



**Proposal:**  
PM2.5 Monitoring Study,  
North West Leicestershire

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March 2021



Experts in air quality  
management & assessment

## Document Control

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### Document Status and Review Schedule

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## Contents

|   |                                   |   |
|---|-----------------------------------|---|
| 1 | Introduction .....                | 2 |
| 2 | Experience .....                  | 2 |
| 3 | Proposal.....                     | 3 |
| 4 | Requirements of the Council ..... | 5 |
| 5 | Costs.....                        | 5 |

## 1 Introduction

- 1.1 Air Quality Consultants Ltd. (AQC), in association with EnviroTechnology (ET), is pleased to provide a quotation to monitor PM<sub>2.5</sub> concentrations in North West Leicestershire with the aim of providing an indication of the contribution of emissions from quarrying and traffic to overall ambient levels of PM<sub>2.5</sub>.
- 1.2 AQC has been undertaking work for North West Leicestershire District Council, most recently providing assistance with the Air Quality Action Plan, which is required to address exceedances of the annual mean nitrogen dioxide objective. Although this PM<sub>2.5</sub> monitoring study is unrelated to the statutory work being undertaken for the action planning process, local residents are concerned about the health impacts of air pollution, and this proposal stems largely from this local concern.
- 1.3 PM<sub>2.5</sub> is not currently addressed within regulations for Local Air Quality Management functions. However, the Environment Bill, currently before Parliament, requires that the Government set an annual mean target for PM<sub>2.5</sub>, as well as long term environmental targets. It is also widely recognised that the strongest evidence in relation to the health effects of air pollution relates to PM<sub>2.5</sub>.
- 1.4 AQC operates a Quality Management System, which is certified to ISO9001:2015, and an Environmental Management System, certified to ISO14001:2015. Further information about the company and its staff is available at [www.aqconsultants.co.uk](http://www.aqconsultants.co.uk).

## 2 Experience

- 2.1 Air Quality Consultants provides expert advice and support to developers, industry, local authorities and policy makers. Our sustained growth over the past 27 years has been founded on the delivery of high quality services, with a high volume of repeat business from satisfied clients. The Company has played a leading role in developing the air quality monitoring, modelling and assessment regime both in the UK and overseas and we are extremely well placed to lead and deliver this project.
- 2.2 Reflecting its expertise and experience, AQC has highly regarded, expert staff, several of whom are, or have been, members of national or international expert groups. For example, Dr Ben Marner currently serves on the UK's Air Quality Expert Group (AQEG), while both Stephen Moorcroft and Duncan Laxen have previously served on the group. Tim Williamson, in a former position, was head of secretariat for Defra's expert groups on air pollution, including AQEG, and both he and Duncan Laxen have served on the UK Committee for the Medical Effects of Air Pollution (COMEAP). Stephen is currently a member of the CEN working group WG43 on model quality objectives and WG42 on low-cost sensors.

- 2.3 ET joined forces with air quality sensor and mapping specialists EarthSense in early 2019, as distributor for the Zephyr® air quality sensor to UK Local Authorities. Since then, ET have supplied over 120 Zephyr® units to a growing number of authorities and has re-signed with EarthSense to continue the partnership. AQC and ET have worked successfully together, for over 20 years, most recently on monitoring barbeque nuisance on Hampstead Heath.

### 3 Proposal

- 3.1 Guidance on monitoring for local authorities is set out in LAQM.TG16. With regard to PM<sub>2.5</sub> monitoring, a number of reference or reference-equivalent samplers are cited. However, these are both expensive to purchase and operate, and installation and commissioning can be complex and time-consuming. For these reasons, the use of indicative samplers are suggested to assess concentrations. It should also be noted that the WHO Guideline makes no reference to sampling methodologies.
- 3.2 There is a preference in North West Leicestershire for air quality monitoring using zephyr air quality sensors which are already in use in both North West Leicestershire and Leicestershire more widely. The standard Zephyr is equipped with NO, NO<sub>2</sub>, ozone, PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub> (as well as temperature, pressure and humidity) sensors. Therefore, although the initial aim of this project is to investigate PM<sub>2.5</sub> concentrations, by default, NO<sub>2</sub> and PM<sub>10</sub> concentrations will also be collected providing further local data for these pollutants.
- 3.3 Zephyr monitors are not currently available for hire, and therefore this proposal includes the cost of purchasing the units. Each unit will monitor for approx. 12-15 months, before requiring a new cartridge of sensors. The quote includes a full warrantee and a 12 month standard package provided by Earthsense, who remotely check the operation of the sensors and manage a web based app<sup>1</sup> which will provide the data direct to the Council.
- 3.4 Initially, it is suggested that 6 months monitoring is undertaken in two locations in North West Leicestershire, a roadside site and a site in proximity to Bardon Hill Quarry. However, as indicated above, costs include the purchase of the zephyr units, which will monitor for at least 12 months, and therefore the units can be left out for 12 months at each site, or moved to new locations, depending on Council priorities.
- 3.5 The sensors are provided as “factory calibrated” – with all calibration and testing carried out at the EarthSense manufacturing facility to near-reference site standard with no in-field calibration

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<sup>1</sup> The web app also allows data integration into existing systems such as environment reports, GIS and traffic management systems. In addition, the zephyr has GPS tracking as standard, so that it can be used in a static or mobile application (i.e. walking, vehicles etc), with the data being able to be plotted on Google street maps.

required. No additional maintenance or QA is required. The sensor will be supplied with all brackets, Solar Panel, 240 VAC power supply (indoor charger), ready to operate out of the box.

### Installation and Operation

- 3.6 It is possible to operate the Zephyr monitors using either solar power, battery, or a 12v power supply. Solar power is considered sufficient for the running of the monitors for this project. It is envisaged that the monitors will be fixed to items of street furniture, such as a traffic sign or lighting column. The pod has a dimension of 235mm x 160mm x 114mm (W x D x H) and weighs 2kg. They are fixed to the pole or column using a steel band and rubber strip to avoid any damage to the surface. The monitors can also be installed at building facades, railings and posts using “stand-off” brackets to avoid interactions with surfaces close to the device. Zephyr monitors have a built-in battery and run for approx. 72hrs+ without charge, or unlimited operation with a solar panel or mains supply.
- 3.7 Zephyrs require minimal maintenance in normal use, and they are designed to cope with harsh outdoor conditions for long periods. It is, however, possible that a sensor may fail and will require replacement. Replacement of cartridges can be done on-site in a matter of 5-10 minutes, and the unit restored to operation immediately, meaning that the unit will not need to be returned to the factory for any calibration or repairs. Because they do not require mains power, the units are also easily moved without requiring external support.

### Proposed Monitoring Strategy

- 3.8 The monitoring strategy has been designed to make best use of the features of the Zephyr monitors; in particular their size, which provides flexibility regarding site selection, and their ability to provide high time-resolution measurements.
- 3.9 The monitoring strategy has the following broad aims:
- To provide an understanding of key emission sources of PM<sub>2.5</sub> in North West Leicestershire; and
  - to provide an indication of how concentrations in North West Leicestershire compare against relevant air quality standards (specifically the objectives and WHO Guidelines).
- 3.10 As noted above, the units will also provide data for NO<sub>2</sub> and PM<sub>10</sub> and although the measurements can only be considered indicative with respect to strict compliance assessment, this does not detract from their ability to inform a picture of concentrations across North West Leicestershire.
- 3.11 Precise siting locations will be agreed with North West Leicestershire District Council following commissioning of the project. Clare Beattie has been working with North West Leicestershire District Council as part of this process, which will also consider any concerns that the Council might raise based on its understanding of local issues.

### ***Roadside Concentrations***

- 3.12 Roadside measurements will be made alongside Broom Leys Road in Coalville in order to represent worst-case exposure to traffic emissions and provide an indication of whether air quality objectives are being achieved at this location.

### ***Other Sources***

- 3.13 It should be recognised that while the contribution to PM<sub>2.5</sub> concentrations made by road traffic is expected to be non-trivial, there will be a number of other emissions sources within North West Leicestershire which might, on aggregate, be more important. A unit will initially be located close to Bardon Hill quarry, with further potential to investigate sites which will be representative of areas with solid fuel burning.

### ***Analysis of Data***

- 3.14 A report will be provided by AQC following analysis of the 2 sites against available meteorological data to show concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> in different wind directions, differences between the sites and likely contributions from traffic and quarry sources. The report will be undertaken at the end of the monitoring period, assumed to be 6 months initially. This quote allows for one report at the end of 6 months monitoring.

## **4 Requirements of the Council**

- 4.1 As the Council has prior experience of monitoring with Zephyr monitors, it is assumed that the council will assume full responsibility for the installation and operation of the monitoring sites. If AQC or ET is required to assist in the installation, costs can be provided to cover this aspect. It should be noted that the following assistance from the Council would be required:

- Authorisation for installing the units at roadside locations and/or roads infrastructure will need to be approved by Leicestershire County Council Highways Department. It is assumed that the Council will obtain such approvals; and
- In cases where a sensor fails, it is a simple matter to replace the cartridge, requiring no more expertise than servicing a passive diffusion tube. To expedite the fastest replacement of the sensor, it has been assumed that a Council officer could undertake the replacement of the sensor which could be dispatched by post immediately when the fault is identified.

## **5 Costs**

- 5.1 The fees for the work set out above are outlined in the table below. All fees are exclusive of VAT.

|    | Item  | Description   | Fees (ex VAT)                      |
|----|---|---|------------------------------------|
| 1. | <b>Purchase of 2 X Zephyr units</b>                                     | Price includes one year's operational fee, solar panel, full warranty, SIM card and data hosting, remote support, web portal          | <b>£7,950</b> (ie £3,975 per site) |
| 2. | <b>Interpretation of data by AQC</b>                                    | Report to be issued following 6 months of monitoring outlining averages (in comparison with objectives) for all pollutants monitored. | <b>£2,450</b>                      |
| 3. | <b>Additional cost for a further year of monitoring (for 2 sensors)</b> | Price includes replacement of cartridge, further year operational fee, data hosting, web support, hosting etc (as per item 1)         | <b>£3,900</b> (ie £1,950 per site) |

### Important Notes

- 1 The work will be carried out in accordance with the Standard Terms of Business of Air Quality Consultants Ltd. These are available [here](#) or can be emailed upon request.
- 2 The fees do not include any provision for attendance on site, or meetings in person. If either site visits, or meetings are deemed necessary, they will be quoted for, and agreed with the Council, in advance.
- 3 The fees are based on the provision of a report in electronic format. If hard copies are required they will be charged at £20 per copy plus cost of delivery.