Air Quality Annual Status Report 2024

Bureau Veritas

June 2024

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Document Control Sheet

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	Name	Job Title	Signature
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Approved By	Viral Patel	Senior Air Quality Consultant	

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2024 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: June 2024

Information	East Lindsey District Council Details
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Report Reference Number	AIR22154586
Date	June 2024

Executive Summary: Air Quality in Our Area

Air Quality in East Lindsey

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year[1].

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution[2].

East Lindsey District Council's administrative area is predominantly rural, with three small towns: Louth, Horncastle, and Skegness. The primary source of air pollution in East Lindsey is vehicular emissions from the established road networks leading into these towns, including the A158, A52, A16, and A1028.

During 2023, diffusion tubes were deployed in these towns to measure the concentration of nitrogen dioxide (NO_2). After correcting the data for bias and annualising it (where required), the 2023 results were consistent with the trend observed over the previous reporting years, indicating concentrations significantly below the air quality objectives.

As a result, there are currently no Air Quality Management Areas (AQMAs) declared within East Lindsey District Council's administrative area.

Monitoring data indicates 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

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[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

below the relevant air quality objectives. During 2024, East Lindsey District Council will be commencing the development an Air Quality Strategy.

In 2023, the maximum NO_2 annual mean concentration was recorded at diffusion tube monitoring location H1, with a value of 25.5µg/m³. Over the last five years (2019 – 2023), this site has continued to record the highest NO_2 concentration.

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO_2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

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[3] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter ($PM_{2.5}$), the pollutant of most harmful to human health. The Air

[3] Defra. Environmental Improvement Plan 2023, January 2023

Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero[5] details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel and the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

East Lindsey District Council is implementing 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 reduce the concentration of $PM_{2.5}$, in-house funding was being sought out in 2022, and is currently ongoing by East Lindsey District Council. Two low cost sensor devices are aiming to be deployed to further monitor trends and hotspots of $PM_{2.5}$ and $PM_{10.}$ This has not been possible to progress during the 2023 reporting year due to funding, however this will continue to be explored during 2024.

Conclusions and Priorities

Air quality is expected to be good as East Lindsey consists predominantly of only three significant urban areas (Louth, Horncastle and Skegness), with the majority of the district considered rural. The 2023 monitoring data supports this, as NO_2 concentrations continue to be well below the Air Quality Objective for the long-term annual mean within the urban areas. The maximum NO_2 annual mean concentrations in each of these areas in 2023 were $19.6\mu g/m^3$ (Louth), $25.5\mu g/m^3$ (Horncastle) and $23.5\mu g/m^3$ (Skegness). These concentrations were similar to concentrations in 2022, indicating that there has not been a significant change in the NO_2 annual mean concentrations in East Lindsey over the last year.

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[4] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

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

Air Quality Assessments will be required for new developments that are submitted through the planning process and it is identified that there is potential for significant change in emissions associated with an increased level of traffic or new combustion processes.

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)[6].

Local Engagement and How to get Involved

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. The following actions 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.
- **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/.

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

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

This ASR has been signed off by a Director of Public Health.

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

David Dodds,

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Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in East Lindsey during 2023. 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 ASR is an annual requirement showing the strategies employed by East Lindsey to improve air quality and any progress that has been made. East Lindsey District Council are in the process of developing an Air Quality Strategy

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

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.

Currently, there are no declared AQMAs within the administrative area of East Lindsey District Council due to the area being largely rural. 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 in East Lindsey

Defra's appraisal of last year's 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:

"Include PM$_{2.5}$ measures into next years action plan measures. This would further support the councils aims in improving air quality within their jurisdiction".

- East Lindsey District Council is still seeking for funding for two low cost sensor monitoring devices to undertake monitoring of hotspots and trends in PM$_{10}$ and PM$_{2.5.}$

"Discuss earlier reporting years (2018/2019) with the current monitoring results within the discussion. It is clear to see that the council has made a lot of progress in improving air quality since 2018/2019. It would be good to see discussions that draw on this".

- In this report, the discussion of monitoring results has included earlier reporting years (2019) to express the council's progress in improving air quality.

East Lindsey District Council has taken forward a number of direct measures during 2023 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. It should be noted that Table 2.1 will form the base of the Air Quality Strategy that is being developed by East Lindsey District Council.

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	Estimated / Actual Completion Year	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	Completed	Air quality website for Lincolnshire	Awareness for general public and information source	Website live	None

2.3 PM$_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[7], local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter (PM$_{2.5}$)). There is clear evidence that PM$_{2.5}$ (particulate matter smaller 2.5 micrometres) 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 concentration across East Lindsey's administrative boundary was 7.4µg/m^3 in 2023. The maximum background concentration was 9.0µg/m^3 in 2023 and was 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 2023 was 7.8%, whilst the fraction for East Lindsey was lower at 6.0%.

East Lindsey District Council is still seeking in-house monitoring using two remote devices for PM$_{2.5}$ and PM$_{10}$ monitoring. However, progress is slow due to acquiring funding. Once implemented, this will help identify the areas where action is needed to be taken.

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[7] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

[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 2023 by East Lindsey District Council and how it compares with the relevant air quality objectives. Monitoring results are presented for a five-year period between 2019 and 2023 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 2023.

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 2023. Two sites were triplicate sites, resulting in a total of 14 diffusion tubes being deployed each month. Table A.1 in Appendix A presents the details of the non-automatic sites. During 2023 there were no changes to the monitoring network.

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 (NO₂)

Table A.1 and 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. 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 2023 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. The maximum recorded concentration across the diffusion tube network in 2023 was 25.2µg/m³ at H1.

During 2023, all diffusion tubes recorded NO₂ annual mean concentrations below the air quality objective of 40µg/m³. All monitoring sites showed reductions in NO₂ concentrations from the previous monitoring year (2022) with the exception of H1 (0.1g/m³) and SK4 (1.3µg/m³).

As expected, a decrease in annual mean concentrations was observed at most of the sites during 2020, due to reduced traffic flows associated with the COVID-19 lockdown periods. Annual mean concentrations have increased during 2021 and 2022 as restrictions were lifted and traffic flows increased. Concentrations in 2023 appear to be comparable to those seen during 2022 which could indicate that annual mean concentrations have steadied.

Monitoring indicates that no diffusion tube site recorded an annual mean concentration above 60µg/m³, it is assumed that the NO₂ hourly objective of 200µg/m³ not to be exceeded more than 18 times per year, is unlikely to have been breached with East Lindsey during 2023.

3.2.2 Particulate Matter (PM₁₀)

East Lindsey District Council did not undertake any PM₁₀ monitoring in 2023.

3.2.3 Particulate Matter (PM₂.₅)

East Lindsey District Council did not undertake any PM₂.₅ monitoring in 2023.

3.2.4 Sulphur Dioxide (SO₂)

East Lindsey District Council did not undertake any SO₂ monitoring in 2023.

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 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 (%)	Valid Data Capture (%)	NO₂ Annual Mean Concentration (µg/m³)				
						2019	2020	2021	2022	2023
SK1, SK2, SK3	556355	363295	Roadside	100.0	100.0	28.7	21.5	23.3	24.2	23.5
SK4	556380	363363	Roadside	84.5	84.5	22.7	18.7	19.5	20.1	21.1
H1	526075	369545	Roadside	100.0	100.0	34.3	23.3	26.2	25.4	25.5
H2	526028	369528	Roadside	100.0	100.0	25.9	20.3	20.7	20.5	19.8
H3	526264	369723	Roadside	92.5	92.5	12.5	14.0	10.9	9.4	8.5
H4	526007	369585	Roadside	100.0	91.2	25.0	12.6	19.4	20.5	18.4
L1	533225	387190	Roadside	100.0	100.0	16.1	12.8	13.3	12.9	11.9
L2, L3, L4	533215	387353	Roadside	100.0	100.0	23.8	16.7	19.2	18.6	18.0
L5	533459	387475	Urban Background	100.0	100.0	12.9	10.1	10.1	9.6	8.4
L6	532693	387335	Roadside	100.0	100.0	25.5	19.3	20.1	21.2	19.6

☒ **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:

(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.

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 NO₂ Concentrations
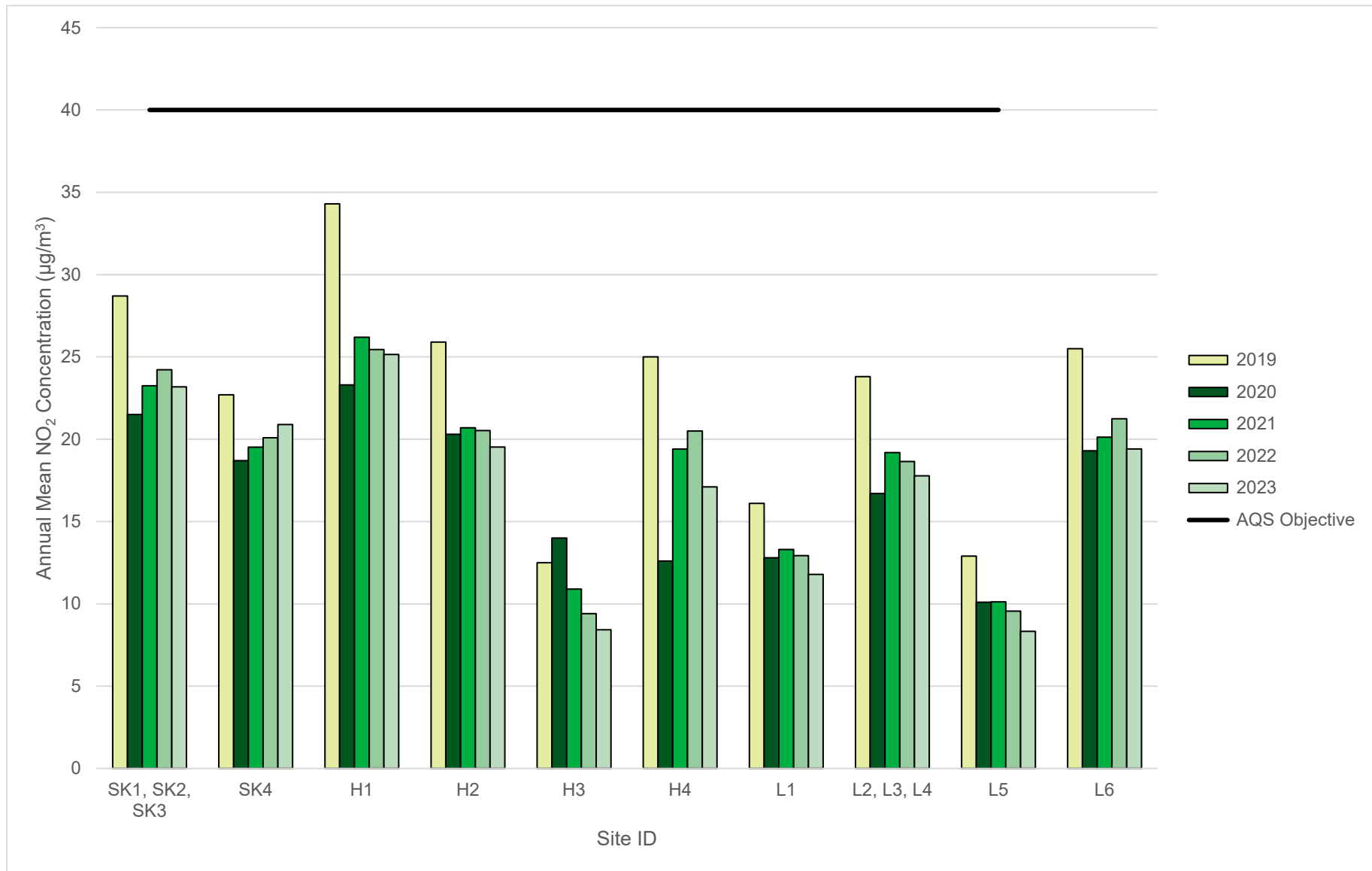
Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO₂ 2023 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO₂ Mean Concentrations (µg/m³)												Simple Annual Mean (µg/m³)			Comment
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82)	Distance Corrected to Nearest Exposure	
SK1	556355	363295	33.9	34.1	25.2	33.1	29.2				30.0	29.0	24.9	23.2	-	-	-	Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK2	556355	363295	25.7	30.2	27.0	26.5	30.6	30.1	25.7	29.0	30.7	26.9	23.6	23.0	-	-	-	Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK3	556355	363295	26.2	28.6	31.0	32.4	29.8	28.9	29.4	28.0	27.3	28.3	22.1	28.9	28.3	23.2	-	Triplicate Site with SK1, SK2 and SK3 - Annual data provided for SK3 only
SK4	556380	363363	32.3	31.6	23.9	16.9	14.5	27.6	24.8	28.8		25.1	29.4		25.5	20.9	-	
H1	526075	369545	33.6	30.1	31.9	30.8	24.8	26.4	32.0	31.5	35.0	33.7	30.4	27.9	30.7	25.2	-	
H2	526028	369528	32.5	28.2	26.4	18.9	19.2	18.3	22.6	21.9	24.1	23.1	26.3	24.2	23.8	19.5	-	
H3	526264	369723	15.2	13.5	10.7	8.4	7.6	7.4	7.4	7.7		10.7	12.9	11.6	10.3	8.4	-	
H4	526007	369585	21.6	26.7	23.1	26.1	29.1	23.8	16.4	21.4	22.0	18.6		15.3	20.9	17.1	-	Concentration in November has been omitted due to reading anonymously low
L1	533225	387190	15.6	16.8	14.8	15.4	14.9	12.1	9.3	11.7	14.6	16.5	17.3	13.4	14.4	11.8	-	
L2	533215	387353	24.0	24.1	22.1	23.6	23.4	21.4	16.6	18.4	21.2	21.3	25.8	16.6	-	-	-	Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L3	533215	387353	23.9	26.1	22.2	22.9	23.0	20.6	15.7	18.9	23.2	22.9	23.3	18.9	-	-	-	Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L4	533215	387353	24.1	25.9	21.6	23.2	20.2	20.5	17.1	18.5	23.3	21.8	24.7	19.7	21.7	17.8	-	Triplicate Site with L2, L3 and L4 - Annual data provided for L4 only
L5	533459	387475	16.5	11.4	10.3	8.0	6.3	6.4	6.9	7.3	9.4	12.0	15.4	12.0	10.2	8.3	-	
L6	532693	387335	31.6	29.3	24.6	24.6	16.0	15.9	20.8	22.1	21.9	25.5	28.4	23.3	23.7	19.4	-	

☒ **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.**

☒ **East Lindsey District Council confirm that all 2023 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 2023

East Lindsey District Council has not identified any new sources relating to air quality within the reporting year of 2023.

Additional Air Quality Works Undertaken by East Lindsey During 2023

East Lindsey District Council has not completed any additional works within the reporting year of 2023.

QA/QC of Diffusion Tube Monitoring

During 2023, 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 the data in this report (2023), Gradko International were awarded the following scores:

- AIR-PT AR050 (May – June 2022) = 100%.
- AIR-PT AR052 (July – August 2022) = 100%.
- AIR-PT AR053 (September – October 2022) = 100%.
- AIR-PT AR055 (January – February 2023) = 100%.
- AIR-PT AR056 (May – June 2023) = 100%.
- AIR-PT AR058 (July – August 2023) = 100%.
- AIR-PT AR059 (September – October 2023) = 100%.

2023 indicate that all results were deemed to be satisfactory, based on a z-score of less than ± 2, highlighting a good performance tof Gradko International Limited. As a result,

there is a high degree of confidence in the diffusion tube results presented withing this report. During 2023, the diffusion tubes were deployed in line with the national calendar from January – January (± 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 2023, no monitoring data required annualisation as the minimum data capture was 75%.

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 2023 diffusion tube data:

- 2023 data: 0.83 (based on 15 co-location studies).

The national bias adjustment spreadsheet used to obtain these national adjustment factors (version 03/24) is shown below. A summary of the adjustment factors used by East Lindsey District Council over the past five years is presented in Table C.1. It should be noted that ELDC does not undertake any automatic monitoring and it was not possible to calculate a local bias adjustment therefore, a national bias adjustment factor has been used.

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/24

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 spreadsheet 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 June 2024

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[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[1]. 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[3] *To undo your selection, choose (All)*	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) ($\mu g/m^3$)	Automatic Monitor Mean Conc. (Cm) ($\mu g/m^3$)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in acetone	2023	UB	City Of London Corporation	10	28	22	26.3%	G	0.79
Gradko	50% TEA in acetone	2023	R	City Of London Corporation	11	36	31	15.0%	G	0.87
Gradko	50% TEA in acetone	2023	R	LB Newham	12	27	21	28.0%	G	0.78
Gradko	50% TEA in acetone	2023	SU	Redcar And Cleveland Borough Council	12	14	10	48.0%	G	0.68
Gradko	50% TEA in Acetone	2023	R	Sandwell Mbc	12	33	26	27.6%	G	0.78
Gradko	50% TEA in acetone	2023	UB	Sandwell Mbc	11	21	18	15.8%	G	0.86
Gradko	50% TEA in acetone	2023	R	Sandwell Mbc	12	23	20	14.2%	S	0.88
Gradko	50% TEA in Acetone	2023	UC	Falkirk Council	12	33	29	14.9%	G	0.87
Gradko	50% TEA in Acetone	2023	UB	Falkirk Council	12	15	13	8.9%	G	0.92
Gradko	50% TEA in Acetone	2023	R	London Borough Of Lewisham	11	33	27	22.7%	G	0.82
Gradko	50% TEA in Acetone	2023	R	London Borough Of Merton	12	37	31	18.5%	G	0.84
Gradko	50% TEA in Acetone	2023	KS	Marylebone Road intercomparison	11	47	38	25.7%	G	0.80
Gradko	50% TEA in Acetone	2023	R	Royal Borough Of Windsor And Maidenhead	11	27	23	21.6%	G	0.82
Gradko	50% TEA in Acetone	2023	R	Royal Borough Of Windsor And Maidenhead	12	24	24	0.6%	G	0.99
Gradko	50% TEA in acetone	2023	R	London Borough Of Richmond Upon Thames	11	18	16	15.6%	G	0.86
Gradko	50% TEA in acetone	2023		Overall Factor[3] (15 studies)					Use	0.83

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.83
2022	National	06/23	0.82
2021	National	06/23	0.82
2020	National	09/21	0.84
2019	National	06/19	0.89

NO₂ Fall-off with Distance from the Road

No diffusion tube NO$_2$ monitoring sites with East Lindsey required distance correction during 2023.

Appendix D: Maps of Non-Automatic Monitoring Locations

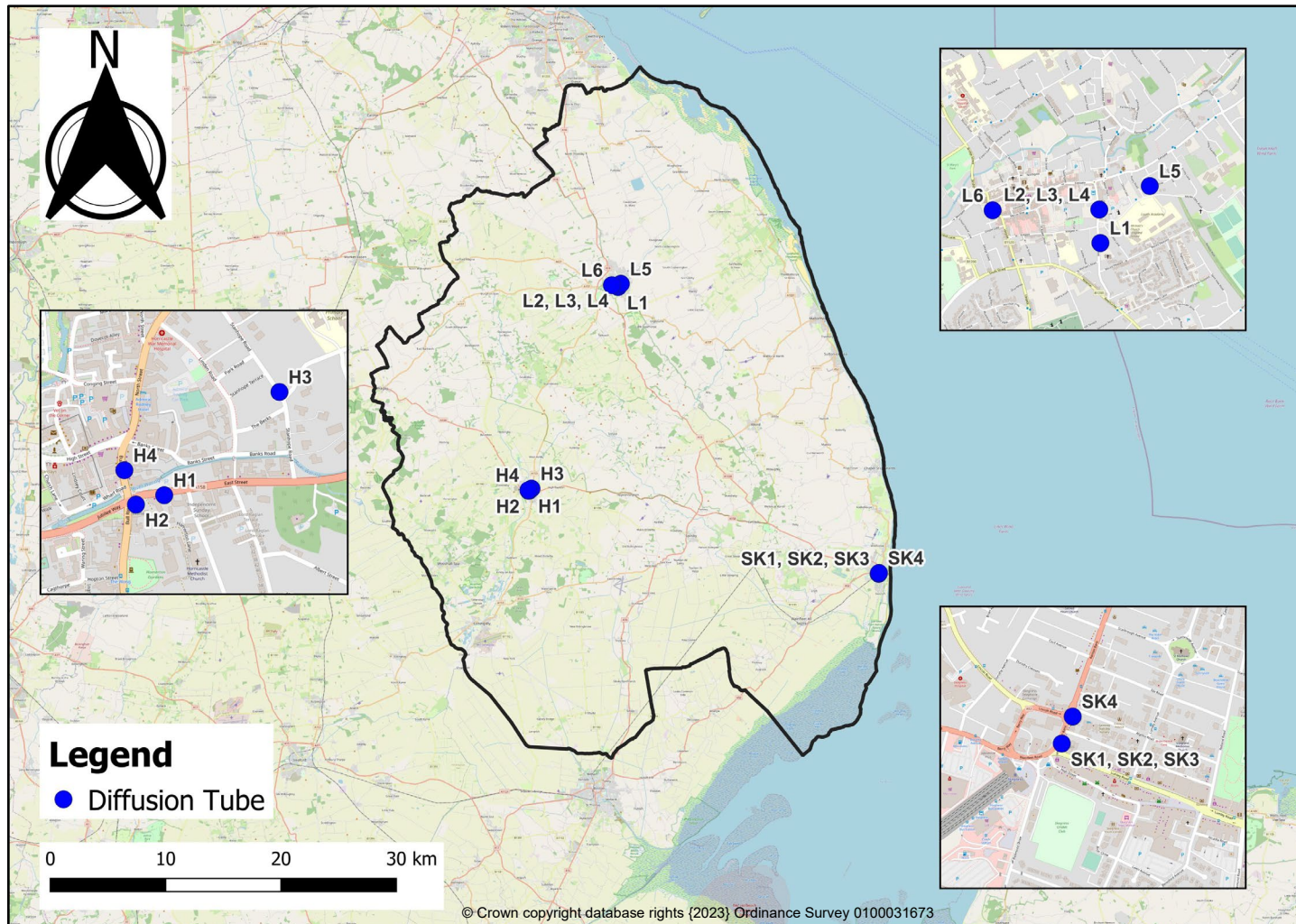**Figure D.1 –**Map of Non-Automatic Monitoring Sites, East Lindsey Overview
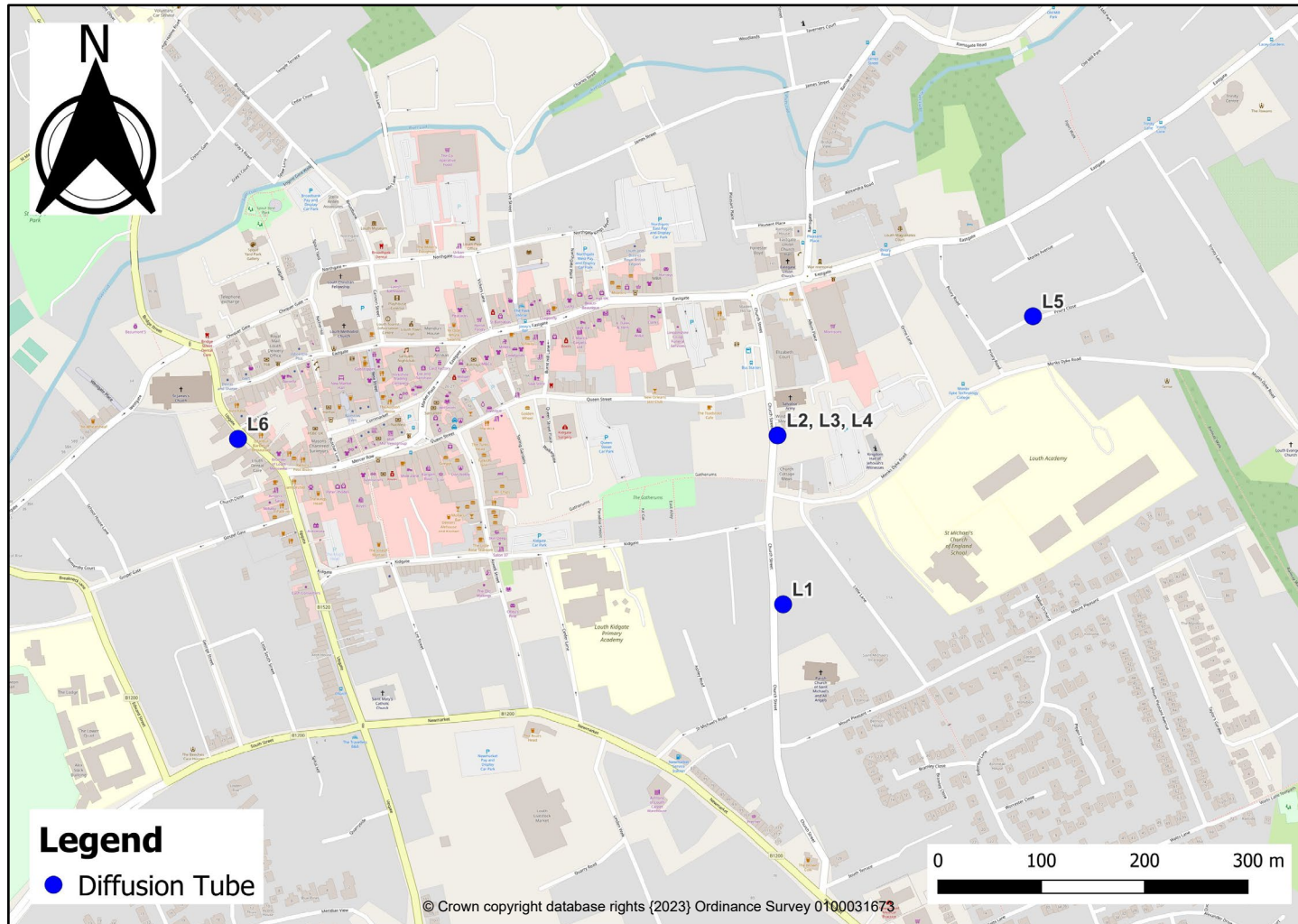
Figure D.2 –Map of Non-Automatic Monitoring Sites, Louth

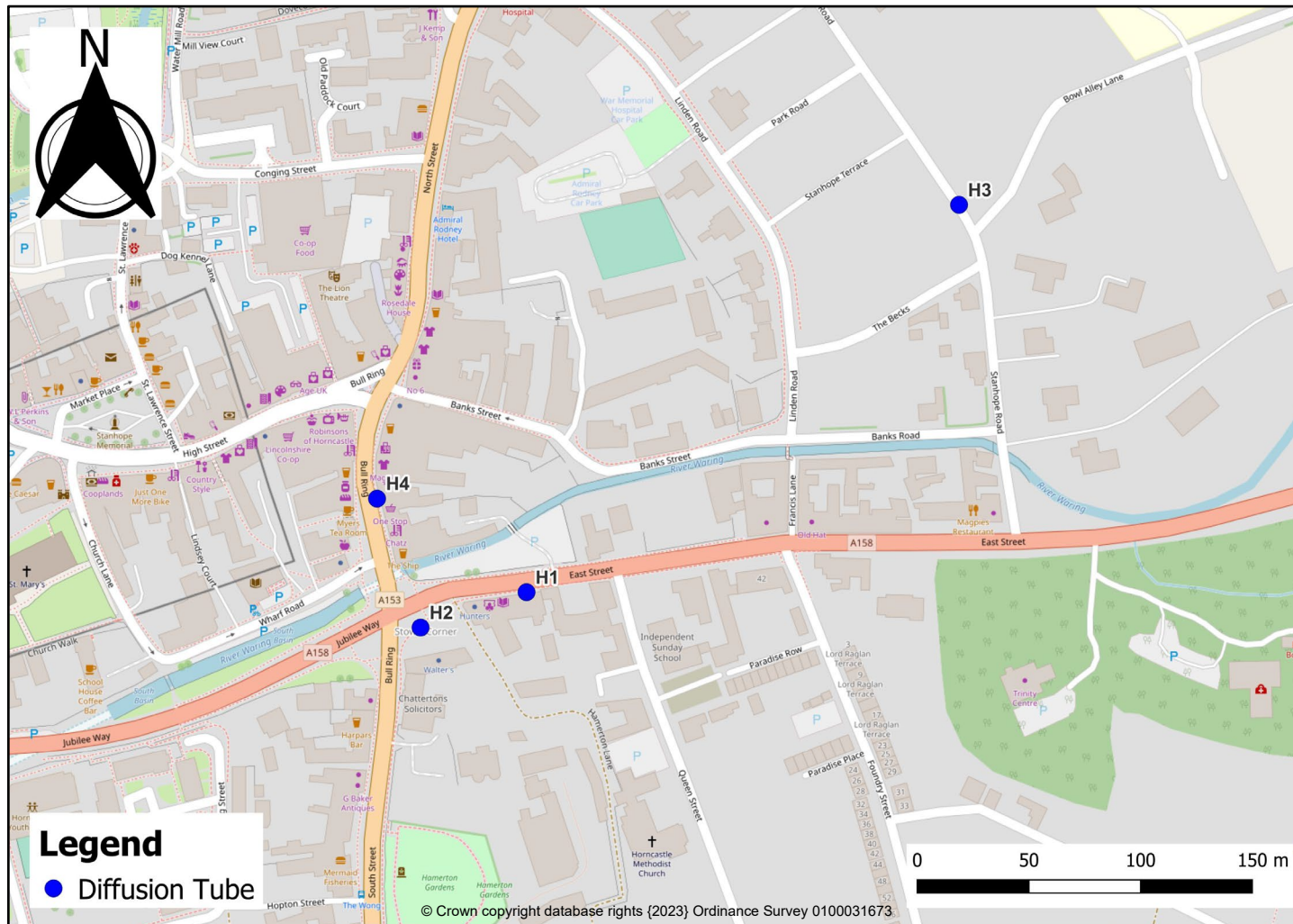**Figure D.3 –Map of Non-Automatic Monitoring Sites, Horncastle**

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[10]

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

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[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
ELDC	East Lindsey District Council
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

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