




2018 Air Quality Annual Status Report (ASR)

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

June 2018

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Executive Summary: Air Quality in Our Area

The 2018 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 2017, Colchester Borough Council measured exceedances of the Air Quality Objectives at relevant exposure. These exceedances took place within Air Quality Management Areas.

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^{1,2}.

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

Colchester is located in Mid Essex, fifty miles from London and has a population of over 176,008 (ONS, 2012). 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, A133, A134, A1232, Brook Street and Mersea Road.

As the oldest 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.

A map of the AQMAs can be found in Appendix F.

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

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

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

Actions to Improve Air Quality

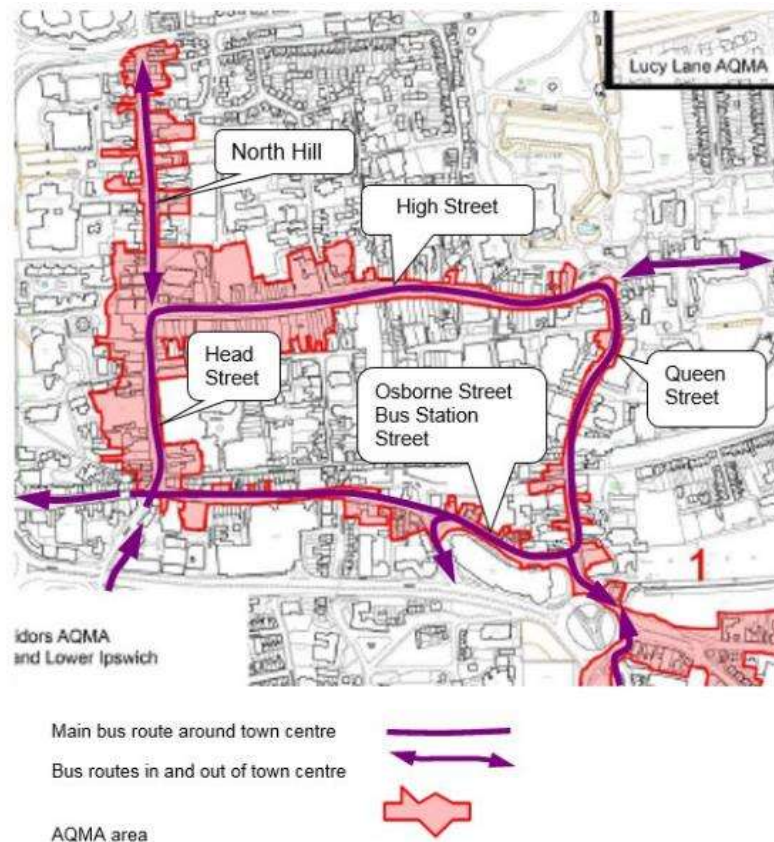
Bus Emissions

Colchester Borough Councils Air Quality Action Plan identified that bus emissions within Colchester Town Centre are a significant source of pollution along within AQMAs 1 & 2.

Following on from a successful bid in 2014 for the DfT Clean Vehicle Technology Fund where £194,000 was awarded to retrofit 10 buses, in 2017 Essex County Council working with Colchester Borough Council, Essex Air, Rochford District Council and Southend Borough Council successfully submitted a joint bid to the Clean Bus Technology fund for £1,072,500 to retrofit 60 buses with Selective Catalytic Reduction Technology (SCRT).

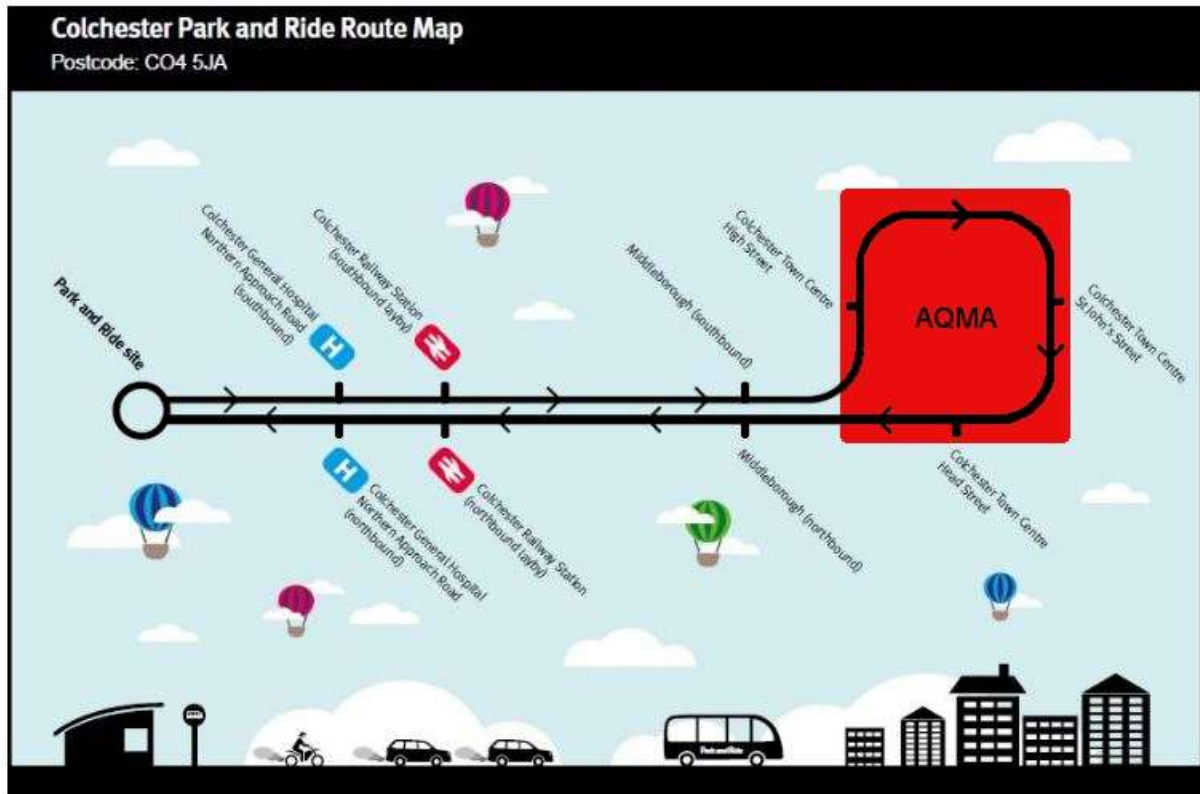
SCRT technology reduces emissions of NOx and NO2 by up to 95% and diesel particulate filters fitted to reduce particulate emissions. This allows buses to operate at the same emissions standard as new Euro VI buses.

Figure i.1 – Bus Corridors in Colchester Town Centre AQMA



Of the 60 upgraded buses, 18 will serve routes in and around the Colchester town centre AQMA including 6 buses dedicated to the Park & Ride.

Figure i.2 – Colchester Park & Ride Route Map



Dispersion modelling identified that an improved bus fleet with all emissions at a Euro VI standard would represent achieving compliance with the Air Quality Objectives at current monitoring locations.

The upgrade of these buses is a step closer to having the commercial bus fleet operating at Euro VI emissions levels which is the minimum standard for all classes of Clean Air Zone Framework.

Conclusions and Priorities

Brook Street

In 2016 Essex County Council carried out works to the junction between East Hill, East Street and Brook Street with the primary objectives of reducing congestion and improving air quality. The junction sees the convergence of east-west town centre traffic and recent growth in residential traffic has seen high levels of queuing develop along Brook Street with corresponding poor air quality.

The mini roundabout was replaced with a signalised junction with adaptive traffic light technology to optimise traffic flows. However, in 2017 measured air quality has shown an increase in nitrogen dioxide (NO₂) concentrations. In addition, there have been complaints that queue lengths have not reduced following the works.

Colchester Borough Council have advised Essex County Council who will be undertaking the following works in 2018:

- Monitor queue lengths during peak times
- Undertake traffic counts to identify if the queue lengths are as a result of increased traffic volumes, issues with the phasing of the traffic lights or a combination of factors

These works will help identify changes that could be made to reduce congestion and improve air quality along Brook Street.

Taxi Emissions

Colchester Borough Council has undertaken a consultation upon a new Hackney Carriage and Private Hire Vehicle Licensing Policy. The policy proposes the following measures relating to emissions:

- Minimum emissions standard Euro 5 for diesel vehicles / Euro 4 for petrol from 2018
- Minimum emission standard Euro 6 for diesel vehicles / Euro 4 for petrol from 2020
- From 2025 all new registrations to meet an LPG, low emission or electric hybrid standard
- Drivers of licensed vehicles are required to turn off their engines when waiting in the AQMAs

It is anticipated that this policy will be ratified in 2018.

No Idling Policies

In addition to proposed requirements that prevent taxis from idling when waiting in AQMAs, Colchester Borough Council and Colchester Borough Homes are developing a no idling policy to cut down air pollution across the borough.

The new policy will mean that 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 adopt the 'No Idling' policy and switch off their vehicle engines when stationary.

The policy will also be introduced at all Council office premises including Rowan House and Shrub End, where new signage will encourage drivers to support the campaign by turning off their vehicle's engine when stationary.

This policy will be implemented in 2018.

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.3 - Essex Air Twitter Air Quality Notifications

ESSEX **Essex Air**
@EssexAir

Essex AQ Forecast MODERATE
[#airpollution](#) for Mon/Tue
Localised areas of HIGH pollution near busy roads
Health advice airtext.info/health

Monday 23 January	Tuesday 24 January
Moderate Action may be required. Health effects are unlikely to require action. If unwell, contact GP.	Moderate Action may be required. Health effects are unlikely to require action. If unwell, contact GP.
Low No action required. You can safely stay outside.	Low No action required. You can safely stay outside.
Low	Low
Max. Day 3°C/37°F Min. Night -2°C/28°F	Max. Day 5°C/41°F Min. Night -1°C/30°F

RETWEET 1

8:18 AM - 23 Jan 2017

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.

Colchester Borough Council

The Colchester Travel Plan [Club](#) was formed in 2004 by several local organisations who needed to manage their demand for car parking and who were concerned about the impact of local traffic congestion on their business, the community and the environment.

The organisation works with a range of businesses and organisations which include University of Essex, Colchester Hospital University Foundation Trust, Colchester Borough Council, Defence Support Group and Click4Quote.

The Colchester Travel Plan Club is working on a number of projects:

LOVE_{UR}CAR Colchester is a fun and innovative Defra funding project led by Colchester Travel Plan Club in partnership with Colchester Borough Council's Air Quality Team. The project encourages greener driving in



Colchester for those journeys that have to be made by car through regular promotions and competitions. Visit www.loveurcarcolchester.co.uk to find out more!

Cycle Colchester aims to get more people cycling, safely. The Travel Plan Club leads on Events and Training in partnership with the local voluntary cycling community and with support from



Essex County Council and Colchester Borough Council. For more information and to sign up to the monthly e-newsletter visit www.cyclecolchester.org.uk

North Colchester Business Park is situated on the outskirts of Colchester. Across the park there is high demand for



car parking, traffic congestion at peak times and a wide variety of varying sized businesses. The Travel Plan Club want to work with as many businesses as possible on the park to collectively help ease the pressure on parking, identify and lobby for infrastructure improvements and promote sustainable travel options as part of an ambition to develop an Area Travel Plan.

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1 Local Air Quality Management

This report provides an overview of air quality in Colchester during 2017. 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.2 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.

The 2017 Air Quality Annual Status Report was submitted to Defra with proposals to amend the AQMA order:

- Extend AQMA 1 Central Corridors
- Revoke AQMA 3 Harwich Road / St Andrew's Junction

Defra supported these proposals but their appraisal also recommended that consideration should be given to removing the designation of the hourly mean objective for AQMA1 Central Corridors.

Colchester Borough Council has undertaken these amendments and the current AQMA Order can be found in Appendix F.

A summary of the 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

Appendix D which provides for a map of air quality monitoring locations in relation to the AQMAs

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan		
						At Declaration	Now	Name	Date of Publication	Link
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	65.9µg/m ³	48.55µg/m ³	Healthier Air For Colchester - Air Quality Action Plan 2016-2021	April 2016	http://www.essexair.org.uk/Reports/Colchester_AQ_Action_Plan.pdf
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	45.2µg/m ³	38.43µg/m ³			
Area 4 - Lucy Lane North, Stanway	Declared January 2012, Amended February 2013	NO2 Annual Mean	Stanway, Colchester	Lucy Lane North, Stanway	YES	55.3µg/m ³	46.08µg/m ³			

Colchester Borough Council is in the process of updating the AQMA information on UK-AIR

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

Colchester Borough Councils air quality measures can be found in the Healthier Air for Colchester 2016-2021 air quality action plan.

Updates for measures contained within the air quality action plan can be found in Table 2.2 below:

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	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)	Colchester Borough Council / Essex County Council	2017	Unknown	Implementation	Setting Minimum Standards for Bus & Taxi Emissions	Minimum Standards for Taxis have been through consultation but not yet approved. Minimum Bus Standards yet to be developed	2019	
2	Consider Air Quality during updates to strategic transport documents, such as the Essex LTP	Policy Guidance and Development Control	Other policy	Essex County Council			Inclusion of Air Quality related policy	Not quantified	No progress to date	Ongoing	
3	Consider Air Quality as part of Local Highways Panel schemes.	Policy Guidance and Development Control	Other policy	Essex County Council			The effect of Air Quality being considered within traffic schemes	Reduced vehicle emissions / exposure	No progress to date		
4	Identify traffic 'bottlenecks'	Traffic Management	Other	Colchester Borough Council			Reduced vehicle emissions	Not quantified	No progress to date		

Colchester Borough Council

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	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	Colchester Borough Council / Essex County Council			Reduced vehicle emissions as a consequence of improved traffic flow	Not quantified	No progress to date		
7	Health Impact Assessment	Policy Guidance and Development Control	Other policy	Colchester Borough Council / Essex County Council	2016		N/A	N/A	Data collection / Research		Difficulties developing a suitable methodology
8	Joint Strategic Needs Assessment	Policy Guidance and Development Control	Other policy	Essex County Council				N/A	No progress to date		Reliance upon another authority
9	Policy influence	Policy Guidance and Development Control	Other policy	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	Colchester Borough Council	2015	2016	Number of subscribers	N/A	Complete	2016	

Colchester Borough Council

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	Colchester Borough Council	See comments	See comments	N/A	N/A	In progress	See comments	Ongoing process
12	Implementation of Low Emission Strategy	Policy Guidance and Development Control	Low Emissions Strategy	Colchester Borough Council	2016	2016-2021	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	Colchester Borough Council	2016	See comments	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	Colchester Borough Council	2016	2017	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	Colchester Borough Council	2016	2016	Number of contracts awarded based on sustainability evaluation	Not Quantified	Complete	Complete	

Colchester Borough Council

16	Public Service Vehicle Procurement	Promoting Low Emission Transport	Public Vehicle Procurement -Prioritising uptake of low emission vehicles	Colchester Borough Council	See Comments	See Comments	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 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	Colchester Borough Council	2017	2018	Reduced emissions	Not quantified	Policy has been through consultation but not yet approved	Estimated September 2018	
18	Require taxis to turn off engines when idling in the AQMAs	Promoting Low Emission Transport	Taxi Licensing conditions	Colchester Borough Council	2017	2018	Reduced emissions within AQMAs	Not quantified	Policy has been through consultation but not yet approved	Estimated September 2018	
19	Explore whether the creation of exclusive LEV/ULEV 'green' taxi bays would be feasible	Promoting Low Emission Transport	Taxi emission incentives	Colchester Borough Council	2017	2018	Reduced emissions within AQMAs	Not quantified	Proposed policy to be presented to Licensing Committee	Estimated 2019	New Taxi Licensing Policy with a requirement for new Taxis to be ULEV after 2026 yet to be approved. Once approved this will all this work to go ahead
20	Explore whether the creation of rapid charging facilities for ULEV taxis	Promoting Low Emission Transport	Taxi emission incentives	Colchester Borough Council	2017	2018	Reduced emissions within AQMAs	Not quantified	Proposed policy to be presented to Licensing Committee	Estimated 2019	New Taxi Licensing Policy with a requirement for new Taxis to be ULEV after 2026 yet to be approved. Once approved this will all this work to go ahead

Colchester Borough Council

21	Encourage Park & Ride use	Alternatives to private vehicle use	Bus based Park & Ride	Colchester Borough Council / Essex County Council	2016	2017	Number of Users	Not quantified	Complete	Ongoing Process	Park & Ride service to be relaunched and marketed with a new stop at the hospital
22	Investment in walking and cycling infrastructure	Transport Planning and Infrastructure	Cycle network	Colchester Borough Council / Essex County Council	See Comments	See Comments	Reduced Car Use	Not quantified	See Comments	See Comments	Ongoing Process
23	Encourage walking and cycling over car use	Promoting Travel Alternatives	Promotion of walking	Colchester Borough Council	See Comments	See Comments	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	Colchester Borough Council	N/A	N/A	Reduced Car Use	Not quantified	No Progress to Date however a private scheme is being operated where some companies in North Colchester rent spaces from the Rugby Club and Stadium then car share or walk to their businesses.		

Colchester Borough Council

25	Attract New Companies to the Colchester Club Travel Plan scheme / Love Ur Car Colchester	Alternatives to private vehicle use	Car Clubs	Colchester Borough Council	2016	See Comments	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	Colchester Borough Council	2016	See Comments	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	Colchester Borough Council / Essex County Council	2016	See Comments	Reduced Car Use	Not quantified		See Comments	Ongoing Process
28	Promotion of reduced pollution walking routes	Promoting Travel Alternatives	Personalised Travel Planning	Colchester Borough Council	2016		Improved Public Health	Not quantified	Evaluation of options	No date set	Funding
29	Provide Exposure Reduction Tips	Public Information	Other	Colchester Borough Council	2016	2017	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	Colchester Borough Council	2017	No date set. See comments	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

Colchester Borough Council

31	Work with local bus operators to retrofit old buses	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	Colchester Borough Council	2017	No date set. See comments	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.	2018	Grant funding opportunities
32	Promotion of PLUSBUS	Promoting Travel Alternatives	Other	Colchester Borough Council	2017	2017	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	Essex County Council	2016	See Comments	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	Colchester Borough Council	2016	2016	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	Colchester Borough Council	Not yet started			Not quantified			Officer Time / Resources / Funding
36	Fleet Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Colchester Borough Council	Not yet started			Not quantified			Officer Time / Resources / Funding

Colchester Borough Council

37	Electric Vehicle Charging Infrastructure	Promoting Low Emission Transport	Other	Colchester Borough Council	2016	2017	Number of charging units installed	Not quantified	A number of developments have had planning conditions applied to provision 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	Colchester Borough Council	2016	See comments	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	Colchester Borough Council	N/A	N/A	N/A	N/A	N/A	N/A	Growth and development of Garden Cities are a long term plan

Colchester Borough Council

40	Prevent new developments from creating street canyons	Other	Other	Colchester Borough Council	2016	2016	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 Policy	
41	Campaign to Central Government for the creation of a low emission, diesel free economy	Other	Other	Colchester Borough Council	N/A		N/A	Not quantified	Response made to National Air Quality Plan Consultation. Will Respond to the 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	Colchester Borough Council	Not yet started		N/A	Not quantified			

Colchester Borough Council

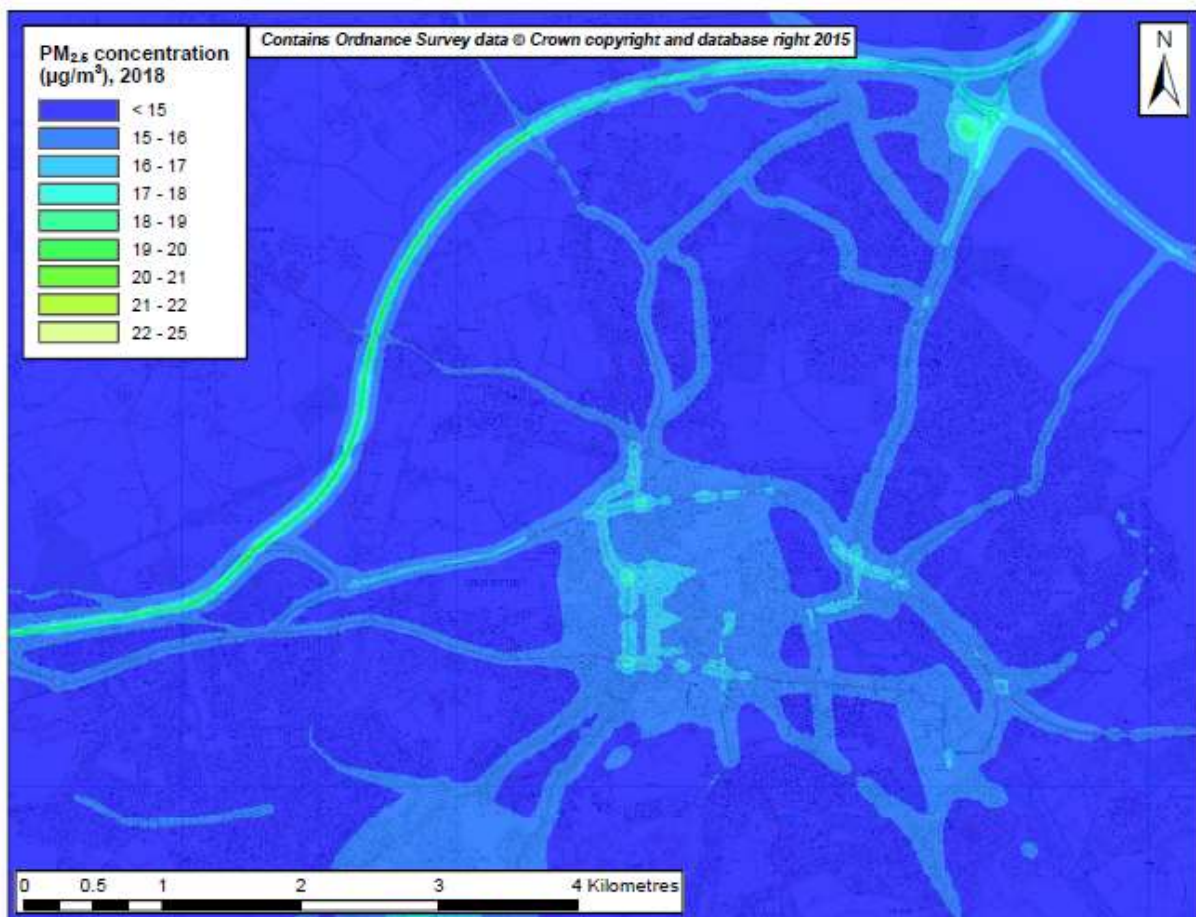
43	No Idling Policy	Policy Guidance and Development Control	Low Emissions Strategy	Colchester Borough Council & Colchester Borough Homes	2017	2018	N/A	0.1ug/m3	Policy Implemented	2018	Drivers of CBC and CBH vehicles (except for recycling and rubbish collection vehicles when collecting refuse and street 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
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2.3 PM_{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations

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

Colchester Borough Council does not monitor PM_{2.5} however a baseline emissions modelling study identified that the average across the urban area was between 16-18µg/m³ and that Colchester does not breach the National Air Quality Objectives for PM_{2.5}.

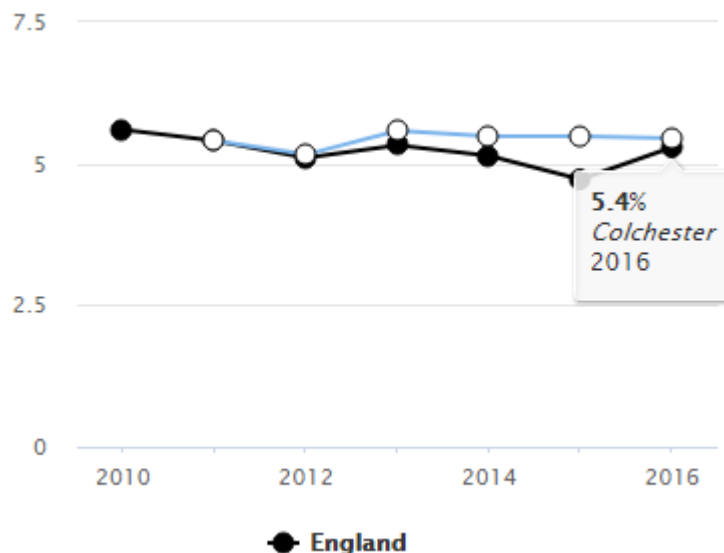
Figure 2.1 – Predicted Annual Average PM_{2.5} Concentrations (2018) in Colchester



Colchester Borough Council

The Council notes the Public Health Outcomes Framework indicator 3.01 – Fraction of mortality attributable to particulate (PM_{2.5}) air pollution which for 2016 gave a value of 5.4% which has reduced from 2015. This value is broadly similar to other authorities within the region.

Figure 2.2 - Public Health Framework Indicator 3.01 Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution



Colchester Borough Council is taking the following measures to address PM_{2.5}:

- Regular inspections of industrial processes permitted by Colchester Borough Council where combustion and non-combustion processes could lead to anthropogenic emissions of PM_{2.5}
- Working to deliver major improvement [schemes](#). In addition to reduced exhaust emissions, these schemes will reduce non-exhaust emissions from brake and tyre wear by making traffic flows smoother.
- Air Quality Action Plan measures are primarily aimed at reducing the exposure of residents within the AQMA to NO₂, however the measures and initiatives are likely to have a positive effect on the reduction of Particulate Matter PM_{2.5}

Colchester Borough Council is currently working on a methodology to carry out an Air Quality Health Impact Assessment. This report will include an assessment of PM_{2.5} in Colchester and its impact on Public Health.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Colchester Borough Council undertook automatic (continuous) monitoring at 1 site during 2017.

Table A.4 in Appendix A provides detail of the site.

Maps showing the location of the monitoring sites are provided in Appendix D. Details on Quality Assurance/Quality Control (QA/QC) for the automatic monitor is included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Colchester Borough Council undertook non-automatic (passive) monitoring of NO₂ at 62 sites during 2017. Table A.5 in Appendix A provides detail of these sites.

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, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.6 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

Table A.4 in Appendix A provides 1-Hour Mean monitoring results.

Figure A.1 in Appendix A provides historical monitoring information from a range of monitoring sites within Colchester.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

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In 2017 Colchester Borough Council monitored exceedances of the NO₂ annual mean objective at 11 sites. All of these exceedances were within existing AQMA 1 & 4. 9 of the exceedances were at Air Quality Objectives at relevant exposure.

No exceedances were measured in AQMA 2.

The measured concentration of NO₂ at CBC122 Lucy Lane North of 59.46µg/m³ is almost at the threshold of 60µg/m³ which is an indication that an exceedance of the 1-hr mean objective may occur. The monitoring site is not at relevant exposure and sited road side of a large fence meaning that it is not in an area which the public could access.

No changes are required to the Air Quality Management Areas.

Appendix A: Monitoring Results

Table A.4 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
CBC Auto1	Brook Street	Roadside	600571	225141	NO2	Y	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.5 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
CBC2	Fairax Road, 21	Urban	599981	224633	NO ₂	NO	2	1.1	NO	2.5
CBC3	Mersea Road, 21	Roadside	599914	224643	NO ₂	YES	0.5	1.9	NO	2.5
CBC8	Shrub End Road, 105/107	Roadside	597640	223661	NO ₂	NO	17	1.2	NO	2.5
CBC17	Hills Crescent	Suburban	597187	224260	NO ₂	NO	8	0.4	NO	2.5
CBC20	Papillon Road	Urban Background	599063	225097	NO ₂	NO	4	1.2	NO	2.5
CBC21	Head Street	Roadside	599413	225056	NO ₂	YES	2	0.6	NO	2.5
CBC22	Trinity Street- Christian Science Society	Urban centre	599612	225072	NO ₂	NO	4	1.2	NO	2.5
CBC43	Magdalen Street	Roadside	600356	224763	NO ₂	YES	9	0.4	NO	2.5
CBC45	Brook Street, 28/30	Roadside	600560	225181	NO ₂	YES	0	1	NO	2.5
CBC46	Worcester Road, 44	Urban background	600376	225674	NO ₂	NO	15	1.6	NO	2.5
CBC48	Queen Street, 35	Roadside	599936	225140	NO ₂	YES	0	1.5	NO	2.5
CBC49	High Street - Brighthouse	Kerbside	599720	225217	NO ₂	YES	0	0.5	NO	2.5
CBC54	Mersea Road, 10	Roadside	599922	224728	NO ₂	YES	1.6	1.8	NO	2.5

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CBC58	Lucy Lane South Monitor	Suburban	595094	225099	NO2	NO	23	5	NO	2.5
CBC59	Lucy Lane North, Terala	Suburban	595031	225196	NO2	YES	0	42	NO	2.5
CBC62	Mersea Road, 9	Roadside	599923	224738	NO2	YES	0	2.9	NO	2.5
CBC62A	Mersea Road, 9	Roadside	599923	224738	NO2	YES	0	2.9	NO	2.5
CBC62B	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 60	Roadside	600594	225103	NO2	YES	1	8.7	NO	2.5
CBC69A	Brook Street 23	Roadside	600545	225205	NO2	YES	0	1.1	NO	2.5
CBC69B	Brook Street 23	Roadside	600545	225205	NO2	YES	0	1.1	NO	2.5
CBC69	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
CBC78	London Road Marks Tey, Damerosehay	Roadside	591255	223366	NO2	NO	10	0.1	NO	1.5
CBC82	Dale Close	Suburban	594822	225232	NO2	NO	1.4	2.4	NO	2.5
CBC85	St Johns Green	Urban Background	599684	224817	NO2	NO	0	0.3	NO	2.5

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CBC86	Hawthorn Av Gardenia Walk	Urban Background	602280	225391	NO2	NO	0	50	NO	2.5
CBC88	Brook Street 48 (Auto Monitor)	Roadside	600571	225151	NO2	NO	0	2.6	YES	2.5
CBC88A	Brook Street 48 (Auto Monitor)	Roadside	600571	225151	NO2	NO	0	2.6	YES	2.5
CBC88B	Brook Street 48 (Auto Monitor)	Roadside	600571	225151	NO2	NO	0	2.6	YES	2.5
CBC89	London Rd 220 Marks Tey	Roadside	591036	223163	NO2	NO	17	6	NO	2.5
CBC90	London Rd 170 Marks Tey	Roadside	591312	223431	NO2	NO	12	2	NO	2.5
CBC91	Blackberry Rd 2	Roadside	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
CBC95	Greenstead House	Roadside	601778	224821	NO2	NO	4	7	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	225960	NO2	NO	5	2	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

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CBC108	North Station Rd 39	Roadside	599354	225802	NO2	YES	2.5	0.1	NO	2.5
CBC109	North Hill, Strada	Roadside	599398	225432	NO2	YES	0	1.5	NO	2.5
CBC110	Queen St Showboat	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	YES	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
CBC121	Priory Street 59	Kerbside	600229	225208	NO2	NO	0	0.1	NO	2.5
CBC122	Lucy Lane North, A12	Roadside	595037	225160	NO2	YES	9	6	NO	2.5
CBC123	131 Bergholt Road	Roadside	598938	226707	NO2	NO	0.15	3.82	NO	2.5
CBC124	58 East Hill	Roadside	600516	225277	NO2	YES	0.15	2	NO	2.5

Notes:

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

(2) N/A if not applicable.

Table A.6 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
CBC Auto 1	Roadside	Automatic	89.99	89.99	29.53	27.97	28.57	27.37	29.13
CBC2	Urban	Diffusion Tube	100	100	30.41	31.12	29.24	30.86	31.19
CBC3	Roadside	Diffusion Tube	92	92	65.90	63.90	52.64	59.96	48.23
CBC8	Roadside	Diffusion Tube	100	100	25.72	24.01	22.28	24.74	23.53
CBC17	Suburban	Diffusion Tube	100	100	19.05	17.84	16.60	18.96	17.98
CBC20	Urban Background	Diffusion Tube	100	100	21.24	19.40	18.18	20.16	20.64
CBC21	Roadside	Diffusion Tube	100	100	50.06	47.75	46.82	51.11	44.95
CBC22	Urban Centre	Diffusion Tube	100	100	21.36	21.19	19.68	21.17	20.87
CBC43	Roadside	Diffusion Tube	100	100	37.74	36.98	33.26	33.59	31.94
CBC45	Roadside	Diffusion Tube	100	100	55.19	50.96	43.74	43.46	45.70
CBC46	Urban Background	Diffusion Tube	100	100	20.14	17.89	16.65	18.25	18.26
CBC48	Roadside	Diffusion Tube	100	100	43.84	44.55	34.24	40.72	35.35
CBC49	Kerbside	Diffusion Tube	75	75	39.60	37.66	35.97	39.17	40.52
CBC54	Roadside	Diffusion Tube	100	100	45.07	31.12	42.99	46.95	42.19
CBC58	Suburban	Diffusion Tube	100	100	29.00	29.12	28.63	32.17	27.34
CBC59	Suburban	Diffusion Tube	100	100	32.39	33.34	29.66	32.97	32.94
CBC62/CBC62A/CBC62B (TriPLICATE)	Roadside	Diffusion Tube	97	97	44.00	45.50	38.78	42.61	39.22
CBC63	Roadside	Diffusion Tube	100	100	48.34	48.94	43.17	47.40	43.92
CBC65	Roadside	Diffusion Tube	100	100	25.79	26.63	25.19	26.22	25.29
CBC66	Roadside	Diffusion Tube	100	100	28.09	28.49	25.83	24.99	26.54

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CBC68	Roadside	Diffusion Tube	100	100	25.66	24.67	23.55	22.20	22.15
CBC69/CBC69A/CBC69B (TriPLICATE)	Roadside	Diffusion Tube	97	97	47.00	47.32	45.63	44.33	48.55
CBC71	Roadside	Diffusion Tube	92	92	54.60	52.55	50.17	50.92	43.25
CBC72	Roadside	Diffusion Tube	100	100	33.57	33.57	31.90	34.64	32.14
CBC76	Roadside	Diffusion Tube	100	100	33.73	34.27	30.68	33.40	31.09
CBC78	Roadside	Diffusion Tube	100	100	28.37	29.36	24.16	26.86	23.73
CBC82	Suburban	Diffusion Tube	100	100	27.30	27.70	24.63	27.05	26.38
CBC85	Urban Background	Diffusion Tube	100	100	24.05	22.22	20.00	23.04	22.18
CBC86	Urban Background	Diffusion Tube	100	100	18.51	17.79	17.85	17.61	18.62
CBC88/CBC88A/CBC88B	Roadside	Diffusion Tube	97	97	29.00	30.03	27.55	26.78	27.90
CBC89	Roadside	Diffusion Tube	100	100	30.38	28.29	25.87	28.26	26.16
CBC90	Roadside	Diffusion Tube	100	100	27.35	29.11	25.25	27.98	26.58
CBC91	Roadside	Diffusion Tube	100	100	25.20	23.63	20.45	22.65	22.36
CBC93	Roadside	Diffusion Tube	100	100	23.28	20.87	19.48	20.99	20.74
CBC94	Roadside	Diffusion Tube	100	100	27.29	25.16	27.25	29.47	27.49
CBC95	Roadside	Diffusion Tube	100	100	32.66	30.02	28.11	32.10	29.58
CBC96	Roadside	Diffusion Tube	100	100	21.17	21.23	18.71	20.45	20.81
CBC97	Roadside	Diffusion Tube	100	100	26.97	26.96	25.37	28.39	25.79
CBC98	Roadside	Diffusion Tube	100	100	24.09	22.86	20.72	22.44	22.09
CBC99	Roadside	Diffusion Tube	100	100	23.39	23.47	22.11	24.58	24.29
CBC100	Roadside	Diffusion Tube	100	100	30.06	32.19	31.39	30.36	29.25
CBC101	Roadside	Diffusion Tube	100	100	37.08	37.72	35.78	35.95	36.51
CBC102	Roadside	Diffusion Tube	100	100	42.39	41.70	41.38	42.93	38.43
CBC103	Roadside	Diffusion Tube	100	100	29.31	29.76	26.12	24.90	26.80
CBC104	Roadside	Diffusion Tube	100	100	29.35	29.56	26.42	28.91	27.88

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CBC105	Roadside	Diffusion Tube	100	100	34.27	35.37	35.50	36.21	33.10
CBC106	Roadside	Diffusion Tube	100	100	36.79	39.19	33.16	38.72	35.60
CBC107	Roadside	Diffusion Tube	100	100	34.37	31.00	28.83	30.95	30.47
CBC108	Roadside	Diffusion Tube	100	100	32.67	32.18	29.57	30.90	29.61
CBC109	Roadside	Diffusion Tube	100	100	38.03	32.57	31.13	33.00	31.16
CBC110	Roadside	Diffusion Tube	100	100	38.42	35.93	31.57	31.21	31.50
CBC111	Urban Centre	Diffusion Tube	100	100	43.08	40.95	40.88	42.31	42.83
CBC112	Urban Centre	Diffusion Tube	100	100	33.59	30.25	30.71	31.80	32.54
CBC113	Roadside	Diffusion Tube	100	100	27.64	31.27	26.01	26.78	27.41
CBC115	Roadside	Diffusion Tube	100	100	26.60	27.74	27.47	29.66	28.02
CBC116	Roadside	Diffusion Tube	100	100	22.28	22.96	20.45	22.42	20.37
CBC117	Roadside	Diffusion Tube	100	100	39.64	43.81	39.44	44.37	41.08
CBC118	Roadside	Diffusion Tube	100	100	34.82	31.52	31.21	30.79	29.57
CBC119	Roadside	Diffusion Tube	100	100	23.89	22.64	21.50	20.74	20.93
CBC121	Roadside	Diffusion Tube	92	92	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	23.14	21.69
CBC122	Roadside	Diffusion Tube	100	100	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	64.64	59.46
CBC123	Roadside	Diffusion Tube	83	83	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	21.04
CBC124	Roadside	Diffusion Tube	50	50	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	39.76

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

Notes:

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

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

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

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

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

Figure A.2 – Trends in Annual Mean NO₂ Concentrations

The chart below contains data from a range of monitoring sites in Colchester.

- Concentrations at background locations are stable
- Concentrations at monitoring locations exposed to more traffic emission are trending slightly downwards.

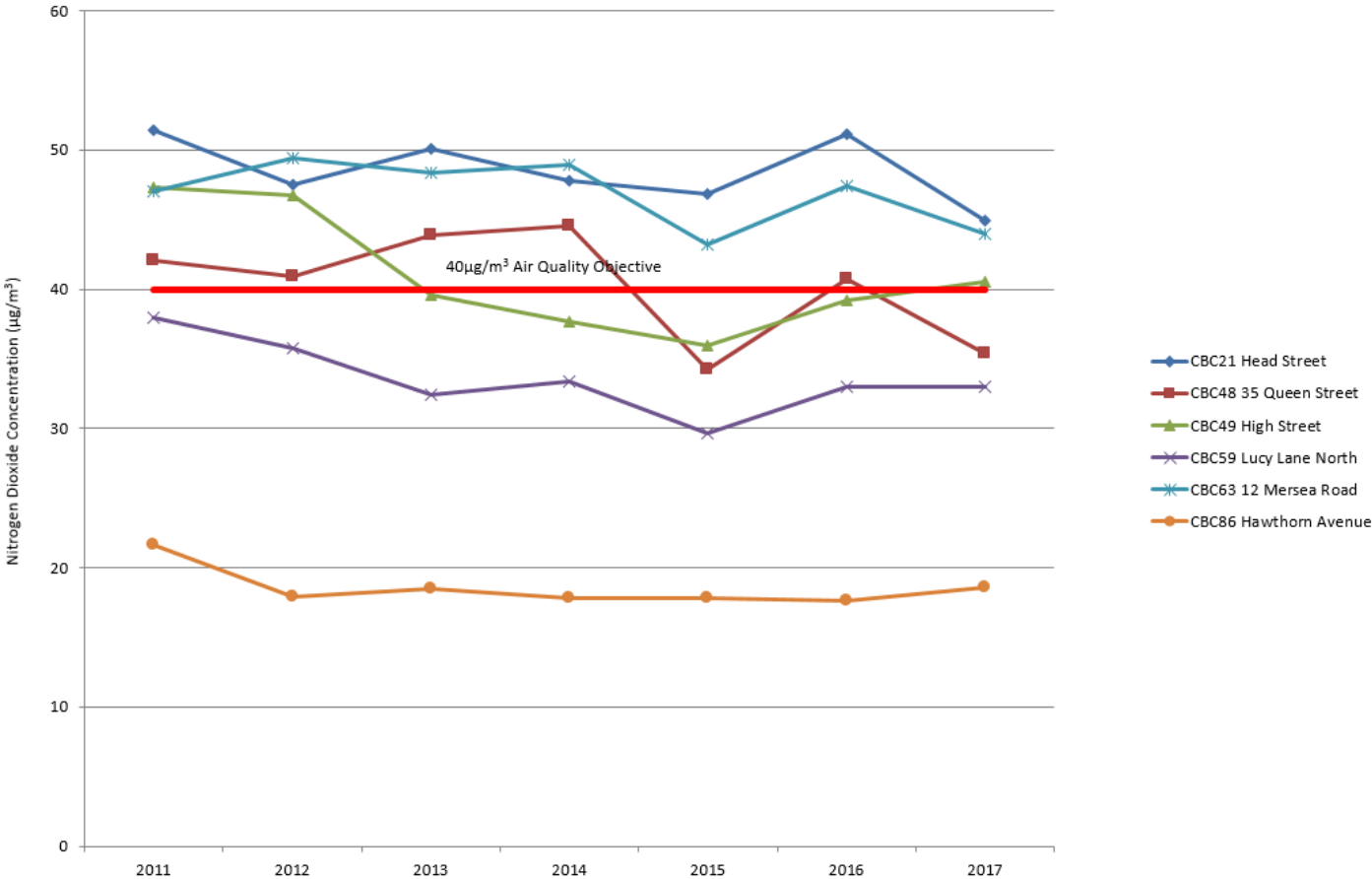


Table A.7 – 1-Hour Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2013	2014	2015	2016	2017
CBC Auto 1	Roadside	Automatic	89.99	89.99	0	0	0	0 (106.05)	0

Notes:

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ 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 99.8th percentile of 1-hour means is provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO₂ Monthly Diffusion Tube Results – 2017

Site ID	NO ₂ Mean Concentrations (µg/m ³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.89) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
CBC2	52.7	37.0	37.2	33.5	30.0	29.6	28.0	29.8	31.8	27.3	43.7	40.1	35.04	31.19	27.80
CBC3	82.7	58.7	54.9	46.6		56.1	45.3	58.4	49.1	47.2	50.1	47.1	54.19	48.23	46.44
CBC8	38.57	30.21	28.98	20.62	21.12	21.76	19.1	21.71	23.5	27.95	33.7	30.1	26.44	23.53	17.00
CBC17	37.9	24.1	22.68	15.7	14.11	14.02	11.73	14.12	15.16	17.28	28.18	27.48	20.21	17.98	14.34
CBC20	40.72	28.46	27.56	16.96	15.73	18.17	14.27	16.9	18.02	22.45	31.03	27.96	23.19	20.64	18.53
CBC21	77.42	55.82	53.6	46.46	62.17	54.13	41.26	45.89	44.77	43.52	44.43	36.66	50.51	44.95	36.60
CBC22	39.56	24.09	25.32	19.23	17.71	18.41	16.63	19.54	20.49	23.82	29.62	26.94	23.45	20.87	19.15
CBC43	58.3	40.4	35.24	33.15	22.63	31.62	30.12	32.21	34.49	28.81	45.27	38.42	35.89	31.94	22.99
CBC45	73.82	52.41	54.58	51.28	55.86	49.98	46.5	51.46	44.75	44.33	47.78	43.44	51.35	45.70	45.70
CBC46	33.92	24.23	21.7	16.76	14.49	15.59	14	15.63	17.31	20.93	27.36	24.25	20.51	18.26	19.21
CBC48	52.91	36.02	39.82	34.8	38.07	38.05	33.24	39.71	38.1	37.53	43.29	45.08	39.72	35.35	35.35
CBC49	62.8	45.58	47.76	37.04	38.19	49.61		41.39	41.48	45.87			45.52	40.52	40.52
CBC54	58.65	44.48	44.47	46.5	55.8	52.78	44.1	48.6	45.5	39.29	49.47	39.23	47.41	42.19	38.28
CBC58	50.15	33.2	37.04	31.47	19.96	30.15	24.08	26.52	29.16	16.51	41.02	29.35	30.72	27.34	20.06
CBC59	49.07	40.17	43.04	29.39	31.41	41.63	30.34	34.46	33.07	38.67	37.14	35.8	37.02	32.94	32.94
CBC62	58.4	39.77	44.25	48.89	47.34	49.06	39.67	43.35	49.49		44.89	33.28	45.31	40.32	40.32

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CBC62A	59.48	43.24	48.29	37.92	51.38	53.64	40.4	41.9	42.13	31.19	38.54	34.37	43.54	38.75	38.75
CBC62B	59.5	31.79	42.42	45.9	54.17	49.64	39.74	44.05	42.87	31.6	46.94	31.78	43.37	38.60	38.60
CBC63	70.66	49	47.63	47.34	55.53	52.24	48.44	45.69	45.41	47.13	42.06	41.08	49.35	43.92	43.92
CBC65	41.81	31.27	29.23	25.64	25.61	21.59	21.75	23.65	22.91	26.71	37.62	33.16	28.41	25.29	18.12
CBC66	47.88	33.9	31.72	24.25	24.11	23.77	24.53	25.56	26.32	29.48	34.49	31.84	29.82	26.54	19.89
CBC68	35.9	26.25	26.91	21.97	22.19	22.51	21.56	21.85	22.1	20.95	31.33	25.18	24.89	22.15	21.86
CBC69A	71.45	52.1	63.38	50.43	43.35	46.1	31.96	55.49	45.78	58.86	74.03	58.55	54.29	48.32	48.32
CBC69B	61.53	50.95	55.97	54.16	55.32	50.05	45.31	54.36	53.32	52.21	62.11	58.58	54.49	48.50	48.50
CBC69		49.76	64.62	51.29	46.55	54.48	47.62	57.49	44.36	59.08	63.86	64.4	54.86	48.83	48.83
CBC71	81.41	50.53	52.46	47.09	47.76	51.08		44.17	46.23	43.25	28.82	41.73	48.59	43.25	43.25
CBC72	47.81	40.41	37.42	33.56	36.48	34.13	30.93	34.92	31.09	32.86	39.34	34.34	36.11	32.14	25.05
CBC76	49.81	41.02	36.93	31.34	30.95	28.97	26.66	33.9	30.33	33.18	40.82	35.33	34.94	31.09	28.42
CBC78	44.63	29.85	30	22.49	27.13	31.88	24.44	25.65	16.27	22.5	24.77	20.39	26.67	23.73	17.57
CBC82	44.84	34.51	32.17	22.88	24.66	27.72	23.5	25.29	26.83	30.01	35.56	27.65	29.64	26.38	24.89
CBC85	39.97	30.09	28.68	18.59	19.2	18.66	16.3	18.15	21.41	23	35.24	29.73	24.92	22.18	22.18
CBC86	36.07	26.86	23.19	15.27	14.95	14.16	14.56	14.44	16.18	21.26	28.37	25.72	20.92	18.62	18.62
CBC88	44.24	31.79	29.02	28.06	26.76	27.51	26.35	29.64	28.46	25.95	38.59	31.28	30.64	27.27	27.27
CBC88A	50.26	34.29	36.13	27.95	27.41	27.03	26.15	30.78	25.44	28.92	36.21	33.02	31.97	28.45	28.45
CBC88B	45.93	31.01		30.61	28.15	29.79	26.28	30.52	27.47	29.18	36.45	30.31	31.43	27.97	27.97
CBC89	44.1	31.46	33.12	23.23	32.2	31.11	23.73	26.2	27.68	30.04	28.56	21.33	29.40	26.16	21.02
CBC90	47.37	33.33	33.78	23.88	27.27	28.47	26.73	28.27	24.74	29.04	26.26	29.28	29.87	26.58	20.86
CBC91	41.35	25.56	25.31	21.71	17.69	20.65	20.41	20.06	20.71	25.05	31.9	31.02	25.12	22.36	19.70
CBC93	39	22.66	25.54	17.3	17.78	17.7	17.21	18.96	20.23	22.78	31.31	29.19	23.31	20.74	17.75
CBC94	40.01	30.44	34.36	29.99	23.55	27.09	24.66	26.99	27.14	32.96	38.58	34.89	30.89	27.49	22.36
CBC95	50.15	36.17	33.07	29.81	36.28	30.03	25.84	28.44	27.13	28.62	41.48	31.79	33.23	29.58	27.42
CBC96	32.04	25.4	24.45	19.45	17.29	18.26	15.13	17.68	25.45	22.63	29.8	32.94	23.38	20.81	17.67

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CBC97	45.77	31.21	31.13	27.15	27.79	27.01	25.38	23.41	19.58	29.51	35.42	24.35	28.98	25.79	20.06
CBC98	33.16	30.09	24.41	21.56	17.25	22.43	21.31	23.71	21.61	24.66	30.79	26.88	24.82	22.09	21.44
CBC99	40.13	32.14	26.86	25.03	23.36	23.02	20.03	24.04	23.41	24.69	34.16	30.58	27.29	24.29	21.55
CBC100	41.83	31.87	35.85	27.81	28.98	27.08	24.65	28.79	35.22	33.8	40.95	37.59	32.87	29.25	22.35
CBC101	52.91	42.87	36.31	43.83	40.22	36.37	34.25	39.63	36.46	37.58	48.5	43.29	41.02	36.51	32.17
CBC102	50.37	42.41	48.44	44.1	43.75	40.96	37.83	41.11	41.06	36.09	45.85	46.25	43.19	38.43	38.43
CBC103	46.04	30.9	31.04	29.2	29.36	26.54	24.27	24.98	26.94	27.18	34.54	30.39	30.12	26.80	22.84
CBC104	49.95	32.2	34.48	30.78	28.66	31.37	28.88	31.31	4.81	30.7	39.71	33.09	31.33	27.88	27.88
CBC105	47.53	42.5	37.87	33.59	34.02	39.02	32	37.16	31.65	33.53	38.83	38.54	37.19	33.10	30.61
CBC106	56.75	37.47	36.41	37.68	40.48	43.21	32.06	42.77	37.43	34.52	41.11	40.06	40.00	35.60	27.84
CBC107	53.14	31.56	33.93	33.08	27.57	30.88	27.2	30.46	32.53	33.83	41.71	34.98	34.24	30.47	23.16
CBC108	52.87	39.6	32.72	31.14	32.78	32.36	26.17	29.11	28.53	28.56	37.34	28.04	33.27	29.61	22.20
CBC109	52.25	38.51	36.74	32.71	33.5	33.9	29.95	32.46	32.76	30.08	36.7	30.57	35.01	31.16	31.16
CBC110	55.02	33.17	32.85	31.59	30.09	31.8	26.05	32.51	33.13	35.94	43.28	39.3	35.39	31.50	31.50
CBC111	66.65	46.23	48.75	50.25	41.94	48.82	40.69	41.62	45.09	45.69	57.79	43.92	48.12	42.83	42.83
CBC112	49.92	38.65	36.79	34.58	31.63	33.69	30.85	32.3	34.28	36.24	44.32	35.43	36.56	32.54	32.54
CBC113	46.34	35.58	36.02	25.7	28.44	29.99	24.43	28.52	27.35	24.63	31.83	30.75	30.80	27.41	21.63
CBC115	46.22	33.21	32.23	32.68	28.49	26.66	23.23	27.53	24.15	30.22	37.1	36.03	31.48	28.02	28.02
CBC116	38.09	26.63	25.66	20.75	20.13	18.85	17.6	20.65	19.18	22	29.72	15.44	22.89	20.37	20.37
CBC117	60.21	49.22	47.08	39.41	44.3	50.1	37.23	42.79	41.04	45.64	50.93	45.89	46.15	41.08	41.08
CBC118	44.63	39.26	36.07	32.03	28.81	29.53	27.53	30.18	31.55	31.38	37.82	29.94	33.23	29.57	29.57
CBC119	37.16	27.33	24.69	18.74	20.82	21	18.24	19.96	20.93	24.83	26.45	22.09	23.52	20.93	20.93
CBC121	37.46	29.75		19.26	18.26	20.61	17.15	17.31	19.05	25.97	33.26	29.98	24.37	21.69	21.69
CBC122	90.31	62.35	68.18	59.41	59.85	77.05	55.72	65.28	63.86	57.29	73.4	68.95	66.80	59.46	46.08
CBC123			27.69	23.03	25.42	20.33	18.76	20.55	21.29	22.4	28.44	28.55	23.65	21.04	20.95
CBC124					41.91	43.17		38.8	38.66	33.3	52.34		41.36	39.76	39.33

- ☒ National bias adjustment factor used
- ☒ Annualisation has been conducted where data capture is <75%
- ☒ Where applicable, data has been distance corrected for relevant exposure

Notes:

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

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

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

(2) Distance corrected to nearest relevant public exposure.

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

Automatic Monitoring QA/QC

Colchester Borough Council operates one automatic monitoring site which contains an API 200a analyser that measures NO₂. 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 NO₂ 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 68 NO₂ diffusion tubes at 62 sites in 2017.

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

The AIR NO₂ proficiency testing scheme found that the laboratory achieved the following percentage of results determined as satisfactory for 2017:

Table C.1 – AIR PT Results

AIR PT Round	AIR PT AR018	AIR PT AR019	AIR PT AR021	AIR PT AR022
Round conducted in the period	January – February 2017	April – May 2017	July – August 2017	September – October 2017
Gradko	100%	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 03/18 identified that for Gradko 20% TEA in water diffusion tubes in 2017, a bias adjustment factor of 0.89 should be used. This was derived from orthogonal regression analysis of 34 studies.

Point Sources

No significant new point source of emissions has been identified.

CBC124 Data Annualisation

One diffusion tube monitoring site had less than 8 months' worth of data it was necessary to annualise the data. The rural background AURN sites at St. Osyth and Rochester Stoke were used for the process.

Table C.2 – CBC124 East Hill Annualisation

CBC124 58 East Hill Exposure Dates	Background Site Mean (B1)	CBC124 58 East Hill (D1)	B1 when D1 is available
4th January 2017	1st February 2017	28.91	
1st February 2017	1st March 2017	16.80	
1st March 2017	29th March 2017	15.04	
29th March 2017	26th April 2017	11.82	
26th April 2017	31st May 2017	12.49	41.91
31st May 2017	28th June 2017	12.38	43.17
28th June 2017	2nd August 2017	7.81	
2nd August 2017	30th August 2017	11.32	38.8
30th August 2017	27th September 2017	12.03	38.66
27th September 2017	1st November 2017	13.38	33.3
1st November 2017	6th December 2017	20.19	52.34
6th December 2017	3rd January 2018	17.56	
Average		14.74	41.36
Annualisation Factor			1.08
Bias Adjustment			0.89
Average Concentration			39.76

NO₂ Fall Off Estimation

Diffusion tube monitoring shown in Table B.1 in Appendix B has been adjusted for NO₂ falloff between the monitoring location and the point of relevant exposure.

Using the equation from the Air Quality Consultants 'NO₂ Concentrations and Distance from Roads (2008)' report a custom Excel spreadsheet has been developed to derive the NO₂ concentrations at relevant exposure from the measured annual mean concentrations and using 2017 NO₂ background maps.

Estimated Annual Mean at Relevant Exposure:

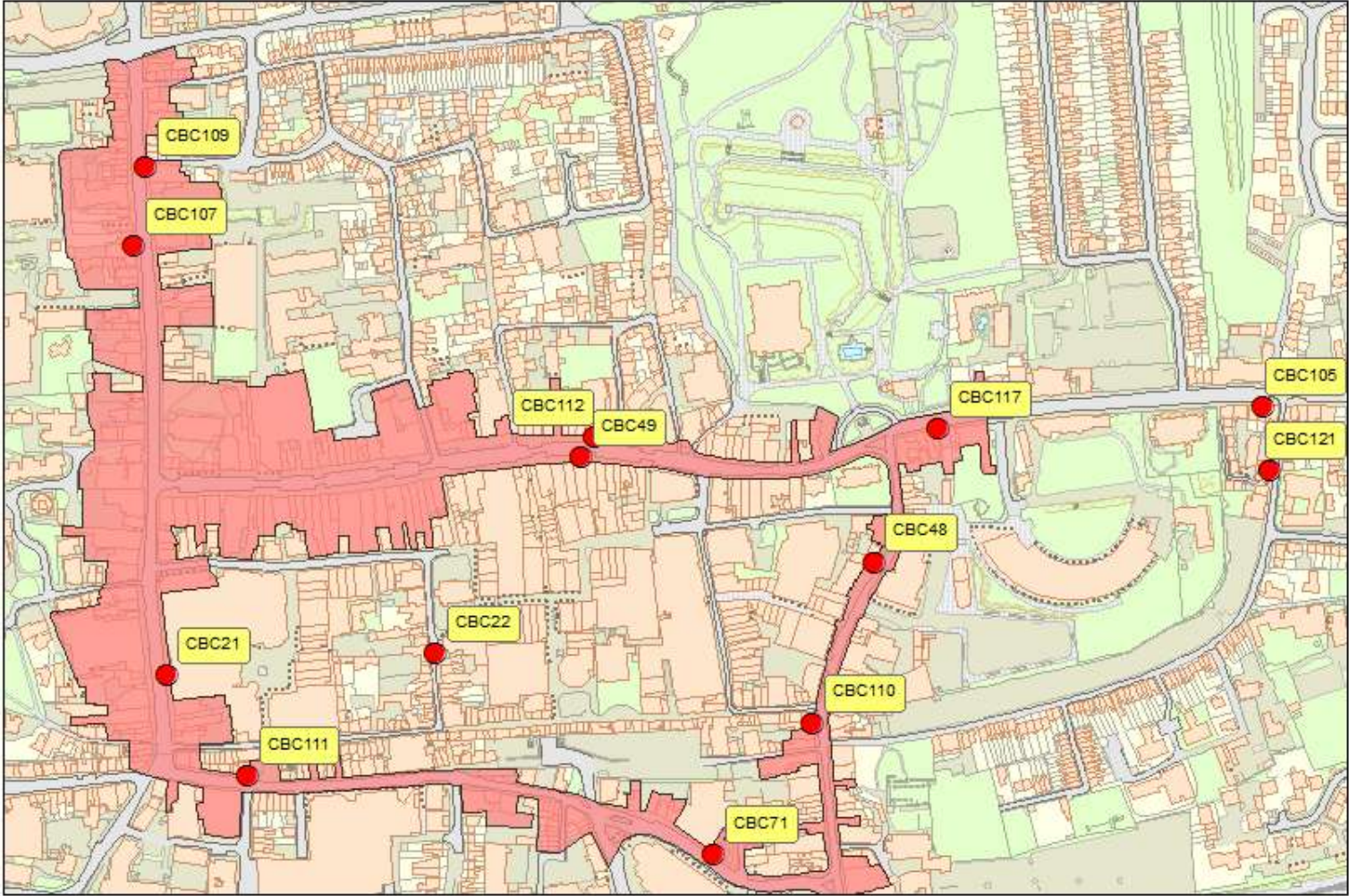
$$C_z = ((C_y - C_b) / (-0.5476 \times \ln(D_y) + 2.7171)) \times (-0.5476 \times \ln(D_z) + 2.7171) + C_b$$

Where:

- C_z is the total predicted concentration (µg/m³) at distance D_z;
- C_y is the total measured concentration (µg/m³) at distance D_y;
- C_b is the background concentration (µg/m³);
- D_y is the distance from the kerb at which concentrations were measured;
- D_z 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

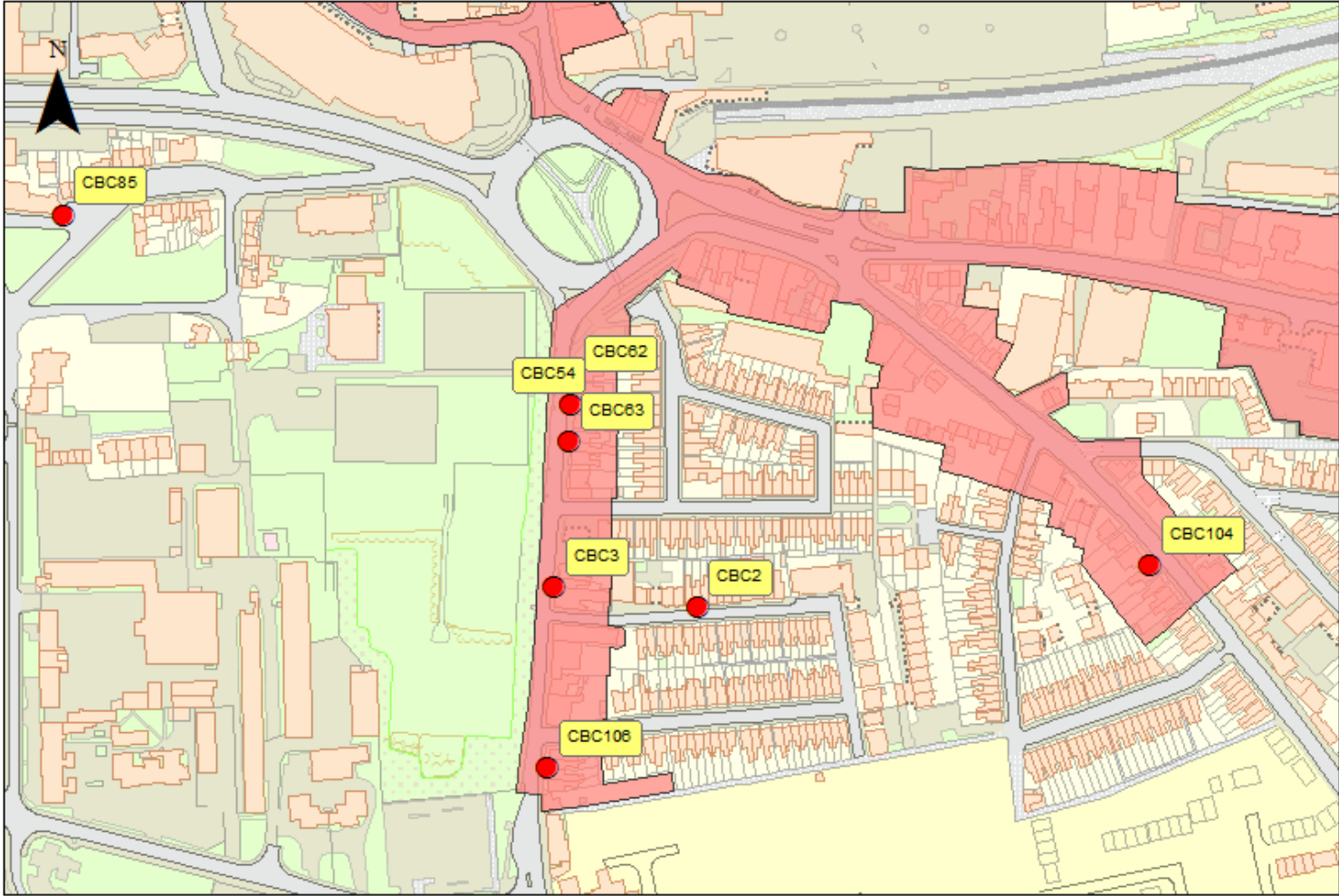
Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 - Town Centre Area (Part of AQMA1)



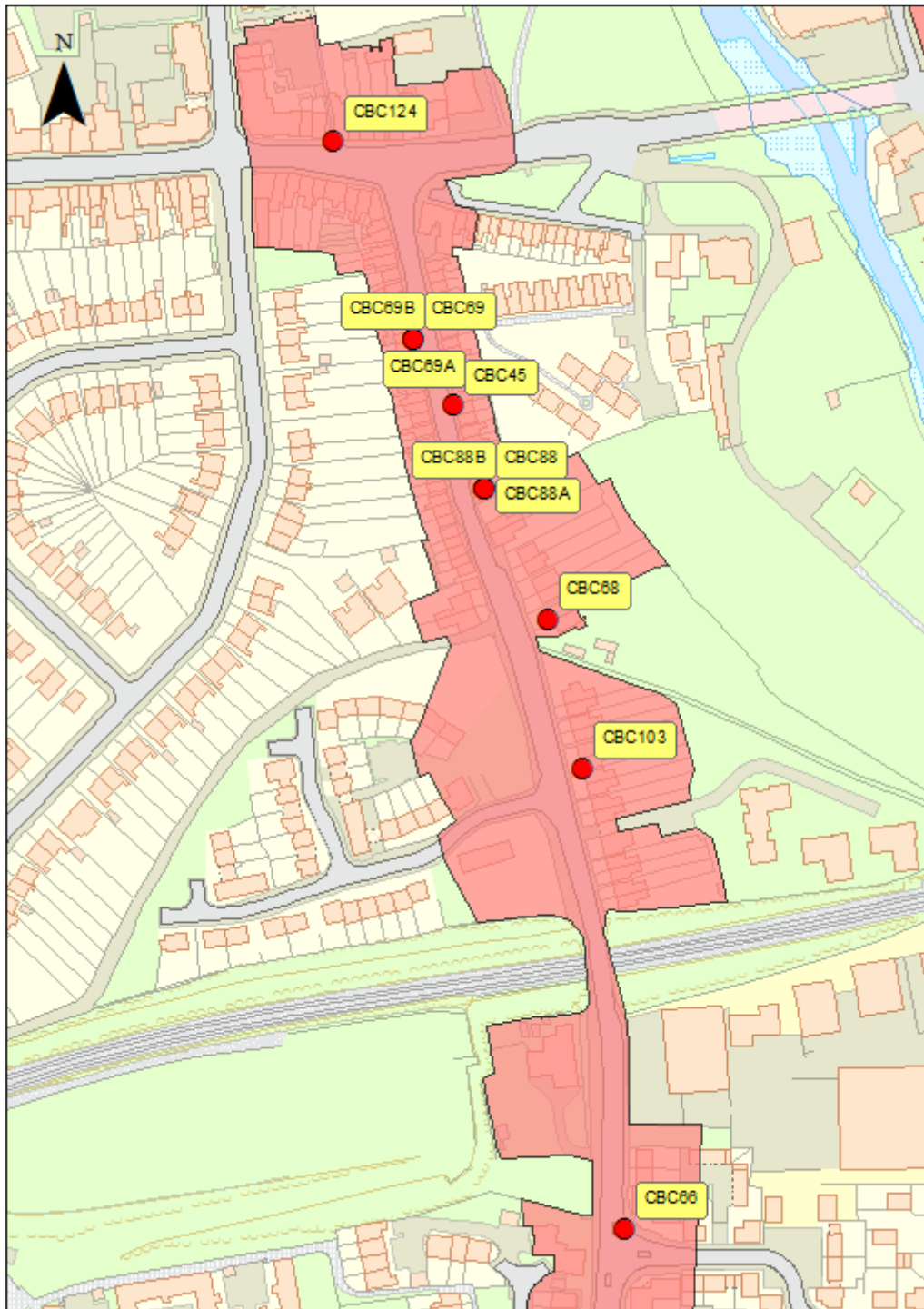
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Figure D.2 - Mersea Road Area (Part of AQMA1)



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Figure D.3 - Brook Street (Part of AQMA1)



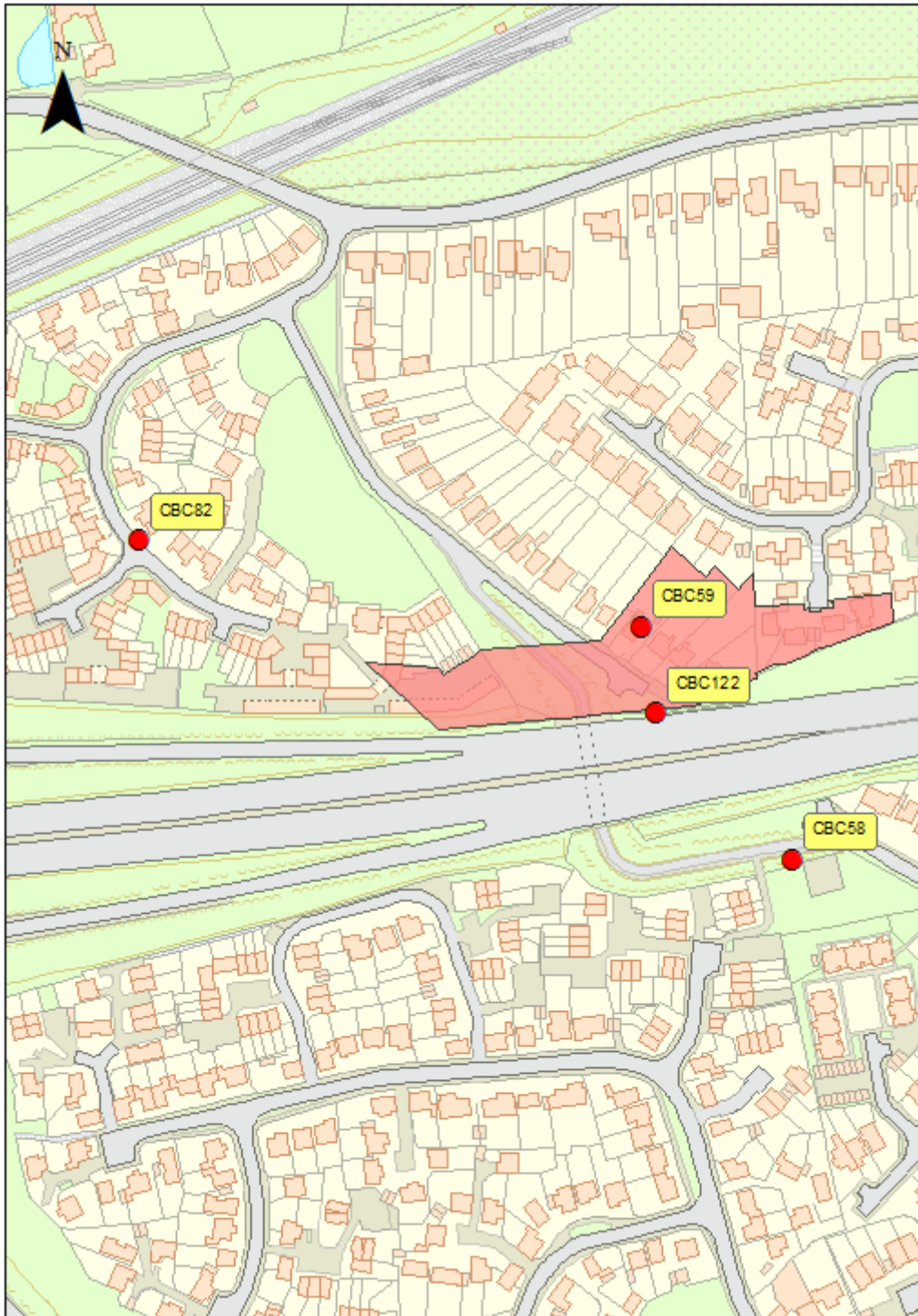
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Figure D.4 - AQMA 2



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Figure D.5 - AQMA 4

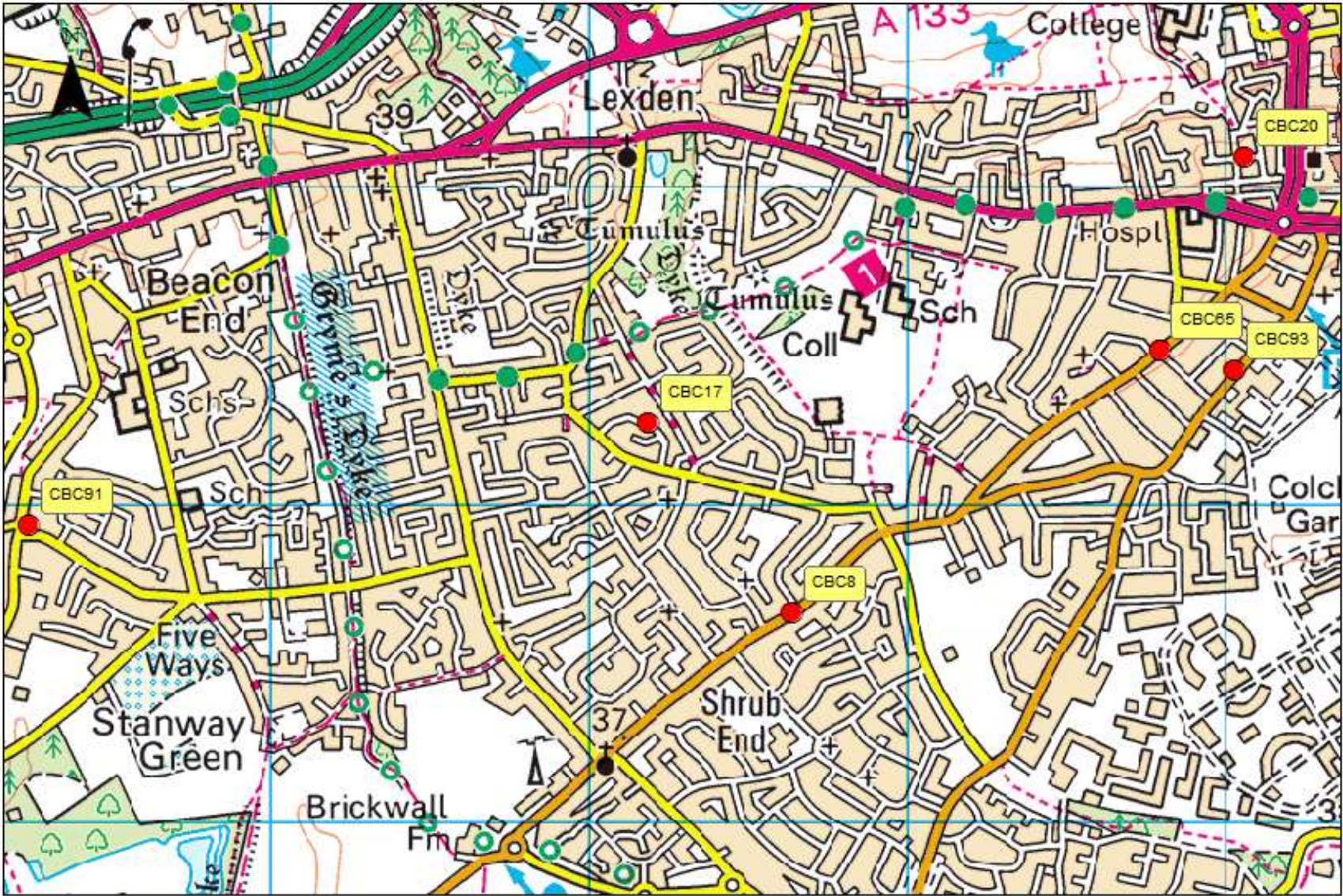


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Figure D.6 - North Colchester



Figure D.7 - West Colchester



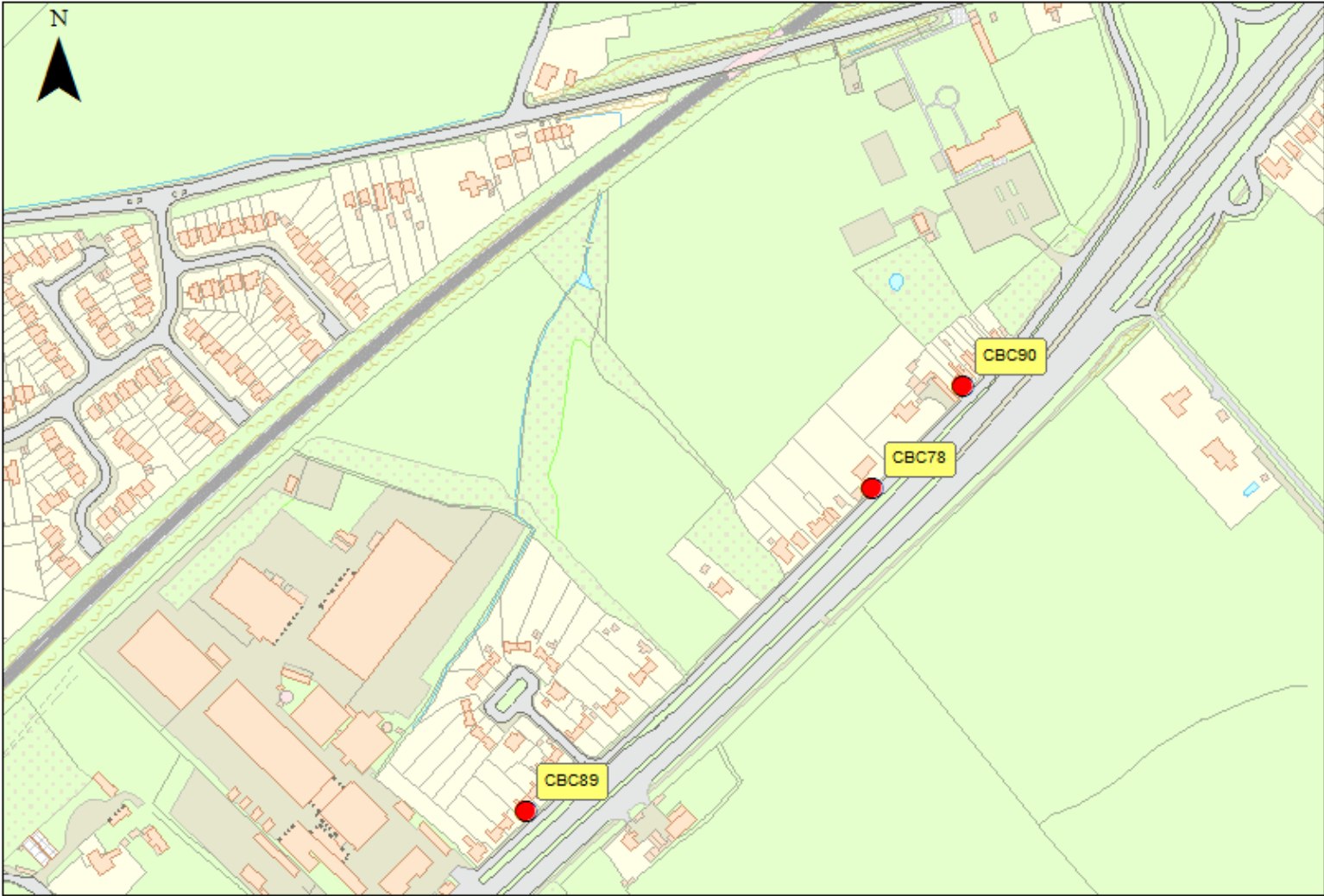
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Figure D.8 - East Colchester



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Figure D.9 - Marks Tey



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Appendix E: Summary of Air Quality Objectives in England

Table E.2 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁴	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁴ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Appendix F: New Colchester Borough Council AQMA Order



Environment Act 1995 Part IV Section 83(1)
Colchester Borough Council
Air Quality Management Order

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

This Order may be cited/referred to as the Colchester Borough Council Air Quality Management Area numbers 1, 2 and 4:

Area 1 – Central Corridors.

Area 2 – East Street and the adjoining lower end of Ipswich Road.

Area 4 – Lucy Lane North, Stanway

And shall come into effect on 30th June 2018

Area 3 – Harwich Road / St Andrew's Avenue Junction as detailed in the boroughs Air Quality Management Order dated 26 February 2013 is revoked

The areas shown on the attached maps in red are to be designated as air quality management areas (the designated areas). The designated areas incorporate (either fully or in part):

Area 1 – High Street Colchester, 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.

Area 2 – East Street and Ipswich Road

Area 4 – Lucy Lane North, Stanway

The map may be viewed online and at the Council Offices.

Areas 1, 2 and 4 are designated in relation to breaches and likely breaches of the Nitrogen Dioxide annual mean objective as specified in the Air Quality Regulations (England) 2000.

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

The Common Seal of Colchester Borough Council was hereunto affixed in the presence of:

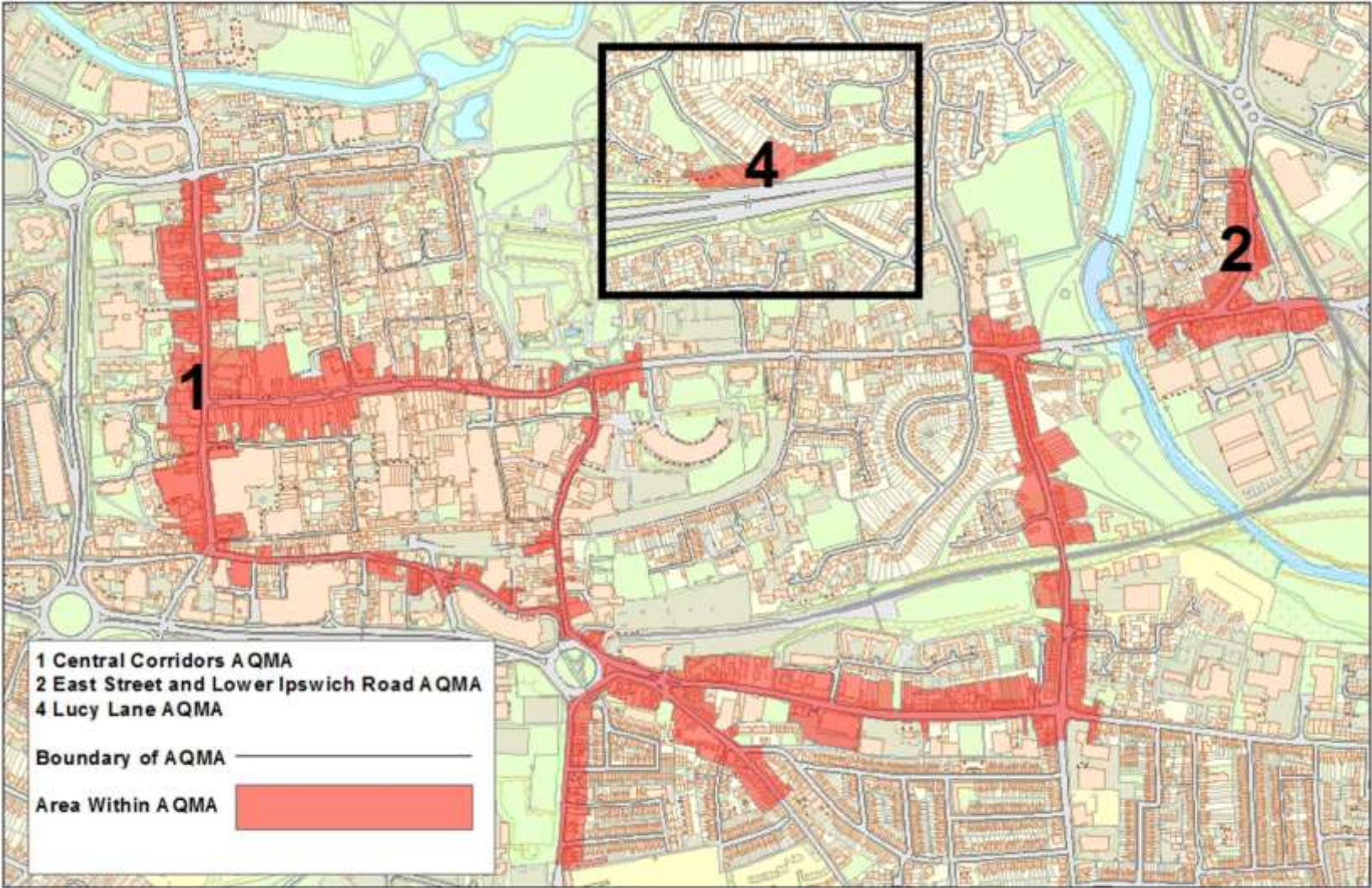
Authorised signatory


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101/18.

Recycled paper



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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 ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PEMS	Portable Emissions Measurement System – a method of monitoring vehicle emissions during operation
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
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

References

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- air*TEXT Twitter Feed available at; https://twitter.com/airtext_colc
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- Colchester Borough Council Annual Status Report 2017 available at http://www.essexair.org.uk/Reports/Colchester_Borough_Council_ASR_2017.pdf
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- Colchester Park & Ride website available at; <http://www.essexhighways.org/Transport-and-Roads/Getting-Around/Bus/Park-and-Ride/Colchester-Park-and-Ride.aspx>
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- Defra Diffusion Tube Bias Adjustment Factors Spreadsheet available at; https://laqm.defra.gov.uk/assets/Database_Diffusion_Tube_Bias_Factors_v03_18%20FINAL.xls
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- Essex Air Twitter Feed available at; <https://twitter.com/essexair>
- EssexCarShare.com available at; <https://liftshare.com/uk/community/essex>
- Essex County Council Major Schemes website available at; <http://www.essexhighways.org/Transport-and-Roads/Highway-Schemes-and-Developments/Major-Schemes.aspx>
- Essex County Council Brook Street junction improvements available at; <http://www.essexhighways.org/Transport-and-Roads/Highway-Schemes-and-Developments/Major-Schemes/Brook-Street-Roundabout.aspx>
- National Air Quality Objectives and European Directive Limit and target values for the protection of human health available at; https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update.pdf