

Air Monitoring in the Auckland Region

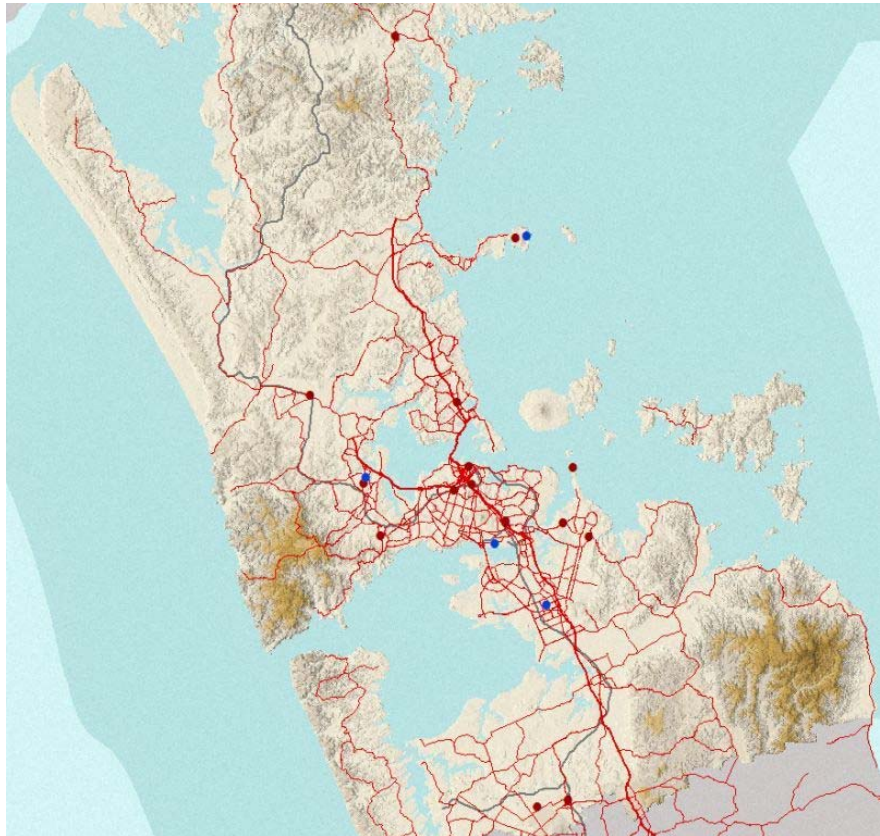
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To manage air quality and reduce pollutant discharges, it is essential that the Auckland Regional Council (ARC) has a sound scientific understanding of pollutant levels, trends and sources. The ARC monitors several pollutants at 15 sites around the Auckland region. These sites represent a variety of sources and exposures from suburban residential areas to peak traffic areas. The pollutants measured are typical for monitoring carried out in most western countries.

Why do we monitor air pollution?

Air quality monitoring tracks levels of air pollution in the Auckland region. The ARC is required to monitor air quality under the Resource Management Act (RMA) 1991 and the National

Environmental Standards (NES) 2004. We need good quality data so that we can find out whether the levels of air pollution exceed guidelines and standards, and whether air pollution is improving or getting worse over time. This helps us to decide what the best policies are to reduce pollution and to see whether those strategies are working.



Map showing where the monitoring sites are located around Auckland (sites in blue indicate meteorological masts only).

Where are our monitoring sites?

Key air pollutants are monitored at various sites in the Auckland region to establish the levels of air quality. The current monitoring network comprises of 12 permanent, one temporary and two mobile sites for pollutant monitoring, and three sites that measure meteorological parameters only. Ten sites are within the Auckland Urban Airshed, three are in the smaller town airsheds and two are in the rural airshed. The network extends from Pukekohe in the South to Warkworth in the North, and from Henderson in the West to Botany Downs in the East. Sites range in their scope; some monitor a single parameter; others measure a suite of pollutants and meteorology on a continuous basis. The air quality sites include:

- Peak Traffic & CBD sites: Khyber Pass and Queen Street
- Residential: Botany Downs, Glen Eden, Henderson, Kingsland, Kumeu, Pakuranga, Pukekohe (urban), Takapuna, Warkworth
- Industrial: Penrose
- 'Remote' sites: Musick Point, Pukekohe (rural), Whangaparaoa

The following table summarises air monitoring sites in the region (as of April 2007).

Location	District Council Area	PM ₁₀	PM _{2.5}	CO	NOx	Ozone	Other Pollutants
Botany Downs	Manukau	Y	-	-	-	-	-
Ceramco Park, Glen Eden	Waitakere	Y	-	Y	Y	-	-
Henderson, Lincoln Rd	Waitakere	Y	-	Y	Y	-	-
Khyber Pass, Newmarket	Auckland	Y	Y	Y	Y	-	Benzene and 1,3-Butadiene
Kowhai Intermediate, Kingsland	Auckland	Y	Y	-	Y	Y	TSP and Lead*
Kumeu (1 year short term site)	Rodney	Y	-	-	-	-	-
Musick Pt	Manukau	-	-	-	Y	Y	-
Pakuranga	Manukau	Y	-	Y	-	-	-
Gavin St Substation, Penrose	Auckland	Y	Y	-	Y	-	SO ₂ , TSP and Lead*
Pukekohe rural	Franklin	Y	-	-	Y	Y	-
Pukekohe urban (mobile trailer)	Franklin	Y	-	Y	Y	-	-
Queen St, CBD	Auckland	Y	Y	Y	Y	-	-
Takapuna	North Shore	Y	-	Y	Y	-	-
Warkworth (mobile trailer)	Rodney	Y	Y	-	Y	-	-
Whangaparaoa	Rodney	-	-	-	-	Y	-
Number of sites monitoring parameter		13	5	7	11	4	3

* These measurements are funded by the Ministry for the Environment (MfE) as part of the Global Environmental Monitoring Systems network (GEMS)

Meteorological monitoring is now undertaken at all sites except Queen St because information on local meteorology is essential for understanding pollutant sources, short term events, chemical reactions, the trends in data and why exceedences of guidelines and standards have occurred.

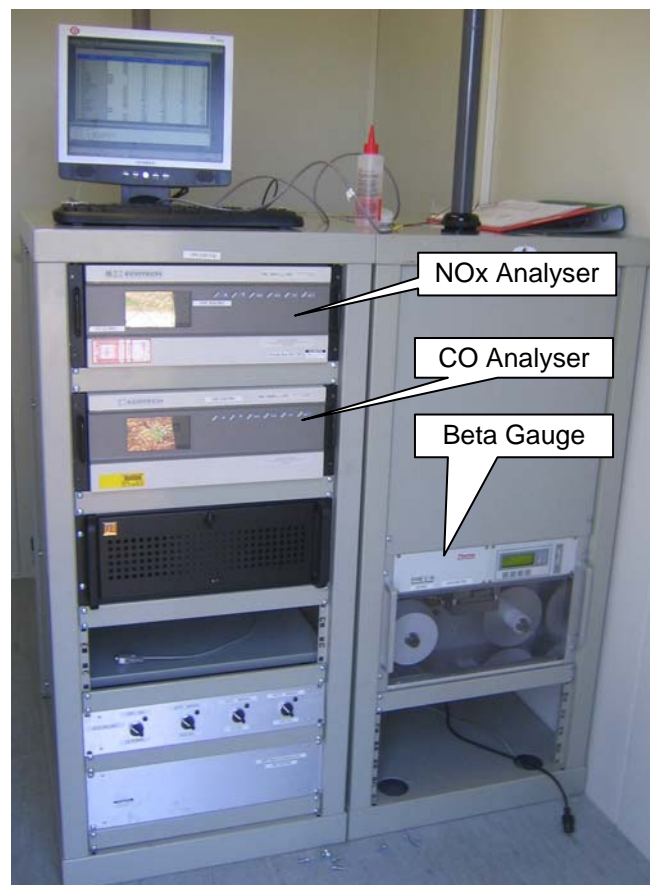
The rural Pukekohe PM₁₀ site is expected to provide information on the contribution of PM₁₀ in the urban areas which may not be from urban sources. Nitrogen oxides and ozone are also measured at this site to see whether rural areas are affected by pollution from the city.



Ceramco Park Site in Glen Eden (established December 2005)

What type of monitors are used?

The instruments that are used to monitor air quality in Auckland are chosen so that they meet regulatory standards, including the NES or the United States Federal Reference Methods. Particulate matter is either measured gravimetrically (24 hour averages) with Partisol samplers or continuously using Beta Attenuation Monitors. CO, NO_x, SO₂ and ozone are monitored using continuous methods (i.e. IR absorption, chemiluminescence, UV fluorescence and UV photometry). All of the continuous monitors are housed in air conditioned monitoring sheds. The data is telemetered to the office to be checked daily (weekdays) and automatic calibrations are carried out every two days.



Instruments inside the shed at Ceramco Park

How has the air monitoring network changed?

Continuous ambient air quality monitoring has been undertaken in Auckland for several decades. Early ambient air quality monitoring by the Department of Health (DoH) was at two sites (Mt Albert and Penrose) measuring total suspended particulates (TSP) as a weekly average and lead as a monthly average. The addition of SO₂ and smoke in 1975, and NO_x in 1987 further expanded the monitoring programme. The Clean Air Act of 1972 was superseded by the RMA in 1991 and responsibility of air quality management was handed over to regional councils. By June 1993 the ARC had taken over the majority of the ambient air quality monitoring in the region.

Over the years the nature of monitoring and overall objectives have changed. This reflects international trends in monitoring, including increasing concern with smaller particles and hazardous air pollutants, improved instrumentation, and an improved understanding of air quality in Auckland. Changes in air quality monitoring in the Auckland region have arisen due to a number of factors:

- Concern about the effects of smaller particles has led to a move away from measuring TSP to measuring smaller particles such as PM₁₀ and PM_{2.5}. Lead monitoring (associated with TSP monitoring) was also reduced as petrol (a main source) became lead free.
- There has been a change in focus for gaseous pollutants from sulphur dioxide (SO₂) from industrial coal and oil burning, to carbon monoxide (CO) (from older vehicles) and subsequently oxides of nitrogen (NO_x) from gas and diesel combustion and hazardous air pollutants such as benzene and 1,3-butadiene.
- Concern about photochemical smog due to reactions between air pollutants on warm summer days.
- Move from 1 day in 6, to 1 day in 3 to continuous particulate monitoring to improve data and the ability to interpret trends. Continuous monitoring has become feasible with better technology and is also usually more cost effective as it is less labour intensive.
- Changes in air quality guidelines and standards.

In addition to providing information for local and national bodies, two sites in Auckland have contributed data to the World Health Organisation (WHO) Global Environmental Monitoring (GEMS) programme since 1977 (although the actual locations of those sites have changed in that time). There have also been numerous short survey and passive monitoring programmes over the years to provide more detail on the spatial distribution of pollutants or in relation to specific sources.

For further information on Auckland's Air Quality Monitoring Network, refer to *TP296 The Ambient Air Quality Monitoring Network in the Auckland Region* available from our website www.arc.govt.nz (look for publications in the air quality home page) or contact us on 09 366 2000.

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