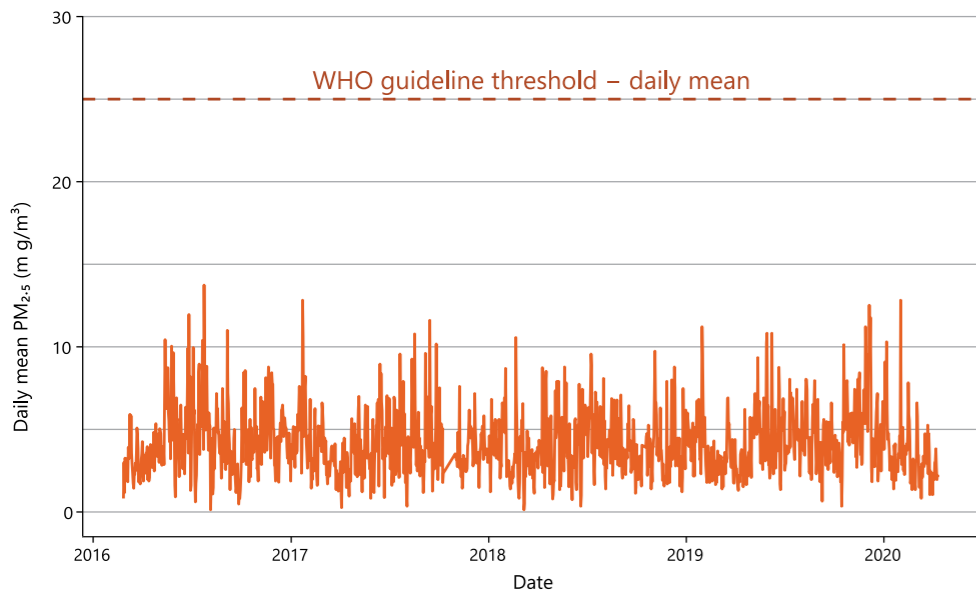
have not triggered the 'action' category of air quality. Finer particles (PM<sub>2.5</sub>) pose a greater public health risk than the larger particles in the PM<sub>10</sub> range. While New Zealand has not yet formally set a standard PM<sub>2.5</sub>, results are well within World Health Organization (WHO) guidelines.

observed with westerly winds, due to the increase in salt particulates blown onshore. Traffic flows show no discernible effect even in urban areas, while on calm winter evenings the smoke from domestic fires increases particulate concentrations.

Survey results also suggest onshore winds have a major influence on air quality, with airborne salt causing PM concentrations to double. Lower air quality is often



*Daily mean PM<sub>2.5</sub> concentrations between March 2016 and April 2020, measured at Central School. All recorded PM<sub>2.5</sub> levels are well below the WHO guideline threshold of 25 µg/m<sup>3</sup>.*



*Daily air quality categories for PM<sub>2.5</sub>, as measured at Central School. No daily means have ever exceeded the Acceptable band. Due to technical issues only 100 days were monitored in 2020.*

### Carbon monoxide, nitrogen oxides and volatile organic compounds

Carbon monoxide (CO) is the result of incomplete fossil fuel combustion and at high indoor concentrations can cause dizziness or aggravate heart conditions. In some cases, it can be fatal. It is emitted from motor vehicle emissions and from burning of fuels in confined spaces.

In New Zealand, the standard for CO is 10mg/m<sup>3</sup> (calculated as an average exposure over eight hours of measurement). CO is monitored in Taranaki around significant potential sources, such as gas production stations, and this shows levels well below both the national guidelines and standards.

Nitrogen oxides (NO<sub>x</sub>) are a group of gases that can cause lung inflammation and increase a person's vulnerability to respiratory infections and asthma, while long-term exposure can lead to lung disease. They are produced through biological activity from natural sources such as soil and vegetation and also come from motor vehicles and industrial fuel combustion processes. Domestic appliances such as gas stoves or unflued gas heaters can be significant indoor sources of nitric oxide and nitrogen dioxide.

**30** No<sub>x</sub> monitoring sites at **14** locations around the region

**0** exceedances in the last five years of the NO<sub>x</sub>-1hr NES of 200 µg/m<sup>3</sup>

**54.6** Maximum measured regionally since 2016 estimated 1hr NO<sub>x</sub> concentration µg/m<sup>3</sup>

The Council has surveyed NO<sub>x</sub> at various sites (urban, industrial and rural) as part of State of the Environment monitoring since 1997. We use screening techniques, which are not directly comparable to national standards. However, results show air quality in each location will achieve the standards and do not suggest NO<sub>x</sub> concentrations in the region are increasing.

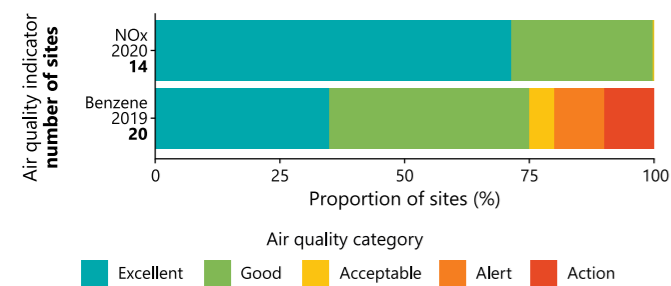
We also monitor volatile organic compounds (VOCs). The four most common VOCs are benzene, toluene, ethylbenzene and xylenes, often found together and referred to as BTEX. Short-term exposure to high levels of BTEX can irritate the eyes, nose and throat, can cause difficulty breathing and damage the central nervous system, as well as other organs. These volatile gases occur in solvents (including paints and glues) and petrol and diesel fuels. They are also produced during the combustion of organic matter such as petrol, diesel and some other hydrocarbons.

**20** BTEX monitoring sites around the region

**2** exceedances in 2019 survey of the Benzene-1hr National guideline of 22 µg/m<sup>3</sup>

**633.4** Maximum measured in 2019 survey estimated 1hr Benzene concentration µg/m<sup>3</sup> (measured at New Plymouth petrol station)

Presently, there is no national standard for BTEX compounds. The results of BTEX monitoring in Taranaki, using screening techniques, indicate levels of BTEX to be generally better than the current MfE guideline value. Levels of toluene and xylene are particularly low by comparison.



*Number of NOx and BTEX monitoring sites falling into different air quality categories. The Action BTEX concentrations were recorded at a central New Plymouth petrol station.*

## What we're doing

### Air quality in Taranaki

The Resource Management Act 1991 (RMA) requires councils to have regional plans to address regional resource management issues. The Regional Air Quality Plan for Taranaki (the Plan) became operative in July 2011. The objective of the Plan is to “maintain the existing high standard of ambient air quality in the Taranaki region and to improve air quality in those instances or areas where air quality is adversely affected, whilst allowing for communities to provide for their economic and social wellbeing”. The Plan sets out which activities can occur without a consent, activities that are banned outright and activities that need a consent from the Council before they can occur.

Where activities require resource consent, they are monitored for compliance to ensure they do not have an adverse effect on people or the environment. We design a monitoring programme based on the range of air quality pollutants to be measured. Equipment ranges from simple but effective dust deposition gauges to more complex air quality analysing equipment.

In 2020, there were 319 consents allowing discharges to the air. The hydrocarbon extraction and processing industry held 188 (59%) and broiler (poultry) farms held 39 (12%) of these consents. The remaining 92 (29%) were associated with, but were not limited to, manufacturing and processing, waste management, crematoriums, piggeries and power generation. Compliance monitoring showed 97% of air permit holders routinely achieve a ‘high’ or ‘good’ level of environmental performance.

Breaches in resource consent conditions lead to further investigation and enforcement, if required. Consent holders may self-report an incident, they may be discovered by Council staff during inspections or members of the public may report them. The most common complaints about air quality from the public relate to dust, smoke or odour. In the 2019-2020 year, the Council recorded 214 incidents involving air quality. Air quality incidents made up 40% of all environmental incidents the Council dealt with. Upon investigation, 25% of all incidents involved unauthorised activities and discharges.

Since the Plan became operative, increased levels of poultry farming and hydrocarbon exploration and production have led to more resource consents for air discharges. However, because of effective regulation and monitoring, there have been negligible impacts on air quality in the region.

## Where we're heading

To provide greater protection to the health of our communities, the Government is proposing new measures to improve air quality across New Zealand. Evidence suggests a strong link between PM<sub>2.5</sub> and adverse health effects. The new standard for particulate matter proposes to change the current standard to PM<sub>2.5</sub> (a subset of PM<sub>10</sub> fine particulate) for any 24-hour period and as an annual average.

The Council supports the proposal and already conducts routine monitoring for PM<sub>2.5</sub>. Results show the region's air quality is well within the WHO guideline of 25 µg/m<sup>3</sup> (24-hour average) and annual guideline of 10µg/m<sup>3</sup>. Investigations have shown a major influence on PM<sub>2.5</sub> levels in Taranaki is sea spray, with a localised influence on calm winter evenings being smoke from domestic fires.

The Users' Guide to the revised NES for Air Quality provides a guide to the standards addressing dioxins and other toxics, ambient air quality, the wood burner design standard and the control of greenhouse gases at landfills.

Locally, the Council is reviewing its Regional Air Quality Plan, as required by law. It will be combined with management of water and land resources into an integrated Natural Resources Plan for the region. The review process includes public consultation, to ensure the new Plan reflects community aspirations for air quality, and will reflect the changing industrial landscape, improved knowledge, and community expectations of our region.

### Information, education and advice

While air quality is generally good, in winter, concentrations of fine particles have the potential to breach the NES. This is particularly the case in areas such as Stratford and Inglewood where a combination of factors such as altitude, topography and meteorology can trap fine particles on cold still nights.

There are many ways we can all improve air quality:

- Recycle rubbish, compost green waste or chip it and use for mulch – in many urban areas burning rubbish and green waste is banned. Take care to only burn approved materials – do not burn tyres or treated timber.
- When installing or upgrading your heating appliance – choose a low- to no-emissions option, such as an ultra-low emissions wood burner or heat pump.
- No one likes a smoky fire – if you do have a wood burner,

use only dry-seasoned and non-treated wood. Get your fire going quickly, keep it burning hot, and don't damp your fire down overnight.

- Tune and service your vehicle regularly, and use sustainable transport options such as public transport, car-pooling, electric vehicles, cycling and walking. You'll save money too.

# Back to school for air quality data

Air quality in New Plymouth is continuously monitored using equipment strategically sited at a primary school near the city's business district (CBD).

The arrangement between Central School Te Kura Waenga o Ngāmotu and Taranaki Regional Council dates back to 2015. It gives the school a passive but unique role in the important task of keeping tabs on what's happening to our environment.

## Why Central School?

As the name implies, it's centrally located. Main traffic routes are within a couple of hundred metres to the north and the CBD lies just beyond them. To the south, west and east are residential areas.

Central School is at the 'crossroads' of prevailing winds from the west and southeast. It's in the path of air flows that have just passed, or are about to pass, over residential areas. So, it's a sensitive site, exposed to possible emissions from traffic, as well as commercial and residential areas.

New Plymouth has the most people, traffic and industry in Taranaki, so is the logical place for continuous air quality monitoring. The Council also carries out intermittent air quality monitoring elsewhere across the region, including monitoring to assess whether major consent holders are meeting their environmental obligations.

## How do you monitor air quality, anyway? And what are you finding?

The equipment at Central School measures levels of tiny particles, known as 'particulate matter', which circulate in the air. It's calibrated for particles just 2.5 micrometres in diameter - that's 2.5 millionths of a metre. Being so tiny, they can easily enter our airways and lodge in respiratory or lung tissue, leading to serious issues - particularly for vulnerable groups such as the very young, the very old, and those with existing health issues.

The monitoring station at Central School plays an important role in the health of our region. In early 2022, the Council upgraded the station with the latest technology to ensure Taranaki continues to meet national monitoring standards.

PM<sub>2.5</sub> readings at Central School consistently fall well within international guidelines. Monitoring at other sites also takes in nitrous oxides, carbon monoxide and volatile organic compounds. Results of all the monitoring show that, in general terms, Taranaki has good quality air.

## What happened during our first and longest COVID-19 lockdown in 2020? Did air quality improve?

Maybe, but the evidence is inconclusive. Because of an unfortunately timed equipment failure, we have data for only the first couple of weeks of the 2020 lockdown.

The data shows PM<sub>2.5</sub> levels dropped after the lockdown started on 26 March 2020. But this also coincided with the arrival of a new weather system that brought southeast winds. We often see low PM<sub>2.5</sub> levels during moderate-to-strong southeasterlies. There is another reason for caution in interpreting the data. When we compare our 2020 lockdown readings with those from the same time period in previous years, we see they're all within a similar range.

However, the pandemic period shows the importance of air quality monitoring. Research carried out early in the spread of COVID-19 indicated that even a small increase in long-term exposure to PM<sub>2.5</sub> was linked to a large increase in COVID-19 mortality rates. So it's more important than ever to keep tabs on PM<sub>2.5</sub>.

