Date: 8 February 2021

Dear ████████

Freedom of Information request

Thank you for your email dated 14th January, which was received by the Greater London Authority on 20th January.

Our response to your request is as follows:

1. You have over the past year or two issue a slew of press releases charting the success of BreatheLondon's £1m 100 AQmesh monitor-based BreathLondon monitoring data, saying how successful it is, how the data is useful, and how the data is disseminated on a public website.
   You have now let a follow on £750,000 four year contract in a new press release which appears to have some inconsistencies:
   The first contract is now referred to as a successful pilot and yet the AQMesh technology that underpinned that pilot appears to have been entirely abandoned. A pilot is by definition there to prove technology and you are restarting a new project with unproven technology?
   [Please see information attached] [response 1].

2. The new contract documentation required proven technology and yet the technology chosen is unproven in the UK and perhaps at all. Why has the contract chosen unproven technology especially as it is well known it can take year to colocate and prove new monitoring technology?
   [Please see information attached] [response 2].

3. Numerous indicative monitoring types have been tested in the UK and been found lacking in some respect or another, indeed the 'proven' AQMesh now appears to have proven to have failed. Who is carrying the risk that this new unheard-of technology will fail?

[Please see information attached] [response 3].

4. Part of the value of monitoring, even with flawed indicative and reference monitors, is a consistent dataset. What has happened to the dataset from the last year or so of the AQMesh's, and what will happen to the currently installed AQMesh's eg have they been removed and directly replaced with new sensors (maybe with crossover period)? All historic BreatheLondon documentation appears to have been wiped. [Please see information attached] [response 4].

5. Many sensor systems are simply a number of 99-cent sensors soldered together only deriving value if the algorithm works. Early AQMesh systems were criticised as both the sensor technology and the algorithm were considered commercial in confidence. Will this be made public so external folk can make up their own mind on their efficacy?
[Please see information attached] [response 5].

Responses:

Q1. The aim of the Breathe London pilot was not to test a specific technology, but instead aimed to experiment with deployment of different types of low-cost sensors in London, and the concept of using low cost sensors to supplement the existing reference network. This included static monitors, mobile monitors installed in Google Streetview Cars and wearable sensors. The past two years have provided a proof of concept for a dense, low-cost sensor network to supplement existing reference monitoring and this is the element of the network the Greater London Authority (GLA) are taking forward. Additionally, the AQMesh devices, whilst not part of the 2021-24 GLA funded network, continue with NERC funding as a separate network until at least April 30th 2021.

The Children's Investment Fund Foundation (CIFF) was the main funder of the pilot phase, which was devised alongside C40 Cities, a climate leadership group of 96 cities around the world. A key objective of the project was to enable replicability of the network if the concept was proven. A Blueprint for other cities to replicate this kind of low-cost sensor network; and a Technical Report will be published in February 2021 by Environmental Defense Fund Europe (EDFE), the lead delivery partner for the pilot phase. This guidance is technology agnostic, though it does include important advice on what to consider when selecting a sensor, and includes an evaluation of the AQ Mesh pods used in Breathe London as that was the technology used. The Technical Report provides the methodologies, processes and findings from the project which serve as the evidence base of the Blueprint including an assessment of the performance of the AQMesh pods.

London was selected to pilot this new approach in part because of London's extensive existing air quality reference monitors, which meant data collected from the new lower cost network could be properly validated. The intention was to trial the new approach in London and, once the concept had been tested and proven, use the learnings from London to replicate the network in lower capacity cities globally.

After a successful pilot, CIFF will apply the learnings from London in cities with less capacity.. Given the proven success of the concept of combining low cost sensors with the reference network the GLA will fund the Breathe London network 2021-24. A

competitive OJEU process was undertaken by the GLA to appoint a Service Provider for the new contract. The technical specification required sensors to meet the uncertainty requirements of the EU Air Quality Directive for indicative (Class 1) methods for particulate matter (PM2.5) and nitrogen dioxide (NO2) (please see Q2 for more detail). The successful Service Provider is Imperial College London in partnership with Clarity Movement, a data analytics company that is providing the new sensor technology.

Q2. The contract required sensors meet the uncertainty requirements of the EU Air Quality Directive for indicative (Class 1) methods for particulate matter (PM2.5) and nitrogen dioxide (NO2). The chosen Clarity Node-S has been regularly evaluated by third-party evaluation programmes (e.g. 2017 AQ-SPEC Field Testing and Laboratory Testing Reports) and through direct colocation analyses performed at government-operated reference monitoring sites. These programmes have facilitated continuous improvement of performance and data quality.

Clarity's Node-S air monitor was evaluated by the Airparif AirLab's 2018 & 2019 MicroSensors Competition. As a result, Clarity was funded to deploy 150 Node-S devices throughout Paris in collaboration with Airparif, the Paris Mayor's Office and Bloomberg Philanthropies. Uncertainty results from co-location studies in the City of Paris (Airparif), Milwaukee (US EPA) and London (King's College London) have been assessed using the equivalence testing procedures stipulated in the EU Air Quality Directive and processed through the SensorCheck.org website. These were within the expanded uncertainty required of indicative methods as per the tender requirement. An algorithm was used to baseline NO2 measurements using Relative Humidity temperature and co-located reference data, and a slope and offset correction was used to calibrate the PM2.5 sensor against a reference equivalent method; this methodology will also be used prior to deployment in the network. Further information on recent performance evaluation can be accessed on Clarity's Knowledge Base.

Q3. Please refer to Q1 response for information on the Technical Report concerning AQMesh pods.

Please refer to Q2 for evidence of the Clarity sensors meeting the uncertainty requirements of the EU Air Quality Directive for indicative (Class 1)

It is a requirement in the contract with Imperial College that 1) sensors continue to meet the uncertainty requirements of the EU Air Quality Directive for indicative (Class 1) methods for particulate matter (PM2.5) and nitrogen dioxide (NO2) and; 2) they ensure a minimum 90 per cent (a target agreed amongst technical experts for sensor technology) of sensors are in operation at any given time.

Q4. Providing Breathe London data on multiple platforms was part of the project's original deliverables and in addition to the Breathe London site, project data has also been made available via the Air Quality Data Commons and is shortly to be launched on Open AQ. This will include all historic data from the pilot.

Since (and slightly before) Imperial took on the continuation of the project, the annual average map and the full preliminary datasets for stationary NO2 and PM2.5 were made

available on EDF's Global Clean Air site: https://www.globalcleanair.org/data-to-action/london-uk/. The final ratified data was finalised this week and it will be uploaded to this site as soon as possible and at least by 9 February when the Blueprint is launched.

The new Breathe London site (https://www.breathelondon.org/) provides the link above as the location for information on the pilot and historic data. This data will be hosted on the updated Breathe London website once the website is relaunched this year.

The AQMesh's used in the pilot phase of Breathe London continue to be in operation, having secured funding from Natural Environment Research Council.
These are no longer affiliated to Breathe London or the GLA, though we maintain an ongoing collaborative relationship with the team. For more information please contact me.

Q5. A scientific paper by the University of Cambridge is in the pre-publication phase and will provide an overview of the methodology approach, the testing and validation as well as an analysis of the method's potential and limitations. If you would like more information about the paper on the methodology please let me know.

If you have any further questions relating to this matter, please contact me, ensuring that you quote the reference at the top of this letter.

Yours sincerely

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Senior Policy and Programme Officer

If you are unhappy with the way the GLA has handled your request, you may complain using the complaints procedure, available at: https://www.london.gov.uk/about-us/governance-and-spending/sharing-our-information/freedom-information