



West Lindsey District Council

Annual Progress Report 2023

Bureau Veritas

March 2023



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2023 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995
Local Air Quality Management, as amended by the
Environment Act 2021

Date: March 2023

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Date	March 2023

Executive Summary: Air Quality in Our Area

Air Quality in West Lindsey District Council

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

The mortality burden of air pollution within the UK is equivalent to 29,000 to 43,000 deaths at typical ages³, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017⁴.

In 2022, the annual mean nitrogen dioxide (NO₂) concentrations reported in West Lindsey continue to remain below the Air Quality Strategy (AQS) objectives. No new monitoring sites were established in 2022 and there has been no reported exceedance of any AQS objective within West Lindsey for the past 5 years. West Lindsey is largely rural in nature and the main pollution source is vehicle emissions from the existing road network, particularly from the, A15, A46 and A631.

Three power stations, operated by EDF energy are located outside of district (within the neighbouring county of Nottinghamshire), and are in close proximity to one-another. Two of the power stations, Cottam and West Burton A, are coal-fired. Both locations are due to be closed this year. The third station, West Burton B, is a gas-fired combined cycle gas turbine power station. All facilities are regulated through environmental permits.

There are no Air Quality Management Areas (AQMAs) within the Council's designation. The current monitoring network will remain in place and will be updated where necessary.

¹ Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

³ Defra. Air quality appraisal: damage cost guidance, January 2023

⁴ Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

These locations are constantly reviewed with respect to any hotspot area(s) of pollution being identified.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan⁵ sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term PM_{2.5} targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce PM_{2.5} in their areas. The Road to Zero⁶ details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of AQMAs are designated due to elevated concentrations heavily influenced by transport emissions.

There are currently no designated AQMAs within the District and as such an Air Quality Action Plan (AQAP) is not required. Additionally, there are currently no plans to produce an Air Quality Strategy (AQS) for the district. The air quality in West Lindsey is considered to be good, and as such there are no specific measures related to the control and mitigation of sources of local air pollution currently in place.

West Lindsey will continue to monitor and assess the results for the coming year within the NO₂ diffusion tube network.

The adopted [Central Lincolnshire Local Plan](#) contains objectives and policies designed to minimise the impact of new developments upon local air quality.

⁵ Defra. Environmental Improvement Plan 2023, January 2023

⁶ DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Conclusions and Priorities

During 2022, there were no exceedances of the annual mean objective for NO₂ within the district of West Lindsey. Being a predominantly rural district, pollution levels continue to be low and monitoring will continue to any ensure any concentrations trends can be identified.

West Lindsey will continue to assess new developments submitted through the planning process to ensure that any proposed developments are not detrimental to local air quality. In addition, any new industrial processes will be regulated in line with The Environmental Permitting (England and Wales) Regulations 2016 (as amended).

Local Engagement and How to get Involved

A number of measures can be completed by everyone to help reduce air pollution concentrations on a local scale, these include:

- Using alternative modes of transport rather than the car, including walking, cycling or using public transport;
- Changes in transport modes can bring added health benefits through walking and cycling exercise; and
- Asking your employer, school or college about the possibility of developing a green travel plan.

Local Responsibilities and Commitment

This ASR was prepared by the Housing and Environmental Enforcement Service area of West Lindsey District Council with the support and agreement of the following officers and departments:

- [REDACTED] - Senior Environmental Health Practitioner

This ASR has been approved by:

- [REDACTED] Chief Executive of West Lindsey District Council

This ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to [REDACTED] at: West Lindsey District Council, Guildhall, Marshall's Yard, Gainsborough, DN21 2NA. 01427 676676 -

[REDACTED]

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1 Local Air Quality Management

This report provides an overview of air quality in West Lindsey District Council during 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by West Lindsey District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

AQMAs are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

West Lindsey District Council currently does not have any declared AQMAs. A map of monitoring locations within the District is provided in Appendix D.

West Lindsay District Council currently does not have any declared AQMAs.

2.2 Progress and Impact of Measures to address Air Quality in West Lindsey District Council

Defra's appraisal of last year's ASR concluded that:

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports.

- 1. Reference to the Public Health Outcomes Framework has been made and this practice should continue going forward.*

As West Lindsey is a predominantly rural district, pollution levels continue to be low across the Council's administrative extents and few measures are required to control this.

Several industries remain in the district with the potential to pollute and are controlled by Environmental Permits. These industries have their emissions controlled by a range of legally enforceable conditions. Whilst Part A1 processes are subject to regulation by the Environment Agency, Part A2 and Part B processes are subject to regular routine inspection by the Council. The Environmental Protection team also responds to complaints regarding other air pollution issues, such as smoke nuisance from bonfires, emissions of dark smoke and offensive odours.

Based on Defra's appraisal of last year's ASR, West Lindsey District Council will continue to provide detailed ASRs in accordance with relevant Policy and Technical Guidance documents. The Council continues to assess new developments through the planning department to ensure that any proposed developments are not detrimental to local air quality. In addition, any new industrial processes will be regulated in line with The Environmental Permitting (England and Wales) Regulations 2016 (as amended).

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), 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.

There is not currently any monitoring of PM₁₀ or PM_{2.5} within the district of West Lindsey. As such, no concentration values can be reported or estimated using the method described in Box 7.7 of LAQM.PG(22), which provides a for estimating PM_{2.5} concentrations from PM₁₀ measurements.

The current [Defra background maps](#) for West Lindsey (2018 reference year) show that all 2022 background concentrations of PM_{2.5} are far below the recommended annual mean AQS objective for PM_{2.5} of 25µg/m³. The highest concentration is predicted to be 9.3µg/m³ within the 1km x 1km grid square with the centroid grid reference of 497500, 374500. This is an area to the north of Lincoln close to the A46 and A15.

Smoke control zones are a defined geographical region within which smoke cannot be legally emitted from a chimney, unless using authorised fuels or using exempt appliances. There is currently one designated [smoke control zone](#) within West Lindsey, the Lincoln Fringe, which represents the area between the boundary of the West Lindsey District and Lincoln bypass.

The [Public Health Outcomes Framework](#) data tool compiled by Public Health England quantifies the mortality burden of PM_{2.5} within England on a county and local authority scale. The 2021 fraction of mortality attributable to PM_{2.5} pollution within West Lindsey is 4.8%. This remains lower than average for England as a whole and the East Midlands region, which are 5.5% and 5.6% respectively.

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

This section sets out the monitoring undertaken within 2022 by West Lindsey District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2018 and 2022 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

West Lindsey District Council did not undertake automatic (continuous) monitoring during 2022. Monitoring was previously undertaken at Gainsborough Cemetery; however the site has since been decommissioned by EDF energy, the operators of the site, in December 2022.

3.1.2 Non-Automatic Monitoring Sites

West Lindsey District Council undertook non-automatic (i.e. passive) monitoring of NO₂ at 12 sites during 2022, including one triplicate site. Table A.1 – Details of Non-Automatic Monitoring Sites in Appendix A presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D. It was not possible to retrieve monitoring results from diffusion tube site WL1 during most of the survey period. As such, in accordance with the advice within LAQM.TG(22), the annual mean concentration at this site has not been reported in Table B.1. 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.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater

than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

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

For diffusion tubes, the full 2022 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. Additionally, the National Bias Adjustment Factor assumes monitoring is undertaken in accordance with the Defra calendar dates. It is noted that the monitoring dates do not coincide with the Defra calendar dates for a number of months during the survey period. As such, there is a degree of uncertainty surrounding the monitoring results provided.

All monitoring sites within the district of West Lindsey continue to report annual mean NO₂ concentrations below the AQS objective. Due to the low monitored concentrations, fall-off with distance correction was not required. Following bias adjustment and annualisation where necessary, the maximum report concentration in 2022 is 23.3µg/m³ at diffusion tube monitoring location WL14, located along the A631 Queen Street in Market Rasen. This location also reported the maximum concentration (24.4µg/m³) in the 2021 report.

Figure A.1 presents the 2022 annual mean NO₂ concentrations at West Lindsey District Council's monitoring sites. Concentrations at sites WL2, WL3, WL4, triplicate WL5/6/7, WL8 and WL14 all decreased slightly during 2022 in comparison to 2021. Concentrations at the remaining locations increased during 2022 in comparison to 2021. This is most likely attributable to a return to business as usual following the COVID-19 pandemic, where Government advice was given to stay at home where possible. This resulted in decreased levels of traffic observed across the UK, and as such, reduced NO₂ concentrations recorded during 2021.

It is possible to infer the risk of exceedances of the 1-hour mean NO₂ AQS objective at diffusion tube monitoring sites. LAQM.TG(22) provides an empirical relationship that states exceedances of the 1-hour objective are unlikely when the annual mean concentration is below 60µg/m³. Given that the highest recorded annual mean concentration at any of the

diffusion tube monitoring sites is $23.3\mu\text{g}/\text{m}^3$, it is possible to conclude that there have been no exceedances of the hourly mean NO_2 objective in the last five years at all monitoring locations.

Appendix A: Monitoring Results

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co-located with a Continuous Analyser?	Tube Height (m)
WL1	3 Lea Road, Gainsborough	Roadside	481526	389077	NO ₂	No	0.0	8.6	No	2.8
WL2	58 Etherington Street, Gainsborough	Roadside	481688	389770	NO ₂	No	20.1	1.6	No	2.8
WL3	19 Spring Gardens, Gainsborough	Roadside	481721	389935	NO ₂	No	7.8	2.9	No	2.8
WL4	Heaton Street	Roadside	481555	389891	NO ₂	No	5.9	2.2	No	2.8
WL5, WL6, WL7	Gainsborough Cemetery, Gainsborough	Industrial	482021	389974	NO ₂	No	N/A	13.8	No	3.0
WL8	Cherry Tree Road, Gainsborough	Kerbside	481500	390400	NO ₂	No	1.7	0.2	No	2.8
WL9	Walkerith Road	Rural	479811	392738	NO ₂	No	51.0	2.0	No	2.8
WL10	Marshall Way, Gainsborough	Roadside	483062	389224	NO ₂	No	11.2	15.9	No	2.8
WL11	53 Caistor Rd/ Galamore Lane, Market Rasen	Roadside	510681	389675	NO ₂	No	15.1	1.7	No	2.8
WL12	Lammas Leas Lane, Market Rasen	Roadside	510840	388610	NO ₂	No	32.4	10.2	No	2.8

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co-located with a Continuous Analyser?	Tube Height (m)
WL13	Beechers Way, Market Rasen	Roadside	510851	388475	NO ₂	No	1.2	6.9	No	2.8
WL14	Queen Street	Roadside	510866	389106	NO ₂	No	2.0	2.0	No	2.8

Notes:

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2022 (%) ⁽²⁾	2018	2019	2020	2021	2022
WL1	481526	389077	Roadside	7.5	7.5	24.6	22.8	16.3	20.6	-
WL2	481688	389770	Roadside	71	71.0	18.6	19.0	14.4	15.0	14.1
WL3	481721	389935	Roadside	71	71.0	20.6	17.3	14.2	13.8	14.1
WL4	481555	389891	Roadside	51.7	51.7	21.4	20.7	15.2	16.7	15.3
WL5, WL6, WL7	482021	389974	Industrial	71	71.0	11.5	11.3	9.1	8.7	9.1
WL8	481500	390400	Kerbside	71	71.0	15.0	14.7	11.9	11.3	10.6
WL9	479811	392738	Rural	71	71.0	11.7	11.5	9.5	8.5	8.6
WL10	483062	389224	Roadside	71	71.0	16.8	15.0	12.0	11.7	12.3
WL11	510681	389675	Roadside	71	71.0	17.1	16.3	11.2	12.1	12.6
WL12	510840	388610	Roadside	71	71.0	17.2	14.8	12.0	13.1	13.1
WL13	510851	388475	Roadside	71	71.0	12.8	12.3	9.9	10.1	10.6
WL14	510866	389106	Roadside	71	71.0	-	28.8	24.4	26.2	23.3

☒ Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

☒ Diffusion tube data has been bias adjusted.

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

Notes:

The annual mean concentrations are presented as µg/m³.

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

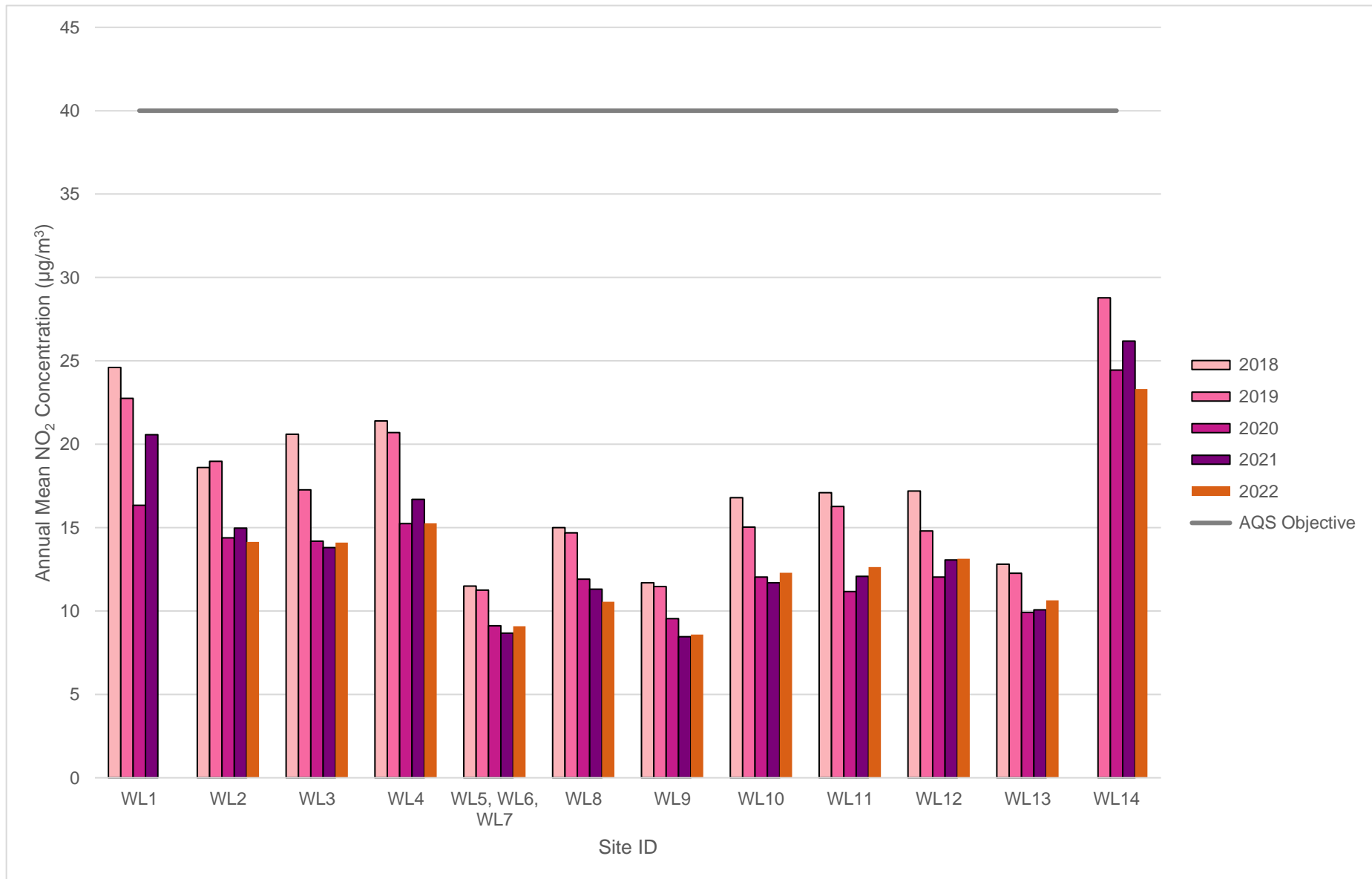
NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

- (1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
- (2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO₂ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO₂ 2022 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.82)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
WL1	481526	389077									24.3				-	-		
WL2	481688	389770	26.8	15.2			12.2	12.3	12.7	13.8	17.2		21.2	24.3	17.3	14.1		
WL3	481721	389935	27.6	16.3			11.0	12.1	13.2	13.5	15.2		21.6	24.9	17.2	14.1		
WL4	481555	389891	27.8	15.2			12.6		12.5		18.2		19.7	26.0	19.2	15.3		
WL5	482021	389974	18.5	9.2			8.4	7.7	7.3	7.6	11.2		12.5	14.8	-	-		Triplicate Site with WL5, WL6 and WL7 - Annual data provided for WL7 only
WL6	482021	389974	19.0	20.3			6.4	7.0	6.5	8.0	10.1		13.3	16.7	-	-		Triplicate Site with WL5, WL6 and WL7 - Annual data provided for WL7 only
WL7	482021	389974	20.3	9.3			7.6	6.9	6.7	8.4	9.8		11.8	15.3	11.1	9.1		Triplicate Site with WL5, WL6 and WL7 - Annual data provided for WL7 only
WL8	481500	390400	21.4	13.7			8.8	8.6	8.6	9.9	11.3		16.0	18.2	12.9	10.6		
WL9	479811	392738	18.3	9.8			6.8	6.3	6.5	8.7	9.3		13.3	15.4	10.5	8.6		
WL10	483062	389224	24.0	15.8			10.8	10.0	9.6	12.4	14.3		18.9	19.4	15.0	12.3		
WL11	510681	389675	21.8	14.8			13.3	12.2	11.2	14.3	15.5		15.6	19.7	15.4	12.6		
WL12	510840	388610	20.7	13.6			11.7	9.5	11.3	11.6	14.2		19.4	32.3	16.0	13.1		

All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

Local bias adjustment factor used.

National bias adjustment factor used.

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

West Lindsey District Council confirm that all 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

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**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within West Lindsey District Council During 2022

West Lindsey District Council has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by West Lindsey District Council During 2022

West Lindsey District Council has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes for the year 2022 were supplied and analysed by Gradko International Ltd, the tubes were prepared using the 50% TEA in acetone preparation method.

Gradko is a UKAS accredited laboratory and participates in the AIR-PT Scheme for NO₂ tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO₂ concentrations reported are of a high calibre. The latest available AIR-PT result is AIR-PT AR050 (May – June 2022), in which Gradko scored 100%. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$. Data from June 2022 onwards has not yet been made available.

The precision of the current 14 local authority co-location studies in 2022 detailed within the national bias adjustment factor spreadsheet (version 03/23) was rated as 'good' (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%).

Further information on the precision summary results can be found on the [LAQM website](#).

It is noted that diffusion tube monitoring dates do not coincide with the Diffusion Tube Monitoring Calendar for a number of months during the 2022 survey period. As such, there is a degree of uncertainty surrounding the monitoring results provided.

A number of tubes were found with insects inside on collection (WL6 in May, WL13 in August and WL11 in September). In addition, it was not possible to retrieve reported results from WL1 during most of the survey period. The advice within LAQM.TG(22) has been followed when determining whether these results should be included or excluded from calculations of the annual averages. Any erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.

Diffusion Tube Annualisation

As per LAQM.TG(22), annualisation is required for any site which has a data capture of less than 75%, but greater than 25%. Annualisation was therefore required to be completed for one site, WL4, due to there being a 57.1% data capture for 2022. This was completed by using version 3 (March 2023) of the [Diffusion Tube Data Processing Tool](#). The two closest continuous monitoring background locations which were selected to annualise the data were:

- Hull Freetown; and,
- Immingham Woodlands Avenue.

Both of these sites have a data capture of >85% and therefore could be used for annualisation.

Table C.1 presents the annualisation summary and is taken directly from the Diffusion Tube Data Processing Tool.

Table C.1 – Annualisation Summary (concentrations presented in µg/m³)

Site ID	Annualisation Factor Hull Freetown	Annualisation Factor Immingham Woodlands Avenue	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
WL4	0.9255	1.0142	0.9699	19.2	18.6

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under

or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Diffusion tubes for West Lindsey District Council are supplied and analysed by Gradko International Ltd. The tubes were prepared using the 50% TEA in acetone preparation method. The national bias adjustment factor for Gradko 50% TEA in acetone is 0.82 for the year 2022 (based on 14 studies) as derived from the [National Bias Adjustment Factor Spreadsheet](#) (version 03/23).

National Diffusion Tube Bias Adjustment Factor Spreadsheet							Spreadsheet Version Number: 03/23			
Follow the steps below in the correct order to show the results of relevant co-location studies							This spreadsheet will be updated at the end of June 2023			
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods							LAQM Helpdesk Website			
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet							Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.			
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.										
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.										
Step 1:		Step 2:	Step 3:	Step 4:						
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor ² shown in blue at the foot of the final column.						
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data ²	If you have your own co-location study then see footnote ³ . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953						
Analysed By ¹	Method ² <small>To end year selection, choose (All) from the pop-up list</small>	Year ² <small>To end year selection, choose (All)</small>	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ³	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in Acetone	2022	KS	Adur District Council	10	30	21	42.9%	G	0.70
Gradko	50% TEA in Acetone	2022	UC	Falkirk Council	12	32	26	22.7%	G	0.81
Gradko	50% TEA in Acetone	2022	UB	Falkirk Council	9	15	13	16.4%	G	0.86
Gradko	50% TEA in Acetone	2022	R	Lb Newham	12	30	23	29.1%	G	0.77
Gradko	50% TEA in acetone	2022	SU	Redcar & Cleveland Borough Council	12	14	10	44.9%	G	0.69
Gradko	50% TEA in Acetone	2022	R	Worthing Borough Council	9	33	23	44.2%	G	0.69
Gradko	50% TEA in acetone	2022	KS	Marplebone Road Intercomparison	12	52	42	23.0%	G	0.81
Gradko	50% TEA in acetone	2022	R	City Of London	11	60	54	11.6%	G	0.90
Gradko	50% TEA in acetone	2022	UB	City Of London	12	28	23	23.7%	G	0.81
Gradko	50% TEA in Acetone	2022	KS	London Borough Of Croydon	12	41	37	11.1%	G	0.90
Gradko	50% TEA in Acetone	2022	R	Royal Borough Of Windsor And Maidenhead	12	30	26	13.9%	G	0.88
Gradko	50% TEA in Acetone	2022	R	Royal Borough Of Windsor And Maidenhead	12	27	27	-1.0%	G	1.01
Gradko	50% TEA in Acetone	2022	R	Sandwell Mbc	12	34	27	27.1%	G	0.79
Gradko	50% TEA in Acetone	2022	UB	Sandwell Mbc	12	21	19	11.9%	G	0.89
Gradko	50% TEA in acetone	2022		Overall Factor² (14 studies)				Use		0.82

West Lindsey District Council have applied a national bias adjustment factor of 0.82 to the 2022 monitoring data. A summary of bias adjustment factors used by West Lindsey District Council over the past five years is presented in Table C.2. During 2020, the SOCOTEC Didcot laboratory was used to supply and analyse the May tubes whilst the Gradko labs were closed as a result of the COVID-19 pandemic. From 2021 onwards West Lindsey’s diffusion tubes have all been supplied and analysed by Gradko International Ltd as normal.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
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2022	National	03/23	0.82
2021	National	03/22	0.83
2020	National	03/21	Gradko – 0.82 SOCOTEC Didcot – 0.77 (applied to May only)
2019	National	03/20	0.87
2018	National	03/19	0.92

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within West Lindsey District Council required distance correction during 2022.

Appendix D: Map(s) of Monitoring Locations

Figure D.1 – Monitoring Locations: Gainsborough

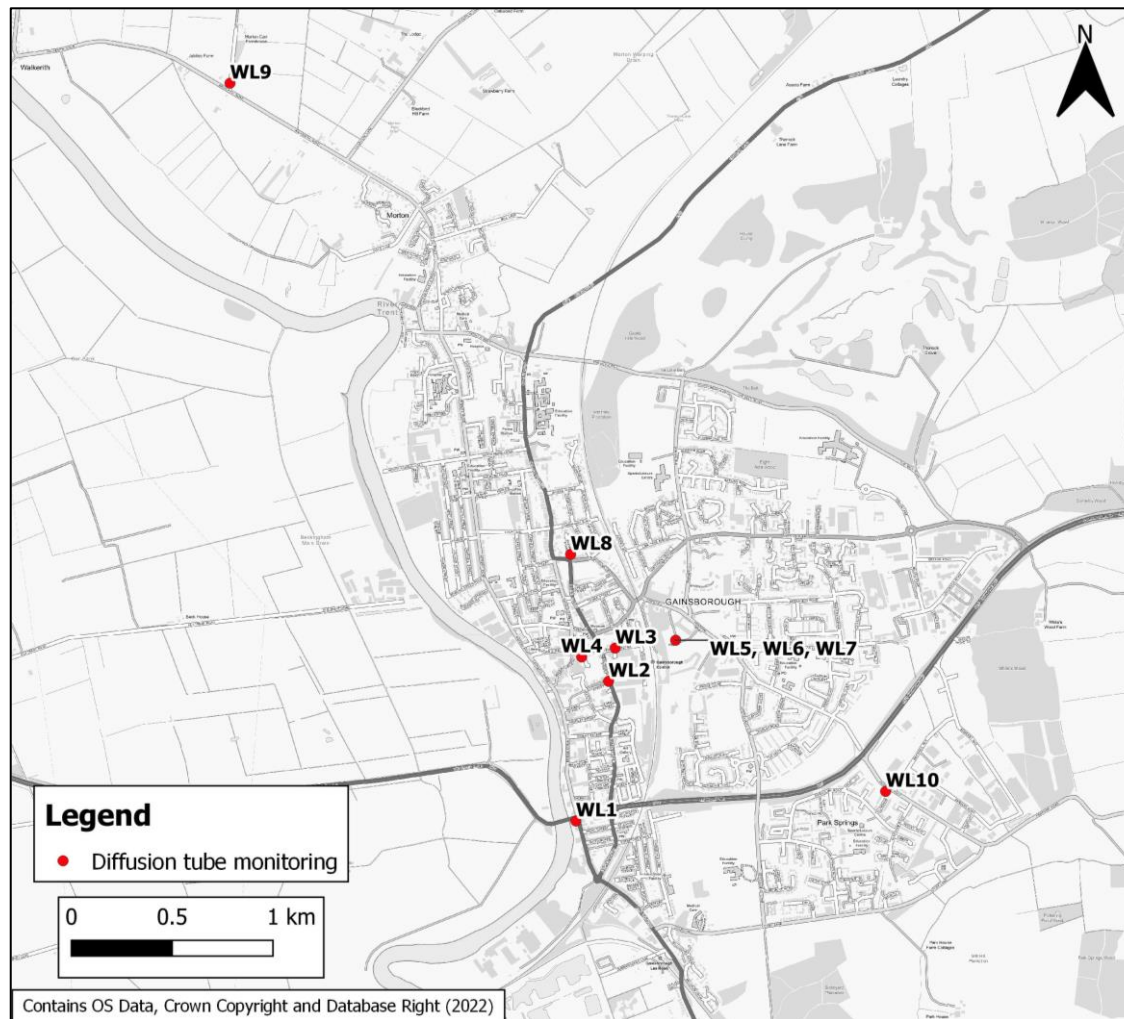
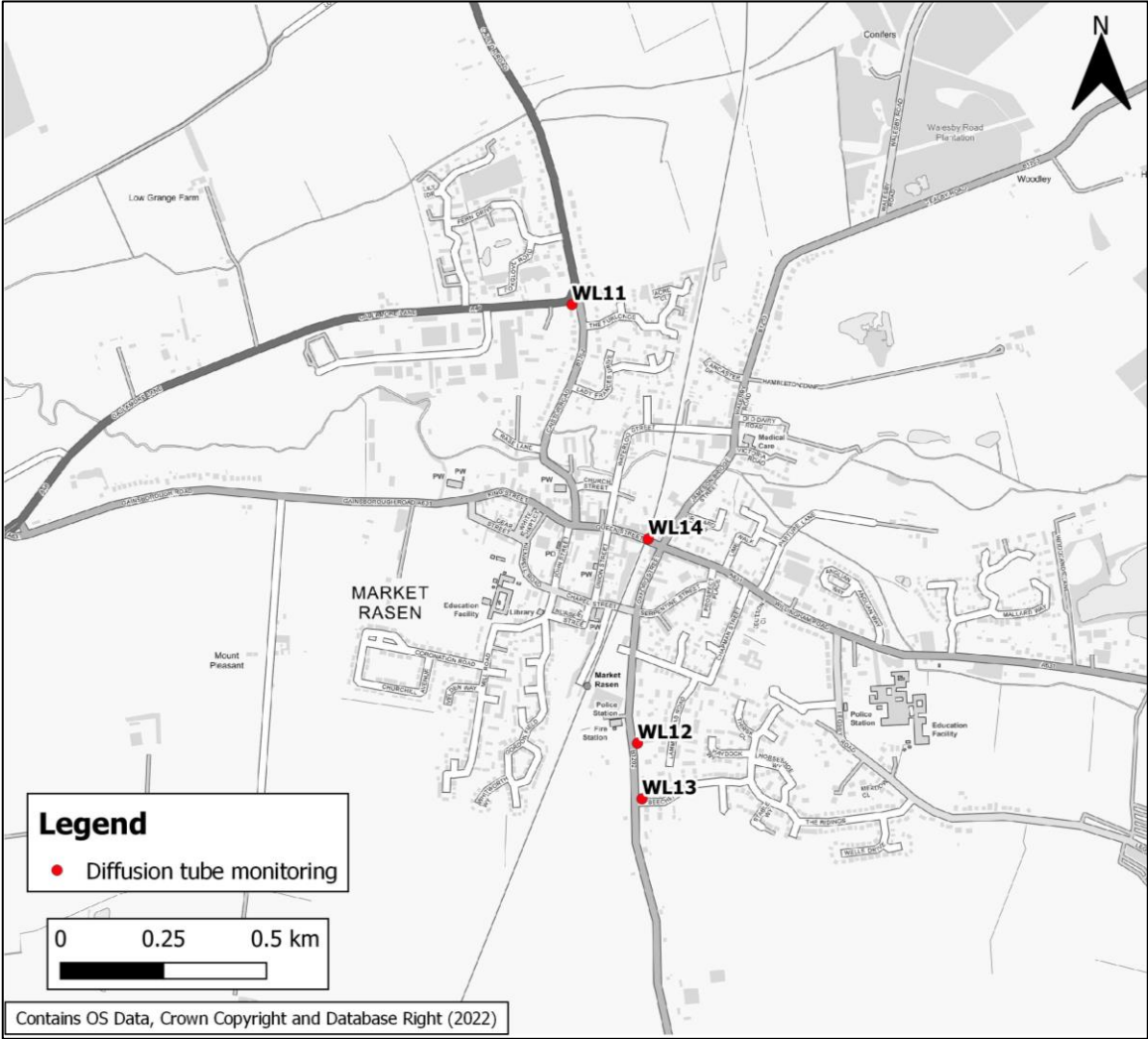


Figure D.2 Monitoring Locations: Market Rasen



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁷

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

⁷ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
AQS	Air Quality Strategy
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- West Lindsey District Council 2022 Annual Status Report.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, published March 2023.
- Diffusion Tube Data Processing Tool version 3.0, published March 2023, Defra.