Harlow Council

Working together for Harlow

2019 Air Quality Annual Status Report (ASR)

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

April, 2019

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Executive Summary: Air Quality in Our Area

The 2019 Annual Status Report is designed to provide the public with information relating to local air quality in Harlow, to fulfil Harlow Council's statutory duty to review and assess air quality within its area, and to determine whether or not the air quality objectives are likely to be achieved.

In 2018, Harlow Council measured **no** exceedances of the Air Quality Objectives.

Air Quality in Harlow

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 billion[3].

Traffic emissions are the most significant source of air pollution in Harlow. The main roads in the District are the M11 and the A414. In addition, there a number of industrial processes. The majority of these are located in the two main industrial areas of the town: Templefields (to the North) and the Pinnacles (to the North West).

The Council recognises the importance of working with partnering Authorities such as with Essex County Council to make improvements to local transport infrastructure and also to fulfil its own regulatory responsibility towards industrial processes.

Air pollution is considered to be generally low in Harlow and monitoring of local Air Quality has measured no exceedances of air quality objective at relevant exposure. The trend of results across all monitored sites indicates that Air Quality is improving. A graph can be found in Appendix A that shows monitoring results from 2012 to 2018.

[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

Air quality in Harlow meets the Air Quality Objectives. However, significant development around the Harlow means that investment in the town's infrastructure is required to manage congestion, maintain good air quality and support future local economic growth.

As part of a £15 million investment in the Harlow road network, Essex County Council has developed a series of improvements and funding has been secured.

Main works include:

- Dual carriageway for Edinburgh Way between Cambridge Road and River Way Roundabouts.
- Upgrade of the A414 Cambridge Road Roundabout.
- Improve traffic signals at the East Road junction with Edinburgh Way, maintaining a crossing point on the A414 for pedestrians and cyclists.
- A414 Chelmsford to Harlow route. Improvements have been identified for the A414 designed to increase safety, highway capacity and to encourage the use of sustainable transport along the route to support future growth and regeneration. Specifically in Harlow, opportunities are being investigated to widen the A414 between Southern Way and Second Avenue (Clock Tower Roundabout), Harlow.

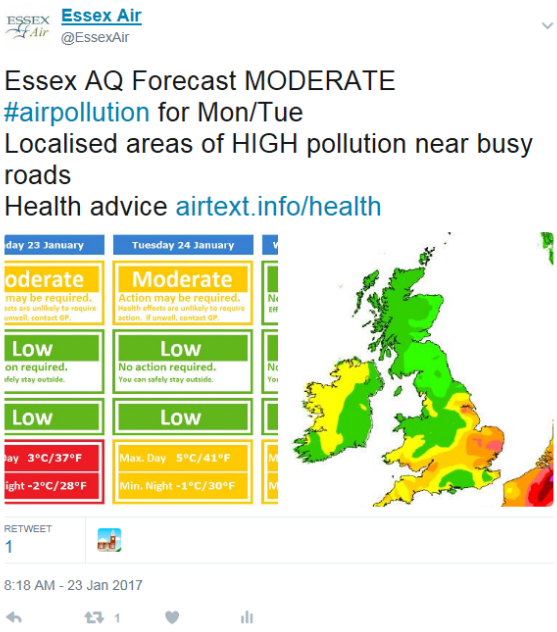
Construction of a new motorway junction on the M11 between the existing junctions 7 and 8 has been proposed. Known as M11 Junction 7A, traffic flow will be smoothed out of Harlow onto the M11, reducing congestion on the north-south links through Harlow and the existing Junction 7.

Environmental Assessment of the M11 Junction 7A concluded that both during construction and operational phases, changes in air quality are shown to remain low both for NOx and particulates and remaining below the air quality objectives. Properties in close proximity to affected roads that receive an improvement of traffic conditions are likely to receive a positive effect on air quality.

Local Engagement and How to get Involved

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

Figure i.1 Essex Air Twitter Air Quality Notifications



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

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

Figure i.2 - Essex Air Reporting Smoky Vehicle Tweets

Essex County Council has worked closely with Liftshare to develop the Essex Car Share scheme. This operates across Harlow and provides commuters with a car sharing service which could cut congestion and air pollution whilst saving money.

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1 Local Air Quality Management

This report provides an overview of air quality in Harlow during 2018. 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 Harlow 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 **Error! Reference source not found.** in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Harlow Council currently does not have any Air Quality Management Areas (AQMAs).

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

Defra's appraisal of last year's ASR identified that the Council should undertake a review of traffic flows and areas of congestions to update the monitoring strategy.

An audit of the monitoring strategy was undertaken and monitoring commenced at four new sites in 2019.

Table 2.1 – Progress on Measures to Improve Air Quality

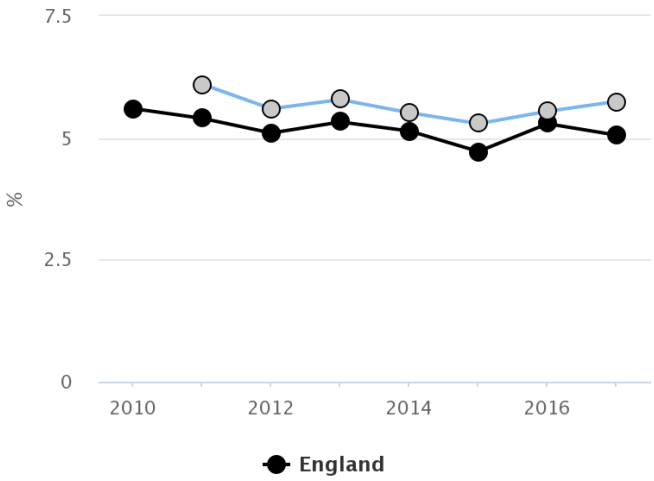
Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Essex Liftshare	Alternatives to private vehicle use	Car & lift sharing schemes	Essex County Council	N/A	2014	Number of Users	No AQMA	Ongoing	N/A	
2	Travel Budi	Alternatives to private vehicle use	Car & lift sharing schemes	Harlow Council	N/A	2007	Number of Users	No AQMA	Ongoing	N/A	
3	Member of Essex Air	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Essex Air	N/A	N/A	N/A	No AQMA	Ongoing	N/A	
4	Environmental Permit Inspection & Enforcement	Environmental Permits	Measures to reduce pollution through IPPC Permits going beyond BAT	Harlow Council	N/A	N/A	Operator compliance with Environmental Permit	No AQMA	Ongoing	N/A	
5	M11 J7a and associated Improvements	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Essex County Council / South East Local Enterprise Partnership	2016	2021	Monitored Air Quality	No AQMA	Consultation Completed / Preferred Route Approved	2021	
6	A414 Edinburgh Way / Cambridge Road junction improvement scheme	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Essex County Council	2016	2019	Monitored Air Quality	No AQMA	Scheme Development / Utility Diversions / In Construction Phase	2019	Road investment and congestion management programme for Harlow

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.

Harlow Council does not monitor $PM_{2.5}$ concentrations however notes the Public Health Outcomes Framework indicator 3.01 – Fraction of mortality attributable to particulate ($PM_{2.5}$) air pollution which for 2017 gave a value of 5.7% which has improved from 6.1% in 2011. These values are broadly similar to other authorities within the region.

Figure 2.1 - Public Health Framework Indicator 3.01 Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution



Harlow Council is taking the following measures to address $PM_{2.5}$:

- The Essex Air twitter account is encouraging the reporting of smoky vehicles through the DVSA reporting service. It is possible to report either heavy goods vehicles or public service vehicles (buses).
- Regular inspections of permitted industry where combustion and non-combustion processes could lead to anthropogenic emissions of $PM_{2.5}$
- Working with Essex County Council (highway authority) to deliver Major Transport improvement schemes to alleviate congestion. In addition to reduced exhaust emissions, these schemes will reduce non-exhaust emissions from brake and tyre wear by making traffic flows smoother.

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

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

Harlow Council does not undertake automatic continuous monitoring.

3.1.2 Non-Automatic Monitoring Sites

Harlow Council undertook non-automatic (passive) monitoring of NO_2 at 9 sites during 2018. **Error! Reference source not found.**1 in Appendix A shows the details of the sites.

No exceedances have been identified and the long-term trend for monitored concentrations is downwards. Details of this can be found in Figure A.1 in Appendix A which compares the bias adjusted monitored NO_2 annual mean concentrations for 2012 to 2018 with the air quality objective of 40µg/m^3.

Monitoring locations have been distance corrected for relevant exposure and the results are in Appendix B.

Details of the Quality Assurance/Quality Control (QA/QC) for the diffusion tube monitoring is included in Appendix C.

A plan showing the location of the monitoring sites is 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 (NO_2)

Table A.2 in Appendix A compares the ratified and bias adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Harlow Council has measured **no** exceedances of the Air Quality Objectives.

Appendix A: Monitoring Results

Table A.1 – Details of 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)
HAR8	East Park	Suburban	546942	211186	NO2	No	34.2	11	NO	2.00
HAR9	Gardiners	Urban Background	546888	209435	NO2	No	8.8	7.6	NO	2.00
HAR10	Dadds Wood	Urban Background	544434	209709	NO2	No	45.9	12.5	NO	2.00
HAR11	Town Centre	Kerbside	544680	210016	NO2	No	19.5	13.2	NO	2.00
HAR13	Guilfords	Suburban	547524	212479	NO2	No	15.2	14.2	NO	2.00
HAR15	Gilden Way	Roadside	548658	212004	NO2	No	15.5	14	NO	2.00
HAR16	Chalk Lane	Rural	549466	211598	NO2	No	20.75	20	NO	2.00
HAR17	Rivermill	Kerbside	544297	210988	NO2	No	4.7	0	NO	2.00
HAR18	Station Approach	Urban Background	544640	211192	NO2	No	8.01	8	NO	2.00

Notes:

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
					2014	2015	2016	2017	2018
HAR8	Suburban	Diffusion Tube	83.33	83.33	28.24	27.55	24.95	25.17	21.91
HAR9	Urban Background	Diffusion Tube	100.00	100.00	29.76	28.68	27.93	29.99	24.24
HAR10	Urban Background	Diffusion Tube	100.00	100.00	29.09	24.83	26.19	27.50	24.58
HAR11	Kerbside	Diffusion Tube	100.00	100.00	33.56	31.04	29.75	29.82	27.52
HAR13	Suburban	Diffusion Tube	91.67	91.67	20.79	17.45	16.72	16.58	13.66
HAR15	Roadside	Diffusion Tube	91.67	91.67	**N/A**	21.59	25.37	26.08	23.41
HAR16	Rural	Diffusion Tube	91.67	91.67	**N/A**	18.09	20.36	18.89	18.65
HAR17	Kerbside	Diffusion Tube	100.00	100.00	**N/A**	**N/A**	21.91	25.99	23.90
HAR18	Urban Background	Diffusion Tube	100.00	100.00	**N/A**	**N/A**	**N/A**	30.77	24.42

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

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

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

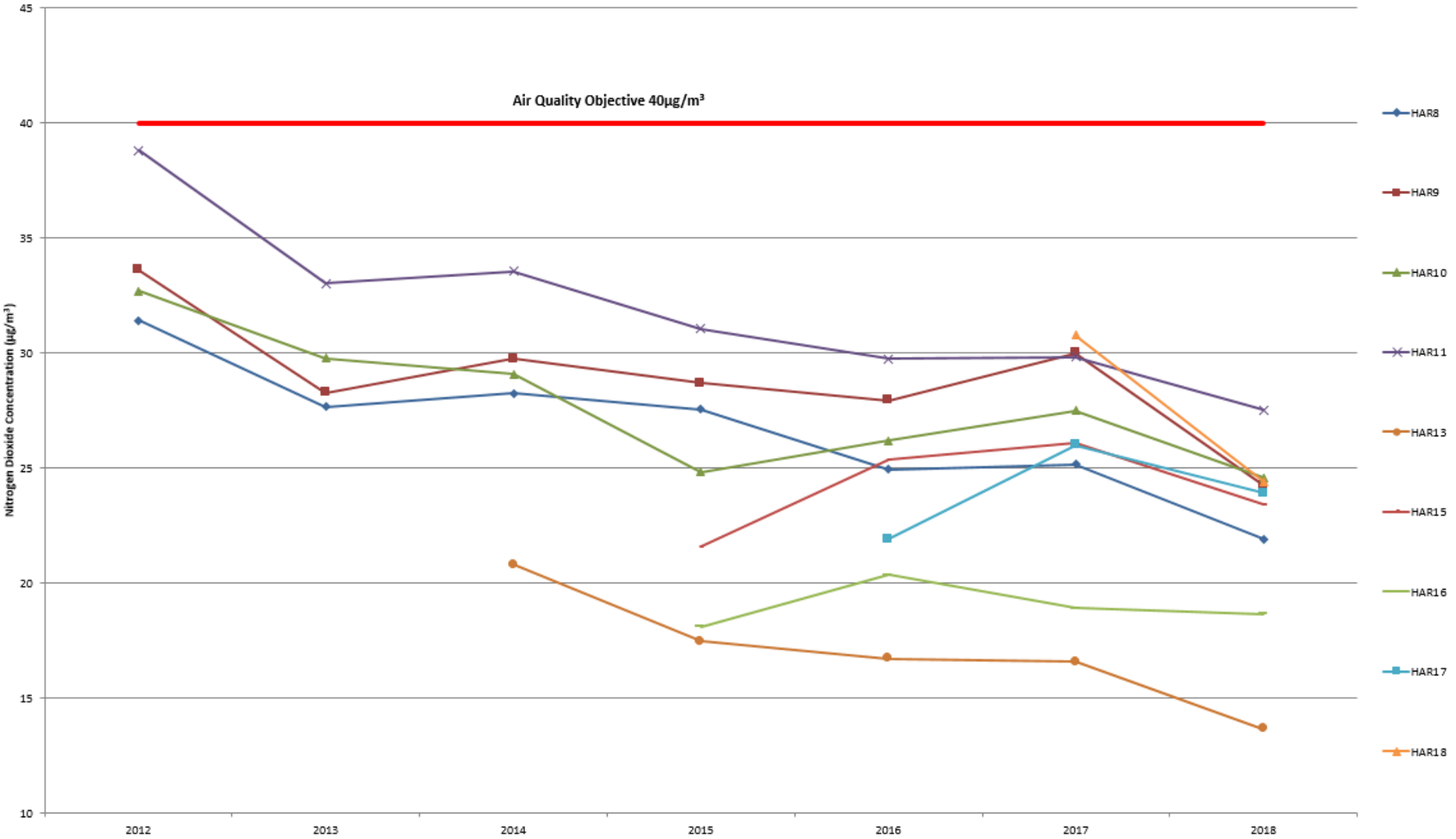
NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(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 NO_2 Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.2 – NO_2 Monthly Diffusion Tube Results - 2018

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 (0.76) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
HAR8	Missing	30.40	28.00	31.40	21.30	17.30	24.00	27.00	31.70	35.70	36.20	34.10	28.67	21.91	20.15
HAR9	43.90	35.20	33.50	32.70	23.60	20.10	26.30	29.00	35.70	31.90	33.70	37.10	31.89	24.24	19.90
HAR10	41.40	31.10	38.20	33.00	25.60	20.70	26.00	27.00	30.40	38.20	39.60	36.90	32.34	24.58	22.10
HAR11	33.40	41.90	40.40	40.90	31.60	28.70	35.40	31.10	32.90	40.90	40.90	36.40	36.21	27.52	22.42
HAR13	25.60	18.80	21.50	18.80	13.60	10.20	12.40	14.10	17.30	19.40	Missing	26.00	17.97	13.66	13.46
HAR15	40.50	Missing	33.70	32.90	32.00	26.30	26.20	21.40	32.10	30.40	31.00	32.30	30.80	23.41	17.45
HAR16	29.30	32.60	31.40	Missing	18.50	17.10	20.10	16.90	20.00	26.30	32.10	25.60	24.54	18.65	14.31
HAR17	36.00	36.40	35.80	31.00	30.40	25.50	25.60	25.20	28.90	33.20	37.40	32.00	31.45	23.90	23.90
HAR18	48.50	24.20	44.30	31.40	24.90	24.80	28.40	33.00	1.60	38.60	44.70	41.20	32.13	24.42	17.53

☒ **National bias adjustment factor used**

☒ **Where applicable, data has been distance corrected for relevant exposure**

Annualisation was not required

Notes:

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

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

(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

Diffusion Tubes QA/QC

Harlow Council undertook monitoring at 9 nitrogen dioxide diffusion tubes sites in 2018.

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

The AIR NO_2 proficiency testing scheme found that the laboratory achieved the following percentage of results determined as satisfactory for 2018:

Table C.1 – AIR PT Results 2018

AIR PT Round	AIR PT AR024	AIR PT AR025	AIR PT AR027	AIR PT AR028
Round conducted in the period	January – February 2018	April – May 2018	July – August 2018	September – October 2018
ESG Didcot	100%	100%	100%	100%

Diffusion tube Bias Adjustment Factors

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

The Diffusion Tube Bias Adjustment Factors Spreadsheet 03/18 identified that for Socotec 50% TEA in acetone diffusion tubes in 2018, a bias adjustment factor of 0.76 should be used. This was derived from orthogonal regression analysis of 21 studies.

NO_2 Fall Off Estimation

Using the equation from the Bureau Veritas NO_2 Fall Off with Distance Calculator (version 4.2), a custom Excel spreadsheet has been developed to derive the NO_2 concentrations for multiple diffusion tubes from measured annual mean concentrations 2018 NO_2 background maps.

Estimated Annual Mean at Relevant Exposure:

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

AB = Bias Adjusted Mean

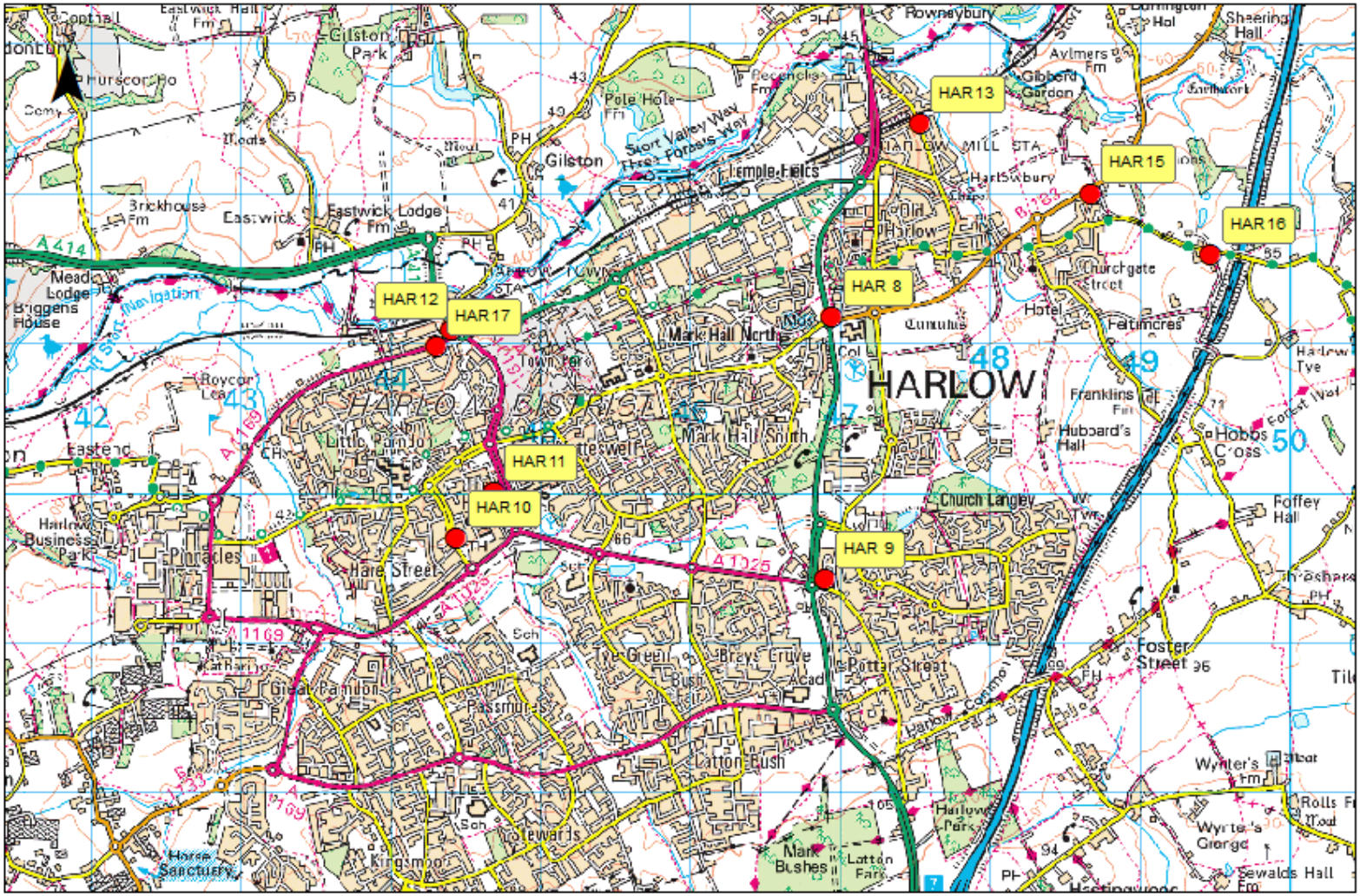
AC = Annual Mean Background NO_2

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

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

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

Figure D.1 – Diffusion Tube Monitoring Locations in Harlow



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 micrograms of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air Quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessments
EU	European Union
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SSSI	Site of Special Scientific Interest
TEA	Triethanolamine – substance used for absorbing nitrogen dioxide in diffusion tubes
UKAS	United Kingdom Accreditation Service

References

Defra Diffusion Tube Bias Adjustment Factors Spreadsheet available at; https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Defra LAQM Summary of Laboratory Performance in AIR NO_2 PT Scheme available at; https://laqm.defra.gov.uk/assets/tubeprecision2019version0319finalfull.pdf

Defra LAQM Policy Guidance LAQM.PG16 available at; https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf

Defra LAQM Technical Guidance LAQM.TG16 available at; http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf

Defra NO2 Background Maps available at; https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015

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

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

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

Essex County Council: Harlow Improvement Schemes available at; http://www.essexhighways.org/highway-schemes-and-developments/major-schemes.aspx

Harlow Council 2018 Air Quality Annual Status Report available at; http://www.essexair.org.uk/Reports/Harlow2018ASR.pdf

Proposal for new junction 7a on M11 available at; http://www.essexhighways.org/Transport-and-Roads/Highway-Schemes-and-Developments/major-schemes/m11-junction-7a.aspx

Public Health Outcomes Framework Indicator 3.01 available at; http://www.phoutcomes.info/