aeroqual

Case Study

Conducting an Accurate Air Monitoring Assessment for a Proposed Childcare Facility Using Real-Time Data

AECOM is a global design, engineering, construction and management consultancy, with nearly 100,000 employees in 150 countries on seven continents.

Project
AECOM

Location
Auckland, New Zealand

Date
2017

Services
AQS 1 Mini Air Quality Station

Measurements
PM_{10}, $PM_{2.5}$, NO_2, ozone and wind

Sector
Outdoor

The customer

AECOM

AECOM is a global design, engineering, construction and management consultancy, with nearly 100,000 employees in 150 countries on seven continents. Fortune magazine lists AECOM as one of the "World's Most Admired Companies" and it ranks #1 in Engineering News-Record's "Top 500 Design Firms". Iconic projects include One World Trade Center, Crossrail London, Los Angeles International Airport, and China's Taizhou Bridge.

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Air quality consulting is a subset of AECOM's Environmental Services portfolio and it operates a global air quality practice delivered by more than 400 professionals. As a consulting group with no vested interests in specific technologies, equipment or processes, AECOM prides itself on offering its clients industry-leading technical solutions that are objective and based on sound science.

> **"We were able to give the client valuable insights not available by conventional methods within the budget."**
>
> **Jonathan Harland**
> Senior Air Quality Scientist AECOM

The problem

AECOM New Zealand was engaged by its client to conduct an air quality assessment for a proposed childcare facility. The mixed-use development site was in the vicinity of a Heavy Industrial Zone and close to arterial roads. Since a childcare facility is considered a 'sensitive receptor' the assessment evaluated potential air quality impacts from neighbouring industrial processes, and traffic related emissions which could result in ambient air pollutants that exceed relevant air quality guidelines.

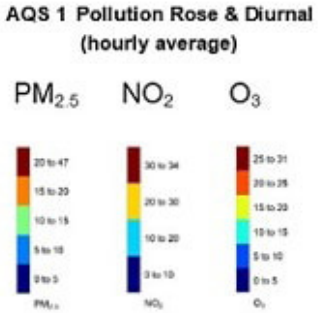
Identified air pollutants included: volatile organic compounds (VOC), silica, ozone and combustion emissions (NO_2, PM_{10} and $PM_{2.5}$). The planning consent required the assessment to include a minimum dataset of three months for PM_{10}, NO_2 and BTEX. To measure PM_{10} continuously AECOM installed a Met One Instruments E-BAM, and diffusion tubes for collecting NO_2 and BTEX samples.

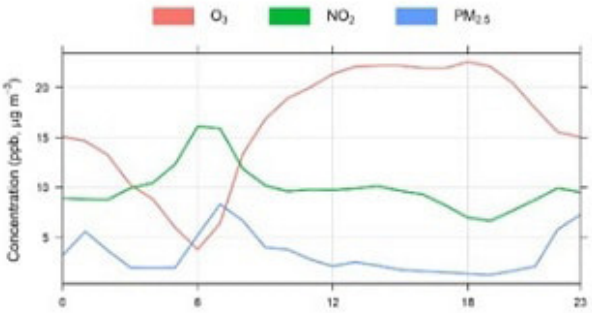
However, AECOM and its client were interested in more than simply meeting the consent criteria. Continuous monitoring of $PM_{2.5}$, NO_2 and ozone, as well as wind data, would provide a richer dataset for emissions source apportionment and help determine whether potential exceedances could impact on the childcare facility during hours of operation. But data collected from diffusion tubes is not real-time and often reported in monthly averages. On the flipside, the budget did not allow for a second E-BAM for capturing $PM_{2.5}$ data, nor continuous analyzers for measuring NO_2 and ozone.

The solution

AECOM approached Aeroqual to co-locate an AQS 1 Mini Air Quality Station at the site. The brief specified a compact instrument configured for $PM_{2.5}$ and ambient NO_2 and ozone, plus integrated meteorological station. The AQS 1 was selected because it was easy to deploy, offered real-time data, and was cost-effective compared to installing reference analyzers for each parameter. Although not required for this project, the AQS 1 can be configured to measure PM_{10}, $PM_{2.5}$, PM_1 and TSP simultaneously, as well as gases including VOCs for targeted environmental applications.

The AQS 1 came factory-calibrated to traceable standards and was installed on a tripod next to the E-BAM and diffusion tubes attached to the fenceline. Data was transmitted in real-time via the 3G modem to Aeroqual Cloud which has advanced data tools for air quality professionals. The software aided AECOM's scientists to quickly plot multi-channel data from the AQS 1, upload validated datasets, and generate pollution rose and diurnal charts like the examples shown below.





Evaluation

Following best practice, at the end of the monitoring AECOM arranged for a calibration check of the AQS 1 against traceable standards. After a minor slope adjustment a validated dataset was produced which also correlated well with data from the E-BAM and passive samplers. The quality and quantity of data captured by the AQS 1 exceeded the client's expectations.

Overall, the AQS 1 lived up to the design brief for air quality professionals. In summing up, Jonathan Harland, Senior Air Quality Scientist at AECOM commented, "The approach using the AQS 1 worked out cost-effective for the project. Set up was quick and the data capture was high. We were able to give the client valuable insights not available by conventional methods within the budget."