

### DEFRA Air Quality Grant-Funded Project

#### Heavitree Corridor Air Quality Virtual Sensors

Exeter's current air quality monitoring network comfortably achieves the legal requirements under the Environment Act 1995 to identify areas of non-compliance with the air quality objectives. However it does not provide the kind of high spatio-temporal resolution data that is visually engaging to the public, nor does it closely identify the sources of pollution. Traditionally this would have been done by either the use of dispersion models (to predict typical pollution levels based on historic inputs of traffic and weather data) or by the addition of expensive (c £10k each) real-time monitors.

This project proposes an alternative methodology, instead focussing on the development of virtual sensors trained by a few real-world sensors which will learn to predict pollution levels. A variety of both historic and near real time inputs will allow the virtual sensors to display near current estimates of pollution concentrations which will become more and more accurate as they learn from the real-world sensor data.

Currently only one site in Exeter exceeds the legal objectives for air pollution levels. This is at East Wonford Hill, nitrogen dioxide (NO<sub>2</sub>) levels are above the relevant level. For this reason the project will focus on NO<sub>2</sub> in the Heavitree Corridor area. This will serve as a model template for other areas of highest needs, both for Exeter and other cities.

The project team will install new state-of-art Internet of Things (IoT) air quality sensors within the project area which will be used alongside the existing pollution monitors to:

- Build a robust data set from which the project team will create algorithms to inform virtual sensors to automatically estimate the air quality across the Heavitree corridor.
- Expose the rapid fluctuations of air quality across time. For reference, the diffusion tubes utilised by ECC take monthly averages of NO<sub>2</sub> concentrations whereas the new sensors will provide 15-minute average data in real-time.
- Help to establish patterns in concentrations which in turn will better inform what is causing localised and potentially short-lived high ambient concentrations (for example we will better understand the impact of congestion, road junctions etc)

The project team will then create a robust, simple, and digestible data dissemination pathway to help inform the local population about the air quality issues along the Heavitree corridor. The main aim of the dissemination pathway is to inspire behaviour change in individuals which should result in reduced NO<sub>2</sub> emissions and ambient concentrations.

The project is a partnership between Exeter City Council and Emerald Green Power. It will last two years. Because it has been funded by grant from DEFRA, the Council does not currently expect to have the funding available to continue or expand the project beyond this period.