

Science and Planning fact sheet

Air quality monitoring in Mandurah

Purpose

The purpose of this fact sheet is to provide information on monitoring for airborne particles that is undertaken in Mandurah by the Department of Water and Environmental Regulation (the department).

Introduction

Air quality monitoring is undertaken by the department at a number of metropolitan and regional locations within Western Australia, in accordance with the National Environment Protection (Ambient Air Quality) Measure (referred to as the AAQ-NEPM).

The Western Australia Monitoring Plan describes the rationale for the air quality monitoring needed to determine compliance with the standards and goals of the AAQ-NEPM.

The Mandurah station was established in November 2019 and is one of 16 air quality monitoring stations (AQMS) operated by the department.

The City of Mandurah, about 72 km south of Perth, is Western Australia's second-largest city, with a population of about 97,000. The AQMS is in the Mandurah suburb of Halls Head and is about 100 m from the coast, as shown in Figure 1.

To the south of the AQMS lies the Mandurah Estuary comprising 155 km² of open water and waterways. North-east of the AQMS, the coast turns to the east. The site is therefore mostly surrounded by saltwater bodies.

What is monitored?

The Mandurah AQMS has instruments that measure ozone, carbon monoxide, oxides of nitrogen and particles as PM₁₀ and PM_{2.5}.

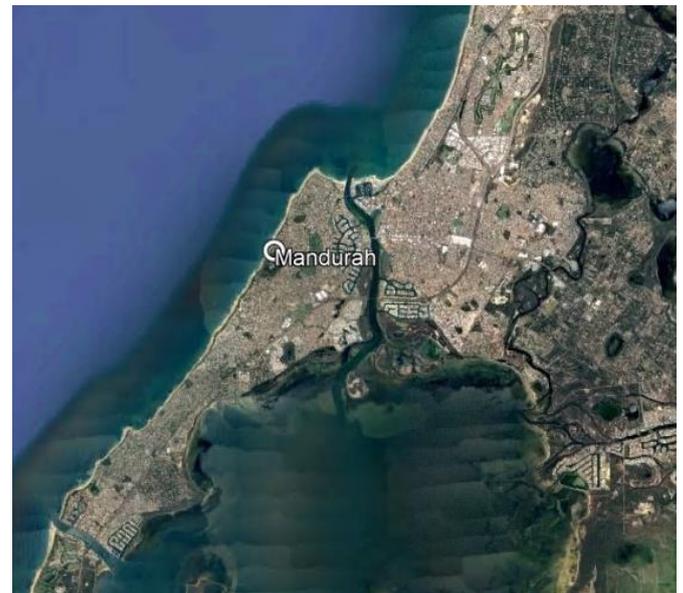


Figure 1 Location of Mandurah air quality monitoring station

PM₁₀ is made up of small particles found in air that are less than 10 micrometres (µm) in diameter. PM_{2.5} particles are even finer with diameters less than 2.5 µm.

PM₁₀ and PM_{2.5} are both associated with adverse health outcomes. Common sources of these pollutants include bushfires, hazard-reduction burns, wood heaters and motor vehicles.

Air quality particle criteria

The AAQ-NEPM provides standards for PM₁₀ and PM_{2.5} particles as shown in Table 1.



Table 1 Air quality particle standards

Pollutant	Averaging Period	Maximum concentration (micrograms per cubic metre)
Particulate matter as PM ₁₀	1 day	50 µg/m ³
	1 year	25 µg/m ³
Particulate matter as PM _{2.5}	1 day	25 µg/m ³
	1 year	8 µg/m ³

All exceedances of these standards (referred to as ‘events’) are identified and reported by the department in accordance with the AAQ-NEPM protocols.

Events that were caused by a hazard-reduction burn, bushfire or continental dust event are called ‘exceptional events’. All other events are referred to as ‘assessable events’.

The goal of the AAQ-NEPM is to have no exceedances because of assessable events in any year. Exceedances because of exceptional events are not included in this assessment.

Particle levels in Mandurah

The Mandurah site has been recording a larger than expected number of exceedances of the AAQ-NEPM standard for PM₁₀ owing to sea-salt from the beach close by. The levels of other pollutants monitored are low.

Measurements of PM₁₀ taken between November 2019 and July 2020 have exceeded the AAQ-NEPM standard on five days in May, six days in June and four days in July 2020. Of these exceedances, one was caused by hazard-reduction burning, one by continental-scale windblown dust associated with ex-Tropical Cyclone Mangga and 13 by marine aerosols

(sea-salt) from persistent onshore westerly winds.

There was also an exceedance of the PM_{2.5} daily standard during the hazard-reduction burn event. The PM_{2.5} daily standard was not exceeded as a result of ex-Tropical Cyclone Mangga or during any of the marine aerosol PM₁₀ events.

The image in Figure 2 shows the wind speed (concentric rings) and wind direction (compass bearings) along with the average PM₁₀ concentration (shaded area of image) measured at the Mandurah AQMS. The image shows that higher concentrations of PM₁₀ (yellow-orange colours) mostly occur under westerly winds, that is, from the direction of the ocean.

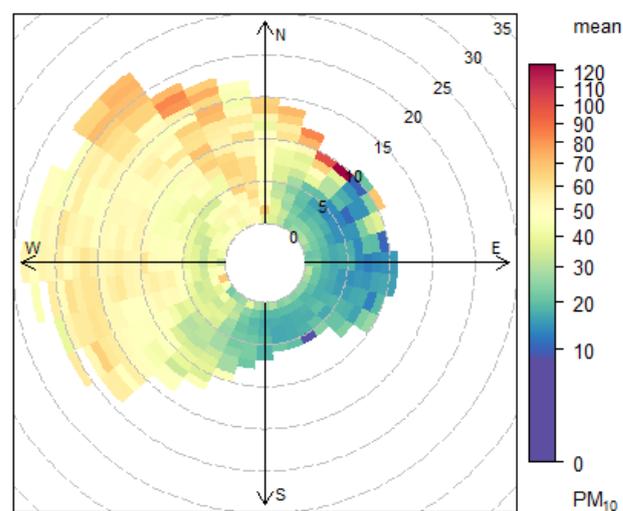


Figure 2 Polar plot from November 2019 to August 2020 showing the higher concentrations of PM₁₀ originating from the western (ocean) side of the site (yellow-orange portion of plot) indicating the likely influence of marine aerosols (sea salt)

The Mandurah AQMS is the closest station to the coast when compared with other Perth and regional



monitoring stations. Concentrations at the other monitoring stations, which are further inland, do not show this strong relationship with wind direction.

Although the PM₁₀ NEPM standard has been exceeded at the Mandurah AQMS on a number of occasions, our analysis of the monitoring data suggests that these exceedances are most likely because of marine aerosols. The Department of Health has provided advice that inhaling 'sea air' or 'ocean air' is not harmful.

Monitoring data collected at the Mandurah AQMS and other Department of Water and Environmental Regulation stations are available on the department's [website](#).

Particles explained

Airborne particles are commonly classified by size in terms of their equivalent aerodynamic diameter or EAD. An EAD is the diameter of a spherical particle of density 1 gram per cubic centimeter (the same density as water) which exhibits the same aerodynamic behaviour as the particle in question. Particles are sampled and described on the basis of their EAD but usually simply called the particle size.

PM₁₀ particles are any substances that have an EAD less than or equal to 10 micrometres in diameter. PM_{2.5} particles are any substances that have an EAD less than or equal to 2.5 micrometres in diameter.

Particles in the PM_{2.5} size range make up a large portion of smoke that can be drawn into the lungs. Larger particles tend to be trapped in the nose, mouth or throat.

The important thing to note is that PM₁₀ and PM_{2.5} are not one particular substance, but simply a classification of particle or dust size.

More information

For advice on air quality, or related matters, please email info@dwer.wa.gov.au

This document is available in alternative formats and other languages on request.

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Legislation

This document is provided for guidance only. It should not be relied upon to address every aspect of the relevant legislation. Please refer to the State Law Publisher (SLP) for copies of the relevant legislation, available electronically from the SLP website at www.slp.wa.gov.au