




## 2020 Air Quality Annual Status Report (ASR)

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

Date (June, 2020)

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## 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 Colchester, to fulfil Colchester Borough Council's statutory duty to review and assess air quality within its area, and to determine whether the air quality objectives are likely to be achieved.

In 2019 Colchester Borough Council has measured exceedances of the Air Quality Objectives at relevant exposure.

## Air Quality in Colchester

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<sup>1,2</sup>.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

Colchester is located in North Essex, fifty miles from London and the population is estimated to stand at 190,000. The Borough comprises several suburban areas around these main urban areas and many villages, within a rural setting.

The main source of air pollution in the Borough is road traffic emissions from major roads, notably the A12, A120, A133, A134, A1232, Brook Street and Mersea Road.

As the oldest recorded Roman town in Britain, Colchester has many narrow roads within the town centre and surrounding areas buildings flank to form a canyon like environment. Street canyons act to reduce dispersal of pollutants which can result in poor air quality. Also, significant traffic congestion can occur during peak times within Colchester directly affecting local air quality.

Colchester Borough Council has three Air Quality Management Areas (AQMAs) which are detailed in Table 2.1. These are due to emissions from road traffic causing exceedances of Nitrogen Dioxide concentrations at relevant exposure.

The Air Quality Objectives and examples of where they apply are described in Appendix E.

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<sup>1</sup> Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013

## Actions to Improve Air Quality

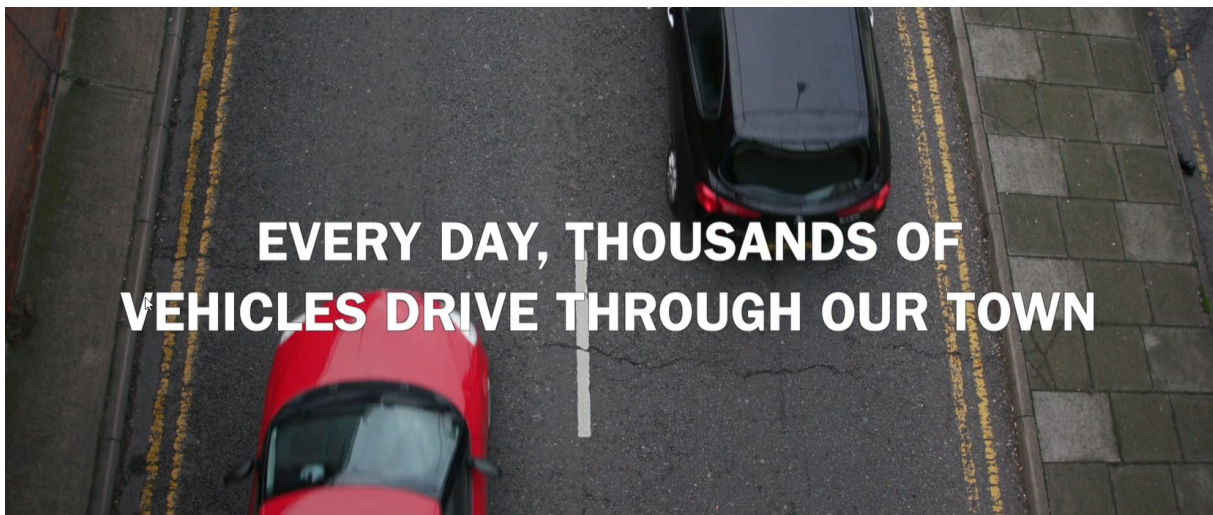
### Behavioural Change Project

To support air quality improvements in the borough, Colchester Borough Council has been awarded funding from Defra to manage a two year project. The project focuses on encouraging walking and cycling for short journeys and getting people to switch off their engines when they are not moving.

We know from work in other parts of the country that small easy changes to driving habits, such as switching the engine off whilst stationary, can cut pollution by up to 30% - think how much cleaner Colchester's air will be with 30% less pollution!

In Colchester, we want to make the air we breathe cleaner - but we can't do it alone.

Help us spread the word - Do you know about pollution and its health effects? Click on the image below to watch this 2 minute film below and you may be surprised!



From lung cancer to dementia pollution can have a huge impact on our health and we can all play a part in improving it. Share the film on social media and tag us with #cleanaircol

In October 2019 we launched the Clean Air for Colchester survey, aimed at getting a better understanding of what people currently know about air quality and the impact it has on their health.

The survey of 1,181 people revealed that:

- 87% of adults are concerned about air quality in general
- 41% of adults think of Colchester as 'highly polluted'
- Only 15% of drivers regularly switch off their engines whilst waiting at traffic lights or level crossings but after taking the survey 84% said they would now consider switching off their engine regularly
- 56% said knowing how long they will wait at traffic lights would encourage them to switch off.
- 45% said road-side reminders would encourage them to regularly switch their engines off

An important part of this two-year project is that it is guided by you, the people of Colchester and that the next steps in the project reflect your level of concern and desire for action as highlighted in the survey.

One of the key findings was that 84% of drivers said they would now consider switching off their engine regularly. Most indicated that they would be more motivated to switch off if they knew how long they would be waiting at traffic lights and level crossings, and if roadside reminders were in place.

In response to these findings the Council put in a bid to Defra for additional funding to explore traffic light timers and signage for the borough. The Council was successful and has been awarded an additional £59,785 grant from Defra as part of the Air Quality Grant Scheme 2019-2020.

The funding will cover work into both signage and a feasibility study of driver facing traffic signal countdown timers. The feasibility study will determine whether it would be possible to have the timers on existing traffic lights and will explore the economic cost and technicalities of installing the timers as an encouragement for drivers to switch off their engines at red lights in Colchester. This study will not result in the installation of countdown timers, but instead it will assess the effectiveness of the use of such technologies.

## School Run Exposure Monitoring

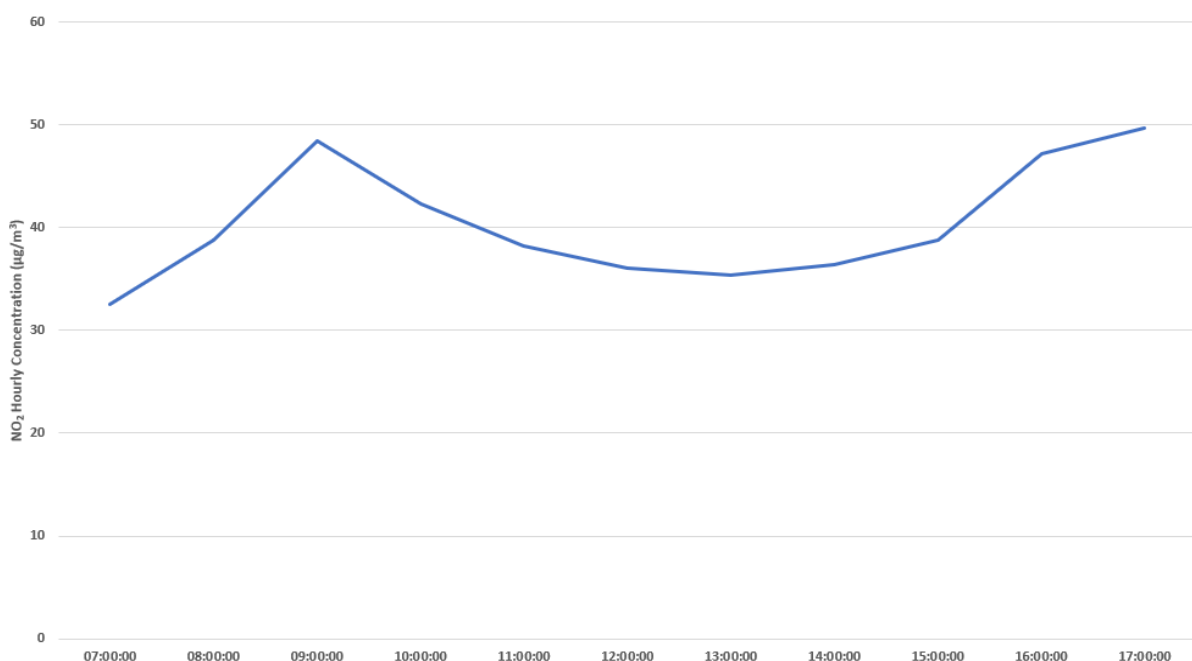
As part of the evidence gathering exercise for the behavioural change project, a short term air quality monitoring study has been undertaken to identify exposure to air pollution at a school very close to an Air Quality Management Area (AQMA). Vehicles often idle outside the school during drop off and pickup times and there are nearby traffic lights which cause queuing traffic to tailback past the school during rush hour periods.

The nearest air quality monitoring location is a diffusion tube site located approximately 75 metres away. However, passive analysers such as diffusion tubes can only measure an average across the sampling period and cannot identify short-term fluctuations in NO<sub>2</sub>.

The monitoring location was sited at the front of the school near to the road and on the school site, classrooms and playgrounds are generally further away from the road and generated pollution than the monitoring location.

This monitoring has identified elevated concentrations of nitrogen dioxide (NO<sub>2</sub>) particularly in the morning when children are coming into school and the afternoon when children are leaving the school. This means that children's exposure to poor air quality may be mainly on the school run.

**Figure i.1 – Chart Showing Average Measured NO<sub>2</sub> Concentrations During A School Day in December**

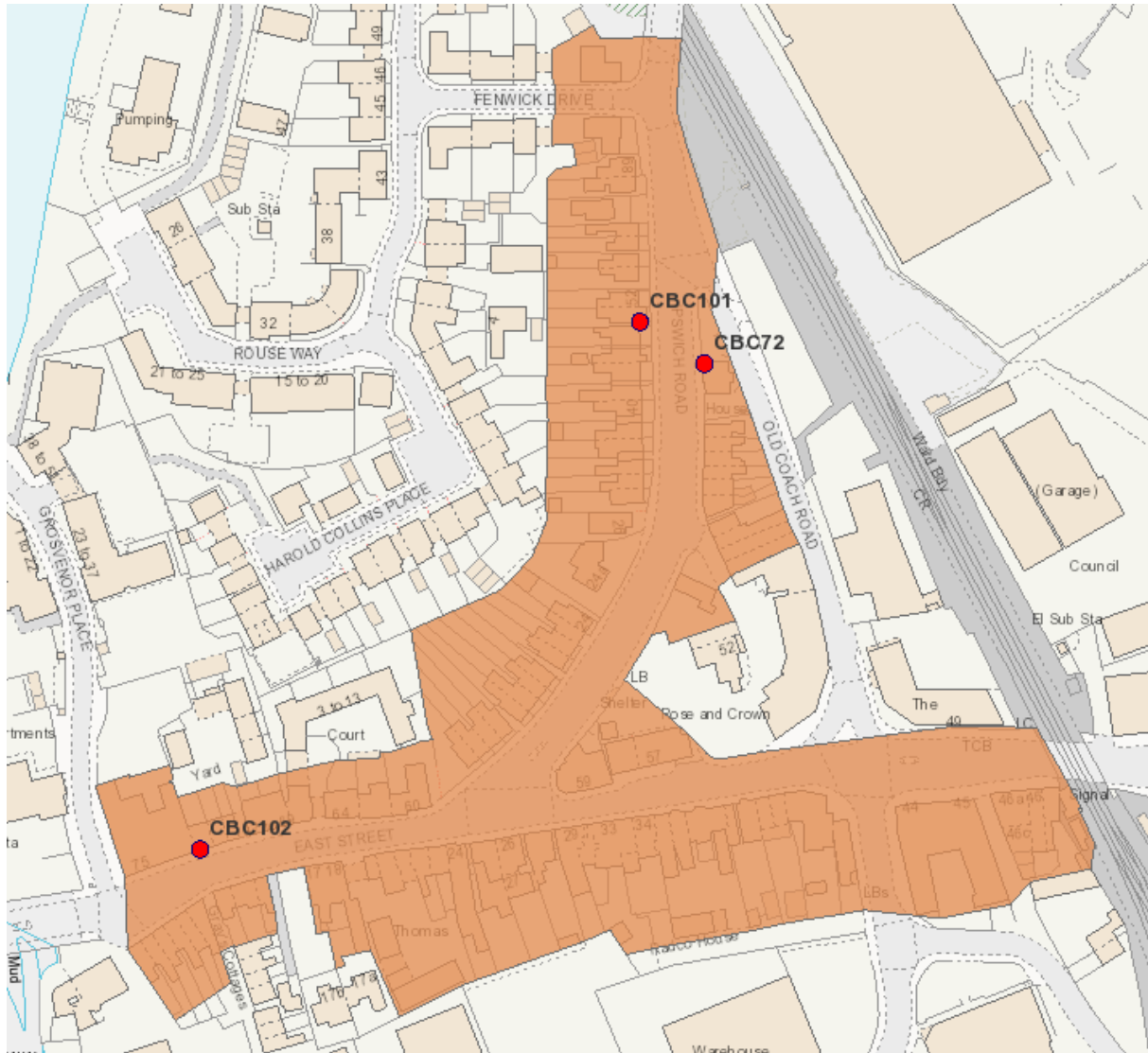


This monitoring was undertaken in wintertime when NO<sub>2</sub> is generally measured at higher concentrations and an exceedance of the annual mean Air Quality Objectives is not expected. However, children's exposure to air pollution during the school run is concerning and the effect of the idling vehicles and nearby traffic lights shall be considered in the context of other policy work.

## AQMA 2 Diffusion Tube Monitoring

AQMA 2 is a small area with three diffusion tube monitoring sites located within it.

**Figure i.2 – AQMA 2 Diffusion Tube Monitoring Locations**



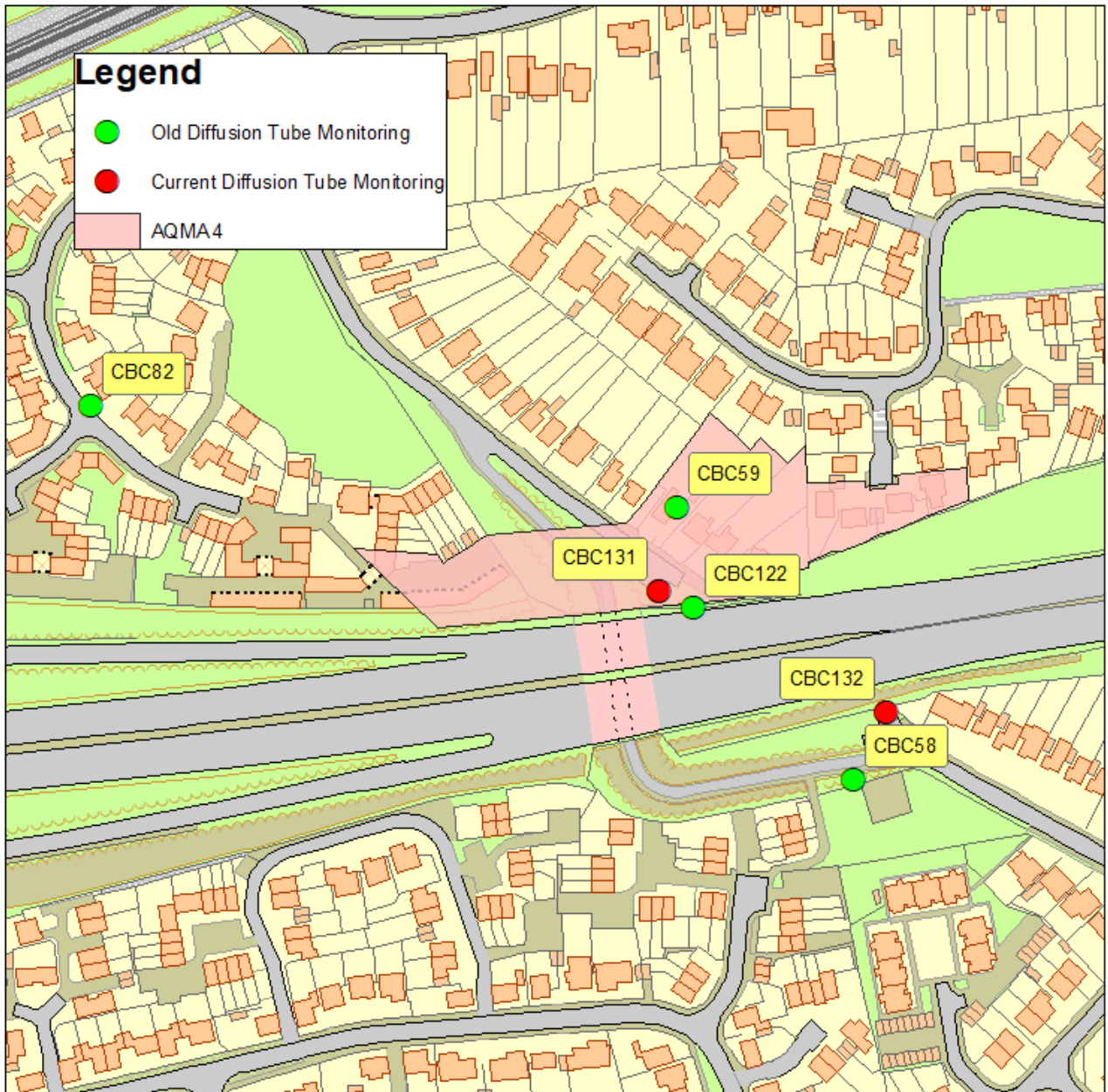
In 2019 the highest concentration at relevant exposure in AQMA 2 was  $40.8\mu\text{g}/\text{m}^3$ . Major highway improvement works are taking place at the Ipswich Road and St Andrew's Avenue roundabout to the immediate north of the AQMA. In summer 2020 these works are due to be completed and will result in improved traffic flow exiting the AQMA from Ipswich Road. It is expected that in the first full year of operation, compliance of the Air Quality Objectives will be achieved.

Colchester Borough Council proposes that when the diffusion tube monitoring at site ID CBC102 maintains an annual mean level below the air quality objectives for 3 years, revocation of AQMA 4 can be considered.

### AQMA4 A12 and Lucy Lane Dispersion Modelling

Diffusion tube monitoring in AQMA 4 has historically consisted of diffusion tubes located either close to the A12 trunk road or significantly set back to determine a generalised pollution profile for the local area.

Figure i.3 – Historic and Current Monitoring Locations for AQMA 4





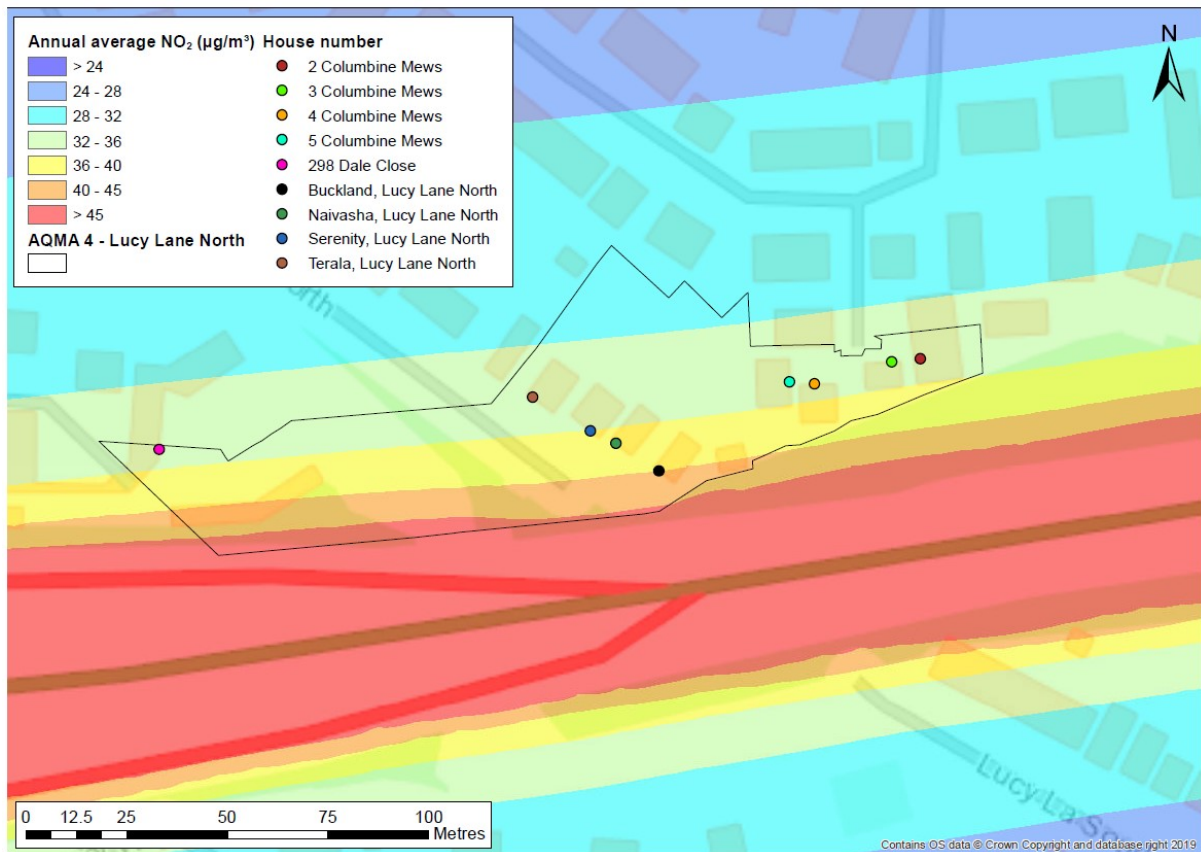
No monitored data has been recorded for worst case exposure. Using the NO<sub>2</sub> fall off calculator, concentrations were estimated to exceed the Air Quality Objectives.

Table i.1 - AQMA 4 Diffusion Tube Monitoring Results

Site ID	Monitored Nitrogen Dioxide Concentration (µg/m <sup>3</sup> )				
	2015	2016	2017	2018	2019
CBC58 (Discontinued for 2019)	28.6	32.2	27.3	29.9	Discontinued
CBC59 (Discontinued for 2019)	29.7	33.0	32.9	32.3	Discontinued
CBC82 (Discontinued for 2019)	24.6	27.1	26.4	25.6	Discontinued
CBC122 (Discontinued for 2019)	Not Monitored	<b><u>64.6</u></b> (50.32 estimated at the receptor)	<b><u>59.5</u></b> (46.08 estimated at the receptor)	<b><u>64.6</u></b> (46.58 estimated at the receptor)	Discontinued
CBC131	Not Monitored	Not Monitored	Not Monitored	Not Monitored	39.82
CBC132	Not Monitored	Not Monitored	Not Monitored	Not Monitored	32.48

To complement the new monitoring, Colchester Borough Council commissioned dispersion modelling of AQMA 4.

**Figure i.4 – Modelled Annual Average Concentrations ( $\mu\text{g}/\text{m}^3$ ) within the vicinity of AQMA 4, Colchester**



The modelled concentrations show exceedances of the  $40 \mu\text{g}/\text{m}^3$  annual average NO<sub>2</sub> concentrations standard within the AQMA but concentrations reach the standard at the closest receptor. This validates the results from the diffusion tube monitoring.

It is proposed that when the diffusion tube monitoring at site ID CBC131 maintains an annual level below the air quality objectives for 3 years, revocation of AQMA 4 can be considered.

### A120 Diffusion Tube Monitoring

Following receipt of air quality monitoring study documents in support of a proposed A120 development scheme, Colchester Borough Council commenced diffusion tube monitoring along the A120 in Marks Tey at three locations.

This study commenced in June 2019 and results are shown in Table i.2.

**Table i.2 – A120 Marks Tey 2019 Monitoring Results**

Site ID	Raw Mean	Annualisation Ratio	Monitored Nitrogen Dioxide Concentration ( $\mu\text{g}/\text{m}^3$ )		
			Bias Adjustment	Adjusted Annual Mean	Distance Corrected to Nearest Exposure
CBC135	36.5	1.1187	0.75	30.6	30.6
CBC136	45.1	1.1187	0.75	37.9	34.1
CBC136	53.1	1.1187	0.75	44.6	44.6

It should be noted that the selected diffusion tube supplier and preparation for these locations were different from monitoring in the rest of the Colchester to align with the monitoring strategy of the neighbouring district of Braintree.

Due to this study not being across the entire calendar year, a seasonal adjustment is needed to simulate an entire year's monitoring. The annualisation process is an estimation based on air quality monitoring from different areas.

The annualised monitoring results indicate a potential exceedance at CBC136. However, the exceedance was based on just one diffusion tube which for its seven months of monitoring both across summer and winter months, the bias adjusted result would be  $39.86\mu\text{g}/\text{m}^3$  just below the Air Quality Objectives.

For this reason, Colchester Borough Council does not propose to declare an AQMA at this time but will continue to monitor these locations for all of 2020.

## Conclusions and Priorities

When developing this Annual Status Report, Colchester Borough Council has identified the following conclusions:

- Air quality is slowly improving at the worst case monitoring locations such as within Brook Street and Mersea Road areas of AQMA1.
- Some monitoring locations within the Town Centre area do not appear to be improving in the same manner.
- Diffusion tube monitoring has identified elevated concentrations along the A120.

Since the Healthier Air for Colchester 2016-2021 Air Quality Action Plan was adopted, new developments have been constructed, highway improvements taken place and traffic patterns have changed. In order to adapt to local circumstances and to continually improve air quality, the air quality action plan will require review.

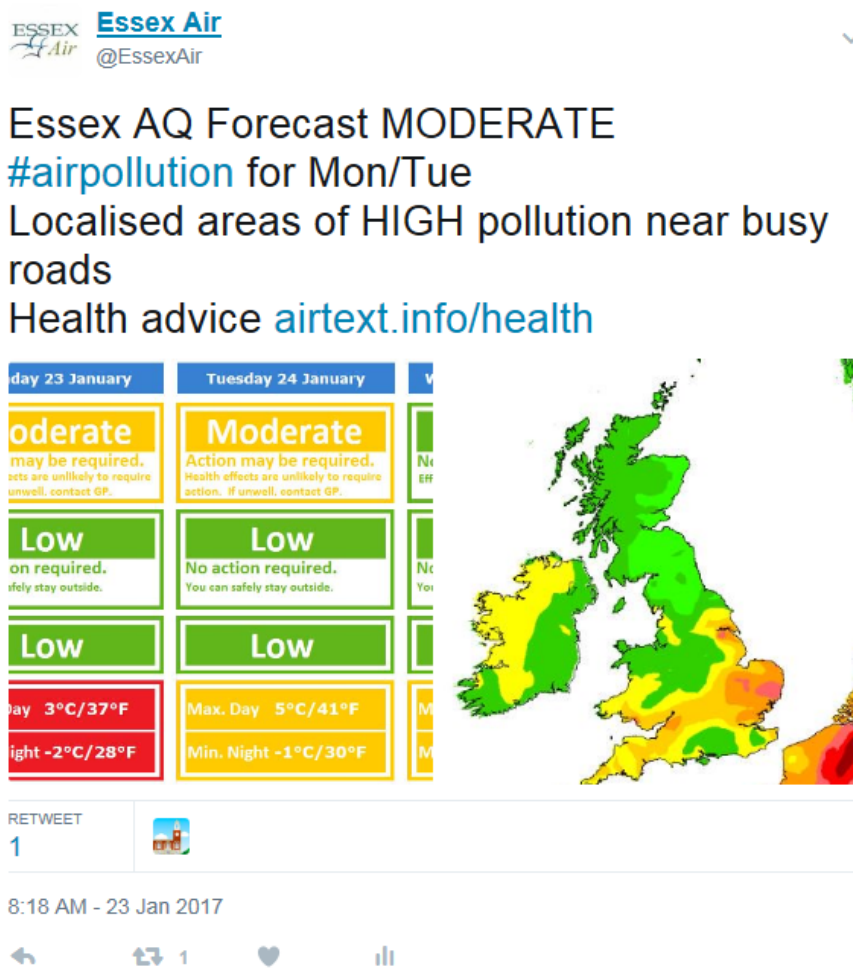
Colchester Borough Councils air quality priorities for the coming year are as follows:

- Review the status of the current Air Quality Action Plan, undertake revision where necessary or if appropriate, begin development of a new action plan.
- Undertake further monitoring on the A120 to determine whether an AQMA should be declared.
- Continue monitoring in AQMA2 to allow for a review to determine whether revocation of the AQMA is possible.
- Continue monitoring in AQMA4 to allow for a review to determine whether revocation of the AQMA is possible.

## Local Engagement and How to get Involved

Colchester Borough Council is a member of the Essex Air Quality consortium. The purpose of the Essex Air is to promote improvements in air quality related issues. The Essex Air [web site](#) provides a daily forecast of air pollution based on [UK-AIR](#) data. In addition, the [@airTEXT\\_COLC](#) twitter feed and the [@EssexAir](#) twitter feed provides localised weekly air pollution forecasts.

Figure i.5 - 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.

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# 1 Local Air Quality Management

This report provides an overview of air quality in Colchester 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 Colchester Borough 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 (AQMAs) 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 AQMAs declared by Colchester Borough Council 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=64](https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=64)

Alternatively, see Appendix D: Maps of Monitoring Locations and 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
Area 1 - Central Corridors	Declared May 2001, Amended February 2013	NO2 Annual Mean	Colchester	High Street, Head Street, North Hill, Queen Street, St Botolph's Street, St Botolph's Circus, Osborne Street, Magdalen Street, Military Road, Mersea Road, Brook Street, East Street and St Johns Street	NO	65.9	µg/m <sup>3</sup>	53.3	µg/m <sup>3</sup>	Healthier Air For Colchester - Air Quality Action Plan 2016-2021	April 2016	<a href="http://www.essxair.org.uk/Reports/Colchester_AQ_Action_Plan.pdf">http://www.essxair.org.uk/Reports/Colchester_AQ_Action_Plan.pdf</a>
Area 2 - East Street and the adjoining lower end of Ipswich Road	Declared January 2012, Amended February 2013	NO2 Annual Mean	Colchester	East Street and Ipswich Road	NO	45.2	µg/m <sup>3</sup>	40.8	µg/m <sup>3</sup>			
Area 4 - Lucy Lane North, Stanway	Declared January 2012, Amended February 2013	NO2 Annual Mean	Stanway	Lucy Lane North, Stanway	YES	55.3	µg/m <sup>3</sup>	39.8	µg/m <sup>3</sup>			

Colchester Borough Council confirm 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 Colchester

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	Consideration of a Clean Air Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2016	Colchester Borough Council	Colchester Borough Council	Implementation	Not quantified	Dispersion Modelling Complete	2019	
2	Consider Air Quality during updates to strategic transport documents, such as the Essex LTP	Policy Guidance and Development Control	Other policy	2016	Essex County Council	Essex County Council	Inclusion of Air Quality related policy	Not quantified		Ongoing	
3	Consider Air Quality as part of Local Highways Panel schemes.	Policy Guidance and Development Control	Other policy	2016	Essex County Council	Essex County Council	The effect of Air Quality being considered within traffic schemes	Reduced vehicle emissions / exposure	Some traffic schemes have been developed with air quality being quantified from the outset.	Ongoing	
4	Identify traffic 'bottlenecks'	Traffic Management	Other	2016	Colchester Borough Council	Colchester Borough Council	Reduced vehicle emissions	Not quantified	No progress to date		
5	Traffic Flow and Congestion management and monitoring through highways infrastructure improvements and the use of active technology, both autonomously and through the Essex Traffic Control Centre	Traffic Management	UTC, Congestion management, traffic reduction	2016	Essex County Council	Essex County Council	Reduced vehicle emissions as a consequence of improved traffic flow	Not quantified	No progress to date		
6	Traffic Flow and Parking Surveys	Traffic Management	UTC, Congestion management, traffic reduction	2016	Colchester Borough Council / Essex County Council	Colchester Borough Council / Essex County Council	Reduced vehicle emissions as a consequence of improved traffic flow	Not quantified	No progress to date		

Colchester Borough Council

7	Health Impact Assessment	Policy Guidance and Development Control	Other policy	2016	Colchester Borough Council / Essex County Council	Colchester Borough Council / Essex County Council	N/A	N/A	Data collection / Research		Difficulties developing a suitable methodology
8	Joint Strategic Needs Assessment	Policy Guidance and Development Control	Other policy	2016	Essex County Council	Essex County Council		N/A	No progress to date		Reliance upon another authority
9	Policy influence	Policy Guidance and Development Control	Other policy	2016	Colchester Borough Council	Colchester Borough Council		N/A	Successful inclusion of air quality policy within the Local Plan		
10	Provision of an air quality forecasting service and alert system to provide information to residents, healthcare providers and local business.	Public Information	Via the Internet	2016	Colchester Borough Council	Colchester Borough Council	Number of subscribers	N/A	Complete	2016	
11	Knowledge sharing	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2016	Colchester Borough Council	Colchester Borough Council	N/A	N/A	In progress	See comments	Ongoing process
12	Implementation of Low Emission Strategy	Policy Guidance and Development Control	Low Emissions Strategy	2016	Colchester Borough Council	Colchester Borough Council	Reduced emissions	Not quantified	A number of measures that the LES identified are in progress.	2021	Officer Time/Resources
13	Implementation of Air Quality & Emissions Technical Planning Guidance	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2016	Colchester Borough Council	Colchester Borough Council	N/A	Not Quantified	See comments	See Comments	Guidance written but not yet adopted. Planning policy & Local Plan will take up principles of assessment and mitigation
14	Ensure the integration of Air Quality as a core component of the new Local Plan 2017-2032	Policy Guidance and Development Control	Other policy	2016	Colchester Borough Council	Colchester Borough Council	Inclusion of Air Quality related policy	Not Quantified	A number of key AQ policies have been included within the emerging Local Plan	Complete	

15	Inclusion of a sustainable award criteria into the procurement strategy relating to the tender evaluation of goods and services	Policy Guidance and Development Control	Sustainable Procurement Guidance	2016	Colchester Borough Council	Colchester Borough Council	Number of contracts awarded based on sustainability evaluation	Not Quantified	Complete	Complete	
16	Public Service Vehicle Procurement	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2016	Colchester Borough Council	Colchester Borough Council	Number of LEV Vehicles	Not Quantified	See Comments	See Comments	The Council is currently in a lease contract for its vehicles but is actively investigating the purchase of LEV vehicles in future contracts
17	Examine whether the licensing standard can be based on vehicle age or emissions (linked to Euro Standards)	Promoting Low Emission Transport	Taxi Licensing conditions	2016	Colchester Borough Council	Colchester Borough Council	Reduced emissions	Not quantified	Policy has been through consultation but not yet approved	Complete	
18	Require taxis to turn off engines when idling in the AQMAs	Promoting Low Emission Transport	Taxi Licensing conditions	2016	Colchester Borough Council	Colchester Borough Council	Reduced emissions within AQMAs	Not quantified	Complete	Complete	
19	Explore whether the creation of exclusive LEV/ULEV 'green' taxi bays would be feasible	Promoting Low Emission Transport	Taxi emission incentives	2016	Colchester Borough Council	Colchester Borough Council	Reduced emissions within AQMAs	Not quantified	No progress to date		
20	Explore whether the creation of rapid charging facilities for ULEV taxis	Promoting Low Emission Transport	Taxi emission incentives	2016	Colchester Borough Council	Colchester Borough Council	Reduced emissions within AQMAs	Not quantified	No progress to date		
21	Encourage Park & Ride use	Alternatives to private vehicle use	Bus based Park & Ride	2016	Colchester Borough Council / Essex County Council	Colchester Borough Council / Essex County Council	Number of Users	Not quantified	Complete	Ongoing Process	
22	Investment in walking and cycling infrastructure	Transport Planning and Infrastructure	Cycle network	2016	Colchester Borough Council / Essex County Council	Colchester Borough Council / Essex	Reduced Car Use	Not quantified	See Comments	See Comments	Ongoing Process

						County Council					
23	Encourage walking and cycling over car use	Promoting Travel Alternatives	Promotion of walking	2016	Colchester Borough Council	Colchester Borough Council	Reduced Car Use	Not quantified	See Comments	See Comments	Ongoing Process
24	Promotion of Park & Walk scheme to encourage the uptake of small satellite car parks	Promoting Travel Alternatives	Promotion of walking	2016	Colchester Borough Council	Colchester Borough Council	Reduced Car Use	Not quantified	No progress to date		
25	Attract New Companies to the Colchester Club Travel Plan scheme / Love Ur Car Colchester	Alternatives to private vehicle use	Car Clubs	2016	Colchester Borough Council	Colchester Borough Council	Reduced Car Use	Not quantified	New Paying members: St Helena Hospice, Colchester Arts Centre and Lookers. New Associate members: Birkett Long, Firstsite, Fenwick, Lion Walk, Culver Square, Provide, Ace. Regular promotion via social media.	See Comments	Ongoing Process
26	Reduction of Town Centre Off Street Parking Spaces	Alternatives to private vehicle use	Other	2016	Colchester Borough Council	Colchester Borough Council	Reduced emissions for passenger cars	Not quantified	Removal of one town centre car park & reduction in space of another	See Comments	Ongoing Process
27	Further promotion of the Essex Car Share scheme	Alternatives to private vehicle use	Car Clubs	2016	Essex County Council	Essex County Council	Reduced Car Use	Not quantified	Ongoing Process	See Comments	Ongoing Process
28	Promotion of reduced pollution walking routes	Promoting Travel Alternatives	Personalised Travel Planning	2016	Colchester Borough Council	Colchester Borough Council	Improved Public Health	Not quantified	Evaluation of options	No date set	Funding
29	Provide Exposure Reduction Tips	Public Information	Other	2016	Colchester Borough Council	Colchester Borough Council	Reduced exposure to air pollution	Not quantified	Complete	2017	Information leaflet drafted

30	Work with local bus operators to upgrade the bus operating fleet	Vehicle Fleet Efficiency	Other	2016	Colchester Borough Council	Colchester Borough Council	Improved monitored air quality	Up to 5ug/m3 at worst case locations	Discussions with operators	No date set	Mandated Clean Air Zones may cause bus migration elsewhere / Lack of Grant funding opportunities
31	Work with local bus operators to retrofit old buses	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2016	Colchester Borough Council	Colchester Borough Council	Improved monitored air quality	Up to 5ug/m3 at worst case locations	Joint CBTF Bid in 2017 for upgrading 18 buses (including 6 P&R buses) with ECC was successful. Funding for a further 12 buses will be achieved in 2018. Retrofit work complete	Complete but new funding opportunities would be applied for	
32	Promotion of PLUSBUS	Promoting Travel Alternatives	Other	2016	Colchester Borough Council	Colchester Borough Council	Reduced car use	Not quantified	Regular social media communication	See comments	Ongoing Process
33	Consider the use of electric buses for the Colchester Park & Ride	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2016	Essex County Council	Essex County Council	N/A	Not quantified	Grant funding application submitted but unsuccessful	N/A	Essex County Council were unsuccessful in an application for funding to trial Electric Buses for Park & Ride
34	Encourage the reporting of excessively smoky vehicles to the Driver and Vehicle Standards Agency (DVSA).	Vehicle Fleet Efficiency	Other	2016	Colchester Borough Council	Colchester Borough Council	N/A	Not quantified	Regular social media communication to encourage the reporting of smoky vehicles	See Comments	Ongoing process
35	Examine local HGV Routing Strategies	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	2016	Colchester Borough Council	Colchester Borough Council		Not quantified			Officer Time / Resources / Funding
36	Fleet Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2016	Colchester Borough Council	Colchester Borough Council		Not quantified			Officer Time / Resources / Funding

37	Electric Vehicle Charging Infrastructure	Promoting Low Emission Transport	Other	2016	Colchester Borough Council	Colchester Borough Council	Number of charging units installed	Not quantified	Proposed developments are having planning conditions requiring electric vehicle charging points. The Council is to look at installing electric vehicle charging points in Council car parks.	Ongoing Process	Policy DM22 in the preferred options of emerging Local Plan 2017-2033 identifies that facilities for electric vehicle charging and other ultra-low emission vehicles should be required where appropriate, including parking courts and at non-residential locations
38	Air Quality Mitigation through Planning Developments	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2016	Colchester Borough Council	Colchester Borough Council	N/A	Not quantified	See comments	See comments	Guidance written but not yet adopted. Mitigation will be required as part of planning policy
39	Encourage emission neutral developments	Policy Guidance and Development Control	Other policy	2016	Colchester Borough Council	Colchester Borough Council	N/A	N/A	N/A	N/A	Growth and development of Garden Cities are a long term plan
40	Prevent new developments from creating street canyons	Other	Other	2016	Colchester Borough Council		N/A	Reduced exposure to air pollution / development not affecting dispersion of pollution	To date, one development within an AQMA has been required to be set back from the road. The developer undertook a redesign of the development to accommodate this requirement.	Ongoing Process	
41	Campaign to Central Government for the creation of a low emission, diesel free economy	Other	Other	2016	Colchester Borough Council		N/A	Not quantified	Response made to National Air Quality Plan Consultation & Clean Air Strategy Consultation	Ongoing Process	
42	Require Best Practice Guidance to be followed for demolition / construction sites	Policy Guidance and Development Control	Other policy	2016	Colchester Borough Council		N/A	Not quantified			

43	No Idling Policy	Traffic Management	Anti-idling enforcement	2018	Colchester Borough Council & Colchester Borough Homes	Colchester Borough Council & Colchester Borough Homes	N/A	0.1ug/m3	Policy Implemented	Complete	Drivers of CBC and CBH vehicles (except for recycling and rubbish collection vehicles when collecting refuse and street cleaning vehicles) and all staff using their own vehicles for business travel, will be required to adopt the 'No Idling' policy and switch off their vehicle engines when stationary. This also applies to vehicles on Council office premises. Also a no idling requirement for AQMAs has been introduced into the Taxi Licensing policy.
44	Behavioural Change Project	Promoting Travel Alternatives	Other	2019	Colchester Borough Council	Defra Grant	N/A	Not quantified	Publicity video commissioned. School exposure monitoring completed	2021	
45	St Botolphs Circus Roundabout	Transport Planning and Infrastructure	Other	2019	Essex County Council	Essex County Council	Reduced Congestion	Not quantified	Consultation Complete	Autumn 2021	

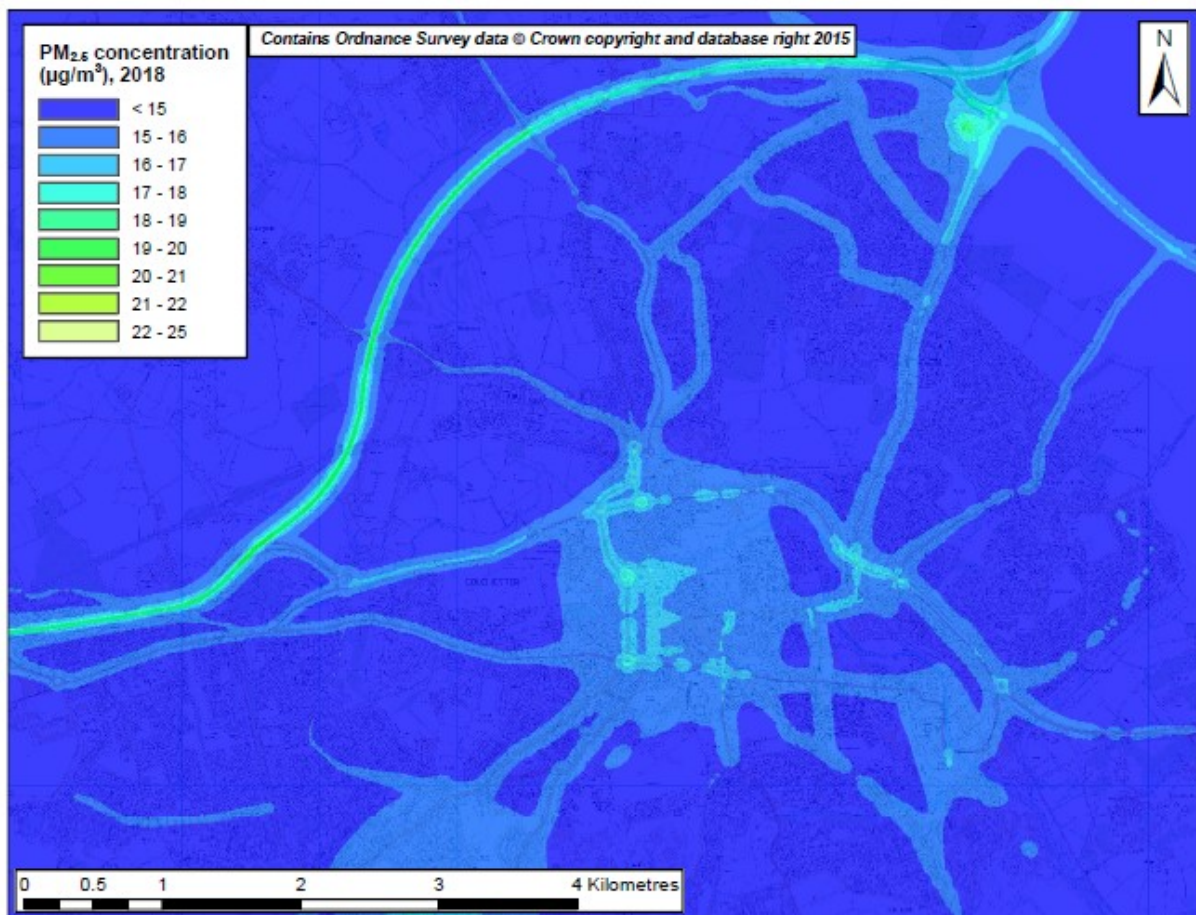


## 2.3 PM<sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations

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

Colchester Borough Council does not monitor PM<sub>2.5</sub> however a baseline emissions modelling study identified that the average across the urban area was between 16-18µg/m<sup>3</sup> and that Colchester does not breach the National Air Quality Objectives for PM<sub>2.5</sub>

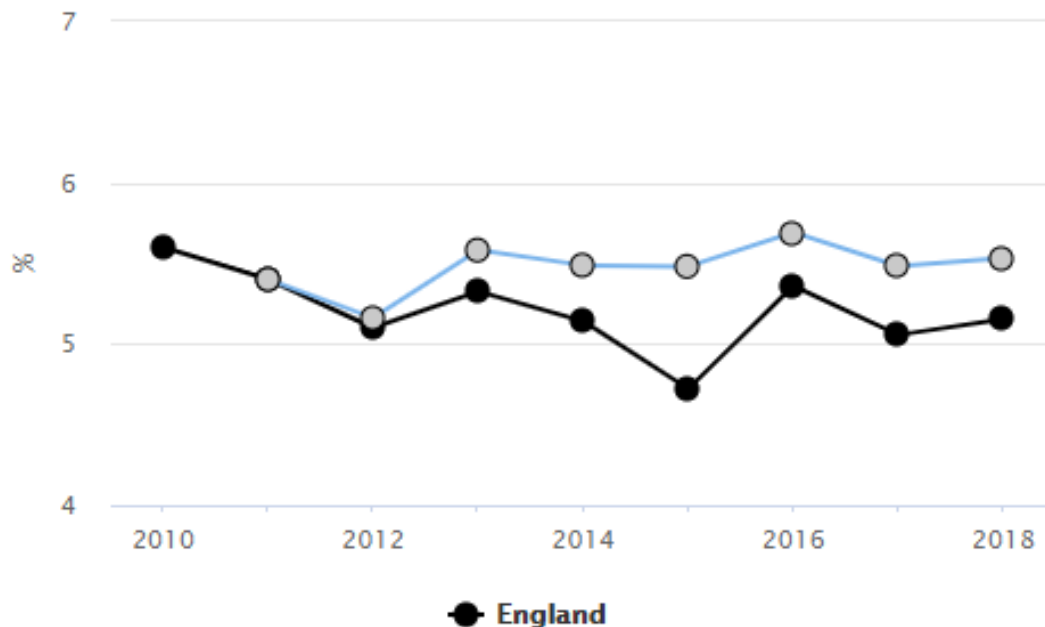
**Figure 2.1 – Predicted Annual Average PM<sub>2.5</sub> Concentrations (2018) in Colchester**



## Colchester Borough Council

The Council notes the Public Health Outcomes Framework indicator D01 – Fraction of mortality attributable to particulate (PM<sub>2.5</sub>) air pollution which for 2018 gave a value of 5.5%. This value is broadly similar to other authorities within the region.

**Figure 2.2 - Public Health Framework Indicator D01 Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution**



Colchester Borough Council is taking the following measures to address PM<sub>2.5</sub>:

- Regular inspections of industrial processes permitted by Colchester Borough Council where combustion and non-combustion processes could lead to anthropogenic emissions of PM<sub>2.5</sub>
- Air Quality Action Plan measures are primarily aimed at reducing the exposure of residents within the AQMA to NO<sub>2</sub>. However the measures and initiatives are likely to have a positive effect on the reduction of Particulate Matter PM<sub>2.5</sub>

## 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

Colchester Borough Council undertook automatic (continuous) monitoring at 1 site during 2019.

Table A.1 in Appendix A provides detail of the site.

Details on Quality Assurance/Quality Control (QA/QC) for the automatic monitor is included in Appendix C.

A map showing the location of the monitoring site is provided in Appendix D.

#### 3.1.2 Non-Automatic Monitoring Sites

Colchester Borough Council undertook non-automatic (passive) monitoring of NO<sub>2</sub> using 74 diffusion tubes at 64 sites during 2019. Table A.2 in Appendix A provides detail of the 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 bias<sup>4</sup>, “annualisation” (where the data capture falls below 75%), and distance correction<sup>5</sup>. Further details on adjustments are provided in Appendix C.

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

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

### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>. Note that the concentration data presented in Table A.3 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 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, only where relevant.

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

Figure A.1 in Appendix A details historical monitoring from the Mersea Road area of AQMA 1 against the NO<sub>2</sub> annual mean air quality objective. Air quality can generally be seen to be improving.

Figure A.2 in Appendix A details historical monitoring from the Brook Street area of AQMA 1 against the NO<sub>2</sub> annual mean air quality objective. Air quality can generally be seen to be improving.

Figure A.3 in Appendix A details historical monitoring from the High Street area of AQMA 1 against the NO<sub>2</sub> annual mean air quality objective. The results are mixed with measured pollution increasing at some locations and decreasing at others.

Figure A.4 in Appendix A details historical monitoring from the area of AQMA 2 against the NO<sub>2</sub> annual mean air quality objective. In 2019, NO<sub>2</sub> concentrations have improved but it is not possible to determine if this is a trend or variation due to meteorology.

Due to monitoring locations in AQMA4 having been relocated, it is not possible to detail historic monitoring data in this way.

Colchester Borough Council has not measured any annual mean concentrations greater than 60µg/m<sup>3</sup>, which could have indicated an exceedance of the 1-hour mean objective.

## Appendix A: Monitoring Results

### Table A.1 - Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
CBC Auto1	Brook Street	Roadside	600571	225141	NO2	Yes	Chemiluminescent	0	3	1.5

**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 – 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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
CBC2	Fairfax Road, 21	Urban	599981	224633	NO2	NO	2	1.1	NO	2.5
CBC3A/B/C	Mersea Road, 21	Roadside	599914	224643	NO2	YES	0.5	1.9	NO	2.5
CBC8	Shrub End Road, 105/107	Roadside	597640	223661	NO2	NO	17	1.2	NO	2.5
CBC20	Papillon Road	Urban Background	599063	225097	NO2	NO	4	1.2	NO	2.5
CBC21	Head Street	Roadside	599413	225056	NO2	YES	2	0.6	NO	2.5
CBC22	Trinity Street- Christian Science Society	Urban centre	599612	225072	NO2	NO	4	1.2	NO	2.5
CBC43	Magdalen Street	Roadside	600356	224763	NO2	YES	9	0.4	NO	2.5
CBC45A/B/C	Brook Street, 28/30	Roadside	600560	225181	NO2	YES	0	1	NO	2.5
CBC48	33 St Botolphs Street	Roadside	599908	224942	NO2	YES	0	1.5	NO	2.5
CBC49	High Street - Brighthouse	Kerbside	599720	225217	NO2	YES	0	0.5	NO	2.5
CBC54	Mersea Road, 10	Roadside	599922	224728	NO2	YES	1.6	1.8	NO	2.5
CBC62/A/B	Mersea Road, 9	Roadside	599923	224738	NO2	YES	0	2.9	NO	2.5
CBC63	Mersea Road, 12	Roadside	599921	224711	NO2	YES	0	1.8	NO	2.5
CBC65	Maldon Road, 99	Roadside	598797	224489	NO2	NO	8	0.4	NO	2.5
CBC66	Brook Street RAB	Roadside	600622	224881	NO2	YES	16	1.2	NO	2.5
CBC68	Brook Street 56	Roadside	600589	225113	NO2	YES	0	10.4	NO	2.5
CBC69/A/B	Brook Street 23	Roadside	600545	225205	NO2	YES	0	1.1	NO	2.5
CBC71	Osborne Street, 6	Roadside	599818	224924	NO2	YES	0	2.1	NO	2.5
CBC72	Ipswich Road. Old Coach House.	Roadside	600885	225441	NO2	YES	9	1.9	NO	2.5
CBC76	Harwich Road, 53	Roadside	601162	225471	NO2	NO	2	2	NO	2.5
CBC86	Hawthorn Av Gardenia Walk	Urban Background	602280	225391	NO2	NO	0	50	NO	2.5
CBC88/A/B	Brook Street 48 (Auto Monitor)	Roadside	600571	225151	NO2	YES	0	2.6	YES	1.5
CBC90	London Rd 170 Marks Tey	Roadside	591312	223431	NO2	NO	12	2	NO	2.5
CBC91	Blackberry Rd 2	Façade	595239	223936	NO2	NO	3	2	NO	2.5
CBC93	Butt Road 129	Roadside	599031	224427	NO2	NO	5	1.5	NO	2.5
CBC94	Elmstead Rd 6	Roadside	601925	224652	NO2	NO	11	2.5	NO	2.5
CBC96	Mill Rd 239	Roadside	599909	228288	NO2	NO	7	1.2	NO	2.5
CBC97	Mill Rd 87	Roadside	599452	227884	NO2	NO	6	1.2	NO	2.5
CBC98	Cowdray Av 154	Roadside	600086	226157	NO2	NO	4	1	NO	2.5
CBC99	Ipswich Rd 130	Roadside	600891.32	225956.98	NO2	NO	0	15.5	NO	2.5

CBC100	Harwich Road 175	Roadside	601252	225627	NO2	NO	12	1.5	NO	2.5
CBC101	Ipswich Rd 50	Roadside	600868	225452	NO2	YES	2	1.3	NO	2.5
CBC102	East St 72	Roadside	600752	225313	NO2	YES	0	1	NO	2.5
CBC103	Brook St 74	Roadside	600607	225049	NO2	YES	6	2	NO	2.5
CBC104	Military Rd 37	Roadside	600193	224653	NO2	YES	0	4.5	NO	2.5
CBC105	East Hill 4A	Roadside	600224	225255	NO2	NO	1	1	NO	2.5
CBC106	Mersea Rd 30	Roadside	599911	224558	NO2	YES	1.5	0.1	NO	2.5
CBC107	North Hill 49	Roadside	599389	225373	NO2	YES	2.3	0.1	NO	2.5
CBC108	North Station Rd 39	Roadside	599354	225802	NO2	NO	2.5	0.1	NO	2.5
CBC109	North Hill, Strada	Roadside	599398	225432	NO2	YES	0	1.5	NO	2.5
CBC110	1A St Botolphs Street	Roadside	599891	225021	NO2	YES	0	2	NO	2.5
CBC111	St John's Street, Lemon Tree	Urban Centre	599473	224982	NO2	YES	0	1.5	NO	2.5
CBC112	High St George Hotel	Urban Centre	599730	225232	NO2	YES	0	2.5	NO	2.5
CBC113	Orchard Gardens	Roadside	600845	225671	NO2	NO	15	3	NO	2.5
CBC115	Harwich Road 18	Roadside	601083	225387	NO2	NO	0	7	NO	2.5
CBC116	Harwich Road 19	Roadside	601115	225355	NO2	NO	0	12	NO	2.5
CBC117	High Street 71	Roadside	599984	225238	NO2	NO	0	2	NO	2.5
CBC118	North Station Road 120	Roadside	599269	226122	NO2	NO	0	2	NO	2.5
CBC119	Claremont Heights	Roadside	599230	226272	NO2	NO	0	2	NO	2.5
CBC123	131 Bergholt Road	Roadside	598938	226707	NO2	NO	0	3.82	NO	2.5
CBC124	58 East Hill	Roadside	600516	225277	NO2	YES	0	2	NO	2.5
CBC125	6 Bergholt Road	Roadside	599226.52	226508.71	NO2	NO	0	1	NO	2.5
CBC126	Gilbert House Lexden Road	Roadside	597244	225178	NO2	NO	0	12	NO	2.5
CBC127	West Side Brook Street Junction w/ East Hill	Roadside	600537.22	225241.99	NO2	YES	0	1	NO	2.5
CBC128	East Side Brook Street Junction w/ East Street	Roadside	600546.54	225244.33	NO2	YES	0	1	NO	2.5
CBC129	37 Brook Street	Roadside	600550	225183	NO2	YES	0	1	NO	2.5
CBC130	43 St John's Street	Roadside	599699.63	224962.91	NO2	YES	0	1	NO	2.5
CBC131	Lucy Lane North	Roadside	595025	225166	NO2	YES	0	12	NO	2.5
CBC132	Lucy Lane South	Roadside	595106.06	225123	NO2	NO	0	15	NO	2.5
CBC133	East Mersea, Bromans Lane	Rural	606179	214749	NO2	NO	N/A	2	NO	2.5
CBC134	Aldham, Ford Street	Kerbside	592043	226989	NO2	NO	2	0.3	NO	2.5
CBC135	11 Bridge Farm Coggeshall Road	Roadside	591366	223679	NO2	NO	0	9	NO	2.5
CBC136	85 Coggeshall Road	Roadside	590444	223502	NO2	NO	1	1	NO	2.5
CBC137	93B Coggeshall Road	Roadside	590325	223495	NO2	NO	0	3	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.3 – Annual Mean NO<sub>2</sub> Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
CBC Auto 1	600571.00	225151.00	Roadside	Automatic	88.20	88.20	28.57	27.37	29.13	25.84	26.44
CBC2	599981.00	224633.00	Urban	Diffusion Tube	100.00	100.00	29.24	30.86	31.19	28.03	30.02
CBC3A/3B/3C (Triplicate)	599914.00	224643.00	Roadside	Diffusion Tube	94.44	94.44	<b>52.64</b>	<b>59.96</b>	<b>48.23</b>	<b>54.51</b>	<b>55.43</b>
CBC8	597640.00	223661.00	Roadside	Diffusion Tube	100.00	100.00	22.28	24.74	23.53	22.50	22.09
CBC20	599063.00	225097.00	Urban Background	Diffusion Tube	100.00	100.00	18.18	20.16	20.64	21.70	19.48
CBC21	599413.00	225056.00	Roadside	Diffusion Tube	83.33	83.33	<b>46.82</b>	<b>51.11</b>	<b>44.95</b>	<b>48.70</b>	<b>51.85</b>
CBC22	599612.00	225072.00	Urban centre	Diffusion Tube	91.67	91.67	19.68	21.17	20.87	20.91	20.29
CBC43	600356.00	224763.00	Roadside	Diffusion Tube	100.00	100.00	33.26	33.59	31.94	32.77	32.45
CBC45A/45B/45C (Triplicate)	600560.00	225181.00	Roadside	Diffusion Tube	100.00	100.00	<b>43.74</b>	<b>43.46</b>	<b>45.70</b>	<b>50.51</b>	<b>44.02</b>
CBC48	599908.00	224942.00	Roadside	Diffusion Tube	100.00	100.00	34.24	<b>40.72</b>	35.35	<b>42.50</b>	39.90
CBC49	599720.00	225217.00	Kerbside	Diffusion Tube	100.00	100.00	35.97	39.17	<b>40.52</b>	38.81	<b>40.37</b>
CBC54	599922.00	224728.00	Roadside	Diffusion Tube	83.33	83.33	<b>42.99</b>	<b>46.95</b>	<b>42.19</b>	<b>47.14</b>	<b>42.76</b>
CBC62/62A/62B (Triplicate)	599923.00	224738.00	Roadside	Diffusion Tube	100.00	100.00	38.78	<b>42.61</b>	39.22	<b>42.93</b>	<b>40.68</b>
CBC63	599921.00	224711.00	Roadside	Diffusion Tube	100.00	100.00	<b>43.17</b>	<b>47.40</b>	<b>43.92</b>	<b>48.63</b>	<b>45.02</b>
CBC65	598797.00	224489.00	Roadside	Diffusion Tube	100.00	100.00	25.19	26.22	25.29	24.28	23.35
CBC66	600622.00	224881.00	Roadside	Diffusion Tube	100.00	100.00	25.83	24.99	26.54	25.73	25.64
CBC68	600589.00	225113.00	Roadside	Diffusion Tube	66.67	66.67	23.55	22.20	22.15	23.20	26.78
CBC69/69A/69B (Triplicate)	600545.00	225205.00	Roadside	Diffusion Tube	97.22	97.22	<b>45.63</b>	<b>44.33</b>	<b>48.55</b>	<b>46.88</b>	<b>44.97</b>
CBC71	599818.00	224924.00	Roadside	Diffusion Tube	100.00	100.00	<b>50.17</b>	<b>50.92</b>	<b>43.25</b>	<b>51.55</b>	<b>46.51</b>
CBC72	600885.00	225441.00	Roadside	Diffusion Tube	100.00	100.00	31.90	34.64	32.14	34.73	29.19
CBC76	601162.00	225471.00	Roadside	Diffusion Tube	66.67	66.67	30.68	33.40	31.09	31.35	30.59
CBC86	602280.00	225391.00	Urban Background	Diffusion Tube	100.00	100.00	17.85	17.61	18.62	17.56	18.08
CBC88/88A/88B (Triplicate)	600571.00	225151.00	Roadside	Diffusion Tube	100.00	100.00	27.55	26.78	27.90	27.73	25.93
CBC90	591312.00	223431.00	Roadside	Diffusion Tube	100.00	100.00	25.25	27.98	26.58	27.07	26.72
CBC91	595239.00	223936.00	Façade	Diffusion Tube	100.00	100.00	20.45	22.65	22.36	21.71	21.22
CBC93	599031.00	224427.00	Roadside	Diffusion Tube	100.00	100.00	19.48	20.99	20.74	20.41	20.38
CBC94	601925.00	224652.00	Roadside	Diffusion Tube	100.00	100.00	27.25	29.47	27.49	25.75	26.83
CBC96	599909.00	228288.00	Roadside	Diffusion Tube	100.00	100.00	18.71	20.45	20.81	18.38	19.93
CBC97	599452.00	227884.00	Roadside	Diffusion Tube	100.00	100.00	25.37	28.39	25.79	25.96	26.82
CBC98	600086.00	226157.00	Roadside	Diffusion Tube	91.67	91.67	20.72	22.44	22.09	21.75	21.91
CBC99	600891.32	225956.98	Roadside	Diffusion Tube	100.00	100.00	22.11	24.58	24.29	22.37	22.68
CBC100	601252.00	225627.00	Roadside	Diffusion Tube	100.00	100.00	31.39	30.36	29.25	28.43	28.50
CBC101	600868.00	225452.00	Roadside	Diffusion Tube	100.00	100.00	35.78	35.95	36.51	34.91	32.66

CBC102	600752.00	225313.00	Roadside	Diffusion Tube	91.67	91.67	<b>41.38</b>	<b>42.93</b>	38.43	<b>41.24</b>	<b>40.78</b>
CBC103	600607.00	225049.00	Roadside	Diffusion Tube	100.00	100.00	26.12	24.90	26.80	27.80	26.75
CBC104	600193.00	224653.00	Roadside	Diffusion Tube	100.00	100.00	26.42	28.91	27.88	29.01	29.71
CBC105	600224.00	225255.00	Roadside	Diffusion Tube	100.00	100.00	35.50	36.21	33.10	34.09	34.01
CBC106	599911.00	224558.00	Roadside	Diffusion Tube	100.00	100.00	33.16	38.72	35.60	36.44	35.88
CBC107	599389.00	225373.00	Roadside	Diffusion Tube	100.00	100.00	28.83	30.95	30.47	30.92	32.33
CBC108	599354.00	225802.00	Roadside	Diffusion Tube	100.00	100.00	29.57	30.90	29.61	32.36	29.87
CBC109	599398.00	225432.00	Roadside	Diffusion Tube	100.00	100.00	31.13	33.00	31.16	33.30	34.52
CBC110	599891.00	225021.00	Roadside	Diffusion Tube	91.67	91.67	31.57	31.21	31.50	32.15	32.37
CBC111	599473.00	224982.00	Urban Centre	Diffusion Tube	91.67	91.67	<b>40.88</b>	<b>42.31</b>	<b>42.83</b>	<b>42.33</b>	<b>44.24</b>
CBC112	599730.00	225232.00	Urban Centre	Diffusion Tube	83.33	83.33	30.71	31.80	32.54	32.34	30.44
CBC113	600845.00	225671.00	Roadside	Diffusion Tube	100.00	100.00	26.01	26.78	27.41	27.93	26.21
CBC115	601083.00	225387.00	Roadside	Diffusion Tube	100.00	100.00	27.47	29.66	28.02	27.16	27.48
CBC116	601115.00	225355.00	Roadside	Diffusion Tube	100.00	100.00	20.45	22.42	20.37	21.51	21.10
CBC117	599984.00	225238.00	Roadside	Diffusion Tube	100.00	100.00	39.44	<b>44.37</b>	<b>41.08</b>	39.77	<b>41.72</b>
CBC118	599269.00	226122.00	Roadside	Diffusion Tube	100.00	100.00	31.21	30.79	29.57	28.49	30.05
CBC119	599230.00	226272.00	Roadside	Diffusion Tube	100.00	100.00	21.50	20.74	20.93	21.92	22.06
CBC123	598938.00	226707.00	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	21.04	24.67	22.00
CBC124	600516.00	225277.00	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	39.76	39.82	38.95
CBC125	599226.52	226508.71	Roadside	Diffusion Tube	91.67	91.67	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	30.15	34.72
CBC126	597244.00	225178.00	Suburban	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	17.87
CBC127	600537.22	225241.99	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<b>43.21</b>
CBC128	600546.54	225244.33	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	31.40
CBC129	600550.00	225183.00	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<b>45.30</b>
CBC130	599699.63	224962.91	Roadside	Diffusion Tube	91.67	91.67	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<b>40.95</b>
CBC131	595025.00	225166.00	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	39.82
CBC132	595106.06	225123.00	Roadside	Diffusion Tube	100.00	100.00	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	32.48
CBC133	606179.00	214749.00	Rural	Diffusion Tube	100.00	33.33	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	12.27
CBC134	592043.00	226989.00	Kerbside	Diffusion Tube	100.00	16.67	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	18.91
CBC135	591366.00	223679.00	Roadside	Diffusion Tube	100.00	58.33	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	30.62
CBC136	590444.00	223502.00	Roadside	Diffusion Tube	100.00	58.33	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	37.86
CBC137	590325.00	223495.00	Roadside	Diffusion Tube	100.00	58.33	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<b>44.59</b>

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 NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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 – Trends in Mersea Road Annual Mean NO<sub>2</sub> Concentrations

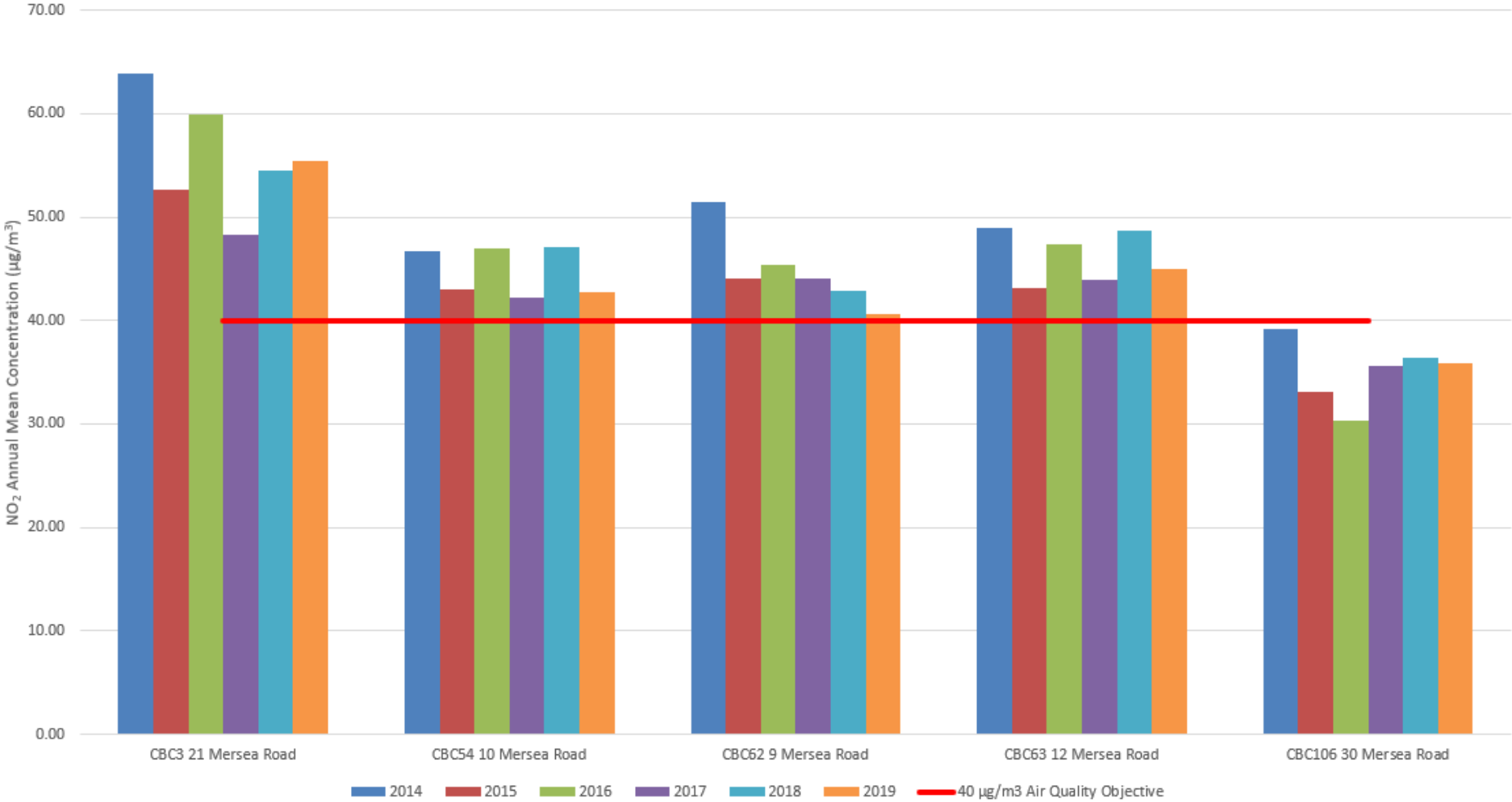


Figure A.2 – Trends in Brook Street Annual Mean NO<sub>2</sub> Concentrations

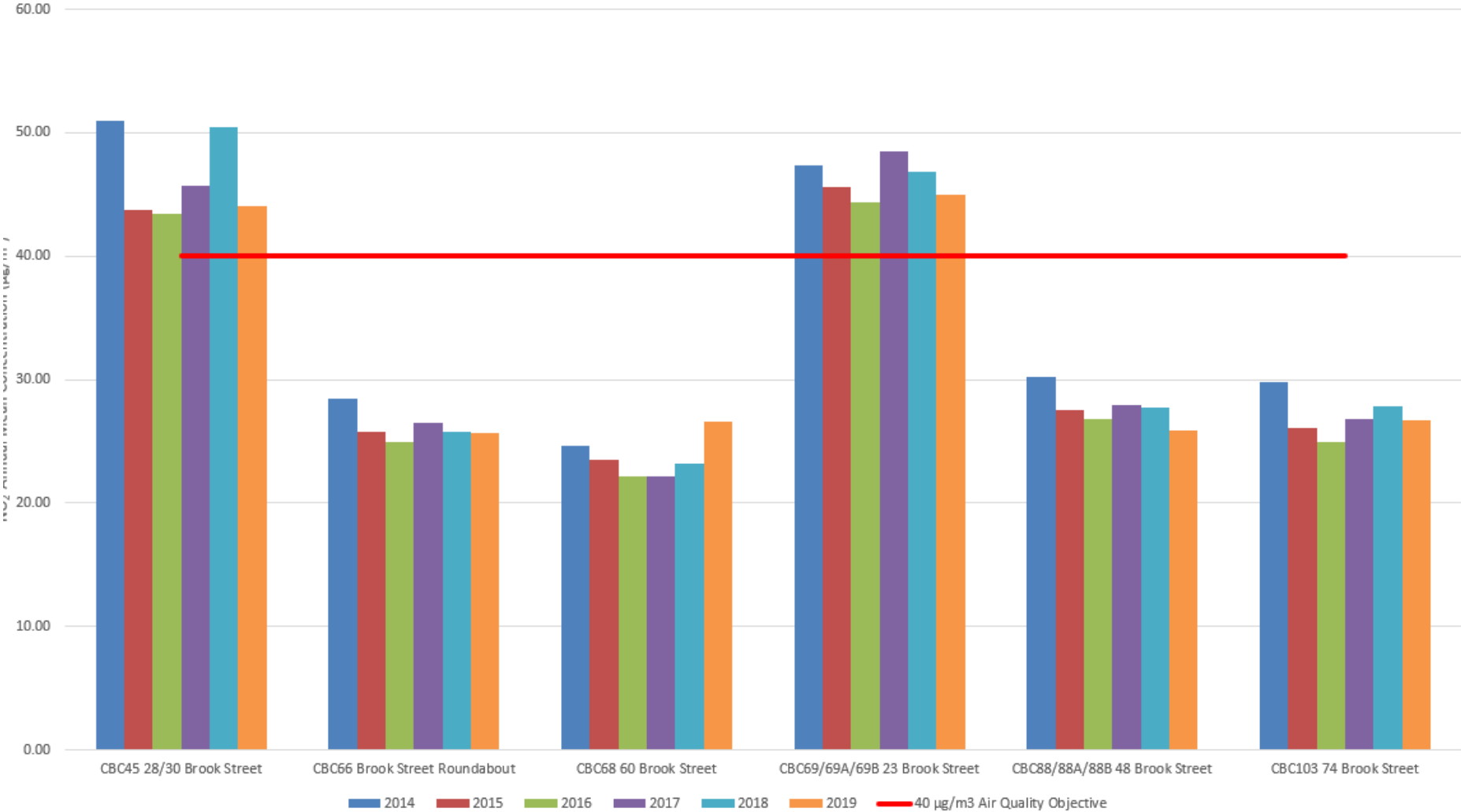


Figure A.3 – Trends in High Street Area Annual Mean NO<sub>2</sub> Concentrations

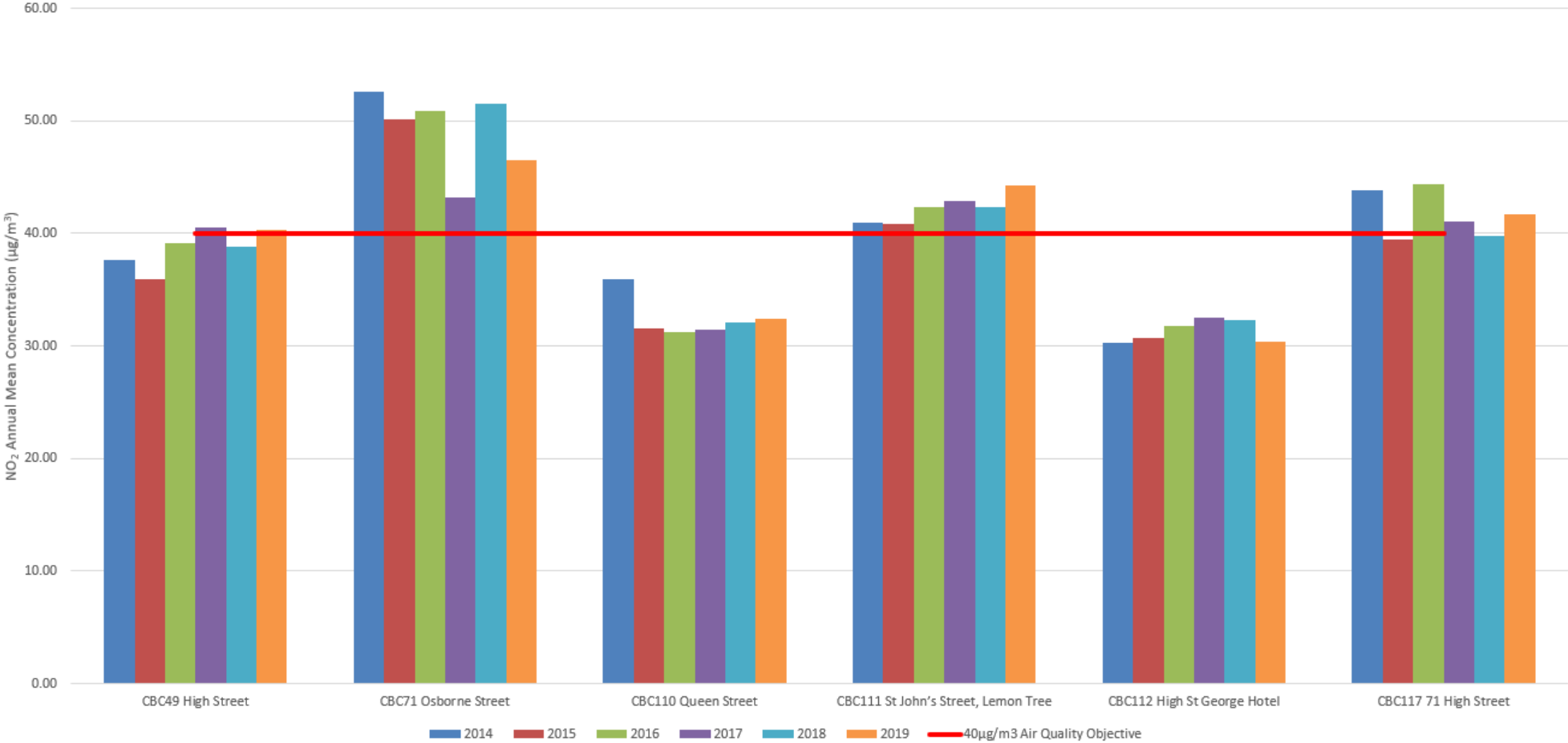


Figure A.4 – Trends in AQMA 2 Annual Mean NO<sub>2</sub> Concentrations

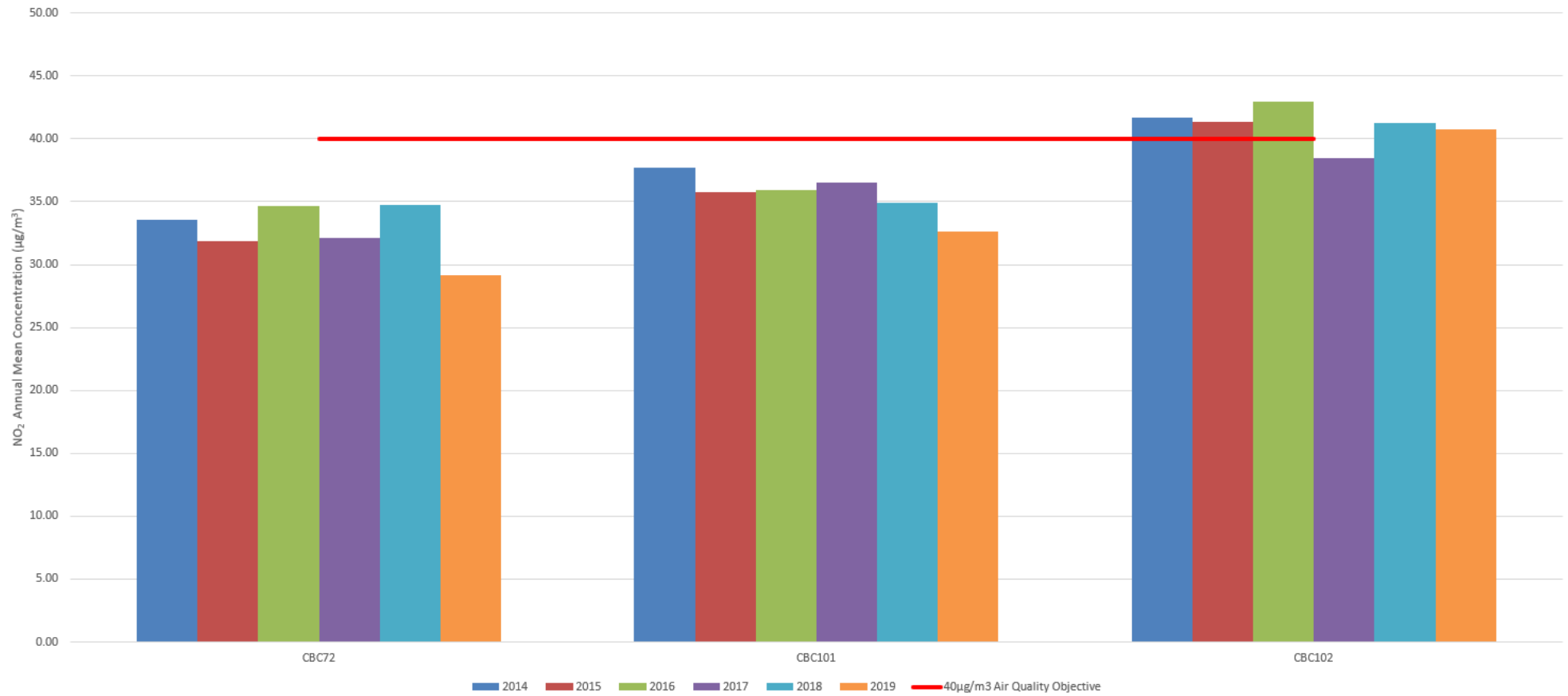


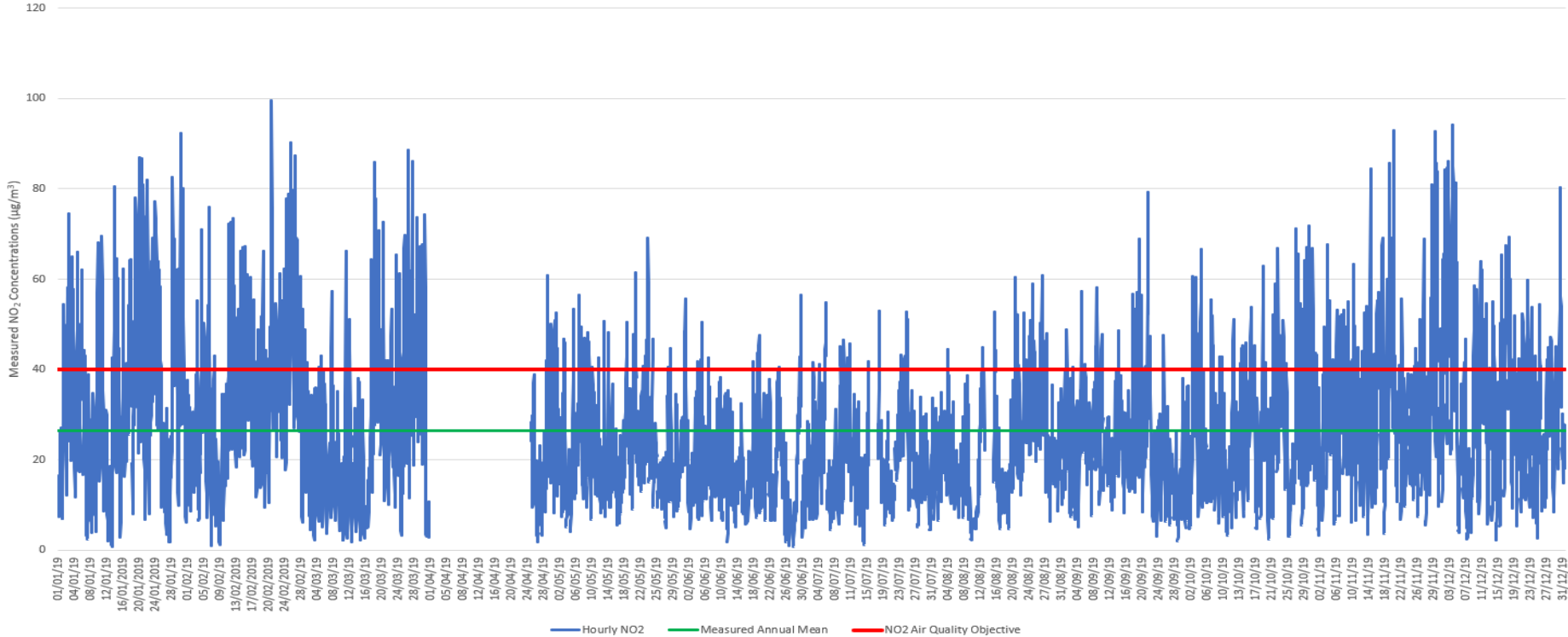
Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
							2015	2016	2017	2018	2019
CBC Auto 1	600571	225141	Roadside	Automatic	88.2	88.2	0	<b>0</b> <b>(106.05)</b>	0	0	0

Notes:

- Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.
- (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) If the period of valid data is less than 85%, the 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

Figure A.5 – 2019 Brook Street NO<sub>2</sub> Monitoring Data



## Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO<sub>2</sub> Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.93) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
CBC2	599981	224633	37.3	43.8	36.0	24.7	25.0	23.7	26.8	33.7	28.8	29.3	38.5	40.0	32.3	30.02	27.00
CBC3A	599914	224643	63.1	65.5	46.9	61.0	*Erroneous Data Point Removed	61.5	54.6	60.0	54.6	59.9	61.0	50.1	58.0	<b>54.0</b>	<b>51.9</b>
CBC3B	599914	224643	84.74	63.45	48.2	60.88	*Erroneous Data Point Removed	52.39	55.93	54.35	52.57	80.07	70.88	51.98	61.4	<b>57.1</b>	<b>54.9</b>
CBC3C	599914	224643	57.56	64.95	46.4	61.84	50.03	54.59	56.06	57.63	51.01	54.32	71.85	86.24	59.4	<b>55.2</b>	<b>53.1</b>
CBC8	597640	223661	29.09	35.57	23.81	25.23	16.12	19.27	17.54	19.66	20.54	26.22	25.72	26.32	23.8	22.1	16.5
CBC20	599063	225097	24.85	31.63	20.74	22.29	14.34	14.14	13.22	16.01	15.82	21.75	32.5	24.07	20.9	19.5	17.7
CBC21	599413	225056	51.06	60.25	50.1	68.27	52.84	53.3	62.19	46.15	Missing	Missing	68.54	44.8	55.8	<b>51.8</b>	<b>41.6</b>
CBC22	599612	225072	25.25	34.16	23.63	19.06	14.61	14.19	16.31	Missing	19.78	22.45	28.69	21.82	21.8	20.3	18.9
CBC43	600356	224763	44.45	49.99	37.08	32.91	28.72	22.67	29.76	34.33	29.79	30.21	46.61	32.23	34.9	32.5	23.5
CBC45A	600560	225181	49.22	54.66	47.41	67.94	51.41	10.08	42.69	40.47	44.34	43.45	56.68	42.51	45.9	<b>42.7</b>	<b>42.7</b>
CBC45B	600560	225181	57.66	55.85	45.48	60.26	53.7	44.94	36.26	40.9	39.9	45.23	55.55	40.82	48.0	<b>44.7</b>	<b>44.7</b>
CBC45C	600560	225181	51.1	49.13	45.19	59.02	49.82	40.55	43.36	41.81	45.36	44.35	65.78	40.99	48.0	<b>44.7</b>	<b>44.7</b>
CBC48	599908	224942	49.63	46.51	40.89	45.33	35.65	37.56	36.75	34.21	37.54	50.72	87.16	12.84	42.9	39.9	39.9
CBC49	599720	225217	49.28	56.97	48.15	31.1	34.13	33.97	44.72	51.41	31.84	46.98	49.72	42.62	43.4	<b>40.4</b>	<b>40.4</b>
CBC54	599922	224728	43.23	55.36	Missing	52.11	45.29	45.34	45.65	Missing	39.24	40.46	54.85	38.24	46.0	<b>42.8</b>	38.8
CBC62	599923	224738	39.67	49.89	38.27	50.93	44.08	43.6	47.96	46.61	38.15	37.82	50.05	33.05	43.3	<b>40.3</b>	<b>40.3</b>
CBC62A	599923	224738	46.13	51.21	38.84	47.27	45.17	46.74	46.84	44.8	37.57	39.39	46.1	36.07	43.8	<b>40.8</b>	<b>40.8</b>
CBC62B	599923	224738	41.15	47.96	39.54	46.02	43.92	45.45	50.54	42.86	40.06	39.44	49.39	42.2	44.0	<b>41.0</b>	<b>41.0</b>
CBC63	599921	224711	46.55	56.55	47.68	52.35	43.94	49.49	52.27	50.35	40.02	46.81	52.97	41.97	48.4	<b>45.0</b>	<b>45.0</b>
CBC65	598797	224489	30.39	35.02	25.4	26.49	20.38	21.37	20.03	20.61	24.14	24.85	28.18	24.42	25.1	23.3	17.3
CBC66	600622	224881	33.79	35.54	28.72	23.69	21.64	21.04	20.52	24.64	24.1	26	33.57	37.61	27.6	25.6	19.6
CBC68	600589	225113	Missing	Missing	Missing	31.76	19.62	22.5	20.67	21.94	23.4	25.41	Missing	27.26	24.1	26.8	26.8
CBC69A	600545	225205	59.85	54.17	57.19	43.34	46.46	43.63	36.81	50.98	43.23	52.35	47.25	49.98	48.8	<b>45.4</b>	<b>45.4</b>
CBC69B	600545	225205	52.01	59.3	57.29	43.59	Missing	38.04	37.91	42.47	42.02	48.47	47.1	47.89	46.9	<b>43.6</b>	<b>43.6</b>
CBC69	600545	225205	58.93	64.66	59.61	46.28	43.37	37.94	41.1	44.63	45.01	42.81	54.01	54.16	49.4	<b>45.9</b>	<b>45.9</b>

CBC71	599818	224924	53.51	58.69	48.76	50.88	40.44	45.61	53.96	51.13	46.26	48.3	57.2	45.38	50.0	<b>46.5</b>	<b>46.5</b>
CBC72	600885	225441	38.74	34.68	29.93	41.15	34.52	25.8	18.39	22.38	28.22	31.24	41.51	30.06	31.4	29.2	23.4
CBC76	601162	225471	42.95	50.65	35.8	Missing	Missing	Missing	Missing	33.6	29.8	28.56	40.3	35.07	37.1	30.6	28.0
CBC86	602280	225391	25.64	31.33	20.37	18.58	12.01	13.01	12.71	16.49	15.55	18.32	26.89	22.38	19.4	18.1	18.1
CBC88	600571	225151	34.37	36.01	28.05	26.68	20.84	23.01	24.71	26.31	24.49	25.69	33.99	28.95	27.8	25.8	25.8
CBC88A	600571	225151	36.23	36.34	28.35	26.21	24.24	22.27	23.65	25.72	24.05	27.85	34.26	34.33	28.6	26.6	26.6
CBC88B	600571	225151	30.29	36.85	27.23	27.05	25.13	21.23	21.3	25.17	27.38	27.72	31.83	25.95	27.3	25.4	25.4
CBC90	591312	223431	30.18	46.02	26.29	32.13	24.4	25.6	22.49	28.3	23.4	28	29.47	28.45	28.7	26.7	21.1
CBC91	595239	223936	27.86	34.94	24.06	19.45	17.21	16.97	17.56	18.55	19.79	22.11	31.33	24.04	22.8	21.2	18.9
CBC93	599031	224427	28.41	33.83	21.31	21.82	15.66	15.75	14.72	18.44	17.79	23.09	29.97	22.18	21.9	20.4	17.6
CBC94	601925	224652	35.92	39.87	32.45	25.83	21.8	24.19	21.95	26.5	24.77	29.96	31.85	31.15	28.9	26.8	22.1
CBC96	599909	228288	27.75	34.64	22.24	20.38	15.13	14.89	14.6	18.24	17.01	21.95	27.47	22.91	21.4	19.9	17.4
CBC97	599452	227884	33.53	42.56	30.91	28.38	25.47	25	22.38	24.89	26	24.81	33.02	29.12	28.8	26.8	20.9
CBC98	600086	226157	26.78	34.52	24.06	20.17	17.74	17.56	19.25	25.33	19.64	Missin g	25.64	28.44	23.6	21.9	21.1
CBC99	600891.32	225956.98	29.62	34.14	26.78	22.38	17.95	17.05	17.89	23.56	19.86	24.07	32.26	27.05	24.4	22.7	22.7
CBC100	601252	225627	38.77	40.38	28.92	29.31	23.89	24.13	21.99	29.56	18.95	30.3	35.84	45.75	30.6	28.5	22.2
CBC101	600868	225452	45.63	39.86	32.06	38.91	35.1	28.82	18.7	29.56	34.78	36.5	44.15	37.33	35.1	32.7	29.1
CBC102	600752	225313	50.54	46.88	46.83	50.66	43.67	38.35	41.1	40.87	Missin g	36.09	46.31	41.02	43.8	<b>40.8</b>	<b>40.8</b>
CBC103	600607	225049	36.25	37.13	28.33	27.98	26.92	24.05	23.03	24.44	26.24	28.22	35.68	26.91	28.8	26.8	22.9
CBC104	600193	224653	37.82	42.26	31.33	26.52	25.11	23.71	29.25	32.06	30.75	32.89	38.8	32.88	31.9	29.7	29.7
CBC105	600224	225255	38.69	49.14	37.68	32.52	30.36	32.23	27.75	36.36	33.54	38.79	41.57	40.22	36.6	34.0	31.5
CBC106	599911	224558	36.82	43.88	35.2	38.69	36.19	36.38	44.84	41.98	38.11	34.72	45.64	30.47	38.6	35.9	28.2
CBC107	599389	225373	36.58	43.56	35.2	28.65	26.91	30.81	31.4	37.65	29.98	38.87	39.74	37.85	34.8	32.3	24.2
CBC108	599354	225802	36.3	36.46	34.17	37.21	26.44	31.11	28.78	28.73	28.88	29.19	39.3	28.8	32.1	29.9	22.4
CBC109	599398	225432	38.3	43.9	32.09	38.37	32.49	33.35	37.24	37.63	35.88	34.39	46.25	35.54	37.1	34.5	34.5
CBC110	599891	225021	38.42	48.05	38.81	33.07	29.59	25.8	31.13	Missing	31.7	33.56	41.55	31.23	34.8	32.4	32.4
CBC111	599473	224982	53.94	48.75	50.01	46.9	44.55	42.15	52.05	49.26	47.83	44.25	Missin g	43.62	47.6	<b>44.2</b>	<b>44.2</b>
CBC112	599730	225232	41.56	41.13	39.65	34.25	33.7	Missing	Missing	26.92	25.06	27.59	32	25.4	32.7	30.4	30.4
CBC113	600845	225671	32.22	47.19	27.7	27.32	18.64	23.18	22.44	25.35	22.74	25.1	33.55	32.79	28.2	26.2	21.2
CBC115	601083	225387	35.99	38.13	33.07	19.75	19.03	29.26	31.3	30.51	28.07	25.47	34.95	29.02	29.5	27.5	27.5
CBC116	601115	225355	28.46	31.57	23.62	18.4	15.59	17.39	20.95	21.96	19.51	21.47	30.65	22.69	22.7	21.1	21.1
CBC117	599984	225238	46.61	59.16	42.19	43.82	41.07	38.92	37.82	43.95	41.58	41.31	52.47	49.43	44.9	<b>41.7</b>	<b>41.7</b>
CBC118	599269	226122	36.33	37.53	34.11	28.35	28.62	26.99	29.89	32.19	29.22	31.78	39.28	33.49	32.3	30.1	30.1
CBC119	599230	226272	28.39	33.53	23.25	24.79	16.66	19.98	19.75	21.9	19.79	23.65	29.12	23.85	23.7	22.1	22.1
CBC123	598938	226707	28.62	29.01	23.19	26.68	19.27	18.46	18.85	21.14	20.52	23.03	31.12	23.98	23.7	22.0	22.0
CBC124	600516	225277	47.58	49.6	39.86	48.38	40.88	43.95	38.04	35.59	37.56	37.68	48.8	34.64	41.9	38.9	38.9
CBC125	599226.52	226508.71	37.74	42.87	33.6	40.16	Missing	31.69	32.3	36.09	32.99	40.22	43.95	39.02	37.3	34.7	34.7
CBC126	597244	225178	23.76	27.04	17.2	19.3	14.91	14.71	14.34	15.2	15.36	22.62	26.23	19.88	19.2	17.9	17.9
CBC127	600537.22	225241.99	54.29	56.05	49.98	46.94	40.44	41.38	43.68	47.29	41.61	38.33	45.99	51.52	46.5	<b>43.2</b>	<b>43.2</b>
CBC128	600546.54	225244.33	41.46	41.03	33.77	39.11	29.45	31.19	27.23	28.58	30.21	30.66	38.57	33.84	33.8	31.4	31.4

CBC129	600550	225183	56.21	59.03	57.49	45.08	45.18	43.39	38.76	41.77	43.33	46.77	56.76	50.72	48.7	<b>45.3</b>	<b>45.3</b>
CBC130	599699.63	224962.91	49.86	Missing	45.16	42.8	40.35	41.16	44.32	48.71	37.89	44.25	53.98	35.88	44.0	<b>41.0</b>	<b>41.0</b>
CBC131	595025	225166	42.92	63.98	38.1	32.18	35.54	39.91	38.25	48.57	36.94	42.35	46.71	48.33	42.8	39.8	39.8
CBC132	595106.06	225123	42.97	42.57	39.46	51.25	27.59	33.51	23.12	24.86	33.91	32.29	38.93	28.6	34.9	32.5	32.5
CBC133	606179	214749	N/A	N/A	N/A	N/A	N/A	N/A	8.81	11.6	10.13	11.54	Discontinued	Discontinued	10.5	12.3	<b><u>N/A</u></b>
CBC134	592043	226989	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25.11	20.74	22.9	18.9	15.8
CBC135	591366	223679	N/A	N/A	N/A	N/A	N/A	35.3	34.1	39.3	33.1	37.6	34.9	41.2	36.5	~30.6	~30.6
CBC136	590444	223502	N/A	N/A	N/A	N/A	N/A	38.1	37.3	47.1	38.2	46.2	63.5	45.5	45.1	~37.9	~34.1
CBC137	590325	223495	N/A	N/A	N/A	N/A	N/A	45.7	48	40.5	48.9	49.6	77.3	62	53.1	<b>~45.0</b>	<b>~44.6</b>

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 NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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.

~ Bias Adjustment of 0.75 See Appendix C for details.



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

Colchester Borough Council operates one automatic monitoring site which contains an API 200a analyser that measures NO<sub>2</sub>. Data from this site is collected by a contractor and forwarded to the Councils server.

Daily data validation checks are made to ensure the analysers are working correctly and to identify any abnormal readings that may occur.

The automatic monitoring station equipment is serviced every six months by a contractor who also carries out maintenance callouts when faults are identified.

The analyser is calibrated fortnightly with a certified reference gas by Council officers. The site also has triplicate NO<sub>2</sub> diffusion tubes to provide co-location data.

Data ratification for the analyser contains following the processes;

- Applying the scaling factors derived from calibrations, maintenance visits and servicing.
- Checking for equipment drift with adjustments made where detected
- Comparison of data with other pollutants and other appropriate Essex Air monitoring sites
- Checking for and deletion of erroneous data that can be linked to analyser failure or unrepresentative periods of operation

### Diffusion Tubes QA/QC

Colchester Borough Council undertook monitoring with 74 NO<sub>2</sub> diffusion tubes at 64 sites in 2019.

The majority (71) of the diffusion tubes were supplied by Gradko (UKAS Testing Laboratory number 2187) with a preparation method of 20% triethanolamine (TEA) in water.

3 diffusion tubes sited at new locations along the A120 used Socotec (UKAS Testing Laboratory number 1015) with a preparation method of 50% triethanolamine (TEA) in acetone. This is to ensure that monitoring along the A120 is consistent with neighbouring district of Braintree.

The AIR NO<sub>2</sub> proficiency testing scheme found that both laboratories achieved the following percentage of results determined as satisfactory for 2019:

**Table C.1 – AIR PT Results**

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
Gradko	75%	100%	100%	100%
SOCOTEC	87.5%	100%	100%	100%

**Diffusion Tube Bias Adjustment Factors**

Colchester Borough Council uses the national bias adjustment figure for calculating diffusion tube results.

The Diffusion Tube Bias Adjustment Factors Spreadsheet 03/20 identifies that for Gradko 20% TEA in water diffusion tubes in 2019, a bias adjustment factor of 0.93 should be used. This was derived from orthogonal regression analysis of 27 studies.

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.

**Point Sources**

No significant new point sources of emissions have been identified.

**NO<sub>2</sub> Fall Off Estimation**

Diffusion tube monitoring shown in Table B.1 in Appendix B has been adjusted for NO<sub>2</sub> falloff between the monitoring location and the point of relevant exposure.

Using the equation taken from the NO<sub>2</sub> Fall Off With Distance Calculator, a custom Excel spreadsheet has been developed to derive the NO<sub>2</sub> concentrations at relevant exposure. This calculator uses background concentrations taken from the 2017 NO<sub>2</sub> background maps, measured annual mean concentrations and distances between the kerb, monitor and relevant exposure.

Estimated Annual Mean at Relevant Exposure:

$$C_z = ((C_y - C_b) / (-0.5476 \times \ln(D_y) + 2.7171)) \times (-0.5476 \times \ln(D_z) + 2.7171) + C_b$$

Where:

C<sub>z</sub> is the total predicted concentration (µg/m<sup>3</sup>) at distance D<sub>z</sub>;

C<sub>y</sub> is the total measured concentration (µg/m<sup>3</sup>) at distance D<sub>y</sub>;

C<sub>b</sub> is the background concentration (µg/m<sup>3</sup>);

D<sub>y</sub> is the distance from the kerb at which concentrations were measured;

D<sub>z</sub> is the distance from the kerb (m) at which concentrations are to be predicted; and

Ln(D) is the natural log of the number D

Table C.2 – NO<sub>2</sub> Fall-Off Calculator

Site ID	Site Name	Bias Adjusted Mean	Annual Mean Background	Distance to kerb of nearest road (m) <sup>(2)</sup>	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
CBC2	Fairax Road, 21	30.02	15.82	1.1	2	27.00
CBC3A	Mersea Road, 21	53.96	15.82	1.9	0.5	51.89
CBC3B	Mersea Road, 21	57.11	15.82	1.9	0.5	54.87
CBC3C	Mersea Road, 21	55.22	15.82	1.9	0.5	53.09
CBC8	Shrub End Road, 105/107	22.09	12.26	1.2	17	16.50
CBC20	Papillon Road	19.48	13.75	1.2	4	17.72
CBC21	Head Street	51.85	13.75	0.6	2	41.64
CBC22	Trinity Street-Christian Science Society	20.29	15.82	1.2	4	18.92
CBC43	Magdalen Street	32.45	15.82	0.4	9	23.52
CBC45 A	Brook Street, 28/30	42.69	14.75	1	0	42.69
CBC45 B	Brook Street, 28/30	44.68	14.75	1	0	44.68
CBC45 C	Brook Street, 28/30	44.68	14.75	1	0	44.68
CBC48	33 St Botolphs Street	39.90	15.82	1.5	0	39.90
CBC49	High Street - Brighthouse	40.37	15.82	0.5	0	40.37
CBC54	Mersea Road, 10	42.76	15.82	1.8	1.6	38.84
CBC62	Mersea Road, 9	40.31	15.82	2.9	0	40.31
CBC62 A	Mersea Road, 9	40.78	15.82	2.9	0	40.78
CBC62 B	Mersea Road, 9	40.96	15.82	2.9	0	40.96
CBC63	Mersea Road, 12	45.02	15.82	1.8	0	45.02
CBC65	Maldon Road, 99	23.35	11.67	0.4	8	17.30
CBC66	Brook Street RAB	25.64	14.75	1.2	16	19.58
CBC68	Brook Street 56	26.64	14.75	10.4	0	26.64
CBC69 A	Brook Street 23	45.36	14.75	1.1	0	45.36
CBC69 B	Brook Street 23	43.63	14.75	1.1	0	43.63
CBC69	Brook Street 23	45.92	14.75	1.1	0	45.92
CBC71	Osborne Street, 6	46.51	15.82	2.1	0	46.51
CBC72	Ipswich Road. Old Coach House.	29.19	14.75	1.9	9	23.35
CBC76	Harwich Road, 53	31.05	14.75	2	2	28.40

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CBC86	Hawthorn Av Gardenia Walk	18.08	15.38	50	0	18.08
CBC88	Brook Street 48 (Auto Monitor)	25.82	14.75	2.6	0	25.82
CBC88 A	Brook Street 48 (Auto Monitor)	26.62	14.75	2.6	0	26.62
CBC88 B	Brook Street 48 (Auto Monitor)	25.35	14.75	2.6	0	25.35
CBC90	London Rd 170 Marks Tey	26.72	14.43	2	12	21.12
CBC91	Blackberry Rd 2	21.22	10.51	2	3	18.92
CBC93	Butt Road 129	20.38	11.67	1.5	5	17.58
CBC94	Elmstead Rd 6	26.83	15.38	2.5	11	22.06
CBC96	Mill Rd 239	19.93	13.72	1.2	7	17.43
CBC97	Mill Rd 87	26.82	11.12	1.2	6	20.94
CBC98	Cowdray Av 154	21.91	19.35	1	4	21.08
CBC99	Ipswich Rd 130	22.68	15.41	15.5	0	22.68
CBC100	Harwich Road 175	28.50	15.41	1.5	12	22.19
CBC101	Ipswich Rd 50	32.66	14.75	1.3	2	29.11
CBC102	East St 72	40.78	14.75	1	0	40.78
CBC103	Brook St 74	26.75	14.75	2	6	22.85
CBC104	Military Rd 37	29.71	15.82	4.5	0	29.71
CBC105	East Hill 4A	34.01	15.82	1	1	31.47
CBC106	Mersea Rd 30	35.88	15.82	0.1	1.5	28.22
CBC107	North Hill 49	32.33	13.75	0.1	2.3	24.20
CBC108	North Station Rd 39	29.87	13.31	0.1	2.5	22.44
CBC109	North Hill, Strada	34.52	13.75	1.5	0	34.52
CBC110	1A St Botolphs Street	32.37	15.82	2	0	32.37
CBC111	St John's Street, Lemon Tree	44.24	13.75	1.5	0	44.24
CBC112	High St George Hotel	30.44	15.82	2.5	0	30.44
CBC113	Orchard Gardens	26.21	15.41	3	15	21.20
CBC115	Harwich Road 18	27.48	14.75	7	0	27.48
CBC116	Harwich Road 19	21.10	14.75	12	0	21.10
CBC117	High Street 71	41.72	15.82	2	0	41.72
CBC118	North Station Road 120	30.05	13.31	2	0	30.05
CBC119	Claremont Heights	22.06	13.31	2	0	22.06
CBC123	131 Bergholt Road	22.00	12.27	3.82	0	22.00
CBC124	58 East Hill	38.95	14.75	2	0	38.95
CBC125	6 Bergholt Road	34.72	12.27	1	0	34.72
CBC126	Gilberd House Lexden Road	17.87	12.26	12	0	17.87
CBC127	West Side Brook Street Junction w/ East Hill	43.21	14.75	1	0	43.21

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CBC128	East Side Brook Street Junction w/ East Street	31.40	14.75	1	0	31.40
CBC129	37 Brook Street	45.30	14.75	1	0	45.30
CBC130	43 St John's Street	40.95	15.82	1	0	40.95
CBC131	Lucy Lane North	39.82	13.81	12	0	39.82
CBC132	Lucy Lane South	32.48	13.81	15	0	32.48
CBC133	East Mersea, Bromans Lane	12.33	7.79	2	N/A	N/A
CBC134	Aldham, Ford Street	18.12	9.48	0.3	2	15.27
CBC135	11 Bridge Farm Coggeshall Road	30.62	12.33	9	0	30.62
CBC136	85 Coggeshall Road	37.86	10.58	1	1	34.05
CBC137	93B Coggeshall Road	44.59	10.69	3	0	44.59

### Seasonal Adjustments

Diffusion tubes with less than 75% valid capture have been adjusted using the Defra annualisation tool and data from four regional sites:

- St Osyth (AURN rural background site)
- Rochester (AURN rural background site)
- Chignal St James (Chelmsford City Council rural background site)
- Southend (AURN urban background site)

**Table C.3 – Annualisation Calculations**

Site ID	Annualisation Factor St Osyth	Annualisation Factor Rochester	Annualisation Factor Chignal St James	Annualisation Factor Southend	Average Annualisation Factor	Raw Annual Mean	Annualised Annual Mean	Bias Adjusted & Annualised Annual Mean
CBC68	1.0968	1.2415	1.2395	1.2077	1.1964	24.1	28.8	26.78
CBC76	0.9330	0.8739	0.8491	0.8915	0.8869	37.1	32.9	30.59
CBC133	1.0557	1.3286	1.3507	1.2819	1.2542	10.5	13.2	12.27
CBC134	1.1522	0.8641	0.8195	0.9076	0.9359	22.9	21.5	18.91
CBC135	1.1073	1.1236	1.1121	1.1317	1.1187	36.5	40.8	30.62
CBC136	1.1073	1.1236	1.1121	1.1317	1.1187	45.1	50.5	37.86
CBC137	1.1073	1.1236	1.1121	1.1317	1.1187	53.1	59.5	44.59

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – AQMA 1

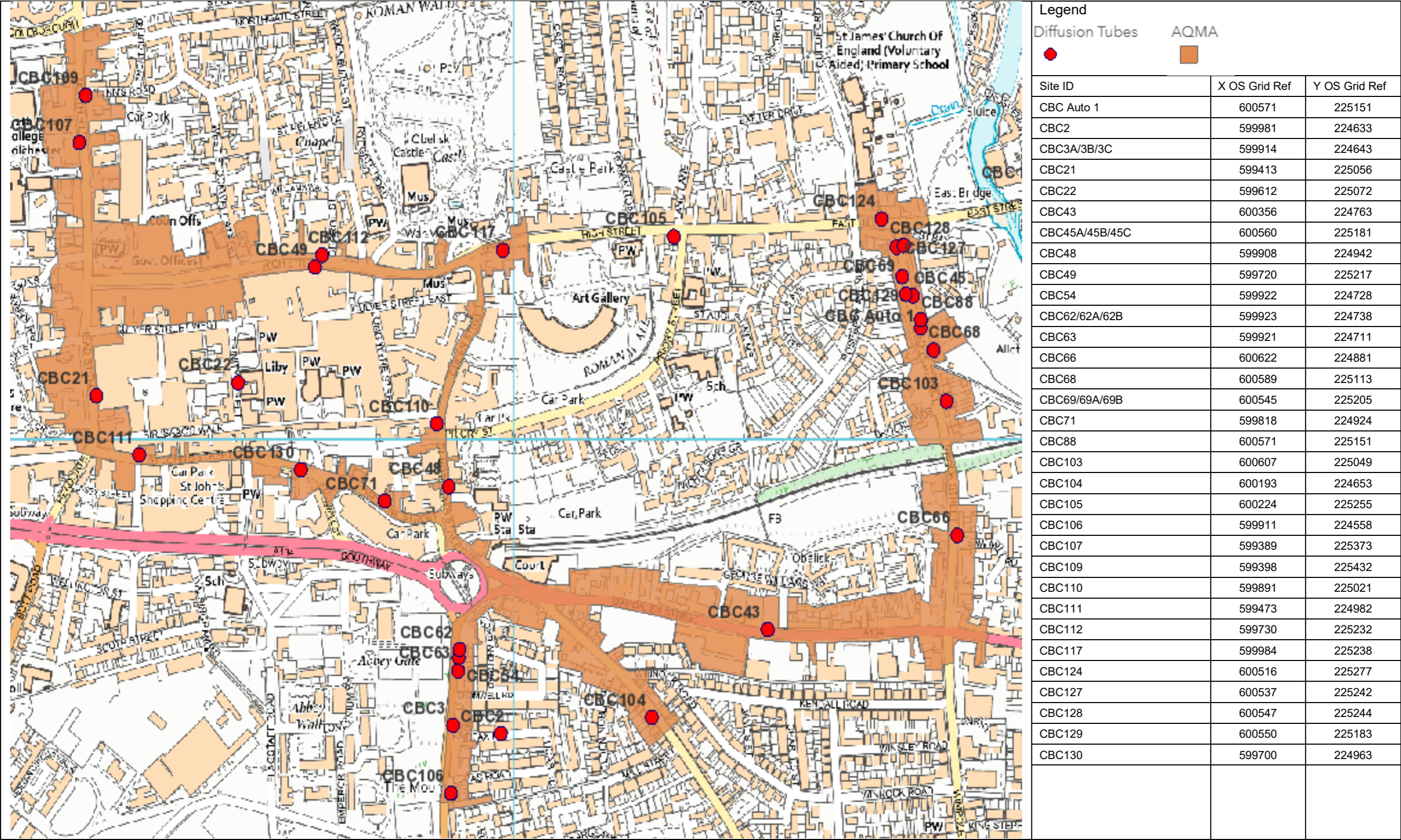


Figure D.2 – AQMA 2 & East Colchester

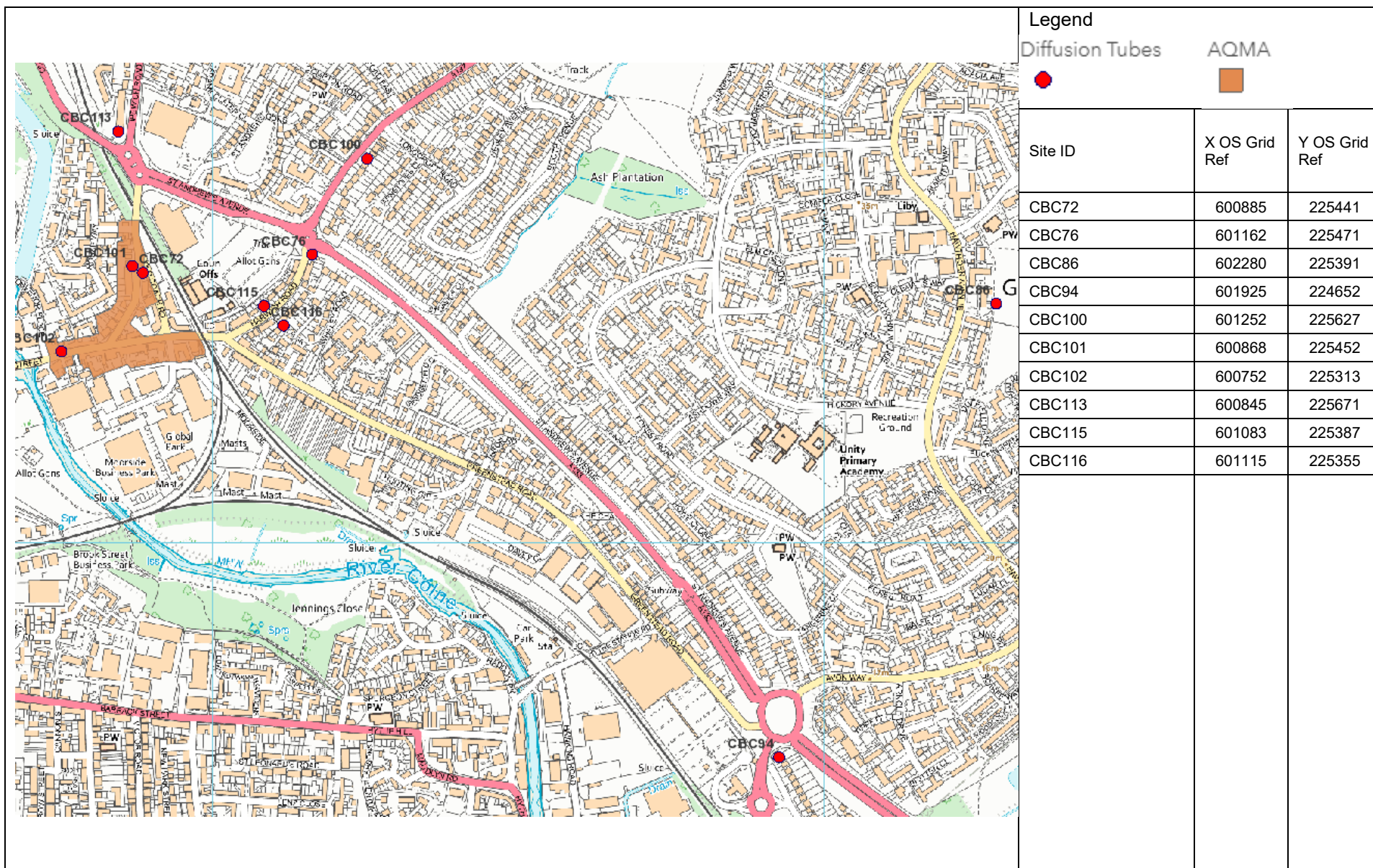




Figure D.3 – AQMA 4 & Stanway

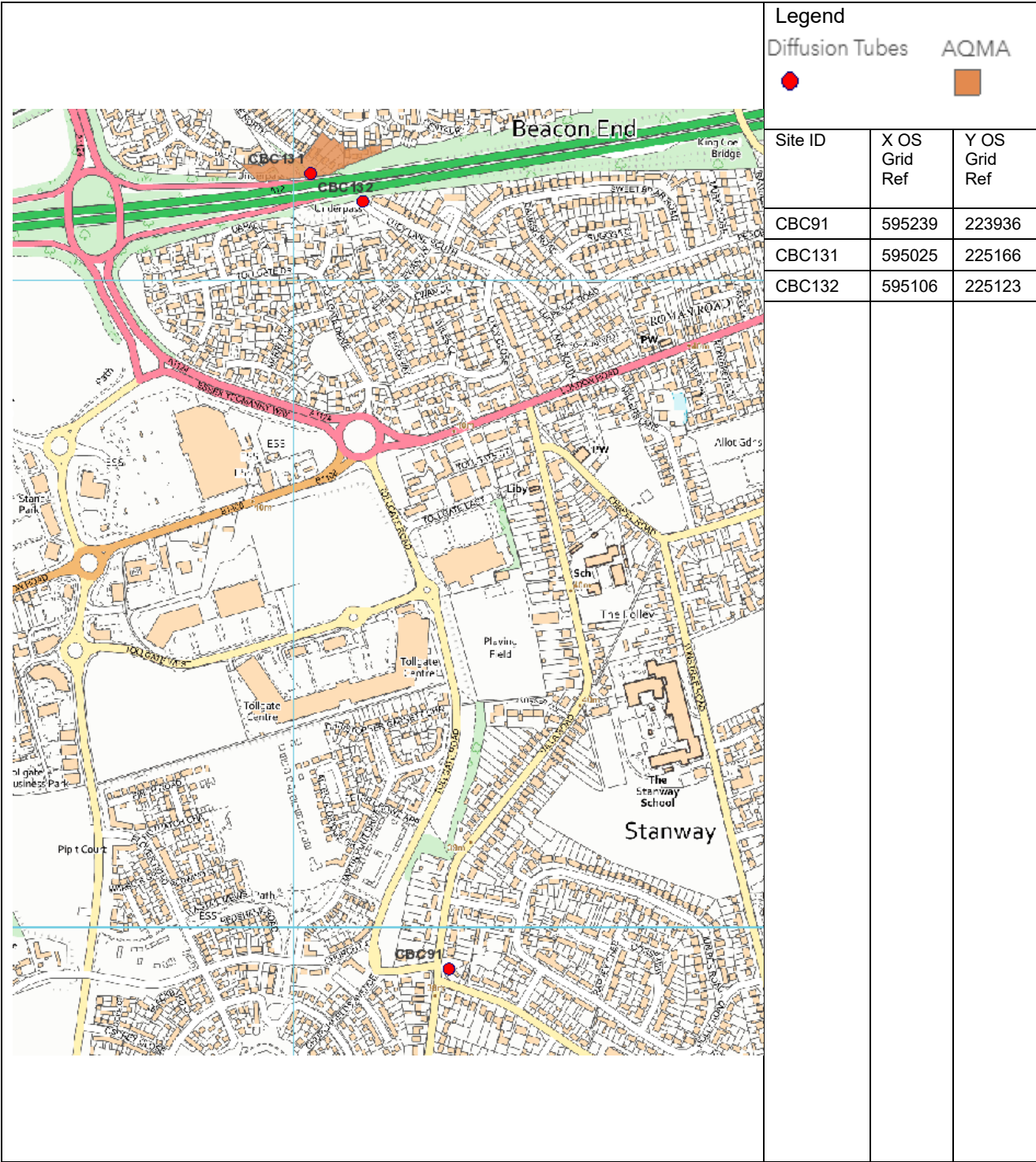


Figure D.4 – West Colchester

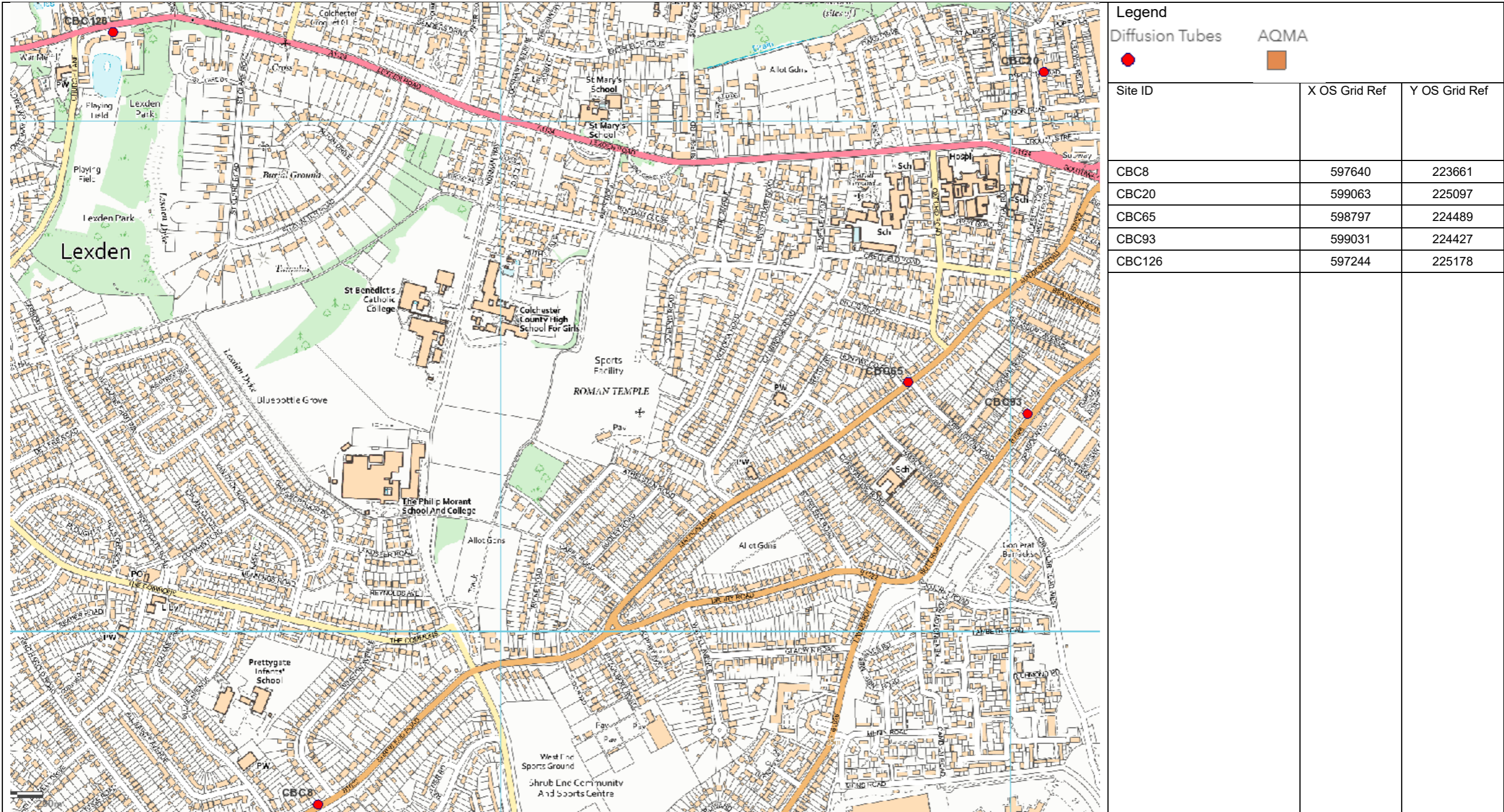


Figure D.5 – North Colchester

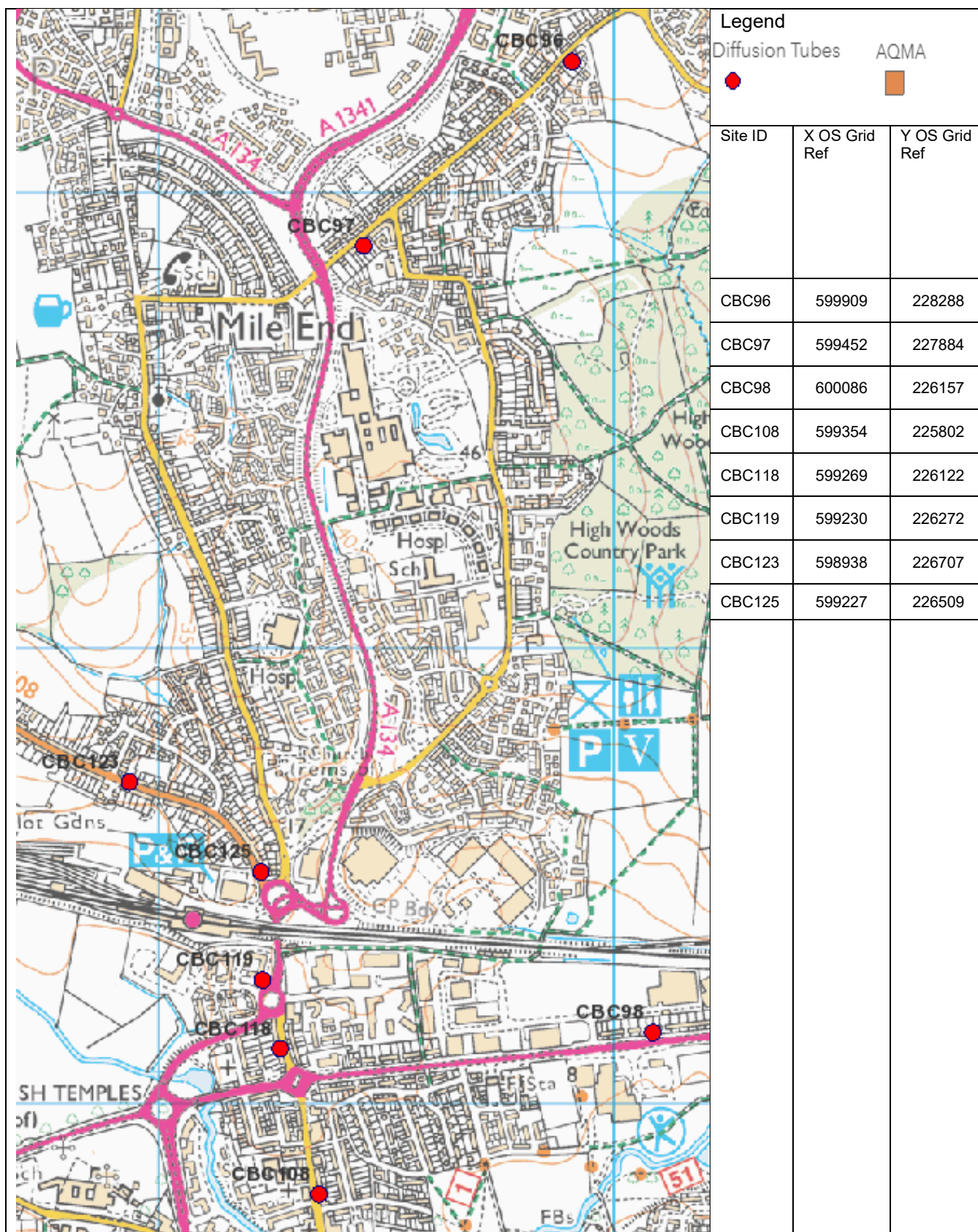


Figure D.6 – Marks Tey



Figure D.7 – Fordstreet

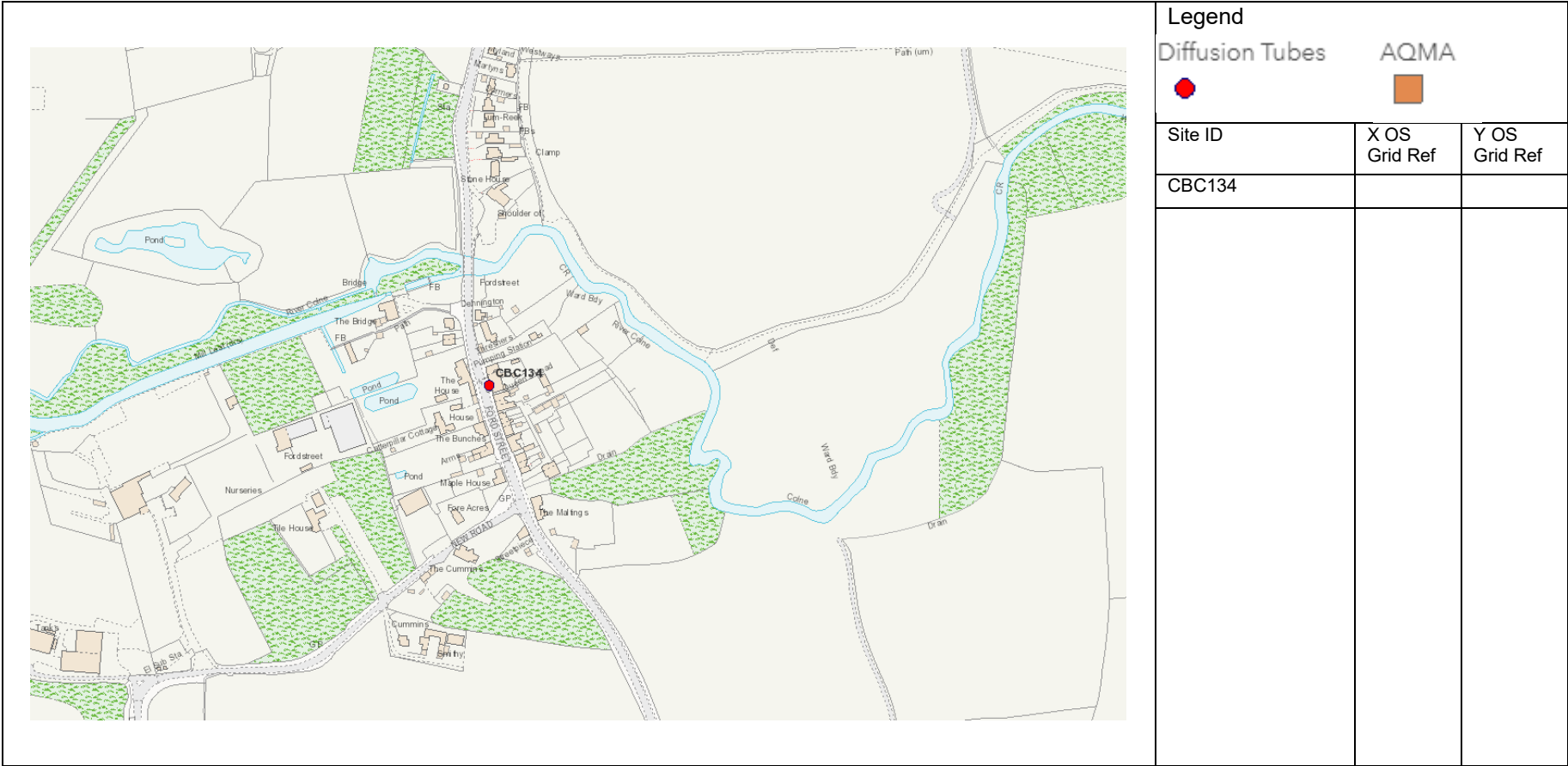
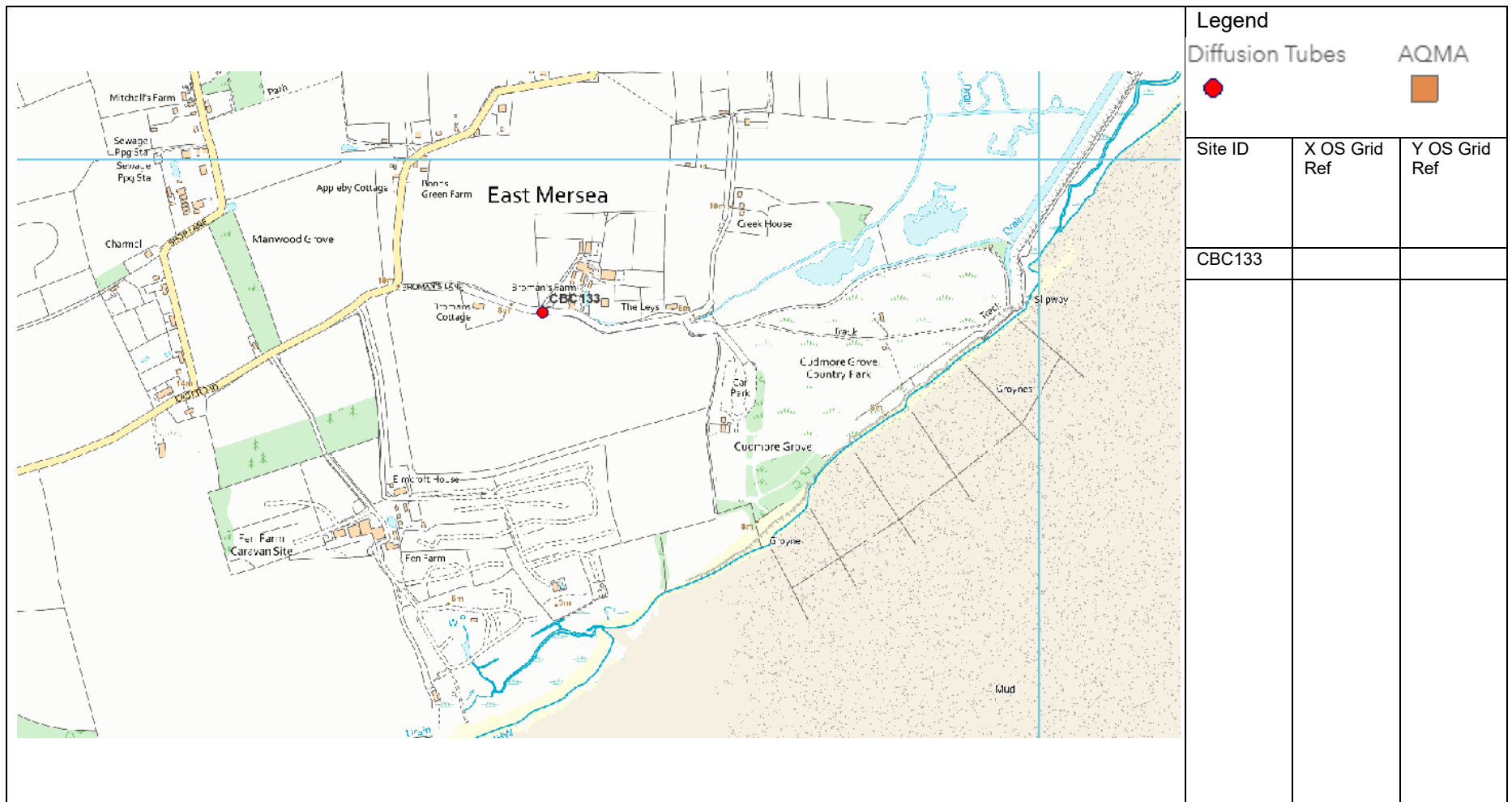


Figure D.8 – Mersea



## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>6</sup>	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

Table E.2 – Examples of Where the Air Quality Objectives Should Apply

Averaging Period	Nitrogen Dioxide (NO <sub>2</sub> ) Air Quality Objective <sup>7</sup>	
	Objectives should apply at:	Objectives should not generally apply at:
Annual Mean (40 µg/m <sup>3</sup> )	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.

<sup>6</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

<sup>7</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

Averaging Period	Nitrogen Dioxide (NO <sub>2</sub> ) Air Quality Objective <sup>7</sup>	
	Objectives should apply at:	Objectives should not generally apply at:
<p>1-hour Mean (200 µg/m<sup>3</sup> not to be exceeded more than 18 times a year)</p> <p>It can be considered that exceedances of the NO<sub>2</sub> 1-hour objective may occur at roadside sites if the annual mean is above 60µg/m<sup>3</sup></p>	<p>All locations where the annual mean and: 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.</p>	<p>Kerbside sites where the public would not be expected to have regular access.</p>



## Glossary of Terms

Abbreviation	Description
airTEXT	airTEXT is a free service for the public providing air quality alerts by SMS text message, email and voicemail and 3-day forecasts of air quality, pollen, UV and temperature
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'
AQIA	Air Quality Impact Assessment – Reports provided in support of planning applications.
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
CAZ	Clean Air Zone - Defined geographic areas used as a focus for action to improve air quality
CVTF	Clean Vehicle Technology Fund – A DfT fund that provides grants for upgrading vehicles to reduce emissions in areas of poor air quality
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EU	European Union
Euro Standard	Euro standards define the acceptable limits for exhaust emissions of new vehicles sold in EU and EEA member states.
HIA	Health Impact Assessment – A means of assessing the health impacts of policies, plans and projects in diverse economic sectors using quantitative, qualitative and participatory techniques.
LAQM	Local Air Quality Management
LEZ	Low Emission Zone - A defined area where access by certain polluting vehicles is restricted or deterred with the aim of improving the air quality.
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PEMS	Portable Emissions Measurement System – a method of monitoring vehicle emissions during operation
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SCRT	Selective Catalytic Reduction Technology – Retrofitted equipment to reduce bus emissions
SELEP	South East Local Enterprise Partnership
Street Canyon	Road which is flanked by buildings resembling a canyon
TEA	Triethanolamine – substance used in diffusion tubes for absorbing nitrogen dioxide
UK-AIR	An information resource providing in-depth information on air quality and air pollution in the UK. A range of information is available, from the latest pollution levels, pollution forecast information, a data archive, and details of the various monitoring networks.
UKAS	United Kingdom Accreditation Service

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