MALDON DISTRICT COUNCIL

# 2018 Air Quality Management Area Preliminary Report

In fulfilment of Part IV of the
Environment Act 1995
Local Air Quality Management

February 2018

| | |
|---|---|
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# Executive Summary

Local authorities have a legal requirement to work towards Air Quality Strategy (AQS) objectives under Part IV of the Environment Act 1995 and relevant regulations made under that part and to meet the requirements of the Local Air Quality Management (LAQM) statutory process.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

Whilst conducting the LAQM process, Maldon District Council Environmental Health team have identified high concentrations of Nitrogen Dioxide ($NO_2$) in Market Hill, Maldon. Analysis of roadside air quality monitoring has identified that for the period of July to December 2017 the mean concentration of $NO_2$ was 55.19µg/$m^3$ and that an exceedance of the annual mean Air Quality Objectives (40µg/$m^3$) is highly likely. It has been estimated that the $NO_2$ concentration at the receptor (façade of residential property) is 52.4µg/$m^3$.

This report identifies a suitable boundary for an Air Quality Management Area and sets out a timeline for the process of AQMA declaration and AQAP development.

### Alternative Options

There is no alternative option – failure to declare affected areas AQMAs could result in the Council being prosecuted by the Department for the Environment, Food and Rural Affairs (Defra), who in turn, could be prosecuted by the EU if the UK fails to comply with EU directives.

# Local Air Quality Management

Diffusion tube monitoring commenced in February 2017 adjacent to a property on Market Hill. Measured concentrations were exceptionally high but the site was located on the corner of a building, slightly set back from the façade where the free circulation of air was affected. This site did not fully comply with the Defra Technical Guidance TG.16 and monitoring at a new roadside site close-by commenced in July 2017 and the existing site was retained for reference.

Table 1 below provides 2017 monitoring data for the two monitoring locations on Market Hill and two nearby locations on the Causeway and junction with the High Street.

## Table 1 - Diffusion Tube Monitoring Results

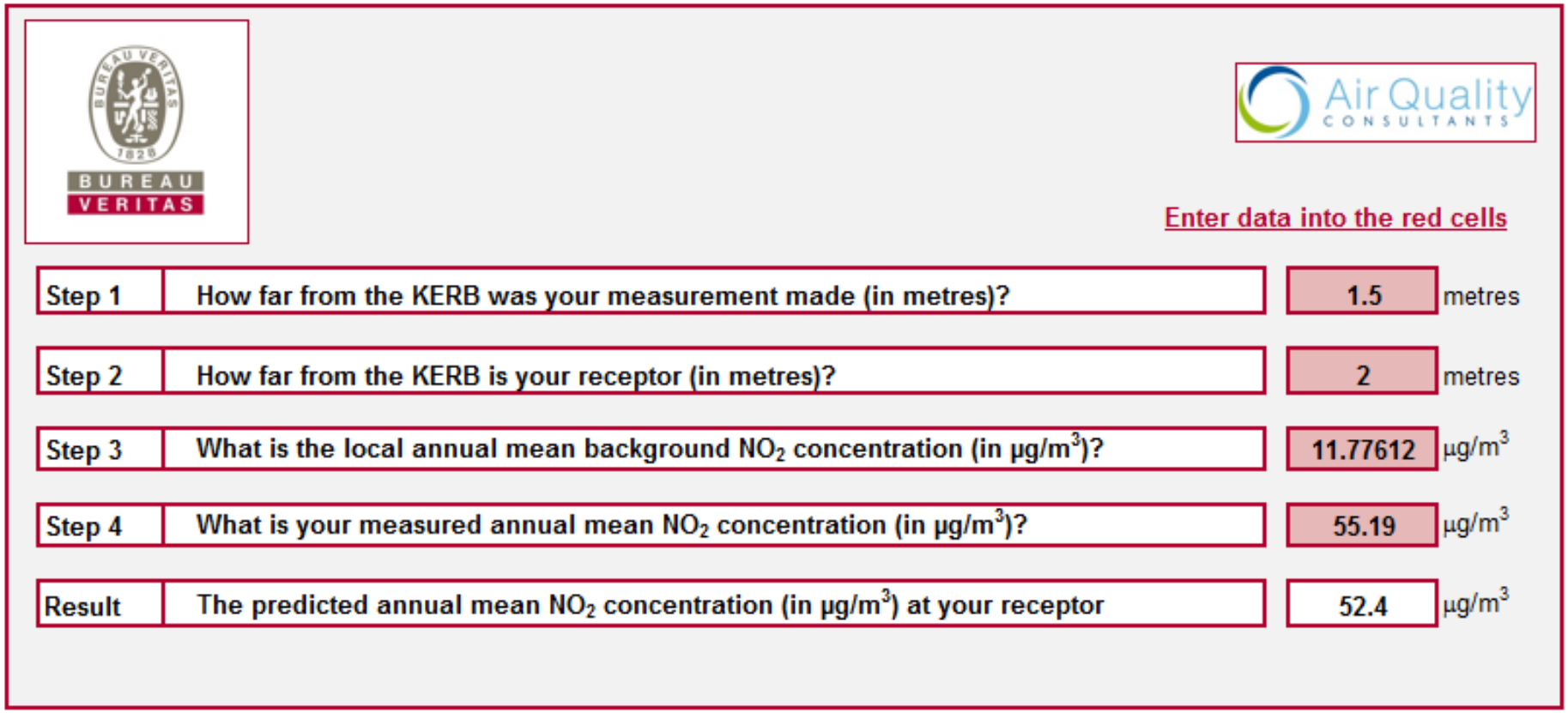
| Site ID | Monitoring Address | Nitrogen Dioxide concentrations measured in µg/m$^3$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan-17 | Feb-17 | Mar-17 | Apr-17 | May-17 | Jun-17 | Jul-17 | Aug-17 | Sep-17 | Oct-17 | Nov-17 | Dec-17 | Raw Annual Mean | Valid Data Capture rate | Bias Adjusted Annual Mean (0.77) | Estimated Concentration at Adjacent Receptor |
| MD6 | High Street (Market Hill Junction) | 54.8 | 45.7 | 45.7 | 34.9 | 32.5 | 31.8 | 26.3 | 33 | 34.1 | 44.5 | 42.2 | 37.1 | 38.55 | 100% | 31.23 | 31.23 |
| MD14 | The Causeway | 49.5 | 51.2 | 30.8 | 26.8 | 34.2 | 33.8 | 32.3 | 34.4 | 41.5 | 43.5 | 50.1 | 30.3 | 38.2 | 100% | 30.94 | 30.94 |
| MD20~ | Side of 10 Market Hill, Maldon | N/A | 141.4 | 143.1 | 117.4 | 84.7 | 54.8 | 58.7 | 68 | 64.3 | 119.1 | 140.9 | 135.7 | 102.55 | 92% | **83.07** | **83.07** |
| MD21A | Front of 10 Market Hill | N/A | N/A | N/A | N/A | N/A | N/A | 59.4 | 81.2 | 61.9 | 73.4 | 60.6 | 65.5 | 67.30 | 50% | **54.27** | **51.59** |
| MD21B | Front of 10 Market Hill | N/A | N/A | N/A | N/A | N/A | N/A | 61.2 | 81.7 | 70.8 | 73.3 | 60.2 | 65.7 | 69.44 | 50% | **55.74** | **52.97** |
| MD21C | Front of 10 Market Hill | N/A | N/A | N/A | N/A | N/A | N/A | 64 | 75.2 | 63.7 | 73 | *Erroneous Value Removed | 67.0 | 68.98 | 42% | **55.55** | **52.79** |

~ Site MD20 is not compliant with TG.16 guidance and has been retained for reference only.

* MD21C November 2017 data point removed. The concentration from the laboratory report was 28.7µg/m$^3$ which when compared with the other tubes, highlighted poor precision and was removed to ensure overall reliability for the data set.

The average of the MD21 monitoring tubes is 52.80µg/m$^3$ which when applying the $NO_2$ drop off calculation estimates the concentration at the receptor (residential property) as 50.3µg/m$^3$ which is a significant exceedance of the Air Quality Objective (40µg/m$^3$).

**Figure 1 - MD21 Nitrogen Dioxide Drop Off Calculator**



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Air Quality CONSULTANTS

Enter data into the red cells

| | | | |
|---|---|---|---|
| Step 1 | How far from the KERB was your measurement made (in metres)? | 1.5 | metres |
| Step 2 | How far from the KERB is your receptor (in metres)? | 2 | metres |
| Step 3 | What is the local annual mean background $NO_2$ concentration (in $\mu g/m^3$)? | 11.77612 | $\mu g/m^3$ |
| Step 4 | What is your measured annual mean $NO_2$ concentration (in $\mu g/m^3$)? | 55.19 | $\mu g/m^3$ |
| Result | The predicted annual mean $NO_2$ concentration (in $\mu g/m^3$) at your receptor | 52.4 | $\mu g/m^3$ |

When interpreting these results, it should be noted that there is low capture rate for the triplicate site of MD21 at 47.2% due to the commencement of monitoring in July 2017 however, both summer and winter months are included making the study reasonably representative of a full year's study. A full year's monitoring results could be lower however, it is still highly probable that the result would still exceed the Air Quality Objective (40µg/$m^3$).

# Market Hill

Market Hill is the only access between Maldon Town Centre and Heybridge and is a busy route throughout the day.

The road has a steep gradient between Anchorage Hill and Bull Lane. When vehicles travel up inclines, engines are required to work harder to overcome gravity and emissions are significantly higher. The opposite occurs for vehicles travelling downhill however a general increase in emissions usually occurs when compared with flat roads.

Areas of the road have street canyon characteristics which is where the road is flanked by buildings on both sides. Street canyons significantly reduce the dispersal of pollution. The MD21 monitoring site is at a location on Market Hill where the gradient is steep and within a partial street canyon.

**Figure 2 - Google Streetview image of Market Hill to indicate street canyon characteristics and gradient**

# Air Quality Management Area Declaration

Appendix A contains a draft Air Quality Management order which would designate the stretch of Market Hill and properties between Anchorage Hill and Bull Lane as an Air Quality Management Area. This is for likely breaches of the annual mean Air Quality Objective for Nitrogen Dioxide.

Breaches of the 1-hour objective are not considered likely because the monitored annual mean does not exceed 60µg/$m^3$ which can be considered a proxy measurement.

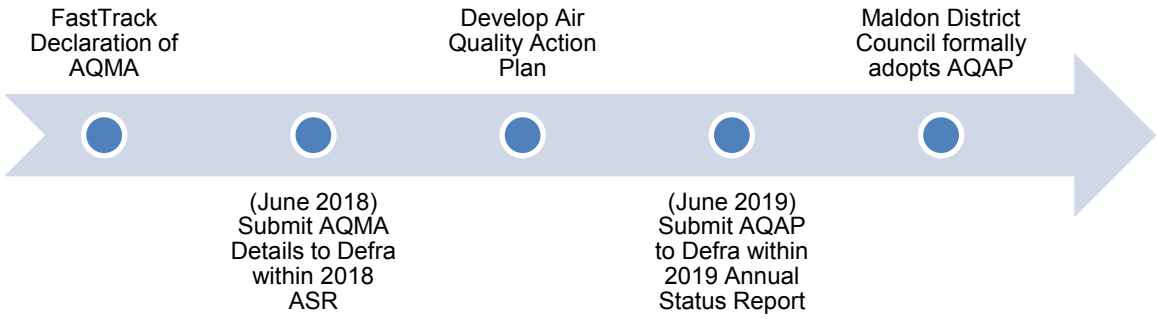
The boundary of the Air Quality Management Area has been chosen using the following information:

- At Anchorage Lane, properties begin to form a street canyon and the gradient increases. Emissions are likely to increase due to the gradient and dispersion will take place at a lower rate than in open areas.
- Monitoring at the top of Market Hill opposite Bull Lane has never exceeded the Air Quality Objectives. At this location, the gradient levels off meaning lower emissions and the street canyon finishes allowing for better dispersion.

# Project Timeline

Development and delivery of the project would take place across the following anticipated timeline:

**Figure 3 – Project Timeline**




Development of the Air Quality Action Plan would likely include the following tasks:

- Creation of steering group
- Source apportionment & dispersion modelling of area in and surrounding AQMA
- Development and quantification of measures (effectiveness/price)
- Identify how measures would be delivered and funding streams
- Writing of Air Quality Action Plan
- Internal and external consultation

# Appendix A: Draft Air Quality Management Area Order

Environment Act 1995 Part IV Section 83(1)
Maldon District Council
Air Quality Management Order

Maldon District Council in exercise of the powers conferred upon it by Section 83(1) of the Environment Act 1995, hereby makes the following Order.

This Order may be cited/referred to as the Maldon District Council Air Quality Management Area number 1.

**Area 1 – Market Hill, Maldon.**

And shall come into effect on **[date]**.

The areas shown on the attached maps in red are to be designated as air quality management area 1. The designated area incorporates the stretch of road and properties between Anchorage Hill and Bull Lane.

The map may be viewed at the Council Offices.

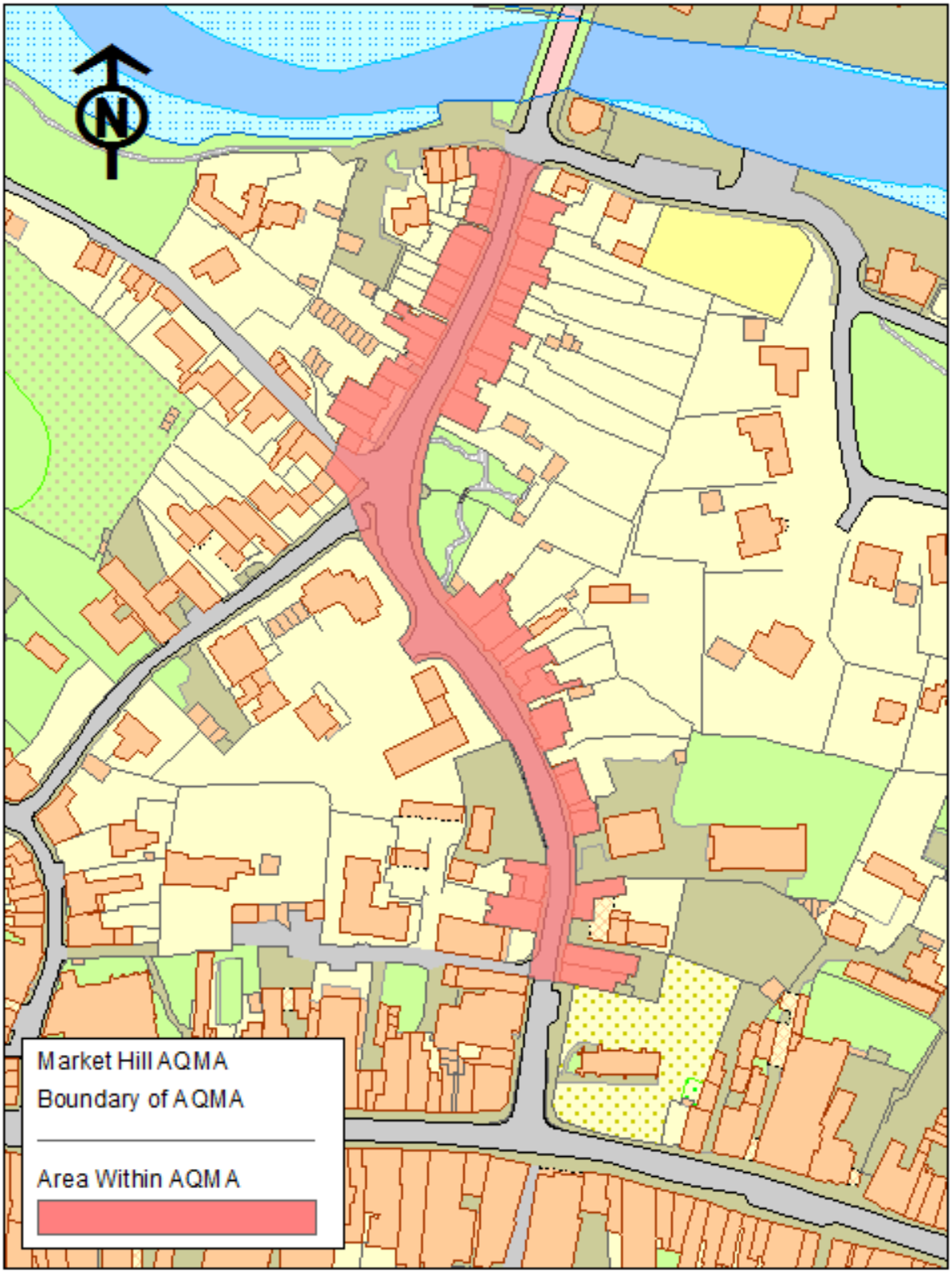
**Area 1** is designated in relation to the likely breach of the nitrogen dioxide annual mean as specified in the Air Quality Regulations 2000.

This Order shall remain in force until it is varied or revoked by a subsequent order.

The Common Seal of Maldon District Council was hereunto affixed in the presence of:

Authorised signatory

……..




1:1,500 0 25 50 100 150 200 Metres

# Appendix B: Summary of Air Quality Objectives in England

## Table B.2 – Air Quality Objectives in England

| Pollutant | Air Quality Objective[1] | |
|---|---|---|
| | Concentration | Measured as |
| Nitrogen Dioxide ($NO_2$) | 200 µg/m$^3$ not to be exceeded more than 18 times a year | 1-hour mean |
| | 40 µg/m$^3$ | Annual mean |
| Particulate Matter ($PM_{10}$) | 50 µg/m$^3$, not to be exceeded more than 35 times a year | 24-hour mean |
| | 40 µg/m$^3$ | Annual mean |
| Sulphur Dioxide ($SO_2$) | 350 µg/m$^3$, not to be exceeded more than 24 times a year | 1-hour mean |
| | 125 µg/m$^3$, not to be exceeded more than 3 times a year | 24-hour mean |
| | 266 µg/m$^3$, not to be exceeded more than 35 times a year | 15-minute mean |

[1] The units are in microgrammes of pollutant per cubic metre of air (µg/m$^3$).

# Glossary

| Abbreviation | Description |
|---|---|
| AQAP | Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values' |
| AQMA | Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives |
| ASR | Air Quality Annual Status Report |
| Defra | Department for Environment, Food and Rural Affairs |
| EU | European Union |
| LAQM | Local Air Quality Management |
| $NO_2$ | Nitrogen Dioxide |
| Street Canyon | Road which is flanked by buildings resembling a canyon |

# References

Defra Diffusion Tube Bias Adjustment Factors Spreadsheet available at;

https://laqm.defra.gov.uk/assets/databasediffusiontubebiasfactorsv0917final.xls

Defra LAQM Policy Guidance LAQM.PG16 available at;

http://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf

Defra LAQM Technical Guidance LAQM.TG16 available at;

http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf

Essex Air Quality Consortium available at; http://www.essexair.org.uk/Default.aspx

Google Streetview of Market Hill available at;
https://www.google.co.uk/maps/@51.7339001,0.6785149,3a,75y,205.31h,82.44t/data=!3m6!1e1!3m4!1svCP7SOGTBYeQHUHTIqxobw!2e0!7i13312!8i6656

Defra Nitrogen Dioxide Fall Off With Distance Calculator available at;
https://laqm.defra.gov.uk/documents/NO2-Fall-Off-With-Distance-from-Roads-Calculator-v4.1.xls

Maldon District Council Air Quality Annual Status Report 2017 available at;
http://www.essexair.org.uk/Reports/Maldon_ASR_2017.pdf