Case Study

London Borough of Newham Council

Client

London Borough of Newham is a customer of Enviro Technology Services Ltd, (ET).

Overview

ET provided London Borough of Newham with a network of Zephyr® air quality sensors.

The sensors were deployed at nine primary school sites in the borough to measure air quality during peak travel times. Zephyr® measurements evidenced how nearby idling vehicles were depleting air quality at each location and potentially harming the health of children, giving the council evidence-based reasoning to introduce timed road closures.

London Borough of Newham also deployed Zephyr® air quality sensors at the Nightingale Hospital, London to measure air quality surrounding the location built to manage public health following the outbreak of Covid-19.

The Challenge

Many residents of Newham live near busy roads and are exposed to high levels of harmful gases in the country leading to high mortality rates and the highest number of children attending hospital with asthma.

London Borough of Newham's transport department outlined their concerns about how vehicles may be damaging resident's health, particularly children, so carried out a pilot study using Zephyr® air quality sensors to give an insight into air pollution.

There were also concerns about patients at the Nightingale Hospital suffering from coronavirus, an illness that affects the respiratory organs. The council wanted to identify air pollution levels along the road to ensure the hospital related diesel vehicles were not impacting the neighbouring residents.

Figure 1: London Boroughs and Newham location.

Figure 2: Zephyr® Sensor being deployed with solar panel to a lighting column in Newham.

The Solution

The transport department of London Borough of Newham Council are working towards 'Healthy School Streets' and 'Anti Idling' campaigns and put forward concerns about primary school children in Newham suffering from asthma linked to air pollution. To understand more about the issue, they needed a sensor that would provide them with high resolution, real-time air quality data. They agreed that a Zephyr® air quality sensor would be the ideal tool to identify NO_2 levels for each school site experiencing high pollutant levels and purchased 29 sensors for the local councils from Enviro Technology Services Ltd (ET).

To identify the areas which would have Zephyr® sensors installed, problem areas were pinpointed. Five schools were recognised as having significantly high traffic and known driver behaviour issues and four primary schools with poor air quality were outlined as a result of the Mayor of London's Air Quality Audits, all of which were to be part of the study.

Once the schools had been identified, 11 Zephyr® air quality sensors powered by solar panels were attached to lighting columns at each site and began measuring the state of air quality in real time through the sensors active sampling fan, which draws local air in and out of its cartridge every 10 seconds.

These measurements were transmitted to the Zephyr® web portal to provide quantified information about harmful pollutants including O_3, $PM_{2.5}$ and PM_{10}, and in particular, NO_2.

Air quality data allowed the council to better understand the level of pollutants throughout the day, paying close attention to measurements during peak commuting times.

To measure air quality surrounding Nightingale Hospital in London, ET provided London Borough of Newham Council with 4 Zephyr® air quality sensors powered by long-life batteries, giving them insight into local air quality for pollutants NO2 and $PM_{2.5}$. 2 sensors were deployed on to lighting columns nearby the hospital at one time, which were swapped each week whilst other units charged. Using long life batteries for the investigation meant the council were able to use Zephyr® sensors to measure air quality for a prolonged period of time without having to intervene by recharging the units during the global Coronavirus pandemic. Prolonged air quality data would evidence the impact nearby diesel cars were having on patients inside the hospital.

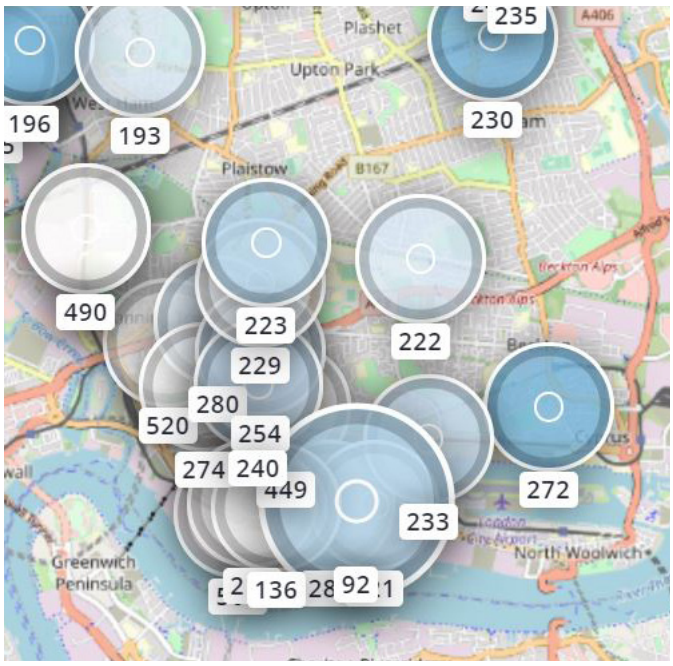

Figure 3: Zephyr® Sensor locations and concentrations across London Borough of Newham via a web portal.

Outcomes

After collating and analysing air quality data, pollution mitigations were trialled at each of the schools. The trials involved building 'green

screens' with hedges between playgrounds and main roads to act as a shield between children and pollution and timed road closures during hours previously identified as having high levels of air pollution, allowing access to pedestrians and cyclists and prohibiting access of cars polluting the roads by parking or idling. One of the schools involved in the project relocated their play area from the front of the building to the rear, away from nearby vehicles. Once the interventions were put in place, air quality measurements during peak times were used to identify the effectiveness of each. Zephyr® sensors indicated a reduction in NO_2, including evidence that children were no longer subjected to high levels of the NO_2 post playground relocation.

> Newham's network of Zephyr® air quality monitors is enabling the sustainable transport, public health and environmental control teams with extensive data to inform future measures to reduce exposure to air pollution thereby positively impacting on the health and quality of life of residents and visitors.
>
> **Tim Baker**
> Environmental Control Officer

After measuring a reduction on NO_2 concentrations and evidencing the success of the pilot study, further interventions were rolled out throughout all 96 primary schools in Newham. Pollution lowering strategies have since been initiated including the use of games between parents and children to encourage anti-idling. Zephyr® air quality sensors have subsequently measured the state of air pollution post-interventions.

Figure 4: Zephyr® air quality sensor deployed to a lighting column powered by solar panel.

During the coronavirus lockdown, ambient air measured by Zephyr® air quality sensors at Nightingale Hospital identified surrounding air pollution levels to be low. The mean NO_2 concentration reached 21.14 ug/m^3 and data showed that there were no unique spikes in emissions as there were a reduced number of cars on the road due to lockdown restrictions being put in place. For the period that the Nightingale hospital was open to patients, the sensors recorded the lowest peak, median and mean NO_2 concentrations against the Newham Zephyr® network. This suggested that the Nightingale Hospital was located in one of the less polluted areas of the borough, so the risk of Covid-19 patients experiencing exacerbated symptoms caused by nearby diesel fumes was

low. Zephyr® measurements have since been sent to the Mayor of Newham to provide data about air pollution to help plan appropriate pollution mitigation strategies in place of dangerous air quality levels.

Long Term Health Benefits

The World Health Organisation have found that over one in every four child deaths aged under 5 years old is related to environmental risks such as high numbers of air pollution. Research shows that air pollution contributes to children suffering from irreversible health problems such as infant mortality, neurodevelopmental disorders, childhood obesity, lung function and cancers, and these findings highlight the importance of improving air quality to improve a child's future.

London Borough of Newham Council's project to improve air pollution in Newham primary schools is one which could save children's lives. The introduction of initiatives such as timed road closures and green screens reduce air pollution levels through lowering vehicle emissions, which avoids the risk of high concentrations of pollutants getting trapped in their respiratory systems which contribute to detrimental health issues. The introduction of small changes to Newham's school surroundings may lead to big changes for a child's future as they are lowering the risk of children developing and suffering from health problems and potentially saving lives.

Future Plans

London Borough of Newham Council have planned further projects with their Zephyr® air quality sensors. They plan to work with schools to utilise mobile Zephyr® sensors and integrate GPS data from the units to map out pollution levels. Integrating MyAir® and sensor measurements, they will identify clean air routes to schools with aims to lower the risks of children suffering from air pollution health-related impacts. Newham also plan to explore the improvement of footways, pedestrian crossings and cycle routes with projects using the sensors to make for a cleaner community for all.

Get in Touch

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