East Lindsey District Council

Annual Status Report 2023

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East Lindsey DISTRICT COUNCIL

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: September 2023

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Date	September 2023

Executive Summary: Air Quality in Our Area

Air Quality in East Lindsey

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 ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

The majority of East Lindsey District Council's administrative area is rural land, with three small towns of Louth, Horncastle and Skegness. Air pollution in East Lindsey is therefore predominantly caused by vehicular emissions from the established road networks leading into these towns (i.e. the A158, A52, A16 and A1028). During 2021 and 2022, diffusion tubes were deployed in these towns to measure the concentration of NO_2. After being corrected for bias and annualisation (where required), the data for the 2021 and 2022 reporting years was consistent with the trend observed over the previous reporting years of concentrations significantly below the air quality objectives. As a result, there are no Air Quality Management Areas (AQMAs) declared within East Lindsey District Council's administrative area at present. The monitoring data also suggests that there are no areas where the air quality objectives are likely to be exceeded and, therefore, East Lindsey District Council is not planning to declare an AQMA in the coming years. The diffusion tube monitoring network will be reviewed and maintained within the three small towns to ensure that the pollution concentrations remain below the relevant air quality objectives.

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[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

In 2021 and 2022, the maximum NO_2 annual mean concentrations were recorded at diffusion tube monitoring location H1, with values of 26.2µg/m^3 (2021) and 25.4µg/m^3 (2022). Over the last five years (2018 – 2022), this site has continued to record the highest NO_2 concentration. Between 2021 and 2022, the NO_2 annual mean concentrations recorded at each diffusion tube sites were relatively comparable. The largest difference between the two years was a decrease of 1.5µg/m^3 at site H3, indicating that there has not been a significant change in NO_2 annual mean concentrations within East Lindsey. Over the last two years, NO_2 annual mean concentrations have remained relatively stable at all sites and significantly below the air quality objective.

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 Plan[5] 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 Zero[6] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

East Lindsey District Council are to implement measures to improve air quality through the Lincolnshire Clean Air Project. These measures, funded by Defra, are centred around raising the awareness of air pollution and pollution reducing activities amongst the public.

In order to identify hotspot areas for action to reduce the concentration of $PM_{2.5}$, in-house funding is currently being sought by East Lindsey District Council for two remote monitoring devices. This will help identify the areas where action is needed to be taken.

[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

Owing to the fact that East Lindsey is a predominantly rural district with only three main urban areas (Louth, Horncastle and Skegness), the air quality is expected to be good. This assumption is supported by the latest monitoring data, which demonstrates that the NO_2 concentrations are significantly below the relevant air quality objectives in the three urban areas. The maximum NO_2 annual mean concentrations in each of these areas in 2022 were 21.2µg/m^3 (Louth), 25.4µg/m^3 (Horncastle) and 24.2µg/m^3 (Skegness). These concentrations were similar in 2021, indicating that there has not been a significant change in the NO_2 annual mean concentrations in East Lindsey over the last two years.

Any new developments will be submitted through the planning process, reviewed, and where there is a potential for a significant change in emissions as a result of traffic or new combustion processes, air quality assessments will be required. This is to ensure, and give confidence that, any newly proposed developments that are approved will not have a detrimental impact on 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)[7].

Local Engagement and How to get Involved

As the main source of air pollution within East Lindsey is from road traffic emissions, the most effective way in which members of the public can help improve air quality is to transition to a more sustainable form of travel. For example, the following are actions which can help improve air quality by adjusting an individual's normal travel pattern away from private vehicle use and towards a more sustainable alternative:

- **Public Transport:** Use and encourage travel on public transport where possible, to reduce the number of private vehicles on the road. This helps reduce the pollution concentration through reduced vehicle numbers and less congestion (i.e. idling).
- **Car Sharing:** Effective where a number of individuals are making a similar journey (i.e. to a workplace or school). Car sharing reduces the number of cars on the road and therefore the amount of emissions being released. Promoted via travel plans.

[7] UK Government. The Environmental Permitting (England and Wales) Regulations 2016. Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

- **Walking/Cycling:** Where the journey permits, choosing to walk or cycle instead not only reduces the number of vehicles on the road, but also provides an added benefit of keeping fit and healthy.
- **Fuel Efficient Vehicles:** Next time you are purchasing a vehicle, consider whether you are able to buy an electric, hybrid fuel or an alternative fuel-efficient vehicle instead. This doesn't reduce the amount of vehicles on the road, but does limit the amount of emissions that each vehicle on the road is releasing into the atmosphere.

For more information on LAQM and the work being done by Defra to tackle air pollution, please visit https://uk-air.defra.gov.uk/.

Local Responsibilities and Commitment

This ASR was prepared by Bureau Veritas on behalf of East Lindsey District Council, with the support and agreement of the following officers and departments:

- David Dodds – Environmental Health Service Manager
- Jake Dickinson Wray – Scientific Officer Environmental Health
- Caroline Currie – Senior EHP Environmental Health

This ASR has been approved by:

- Cllr Craig Leyland – Leader of the Council East Lindsey District Council
- Cllr Martin Foster – Operational Services Portfolio East Lindsey District Council

If you have any comments on this ASR please send them to:

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Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in East Lindsey during 2021 and 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 East 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 – Air Quality Objectives in England.

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 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.

East Lindsey District Council currently does not have any declared AQMAs. East Lindsey is largely rural, with three small towns (Louth, Horncastle and Skegness). NO_2 annual mean concentrations have been consistently below the air quality objectives at all monitoring locations and the Council is therefore not intending to declare an AQMA.

2.2 Progress and Impact of Measures to Address Air Quality in East Lindsey

Defra's latest appraisal of the 2021 ASR concluded that the report was well structured, detailed and provided the information specified in the guidance. The appraisal also recommended the following improvements which have been actioned in this report:

"The number of monitoring locations reported in the text (page 6) reports 14 sites between 2017 and 2020, and 16 sites in 2016. This differs to the number of locations reported in tables throughout the report, which indicates 10 sites between 2017 to 2020, and 13 in 2016. This is a source of confusion, and the correct number of monitoring sites should be reported on".

- In this report, the number of sites are referred to as the number of different monitoring locations (10). Reference is made to the fact that two sites are triplicates, resulting in a total of 14 diffusion tubes being deployed each month. Identifying the triplicates helps clear any confusion between the number of sites and the total number of diffusion tubes that were deployed across East Lindsey.

"It would be beneficial if the Appendix discussed QA/QC procedures for all reporting years more thoroughly, opposed to only discussing 2020: (a) The diffusion tube laboratory used, and AIR-PT results were reported for 2020 only".

- In this report, AIR-PT results are provided to cover the monitoring periods for the data that is presented (2021 and 2022).

East Lindsey District Council has taken forward a number of direct measures during 2021 and 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1. Two measures that are part of the Lincolnshire Clean Air Project are included within Table 2.1, with the type of measure and the progress East Lindsey District Council has made during 2021 and 2022 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.1.

East Lindsey District Council's priorities for the coming year are:

- **Education/Awareness:** Increase the public's awareness of air pollution, and the actions that can be taken to reduce emissions (i.e. from private vehicle use etc.).

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Lincolnshire Clean Air Project	Public Information	Other	2022	2024	Local Authority Environmental Health, Local Authority County Council & Schools	Defra Funding	Yes	Fully Funded	£50k - £100k	Implementation	Reduced vehicle emissions	Awareness and reduction of pollution levels around schools	Implementation on-going	Lack of interests from schools
2	Lincolnshire Clean Air Project	Public Information	Via the Internet	2022	2024	Local Authority Environmental Health, Local Authority County Council	Defra Funding	Yes	Fully Funded	£50k - £100k	Implementation	Air quality website for Lincolnshire	Awareness for general public and information source	Implementation on-going	None

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.

East Lindsey District Council does not undertake $PM_{2.5}$ or PM_{10} monitoring. Background annual mean $PM_{2.5}$ concentrations were obtained from Defra's background mapping[8] resource. The average $PM_{2.5}$ background concentrations across East Lindsey's administrative boundary were 8.1µg/m^3 in 2021, and 8.0µg/m^3 in 2022. The maximum background concentrations were 9.7µg/m^3 in 2021, and 9.5µg/m^3 in 2022, and were located within Coningsby (1km x 1km grid square: 523500, 358500).

The Public Health Outcomes Framework[9] data tool created by Public Health England quantifies the mortality burden of $PM_{2.5}$ within England on a county and local authority scale. For England, the fraction of mortality attributable to $PM_{2.5}$ pollution in 2021 was 5.5%, whilst the fraction for East Lindsey was lower at 4.7%.

East Lindsey District Council is currently exploring the availability of in-house funding for two remote monitoring devices to measure concentrations of $PM_{2.5}$. These will help identify any hotspot areas where $PM_{2.5}$ levels are high in East Lindsey, highlighting the areas where action is needed to be taken.

[8] Defra. Background Mapping Data for Local Authorities. Available at: https://uk-air.defra.gov.uk/data/laqm-background-home

[9] Public Health England. Public Health Outcomes Framework. Available at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework

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

This section sets out the monitoring undertaken within 2021 and 2022 by East 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

East Lindsey District Council did not undertake any automatic (continuous) monitoring at any site during 2021 and 2022.

3.1.2 Non-Automatic Monitoring Sites

East Lindsey District Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 10 sites during both 2021 and 2022. Two sites were triplicate sites, resulting in a total of 14 diffusion tubes being deployed each month. Table A.1 – Details of Non-Automatic Monitoring Sites in Appendix A presents the details of the non-automatic sites.

Maps showing the locations of the monitoring sites are provided in Appendix D. 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 (NO_2)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

During 2021 and 2022, all diffusion tube sites recorded an NO_2 annual mean concentration below the air quality objective (40µg/m^3). As seen in Figure A.1, this is a continuing trend observed over the last five years, and as such, East Lindsey District Council currently does not have any AQMAs declared. In 2021 and 2022, the maximum NO_2 annual mean concentrations were recorded at diffusion tube monitoring location H1, with values of 26.2µg/m^3 (2021) and 25.4µg/m^3 (2022). Over the last five years (2018 – 2022), this site has continued to record the highest concentration.

In 2021 and 2022, the NO_2 annual mean concentrations recorded at each diffusion tube site were relatively comparable. The largest difference between the two years was a decrease of 1.5µg/m^3 at site H3, indicating that there has not been a significant change in NO_2 annual mean concentrations within East Lindsey. Over the last two years, the NO_2 annual mean concentrations have remained relatively stable, yet comfortably below the air quality objective.

In 2020, a decrease in annual mean concentrations was observed at most of the sites, due to reduced traffic flows associated with the COVID-19 lockdown periods.

As no single diffusion tube site recorded an annual mean concentration above 60µg/m^3, it is assumed that the NO_2 hourly objective of 200µg/m^3 not to be exceeded more than 18 times per year, is unlikely to have been breached with East Lindsey during 2021 and 2022.

For diffusion tubes, the full 2021 and 2022 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 and Table B.2 includes distance corrected values, only where relevant.

3.2.2 Particulate Matter (PM_{10})

East Lindsey District Council did not undertake any PM_{10} monitoring in 2021 and 2022.

3.2.3 Particulate Matter ($PM_{2.5}$)

East Lindsey District Council did not undertake any $PM_{2.5}$ monitoring in 2021 and 2022.

3.2.4 Sulphur Dioxide (SO_2)

East Lindsey District Council did not undertake any SO_2 monitoring in 2021 and 2022.

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)
SK1, SK2, SK3	Roman Bank South	Roadside	556355	363295	NO_2	No	2.5	2.4	No	2.5
SK4	Roman Bank North	Roadside	556380	363363	NO_2	No	1.5	3.0	No	2.5
H1	East Street	Roadside	526075	369545	NO_2	No	0.0	2.4	No	2.5
H2	A158 / South Street	Roadside	526028	369528	NO_2	No	1.1	3.4	No	2.5
H3	Stanhope Road	Roadside	526264	369723	NO_2	No	1.5	2.0	No	2.5
H4	Bull Ring	Roadside	526007	369585	NO_2	No	1.5	1.2	No	2.5
L1	Church Street	Roadside	533225	387190	NO_2	No	0.0	2.1	No	2.5
L2, L3, L4	Church Street	Roadside	533215	387353	NO_2	No	0.8	0.9	No	2.5
L5	Priory Close	Urban Background	533459	387475	NO_2	No	5.5	2.4	No	2.5
L6	Upgate	Roadside	532693	387335	NO_2	No	6.0	5.2	No	2.5

Notes:

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]		Valid Data Capture (%) [2]		2018	2019	2020	2021	2022
				2021	2022	2021	2022					
SK1, SK2, SK3	556355	363295	Roadside	100.0	100.0	100.0	100.0	29.4	28.7	21.5	23.3	24.2
SK4	556380	363363	Roadside	82.7	75.0	82.7	75.0	24.2	22.7	18.7	19.5	20.1
H1	526075	369545	Roadside	100.0	100.0	100.0	100.0	32.3	34.3	23.3	26.2	25.4
H2	526028	369528	Roadside	100.0	90.4	100.0	90.4	26.8	25.9	20.3	20.7	20.5
H3	526264	369723	Roadside	72.9	90.4	72.9	90.4	11.7	12.5	14.0	10.9	9.4
H4	526007	369585	Roadside	92.3	82.7	92.3	82.7	26.4	25.0	12.6	19.4	20.5
L1	533225	387190	Roadside	92.3	100.0	92.3	100.0	18.0	16.1	12.8	13.3	12.9
L2, L3, L4	533215	387353	Roadside	100.0	100.0	100.0	100.0	24.6	23.8	16.7	19.2	18.6
L5	533459	387475	Urban Background	100.0	100.0	100.0	100.0	13.8	12.9	10.1	10.1	9.6
L6	532693	387335	Roadside	100.0	90.4	100.0	90.4	22.3	25.5	19.3	20.1	21.2

☐ **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/m^3.

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

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

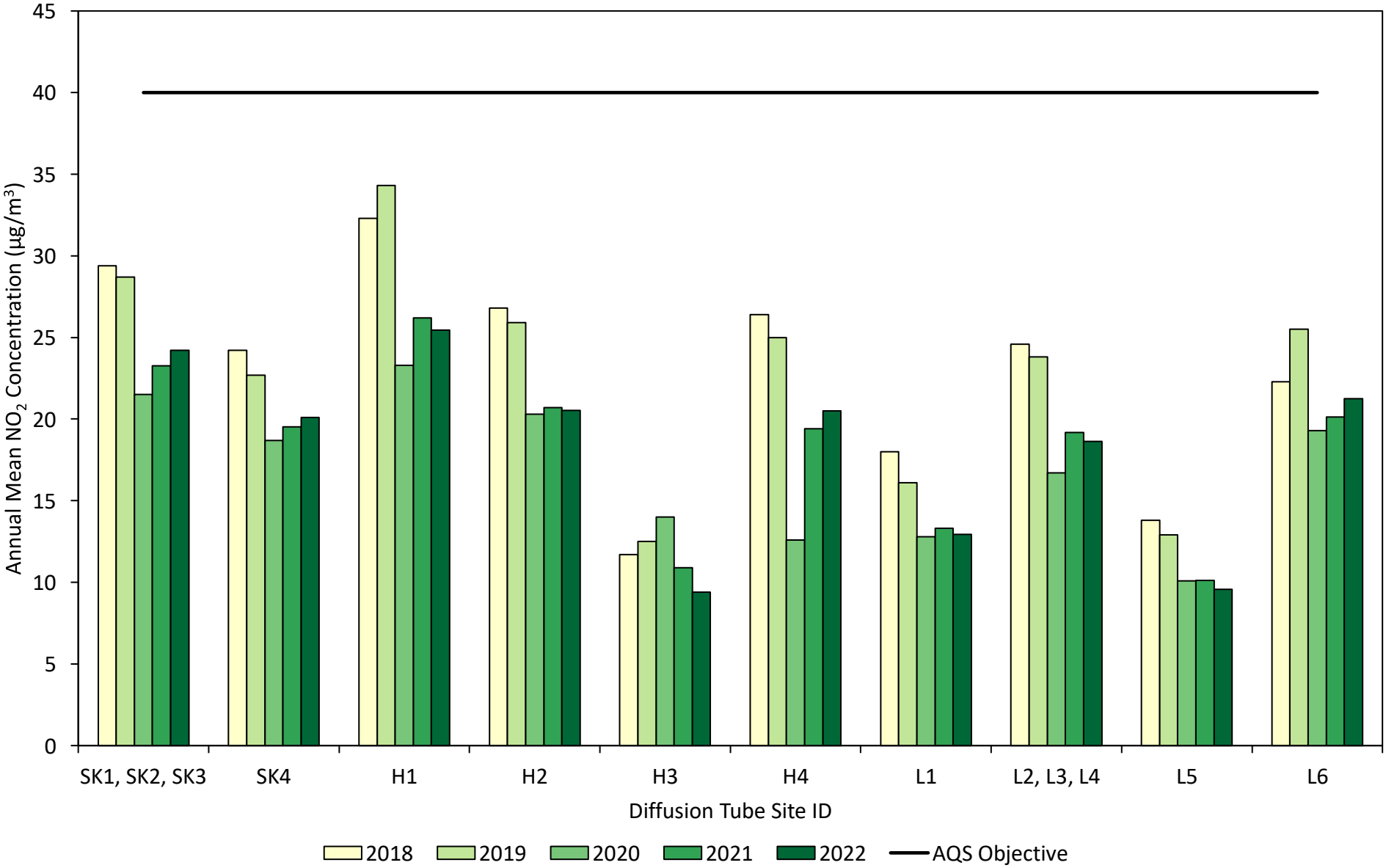
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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 NO_2 Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2021 and 2022

Table B.1 – NO_2 Diffusion Tube Results – 2021

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	2021														Comment
			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	
SK1	556355	363295	30.9	25.9	31.4	23.9	31.0	30.5	27.3	30.4	27.5	31.9	35.8	37.1	-	-		Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK2	556355	363295	28.9	23.5	21.2	23.8	31.4	33.0	29.7	31.2	30.9	28.9	26.9	31.3	-	-		Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK3	556355	363295	30.1	24.2	21.8	24.2	28.0	27.9	28.3	27.4	29.2	25.0	23.7	26.7	28.4	23.3		Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK4	556380	363363	24.7	18.9	24.5	Missing	21.1	Missing	18.7	19.8	23.2	27.3	31.4	28.5	23.8	19.5		
H1	526075	369545	36.2	25.0	28.3	27.1	33.3	30.5	31.5	32.2	38.8	36.8	30.9	32.6	31.9	26.2		
H2	526028	369528	32.5	21.8	26.9	20.8	24.1	19.6	21.0	23.0	26.1	29.8	30.0	27.3	25.2	20.7		
H3	526264	369723	29.5	10.7	10.1	9.9	8.1	8.5	7.3	Missing	Missing	Missing	27.2	8.3	13.3	10.9		
H4	526007	369585	15.5	24.0	Missing	28.7	26.7	23.1	26.0	22.1	27.8	23.5	15.3	27.5	23.7	19.4		
L1	533225	387190	Missing	17.5	13.7	17.5	16.7	13.6	14.8	11.8	17.3	16.1	21.4	18.1	16.2	13.3		
L2	533215	387353	27.0	21.7	23.7	25.0	23.1	22.3	18.9	20.7	25.6	21.8	14.4	25.2	-	-		Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L3	533215	387353	26.9	23.1	20.9	25.3	22.9	23.6	23.8	20.9	24.0	22.9	27.5	26.4	-	-		Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L4	533215	387353	21.2	24.6	24.0	25.0	24.5	23.6	21.4	18.1	25.4	23.7	26.3	26.9	23.4	19.2		Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L5	533459	387475	16.8	11.9	11.9	9.3	8.6	6.7	6.8	7.6	10.5	13.7	27.6	16.8	12.3	10.1		
L6	532693	387335	30.6	24.3	25.7	21.1	24.8	20.1	20.8	20.3	27.5	29.2	20.0	29.9	24.5	20.1		

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

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

☒ **East Lindsey District Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

Table B.2 – NO_2 Diffusion Tube Results – 2022

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	2022														Comment
			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	
SK1	556355	363295	31.6	26.4	36.7	30.9	30.2	27.3	29.2	30.1	25.6	33.7	28.1	31.4	-	-		Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK2	556355	363295	30.0	Missing	37.1	30.2	Missing	Missing	29.1	29.6	27.5	28.4	33.2	28.4	-	-		Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK3	556355	363295	39.0	23.7	34.1	29.5	27.7	26.3	30.2	27.4	26.4	25.9	26.1	31.6	29.5	24.2		Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK4	556380	363363	38.8	Missing	23.2	14.4	22.0	21.0	Missing	18.3	22.6	Missing	30.4	29.7	24.5	20.1		
H1	526075	369545	36.7	25.0	32.7	22.2	33.2	36.0	33.8	23.7	23.3	37.3	34.4	34.2	31.0	25.4		
H2	526028	369528	32.3	25.4	21.5	19.1	Missing	17.7	20.8	31.5	24.2	25.7	30.1	27.3	25.0	20.5		
H3	526264	369723	18.9	10.5	14.1	10.0	Missing	7.8	7.4	7.7	10.4	11.4	13.0	15.0	11.5	9.4		
H4	526007	369585	28.5	17.6	32.0	21.5	Missing	24.5	23.1	26.9	Missing	23.0	25.2	27.7	25.0	20.5		
L1	533225	387190	18.1	12.3	23.7	15.1	11.6	12.0	13.7	13.5	17.1	14.8	18.9	18.7	15.8	12.9		
L2	533215	387353	28.6	17.6	25.4	23.2	20.0	17.1	20.1	22.6	25.2	21.3	23.8	23.5	-	-		Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L3	533215	387353	27.6	17.4	30.7	22.7	20.2	18.4	20.3	22.9	23.5	19.7	25.0	26.6	-	-		Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L4	533215	387353	31.5	17.4	23.9	19.3	21.0	18.9	20.6	22.4	25.5	21.7	26.4	26.7	22.7	18.6		Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L5	533459	387475	21.7	12.6	14.5	9.1	8.4	6.7	7.4	7.6	10.9	9.6	14.0	17.4	11.7	9.6		
L6	532693	387335	35.4	25.4	28.8	20.5	Missing	21.3	21.4	20.8	25.2	25.7	31.0	29.5	25.9	21.2		

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

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

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

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within East Lindsey During 2021 and 2022

East Lindsey District Council has not identified any new sources relating to air quality within the reporting years of 2021 and 2022.

Additional Air Quality Works Undertaken by East Lindsey District Council During 2021/2022

East Lindsey District Council has not completed any additional works within the reporting years of 2021 and 2022.

QA/QC of Diffusion Tube Monitoring

During 2021 and 2022, the diffusion tubes deployed by East Lindsey District Council were supplied and analysed by Gradko International Limited. All tubes were prepared using the 50% TEA in acetone method. The results discussed throughout this report have been bias adjusted and annualised (if required). Gradko International Limited are a UKAS accredited laboratory that participates in the AIR-PT scheme for NO_2 diffusion tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring that the reported NO_2 concentrations are of a high calibre. In the most recent results, covering both years of data in this report (2021 and 2022), Gradko International were awarded the following scores:

- AIR-PT AR045 (July – August 2021) = 100%.
- AIR-PT AR046 (September – October 2021) = 100%.
- AIR-PT AR049 (January – February 2022) = 100%.
- AIR-PT AR050 (May – June 2022) = 100%.

These scores indicate that all results were deemed to be satisfactory, based on a z-score of less than ± 2, highlighting a good performance of Gradko International Limited during

both 2021 and 2022. As a result, there is a high degree of confidence in the diffusion tube results presented withing this report. During 2021, the diffusion tubes were deployed in line with the national calendar from January – September (± 2 days), but did not follow the national calendar for the remainder of the year. However, during 2022, the diffusion tubes were all deployed in accordance with the dates of the national calendar (± 2 days).

Diffusion Tube Annualisation

The LAQM TG.22 states that annualisation is required for any site with a data capture of less than 75% (or less than nine periods, but greater than 25%). During 2022, no monitoring data required annualisation as the minimum data capture was 75% (SK4). In 2021, the minimum data capture was 73% and, although below the 75% threshold, this site did not require annualisation as there was a total of 9 months of monitoring data. This is because, according to the LAQM TG.22, section 7.214 states:

"For any monitoring sites with fewer than nine months' worth of data assuming compliance with the Defra monitoring calendar, it is necessary to perform annualisation. If not following the Defra monitoring calendar, 75% annual data capture is required".

Based on professional judgement, as the majority of the year (9 months) was deployed in line with the national calendar, and this site (H3) has 9 months data capture, annualisation was not required to be completed.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented throughout this report has 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/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

East Lindsey District Council has applied the following national bias adjustment factor to the 2021 and 2022 diffusion tube data:

- 2021 data: 0.82 (based on 16 co-location studies).
- 2022 data: 0.82 (based on 15 co-location studies).

The national bias adjustment spreadsheet used to obtain these national adjustment factors (version 06/23) is shown below in Figure C.1. A summary of the adjustment factors used by East Lindsey District Council over the past five years is presented in Table C.1.

Figure C.1 – National Bias Adjustment Factor Spreadsheet, Version 06/23

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 06/23

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of September 2023

LAQM Helpdesk Website

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.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

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[3] 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[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[5]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in acetone	2021		Overall Factor[3] (16 studies)				Use		0.82
Gradko	50% TEA in acetone	2022		Overall Factor[3] (15 studies)				Use		0.82

Table C.1 – Bias Adjustment Factors, 2018 – 2022

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	06/23	0.82
2021	National	06/23	0.82
2020	National	09/21	0.84
2019	National	09/20	0.89
2018	National	06/19	0.89

NO_2 Fall-off With Distance from the Road

No diffusion tube NO_2 monitoring sites with East Lindsey required distance correction during both 2021 and 2022.

Appendix D: Maps of Non-Automatic Monitoring Locations

Figure D.1 – Map of Non-Automatic Monitoring Sites, East Lindsey Overview

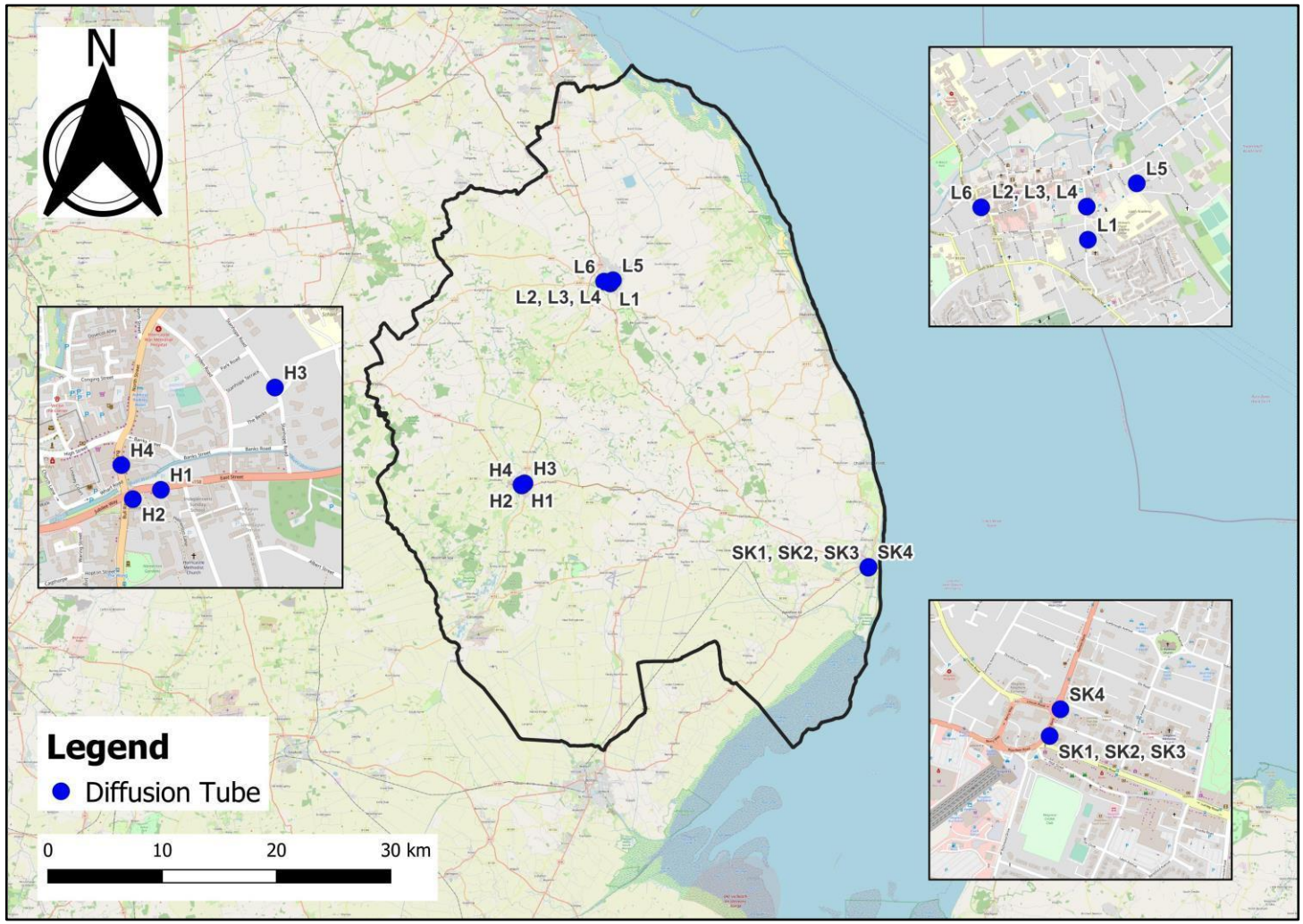


Figure D.2 – Map of Non-Automatic Monitoring Sites, Louth

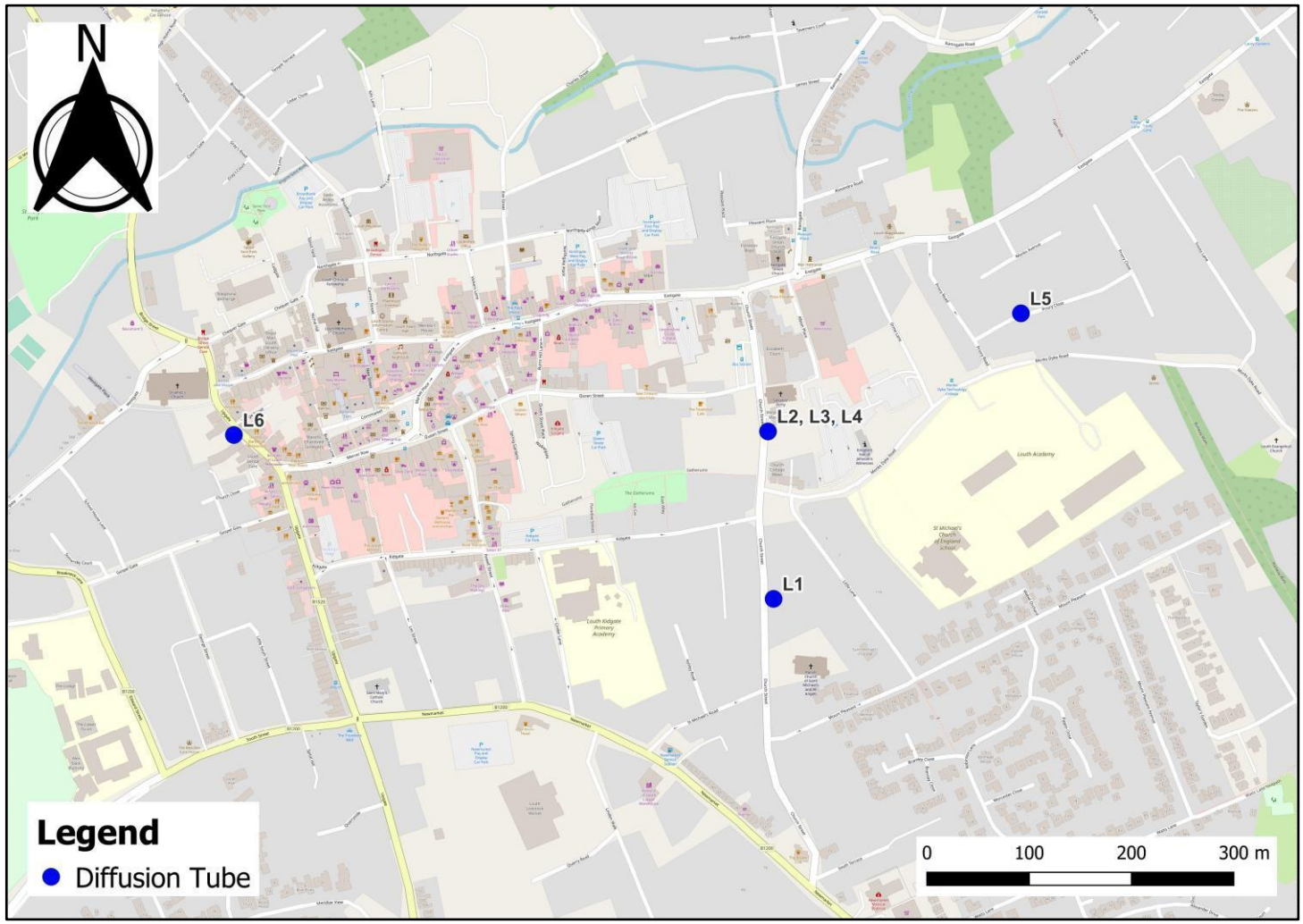


Figure D.3 – Map of Non-Automatic Monitoring Sites, Horncastle

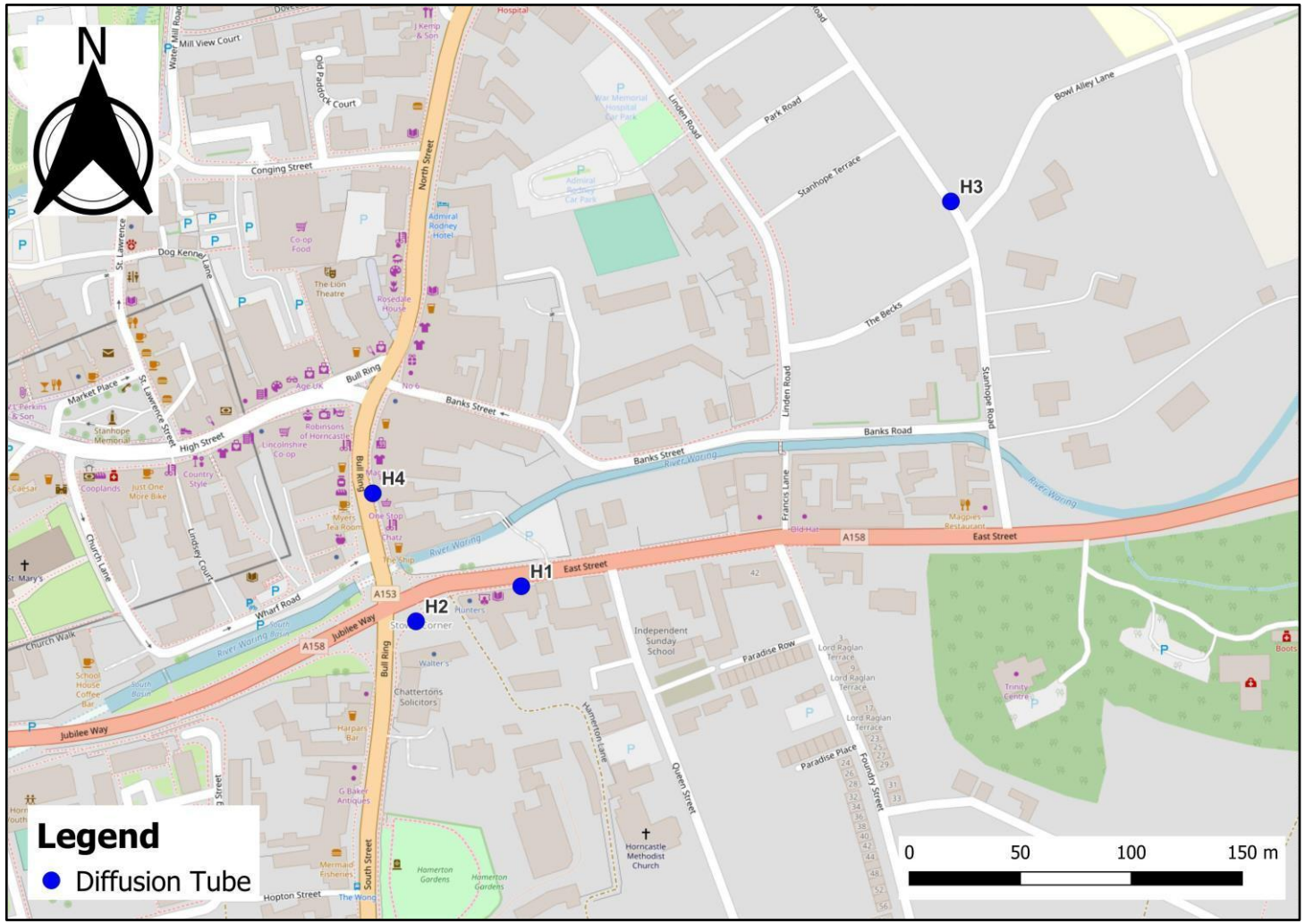
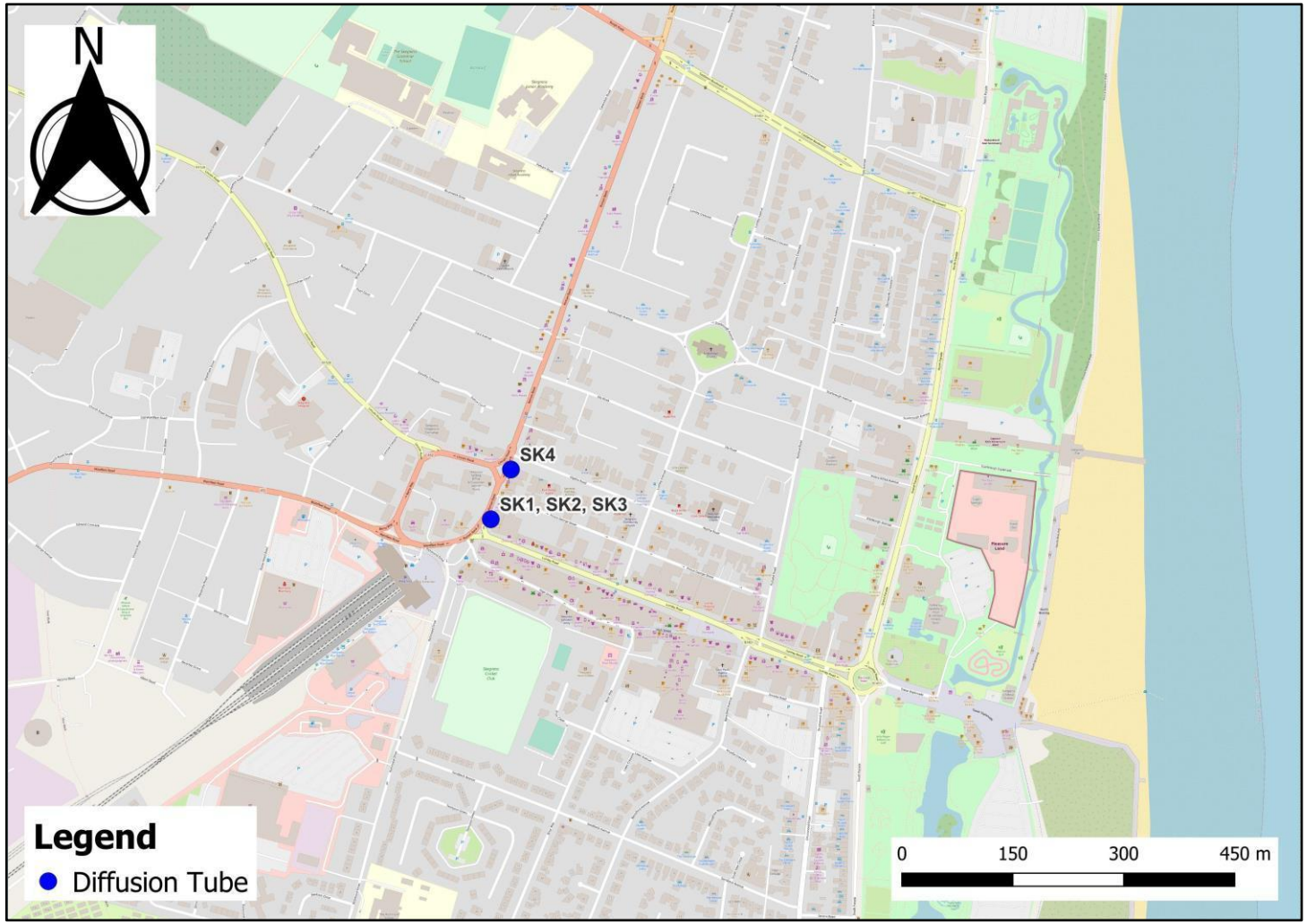


Figure D.4 – Map of Non-Automatic Monitoring Sites, Skegness



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective: Concentration[10]	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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006.
- Defra. Air quality appraisal: damage cost guidance, January 2023.
- Defra. Background Mapping Data for Local Authorities. Available at: https://uk-air.defra.gov.uk/data/laqm-background-home.
- Defra. Environmental Improvement Plan 2023, January 2023.
- DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018.
- 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.
- 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.
- Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017.
- Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018.
- Public Health England. Public Health Outcomes Framework. Available at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework.
- UK Government. The Environmental Permitting (England and Wales) Regulations 2016. Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made.