CAMBRIDGE
CITY COUNCIL

Air Quality Monitoring Mill Road

UPDATE: OCTOBER 2019

Air Quality Monitoring Mill Road – Update on Project Progress

1 Introduction

Air Quality Monitoring has been in place before and during the Mill Road Bridge closure. It will continue to be in place following the re-opening of the bridge for a period of at least 3 months.

Conventional monitoring in the form of continuous monitors (already in situ) and additional nitrogen dioxide (NO_2) diffusion tubes were deployed prior to the bridge closure in March 2019.

Using a grant from the Department of Environment, Food, and Rural Affairs (DEFRA) a trial of "low cost" AQ Mesh sensors was also undertaken by placing the AQ Mesh sensors in and around the Mill Road area alongside the conventional monitoring whilst the bridge was closed and after it re-opened. The trial is to look at how well these monitors perform against the conventional monitoring and what useful data can be provided from them.

1.1 Project Aims

In air quality terms the project has two main aims:

1) To ascertain if there were any effects on air quality on Mill Road and the surrounding area during and after the bridge closure.
2) To ascertain if the new type of "low cost" sensors can perform in a real life monitoring situation and provide useful data.

1.2 Briefing outline

The preliminary results from the monitoring equipment so far are given in Section 2.

The raw data available so far from the AQ Mesh monitors is available on Cambridgeshire Insight

https://data.cambridgeshireinsight.org.uk/dataset/mill-road-cambridge-monitoring-air-quality

The data from the continuous monitors is available via the following link:
https://www.cambridge.gov.uk/air-pollution-levels-and-monitoring-them

The diffusion tube data will be released in full with the full analysis report at the end of the project.

Details regarding the further analysis of these results once the monitoring period has been completed are highlighted are given in Section 3.

Section 3 also sets out the preliminary timescales for reporting on the analysis of the data.

2 Monitoring Results

2.1 Nitrogen Dioxide (NO_2) Diffusion Tubes

The average monthly results for the NO_2 diffusion tubes for the first 6 months of the monitoring period are shown in Table 2.1. These results have been bias corrected using the

locally derived bias correction factor for 2018 as stated in Cambridge City Councils Annual Status Report 2019. The locally derived bias correction factor for 2019 will not be available until February 2020 when a full annual dataset can be used to derive the factor. These results are therefore subject to change.

The results shown are for the 5 months prior to the bridge closure and 1 month whilst the bridge was closed (July). Further data for the other month when the bridge was closed (August) and when the bridge re-opened are not yet available.

It should be noted that seasonal variations occur in the diffusion tubes with the tubes showing higher concentrations in the winter months and lower concentrations in the summer months.

Table 2.1: Preliminary NO$_2$ Diffusion Tube monthly average results (February – July 2019)

(μg m^{-3})

Ref No	Location	Feb	Mar	Apr	May	Jun	July
1	Tenison Road 3	32.6	22.7	26.5	m	20.5	16.5
2	Devonshire Road	30.6	17.8	15.5	12.8	14.4	10.8
3	Catharine Street	m	17.9	15.8	11.3	12.0	9.9
4	Ross Street	25.6	15.5	11.8	10.9	m	9.1
5	Cavendish Road	23.9	15.4	12.3	10.9	10.6	9.8
6	Radegund Road	22.3	15.2	12.7	10.0	8.9	10.9
7	Coleridge Road	28.6	18.1	13.9	14.0	13.9	12.1
8	Cherry Hinton Road 2	m	19.6	19.7	15.1	13.1	18.3
9	Cherry Hinton Road 3	29.8	22.0	17.6	18.0	14.2	18.4
10	Cherry Hinton High Street	m	1.1	16.0	14.6	13.0	15.1
11	Brooks Road	23.5	23.2	20.9	18.0	15.1	19.7
12	Vinery Road	23.2	15.5	11.4	13.5	11.0	10.9
13	Perne Road 1	30.0	19.4	19.6	14.4	14.3	15.3
14	Perne Road 2	29.7	23.2	22.5	17.3	16.3	18.0

Notes:

m = missing tube

Bias correction factor 0.7. Source: Cambridge City Council Annual Status Report 2019 (https://www.cambridge.gov.uk/media/7417/air-quality-annual-status-report-2019.pdf)

2.2   Continuous Monitors

There are two continuous monitors within the study area. One is located on Gonville Place close to the junction with Hills Road and measures NO$_2$ and particulate matter less than 10 microns in diameter (PM$_{10}$). The other is located on Newmarket Road and measures NO$_2$ and particulate matter less than 2.5 microns in diameter (PM$_{2.5}$).
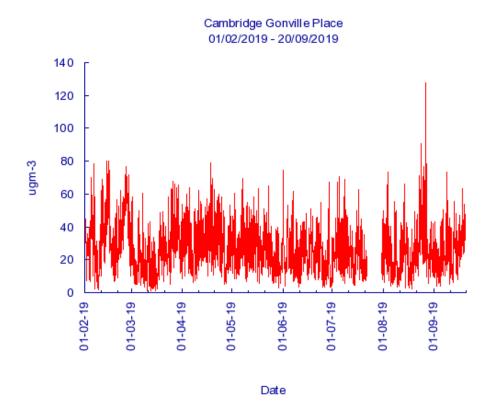
The results from both monitors for the period 1st February to 20th September 2019 are presented in Figures 2.2, 2.3 and 2.4.

The monitor at Gonville Place was unable to record concentrations in the period 22nd July to 31st July 2019 as a result of a fault with the air conditioning unit at this location. No data for this monitor is presented for this period and is shown as a gap in Figures 2.2 and 2.3.

The data from these monitors is ratified by an external independent body. Not all of the data in Figures 2.2, 2.3 and 2.4 will have undergone this ratification process and is therefore subject to change.

Figure 2.2: Gonville Place and Newmarket Road NO$_2$ hourly average concentrations for period 1st February to 20th September 2019 (μg m^{-3}).
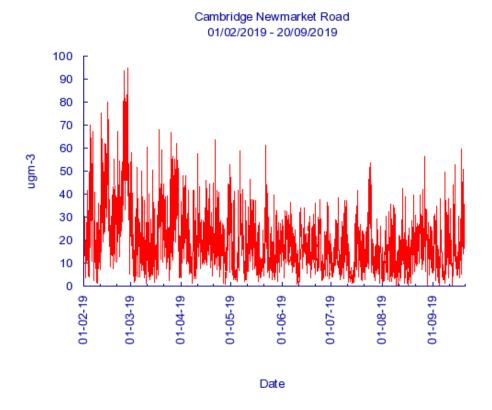

Cambridge Gonville Place
01/02/2019 - 20/09/2019

Cambridge Newmarket Road
01/02/2019 - 20/09/2019

Figure 2.3: Gonville Place PM₁₀ 24 hourly average concentrations for period 1st February to 20th September 2019 ($\mu g\ m^{-3}$).

Cambridge Gonville Place
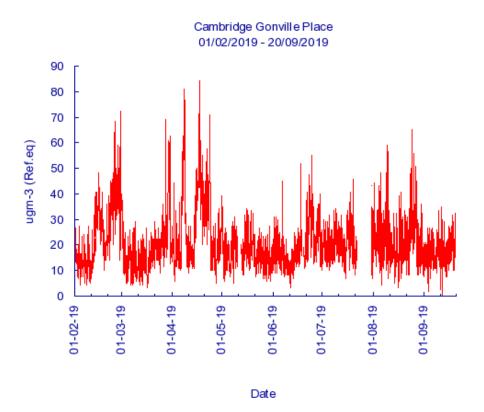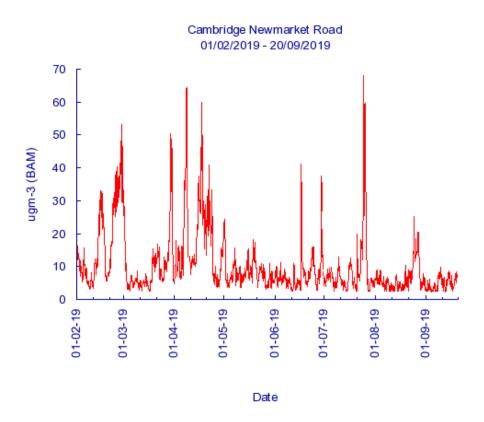01/02/2019 - 20/09/2019

Figure 2.4: Newmarket Road PM$_{2.5}$ hourly average concentrations for period 1st February to 20th September 2019 (μg m^{-3}).
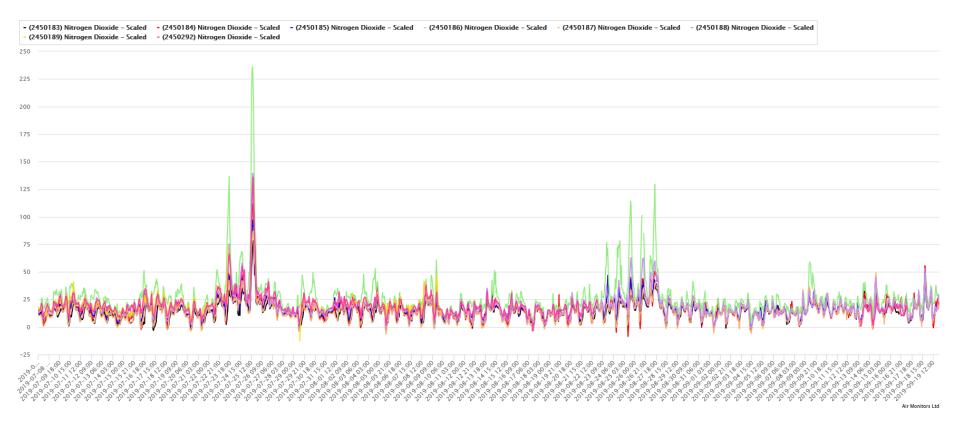

2.3   AQ Mesh

The results for the AQ Mesh monitors are provided from 8th July until 20th September in the graphs in Figures 2.5 to 2.7 for NO$_2$, and particulate matter (PM$_{10}$ and PM$_{2.5}$).

The AQ Mesh results are the raw results directly from the monitor. These results require post processing following comparison with the continuous monitor which one of the AQ Mesh monitors has been co-located with. These results are therefore subject to change.

The spike in PM$_{10}$ concentrations on Saturday 3rd August occurred between 3am and 6am. This spike is detected at several of the monitors, with the highest concentration recorded at the monitor situated on Coldhams Lane. Further investigation is ongoing as to the source of the spike in PM$_{10}$ concentrations and will be included in the future analysis of the data.
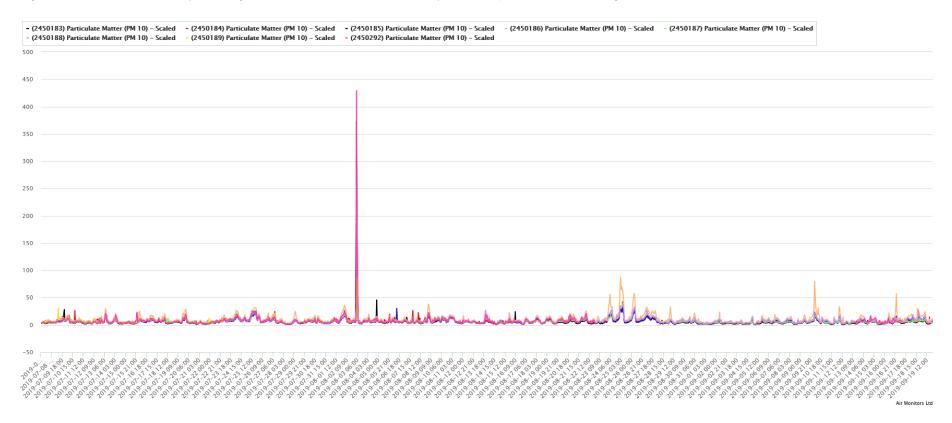
Figure 2.5: AQ Mesh hourly average NO$_2$ concentrations (8th July -20th September 2019) (μg m^{-3}).

Notes: 2450183 – Mill Road East, 2450184 – Tenison Road, 2450185 – Cherry Hinton Road, 2450186 – Gonville Place, 2450187 – Coleridge Road, 2450188 – Perne Road, 2450189 – Mill Road West, 2450292 – Coldhams Lane.

Figure 2.6: AQ Mesh hourly average PM$_{10}$ concentrations (8th July -20th September 2019) (μg m^{-3}).

Notes: 2450183 – Mill Road East, 2450184 – Tenison Road, 2450185 – Cherry Hinton Road, 2450186 – Gonville Place, 2450187 – Coleridge Road, 2450188 – Perne Road, 2450189 – Mill Road West, 2450292 – Coldhams Lane
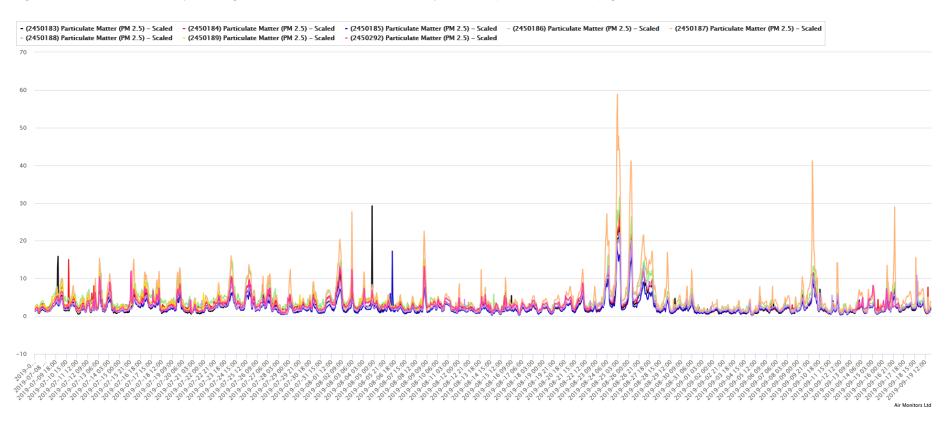
Figure 2.7: AQ Mesh hourly average PM$_{2.5}$ concentrations *(8th July -20th September 2019) ($\mu g\ m^{-3}$).*

Notes: 2450183 – Mill Road East, 2450184 – Tenison Road, 2450185 – Cherry Hinton Road, 2450186 – Gonville Place, 2450187 – Coleridge Road, 2450188 – Perne Road, 2450189 – Mill Road West, 2450292 – Coldhams Lane

3 Further Analysis

3.1 Diffusion Tubes

Given the known variation in diffusion tubes results as a consequence of seasonal variation, we will use the data from the existing tube network in Cambridge to assess whether any changes during the year are as a result of seasonal variation or as a result of the Mill Road bridge closure.

The results for the diffusion tubes will be analysed to see if there is any variation between the results for the tubes before, during and after the bridge closure. In addition the tube results will be compared against the rest of the diffusion tube network in Cambridge to assess whether there are any significant findings.

The results will also be analysed alongside the traffic data to assess whether the traffic levels have an effect on monthly NO_2 concentrations.

3.2 Continuous Monitors

The data from the continuous monitors will be analysed for the same period as the diffusion tubes (February 2019 to January 2020) to allow any comparisons to be drawn between the two types of monitoring methods.

This will also allow time for the data set to be fully ratified before analysis is undertaken.

The data from the continuous monitors will be analysed alongside the traffic data to assess whether the traffic levels have an effect on NO_2, PM_{10} and $PM_{2.5}$ concentrations.

3.3 AQ Mesh

The AQ Mesh monitors will remain in situ until the end of 2019 to ensure we have data to compare against the data for when the bridge was closed.

The data from the AQ Mesh monitors will be analysed alongside the traffic data to assess whether the traffic levels have an effect on NO_2, PM_{10} and $PM_{2.5}$ concentrations.

The performance of the monitors themselves will also be evaluated.

3.4 Analysis of all data

Analysis of all of the air quality monitoring will be undertaken to determine if there were any effects on air quality as a result of the road closure.

During the road closure there were also temporary traffic lights to allow gas main works to take place on Mill Road itself. The effect of these works alongside the road closure will also be evaluated.

In addition a fire took place in one of the buildings on Mill Road close to the road closure location resulting in the closure of one of the other roads in the area. The effect of this on air quality will also be evaluated.

The analysis will also consider whether there are any learning points which can be taken forward and used on other projects within the Greater Cambridge area.

3.5 Project Completion

Another briefing will be issued towards the end of 2019 summarising the data and outlining the next steps in more detail.

At present we are aiming to undertake the full analysis of the data in 2020 with a presentation of the data analysis and a full report available in Summer 2020. The report will include any conclusions we have come to from the analysis of the data.