2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

June, 2022

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Executive Summary: Air Quality in Our Area

The 2022 Annual Status Report (ASR) 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 2021, Maldon District Council measured exceedances of the Air Quality Objectives within the Market Hill Air Quality Management Area.

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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

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.

Market Hill Air Quality Management Area (AQMA)

Due to exceedances of the air quality objectives, an AQMA has been declared along the stretch of Market Hill between Anchorage Hill and Bull Lane, Maldon.

In July 2020, Maldon District Council adopted the Maldon 2025 – 2025 Air Quality Action Plan.

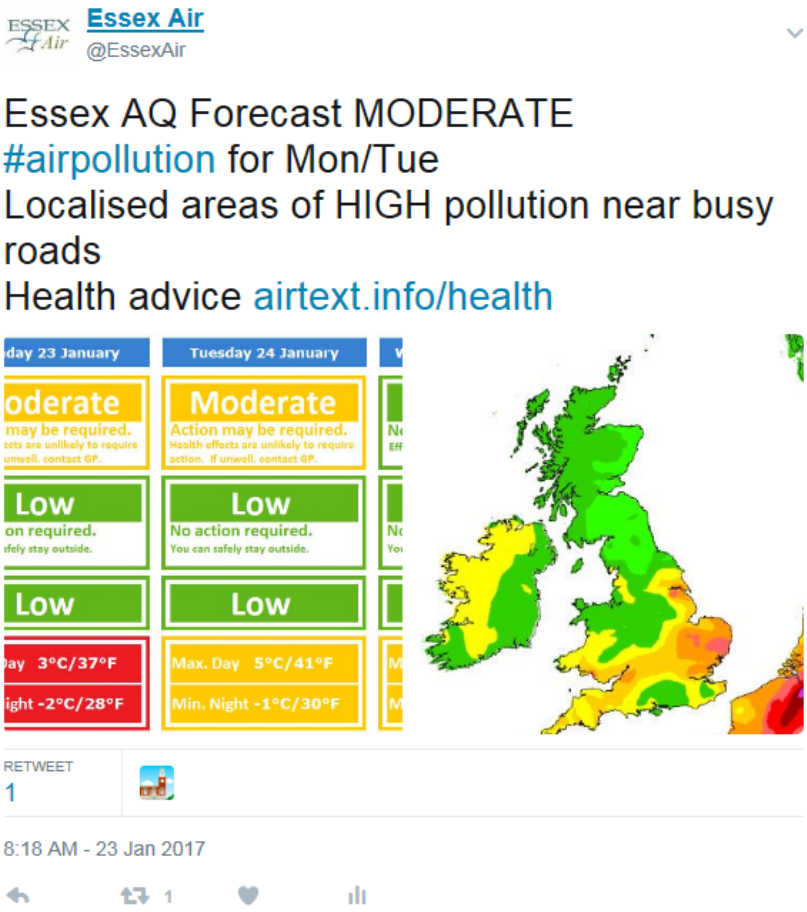
The Council recognises the importance of working with partnering Authorities such as Essex County Council to develop transport strategies and to make improvements to local transport infrastructure to reduce congestion.

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017
[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Air quality appraisal: damage cost guidance, July 2020
[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

Local Engagement and How to get Involved

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.1 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.

Conclusions and Priorities

Maldon District Council have concluded that:

- Two exceedances of the nitrogen dioxide annual mean air quality objective have been measured in the Market Hill AQMA in 2021. These exceedances occurred at monitoring sites MD22 (41.7µg/m^3) and MD27 (40.1µg/m^3). However, after applying distance correction, only one exceedance occurred at relevant exposure. This was at monitoring site MD27 (40.1µg/m^3).
- The maximum measured annual mean concentrations are well below 60µg/m^3 which leads Maldon District Council to conclude that there has not been an exceedance of the 1-Hour air quality objective
- There are no new developments that will have an impact on air quality

Maldon District Council's air quality priority for 2022 will be advancing the adopted air quality action plan measures.

Local Responsibilities and Commitment

This ASR was prepared by Public Health and Protection Services of Chelmsford City Council on behalf of Maldon District Council.

This ASR has been approved by:

Damien Ghela – Lead Specialist: Community, Maldon District Council

This ASR has been sent to the Director of Public Health at Essex County Council.

If you have any comments on this report please send them to Maldon District Council.

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Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Maldon during 2021. 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 are presented in Table E..

2 Actions to Improve Air Quality

Air Quality Management Areas

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

A summary of AQMAs declared by Maldon District Council can be found in Table 2.. The table presents a description of the AQMA that is currently designated within Maldon.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
MDC Air Quality Management Area Number 1 (Market Hill)	11/12/2018	NO_2 Annual & 1 Hour Mean	The stretch of road and properties between Anchorage Hill and Bull Lane, Maldon	No	58.25	43.00	Maldon Air Quality Action Plan 2020 – 2025 June 2020	http://www.maldon.gov.uk/download/downloads/id/18206/air_quality_action_plan_2_july_2020.pdf

Appendix D: Map of Monitoring Locations provide a map of the AQMA and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 Annual Mean
- NO_2 1-Hour Mean

One exceedance of the NO_2 Annual Mean air quality objective has occurred at relevant exposure. This was at monitoring site MD27 (40.1µg/m^3) within the Market Hill AQMA.

Progress and Impact of Measures to address Air Quality in Maldon

Defra's appraisal of last year's ASR concluded that the report is detailed, concise and satisfies the criteria of relevant standards and that the Council should continue their good and thorough work.

Maldon District Council and Essex County Council have a number of ongoing measures to improve air quality in Maldon . These are detailed in Table 2.1 below.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Essex Liftshare	Alternatives to private vehicle use	Car & lift sharing schemes			Essex County Council	Essex County Council	NO	Funded	< £10k	Implementation	Not Quantified	Number of Users	Implementation on-going	
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			County Council / District & Borough Councils	Member Organisations	NO	Funded	< £10k	Implementation	N/A	N/A	Implementation on-going	
3	Development of a Transport Strategy for Maldon	Transport Planning and Infrastructure	Other	2020	2022	Essex County Council / Maldon District Council	Essex County Council / Maldon District Council	NO	Funded	£50k - £100k	Planning	High. Compliance with the Air Quality Objective met in combination with Meaure 2	Reduced traffic flow and congestion on Market Hill. Compliance with NO2 air quality objectives		The Origin and destination survey continues to be delayed due to the ongoing impacts of Covid on traffic levels. Further work with ECC required to agree a point at which traffic levels can be considered representative and robust for survey.
4	Voluntary Class D Clean Air Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2020		Maldon District Council	Maldon District Council	NO	Not Funded	£100k - £500k	Planning	High. Compliance with the Air Qualiity Objective met in combination with Meaure 1	Compliance with NO2 air quality objectives	Defra Grant bid funding unsuccessful for 2020/2021. Report to Council required so that alternative funding through capital expenditure can be investigated	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
5	Set up working group with bus operators in Maldon	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2020	2020	Essex County Council / Maldon District Council / Commercial Bus Operators	N/A	NO	Funded	< £10k	Implementation	High	Quartlery meeting with bus operators	Initial discussions with Essex county Council and bus operators undertaken	
6	Retrofitting of buses travelling on routes along Market Hill	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2020		Maldon District Council / Commercial Bus Operators / DfT	DfT/Defra Joint AQ unit confirmed no plans to run another round of Clean Bus Technology Fund at present	NO	Not Funded	£500k - £1 million	Planning	High	All buses operating on Market Hill to be of a Euro VI standard or retrofitted to CVRAS standard		Retrofitting buses with Selective Catalytic Reduction Technology (SCRT) approved by Clean Vehicle Retrofit Accreditation Scheme ensures that legacy fleet vehicles comply with CAZ standards
7	Hackney Carriage & PHV Emissions Standards	Promoting Low Emission Transport	Taxi Licensing conditions	2020	2022	Maldon District Council	N/A	NO	Funded	< £10k	Planning	Medium	All newly licensed or replacement vehicles to be of a Euro VI standard or better, from 2022	Complete	
8	Council Refuse & Recycling Vehicle Routing	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	2020	2020	Maldon District Council	Maldon District Council	NO	Funded	< £10k	Completed	Medium	Quarterly meeting with Head of Waste	Complete	Maldon District Council Refuse & Recycling Vehicles will not use Market Hill unless undertaking collection on Market Hill
9	MDC Team Talk	Policy Guidance and Development Control	Other policy	2020	2020	Maldon District Council	Maldon District Council	NO	Funded	< £10k	Completed	Low	AQ highlighted in MDC team Talk	Implemented as part of Clean Air day work	MDC staff received the Clean Air Day advice going out to residents and asked to support Clean Air Day by making pledges
10	Council Vehicles Upgrade to Electric	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2020		Maldon District Council	Maldon District Council	NO	Not Funded	£100k - £500k	Planning	Low	Compile an inventory of Council owned vehicles. +Review options to include AQ	Inventory process underway	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
													weighting within the Council's procurement strategy		
11	Clean Air Walking & Cycling Routes	Public Information	Via leaflets	2020	2020	Maldon District Council	Maldon District Council	NO	Funded	< £10k	Completed	Low	Provide online information to residents and visitors about walking and cycling routes away from pollution hotspots to include social distancing pavement space advice	Complete	
12	Electric Vehicle Charging Points at Supermarkets	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2020	2020	Maldon District Council	Supermarkets / Grant funding opportunities	NO	Not Funded	£100k - £500k	Completed	Low	Survey local supermarkets re EV charge points and proposals. Promote mapped EV charging points via social media	Complete	
13	School Travel Plans for schools in Maldon	Promoting Travel Alternatives	School Travel Plans	2020		Maldon District Council	Maldon District Council	NO	Not Funded	< £10k	Planning	N/A	Development and implementation of travel plans by schools		
14	Information on Domestic Fuel & Woodburning	Public Information	Via leaflets	2020	2020	Maldon District Council	Maldon District Council	NO	Funded	< £10k	Completed	Low	Mail drop addresses on Market Hill advice leaflet. Promote through Council website and social media	Complete	
15	Indoor Air Quality	Public Information	Via leaflets	2020	2020	Maldon District Council	Maldon District Council	NO	Funded	< £10k	Completed	Low	Distribution of indoor air quality leaflet through website and social media	Complete	

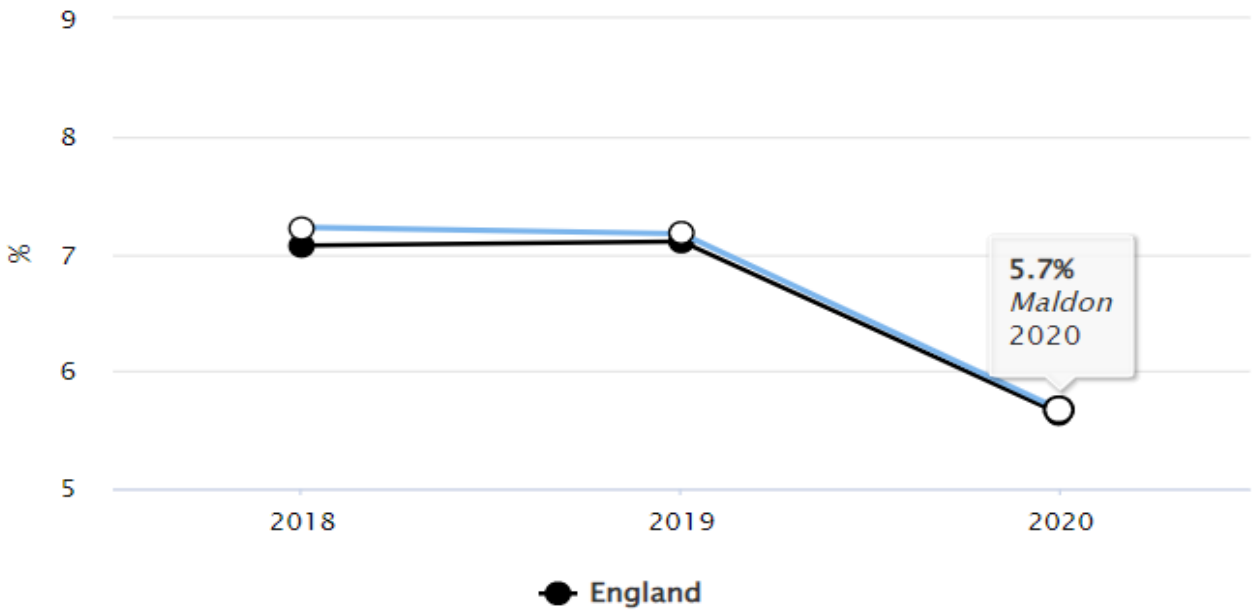
$PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

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 Defra background mapping resource which for $PM_{2.5}$ in 2021 models a maximum annual mean concentration of 9.8µg/m^3 in the Local Authority area.

The Public Health Outcomes Framework indicator D01 – Fraction of mortality attributable to particulate ($PM_{2.5}$) air pollution which for 2020 gave a value of 5.8%. 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 $PM_{2.5}$:

- Regular inspections of permitted industry where combustion and non-combustion processes could lead to anthropogenic emissions of $PM_{2.5}$
- Working with Essex County Council (highway authority) to deliver Major Transport improvement schemes to alleviate congestion. In addition to reduced exhaust emissions, these schemes will reduce non-exhaust emissions from brake and tyre wear by making traffic flows smoother.

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

This section sets out the monitoring undertaken within 2021 by Maldon District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

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 (i.e. passive) monitoring of NO_2 at 26 sites during 2021. Table A.1 in Appendix A presents the details of the non-automatic sites.

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

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.1.3 Nitrogen Dioxide (NO_2)

Table A.2 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented 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).

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Appendix A: Monitoring Results

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
MD1	Opposite CherryOak A414	Roadside	580645	204820	NO_2	No	15.9	10.7	No	2.25
MD2, MD2B, MD2C	A414 Spital Road/A414 Bypass	Kerbside	583952	205742	NO_2	No	17.0	1.0	No	2.25
MD3	Heybridge Approach	Roadside	584763	208107	NO_2	No	17.9	3.7	No	2.25
MD5	Colchester Rd/Heybridge Street Junction	Roadside	585914	208104	NO_2	No	15.6	3.9	No	2.25
MD6	High Street (Market Hill Junction)	Urban Centre	585072	207080	NO_2	No	0.0	2.1	No	2.25
MD7	Wantz Road/High Street	Urban Centre	585307	206943	NO_2	No	1.9	1.6	No	2.25
MD8	Latchingdon/Burnham Road Junction	Kerbside	588575	200492	NO_2	No	11.6	0.4	No	2.25
MD11	Latchingdon Street	Kerbside	588205	200438	NO_2	No	0.0	1.3	No	2.25
MD12	A414 Spital Roadl/A414 Bypass	Kerbside	583862	205549	NO_2	No	32.4	1.5	No	2.25
MD13	Limebrook Way/A414 Bypass	Kerbside	584165	205532	NO_2	No	31.6	1.5	No	2.25
MD14	The Causeway	Roadside	585221	207682	NO_2	No	0.0	9.0	No	2.25
MD16	8 Narvik Close	Roadside	584309	205776	NO_2	No	3.0	0.5	No	2.25
MD17	2 Creasen Butt Close	Suburban	585078	207924	NO_2	No	5.0	0.5	No	2.25
MD19	Adjacent to 16 Mill Road, Maldon	Kerbside	585565	206723	NO_2	No	3.4	0.2	No	2.25

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
MD22A, MD22B, MD22C	10 Market Hill, Maldon	Roadside	585062	207160	NO_2	Yes	0.5	1.5	No	2.25
MD23	59-63 Market Hill, Maldon	Roadside	585055	207324	NO_2	Yes	1.5	1.3	No	2.25
MD24	32 Market Hill	Roadside	585045	207272	NO_2	Yes	0.7	1.9	No	2.25
MD25	1 Hillside, Maldon	Roadside	585016	207241	NO_2	Yes	5.0	1.4	No	2.25
MD26	18 Market Hill, Maldon	Roadside	585045	207186	NO_2	Yes	0.0	2.6	No	2.25
MD27	6 Market Hill, Maldon	Roadside	585073	207132	NO_2	Yes	0.0	2.3	No	2.25
MD28	21 Market Hill, Maldon	Roadside	585067	207116	NO_2	Yes	0.0	1.6	No	2.25
MD29	5 The Square, Heybridge	Roadside	585467	208089	NO_2	No	4.0	1.0	No	2.25
MD30	High Street, Maldon	Roadside	584868	207042	NO_2	No	0.0	1.0	No	2.25
MD31	Petchey Court, Fambridge Road	Roadside	584809	206962	NO_2	No	0.0	3.0	No	2.25
MD32	Goings Wharf, Colchester Road	Roadside	585740	208010	NO_2	No	0.0	2.5	No	2.25
MD33	High Street, Maldon	Roadside	584857	207023	NO_2	No	0.0	1.0	No	2.25

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 NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
MD1	580645	204820	Roadside	100.0	100.0	31.4	28.8	27.3	20.1	20.1
MD2, MD2B, MD2C	583952	205742	Kerbside	100.0	100.0	28.1	28.8	27.0	22.7	25.8
MD3	584763	208107	Roadside	100.0	100.0	30.2	29.2	28.4	24.1	25.7
MD5	585914	208104	Roadside	100.0	100.0	32.2	29.2	28.2	25.1	25.3
MD6	585072	207080	Urban Centre	100.0	100.0	29.7	26.9	25.9	21.3	21.2
MD7	585307	206943	Urban Centre	100.0	100.0	31.6	26.4	27.1	22.2	22.5
MD8	588575	200492	Kerbside	100.0	100.0	32.4	29.0	28.3	23.5	26.1
MD11	588205	200438	Kerbside	100.0	100.0	24.7	24.0	23.2	20.2	20.3
MD12	583862	205549	Kerbside	100.0	100.0	27.6	24.5	23.6	18.8	19.5
MD13	584165	205532	Kerbside	92.3	92.3	25.5	23.9	23.8	18.3	19.4
MD14	585221	207682	Roadside	92.3	92.3	29.4	26.6	26.1	22.8	22.6
MD16	584309	205776	Roadside	92.3	92.3	15.3	13.6	13.8	12.1	10.7
MD17	585078	207924	Suburban	100.0	100.0	20.9	15.8	17.4	14.6	14.6
MD19	585565	206723	Kerbside	100.0	100.0	21.6	20.7	20.7	18.9	18.1
MD22A, MD22B, MD22C	585062	207160	Roadside	100.0	100.0	**58.2**	**58.4**	**55.1**	**42.8**	**41.7**
MD23	585055	207324	Roadside	92.3	92.3		37.1	**41.1**	31.4	33.7
MD24	585045	207272	Roadside	92.3	92.3		**46.3**	**42.6**	33.6	32.6
MD25	585016	207241	Roadside	92.3	92.3		30.9	27.5	23.7	25.4
MD26	585045	207186	Roadside	100.0	100.0		39.1	37.4	27.7	27.8
MD27	585073	207132	Roadside	100.0	100.0		**61.8**	**51.9**	**43.0**	**40.1**
MD28	585067	207116	Roadside	100.0	100.0		28.9	27.7	26.3	27.0
MD29	585467	208089	Roadside	92.3	92.3			28.9	24.9	23.1
MD30	584868	207042	Roadside	92.3	92.3			32.0	25.5	31.5
MD31	584809	206962	Roadside	100.0	100.0			24.5	19.4	19.6
MD32	585740	208010	Roadside	100.0	100.0			31.0	25.6	28.3
MD33	584857	207023	Roadside	100.0	100.0				28.9	27.4

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**

☒ **Diffusion tube data has been bias adjusted**

☒**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 correction**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

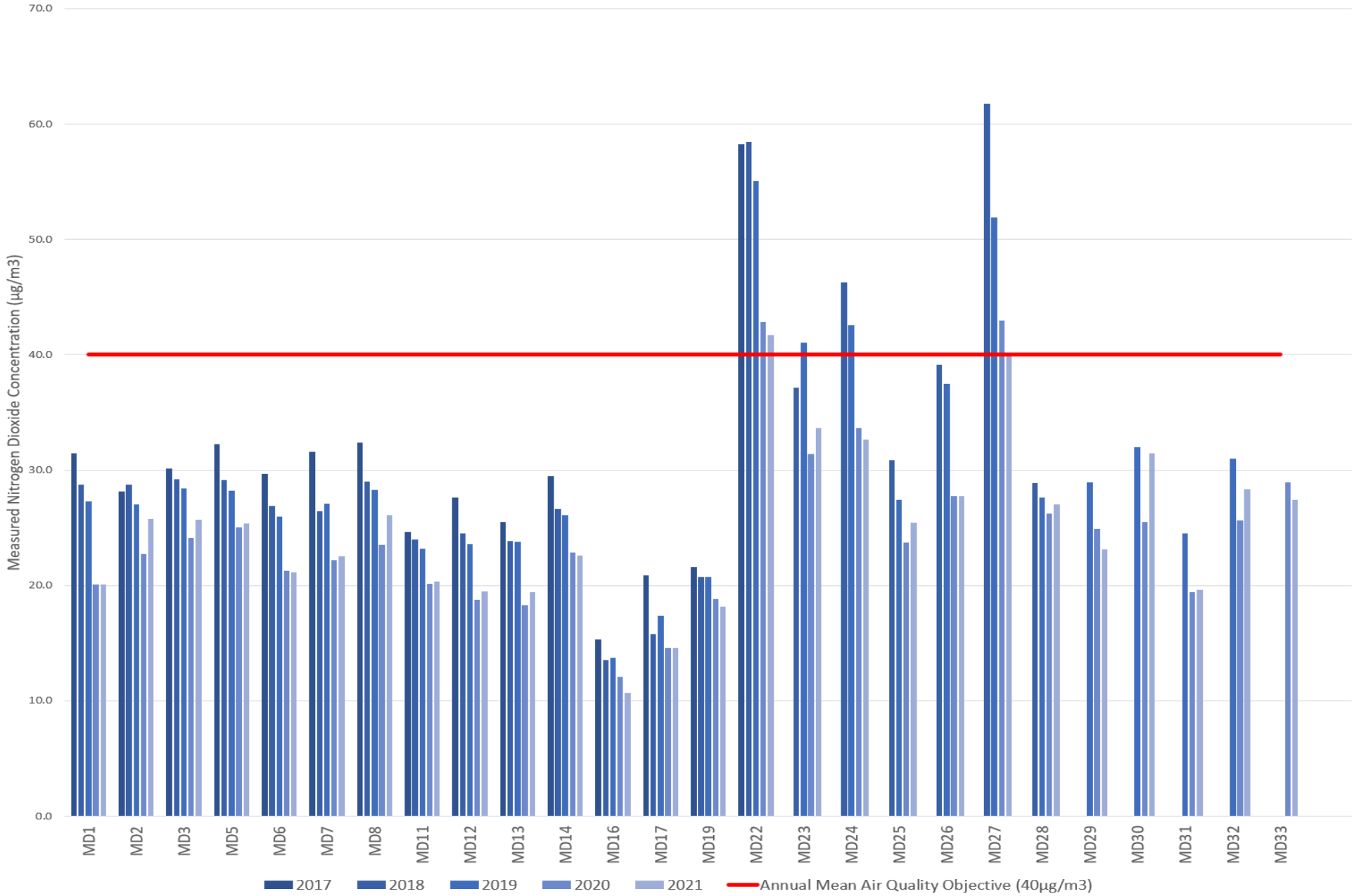
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

(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%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.78)	Annual Mean: Distance Corrected to Nearest Exposure
MD1	580645	204820	30.4	24.2	26.8	21.6	26.6	23.8	21.9	17.9	27.6	24.3	33.7	29.8	25.7	20.1	
MD2, MD2B, MD2C	583952	205742	32.7	39.5	25.0	32.2	30.3	33.9	32.3	26.7	38.7	34.7	32.7	37.5	33.0	25.8	
MD3	584763	208107	37.5	30.1	28.3	26.6	32.7	32.1	28.2	27.3	37.1	38.4	39.0	37.9	32.9	25.7	
MD5	585914	208104	40.0	32.3	31.3	30.4	25.8	29.5	23.5	21.2	36.6	38.7	39.7	40.9	32.5	25.3	
MD6	585072	207080	29.3	24.6	31.6	25.2	19.8	20.5	22.3	26.0	31.7	32.4	34.3	27.7	27.1	21.2	
MD7	585307	206943	33.9	17.4	29.5	27.6	28.7	22.2	24.4	24.1	35.3	29.3	42.0	32.4	28.9	22.5	
MD8	588575	200492	40.0	31.2	26.0	35.0	33.9	27.4	33.2	20.5	37.4	35.8	36.4	44.4	33.4	26.1	
MD11	588205	200438	32.1	25.2	27.0	26.8	25.1	18.5	21.4	18.2	29.8	27.0	31.5	30.0	26.1	20.3	
MD12	583862	205549	26.2	22.8	23.0	24.6	24.3	23.5	20.3	22.1	30.7	28.4	26.2	28.1	25.0	19.5	
MD13	584165	205532	Missing	26.5	27.6	24.0	25.0	23.6	16.7	21.9	24.9	27.8	30.2	25.4	24.9	19.4	
MD14	585221	207682	36.3	23.8	29.2	25.5	26.8	Missing	23.3	20.1	33.7	32.4	29.4	38.4	29.0	22.6	
MD16	584309	205776	23.1	15.1	17.7	10.3	10.0	8.0	7.7	8.4	14.3	15.4	Missing	20.4	13.7	10.7	
MD17	585078	207924	27.8	23.9	20.0	13.5	13.6	10.1	10.9	10.6	21.8	24.0	24.8	24.0	18.8	14.6	
MD19	585565	206723	33.8	24.7	27.0	15.6	23.2	18.1	16.4	16.0	25.3	26.0	31.2	21.9	23.3	18.1	
MD22A, MD22B, MD22C	585062	207160	38.9	50.6	51.0	64.1	54.7	46.6	58.3	47.4	67.4	56.5	53.7	52.0	53.4	**41.7**	39.8
MD23	585055	207324	75.8	46.0	51.6	35.9	32.0	19.2	22.5	31.8	Missing	40.5	62.4	57.0	43.2	33.7	
MD24	585045	207272	36.8	41.7	45.7	48.3	43.5	33.6	43.2	40.4	Missing	46.4	37.3	43.2	41.8	32.6	
MD25	585016	207241	32.1	30.4	33.5	32.9	27.3	Missing	27.1	37.5	36.9	38.8	34.4	27.9	32.6	25.4	
MD26	585045	207186	35.4	26.4	36.5	44.1	31.8	27.3	42.3	32.3	42.0	33.1	38.7	37.5	35.6	27.8	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.78)	Annual Mean: Distance Corrected to Nearest Exposure
MD27	585073	207132	41.1	48.3	52.2	54.1	49.7	41.2	55.7	48.5	66.3	59.3	48.5	52.5	51.5	**40.1**	
MD28	585067	207116	30.0	29.9	33.9	33.3	33.5	27.9	33.0	38.4	41.6	37.9	38.0	38.5	34.7	27.0	
MD29	585467	208089	30.2	33.0	27.1	30.6	28.0	Missing	26.9	20.8	32.6	34.6	28.8	33.8	29.7	23.1	
MD30	584868	207042	43.3	Missing	34.9	38.8	42.2	37.0	28.9	33.7	48.5	44.9	46.3	45.4	40.4	31.5	
MD31	584809	206962	31.0	26.5	25.8	18.4	17.7	20.3	17.9	19.1	29.8	29.3	33.8	32.0	25.1	19.6	
MD32	585740	208010	37.3	35.1	39.2	34.3	29.3	36.9	32.7	32.2	38.9	39.1	39.8	41.3	36.3	28.3	
MD33	584857	207023	43.8	27.2	39.6	31.9	31.9	32.0	30.0	26.2	44.1	38.2	37.0	40.4	35.2	27.4	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**

☒ **National bias adjustment factor used**

It has not been necessary to distance corrected the data for relevant exposure

☒ **Maldon District Council confirms that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Maldon During 2021

Maldon District Council has not identified any significant new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by Maldon District Council During 2021

Maldon District Council has not completed any additional air quality works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

- Maldon District Council undertook monitoring at 26 sites in 2021.
- Maldon District Council adheres with the Diffusion Tube Monitoring Calendar however it is acknowledged that collection dates may occasionally change due to resourcing levels.
- The diffusion tubes were supplied by Socotec (UKAS Testing Laboratory number 1015) with a preparation method of 50% triethanolamine (TEA) in Acetone.
- The AIR NO_2 proficiency testing scheme found that the laboratory achieved the following percentage of results determined as satisfactory for 2021:

Table C.1 – AIR PT Results 2021

AIR PT Round	AIR PT AR42
Round conducted in the period	January – March 2021
SOCOTEC	100%

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Maldon recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Maldon District Council have applied a national bias adjustment factor of 0.78 to the 2021 monitoring data. A summary of bias adjustment factors used by Maldon District Council over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	Diffusion Tube	Version of National Spreadsheet	Adjustment Factor
2021	National	Socotec 50% TEA in Acetone	03/22	0.78
2020	National	Socotec 50% TEA in Acetone	03/21	0.77
2019	National	Socotec 50% TEA in Acetone	03/20	0.75
2018	National	ESG Didcot 50% TEA in Acetone	03/19	0.76
2017	National	ESG Didcot 50% TEA in Acetone	03/18	0.77

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table C.3 below.

Table C.3 – NO_2 Fall off With Distance Calculations (concentrations presented in $\mu g/m^3$)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor
MD22	1.5	2.0	41.7	12.2	*39.8*

Appendix D: Map of Monitoring Locations and AQMAs

Figure D.1 – Monitoring Location Map: Market Hill AQMA

Figure D.2 – Monitoring Location Map: East of Maldon Town Centre

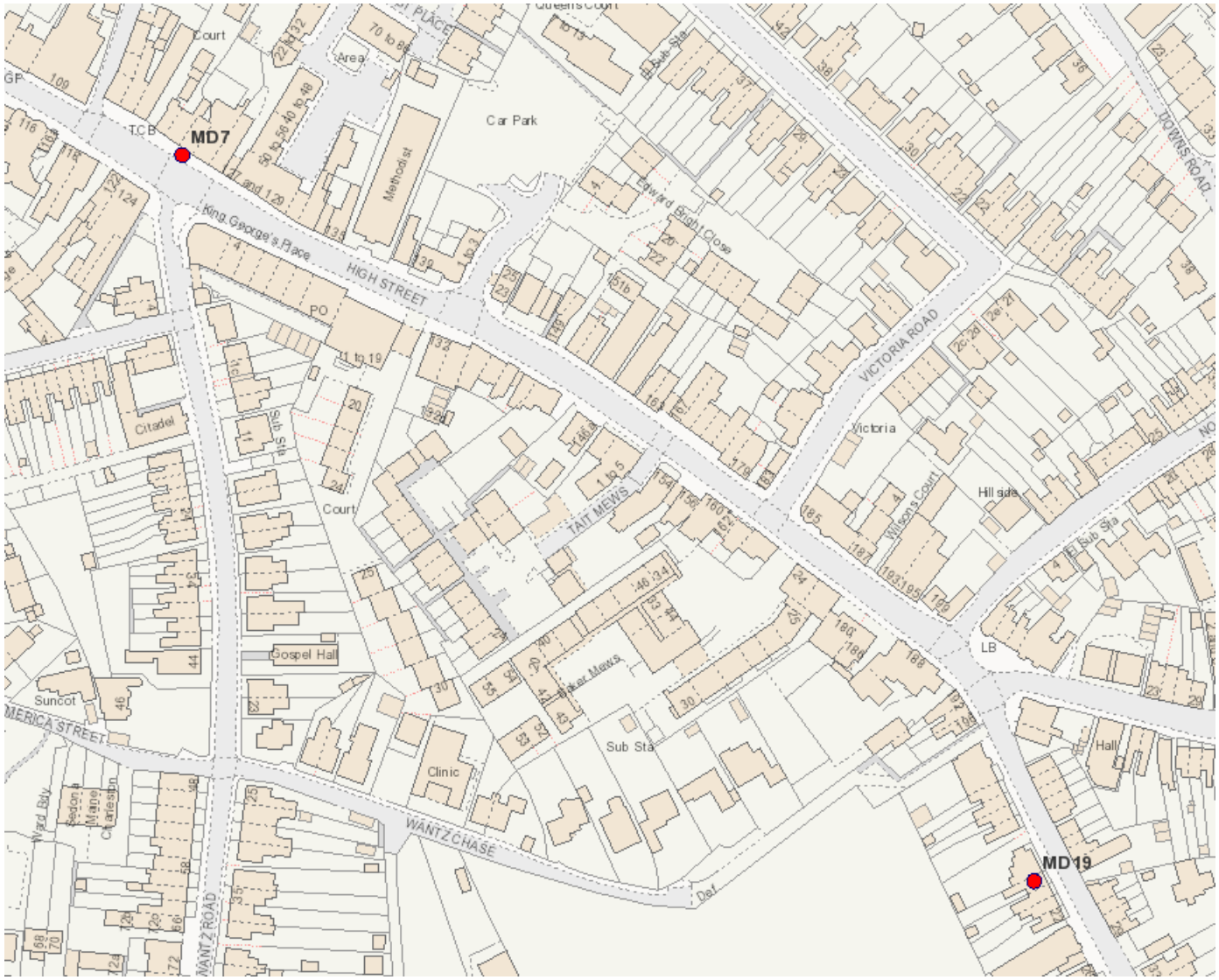


Figure D.3 – Monitoring Location Map: Heybridge

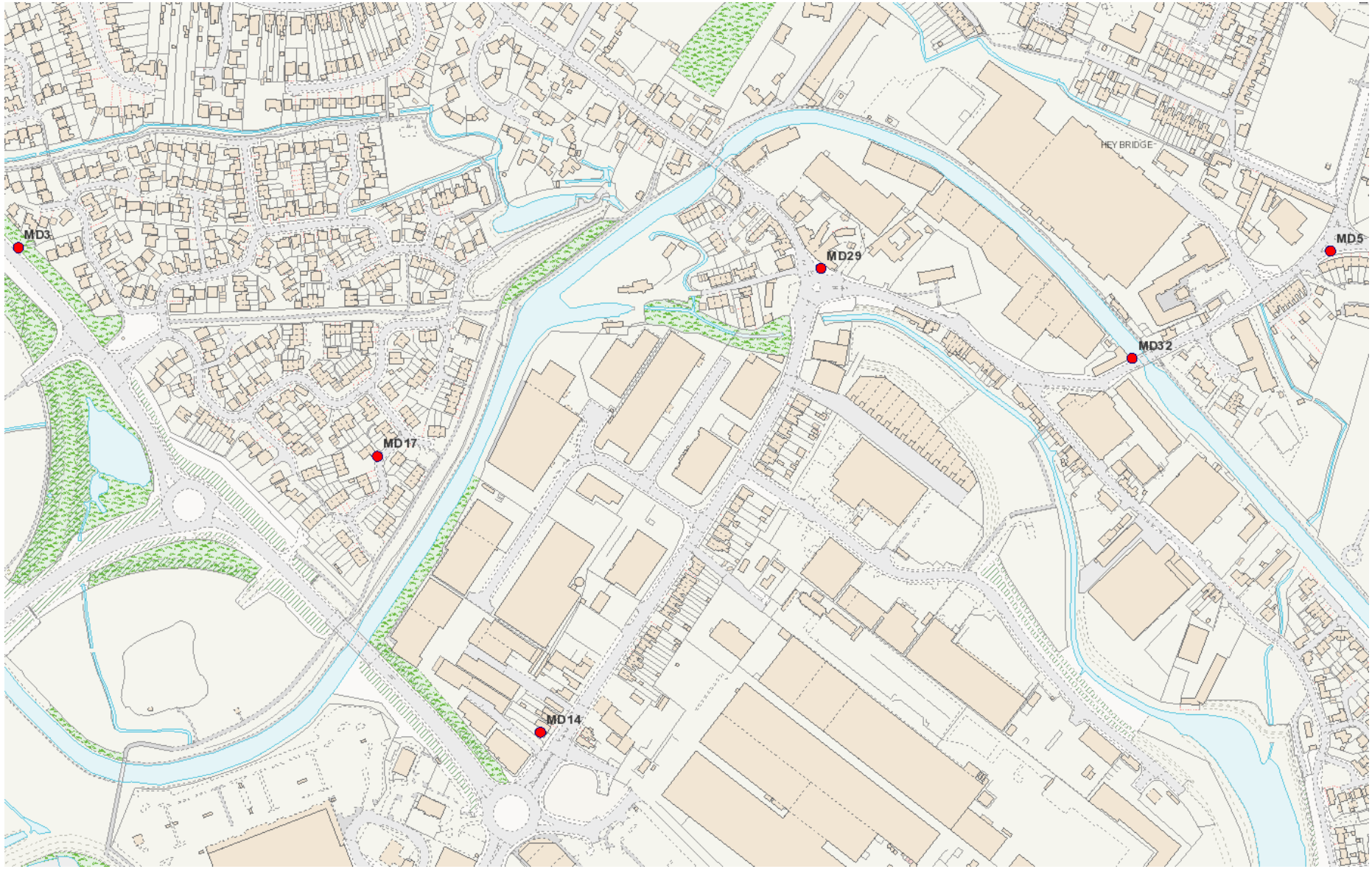


Figure D.4 – Monitoring Location Map: A414 Wycke Hill / Limebrook Way Roundabout

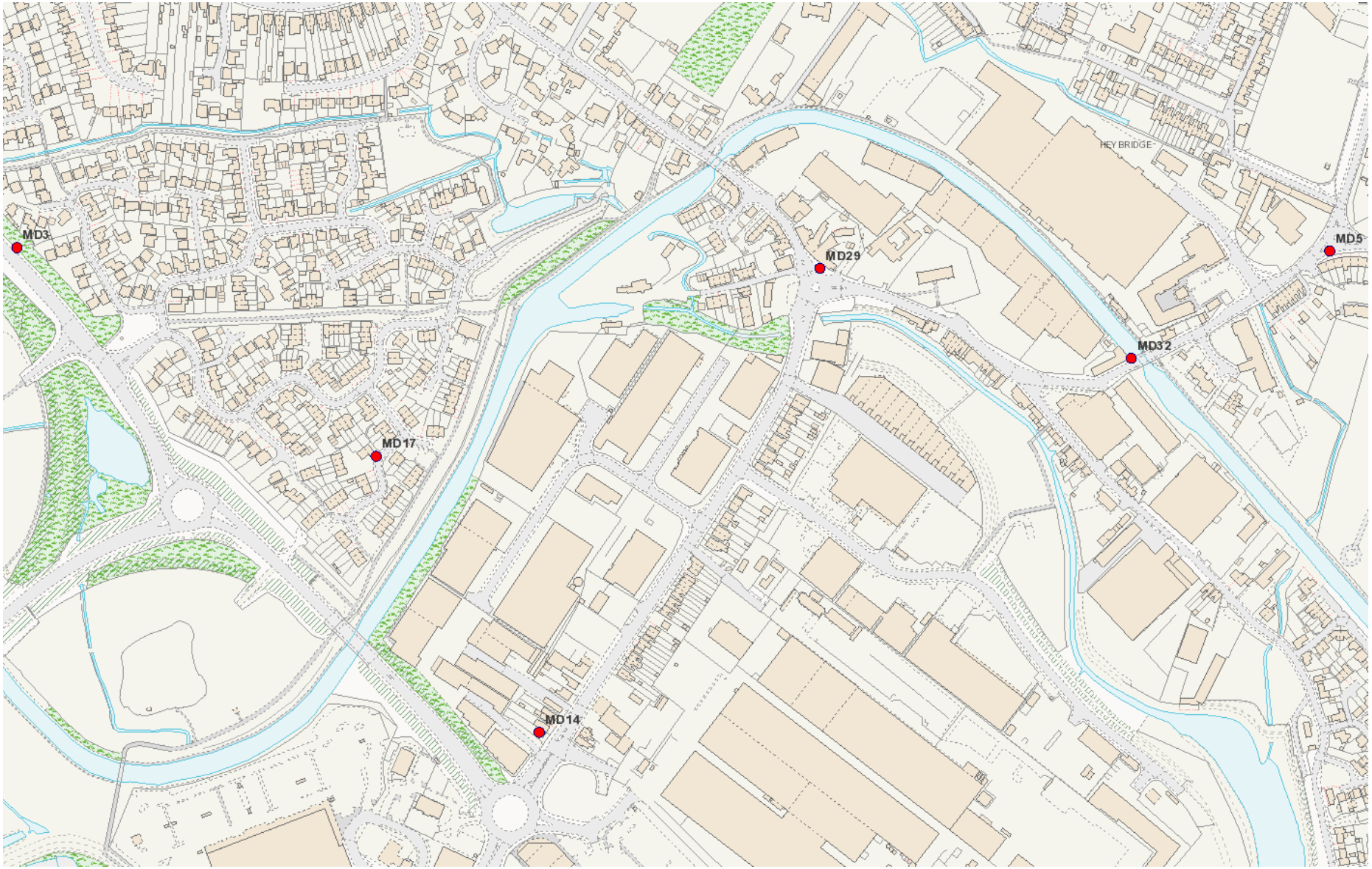


Figure D.5 – Monitoring Location Map: Latchingdon

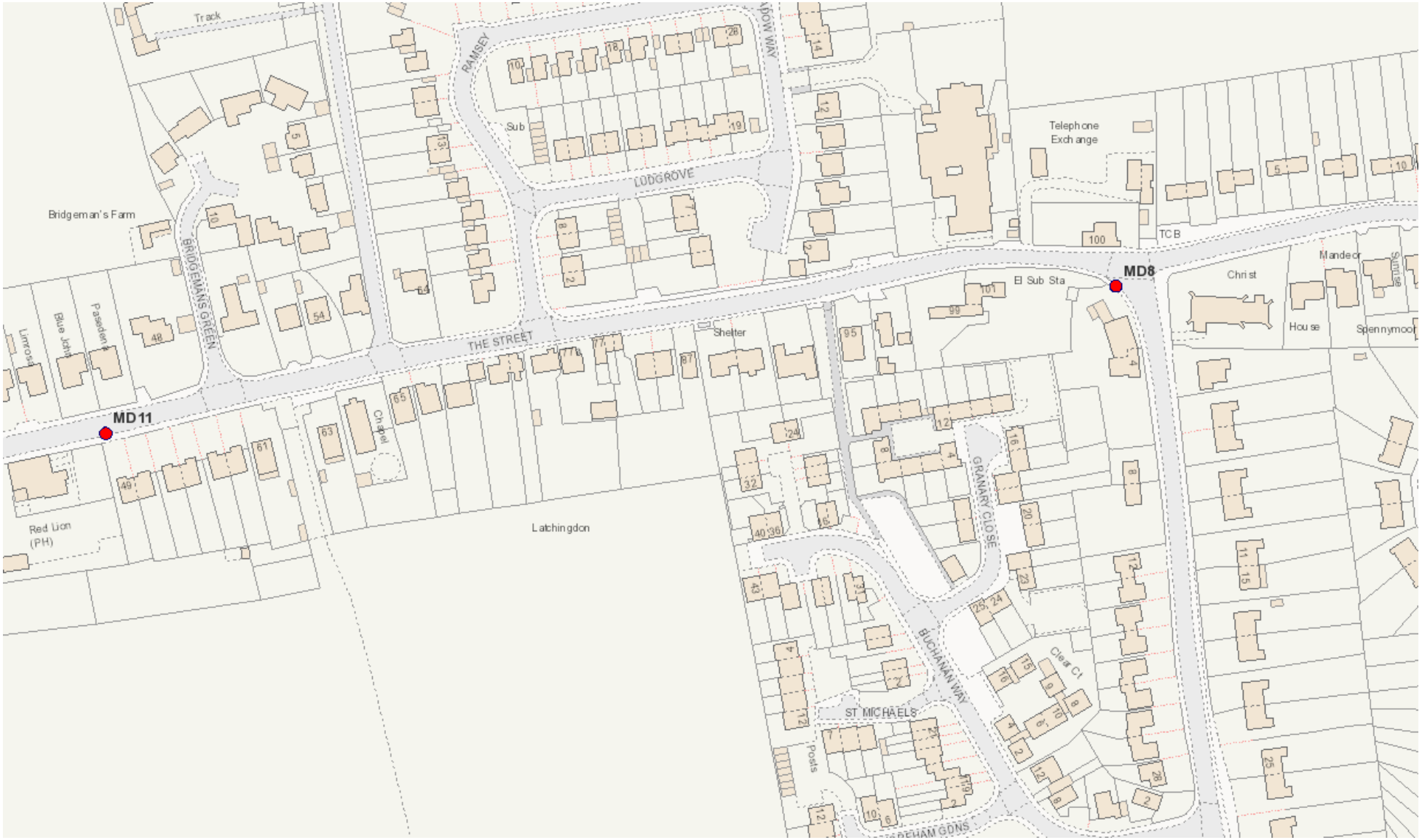
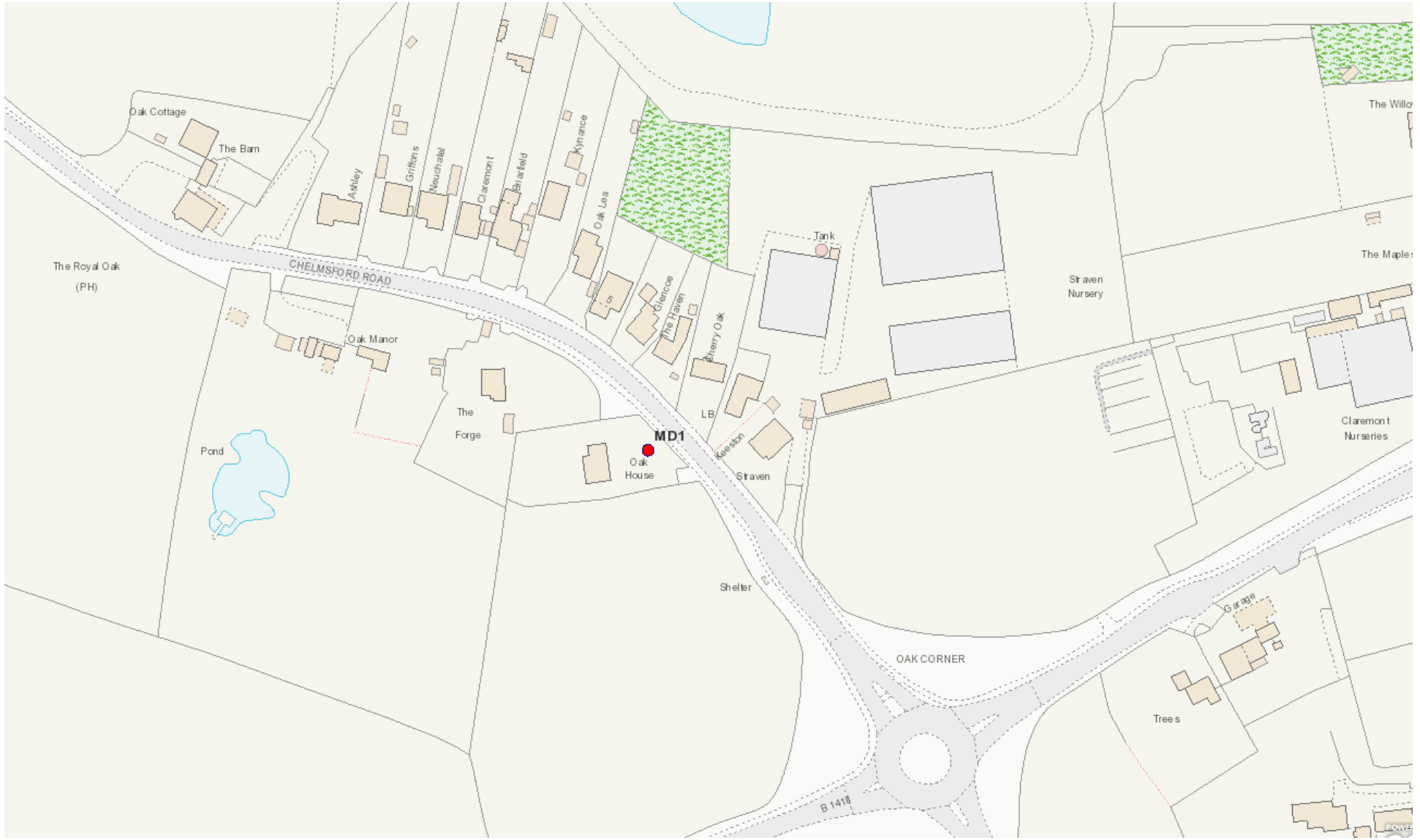


Figure D.6 – Monitoring Location Map: A414 Chelmsford Road



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[5]

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

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

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	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

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 NO_2 PT Scheme available at; https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html
- Essex Air Quality Consortium available at; http://www.essexair.org.uk
- EssexCarShare.com available at; https://liftshare.com/uk/community/essex
- Essex Air Twitter Feed available at; https://twitter.com/essexair
- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland available at; https://laqm.defra.gov.uk/technical-guidance/
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland available at; https://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf
- Maldon District Council Air Quality Action Plan available at; http://www.maldon.gov.uk/download/downloads/id/18206/air_quality_action_plan_2_july_2020.pdf
- Public Health Outcomes Framework Indicator D01 available at; https://fingertips.phe.org.uk/profile/public-health-outcomes-framework