

WYNNUM citizen science air monitoring project

ABOUT THE PROJECT

What is citizen science?

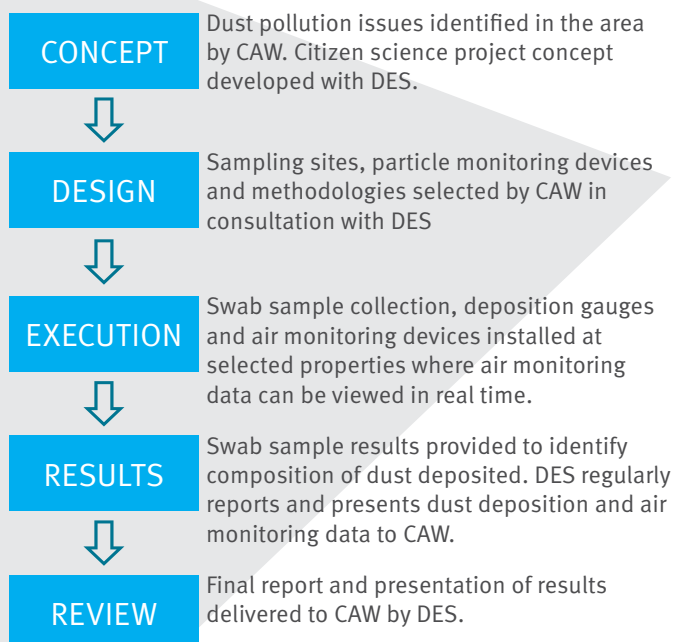
Citizen science involves public participation and collaboration in scientific research with the aim to increase scientific knowledge. The Wynnum Citizen Science Air Monitoring Project is a collaboration between the Department of Environment and Science (DES) and community members of Clean Air Wynnum (CAW) and Bayside Creeks Catchment Group to address concerns relating to particle pollution in the Wynnum area.

What does the project involve?

The aim of this project is to collaboratively measure airborne particle levels (as PM₁₀ and PM_{2.5}) continuously over a 12-month period. Dust deposition levels will be measured, and the composition of the deposited dust as well as surface wipes will also be determined.

Particle monitoring devices and deposition gauges will be provided to community members to monitor levels in Wynnum. The project will also involve ongoing collaboration, data reporting and analysis of results between the community and DES throughout the duration of the project.

Project phases



KEY FACTS

- Particulate matter (PM) is a mixture of solid particles and liquid droplets.
- PM₁₀ and PM_{2.5} are invisible to the naked eye, and for PM_{2.5} can be up to 30 times smaller than the width of a human hair.
- The main sources of particle pollution in Queensland are transport, industrial processes, biomass burning and wind-blown dust.

WHAT ARE WE MEASURING?

Particle size

PM₁₀ and PM_{2.5} will be measured in real-time and over a 24-hour average, and then compared against national standards to identify any potential health risks. Particle monitoring devices size will be measured by either the PurpleAir or arcHUB air monitoring devices.

Particle deposition

Dust deposition gauges will be used to measure deposited dust (dustfall) that settles over a given area and time under the influence of gravity. Dust deposition is measured to assess if an emission source is causing a nuisance.

Particle composition

Particle composition analysis of the indoor and outdoor surface wipes and the deposited dust samples will be conducted by the University of Queensland's Materials Performance Laboratory (UQMP) to assist with identifying likely sources of the dust. The samples are examined through a microscope and the proportions of different types of particles are measured based on their surface area coverage. This analysis method can identify a range of black-coloured particles (coal, soot and rubber dust), mineral dust particles (e.g. soil, rock, cement and glass), biological particles (e.g. insects and plants) and other general organic particles (e.g. wood, fibres, and plastics).



AIR QUALITY

Local air quality can be impacted by emissions from a range of human activities such as transport, industry, rural and domestic activities. Natural processes and factors such as bush fires, dust storms, temperature and rainfall can also affect air quality.

Air quality in urban areas is strongly influenced by airborne particles from local or regional emissions or activities. Particles can be a mixture of both solid particles or liquid droplets; can vary in shape, size, composition; and, behave very different in the atmosphere. At elevated levels, airborne particles can be hazardous to human health or cause a nuisance when deposited.

Potential health effects are closely associated with particle size; the smaller the particle, the more likely it is to enter the respiratory system. Airborne particles are generally measured in two size distributions:

- PM_{10} refers to particles less than 10 micrometres (μm) in diameter, and are considered coarse particles.
- $PM_{2.5}$ refers to particles less than 2.5 micrometres in diameter, and are considered fine particles.

SOURCES OF PARTICLES

Airborne particles are often a result of combustion processes such as vehicle engines, power stations, wood heaters, and bush fire hazard reduction burning. However, non-combustion activities such as earthworks, dirt from roads, sea salt, bulk material handling or dust storms can also produce airborne particulate matter.

Levels can also be affected by meteorological conditions (wind-blown dust) or local activities such as lawn mowing, smoking, barbecuing or running a car engine.

$PM_{2.5}$ particles are mainly generated by combustion processes, whereas PM_{10} particles can be a result of either combustion or non-combustion activities.

STANDARDS

Air quality standards and objectives are numerical benchmarks that help manage short or long-term air quality issues at local, regional or national level. Based on scientific information about the impacts of pollutants, they are set at levels that safeguard human health and the natural environment.

Particle standards as outlined by the National Environment Protection (Ambient Air Quality) Measure (NEPM) are:

$PM_{2.5}$	$25\mu g/m^3$ over 24 hours	$8\mu g/m^3$ over 12 months
PM_{10}	$50\mu g/m^3$ over 24 hours	$25\mu g/m^3$ over 12 months

AIR QUALITY MONITORING DEVICES

The role of CAW citizen scientists

Community members will be collecting air quality monitoring data at their own residences through the installation of air monitoring devices that measure airborne particulate matter in real time. CAW members will also participate in surface wipe and dust deposition sampling, as well as the recording of important and relevant observations that may affect measurements.

Devices

The project will collect data using both PurpleAir and archHUB particle monitoring devices. The PurpleAir devices use a fan to draw air past a laser, causing reflections from any particles in the air. These reflections are used to count both PM_{10} and $PM_{2.5}$ particles. These counts can be viewed in real time on the PurpleAir webpage. The archHUB device is another particle monitoring device that measures PM_{10} and $PM_{2.5}$ and sends the results to a central database for downloading. DES is working towards making this data available on the Queensland Government website.

DISCLAIMER

This fact sheet is provided to members of Clean Air Wynnum for guidance and information only. The information contained in this document is provided by the Queensland Government, and makes every attempt to ensure accuracy and validity.

ADDITIONAL RESOURCES

- Department of Environment and Science
www.qld.gov.au/environment/pollution/monitoring/air
- Environmental Protection (Air) Policy 2008
www.legislation.qld.gov.au/view/pdf/2016-07-08/sl-2008-0441
- National Environment Protection (Ambient Air Quality) Measure
www.legislation.gov.au/Details/F2016C00215

