



MALDON DISTRICT COUNCIL

2020 Air Quality Annual Status Report (ASR)

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

July 2020

Local Authority Officer	Tracy Farrell
Department	Planning and Regulatory Services
Address	Princes Road, Maldon, Essex, CM9 5DL
Telephone	01621 854477
E-mail	Tracy.farrell@maldon.gov.uk
Report Reference number	MAL/ASR2020
Date	7 nd July 2020
Written by	Tim Savage
Scientific Team Public Health & Protection Services Chelmsford City Council Duke Street Chelmsford Essex CM1 1JE	 <p>The logo for Chelmsford City Council features a stylized graphic on the left consisting of a green leaf, a yellow sun, and blue waves. To the right of the graphic, the text 'Chelmsford' is written in a large, bold, purple font, with 'City Council' in a smaller, purple font below it.</p>

Executive Summary: Air Quality in Our Area

The 2020 Annual Status Report is designed to provide the public with information relating to local air quality in Maldon, to fulfil Maldon District Council's statutory duty to review and assess air quality within its area, and to determine whether or not the air quality objectives are likely to be achieved.

In 2019, air quality in the district of Maldon did not comply with the Air Quality Objectives on Market Hill where the Council has declared an Air Quality Management Area (AQMA).

An Air Quality Action Plan (AQAP) is currently being developed and is discussed in this report.

Air Quality in Maldon

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

Air pollution is generally considered to be low across the Maldon district with the exception of along Market Hill in Maldon, where significant exceedances of the nitrogen dioxide (NO₂) air quality objective have been measured.

Traffic emissions are the most significant source of air pollution in Maldon. Congestion dominates Market Hill, the town centre and bypass during the rush hour periods and the A414 is the principle route within the district.

The Council recognises the importance of working with partnering Authorities such as with Essex County Council to develop transport strategies and to make improvements to local transport infrastructure to reduce congestion.

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

² Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

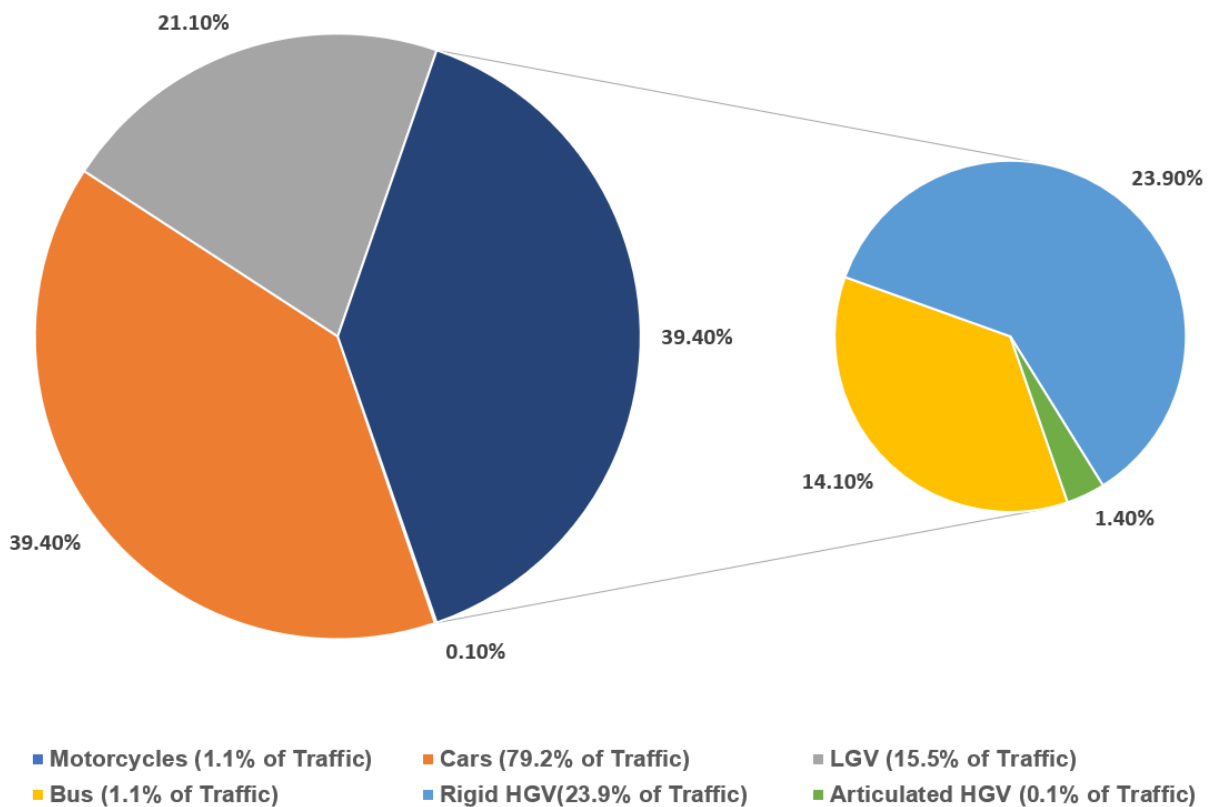
³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

Actions to Improve Air Quality

In 2019, Maldon District Council have been developing an Air Quality Action Plan for Market Hill.

Detailed modelling of NO₂ on Market Hill was undertaken using air quality dispersion modelling to create a baseline for the AQMA. A further study to apportion emissions to sources was undertaken.

Figure i.1 - Market Hill NO_x Emissions by Source Type (2018) (%)



The source apportionment identifies that of the local vehicle fleet, cars make up 79.2% of the vehicular traffic but contribute to 39.4% of vehicle emissions.

Vehicles in the HGV category: Buses, Rigid HGV and Articulated HGV make up 5.1% of the vehicular traffic but contribute to an equal 39.4% of vehicle emissions.

The main measures being developed for the air quality action plan will focus upon the heavier vehicles which due to the gradient of Market Hill, emit pollution at a disproportionately high level.

However, it is important that action plan measures reduce pollution from all sources. In addition to interventions that tackle emissions from HGVs and buses, measures are being developed to reduce emissions through the promotion of sustainable travel and the reduction of personal car use.

Clean Air Zone

Maldon District Councils priority is to implement direct interventions which reduce emissions on Market Hill so that measured concentrations of nitrogen dioxide meet the requirements of the National Air Quality Objectives.

A non-charging Clean Air Zone is being developed to cover Market Hill and Maldon High Street where targeted action will be taken to improve air quality.

Four main scenarios have been modelled to reduce emissions on Market Hill:

- Exclusion of all HGV vehicles except buses on Market Hill
- A one-way northbound route between Bull Lane and Anchorage Hill and, exclusion of all HGV vehicles except buses on Market Hill southbound
- A bus gate operational on the southbound direction between Anchorage Hill and Bull Lane between the hours of 7am and 7pm Monday to Friday and, exclusion of all HGV vehicles except buses on Market Hill
- Exclusion of all HGV vehicles except buses on Market Hill, where all buses are to be Euro VI standard

Major emission reduction options, such as implementation of a bus gate or changes to traffic routing on major roads will be considered within the scope of the proposed Transport Strategy for Maldon.

Without direct intervention, it would not be possible to significantly improve the air quality on Market Hill to achieve compliance with the Air Quality Objectives.

To complement a Clean Air Zone, policy and infrastructure measures are being developed to reduce emissions from buses and taxis. Sustainable transport will be promoted using educational packages and behavioural change opportunities to encourage modal shift.

Maldon Transport Strategy

Development of the Market Hill Air Quality Action Plan has identified the need for a dedicated transport strategy for the town to alleviate congestion on the road network and promote sustainable travel options.

To inform the strategy, Essex County Council will undertake an origin and destination survey and data collection exercises to identify traffic movements and patterns across Maldon and Heybridge to enable traffic routing and signage options to be developed.

Conclusions and Priorities

In 2019, exceedances of the nitrogen dioxide Air Quality Objectives were measured within the Market Hill AQMA. However, outside of the AQMA no exceedances have been measured.

Monitoring data suggests that air quality across Maldon is improving however in the Market Hill AQMA, there is not enough monitoring data to yet determine any trends.

Forthcoming Major Developments

In 2020, public consultation is expected to commence for the proposed development of a new nuclear power station at Bradwell B which is a nationally significant infrastructure project.

Construction of Bradwell B would involve the daily movement of large numbers of construction workers and materials to and from the site.

Road transport would likely play a significant role in moving freight to site with the potential of 500-700 HGV two way traffic movements daily.

With regard to air quality, Maldon District Council will carefully evaluate the submitted routes and transport proposals.

Air Quality Priorities for 2020

Maldon District Councils main priorities for 2020 are as follows:

- Conclude development of the Market Hill Air Quality Action Plan
- Undertake consultation of the Air Quality Action Plan
- Adopt the Air Quality Action Plan
- Commence implementation of the Air Quality Action Plan measures

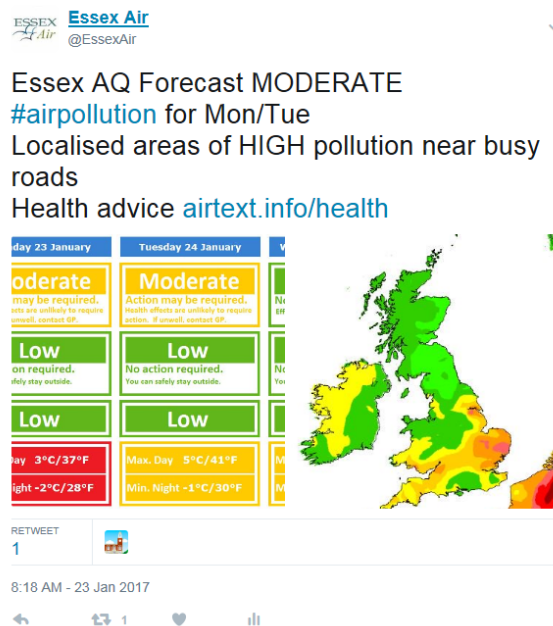
Local Engagement and How to get Involved

As part of development works for the Air Quality Action Plan, Maldon District Council propose to encourage various forms of community engagement events for residents and businesses to have their say and make suggestions on measures that could be used to reduce pollution.

Before the Air Quality Action Plan is finalised, the draft plan will be put out for public consultation to allow public consideration of the proposed options.

Maldon District Council is a member of the Essex Air Quality consortium. The Essex Air [web site](#) provides a daily forecast of air pollution which is based off [UK-AIR](#) data feeds. Also, the [@EssexAir](#) twitter feed provides localised weekly air pollution forecasts.

Figure i.2 Essex Air Twitter Air Quality Notifications



Links to Defra recommended actions and health advice are provided when air pollution is likely to be moderate or higher. This will enable those with heart or lung conditions, or other breathing problems to make informed judgements about their levels of activity or exposure.

The Essex Air twitter also promotes the [DVSA service](#) for reporting smoky lorries or buses. Particulate matter is usually not visible but when poorly maintained diesel engines can produce visible particles, appearing as smoke. Fine particles have an adverse effect on human health, particularly among those with respiratory and cardiovascular problem.

Table of Contents

Executive Summary: Air Quality in Our Area	i
Air Quality in Maldon.....	i
Actions to Improve Air Quality.....	ii
Conclusions and Priorities.....	iv
Local Engagement and How to get Involved.....	v
1 Local Air Quality Management	1
2 Actions to Improve Air Quality	2
2.1 Air Quality Management Areas.....	2
2.2 Progress and Impact of Measures to address Air Quality in Maldon.....	3
2.3 PM _{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations.....	5
3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance	6
3.1 Summary of Monitoring Undertaken.....	6
3.1.1 Automatic Monitoring Sites.....	6
3.1.2 Non-Automatic Monitoring Sites.....	6
3.2 Individual Pollutants.....	6
3.2.1 Nitrogen Dioxide (NO ₂).....	6
Appendix A: Monitoring Results	8
Appendix B: Full Monthly Diffusion Tube Results for 2019	14
Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC	16
Appendix D: Maps of Monitoring Locations and AQMAs	20
Appendix E: Summary of Air Quality Objectives in England	26
Glossary of Terms	27
References	28

List of Tables

Table 2.1 – Declared Air Quality Management Areas.....2
 Table 2.2 – Progress on Measures to Improve Air Quality3
 Table A.1 – Details of Non-Automatic Monitoring Sites8
 Table A.2 – Annual Mean NO₂ Monitoring Results 10
 Table B.1 - NO₂ Monthly Diffusion Tube Results – 2019 14
 Table C.1 – AIR PT Results 2019..... 16
 Table C.2 – NO₂ Fall Off Calculator 18
 Table E.1 – Air Quality Objectives in England26

List of Figures

Figure i.1 - Market Hill NO_x Emissions by Source Type (2018) (%) ii
 Figure i.2 Essex Air Twitter Air Quality Notifications v
 Figure 2.1 - Public Health Framework Indicator D01 Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution5
 Figure A.1 – Annual Mean NO₂ Concentrations Trends in the Market Hill AQMA 12
 Figure A.2 –Annual Mean NO₂ Concentrations outside of the AQMA 13
 Figure C.1 – National Bias Adjustment Factor Spreadsheet 17
 Figure D.1 – Diffusion Tube Monitoring Locations – Market Hill AQMA20
 Figure D.2 – Diffusion Tube Monitoring Locations – East of Maldon Town Centre....21
 Figure D.3 – Diffusion Tube Monitoring Locations – Heybridge.....22
 Figure D.4 – Diffusion Tube Monitoring Locations – A414 Wycke Hill / Limebrook Way Roundabout23
 Figure D.5 – Diffusion Tube Monitoring Locations – Latchingdon24
 Figure D.6 – Diffusion Tube Monitoring Locations – A414 Chelmsford Road.....25

1 Local Air Quality Management

This report provides an overview of air quality in Maldon during 2019. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Maldon District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMA) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of Maldon District Council's AQMA can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=33

Alternatively, see Appendix D: Maps of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMAs.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
MDC Air Quality Management Area Number 1 (Market Hill)	11/12/2018	NO ₂ Annual & 1 Hour Mean	Maldon	The stretch of road and properties between Anchorage Hill and Bull Lane, Maldon	NO	58.25	µg/m ³	52.5	µg/m ³	In Development		

Maldon District Council confirms the information on UK-Air regarding their AQMA(s) is up to date

2.2 Progress and Impact of Measures to address Air Quality in Maldon

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations Involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Essex Liftshare	Alternatives to private vehicle use	Car & lift sharing schemes	N/A	Essex County Council	Essex County Council	Number of Users	Not Quantified	Ongoing	N/A	
2	Member of Essex Air	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	N/A	Maldon District Council	N/A	N/A	Not Quantified	Ongoing	N/A	
3	Environmental Permit Inspection & Enforcement	Environmental Permits	Measures to reduce pollution through IPPC Permits going beyond BAT	N/A	Maldon District Council	N/A	Operator compliance with Environmental Permit	Not Quantified	Ongoing	N/A	
4	A414 Route Improvements	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	Essex County Council	Essex County Council	Monitored Air Quality	Not Quantified	Complete	2016	
5	Provision of strategic measures to reduce vehicle journeys and therefore reduce vehicle exhaust emissions	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2016	Maldon District Council	Development Agreements	Reduced Congestion & Emissions	Not Quantified	Policy Development	Throughout the life of the new Local Plan	New and enhanced public transport links, cycle networks. Installation of EV charging points. Planned Garden Suburb developments are funding a new bus service to Chelmsford and creating a cycle path network linking up to the existing settlement to provide viable alternative to road vehicles. Relief roads have also been secured to reduce congestion in parts of Maldon.

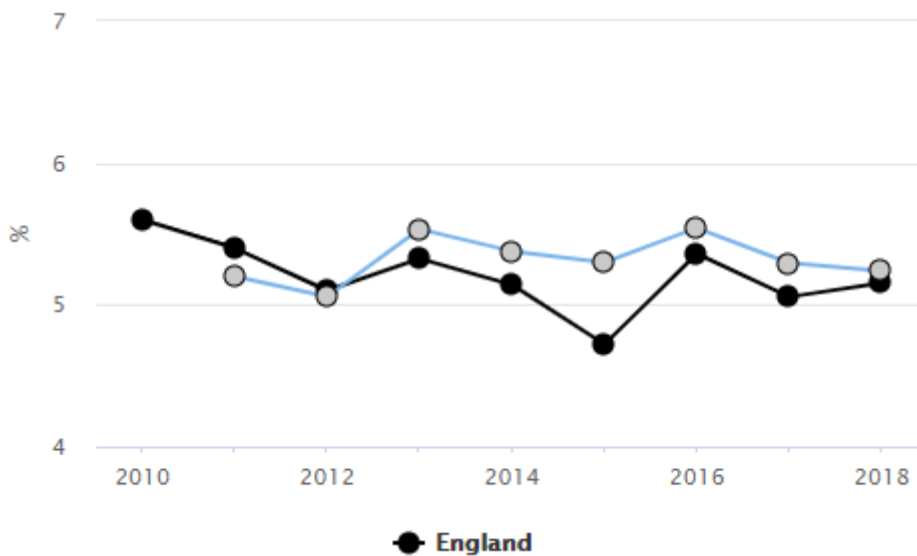
6	Sustainable Procurement Policy	Policy Guidance and Development Control	Sustainable Procurement Guidance	2016	Maldon District Council		N/A	Not Quantified	Complete	2016	Use the procurement system to ensure that air quality is a consideration within contracts for Maldon District Council
7	Air Quality & Public Health Publicity	Public Information	Other	2016	Maldon District Council	Maldon District Council	N/A	Not Quantified	Ongoing	Ongoing	Work with Public Health colleagues to inform the public about health impacts of Air Pollution and how they can change behaviour to reduce emissions and reduce exposure
8	Staff Car Share Scheme	Alternatives to private vehicle use	Car & lift sharing schemes	2016	Maldon District Council	Maldon District Council	Number of Users	Not Quantified	Ongoing	Ongoing	Encouragement of staff to car share including the provision of a car sharing space in the staff car park.
9	Assessing Air Quality & Emissions Impacts from Development Technical Document	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2016	Maldon District Council	N/A	Formal Adoption of Guidance	Not Quantified	Complete	2017	
10	Explore grant options for the installation of electric charging points in 2 strategic locations within the district.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2017	Maldon District Council	Dependant on the availability of funding streams	Number of Users	Not Quantified	Ongoing	Ongoing	By providing these points it will provide and encourage accessibility to both residents of Maldon and visitors.

2.3 PM_{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM_{2.5} has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Maldon District Council does not monitor PM_{2.5} concentrations however notes the Public Health Outcomes Framework indicator D01 – Fraction of mortality attributable to particulate (PM_{2.5}) air pollution which for 2018 gives a value of 5.2%. These values are broadly similar to other authorities within the region.

Figure 2.1 - Public Health Framework Indicator D01 Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution



Maldon District Council is taking the following measures to address PM_{2.5}:

- The Essex Air twitter account is encouraging the reporting of smoky vehicles through the DVSA reporting service. It is possible to report either heavy goods vehicles or public service vehicles (buses).
- Regular inspections of permitted industry where combustion and non-combustion processes could lead to anthropogenic emissions of PM_{2.5}

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

This section sets out what monitoring has taken place and how it compares with objectives.

3.1.1 Automatic Monitoring Sites

Maldon District Council does not undertake automatic continuous monitoring.

3.1.2 Non-Automatic Monitoring Sites

Maldon District Council undertook non-automatic (passive) monitoring of NO₂ at 25 sites during 2019. Table A.1 in Appendix A provides details of these sites.

Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

Maps showing the location of the monitoring sites are provided in Appendix D.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias⁴, “annualisation” (where the data capture falls below 75%), and distance correction⁵. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³. Note that the concentration data presented in Table A.2 represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

⁴ <https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html>

⁵ Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

Maldon District Council

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, where relevant.

Maldon District Council have **not** measured any annual mean concentration greater than $60\mu\text{g}/\text{m}^3$. Annual mean concentrations greater than $60\mu\text{g}/\text{m}^3$ indicates that an exceedance of the 1-hour mean objective could have occurred.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
MD1	Opposite CherryOak A414	Roadside	580645	204820	NO ₂	NO	15.9	10.7	NO	2.5
MD2/ MD2B / MD2C	A414 Spital Road/A414 Bypass	Kerbside	583952	205742	NO ₂	NO	17	1	NO	2.5
MD3	Heybridge Approach	Roadside	584763	208107	NO ₂	NO	17.9	3.7	NO	2.5
MD5	Colchester Rd/Heybridge Street Junction	Roadside	585914	208104	NO ₂	NO	15.6	3.9	NO	2.5
MD6	High Street (Market Hill Junction)	Urban Centre	585072	207080	NO ₂	NO	0	2.1	NO	2.5
MD7	Wantz Road/High Street	Urban Centre	585307	206943	NO ₂	NO	1.9	1.6	NO	2.5
MD8	Latchingdon/Burnham Road Junction	Kerbside	588575	200492	NO ₂	NO	11.6	0.4	NO	2.5
MD11	Latchingdon Street	Kerbside	588205	200438	NO ₂	NO	0	1.3	NO	2.5
MD12	A414 Spital Road/A414 Bypass	Kerbside	583862	205549	NO ₂	NO	32.4	1.5	NO	2.5
MD13	Limebrook Way/A414 Bypass	Kerbside	584165	205532	NO ₂	NO	31.6	1.5	NO	2.5

Maldon District Council

MD14	The Causeway	Roadside	585221	207682	NO ₂	NO	0	9	NO	2.5
MD16	8 Narvik Close	Roadside	584309	205776	NO ₂	NO	3	0.5	NO	2.5
MD17	2 Creasen Butt Close	Suburban	585078	207924	NO ₂	NO	5	0.5	NO	2.5
MD19	Adjacent to 16 Mill Road, Maldon	Kerbside	585565	206723	NO ₂	NO	3.4	0.2	NO	3
MD22A / MD22B / MD22C	10 Market Hill, Maldon	Roadside	585062	207160	NO ₂	YES	0.5	1.5	NO	2.5
MD23	59-63 Market Hill, Maldon	Roadside	585055	207324	NO ₂	YES	1.5	1.3	NO	2.5
MD24	32 Market Hill, Maldon	Roadside	585045	207272	NO ₂	YES	0.65	1.9	NO	2.5
MD25	1 Hillside, Maldon	Roadside	585016	207241	NO ₂	YES	5	1.4	NO	2.5
MD26	18 Market Hill, Maldon	Roadside	585045	207186	NO ₂	YES	0	2.6	NO	2.5
MD27	6 Market Hill, Maldon	Roadside	585073	207132	NO ₂	YES	0	2.3	NO	2.5
MD28	21 Market Hill, Maldon	Roadside	585067	207116	NO ₂	YES	0	1.6	NO	2.5
MD29	5 The Square, Heybridge	Roadside	585467	208089	NO ₂	NO	4	1	NO	2.5
MD30	High Street, Maldon	Roadside	584868	207042	NO ₂	NO	0	1	NO	2.5
MD31	Petchey Course, Farnbridge Road	Roadside	584809	206962	NO ₂	NO	0	3	NO	2.5
MD32	Goings Wharf, Colchester Road	Roadside	585740	208010	NO ₂	NO	0	2.5	NO	2.5

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2019 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ^{(3) (4)}				
							2015	2016	2017	2018	2019
MD1	580645	204820	Roadside	Diffusion Tube	100.00	100.00	31.87	33.30	31.45	28.75	27.32
MD2A / MD2B / MD2C (Triplicate Average)	583952	205742	Kerbside	Diffusion Tube	100.00	100.00	28.40	30.90	28.10	28.80	27.00
MD3	584763	208107	Roadside	Diffusion Tube	100.00	100.00	26.51	26.51	30.78	30.16	28.39
MD5	585914	208104	Roadside	Diffusion Tube	91.67	91.67	32.58	32.27	32.23	29.15	28.19
MD6	585072	207080	Urban Centre	Diffusion Tube	75.00	75.00	30.17	30.09	29.68	26.88	25.94
MD7	585307	206943	Urban Centre	Diffusion Tube	100.00	100.00	26.95	29.16	31.59	26.44	27.13
MD8	588575	200492	Kerbside	Diffusion Tube	100.00	100.00	28.39	32.08	32.42	29.01	28.28
MD11	588205	200438	Kerbside	Diffusion Tube	100.00	100.00	25.26	23.27	24.68	23.96	23.16
MD12	583862	205549	Kerbside	Diffusion Tube	100.00	100.00	26.99	28.98	27.62	24.53	23.60
MD13	584165	205532	Kerbside	Diffusion Tube	100.00	100.00	26.25	25.88	25.49	23.86	23.79
MD14	585221	207682	Roadside	Diffusion Tube	100.00	100.00	31.34	30.71	29.45	26.63	26.08
MD16	584309	205776	Roadside	Diffusion Tube	100.00	100.00	16.90	15.71	15.34	13.56	13.76
MD17	585078	207924	Suburban	Diffusion Tube	100.00	100.00	17.77	18.49	20.88	15.81	17.37
MD19	585565	206723	Kerbside	Diffusion Tube	91.67	91.67	N/A	N/A	21.58	20.72	20.73
MD22A / MD22B / MD2C (Triplicate Average)	585062	207160	Roadside	Diffusion Tube	86.11	86.11	N/A	N/A	58.20	58.40	55.10
MD23	585055	207324	Roadside	Diffusion Tube	91.67	91.67	N/A	N/A	N/A	37.15	41.07
MD24	585045	207272	Roadside	Diffusion Tube	75.00	75.00	N/A	N/A	N/A	46.27	42.56

MD25	585016	207241	Roadside	Diffusion Tube	91.67	91.67	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	30.86	27.45
MD26	585045	207186	Roadside	Diffusion Tube	83.33	83.33	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	39.11	37.45
MD27	585073	207132	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>61.78</u>	<u>51.87</u>
MD28	585067	207116	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	28.87	27.66
MD29	585467	208089	Roadside	Diffusion Tube	91.67	91.67	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	28.92
MD30	584868	207042	Roadside	Diffusion Tube	91.67	91.67	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	31.98
MD31	584809	206962	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	24.51
MD32	585740	208010	Roadside	Diffusion Tube	91.67	91.67	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	31.00

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance adjustment

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

Figure A.1 – Annual Mean NO₂ Concentrations Trends in the Market Hill AQMA

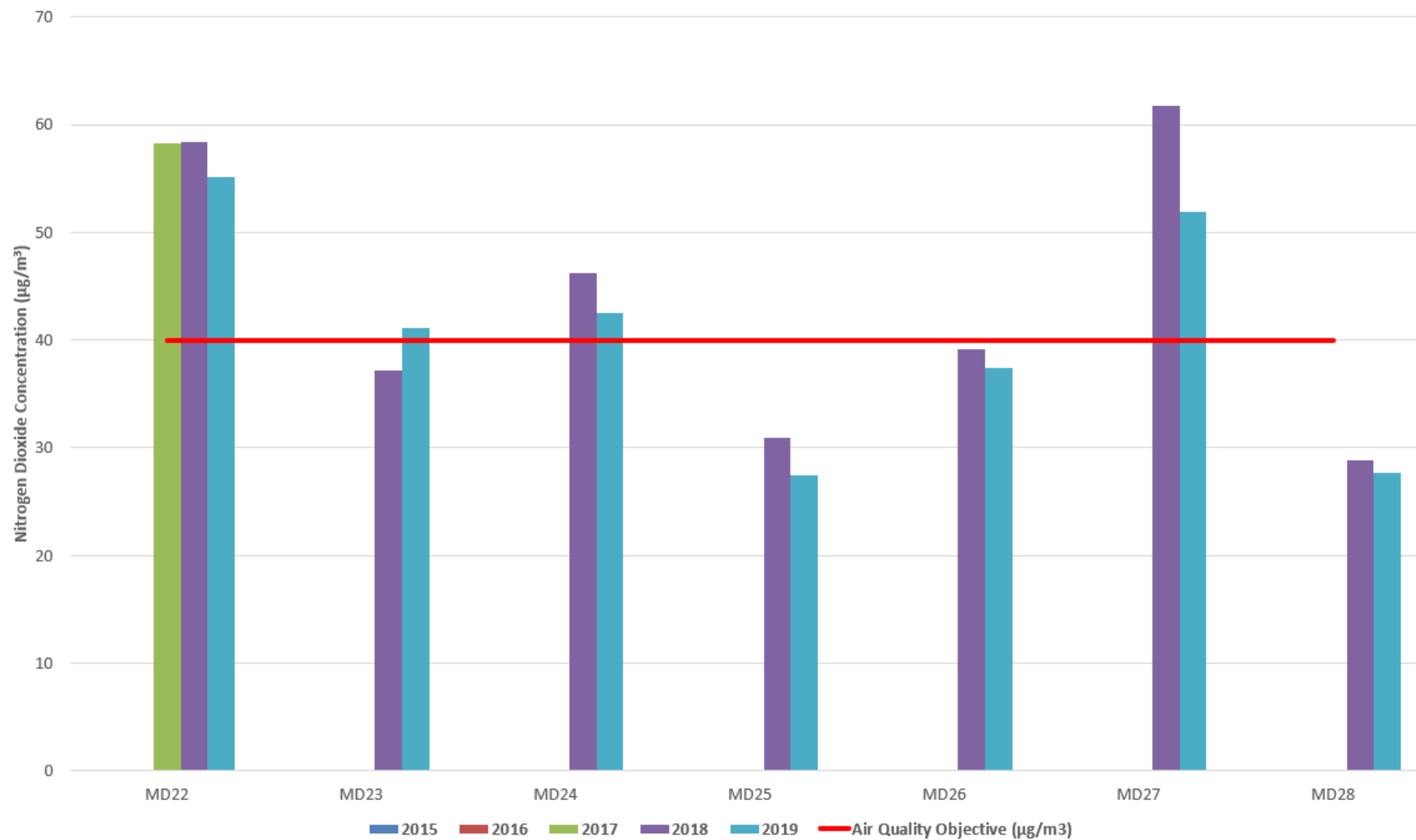
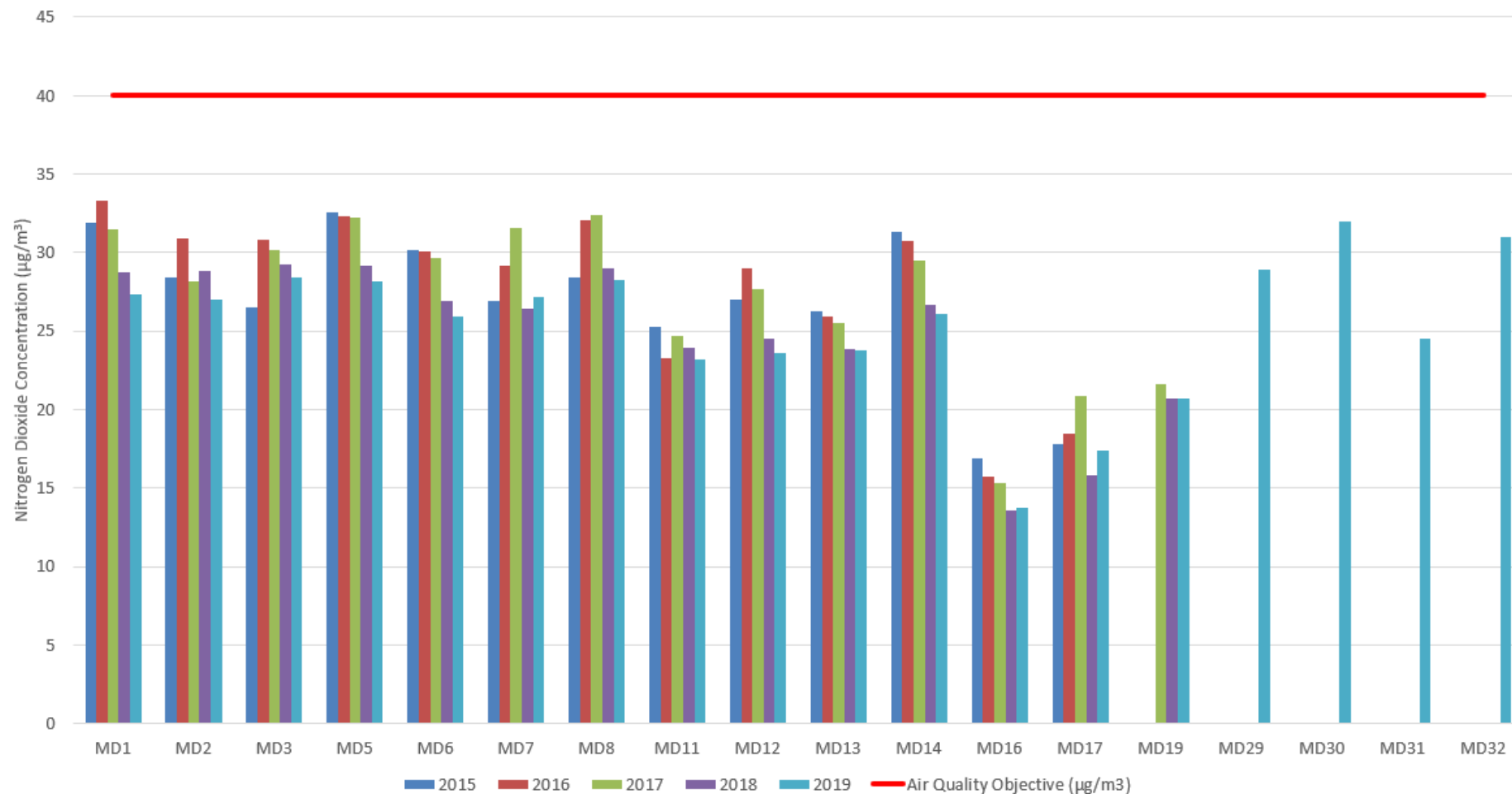


Figure A.2 – Annual Mean NO₂ Concentrations outside of the AQMA



Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO₂ Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Eastin g)	Y OS Grid Ref (Northi ng)	NO ₂ Mean Concentrations (µg/m ³)															Annual Mean		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.75) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾			
MD1	580645	204820	42.5	36.3	37.5	36.6	38.4	33.9	32.6	34.4	30.5	32.0	48.5	33.9	36.4	27.32	21.40			
MD2	583952	205742	19.2	41.6	29.4	39.1	31.4	32.7	31.8	28.6	31.8	37.8	50.8	31.2	33.8	25.34	16.78			
MD2b	583952	205742	38.2	49.8	29.2	37.5	31.9	42.2	36	30.9	32.8	39.3	55.2	37.8	38.4	28.80	18.22			
MD2c	583952	205742	32.5	43.1	29	40.5	33.3	31.4	29.7	37.8	32.7	37.8	48.6	33.3	35.8	26.86	17.41			
MD3	584763	208107	41.2	43.7	36.3	32.1	32.7	36.5	38.7	36	33.1	38.1	48.7	37.1	37.9	28.39	19.70			
MD5	585914	208104	41.3	46.6	36	36.1	28.4	Missing	19.1	36	36.5	41.9	50.1	41.5	37.6	28.19	20.72			
MD6	585072	207080	38.3	43.7	Missing	Missing	24.8	29.2	27.6	Missing	31.3	33.1	47	36.3	34.6	25.94	25.94			
MD7	585307	206943	42.6	49	38.9	28.1	30.2	28.7	28.3	30.7	30.9	38.7	47.4	40.5	36.2	27.13	24.55			
MD8	588575	200492	40.6	44.4	29	34.3	31.3	31.2	33.6	35.9	34.6	41.7	52.3	43.5	37.7	28.28	17.35			
MD11	588205	200438	32.8	40	29.9	30.4	26.6	26	26.1	28.1	26.5	32	37.9	34.3	30.9	23.16	23.16			
MD12	583862	205549	31.5	41.7	25.8	33.6	27.9	26.9	29.1	28.5	28.8	31.6	40.1	32.1	31.5	23.60	14.73			
MD13	584165	205532	37.6	40	27.7	27.4	32.3	23.8	28.9	27	30.7	30.3	44.5	30.5	31.7	23.79	14.89			
MD14	585221	207682	31	51.6	35.7	33.6	23.9	29.7	27.4	27.3	30	38.5	47.1	41.4	34.8	26.08	26.08			
MD16	584309	205776	28.1	28.2	17.5	14	11.5	11.5	11.5	14.3	15.9	18.3	27.7	21.6	18.3	13.76	12.70			
MD17	585078	207924	33.8	34.4	23.3	19.2	13.5	12.6	16	17.1	19.1	26.7	33.8	28.4	23.2	17.37	15.76			
MD19	585565	206723	Missing	43.3	23.2	22.1	21	22.1	20.9	23.5	28	30.9	35.4	33.7	27.6	20.73	17.05			

Maldon District Council

MD22A	585062	207160	69.4	Missing	57.2	88.7	71.4	76.2	75.4	66.2	69.2	74.6	81.1	63.1	72.0	54.03	51.48
MB22B	585062	207160	68	Missing	54.7	98.1	85.6	Missing	75.8	67.3	76.4	81.6	97.5	64.2	76.9	57.69	54.90
MD22C	585062	207160	67.2	Missing	54.2	86.9	74.8	Missing	75.2	65.3	69.7	74	87.9	59.3	71.5	53.59	51.06
MD23	585055	207324	75.1	79.8	67.2	39.9	37.6	32.4	30.5	37.6	43.8	66	92.4	Erroneous Result Removed	54.8	41.07	36.58
MD24	585045	207272	52.2	68.6	54.3	65.4	Missing	Missing	51	53.5	51.5	60	Missing	54.2	56.7	42.56	40.58
MD25	585016	207241	27.9	50.8	48.1	33.1	31.9	31.2	32.8	31	31.5	43.1	Missing	41.2	36.6	27.45	22.89
MD26	585045	207186	47.1	66.4	Missing	60.4	46.2	45.3	Missing	40	43.5	47.8	64.7	37.9	49.9	37.45	37.45
MD27	585073	207132	56.1	76	67.4	84.4	78.3	74.5	73.7	29.6	68.5	73.9	84.7	62.8	69.2	51.87	51.87
MD28	585067	207116	23.6	53.1	35.5	36.1	32	32.5	31.5	34.9	32.4	39.1	48.5	43.3	36.9	27.66	27.66
MD29	585467	208089	43.4	45.7	28.8	37.4	31.3	27.4	29.9	29	29.6	38.1	Missing	83.6	38.6	28.92	23.27
MD30	584868	207042	52.3	46.7	46.7	40.1	34.7	38.4	36.4	42.6	41.6	48.9	Missing	40.7	42.6	31.98	31.98
MD31	584809	206962	39	47.5	31.4	26.5	23.6	24.2	25.2	30.9	29.2	33.3	42.9	38.4	32.7	24.51	24.51
MD32	585740	208010	Missing	50.1	42.4	42.8	34.7	37.7	36.9	36	37.9	42.5	55.1	38.6	41.3	31.00	31.00

National bias adjustment factor used

Annualisation has been conducted where data capture is <75%

Where applicable, data has been distance corrected for relevant exposure in the final column

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

MD23 December Result 1.0µg/m³ erroneous result removed

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Diffusion Tubes QA/QC

In 2019, Maldon District Council undertook monitoring at 25 sites using 29 nitrogen dioxide diffusion tubes.

The diffusion tubes were supplied and analysed by Socotec with a preparation method of 50% triethanolamine (TEA) in Acetone.

The AIR NO₂ proficiency testing scheme found that the laboratory achieved the following percentage of results determined as satisfactory for 2019:

Table C.1 – AIR PT Results 2019

AIR PT Round	AIR PT AR030	AIR PT AR031	AIR PT AR033	AIR PT AR034
Round conducted in the period	January – February 2019	April – May 2019	July – August 2019	September – October 2019
SOCOTEC	87.5%	100%	100%	100%

Diffusion tube Bias Adjustment Factors

Maldon District Council uses the national bias adjustment figure for calculating diffusion tubes results.

The Diffusion Tube Bias Adjustment Factors Spreadsheet 03/20 identified that for Socotec 50% TEA in acetone diffusion tubes in 2019, a bias adjustment factor of 0.75 should be used. This was derived from orthogonal regression analysis of 24 studies.

Figure C.1 – National Bias Adjustment Factor Spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet							Spreadsheet Version Number: 03/20				
Follow the steps below in the correct order to show the results of relevant co-location studies							This spreadsheet will be updated at the end of June 2020				
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods							Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet				
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.							LAQM Helpdesk Website				
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.							Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.				
Step 1:	Step 2:	Step 3:	Step 4:								
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.								
If a laboratory is not shown, use have no data for this laboratory.	If a preparation method is not shown, use have no data for this method at this laboratory.	If a year is not shown, use have no data	If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327353								
Analysed By ¹	Method ²	Year ³	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ⁴	Bias Adjustment Factor (A) (Cm/Dm)	
Socotec Didcot	50% TEA in acetone	2019	UB	Kingston upon Hull City Council	12	30	23	32.2%	G	0.76	
Socotec Didcot	50% TEA in acetone	2019	O	Kingston upon Hull City Council	11	32	26	19.1%	G	0.84	
Socotec Didcot	50% TEA in acetone	2019	R	Vale of Glamorgan	11	40	24	68.0%	G	0.60	
Socotec Didcot	50% TEA in acetone	2019	R	Watford Borough Council	12	35	30	16.8%	S	0.86	
Socotec Didcot	50% TEA in acetone	2019	R	Dumfries & Galloway Council	13	35	31	11.3%	G	0.89	
Socotec Didcot	50% TEA in acetone	2019	KS	Marglebone Road Intercomparison	12	92	65	40.5%	G	0.71	
Socotec Didcot	50% TEA in acetone	2019	UB	City of York Council	12	22	16	35.6%	G	0.74	
Socotec Didcot	50% TEA in acetone	2019	R	City of York Council	12	33	26	26.8%	G	0.79	
Socotec Didcot	50% TEA in acetone	2019	R	City of York Council	9	32	23	37.2%	G	0.73	
Socotec Didcot	50% TEA in acetone	2019	R	City of York Council	11	40	28	43.4%	G	0.70	
Socotec Didcot	50% TEA in acetone	2019	R	Ipswich Borough council	11	34	26	34.1%	G	0.75	
Socotec Didcot	50% TEA in acetone	2019	R	Swale BC	12	51	39	31.7%	G	0.76	
Socotec Didcot	50% TEA in acetone	2019	R	Swale BC	12	33	27	23.9%	G	0.81	
Socotec Didcot	50% TEA in acetone	2019	R	Swale BC	12	40	31	26.7%	G	0.79	
Socotec Didcot	50% TEA in acetone	2019	R	Wrexham County Borough Council	10	20	16	22.2%	G	0.82	
Socotec Didcot	50% TEA in acetone	2019	R	Wolverhampton Council	12	39	27	48.4%	G	0.67	
Socotec Didcot	50% TEA in acetone	2019	R	North Herts DC	12	59	46	28.5%	G	0.78	
Socotec Didcot	50% TEA in acetone	2019	R	Horsham District Council	12	30	24	24.5%	G	0.80	
Socotec Didcot	50% TEA in acetone	2019	R	Horsham District Council	11	31	22	44.5%	G	0.69	
Socotec Didcot	50% TEA in acetone	2019	R	Horsham District Council	11	32	24	34.4%	G	0.74	
Socotec Didcot	50% TEA in acetone	2019	B	Medway Council	10	21	13	59.5%	P	0.63	
Socotec Didcot	50% TEA in acetone	2019	R	Medway Council	12	33	24	35.1%	G	0.74	
Socotec Didcot	50% TEA in acetone	2019	R	Waverley Borough Council	10	38	30	27.5%	G	0.78	
Socotec Didcot	50% TEA in acetone	2019	R	Waverley Borough Council	12	35	24	44.7%	G	0.69	
Overall Factor* (24 studies)							Use		0.75		

NO₂ Fall Off Estimation

Using the equation from the Bureau Veritas NO₂ Fall Off with Distance Calculator (version 4.2), a custom Excel spreadsheet has been developed to derive the NO₂ concentrations for multiple diffusion tubes from measured annual mean concentrations 2018 NO₂ background maps.

Estimated Annual Mean at Relevant Exposure:

$$=IF(AC>0,(((AB-AC)/(-0.5476*LN(J)+2.7171))*(-0.5476*LN(H)+2.7171)+AC), "")$$

AB = Bias Adjusted Mean

AC = Annual Mean Background NO₂

J = Distance: diffusion tube to kerb of nearest road (m)

H = Distance: relevant exposure to kerb of nearest road (m)

Table C.2 – NO₂ Fall Off Calculator

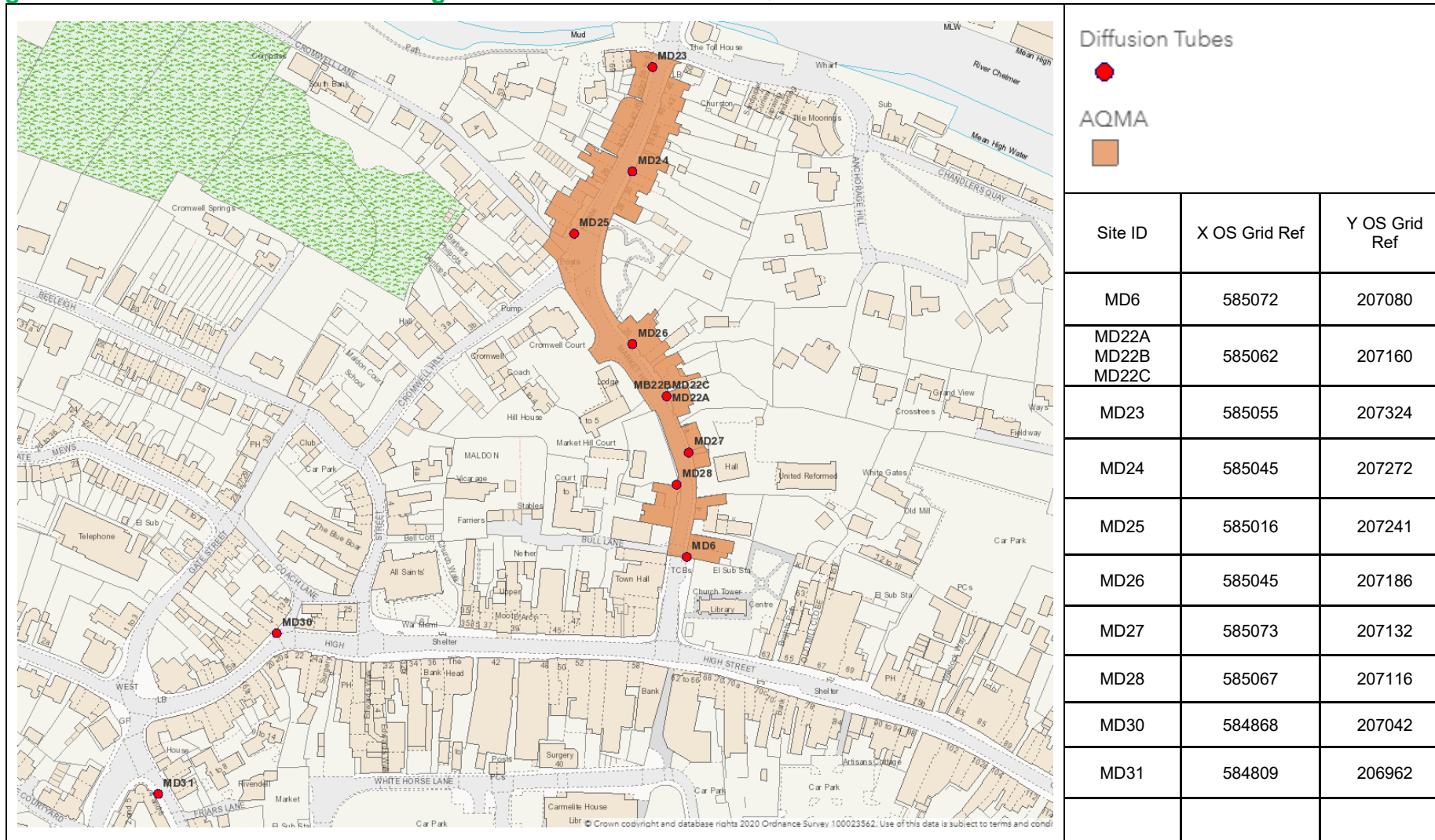
Site ID	Site Name	Bias Adjusted Mean	Annual Mean Background	Distance to Relevant Exposure (m)	Distance to kerb of nearest road (m)	Distance Corrected to Nearest Exposure#
MD1	Opposite Cherry Oak, A414	27.3	10.48	15.90	10.7	21.4
MD2/ MD2B/ MD2C (Average)	A414 Spital Road/A414 Bypass	27.0	10.64	17	1.0	17.5
MD3	Heybridge Approach	28.4	10.41	17.90	3.7	19.7
MD5	Colchester Rd/Heybridge Street Junction	28.2	11.48	15.60	3.9	20.7
MD6	High Street (Market Hill Junction)	25.9	13.58	0.00	2.1	25.9
MD7	Wantz Road/High Street	27.1	12.36	1.90	1.6	24.6
MD8	Latchingdon/Burnham Road Junction	28.3	9.40	11.60	0.4	17.4
MD11	Latchingdon Street	23.2	9.40	0.00	1.3	23.2
MD12	A414 Spital Road/A414 Bypass	23.6	10.64	32.40	1.5	14.7
MD13	Limebrook Way/A414 Bypass	23.8	10.69	31.60	1.5	14.9
MD14	The Causeway	26.1	13.58	0.00	9	26.1
MD16	8 Narvik Close	13.8	10.69	3.00	0.5	12.7
MD17	2 Creasen Butt Close	17.4	13.58	5.00	0.5	15.8
MD19	Adjacent to 16 Mill Road, Maldon	20.7	12.36	3.40	0.2	17.0
MD22A/MD22B/MD22C (Average)	10 Market Hill, Maldon	55.1	13.58	0.50	1.5	52.5
MD23	59-63 Market Hill, Maldon	41.1	13.58	1.50	1.3	36.6
MD24	32 Market Hill, Maldon	42.6	13.58	0.65	1.9	40.6
MD25	1 Hillside, Maldon	27.5	13.58	5.00	1.4	22.9
MD26	18 Market Hill, Maldon	37.4	13.58	0.00	2.6	37.4
MD27	6 Market Hill, Maldon	51.9	13.58	0.00	2.3	51.9

Maldon District Council

MD28	21 Market Hill, Maldon	27.7	13.58	0.00	1.6	27.7
MD29	5 The Square, Heybridge	28.9	11.48	4.0	1.0	23.3
MD30	High Street, Maldon	32.0	11.45	0.0	1.0	32.0
MD31	Petchey Course, Fambridge Road	24.5	12.55	0.0	3.0	24.5
MD32	Goings Wharf, Colchester Road	31.0	11.48	0.0	2.5	31.0

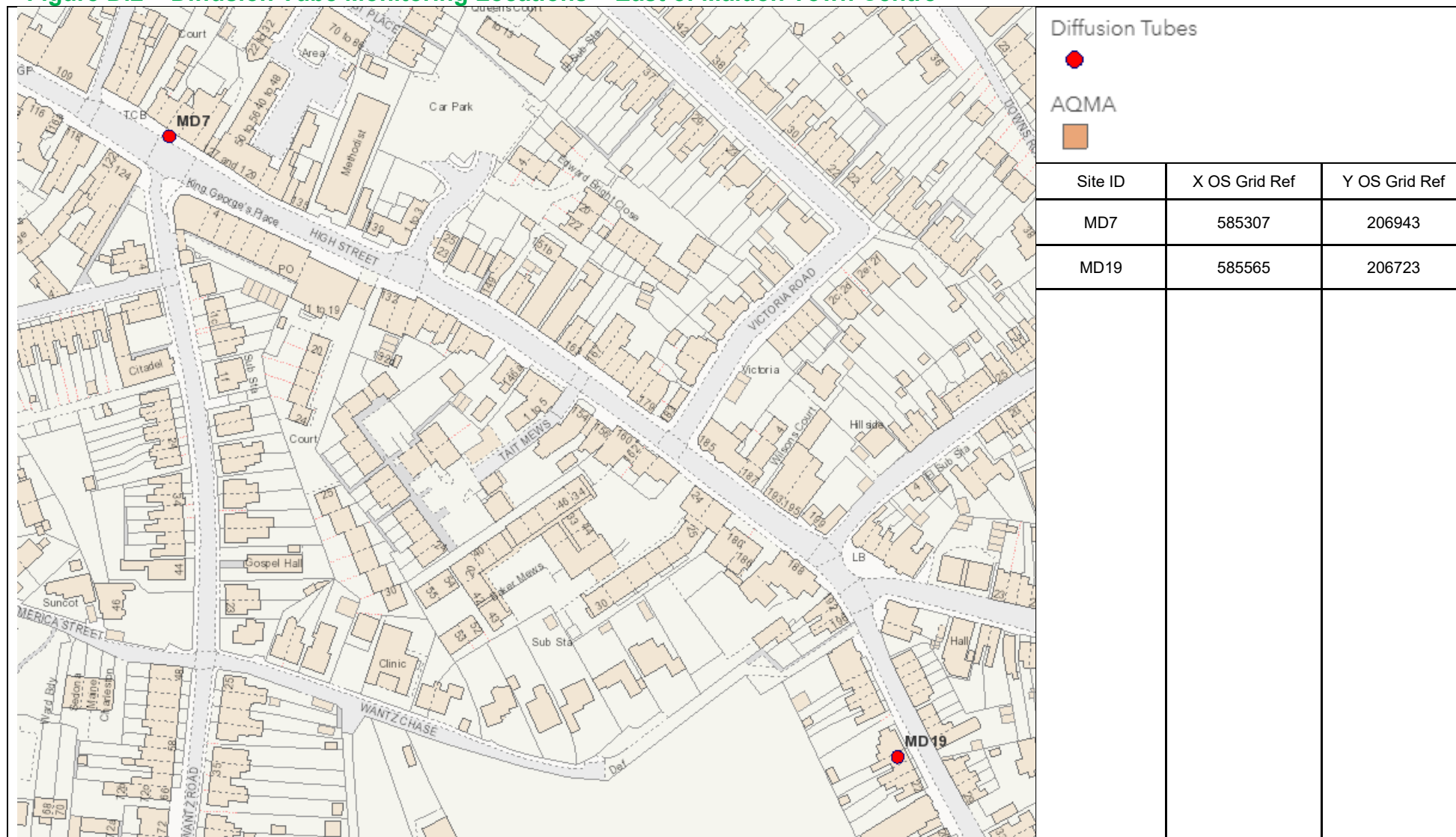
Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Diffusion Tube Monitoring Locations – Market Hill AQMA



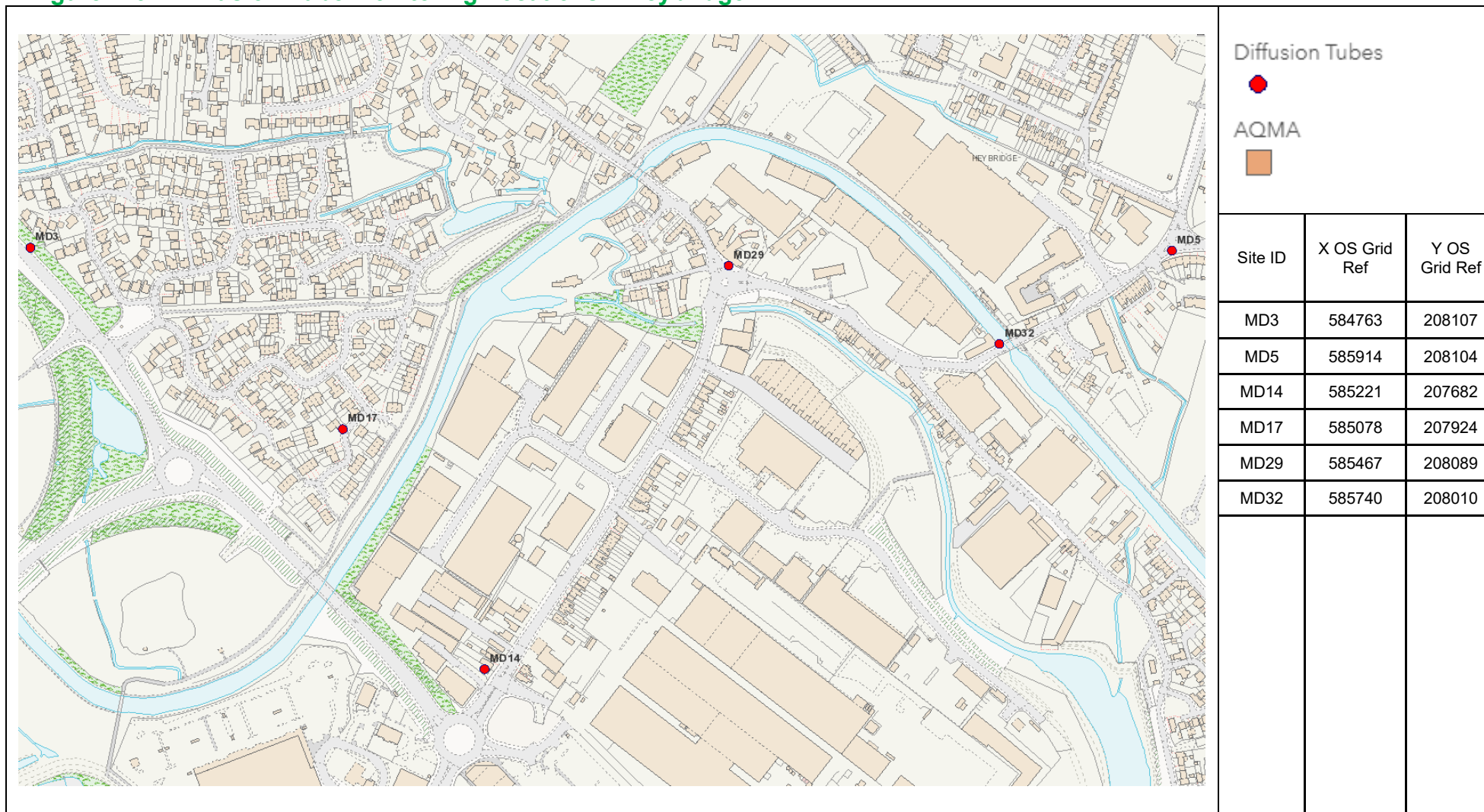
© Crown copyright and database rights 2020 Ordnance Survey 100023562

Figure D.2 – Diffusion Tube Monitoring Locations – East of Maldon Town Centre



© Crown copyright and database rights 2020 Ordnance Survey 100023562

Figure D.3 – Diffusion Tube Monitoring Locations – Heybridge



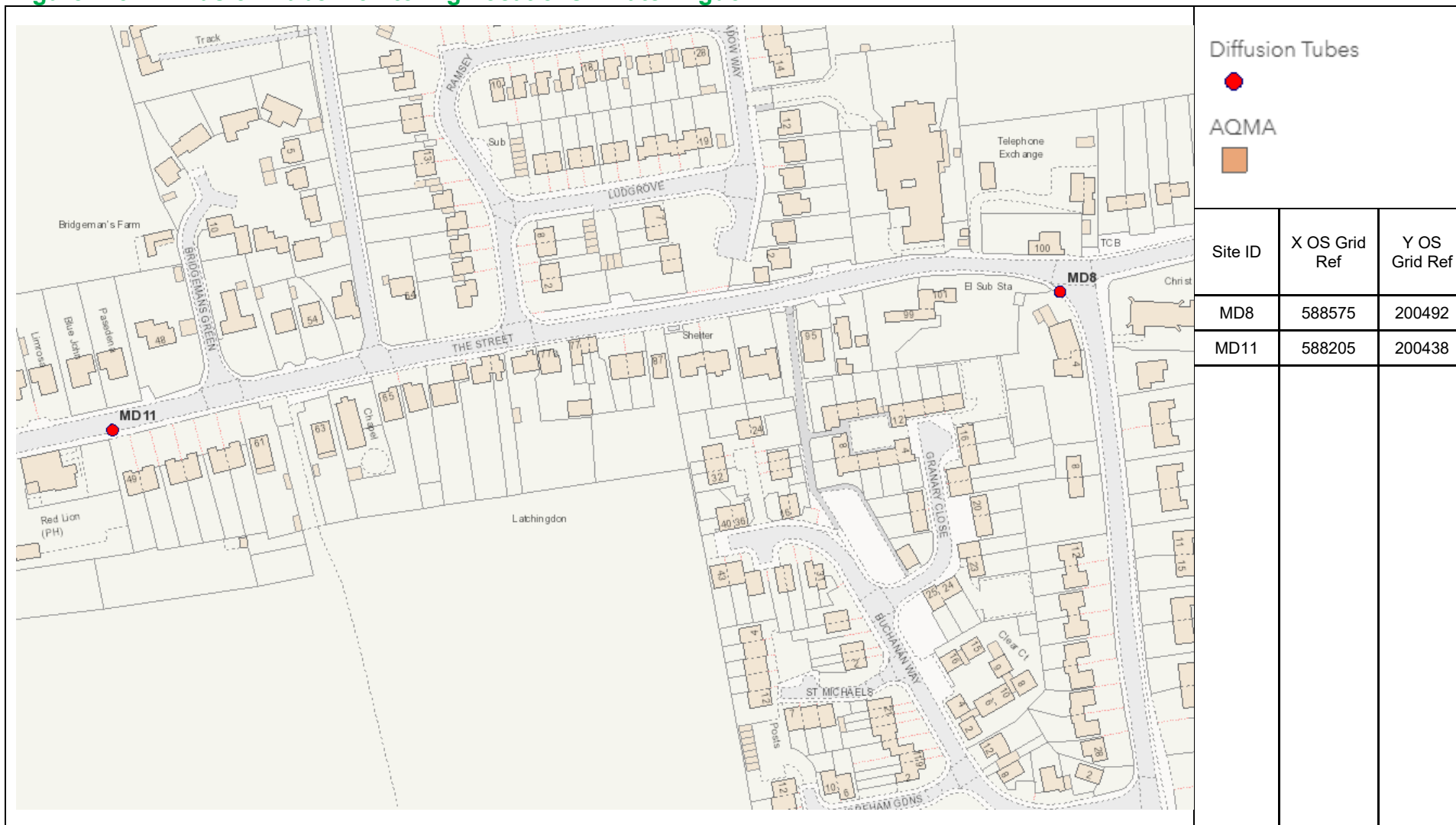
© Crown copyright and database rights 2020 Ordnance Survey 100023562

Figure D.4 – Diffusion Tube Monitoring Locations – A414 Wycke Hill / Limebrook Way Roundabout



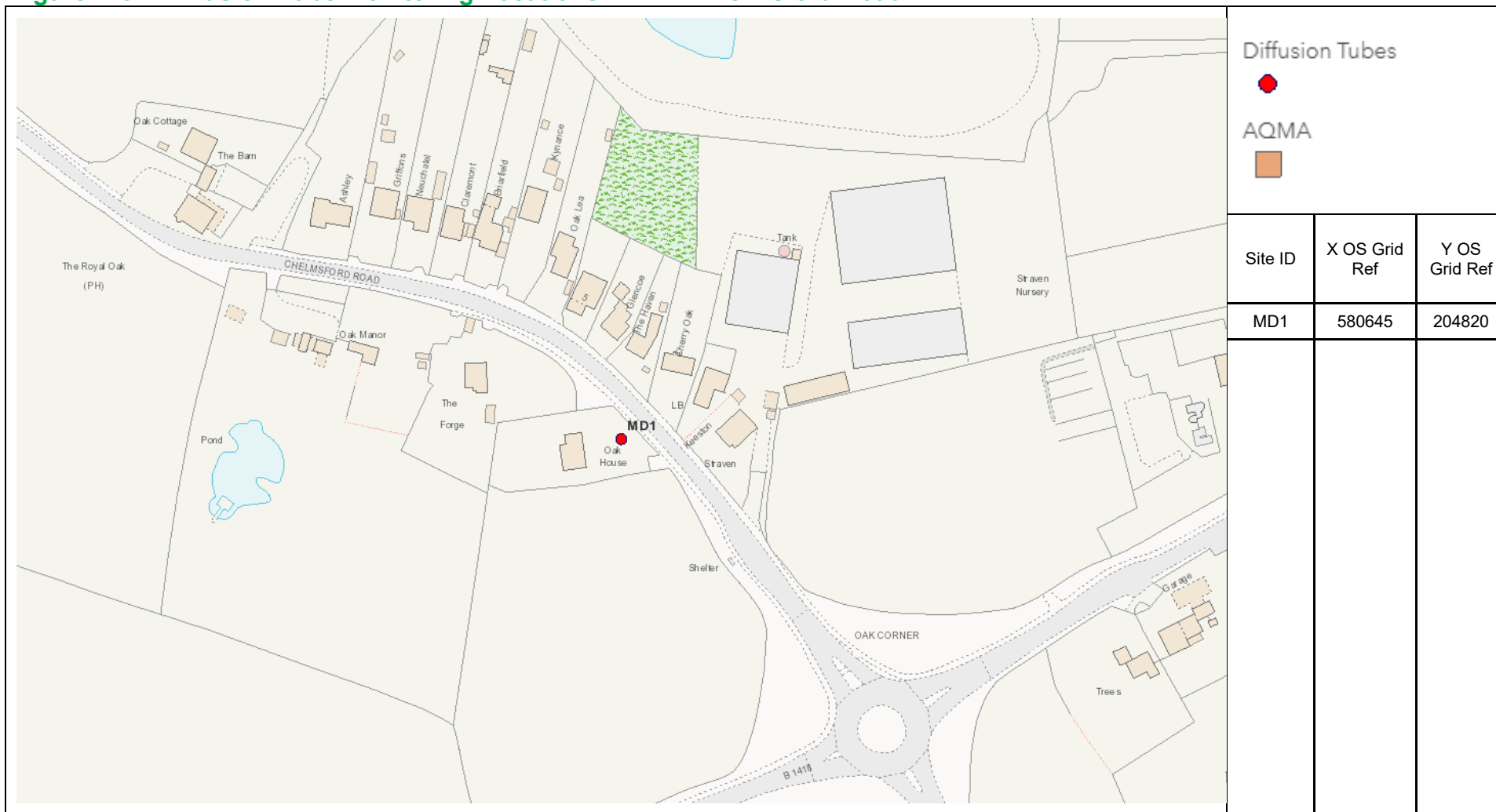
© Crown copyright and database rights 2020 Ordnance Survey 100023562

Figure D.5 – Diffusion Tube Monitoring Locations – Latchingdon



© Crown copyright and database rights 2020 Ordnance Survey 100023562

Figure D.6 – Diffusion Tube Monitoring Locations – A414 Chelmsford Road



© Crown copyright and database rights 2020 Ordnance Survey 100023562

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁶	
	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

⁶ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

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
Bus Gate	A stretch of road through which only scheduled buses and other authorised vehicles to pass through
CAZ	Clean Air Zone -
Defra	Department for Environment, Food and Rural Affairs
Dispersion Modelling	The mathematical computation of the dispersal of emissions as they travel through the ambient atmosphere
Euro Emission Standards	European emission standards define limits for exhaust emissions of new vehicles sold in the European Union and EEA member states.
EU	European Union
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control

References

Defra Diffusion Tube Bias Adjustment Factors Spreadsheet available at;

<https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Defra LAQM Summary of Laboratory Performance in AIR NO₂ PT Scheme available at;

<https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html>

Defra LAQM Policy Guidance LAQM.PG16 available at;

<https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf>

Defra LAQM Technical Guidance LAQM.TG16 available at;

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

Defra NO₂ Background Maps available at; <https://uk-air.defra.gov.uk/data/laqm-background-home>

Essex Air Quality Consortium available at; <http://www.essexair.org.uk>

EssexCarShare.com available at; <https://essex.liftshare.com/>

Essex Air Twitter Feed available at; <https://twitter.com/essexair>

Maldon District Council Statutory Air Quality Reports available at;

<http://www.essexair.org.uk/AQInEssex/LA/Maldon.aspx?View=reports&ReportType=MALDO>
[N](#)

Public Health Outcomes Framework Indicator D01 available at;

<https://fingertips.phe.org.uk/profile/public-health-outcomes-framework>