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

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Executive Summary: Air Quality in Our Area

Air Quality in Luton

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].

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.

[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.

Road traffic is Luton's main source of pollution, with the town and the motorway providing significant traffic volumes. Other sources include London Luton Airport and local industry, distributed in pockets around the borough. As of 2024, 38 industrial processes permitted by Luton Council were operational within the town.

Historically, the main pollutant of concern in Luton has been NO_2, with three Air Quality Management Areas (AQMA) declared for exceedances of the annual mean air quality objective of 40µg/m^3. Declared in 2003 and 2005, respectively, the first two of these AQMAs (No. 1 & 2) are situated along the route of the M1 motorway, starting just south of junction 11 and extending northward. The final AQMA (No. 3) was designated in 2016 and encompasses Stuart Street in the town centre, running along the route of the A505 Dunstable Road East from the south of Bury Park to the western end of the Park Viaduct. Maps showing the boundaries of the AQMAs are provided in Appendix D of this report, with further information available on the council's website (https://tinyurl.com/y9zegeyj) and the UK Air web portal (https://tinyurl.com/yd8t7ma2).

In recent years, monitoring has shown that NO_2 levels have significantly reduced compared to those observed when the AQMAs were first declared (Table 2.1). The maximum annual mean concentration recorded in each AQMA during 2023 has reduced by between 40% and 58% relative to initial values, with no exceedances of the 40µg/m^3 annual mean objective level seen at any AQMA monitoring sites since 2019. Observed across the whole of the town, this continued reduction is consistent with a national trend of decreasing NO_2 levels[3] (Figure A.3).

Between 2016 and 2023 inclusive, the annual mean NO_2 concentration at urban background sites in Luton has decreased slightly faster than the national average, with concentrations decreasing at an average rate of 1.4µg/m^3 each year compared to a national average decrease of 1.3µg/m^3 over the same period. When considering roadside sites, this ranking is reversed, with the national average reduction being 2.3µg/m^3 compared to 1.8µg/m^3 in Luton.

In addition to NO_2, particulate matter (PM) is also measured at automatic and sensor-based indicative monitoring sites across the town. Classified according to size, the current focus is on measuring the fractions of PM where particles are less than 10 micrometres in diameter (PM_{10}) and less than 2.5 micrometres in diameter ($PM_{2.5}$) based on the latest evidence on their effects on

[3] Defra. Accredited official statistics – Nitrogen dioxide (NO_2), 2023 [https://tinyurl.com/347rax7z]

health[4]. To date, no exceedance of the air quality objectives for PM_{10} has either been predicted by modelling or measured within Luton.

Introduced by *The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023*, new legally binding national concentration and exposure reduction targets will come into force for $PM_{2.5}$ in 2040. In preparation, associated interim targets have been set for January 2028. These targets look to reduce annual mean $PM_{2.5}$ concentrations to 12µg/m^3 by the beginning of 2028 and 10µg/m^3 by the end of 2040.

Between 2016 and 2023 inclusive, on a national basis, annual mean PM_{10} and $PM_{2.5}$ levels have decreased at an underlying rate of 0.4µg/m^3 at both roadside and urban background sites[4]. During this same period, at the automatic monitoring sites near London Luton Airport (LA001 and LA08/HB006), the decrease in both PM_{10} and $PM_{2.5}$ concentrations has been noticeably faster. However, at the town's only roadside automatic PM monitor (LN60/HB007 – located on Stuart Street), the rate of improvement has almost flatlined, with $PM_{2.5}$ levels improving by an average of 0.18µg/m^3 a year and PM_{10} concentrations by even less. Despite this persistence, the 2040 annual mean concentration target of 10µg/m^3 has not been exceeded at either of Luton's two $PM_{2.5}$ automatic monitoring sites since 2020.

With NO_2 and PM concentrations remaining at or below the reduced levels seen during the Covid-19-affected years of 2020 and 2021, the 2023 monitoring data represents a turning point for air quality management within Luton. Previously, the working assumption had been that the significant reduction in NO_2 levels resulting from the Covid lockdowns would, to some extent, be reversed as the last domestic Covid restrictions in England were lifted on 21 February 2022 and society moved into a recovery phase. However, with neither the accredited national figures[3] nor local monitoring data showing any sign of the expected reversal, it is increasingly likely that, post-pandemic, the observed reduced NO_2 levels represent a genuine "new normal" rather than a transitory blip. Before this became apparent, Luton Council was progressing with a potential expansion of AQMA N$^{o.}$ 3 and developing a new Air Quality Action Plan (AQAP) to address exceedances of the annual mean air quality objective for NO_2. Underpinned by studies based on pre-pandemic data, these interventions no longer appear relevant due to no exceedances of the objective being observed at relevant receptors in Luton since 2019.

[4] Defra. Accredited official statistics – Particulate matter (PM_{10} / $PM_{2.5}$), 2024 [https://tinyurl.com/mryfpw2r]

With evidence that compliance had been achieved in AQMA Nos. 1 & 2 before Covid, additional passive monitoring at previously unobserved sites commenced in 2024 ahead of their potential revocation later in the year. With 2023 and provisional 2024 data indicating continued compliance in AQMA No. 3, three additional passive monitoring sites have also been established within the town centre AQMA to help determine whether revocation is warranted. In light of the continued absence of exceedances and the potential revocation of its AQMAs, rather than bringing forward an action plan focused on delivering NO_2 reductions that have already been achieved, Luton Council will instead focus on the delivery of a borough-wide Air Quality Strategy to secure further reductions in NO_2 and PM levels across the town.

As a member of the *Herts & Beds Air Quality Network*, Luton Council works with colleagues in neighbouring authorities to ensure a consistent approach and to raise awareness of air quality in Luton and the surrounding area.

As a unitary authority, Luton Council colleagues from Environmental Protection, Climate Change & Sustainability, Highways, Planning and Public Health, amongst others, all work together in an integrated manner to address local air quality concerns. One example of this was a substantial piece of work undertaken during 2023/24 by Public Health with input from Environmental Protection and Sustainability colleagues to develop a new website and communications strategy to raise awareness of poor air quality and its potential health impacts and to offer practical advice on how to minimise personal exposure. Unfortunately, this intervention did not proceed following the withdrawal of funding from Defra's 2023/24 Local Air Quality Grant Scheme.

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 targets for fine particulate matter ($PM_{2.5}$), the pollutant most harmful to human health. The Air Quality Strategy[6] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

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

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

The Road to Zero[7] 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.

Following the recommendations of the Air quality strategy: framework for local authority delivery[8], the reporting year 2023/24 has seen the increasing integration of climate change mitigation and adaptation measures with measures that improve air quality. Further consolidated by the publication of the council's Climate Policy and Action Plan[9], recent developments of significant potential benefit to both the climate change and air quality agendas have included:

- The publication of the Local Cycling and Walking Infrastructure Plan 2023-2033 (https://tinyurl.com/mrh3x3mu);
- The granting of planning permission for a 338-space park and ride at Butterfield Business Park equipped with 32 EV charging bays; and
- The operation of an e-bike hire scheme for council staff and an e-cargo bike project offering local families and businesses the opportunity to try out an e-cargo bike for free for up to 3 months (https://tinyurl.com/4ck7dpv6).

Additionally, the last 12 months have also seen passive monitoring commence at ten new sites distributed across all three AQMAs to obtain further data ahead of their potential revocation.

Conclusions and Priorities

In 2023, monitored NO_2 concentrations continued to follow national trends, remaining at the significantly reduced levels observed since the pandemic. At the same time, town centre PM_{10} and $PM_{2.5}$ levels remained essentially unchanged.

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

[8] Defra. Air quality strategy: framework for local authority delivery, 2023 [https://tinyurl.com/yjb9fuwj]

[9] Luton Council. Luton Net Zero: Climate Policy and Action Plan [https://tinyurl.com/y5ekszz5]

With no exceedances at a relevant receptor in 2023 and with annual mean NO_2 concentrations at all passive sites in AQMAs remaining below 36µg/m^3 since 2019, the main priorities for Luton Council in the coming year are:

- to discontinue the planned expansion of AQMA No. 3;
- to proceed with the revocation of AQMA Nos. 1 & 2 upon the completion of enhanced monitoring during 2024;
- to engage with Defra to determine whether a detailed assessment would be required before the revocation of AQMA No. 3; and
- to discontinue the ongoing development of a new AQAP focused on reducing NO_2 levels within the AQMAs and instead bring forward a more holistic borough-wide Air Quality Strategy.

As in previous years, the principal challenge in delivering this work programme over the coming year will be the continued lack of resources within the Council's Environmental Protection Team, which has been subject to staff shortages for a prolonged period.

Local Engagement and How to Get Involved

Environmental Protection regularly attends the Health Equity Town Board to advise on air quality matters and reports on air pollution to the Climate Change Advisory Board.

The potential for the residents and businesses of Luton to positively impact air quality is considerable. Poor air quality in the town has been shown to result from busy and congested roads.

By choosing sustainable methods of travel, there will be less pollution in the local atmosphere. Recommended travel methods are:

- Walking
- Cycling
- Public Transport
- Use of Electric Vehicles

Where these are not feasible, a newer vehicle that meets a higher emissions specification will produce less pollution than older models.

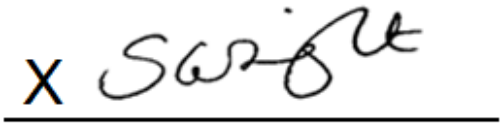
For more information on journey planning, sustainable modes of travel, and the local transport network, visit the LBC Transport and Streets webpages (https://tinyurl.com/yd8du68t). To find out how your activity contributes to pollution levels and receive personalised recommendations on how you can make a difference, use Global Action Plan's online Air Pollution Calculator (https://tinyurl.com/y5ch8jex).

Local Responsibilities and Commitment

This ASR was prepared by Environmental Protection at Luton Council with the support and agreement of the following officers and departments:

- Andrew Loosley, Technical Officer (Environmental Protection)
- Nathan Burge, Electric Vehicle Chargepoint Project Officer (Strategy and Sustainability)

This ASR has been approved by:



Sally Cartwright
Director of Public Health

Sue Frost
Director, Sustainable Development

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

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

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1 Local Air Quality Management

This report provides an overview of air quality in Luton during 2024. 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 Luton 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

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.

A summary of AQMAs declared by Luton Council can be found in Table 2.1. The table presents a description of the three AQMAs that are currently designated within Luton. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMA(s) and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean.

With no exceedances observed at a relevant receptor in 2023 and with annual mean NO_2 concentrations at all passive sites within AQMAs remaining below 36µg/m^3 since 2019, we propose to commence the revocation of all three AQMAs following the completion of enhanced monitoring and detailed assessment as appropriate.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Luton AQMA Nº·1	Declared 03/11/2003	NO_2 Annual Mean	24 Residential properties on either side of the M1 Motorway, near Junction 11	YES	47.6µg/m^3	N/A (highest monitored conc. 24.5µg/m^3)	6 years (4 years below 36µg/m^3 at all passive sites)	Within Local Transport Plan 3 2011-2026 March 2011	Link to LTP3
Luton AQMA Nº·2	Declared 31/03/2005	NO_2 Annual Mean	431 Residential properties on either side of the M1 Motorway, near Junction 11	YES	58.9µg/m^3	N/A (highest monitored conc. 24.5µg/m^3)	6 years (4 years below 36µg/m^3 at all passive sites	Within Local Transport Plan 3 2011-2026 March 2011	Link to LTP3
Luton AQMA Nº·3	Declared 01/05/2016	NO_2 Annual Mean	From Dunstable Road by Kenilworth Road through to Stuart Street and Chapel Viaduct by Latimer Road, including Castle Street to Holly Street and Telford Way	NO	54.6µg/m^3	N/A (highest monitored conc. 32.9µg/m^3)	4 years	Initial AQAP approved by Council Executive June 2018 However, subsequently not accepted by Defra.	Link to relevant minute

☒ Luton Council confirm the information on UK-Air regarding their AQMA(s) is up to date.

☒ Luton Council confirm that all current AQAPs have been submitted to Defra.

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

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

> "On the basis of the evidence provided by the local authority the conclusions reached are accepted for all sources and pollutants… The report is well structured, detailed, and provides the information specified in the Guidance."

The appended commentary made the following suggestions for future reports:

- *"Figures [showing multiple AQMAs] should have different coloured shading showing each individual AQMA."*

  The entirety of AQMA N$^{o.}$ 1 falls within the boundaries of the subsequently declared AQMA N$^{o.}$ 2. In the 2023 ASR, overlapping similarly coloured semi-transparent layers were used to represent both areas on maps. Consequently, the locations within AQMA N$^{o.}$1 were visible as more saturated areas of colour due to the additive effect of overlaying the two layers. However, it is accepted that the approach adopted was not adequately explained in the provided map keys. To avoid any confusion this year, in Figures D.2 and D.12 of Appendix D, AQMA N$^{o.}$ 1 is represented by a hatched overlay and AQMA N$^{o.}$ 2 by a coloured semi-transparent layer.

- *"Table A.2 should not include monitoring sites that are not currently being used as these has the potential to confuse the reader as to how many monitoring sites are currently active and which ones they are."*

  In previous ASRs, all available data was included for any sites active within the last five years. This was done for legacy purposes and to maximise the geographical coverage of the data set. Given the above, only data from currently active sites will be included in this and subsequent reports.

- *"The tables contained within the ASR should match the Excel template."*

  In last year's ASR, the format of some of the included tables was slightly altered to aid readability. In light of the above, all of the tables in this year's ASR are in the exact format specified in the provided reporting templates.

- *"The updating and publication of the AQAPs for each AQMA that is currently active should be treated as a priority by the council and should be done as soon as possible."*

  With the annual mean NO_2 concentrations in all three AQMAs having been compliant for at least four years, an AQAP focused on achieving compliance is no longer required. Instead, Luton Council proposes to revoke all three AQMAs and develop a borough-wide Air Quality Strategy to secure further improvements. It is envisaged that this strategy would focus more on reducing $PM_{2.5}$ levels and exposure.

Luton Council has taken forward a number of direct measures during the current reporting year of 2023/24 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 41 measures are included within Table 2.2 (plus an additional 11 previously completed measures and two that have been aborted), with the type of measure and the progress Luton Council has made during the reporting year of 2023/24 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented in Table 2.2.

As many of these measures are shared with other policy areas where they offer co-benefits (eg Transport, Climate Change and Public Health), where appropriate, links to relevant documents in these areas have been included in Table 2.2..

Over the past year, key completed measures have included:

- The publication of the Local Cycling and Walking Infrastructure Plan 2023-2033 (https://tinyurl.com/mrh3x3mu);
- The granting of planning permission for a 338-space park and ride at Butterfield Business Park equipped with 32 EV charging bays; and
- The operation of an e-bike hire scheme for council staff and an e-cargo bike project offering local families and businesses the opportunity to try out an e-cargo bike for free for up to 3 months (https://tinyurl.com/4ck7dpv6); and
- The commencement of additional passive monitoring in AQMA Nos. 1, 2 & 3.

Luton Council expects the following measures to be completed over the course of the next reporting year: If deemed necessary by the LAQM Helpdesk, the completion of a detailed assessment of AQMA No. 3 to determine whether revocation is appropriate.

Luton Council's priorities for the coming year are:

- to discontinue the planned expansion of AQMA No. 3;
- to proceed with the revocation of AQMA Nos. 1 & 2 upon the completion of enhanced monitoring during 2024;
- to engage with Defra to determine whether a detailed assessment would be required before the revocation of AQMA No. 3; and
- to discontinue the ongoing development of a new AQAP focused on reducing NO_2 levels within the AQMAs and instead bring forward a more holistic borough-wide Air Quality Strategy.

The principal challenge in delivering this work programme over the coming year will be the continued lack of resources within the Council's Environmental Protection Team, which has been subject to staff shortages for an appreciable period.

With compliance already achieved in all AQMAs for at least the last four years, Luton Council does not anticipate that further additional measures not yet prescribed will be required in subsequent years to enable revocation.

Table 2.2 – 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	Implement Luton Park & Ride by securing delivery of Travel Hub at identified locations	Alternatives to private vehicle use	Bus based Park & Ride	2018 Targeted start: 2025		Luton Council		No	Not Funded	£1m - £10m	Planning	A Park & Ride would result in fewer cars driving into Luton Town Centre and the Airport	Monitor use of Park & Ride once up and running	Potential locations for Park & Ride sites identified. Design and development work is underway at Butterfield Business Park. Feasibility study completed (2016) Next step is to secure funding/delivery	Luton Local Plan 2011 - 2031 Policy LLP5 provides policy support for Park & Ride schemes at M1 junction 10A (Policy LLP5) and Butterfield Park (Policy LLP7) [https://tinyurl.com/3cjz6n8f] Supports LTP4 Policy 4 - Improving Public Transport [https://tinyurl.com/bdfnss4m] Sources of funding to be identified Action included in Luton Net Zero: Climate Policy and Action Plan [https://tinyurl.com/53m68nck]
2	Supportive measures to encourage modal shift to active travel, and monitor impacts: - Low Traffic Neighbourhoods - Driver awareness training and marketing and promotion.	Promoting Travel Alternatives	Other	2023		Luton Council; Luton schools and colleges; Businesses; Community groups		No				Emission reduction through modal shift to active travel	Modal shift - increased use of active travel		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
3	Deliver town-wide future cycling and walking network set out in the emerging local cycling and walking infrastructure plan	Transport Planning and Infrastructure	Cycle network	2022	2032	Luton Council		No	Not Funded		Planning	Increase in cycling creates modal shift away from the car, resulting in reduced emissions	Increased number of people using cycle routes to access the town centre	Ongoing Portfolio of suggested network amendments developed Public consultation on draft Local Cycling and Walking Infrastructure Plan (LCWIP) completed April 2023 (https://tinyurl.com/2p8xhr6s)	LTP4 Policy 5 - Smarter Choices supported by LTP4 Policy 2 - Walking and Cycling [https://tinyurl.com/bdfnss4m] Supports Strategic Vision for Sport and Physical Activity 2018-22 Outcome 10 [https://tinyurl.com/3u5z65e5] Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
4	Implement a local delivery hub to maximise the efficiency of deliveries / enable green 'last mile' services.	Freight and Delivery Management	Freight Consolidation Centre		Targeted start: 2025	Luton Council; Delivery Companies		No			Planning	Reduction in vehicle movements and emissions from LDV delivery vehicles	Volume of deliveries routed via the hub		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck

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
5	Widespread EV infrastructure across the council estate for both council and public charging.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2018	2025	Luton Council	£1.2 million provisionally allocated by the Office for Zero Emission Vehicles and private investment	No	Funded	£1m - £10m	Planning	Increased EV use will result in a decrease in emissions	EV charging point usage data	Installation of ×4 rapid chargers completed 2020 Electric vehicle chargepoint strategy 2022 to 2025 adopted November 2022 (https://tinyurl.com/4r54ek7c)	Supported by LTP4 Policy 6 - Ultra Low Emission and Electric Vehicles [https://tinyurl.com/bdfnss4m] Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
6	EV infrastructure installed in key council housing car parks	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2018	2024	Luton Council and private chargepoint operator	Private investment	No	Funded	£100k - £500k	Implementation	Increased EV use will result in a decrease in transport emissions	EV chargepoint utilisation data	Contract has been provisionally awarded to supplier.	Chargepoint infrastructure will be funded by supplier. Expect installation of chargepoints to start Q3.
7	Deliver bus priority measures: - strategic bus lanes on key routes (3km new bus lanes) - improved access for buses to the town centre - Traffic signalling priorities for buses	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, inc Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane		2025	Luton Council; Arriva		No				Reduced congestion and journey time should result in higher uptake and reduced emissions	Congestion reduction Passengers numbers		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
8	Exclusive 'Taxi Only' EV infrastructure at taxi ranks	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2018	2025	Luton Council; Taxi companies		No			[Ongoing]	Increased EV use will result in a decrease in emissions	Number of chargepoints installed Proportion of taxi fleet that are Evs	Four 55kW EV rapid charging units installed in taxi bays on Station Road, Park Street, Cheapside and Chaul End Lane during reporting year 2020/21	Supported by LTP4 Policy 6 - Ultra Low Emission and Electric Vehicles [https://tinyurl.com/bdfnss4m] Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
9	The Council will undertake a fleet review, to identify a preferred pathway to electrify its vehicle fleet and inform a procument strategy based on whole life costs	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2023		Luton Council		No							Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
10	Luton council suppliers' fleet to be EV (set target years for cars and vans). Include zero carbon vehicle requirements in all service delivery contracts	Promoting Low Emission Transport	Other		2030	Luton Council		No							Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck

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11	Improvement of Chapel viaduct / Castle Street roundabout	Traffic Management	Other			LBC Transport		No		£500k - £1m	Planning	Less idling would result in reduced emissions	Improved traffic flow	Junction Mitigation Assessment Completed (2015) [https://tinyurl.com/y52t2hr7]	Included in Luton Local Plan 2011 - 2031 Policy LLP31 - Sustainable Transport Strategy [https://tinyurl.com/3cjz6n8f]
12	Implement School Streets (traffic exclusion zones) for schools in Luton and Play Streets to restrict traffic movements at peak times and encourage shift to active travel.	Promoting Travel Alternatives	Other	2023		Luton Council; Luton schools		No				Emissions reduced through traffic reduction and modal shift to active travel	Modal shift - increased use of active travel at school gate		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
13	Enforce pedestrianisation of key areas such as High Town and Bury Park high Street. Extend vehicle free spaces across Luton town centre.	Traffic Management	Other		2030	Luton Council; Luton businesses		No	Not Funded		Planning	Wider pedestrianisation will reduce vehicle use in the Town Centre and hence result in improved air quality	Expansion of pedestrianised area will result in more people walking into the Town Centre		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
14	Development of taxi and private hire zero (or low) emissions policy, adopting phased approach until 2040	Promoting Low Emission Transport	Taxi Licensing conditions		2040	Luton Council; Taxi companies; Luton Councillors		No			Planning	Increased use of zero emission vehicles will result in a decrease in traffic-related pollution	Proportion of taxi fleet that are EVs		Long timescale Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
15	The Council will undertake a hackney/PHV fleet review and work with operators to develop a pathway that increases EV uptake for these vehicles	Promoting Low Emission Transport	Taxi emission incentives	2023		Luton Council		No				Increase in EV uptake will result in reduced NOx emissions	Number and rate of EV uptake		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck

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16	Work with schools and colleges to develop travel plans via Modeshift STARS which decrease use of the car and increase walking and cycling	Promoting Travel Alternatives	School Travel Plans		2023	Luton Council; Luton Schools & colleges		No			[Ongoing]	Increased uptake of lift sharing or sustainable transport methods will reduce emissions	Number of new and updated school travel plans	Ongoing	LTP4 Policy 5 - Smarter Choices [https://tinyurl.com/bdfnss4m] Supports Strategic Vision for Sport and Physical Activity 2018-22 Outcomes 10 & 17 [https://tinyurl.com/3u5z65e5] LBC information on School Travel Planning: [https://tinyurl.com/bdzy27jj] Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck Accredited schools have to submit their travel plans annually to maintain accreditation
17	Work with large employers to develop travel plans which decrease use of the car and increase walking and cycling	Promoting Travel Alternatives	Workplace Travel Planning	2018	2025	Luton Council; Luton businesses		No			[Ongoing]	Increased uptake of lift sharing or sustainable transport methods will result in reduced emissions	Increase modal shift of staff using more sustainable modes	Planning phase	LTP4 Policy 5 - Smarter Choices [https://tinyurl.com/bdfnss4m] Potential measures to encourage sustainable travel include promotion of cycling and walking, discounted bus and rail travel, and car sharing Modeshift STARS to be used to manage process Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
18	Anti-idling awareness campaign and enforcement	Traffic Management	Anti-idling enforcement	2022	Ongoing	LBC Parking Enforcement		No			Implementation	Reduced idling would result in lower emissions	Fewer drivers idling as a result of LBC intervention	Enforcement commencing Summer 2022	LTP4 calls for interventions to to be directed at areas where there are greater concentrations of vulnerable people (eg schools, hospitals and day care centres). [https://tinyurl.com/bdfnss4m]
19	Engage with and promote travel schemes and discounted tickets eg Arriva discounted tickets for organisations participating in a travel club, including bus fares for 17-21 year olds at 70% of the adult fare, 16 and under at 50%	Alternatives to private vehicle use	Other	2023	2025	Luton Council; Local transport organisations; Arriva		No				Reduction in vehicle numbers resulting in reduced emissions	Scheme uptake Passenger/ticket numbers		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck

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20	Provide support for car clubs through engagement with local schools and businesses beginning with an E-Car Club pilot scheme in Luton	Alternatives to private vehicle use	Car Clubs	2023		Luton Council; Local community groups; Schools; Local business		No				Reduction in pollution secured through provision of either EV or less polluting modern vehicles to replace private ownership of older more polluting models	Number of car club members Number of private cars replaced by membership		Supports LTP4 Policy 1 - Shared mobility and Mobility as a Service [https://tinyurl.com/bdfnss4m] Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
21	Provide support for lift sharing schemes through engagement with local schools and businesses	Alternatives to private vehicle use	Car & lift sharing schemes	2023		Luton Council; Local community groups; Schools; Local business		No				Lift sharing will result in fewer cars on the roads and hence reduced emissions	Number of lift share scheme users Number of jouney miles saved		Supports LTP4 Policy 1 - Shared mobility and Mobility as a Service [https://tinyurl.com/bdfnss4m] Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
22	Road user charging eg implementation of a Clean Air Zone to fund transport improvements	Traffic Management	Road User Charging (RUC)/ Congestion charging		2025	Luton Council		No			Planning	Generate income stream to fund transport improvements that in turn will deliver emissions reductions Reduction in car use resulting in reduced emissions	Amount of funding generated and redistributed	Feasibility study completed (2019)	Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
23	Consider workplace parking levy to fund transport improvements	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2025	2025	Luton Council		No			Planning	Generate income stream to fund transport improvements that in turn will deliver emissions reductions Reduction in car use resulting in reduced emissions	Amount of funding generated and redistributed		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
24	Investigate implementing a Clean Air/Low Emissions Zone in the Town Centre	Promoting Low Emission Transport	Low Emission Zone (LEZ) or Clean Air Zone (CAZ)			LBC Transport Planning LBC Environmental Protection		No	Not Funded			Cleaner / greener transport options for staff and deliveries would reduce emissions in the town centre	Increased take up of clean energy vehicles / bikes by local businesses		Need for action to be reconsidered following the reductions in NO_2 in AQMA N$^{o.}$ 3 Feasibility study identified as a priority in LTP4, however currently still unfunded [https://tinyurl.com/bdfnss4m]
25	Transition bus fleet to electric - introduce electric buses on the Luton Dunstable Busway network	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport			Luton Council; Bus companies		No					Reduced emissions from buses		LTP4 encourages the use of low carbon buses as part of Bus Quality Partnerships [https://tinyurl.com/bdfnss4m] DfT funding opportunities to be explored

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26	Work towards Euro 6 by retrofitting existing bus fleet. All buses entering town centre to be zero or low emissions	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes			Luton Council; Bus companies		No					Reduced emissions from buses		LTP4 encourages the use of low carbon buses as part of Bus Quality Partnerships [https://tinyurl.com/bdfnss4m] Target introduction of zero/low emission buses through Bury Park and on Dunstable Road DfT funding opportunities to be explored
27	Review 20mph zones in and around AQMA #3 to encourage traffic calming and lower speeds	Traffic Management	Reduction of speed limits, 20mph zones	2018		LBC Transport LBC Road Safety		No				Vehicles travelling under 30mph generally emit less particulates and so improve air quality	Increase number of vehicles adhering to 20mph within the zones	20mph zones in place (Completed 2016 – 17)	Need for action to be reconsidered following the reductions in NO_2 in AQMA N$^{o.}$ 3
28	High standards for non-residential new build - Town centre development to provide leadership for change: to meet best practice design standards rather than just current building regulations, and to include the new football stadium development. District heating and shared renewable generation infrastructure should be included and designed for future expansion.	Policy Guidance and Development Control	Other policy	2023		Luton Council; Energy/heat specialists; Local businesses; Construction sector		No				Reduced emissions from combustion	Predicted NOx and $PM_{2.5}$ savings compared individual and/or non-renewable sources		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
29	Non-residential building retrofits - Encourage business and public sector property owners to invest in retrofit to reduce fossil fuel use, improve energy efficiency and increase renewable generation across multiple projects	Promoting Low Emission Plant	Emission control equipment for small and medium sized stationary combustion sources / replacement of combustion sources	2023		Business and public sector property owners		No				Reduction in emissions secured by replacement of more polluting combustion plant with less polluting modern alternatives	Number of retrofits Emissions reductions		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck

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30	Campaign for a car free day and promote behaviour change with businesses and residents	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2023		Luton Council; Local community groups		No				Emissions reduction secured by reduction in private vehicle use; Increased uptake of active travel	Level of engagement with campaign		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
31	Develop targets and an action plan for optimizing mileage for Council business travel through travel planning	Promoting Travel Alternatives	Workplace Travel Planning	2023		Luton Council		No				Reduction in work-related mileage resulting in reduced emissions	Journey miles saved		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
32	All major residential and commercial planning applications to include a Travel Plan in line with current best practice and to ensure buses provided with the infrastructure needed to serve new developments	Policy Guidance and Development Control	Other policy	2023		Luton Council; Developers		No				Promotion of more sustainable modes of travel resulting in reduced use of private vehicles and hence reduced emissions	Uptake of sustainable modes at new developments		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
33	Supportive measures to encourage modal shift to active travel, and monitor impacts: - Cycle training, - Cycle hire schemes - Cycle recycling scheme - Community cycle clubs	Promoting Travel Alternatives	Promotion of cycling	2023		Luton Council; Luton Sschools and colleges; Businesses; Community groups		No				Emission reduction through modal shift to active travel	Modal shift - increased uptake of cycling		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
34	Maximise local and regional rail connectivity to Luton, from London, the Midlands and through interchange with East West Rail	Promoting Travel Alternatives	Promote use of rail and inland waterways		2025	Luton Council; East West Rail		No				Emission reduction through modal shift to rail travel	Increase in rail passenger numbers		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck

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35	Ensure that London Luton Airport has an ambitious Sustainable Travel Plan and outstanding bus connections with Luton and beyond.	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services		2027	Luton Council; Luton Rising; Airport operator		No							Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
36	Implement monitoring mechanisms eg Urban Traffic Management Control. Traffic data will be essential in planning and evaluating the effectiveness of AQ and carbon reduction interventions.	Traffic Management	UTC, Congestion management, traffic reduction	2023		Luton Council		No				Reduce emissions by smoothing traffic flows. Possible source of data on vehicle numbers and fleet make-up to support AQ modelling and intervention evaluation.	Improved traffic flow andreduced congestion		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
37	Airport operations: lighting upgrades and heating equipment	Promoting Low Emission Plant	Other Policy		2025	Luton Rising; Airport tenants; Airport operator		No				Reduction in emissions secured by replacement of more polluting plant with less polluting modern alternatives	Emissions reductions		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
38	Airport operations and Surface Access: Promote the use of low emission vehicles and zero emission vehicles increase flexible capacity for recharging of vehicles using the airport	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2023	2030	Luton Rising; Luton Council - transport		No				Emission reduction secured through increased use of low/zero emission vehicles	Capacity for recharging vehicles		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
39	Surface access: freight consolidation and promotion of proportion of full-load trips	Freight and Delivery Management	Freight Consolidation Centre			Luton Rising; Airport operator		No				Reduction in vehicle movement and associated emissions	Number of journey miles and associated emissions saved		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
40	Surface access: EV points where possible and ensure all new builds provide the infrastructure required to meet Government standards	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging		2030	Luton Rising; Airport operator		No				Emission reduction secured through increased use of low/zero emission vehicles	Number and availability of EV charge points		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck

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41	Surface access: Provide infrastructure to support the use of low emissions public transport and freight vehicles	Promoting Low Emission Transport	Other					No				Emission reduction secured through increased use of low emission PSV/HDVs	Capacity of infrastructure provided		Action included in Luton Net Zero: Climate Policy and Action Plan - https://tinyurl.com/53m68nck
-	Reallocation of lanes, where possible to reduce start-stop traffic and congestion	Traffic Management	Other		2017	LBC Transport		No	Funded		Completed	Reducing start-stop traffic reduces acceleration and braking, resulting in reduced emissions	Improved traffic flow Reduction in queuing traffic	Dunstable Road scheme completed September 2017	Initial report evaluating the impact of the improvements presented to the Overview and Scrutiny Board, 25 June 2019 https://tinyurl.com/yyn7eban
-	In coordination with the Luton BID and local dealers, hold pop-up events in the town centre to showcase available EVs	Promoting Low Emission Transport	Other	2018	2018	LBC Transport LBC Environmental Protection		No			Completed	Increased EV uptake will result in reduced emissions	Increased EV sales resulting from events	Event held in St. Georges Square on 27/28 April 2018	
-	Implement variable message signs (VMS) linked to car parks in town centre, with direction varying dependent on congestion	Traffic Management	UTC, Congestion management, traffic reduction	2017	2018	LBC Transport Network Technology	£76k Government grant awarded February 2017	No	Funded	£50k - £100k	Completed	Smoother traffic flow leading to lower emissions	Improved traffic flow and information dissemination	Installation of VMS completed Autumn 2018	
-	Information to vulnerable groups – Air Pollution Alert service	Public Information	Via other mechanisms	2018	2019	LBC Environmental Health Herts & Beds Air Quality Network		No	Funded	< £10k	Completed	By informing vulnerable groups of likely peaks in air pollution, they will have an opportunity to limit exposure / better manage their conditions	Number of subscribers	Service launched 1st March 2019 and still operational	Service sign-up page: https://tinyurl.com/y3pb95j9
-	School Streets Project - Pilot road closure outside Hillborough Junior School	Promoting Travel Alternatives	Promotion of walking	2018	2019	LBC Road Safety Sustrans		No	Funded		Completed	Modal shift away from the car, resulting in reduced emissions	Decrease in number of young people travelling to school by car Increase in number of children travelling actively Improved air quality at the school gate	Project completed and evaluated August 2019	
-	Prohibition of right turns onto Windsor Street at the traffic light controlled junction with Castle Street	Traffic Management	Other		2020	LBC Transport	LBC Transport	No	Funded	< £10k	Completed	Reduction in queuing traffic would result in reduced emissions	Improved traffic flow	Work completed 2020	Potential issue with non-compliance (ie drivers continuing to make right turns at the junction)

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-	Bedfordshire Sustainable Travel Access to Railway Stations (STARS)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure		2020	LBC Sustainable Transport Team in partnership with Central Bedfordshire Council and Bedford BC	£2.1 million funding secured from the DfT Access Fund for Sustainable Travel 2017 – 2020	No	Funded	£1m - £10m	Completed	Increased use of sustainable travel will reduce car use and emissions	Increase in use of sustainable travel into Luton Town Centre	Completed Funding ended March 2020	
-	Deployment of network of low cost pollution sensors to provide enhanced real time NO_2 and $PM_{2.5}$ monitoring data to public via online portal	Public Information	Via the Internet	2021	2021	LBC Transport LBC Environmental Protection LBC Sustainability	LBC Transport	No	Funded	£50k - £100k	Completed	Data to be used to inform targeted local interventions	Substantial improvement in geographical coverage of real time NO2 and PM2.5 monitoring data Improved public awareness	5 continuous indicative air quality monitors deployed Nov 2021 Real time data available via the Herts & Beds AQ Network website [https://tinyurl.com/3f78jc4c]	Project in final year of funding.
-	Installation of Gas-To-Liquid (GTL) refuelling infrastructure at LBC Depot to facilitate move of entire 300 vehicle fleet from Diesel	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2020	2021	LBC Fleet Services	LBC Fleet Services	No	Funded	£50k - £100k	Completed	Average NOx reduction of 40 to 44% compared to Diesel	Reduced emissions from buses	Completed June 2021	Options being pursued to offer GTL refuelling to third parties
-	Free electric vehicle training course for taxi and private hire drivers to showcase available models	Promoting Low Emission Transport	Other		2022	LBC Sustainable Development and Transport Energy Savings Trust Department for Transport	Department for Transport	No	Funded		Completed	Increased EV uptake will result in reduced emissions	Increased EV uptake amongst taxi & private hire drivers	Hybrid event held on 30th March 2022, with online training in the morning and demonstration test drives at Stockwood Discovery Centre in the afternoon	
-	New Ways of Working adopted at LBC; promotion of a hybrid working model with employees in the office 40% of their hours	Promoting Travel Alternatives	Encourage / Facilitate home-working	2022	[Ongoing]	Luton Council		No			Completed	Reduction in car journeys commuting to work will result in reduced emissions (NO2 and particulate matter)	Number of journeys avoided	Policy implemented and guidance published	
-	Proposed project to replace a number of small town centre surface car parks with intelligent parking system enabled multi storey on Crawley Road site	Traffic Management	Other	2018		LBC Property & Construction		No			Aborted	Less engine idling and running time while drivers search for parking	Improved parking information and organisation	Planning application permitted	Work on project discontinued

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-	Rollout of Schools Air Quality Workshops	Promoting Travel Alternatives	Promotion of cycling Promotion of walking	2022		LBC Sustainable Development and Transport		No	Not Funded		Aborted	Modal shift away from the car, resulting in reduced emissions	Decrease in number of young people travelling to school by car Increase in number of children travelling actively Improved air quality at the school gate	Successful pilot sessions held at Hillborough Junior and Bushmead Primary Exploring funding options	Project discontinued - unable to secure funding

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[10], 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 than 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Responding to growing concerns about the health effects of fine particulate matter, Luton Council started measuring $PM_{2.5}$ levels at its Dunstable Road East roadside automatic monitoring station (LN60/HB007) at the end of 2014. Then, in 2019, Luton Rising also started monitoring $PM_{2.5}$ when it established a new air quality monitoring station in Wigmore Valley Park to monitor airport emissions (LA001). Most recently, in 2021, Luton Council deployed five indicative air quality monitors at suspected congestion hotspots across the borough to measure $PM_{2.5}$ (as well as PM_{10} and NO_2) in real time.

Since coming into operation, the MCERTS-certified Palas Fidas 200 fine dust monitoring device located at LN60/HB007 has shown the annual mean $PM_{2.5}$ concentration at this site to be on a slightly downward trajectory (Figure A.14 in Appendix A). However, with levels between 2016 and 2023 decreasing at an underlying rate of 0.18µg/m^3 a year, this reduction has occurred at half the pace seen nationally, where the accredited official statistics for UK roadside sites show an underlying yearly decrease of 0.4µg/m^3 for the same period[4]. Despite this persistence, since 2020, annual mean levels at both of Luton's $PM_{2.5}$ automatic monitoring sites have not exceeded the 2040 concentration target of 10µg/m^3 introduced by The Environmental Targets (Fine Particulate) (England) Regulations 2023. Furthermore, excluding 2020 at LN60/HB007, the concentrations observed in 2023 are the lowest in the time series.

In contrast to the compliance suggested by recent monitoring results, Defra's modelled LAQM Background Mapping Data [https://tinyurl.com/2eb2urjd] continues to predict that background $PM_{2.5}$ levels will remain above 10µg/m^3 across most of the town. Figure 2.1 shows the Defra modelled background $PM_{2.5}$ levels for each square kilometre in Luton for 2023, with 32 (70%) of the 46 grid squares estimated to exceed the 10µg/m^3 concentration target. However, none are predicted to exceed the 2028 interim target concentration of 12µg/m^3. Figure 2.2 shows similar

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

predictions for 2030, the model's final year. Despite showing across-the-piece reductions, background levels are still predicted to exceed 10µg/m^3 in 19 squares (41%).

Calculated using UK gridded population data from the 2011 census[11], Figure 2.3 shows the percentage of Luton's population estimated to be exposed to $PM_{2.5}$ levels above 10µg/m^3 over the course of the current model. Suggesting that significant reductions in the numbers exposed above the 2040 concentration target will continue until 2025; after this point, the rate of improvement is expected to decrease before flatlining after 2027. When this occurs, 56% of the population is expected to still reside in areas of Luton where the annual mean $PM_{2.5}$ is predicted to remain above 10µg/m^3.

Comparing 2023 modelled and monitored levels at LN60/HB007, the predicted background was 11.0µg/m^3, whilst the measured annual average at this roadside site was 8.7µg/m^3 - a difference of 23%. Broadly consistent with previous years (Figure 2.4 shows the modelled and measured levels for LN60/HB007 from 2018 to 2023), this difference is counterintuitive, as higher concentrations would be expected at the roadside due to additional $PM_{2.5}$ contributed by the passing traffic.

Although measured using instrumentation not currently approved by Defra for use in the UK, comparing the 2023 annual mean $PM_{2.5}$ level recorded at Luton Rising's Wigmore Valley Park site (LA001) with the Defra modelled background value for this location, a similar discrepancy is observed. With a measured annual mean of 8.0µg/m^3 compared to a modelled background of 9.6µg/m^3, the difference in this instance is 18.5%. However, as shown in Figure 2.5, over time (and unlike LN60/HB007), the relationship between these two values has not been consistent.

As the Defra modelled data is also used to calculate Public Health Outcomes Framework indicator D01 – Fraction of mortality attributable to particulate air pollution [https://tinyurl.com/d2duysv5], overestimation by the model could, to some extent, explain Luton's consistently poor performance in this metric. In 2022, with a value of 7.0%, along with St Albans and Three Rivers, Luton had the joint fourth highest attributable mortality figure in the East of England – behind Watford (7.3%), Hertsmere (7.1%) and Welwyn Hatfield (7.1%). The English national average for the year was 5.8%. However, for the most part, the high attributable mortality figure calculated for Luton results from its compact urban form and high population density. With the 21st highest population density

[11] Reis, S.; Liska, T.; Steinle, S.; Carnell, E.; Leaver, D.; Roberts, E.; Vieno, M.; Beck, R.; Dragosits, U. (2017). **UK Gridded Population 2011 based on Census 2011 and Land Cover Map 2015**. NERC Environmental Information Data Centre. https://doi.org/10.5285/0995e94d-6d42-40c1-8ed4-5090d82471e1

of all UK local government administrative areas, an estimated 5,236 people per square kilometre in mid-2022[12], Luton is the most densely populated local authority outside London.

Ultimately, as there is no evidence of a safe level of exposure to $PM_{2.5}$ or a threshold below which no adverse health effects occur[13], the case for action is undiminished regardless of which value best represents actual environmental concentrations. Although the actions listed in Table 2.2 were predominantly chosen with the reduction of NO_2 levels in mind, several will also be effective at securing reductions in $PM_{2.5}$ emissions and exposure. More specifically, these measures fall into three categories:

- Reducing the number of vehicles on the road (eg through public transport improvements and promotion, travel planning and the promotion of lift sharing);
- Promoting modal shift to active forms of travel (eg improvements to cycle infrastructure and the prioritisation of active travel options through travel planning); and
- Improving the public provision of air quality information to enable individuals to manage their personal exposure more effectively (eg the *Herts & Beds Air Pollution Alert service* [https://tinyurl.com/mr3ptc3n] and the publication of near real-time air quality data via the *Herts & Beds Air Quality Network* web portal [https://tinyurl.com/5cdm2h43] and town centre CityTree electronic noticeboard).

During 2023/24, Luton Council commenced a substantial piece of work to target the last of these areas. With a particular focus on $PM_{2.5}$, led by Public Health with input from Environmental Protection and Sustainability colleagues, a work plan was developed to deliver a new website, communications strategy and public engagement programme to raise awareness of poor air quality and its potential health impacts and to offer practical advice on how to minimise personal exposure. Unfortunately, after significant preparatory work, this intervention did not proceed following the withdrawal of funding from Defra's 2023/24 Local Air Quality Grant Scheme.

In addition to the above, Luton Council's entire administrative area has been a smoke control area since the 1970s [https://tinyurl.com/4k4hhzxe].

[12] ONS. Estimates of the population for the UK, England, Wales, Scotland and Northern Ireland, 26 March 2024 [https://tinyurl.com/tjmn42rr]

[13] WHO. WHO global air quality guidelines, 2021 [https://tinyurl.com/rwcp7ady]

Figure 2.1 – Defra modelled annual average background $PM_{2.5}$ concentration (µg/m^3) per square kilometre for 2023

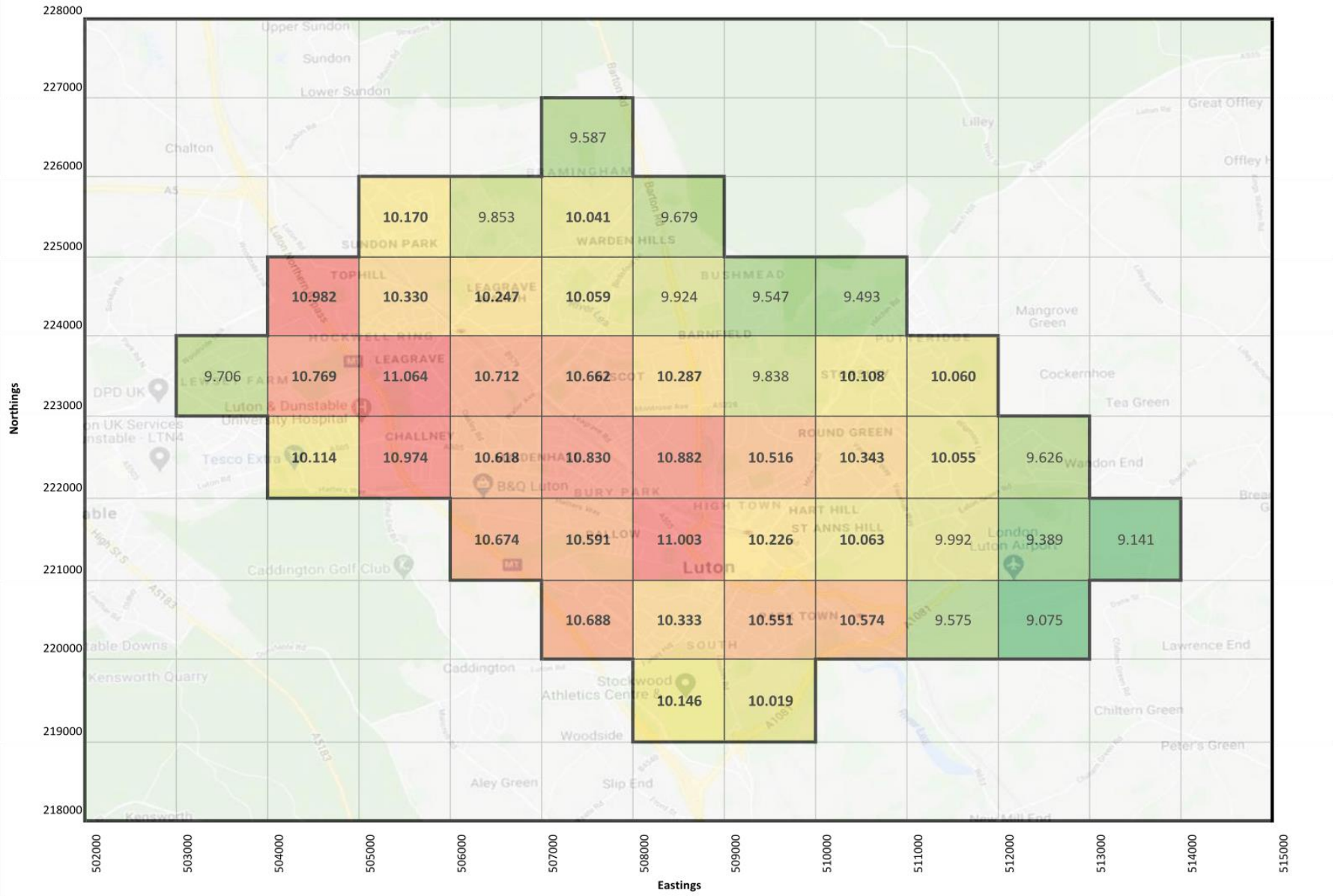


Figure 2.2 – Defra modelled annual average background $PM_{2.5}$ concentration (µg/m^3) per square kilometre for 2030

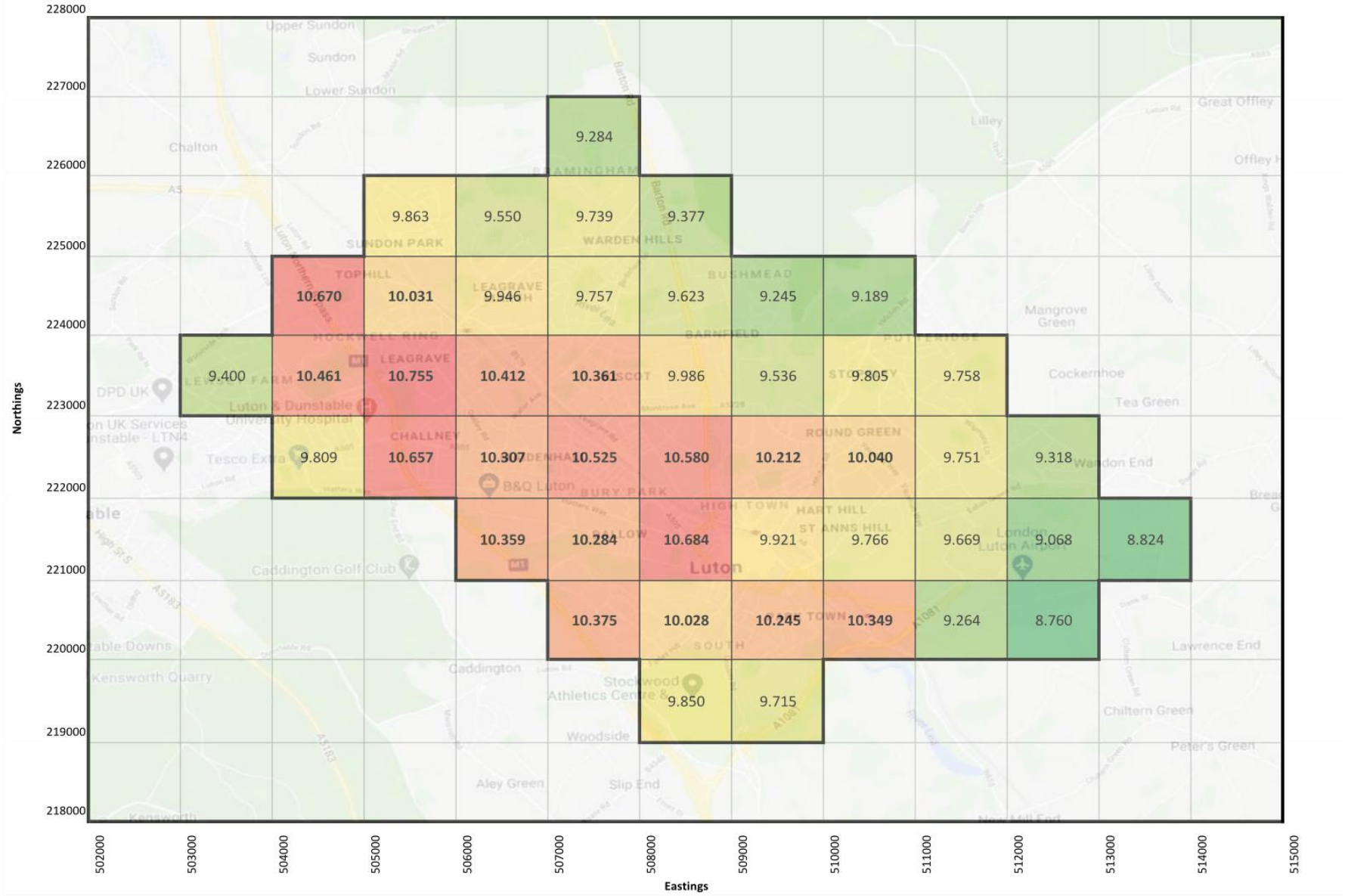


Figure 2.3 – Estimated percentage of Luton's population exposed to $PM_{2.5}$ levels above 10µg/m^3 based on modelled background mapping and 2011 gridded population data

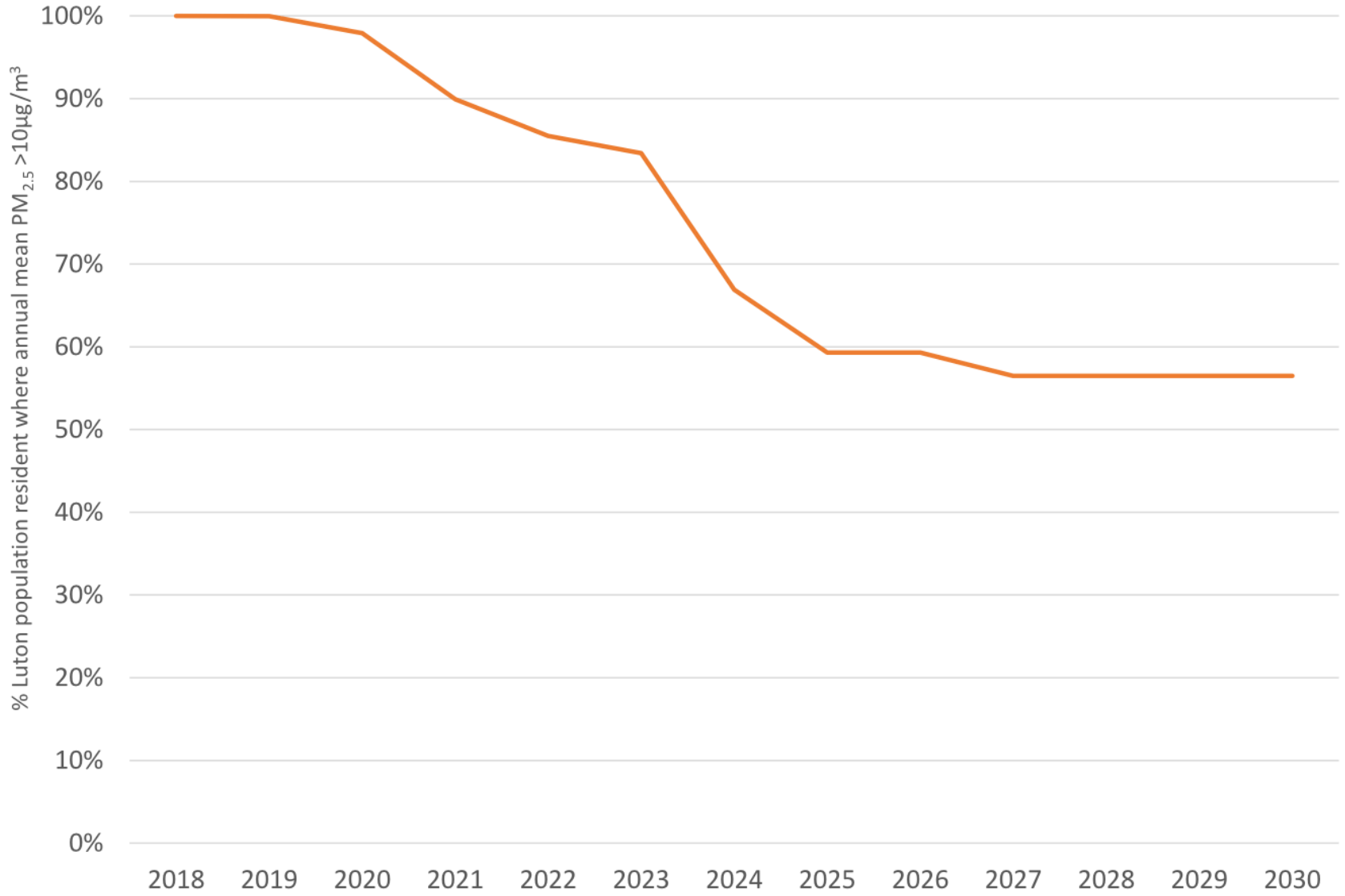


Figure 2.4 – Modelled background and measured annual mean $PM_{2.5}$ levels at LN60/HB007

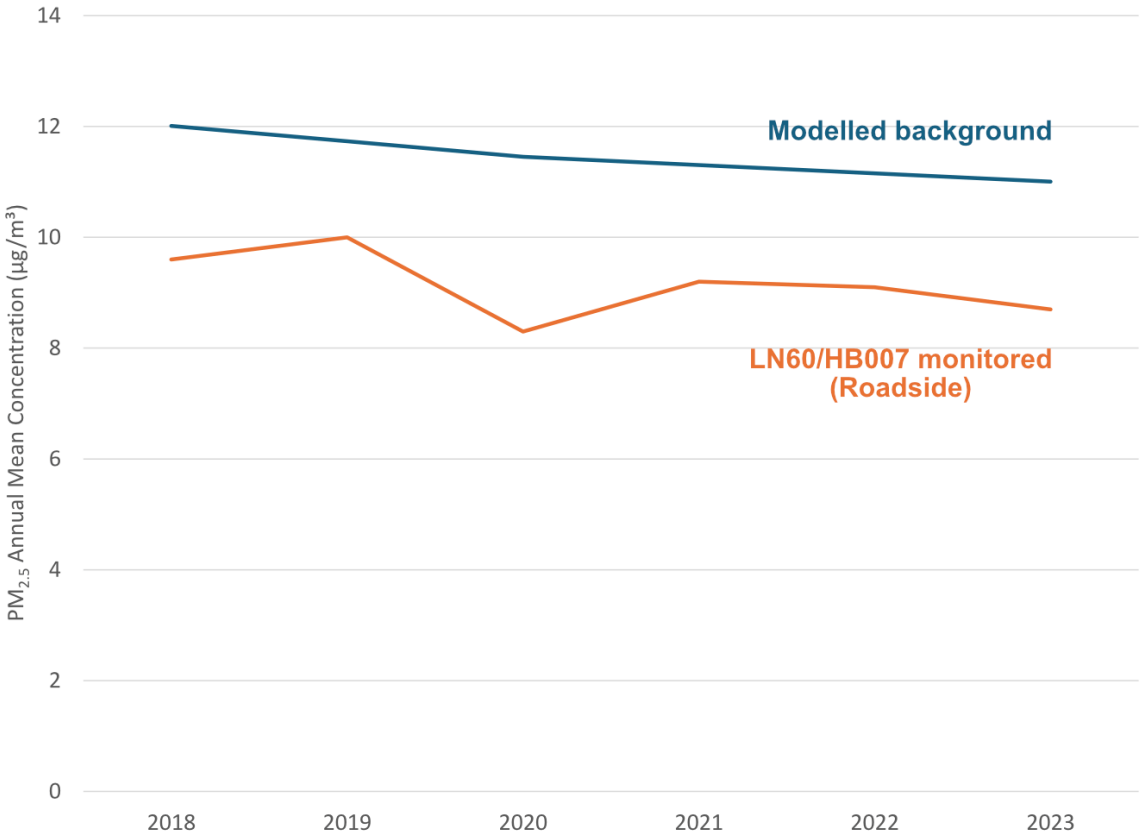
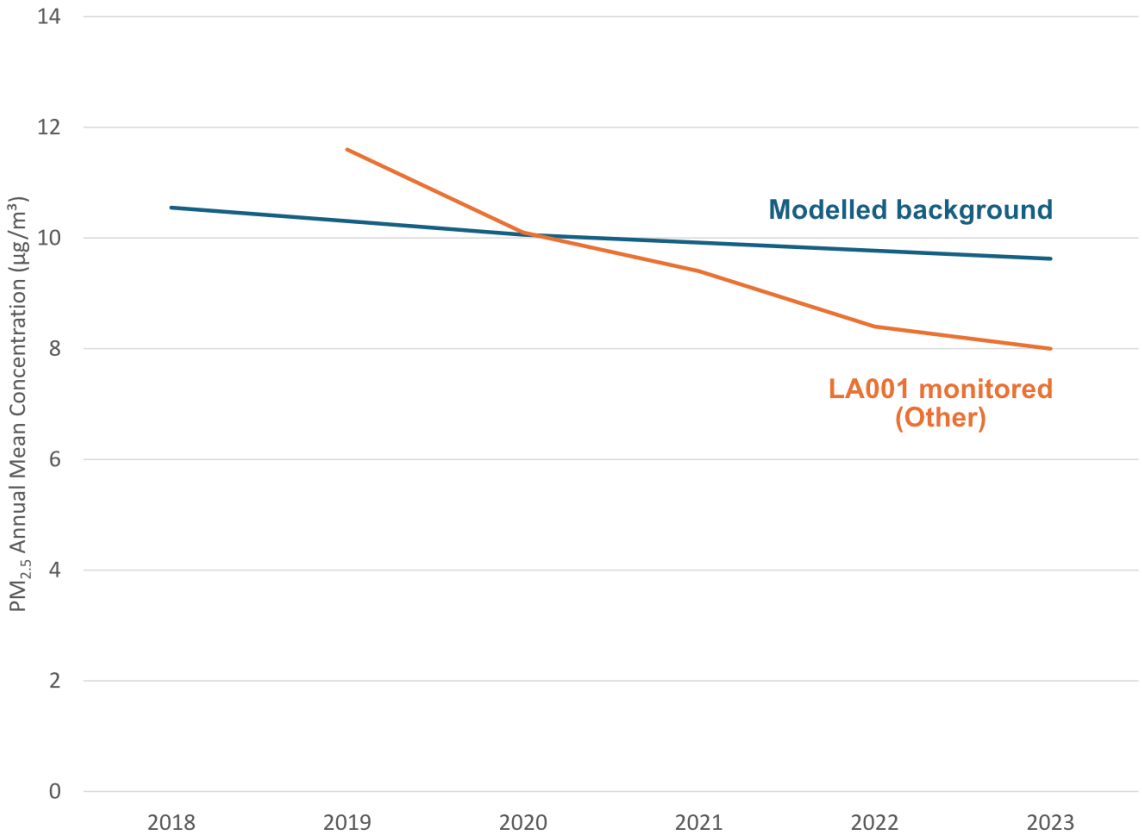


Figure 2.5 – Modelled background and measured annual mean $PM_{2.5}$ levels at LA001



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

This section sets out the monitoring undertaken within 2023 by Luton Council and how it compares with the relevant air quality objectives. In addition, 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

During 2023, Luton Council undertook automatic (continuous) monitoring of NO_2, PM_{10} and $PM_{2.5}$ at one reference site (using a ThermoScientific Model 42i Analyzer and Palas Fidas 200, respectively) and five additional sites using South Coast Science Praxis/Urban sensor-based indicative air quality monitors.

Positioned within AQMA N$^{o.}$ 3 and co-located with diffusion tubes LN61, LN62 and LN63, the reference site is located at LN60 / HB007 – Dunstable Road, with its monitoring data publicly available in near-real-time via the Herts & Beds Air Quality Network web portal (https://tinyurl.com/w73r7gz). The details of the indicative sites are as follows:

- LN97 – Chaul End Road, co-located NO_2 passive site LN98, near-real-time data: https://tinyurl.com/mr2mh72j;
- LN99 – Dunstable Road – Bury Park 2, located in AQMA N$^{o.}$ 3, co-located NO_2 passive site LN100, near-real-time data: https://tinyurl.com/22raz435;
- LN101 – Beech Hill Community Primary School, co-located NO_2 passive site LN102, near-real-time data: https://tinyurl.com/2p8c5jcr;
- LN103 – L&D Hospital, Lewsey Road, co-located NO_2 passive site LN104, near-real-time data: https://tinyurl.com/4tf2246y; and
- LN105 – Peoples Park, co-located NO_2 passive site LN106, near-real-time data: https://tinyurl.com/2p869b79.

In addition to the monitoring undertaken by Luton Council during 2023:

- London Luton Airport Operations Ltd. (LLAOL) continuously monitored PM_{10} at its site within the airport (LA08 / HB006 – https://tinyurl.com/y32oqq5r);
- Defra continuously monitored nitrogen dioxide at its Luton A505 Roadside AURN site (LUTR – https://tinyurl.com/yauuwns7); and
- Luton Rising continuously monitored multiple species, including NO_2, PM_{10} and $PM_{2.5}$, at its air quality monitoring station in Wigmore Valley Park (LA001 – https://tinyurl.com/y8o7oopg).

Table A.1 in Appendix A shows the details of the automatic monitoring sites, whilst Table G.1 in Appendix G provides similar information for the indicative sites. In addition to the links above, automatic monitoring results for these sites are available through the UK-Air website [https://uk-air.defra.gov.uk].

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the automatic monitors are calibrated and how the data has been adjusted are included in Appendix C, with similar information for the indicative sites included in Appendix G.

3.1.2 Non-Automatic Monitoring Sites

Luton Council undertook non-automatic (ie passive) monitoring of NO_2 at 94 sites during 2023. In addition, LLAOL undertook similar monitoring at 19 sites, and Luton Rising deployed NO_2 diffusion tubes at a further eleven. Table A.2 in Appendix A presents the details of the non-automatic sites.

Maps showing the location 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 (eg 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.3 and Table A.4 in Appendix A compare 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 (ie 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.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

As can be seen from the density plots presented in Figure A.2 in Appendix A, when considering diffusion tube sites across all three monitoring networks that have been in operation for the last five years, the distribution of annual mean NO_2 concentrations at these sites has remained largely unchanged since 2020. However, with the lowest levels in the time series, the 2023 data shows a modest reduction relative to the previous three years, with a population mean across all passive sites in 2023 of 21.0µg/m^3, representing a 32.7% reduction from the pre-pandemic levels of 2019.

Continuing a trend of borough-wide compliance started in 2020, no exceedances of the annual mean NO_2 objective level were observed at a relevant receptor location during 2023. The 40µg/m^3 target was exceeded at the following two sites, neither of which are considered representative of relevant exposure:

- L7 - Vauxhall Way, 47.6µg/m^3 – a Luton Rising roadside site located away from amenities and residential accommodation; and
- LLA7 - Drop-off Zone, 40.5µg/m^3 – a LLAL site located in the airport's passenger set-down area.

Excluding these two locations, observed annual mean concentrations remained below 90% of the annual mean objective level (ie 36µg/m^3) at all other sites. This is significant as, due to the inherent uncertainty associated with the use of diffusion tubes, 36µg/m^3 is the threshold above which exceedance is considered likely. Consequently, if the annual mean NO_2 concentrations of

all sites within an AQMA remain below 36µg/m^3 for three consecutive years, para. 3.57 of LAQM.TG22 recommends that consideration should be given to its revocation.

Figures A.4, A.5, and A.6 in Appendix A present threshold value charts showing how the annual mean NO_2 levels obtained at AQMA diffusion tube sites for the last six years have compared to the 90% objective level value of 36µg/m^3. Figure A.7 in Appendix A presents a similar comparison for sites located in areas previously identified for inclusion in the potential expansion of AQMA N$^{o.}$ 3 along Castle Street. Figure A.8 in Appendix A shows how the annual mean concentrations obtained at the automatic monitoring site in AQMA N$^{o.}$ 3 (LN60 / HB007) compare to the full objective level of 40µg/m^3 for the same period.

Comparing the average annual concentration obtained at all Luton urban background and roadside sites between 2016 and 2023 with the corresponding UK figures[3] (Figure A.3 in Appendix A), it can be seen that the decrease in NO_2 levels seen locally is consistent with national trends.

Finally, no instances of the 1-hour mean exceeding 200µg/m^3 were observed at any of the three automatic NO_2 monitoring sites within the borough (*LN60 / HB007, LA001* or *LUTR*).

In summary, the data shows:

- no exceedances of 40µg/m^3 at a relative receptor since 2019;
- no exceedances of either 36µg/m^3 at passive sites or 40µg/m^3 at automatic sites within an AQMA since 2019; and
- only one instance in the last four years where an annual mean concentration at a passive site has exceeded 36µg/m^3 in the area identified for inclusion in a potentially expanded AQMA N$^{o.}$ 3 (and this was only by +1.3µg/m^3).

Based on this continued compliance, Luton Council propose to:

- discontinue the planned expansion of AQMA N$^{o.}$ 3;
- proceed with the revocation of AQMA N$^{os.}$ 1 & 2 upon the completion of enhanced monitoring during 2024;
- engage with Defra to determine whether a detailed assessment would be required before the revocation of AQMA No. 3; and

- discontinue the ongoing development of a new AQAP focused on reducing NO_2 levels within the AQMAs and instead bring forward a more holistic borough-wide Air Quality Strategy.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

To date, no exceedance of the air quality objectives for PM_{10} has either been predicted by modelling or measured within Luton.

Figure A.11 in Appendix A compares the PM_{10} annual mean concentrations measured at automatic sites within Luton between 2016 and 2023 with the corresponding mean figures for UK roadside and urban background sites. Between 2016 and 2023 inclusive, on a national basis, annual mean PM_{10} levels have decreased at an underlying rate of 0.4µg/m^3 at both roadside and urban background sites[4]. During this same period, the decrease in PM_{10} concentrations at the automatic monitoring sites near London Luton Airport (LA001 and LA08/HB006) has been noticeably faster. However, at the town's only roadside automatic PM monitor (LN60/HB007—located on Stuart Street), the rate of improvement has almost flatlined.

It should be noted that, unlike the instruments used at LN60 (HB007) and LA08 (HB006), and although approved for use in other European countries, the GRIMM ED180 deployed at LA001 to monitor PM_{10} is not approved by Defra for use in the UK (LAQM.TG22 para 7.176).

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

The introduction of The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (https://tinyurl.com/2cvjtsed) has established two binding air quality targets for fine particulate matter ($PM_{2.5}$), each with associated interim targets set out in the Environmental Improvement Plan 2023:

- Regulation 4 - the annual mean concentration target: 10µg/m^3 annual mean concentration $PM_{2.5}$ nationwide by 2040, with an interim target of 12µg/m^3 by January 2028; and

- Regulation 7 - the population exposure reduction target: 35% reduction in average population exposure by 2040, with an interim target of a 22% reduction by January 2028, both compared to a 2018 baseline.

A summary of the progress made at a national level towards achieving both targets is available on the UK-Air website [http://tinyurl.com/24mzbv9n].

Figure A.14 in Appendix A compares the $PM_{2.5}$ annual mean concentrations measured at automatic sites within Luton between 2016 and 2023 with the corresponding mean figures for UK roadside and urban background sites. Between 2016 and 2023 inclusive, on a national basis, annual mean $PM_{2.5}$ levels have decreased at an underlying rate of 0.4µg/m^3 at both roadside and urban background sites[4]. During this same period, the decrease seen at Luton Rising's automatic monitoring site in Wigmore Valley Park (LA001) has been noticeably faster. However, at the town's only roadside automatic PM monitor (LN60/HB007 – located on Stuart Street), the rate of improvement has almost flatlined, with $PM_{2.5}$ levels improving by an average of only 0.18µg/m^3 a year. Despite this persistence, the 2040 annual mean concentration target of 10µg/m^3 has not been exceeded at either of Luton's two $PM_{2.5}$ automatic monitoring sites since 2020.

It should be noted that, unlike the Palas Fidas 200 used at LN60 (HB007), and although approved for use in other European countries, the GRIMM ED180 deployed at LA001 to monitor $PM_{2.5}$ is not approved by Defra for use in the UK (LAQM.TG22 para 7.176).

3.2.4 Sulphur Dioxide (SO_2)

Table A.9 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2023 with the air quality objectives for SO_2.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
LN60 (HB007)	Dunstable Road East (CRAQM2)	Roadside	508708	221352	NO_2; PM_{10}; PM_4; $PM_{2.5}$; PM_1	Yes AQMA 3	Chemiluminescent (ThermoScientific Model 42i) Light-Scattering Monitor (Palas Fidas 200)	6.2	3.24	2.15
LA08 (HB006)	London Luton Airport	Other	511868	221144	PM_{10}	No	Unheated Beta Attenuation Mass Monitor (BAM)	N/A	N/A	1.7
LA001	London Luton Airport FutureLuToN	Other	512578	222204	NO_2; PM_{10}; $PM_{2.5}$; PM_1; SO_2; O_3; CO; Black Carbon; Benzene; Toluene; Ethylbenzene; m,p-Xylene; o-Xylene; Naphthalene	No	Chemiluminescent Light-Scattering Monitor (GRIMM EDM180)(3)	N/A	N/A	
LUTR (UKA00605)	Luton A505 Roadside (AURN)	Roadside	505927	222644	NO_2	No	Chemiluminescent	17.1	1.5	1.7

Notes:

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

(2) N/A if not applicable

(3) Instrument not approved by Defra (LAQM.TG22 para 7.176)

Table A.2 – Details of Non-Automatic Monitoring Sites

a) Luton Council 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)
LN07	Guildford Street/Bute Street	Roadside	509227	221455	NO_2	No	1.5	3.1	No	2.6
LN11	Upper George Street	Roadside	508910	221321	NO_2	No	20.0	2.7	No	2.9
LN15	Armitage Garden	Roadside	505557	222325	NO_2	Yes AQMAs 1 & 2	7.0	2.1	No	2.8
LN16	Belper Road	Roadside	505492	222607	NO_2	Yes AQMA 2	5.0	2.5	No	2.7
LN17	Wyndham Road	Roadside	505324	222812	NO_2	Yes AQMA 2	4.0	1.8	No	2.8
LN18	Copperfield	Roadside	505014	223538	NO_2	Yes AQMA 2	2.0	1.6	No	2.8
LN22	1 Mistletoe Hill	Urban Background	511341	221864	NO_2	No	0.0	9.3	No	2.5
LN23	Eaton Green Road 1	Roadside	511377	221814	NO_2	No	18.0	6.4	No	2.3
LN24	19 Barnston Close	Urban Background	511902	222144	NO_2	No	0.0	7.0	No	2.5
LN25	Eaton Green Road 2	Roadside	511893	222068	NO_2	No	17.0	1.9	No	2.9
LN26	8 Keeble Close	Urban Background	512109	222234	NO_2	No	0.0	11.5	No	2.7

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)
LN27	Eaton Green Road 3	Roadside	512134	222198	NO_2	No	6.0	2.3	No	2.7
LN28	Caddington Road	Roadside	507798	219832	NO_2	No	15.0	1.7	No	2.6
LN52	Dunstable Rd/Cardigan St Residential	Roadside	508689	221379	NO_2	Yes AQMA 3	0.0	4.3	No	2.8
LN53	3rd Floor Bagshawe Court F.F.	Suburban	507717	219923	NO_2	No	0.0	23.0	No	9.8
LN54	M1 Corner Bagshawe Court F.F.	Suburban	507712	219915	NO_2	No	0.0	12.0	No	2.0
LN55	M1 Corner Wyatt Court FF	Suburban	507732	219886	NO_2	No	0.0	13.0	No	2.9
LN56	20 Wyatt Court FF	Suburban	507747	219894	NO_2	No	0.0	30.0	No	2.9
LN61, LN62, LN63	Dunstable Road East (CRAQM 2)	Roadside	508708	221352	NO_2	Yes AQMA 3	6.0	2.5	Yes (Reference)	2.0
LN64	Park Viaduct – Park Street	Roadside	509563	220952	NO_2	No	0.2	2.9	No	2.7
LN65	Park Viaduct – Queens Close	Roadside	509486	220865	NO_2	No	1.9	8.8	No	1.9
LN66	Park Viaduct	Roadside	509288	220925	NO_2	Yes AQMA 3	4.9	3.7	No	2.7
LN67	Castle Street	Roadside	509083	220709	NO_2	No	0.0	2.3	No	2.7

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)
LN68	London Road	Roadside	508969	220487	NO_2	No	0.0	8.4	No	2.6
LN69	John Street	Roadside	509326	221357	NO_2	No	0.0	1.7	No	2.7
LN70	Crawley Green Road	Roadside	509813	221161	NO_2	No	0.0	6.0	No	2.6
LN71	Crescent Road	Urban Background	509549	221623	NO_2	No	0.0	10.3	No	2.4
LN72	Hucklesby Way	Urban Background	508937	221745	NO_2	No	0.0	8.7	No	2.5
LN73	Mill Street	Roadside	508959	221633	NO_2	No	0.0	3.9	No	2.9
LN74	Dunstable Road – Bury Park	Roadside	508165	222002	NO_2	No	0.0	4.8	No	2.5
LN75	New Bedford Road	Roadside	508745	222122	NO_2	No	0.0	5.2	No	2.5
LN76	Leagrave Road	Urban Background	507574	222948	NO_2	No	0.0	8.8	No	2.3
LN77	Marsh Road	Roadside	506496	224018	NO_2	No	0.0	4.8	No	2.5
LN78	Hibbert Street	Roadside	509109	220676	NO_2	No	0.2	1.4	No	2.4
LN80	Windsor Street	Roadside	509038	220719	NO_2	No	0.5	1.0	No	2.3
LN81	Bank Close	Suburban	505034	223729	NO_2	Yes AQMA 2		1.7	No	2.6

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)
LN82	11 Withy Close	Suburban	504828	223999	NO_2	Yes AQMAs 1 & 2	0.0	8.5	No	2.5
LN83	b/h 9 Copperfields	Suburban	505116	223467	NO_2	Yes AQMA 2	13.0	26.0	No	2.5
LN84	97 Lime Avenue	Suburban	505230	223304	NO_2	Yes AQMA 2	8.5	1.8	No	2.5
LN85	26 Belper Road	Suburban	505481	222545	NO_2	Yes AQMA 2	0.0	17.0	No	2.0
LN86	Bradley Road (by M1 Bridge)	Roadside	505586	222235	NO_2	Yes AQMAs 1 & 2		2.3	No	2.6
LN87	Shelton Way Alleyway	Suburban	510170	223162	NO_2	No	0.0	13.0	No	2.7
LN88	510 Hitchin Rd	Roadside	510107	223087	NO_2	No	0.0	8.5	No	2.7
LN89	13 Saywell Road	Suburban	510515	222612	NO_2	No	4.5	17.0	No	2.7
LN90	304 Crawley Green Road	Roadside	510846	222209	NO_2	No	0.0	14.1	No	2.7
LN91	International House	Urban Background	511122	221721	NO_2	No	0.0	22.3	No	2.7
LN92	Harrowden Court	Suburban	511037	221657	NO_2	No	0.0	11.5	No	2.7
LN93	Someries Junior School	Suburban	511332	223069	NO_2	No	0.0	35.6	No	2.4
LN94	Ashcroft High School	Suburban	511327	222588	NO_2	No	0.0	78.4	No	2.6

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)
LN95	Wigmore Primary School	Suburban	511996	222534	NO_2	No	0.0	44.3	No	2.4
LN96	Castle Street 3	Roadside	509059	220656	NO_2	No	0.0	2.5	No	2.4
LN98	Chaul End Road	Roadside	506411	222554	NO_2	No		2.2	Yes (Indicative)	
LN100	Dunstable Road - Bury Park 2	Roadside	508380	221764	NO_2	Yes AQMA 3	6.5	3.2	Yes (Indicative)	2.3
LN102	Beech Hill Community Primary School	Roadside	508000	222078	NO_2	No	9.0	3.5	Yes (Indicative)	
LN104	L&D Hospital, Lewsey Road	Roadside	504987	222805	NO_2	No	12.5	2.0	Yes (Indicative)	2.3
LN106	Peoples Park	Urban Background	509339	222128	NO_2	No		5.4	Yes (Indicative)	2.3
LN107	2 Chertsey Close	Urban Background	511573	221897	NO_2	No	0.0	18.8	No	2.2
LN108	Laxton Close	Suburban	512473	222295	NO_2	No		N/A	No	2.3
LN109	59 Malthouse Green	Suburban	512915	222308	NO_2	No		N/A	No	2.4
LN110	Hedley Rise	Suburban	512738	222385	NO_2	No	4.5	2.2	No	2.4
LN111	61 Lalleford Road	Roadside	511521	222203	NO_2	No	6.7	4.2	No	2.6
LN112	140 Prospect Way	Industrial	511254	221466	NO_2	No	0.0	N/A	No	2.3

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)
LN113	786 Dunstable Road	Roadside	505005	222696	NO_2	No	0.0	10.0	No	2.3
LN114	20 Bradgers Hill Road	Roadside	509293	223741	NO_2	No	0.0	8.0	No	2.2
LN115	69 Windmill Road	Roadside	509995	220892	NO_2	No	0.0	7.2	No	2.1
LN116	85 Hitchin Road	Roadside	509655	221842	NO_2	No	0.0	1.3	No	2.3
LN117	258 Stockingstone Road	Roadside	509136	223217	NO_2	No	0.0	10.0	No	2.2
LN118	Fulbourne Close	Roadside	506407	222732	NO_2	No		12.5	No	2.3
LN119	Challney High School for Boys	Urban Background	505588	222871	NO_2	No	0.0	41.6	No	2.5
LN120	20 High Street	Roadside	505723	223787	NO_2	No	0.0	4.1	No	2.4
LN121	4c Marsh Road	Roadside	506990	223425	NO_2	No	0.0	12.8	No	2.4
LN122	404 - 410 Selbourne Road	Roadside	506918	223295	NO_2	No	0.0	10.0	No	2.1
LN123	34 Bury Park Road	Roadside	508413	221918	NO_2	No	3.2	1.7	No	2.4
LN124	114 Bury Park Road	Roadside	508253	222053	NO_2	No	0.0	5.0	No	2.5
LN125	Bury Park Community Centre	Roadside	508321	221839	NO_2	Yes AQMA 3	0.0	10.0	No	2.7

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)
LN126	30 Leagrave Road	Roadside	508140	222103	NO_2	No	0.0	6.4	No	2.5
LN127	33 Leagrave Road	Roadside	508095	222127	NO_2	No	0.0	4.4	No	2.4
LN128	McKenzie House	Roadside	508065	222182	NO_2	No	0.0	6.8	No	2.1
LN129	3 Selbourne Road	Roadside	507973	222289	NO_2	No	0.0	4.4	No	2.5
LN130	218 Leagrave Road	Roadside	507918	222560	NO_2	No	0.0	3.8	No	2.5
LN131	265 Dunstable Road (Learning Corner Daycare Nursery)	Roadside	507666	222143	NO_2	No	0.0	6.9	No	2.6
LN132	1A Maidenhall Road	Roadside	507228	222511	NO_2	No	0.7	2.2	No	2.6
LN133	80 Dunstable Road	Roadside	508381	221795	NO_2	Yes AQMA 3	0.0	7.0	No	2.4
LN134	172 Nadeem Plaza	Roadside	508156	222053	NO_2	No	0.0	4.9	No	2.5
LN135	Units 5-6, The Arcade	Roadside	508136	222040	NO_2	No	0.0	6.0	No	2.4
LN136	182 Dunstable Road	Roadside	508059	222080	NO_2	No	0.0	4.7	No	2.5
LN137	10 Selbourne Road	Roadside	507948	222337	NO_2	No	0.0	4.4	No	2.3

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)
LN138	132 Leagrave Road	Roadside	508021	222248	NO_2	No	0.0	6.4	No	2.4
LN139	132 Dunstable Road	Roadside	508270	221939	NO_2	No	0.0	6.0	No	2.4
LN140	173 Dunstable Road	Roadside	508279	221903	NO_2	No	0.0	6.7	No	2.4
LN141	9 Moor Street	Roadside	508450	221790	NO_2	No	1.7	2.0	No	2.4
LN142	Crawley Road	Roadside	508751	221714	NO_2	Yes AQMA 3	0.0	2.2	No	
LN143	L&D Hospital, Lewsey Road 2	Roadside	504993	222790	NO_2	No	10.5	2.5	No	

Notes:

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

[2] N/A if not applicable.

b) LLAOL 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)
LLA 1	Terminal front [canopy]	Other *[Car Park & Drop-Off Zones]*	511920	221334	NO_2	No			No	
LLA 2	Airport Approach Road	Roadside *[Access Road]*	511586	220978	NO_2	No			No	
LLA 3	Runway Threshold Western	Other *[Runway & Flightpath]*	511156	220437	NO_2	No		N/A	No	
LLA 4	Runway Threshold Eastern	Other *[Runway & Flightpath]*	513634	221198	NO_2	No		N/A	No	
LLA 5	Airside - Stand 5	Other *[Airfield]*	511703	221320	NO_2	No		N/A	No	
LLA 6	President Way Jct	Roadside *[Access Road]*	511645	221679	NO_2	No			No	
LLA 7	Drop-off Zone	Roadside *[Car Park & Drop-Off Zones]*	512105	221168	NO_2	No			No	

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)
LLA 8	BAM Co-located	Other *[Airfield]*	511871	221142	NO_2	No		N/A	No	
LLA 9	Stagenhoe Bottom Farm	Rural *[Runway & Flightpath]*	517637	222554	NO_2	No		N/A	No	
LLA 10	Grove Farm Slip End	Rural *[Runway & Flightpath]*	507623	217724	NO_2	No		N/A	No	
LLA 11	Dane Street	Roadside *[Runway & Flightpath]*	513125	220664	NO_2	No			No	
LLA 12	Airside - Stand 61	Roadside *[Airfield]*	511861	221579	NO_2	No		N/A	No	
LLA 13	Eaton Green Road	Roadside *[Access Road]*	511899	222051	NO_2	No			No	
LLA 14	Undercroft Access	Kerbside *[Car Park & Drop-Off Zones]*	511954	221313	NO_2	No			No	
LLA 15	Eaton Green Road - Lower	Kerbside *[Access Road]*	511168	221706	NO_2	No			No	

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)
LLA 16	Airside - South Stands	Other *[Airfield]*	512275	221115	NO_2	No		N/A	No	
LLA 17	A1081 Southbound Carriage Way	Roadside *[Access Road]*	509489	219237	NO_2	No			No	
LLA 18	A1081 New Airport Way	Roadside *[Access Road]*	510779	220279	NO_2	No			No	
LLA 19	Breachwood Green Community Hall	Rural *[Runway & Flightpath]*	515109	221933	NO_2	No			No	

Notes:

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

(2) N/A if not applicable.

c) Luton Rising 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)
L1(i), L1(ii), L1(iii)	Dunstable Road East	Roadside	508710	221353	NO_2	Yes AQMA 3	6.0	2.4	Yes	2.0
L2(i), L2(ii)	Crawley Green Road	Roadside	511155	222445	NO_2	No		1.2	No	2.1
L3(i), L3(ii)	Wigmore Lane	Roadside	511780	222760	NO_2	No		1.0	No	2.0
L4(i), L4(ii)	Eaton Green Road / Darley Road	Rural	513223	222397	NO_2	No		1.5	No	2.0
L5(i), L5(ii)	Chapel Road, Breachwood	Rural	515047	221904	NO_2	No		2.8	No	2.0
L6(i), L6(ii)	Winch Hill	Rural	513773	221752	NO_2	No		1.2	No	1.9
L7(i), L7(ii)	Vauxhall Way	Roadside	511057	221386	NO_2	No		2.1	No	2.0
L8(i), L8(ii)	Kimpton Road	Roadside	510543	220706	NO_2	No		2.1	No	2.0
L9(i), L9(ii)	Luton Parkway Station Exit (North)	Other	510553	220682	NO_2	No		N/A	No	1.6
L10(i), L10(ii)	Luton Road, Caddington	Roadside	506541	219854	NO_2	No		1.0	No	2.1

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)
L11(i), L11(ii), L11(iii)	Wigmore Valley Park	Rural	512569	222207	NO_2	No		N/A	Yes	1.6
L12(i), L12(ii)	Chiltern Academy	Roadside	510256	220599	NO_2	No		4.6	No	1.9
L13(i), L13(ii)	Surrey Street Primary School	Suburban	509744	220103	NO_2	No		2.5	No	1.8
L14(i), L14(ii)	Tennyson Road Primary School South Site	Suburban	509195	220264	NO_2	No		2.1	No	1.8
L15(i), L15(ii)	Caddington Village School	Rural	506794	219467	NO_2	No		1.6	No	1.8
L16(i), L16(ii)	Breachwood Green JMI School	Rural	515284	222038	NO_2	No		2.1	No	1.8

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023(%) [2]	2019	2020	2021	2022	2023
LN60 (HB007)	508708	221352	Roadside	99.7	99.7	**40.4**	28.3	30.2	32.5	27.8
LA001	512578	222204	Other	96.6	96.6	16.2	11.9	11.3	14.1	12.6
LUTR (UKA00605)	505927	222644	Roadside	99.1	99.1	39.3	30.7	31.4	30.0	27.5

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

☒ **Reported concentrations are those at the location of the monitoring site (annualised, as required), ie 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**.

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

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

a) Luton Council sites

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 2023(%) [2]	2019	2020	2021	2022	2023
LN07	509227	221455	Roadside	90.4	90.4	28.4	20.3	20.9	21.5	18.5
LN11	508910	221321	Roadside	100.0	100.0	34.3	27.3	30.6	28.8	26.4
LN15	505557	222325	Roadside	100.0	100.0	27.0	20.2	20.1	20.3	19.4
LN16	505492	222607	Roadside	100.0	100.0	31.1	25.0	23.9	23.8	21.3
LN17	505324	222812	Roadside	100.0	100.0	33.1	25.5	24.1	25.7	22.7
LN18	505014	223538	Roadside	100.0	100.0	22.1	16.9	18.4	17.2	15.3
LN22	511341	221864	Urban Background	90.4	90.4	23.1	16.0	16.1	17.9	14.7
LN23	511377	221814	Roadside	100.0	100.0	34.9	24.9	24.2	27.6	25.7
LN24	511902	222144	Urban Background	100.0	100.0	22.0	16.2	16.8	17.1	15.8
LN25	511893	222068	Roadside	100.0	100.0	29.6	20.9	20.0	22.7	21.6
LN26	512109	222234	Urban Background	100.0	100.0	19.9	13.8	13.7	15.3	14.2
LN27	512134	222198	Roadside	100.0	100.0	28.3	20.1	20.4	23.2	20.1

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 2023(%) [2]	2019	2020	2021	2022	2023
LN28	507798	219832	Roadside	92.3	92.3	38.5	29.6	29.3	28.5	26.4
LN52	508689	221379	Roadside	82.7	82.7	**42.8**	33.0	35.7	32.9	30.4
LN53	507717	219923	Suburban	100.0	100.0	28.2	21.6	20.5	21.8	18.5
LN54	507712	219915	Suburban	69.2	69.2	28.2	21.4	23.1	22.7	20.8
LN55	507732	219886	Suburban	84.6	84.6	27.4	22.5	21.0	21.7	18.7
LN56	507747	219894	Suburban	92.3	92.3	28.4	21.8	20.1	21.8	17.8
LN61, LN62, LN63	508708	221352	Roadside	100.0	100.0	**40.7**	30.8	32.2	32.2	29.3
LN64	509563	220952	Roadside	50.0	50	31.2	21.9	22.2	21.8	20.5
LN65	509486	220865	Roadside	100.0	100.0	24.0	17.5	19.6	19.4	18.1
LN66	509288	220925	Roadside	100.0	100.0	36.7	27.6	28.6	28.8	25.4
LN67	509083	220709	Roadside	92.3	92.3	**43.0**	32.7	32.9	33.2	30.3
LN68	508969	220487	Roadside	75.0	75	31.9	24.0	26.0	25.4	23.1
LN69	509326	221357	Roadside	100.0	100.0	30.8	22.5	24.7	25.5	22.9
LN70	509813	221161	Roadside	100.0	100.0	32.8	24.1	26.8	25.8	22.7

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 2023(%) [2]	2019	2020	2021	2022	2023
LN71	509549	221623	Urban Background	100.0	100.0	31.3	23.5	25.1	24.9	21.9
LN72	508937	221745	Urban Background	100.0	100.0	29.8	23.5	24.0	24.4	22
LN73	508959	221633	Roadside	92.3	92.3	38.4	28.9	30.6	31.5	28.3
LN74	508165	222002	Roadside	92.3	92.3	36.8	29.5	29.7	29.7	27
LN75	508745	222122	Roadside	92.3	92.3	36.5	22.0	30.8	32.3	29.1
LN76	507574	222948	Urban Background	100.0	100.0	31.3	23.8	26.4	26.0	23.8
LN77	506496	224018	Roadside	100.0	100.0	35.6	27.2	26.7	27.1	25.6
LN78	509109	220676	Roadside	82.7	82.7	31.2	23.3	23.7	22.8	20.5
LN80	509038	220719	Roadside	92.3	92.3	33.3	24.3	25.8	25.7	22.4
LN81	505034	223729	Suburban	100.0	100.0	30.8	21.8	22.7	23.2	21.1
LN82	504828	223999	Suburban	92.3	92.3	27.6	20.9	19.7	19.9	18.5
LN83	505116	223467	Suburban	65.4	65.4	22.5	16.3	19.5	18.0	17.1
LN84	505230	223304	Suburban	100.0	100.0	25.3	16.8	19.4	19.1	18.9
LN85	505481	222545	Suburban	100.0	100.0	30.0	22.8	21.9	21.7	20.3

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 2023(%) [2]	2019	2020	2021	2022	2023
LN86	505586	222235	Roadside	100.0	100.0	38.8	28.4	27.4	28.2	24.5
LN87	510170	223162	Suburban	84.6	84.6		16.3	17.9	18.2	16.6
LN88	510107	223087	Roadside	100.0	100.0		19.9	21.2	21.8	19.6
LN89	510515	222612	Suburban	100.0	100.0		16.6	18.5	19.2	17.1
LN90	510846	222209	Roadside	100.0	100.0		20.5	22.0	22.8	19.8
LN91	511122	221721	Urban Background	82.7	82.7		17.5	18.5	20.4	18.3
LN92	511037	221657	Suburban	100.0	100.0		16.1	17.4	19.0	16.5
LN93	511332	223069	Suburban	100.0	100.0		11.1	12.1	13.8	11
LN94	511327	222588	Suburban	92.3	92.3		12.8	12.6	14.2	12.9
LN95	511996	222534	Suburban	65.4	65.4		13.2	13.2	15.3	14.1
LN96	509059	220656	Roadside	100.0	100.0			35.1	37.3	34.5
LN98	506411	222554	Roadside	90.4	90.4				28.1	25.2
LN100	508380	221764	Roadside	100.0	100.0				35.5	32.9
LN102	508000	222078	Roadside	82.7	82.7				24.8	23.1

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 2023(%) [2]	2019	2020	2021	2022	2023
LN104	504987	222805	Roadside	71.4	40.4				32.8	28.7
LN106	509339	222128	Urban Background	80.8	80.8				17.8	16.4
LN107	511573	221897	Urban Background	92.3	92.3				19.5	17.3
LN108	512473	222295	Suburban	92.3	92.3				16.8	15.2
LN109	512915	222308	Suburban	100.0	100.0				12.7	11.8
LN110	512738	222385	Suburban	92.3	92.3				14.8	14.1
LN111	511521	222203	Roadside	100.0	100.0				16.9	14.7
LN112	511254	221466	Industrial	100.0	100.0				15.9	14.2
LN113	505005	222696	Roadside	100.0	100.0				23.9	22.3
LN114	509293	223741	Roadside	100.0	100.0				12.9	11.2
LN115	509995	220892	Roadside	100.0	100.0				23.8	21.4
LN116	509655	221842	Roadside	69.2	69.2				35.6	35.2
LN117	509136	223217	Roadside	100.0	100.0				27.8	25.7
LN118	506407	222732	Roadside	100.0	100.0				21.7	19.3

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 2023(%) [2]	2019	2020	2021	2022	2023
LN119	505588	222871	Urban Background	100.0	100.0				18.6	17.1
LN120	505723	223787	Roadside	100.0	100.0				23.8	22
LN121	506990	223425	Roadside	90.4	90.4				22.5	19.9
LN122	506918	223295	Roadside	90.4	90.4				23.2	20.6
LN123	508413	221918	Roadside	100.0	100.0				29.7	26.8
LN124	508253	222053	Roadside	100.0	100.0				23.3	21.2
LN125	508321	221839	Roadside	90.4	90.4				29.1	28.8
LN126	508140	222103	Roadside	100.0	100.0				28.0	26.1
LN127	508095	222127	Roadside	92.3	92.3				25.4	23.7
LN128	508065	222182	Roadside	100.0	100.0				29.3	25.6
LN129	507973	222289	Roadside	92.3	92.3				27.6	25
LN130	507918	222560	Roadside	100.0	100.0				25.5	23
LN131	507666	222143	Roadside	100.0	100.0				24.4	21.5
LN132	507228	222511	Roadside	100.0	100.0				29.0	29.2

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 2023(%) [2]	2019	2020	2021	2022	2023
LN133	508381	221795	Roadside	82.7	82.7				29.3	25.8
LN134	508156	222053	Roadside	90.4	90.4				31.4	31.1
LN135	508136	222040	Roadside	100.0	100.0				28.8	26.7
LN136	508059	222080	Roadside	82.7	82.7				26.4	23.8
LN137	507948	222337	Roadside	100.0	100.0				25.5	23.5
LN138	508021	222248	Roadside	100.0	100.0				28.8	26.9
LN139	508270	221939	Roadside	100.0	100.0				31.6	29.6
LN140	508279	221903	Roadside	100.0	100.0				29.9	28.7
LN141	508450	221790	Roadside	92.3	92.3				23.8	21.9
LN142	508751	221714	Roadside	100.0	100.0				29.4	27.7
LN143	504993	222790	Roadside	100.0	42.3					26.8

☒ **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), ie 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 (eg if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

b) LLAOL sites

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 2023 (%) [2]	2019	2020	2021	2022	2023
LLA 1	511920	221334	Other *[Car Park & Drop-Off Zones]*	73.4	67.6	37.4	20.6	19.7	28.1	31.2
LLA 2	511586	220978	Roadside *[Access Road]*	81.2	74.7			18.6	25.3	25.6
LLA 3	511156	220437	Other *[Runway & Flightpath]*	100.0	92.0			14.6	15.8	14.2
LLA 4	513634	221198	Other *[Runway & Flightpath]*	100.0	92.0			10.5	12	10.8
LLA 5	511703	221320	Other *[Airfield]*	91.6	84.3			21.9	32.1	33.5
LLA 6	511645	221679	Roadside *[Access Road]*	100.0	92.0			20.2	24.9	24.2
LLA 7	512105	221168	Roadside *[Car Park & Drop-Off Zones]*	72.8	67.0		26.1	25.6	37.6	**40.5**
LLA 8	511871	221142	Other *[Airfield]*	100.0	92.0			20.2	25.1	23.8
LLA 9	517637	222554	Rural *[Runway & Flightpath]*	71.0	65.4			7.3	7.1	6.2
LLA 10	507623	217724	Rural *[Runway & Flightpath]*	100.0	92.0			8	8.6	6.9
LLA 11	513125	220664	Roadside *[Runway & Flightpath]*	100.0	92.0			7.3	11.4	10.1
LLA 12	511861	221579	Roadside *[Airfield]*	100.0	92.0			21.9	33	34.5
LLA 13	511899	222051	Roadside *[Access Road]*	89.9	82.7			15.5	18.5	18.3

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 2023 (%) [2]	2019	2020	2021	2022	2023
LLA 14	511954	221313	Kerbside *[Car Park & Drop-Off Zones]*	71.0	65.4			21	28.4	33.1
LLA 15	511168	221706	Kerbside *[Access Road]*	89.9	82.7	31.2	20.9	22.7	25.6	24.3
LLA 16	512275	221115	Other *[Airfield]*	100.0	92.0	32.3	19.7	18.1	23.1	26.2
LLA 17	509489	219237	Roadside *[Access Road]*	100.0	92.0	32.1	20.2	21.5	25.4	23.2
LLA 18	510779	220279	Roadside *[Access Road]*	100.0	92.0	29.1	20.2	20.8	24.4	21.9
LLA 19	515109	221933	Rural *[Runway & Flightpath]*	89.9	82.7	15.6	9.2	8.8	9.9	8.2

☒ **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), ie 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 (eg if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

c) Luton Rising sites

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 2023 (%) [2]	2019	2020	2021	2022	2023
L1(i), L1(ii), L1(iii)	508710	221353	Roadside	95.9	95.9	**40.6**	30.5	32.2	34.3	29.2
L2(i), L2(ii)	511155	222445	Roadside	95.9	95.9	29.6	22.9	23.4	23.0	20.6
L3(i), L3(ii)	511780	222760	Roadside	95.9	95.9	29.7	20.9	21.7	22.6	19.2
L4(i), L4(ii)	513223	222397	Rural	95.9	95.9	20.4	13.9	12.5	14.1	12.6
L5(i), L5(ii)	515047	221904	Rural	95.9	95.9	14.5	10.3	9.1	9.9	8.1
L6(i), L6(ii)	513773	221752	Rural	95.9	95.9	17.3	11.6	10.2	11.5	10.6
L7(i), L7(ii)	511057	221386	Roadside	95.9	95.9	**69.4**	**48.0**	**49.7**	**51.4**	**47.6**
L8(i), L8(ii)	510543	220706	Roadside	78.1	78.1	35.1	23.5	22.3	22.1	20.3
L9(i), L9(ii)	510553	220682	Other	88.2	88.2				20.6	17.0
L10(i), L10(ii)	506541	219854	Roadside	95.9	95.9	25.1	17.7	19.1	19.9	18.2
L11(i), L11(ii), L11(iii)	512569	222207	Rural	95.9	95.9	20.0	13.0	11.5	13.1	12.2

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 2023 (%) [2]	2019	2020	2021	2022	2023
L12(i), L12(ii)	510256	220599	Roadside	69.1	58.1					23.5
L13(i), L13(ii)	509744	220103	Suburban	100.0	84.1					11.7
L14(i), L14(ii)	509195	220264	Suburban	88.3	74.2					13.9
L15(i), L15(ii)	506794	219467	Rural	69.7	58.6					10.9
L16(i), L16(ii)	515284	222038	Rural	86.2	51.2					10.2

☒ **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), ie 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.

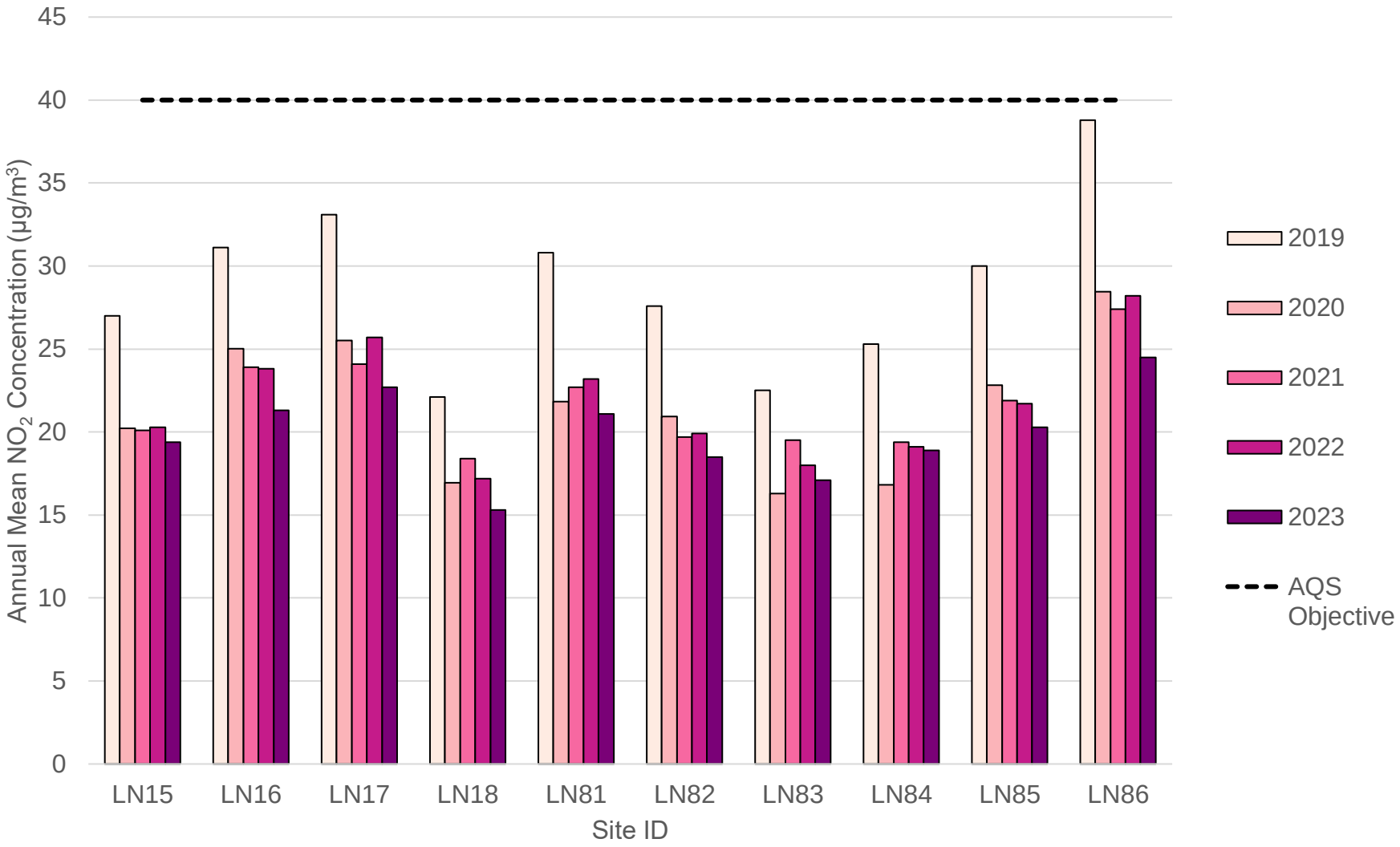
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

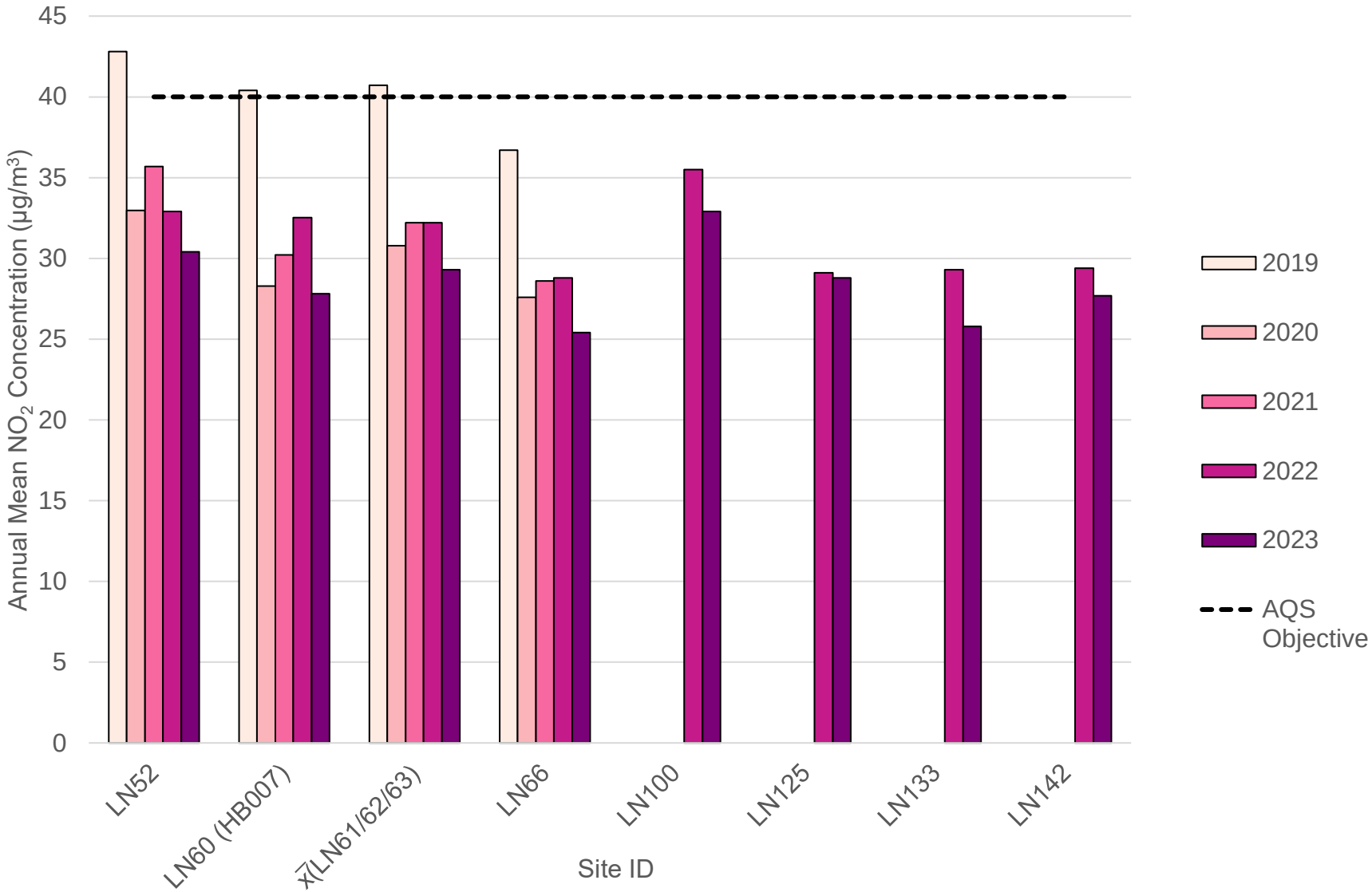
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

a) Luton Council sites

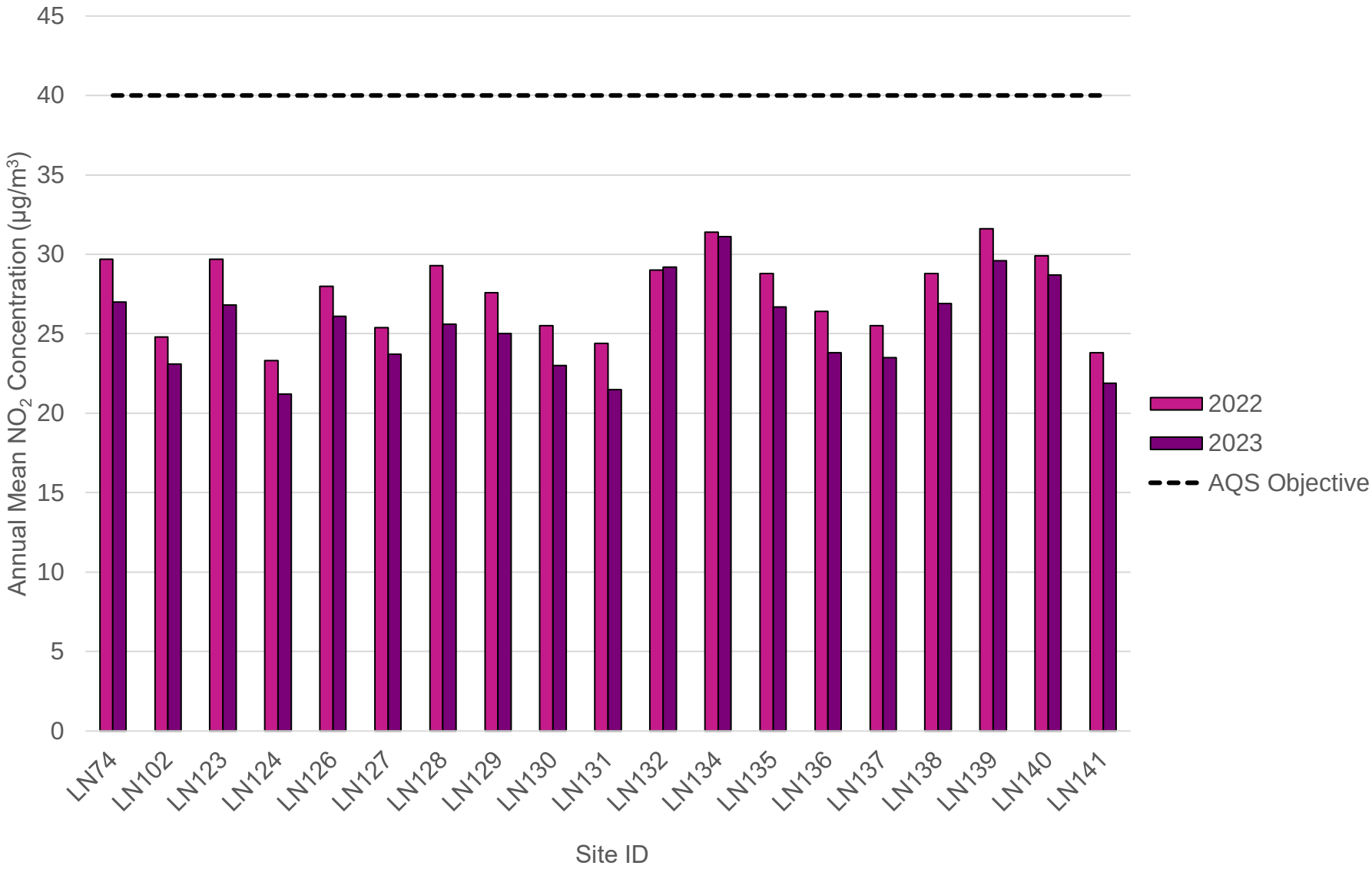
a. Within Luton AQMA N$^{os.}$ 1 & 2 (Located in Challney, Leagrave & Poets Wards)



b. Within Luton AQMA No. 3 (Located in Beech Hill & Central Wards)

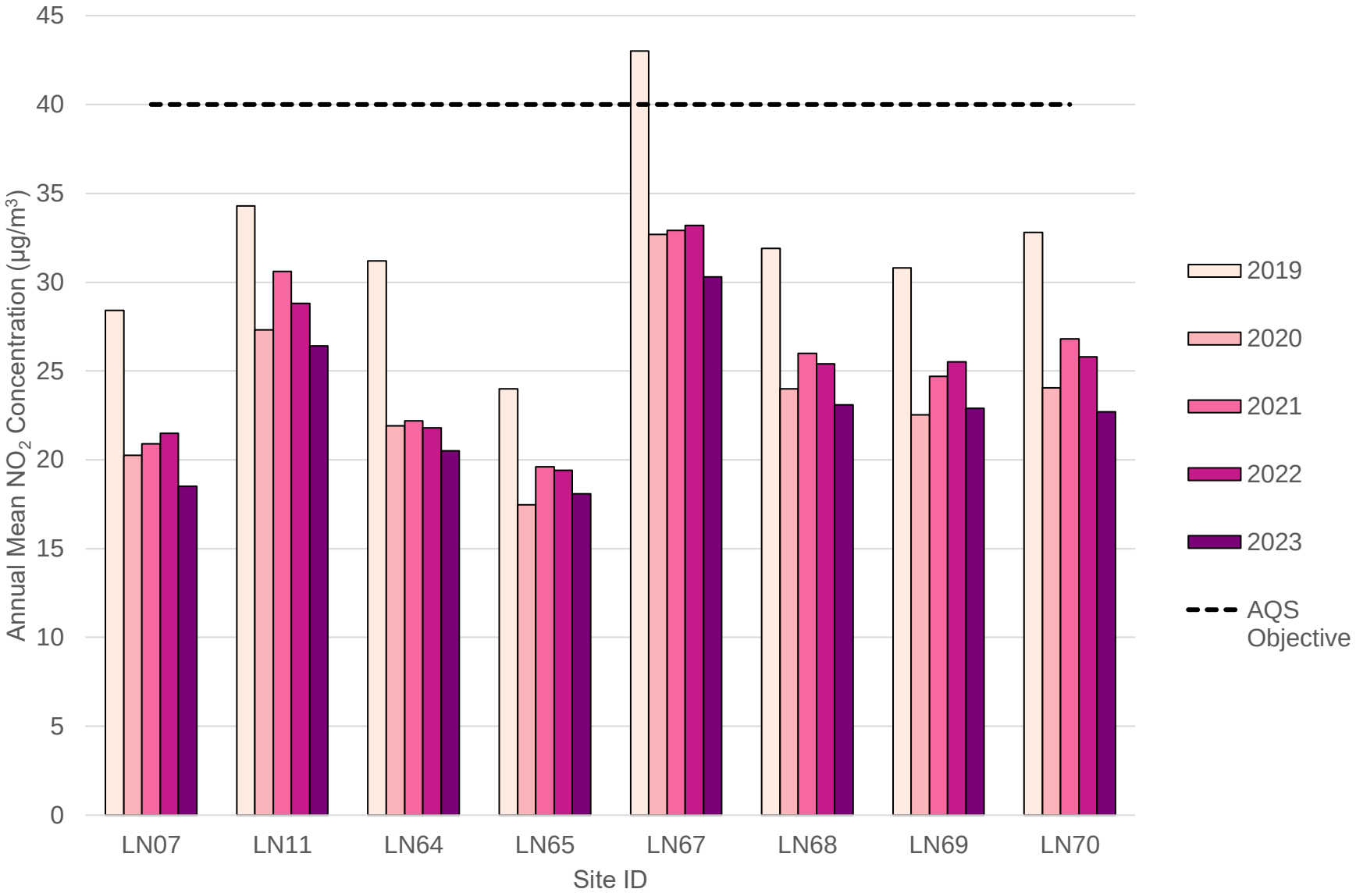


c. Non-AQMA locations in and around Bury Park (Located in Beech Hill, Biscot & Central Wards – deployed 2022)

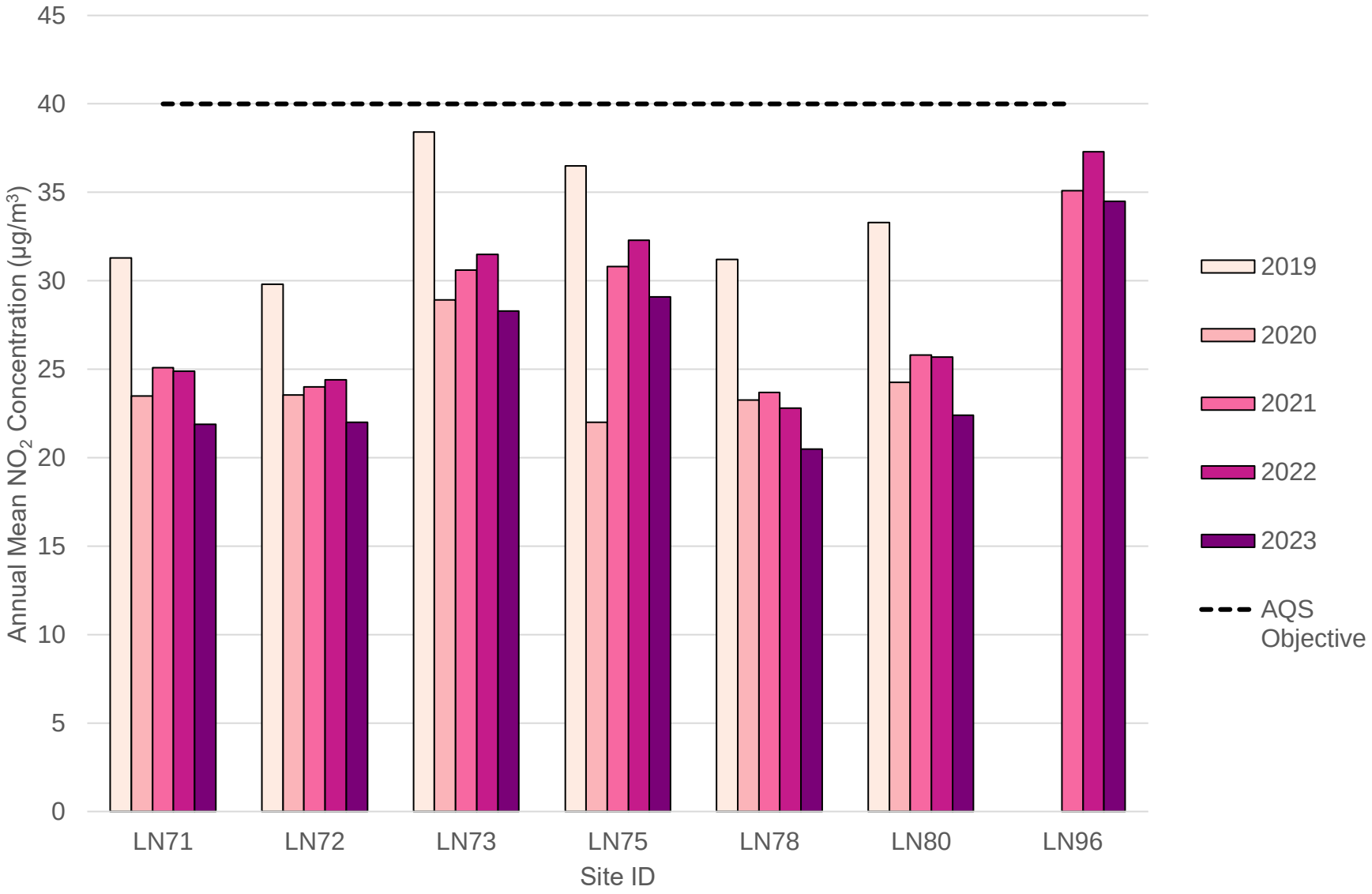


d. Non-AQMA locations in Northwest Luton (Located in Challney, Leagrave, Northwell, Poets & Saints Wards)

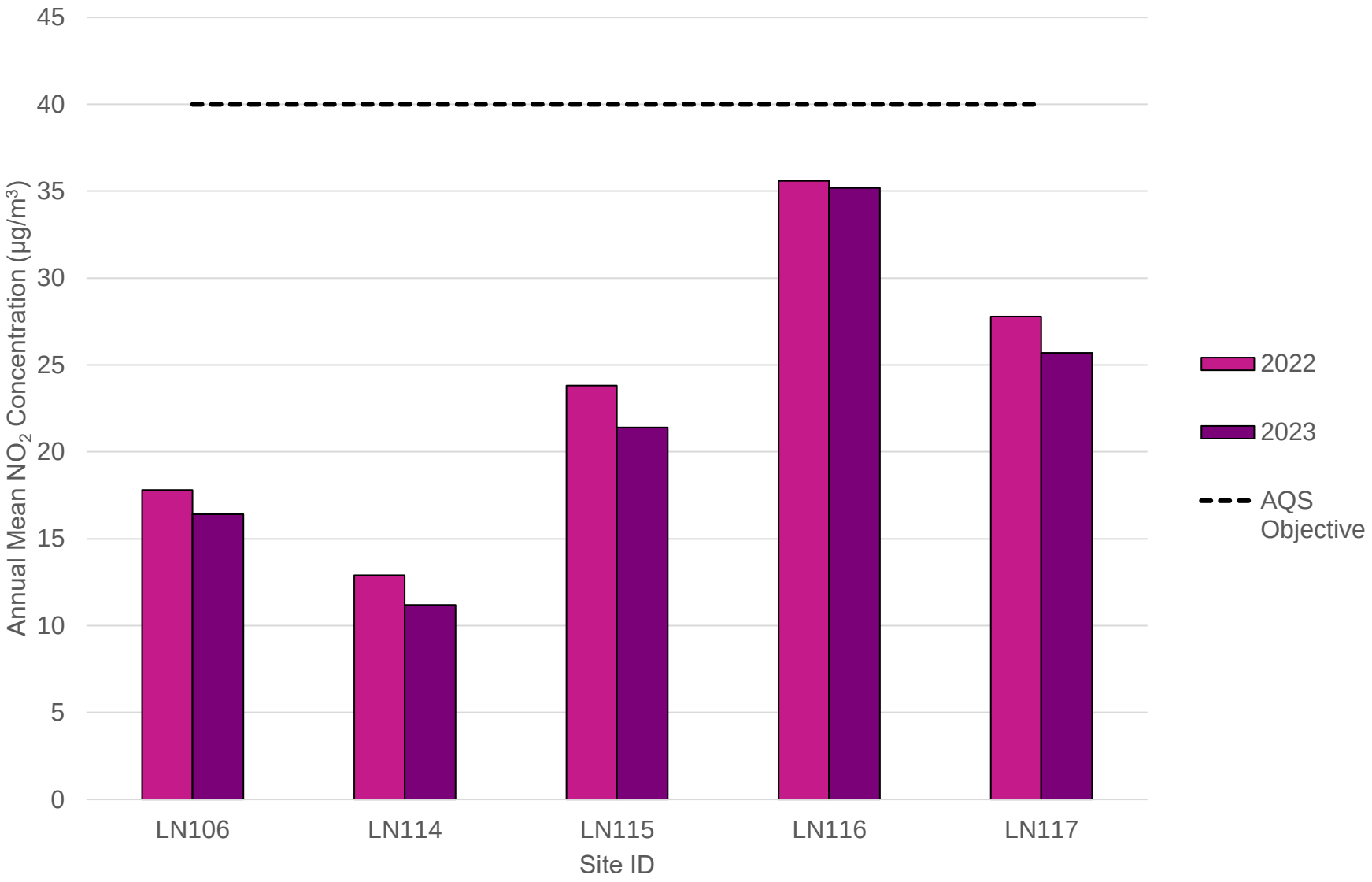
e. Non-AQMA locations in Central / North Luton - Part 1 (Located in Central & South Wards)



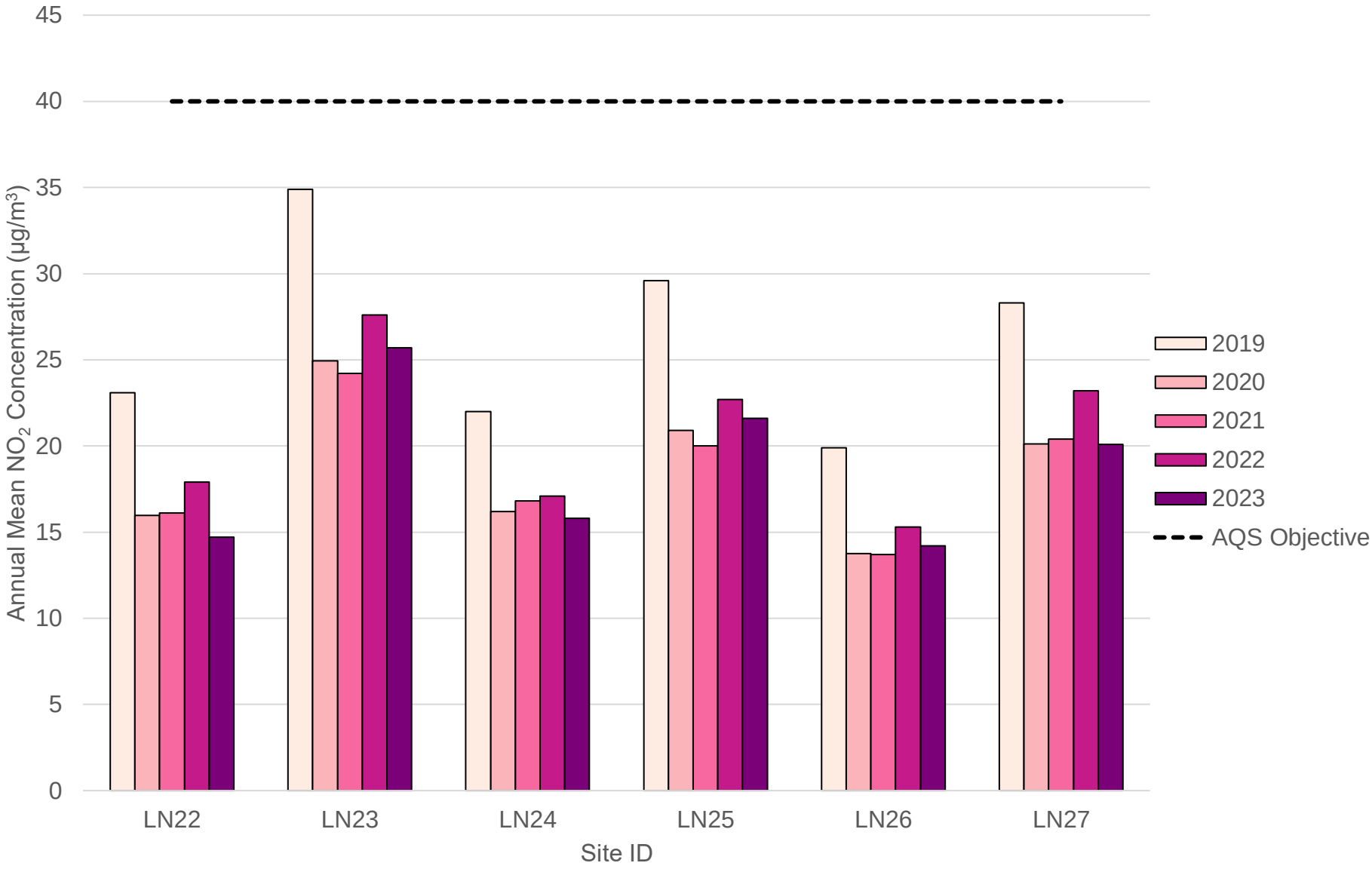
f. Non-AQMA locations in Central / North Luton - Part 2 (Located in Central, High Town & South Wards)



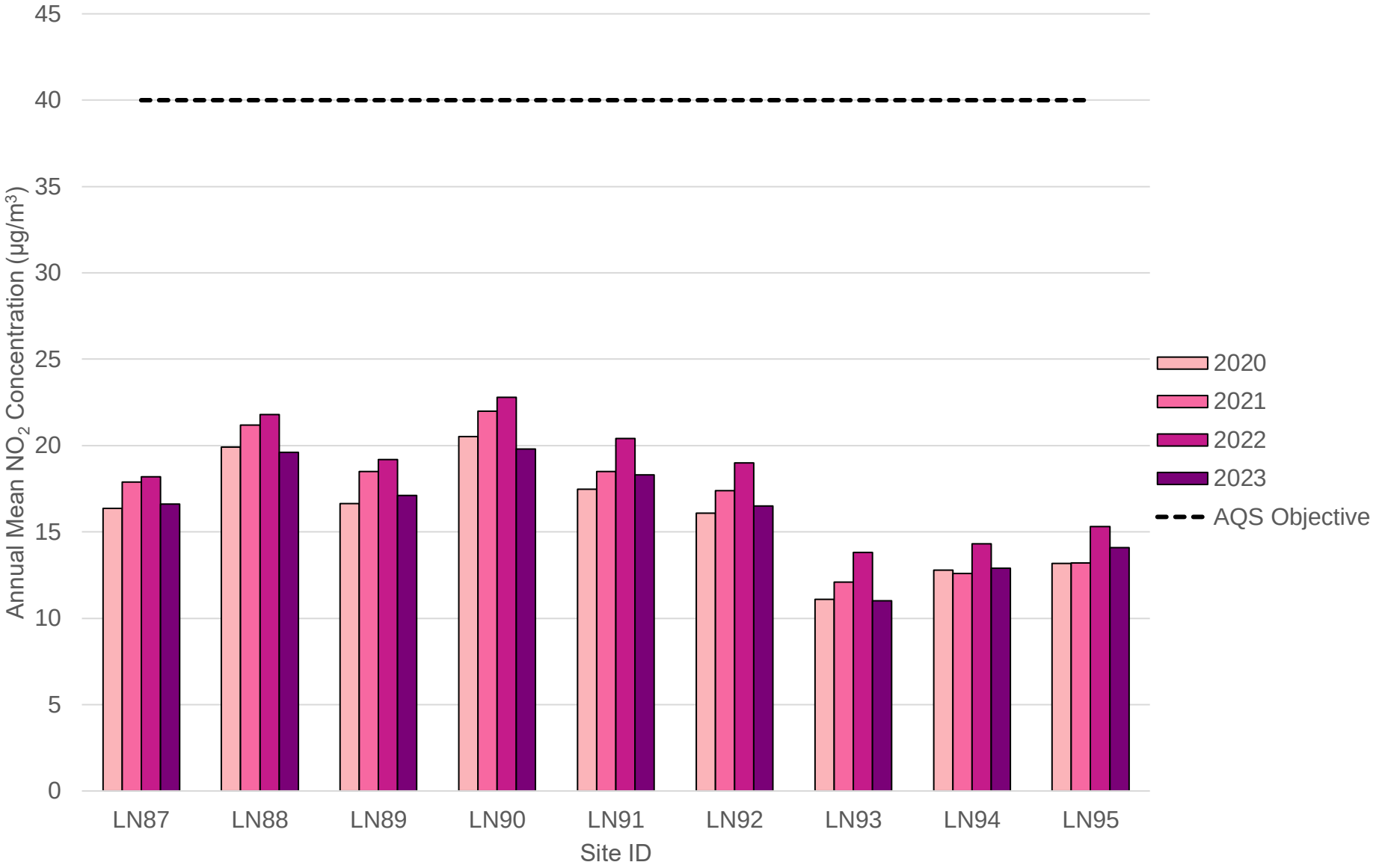
g. Non-AQMA location in Central / North Luton (Located in Barnfield, High Town & South Wards - deployed 2022)



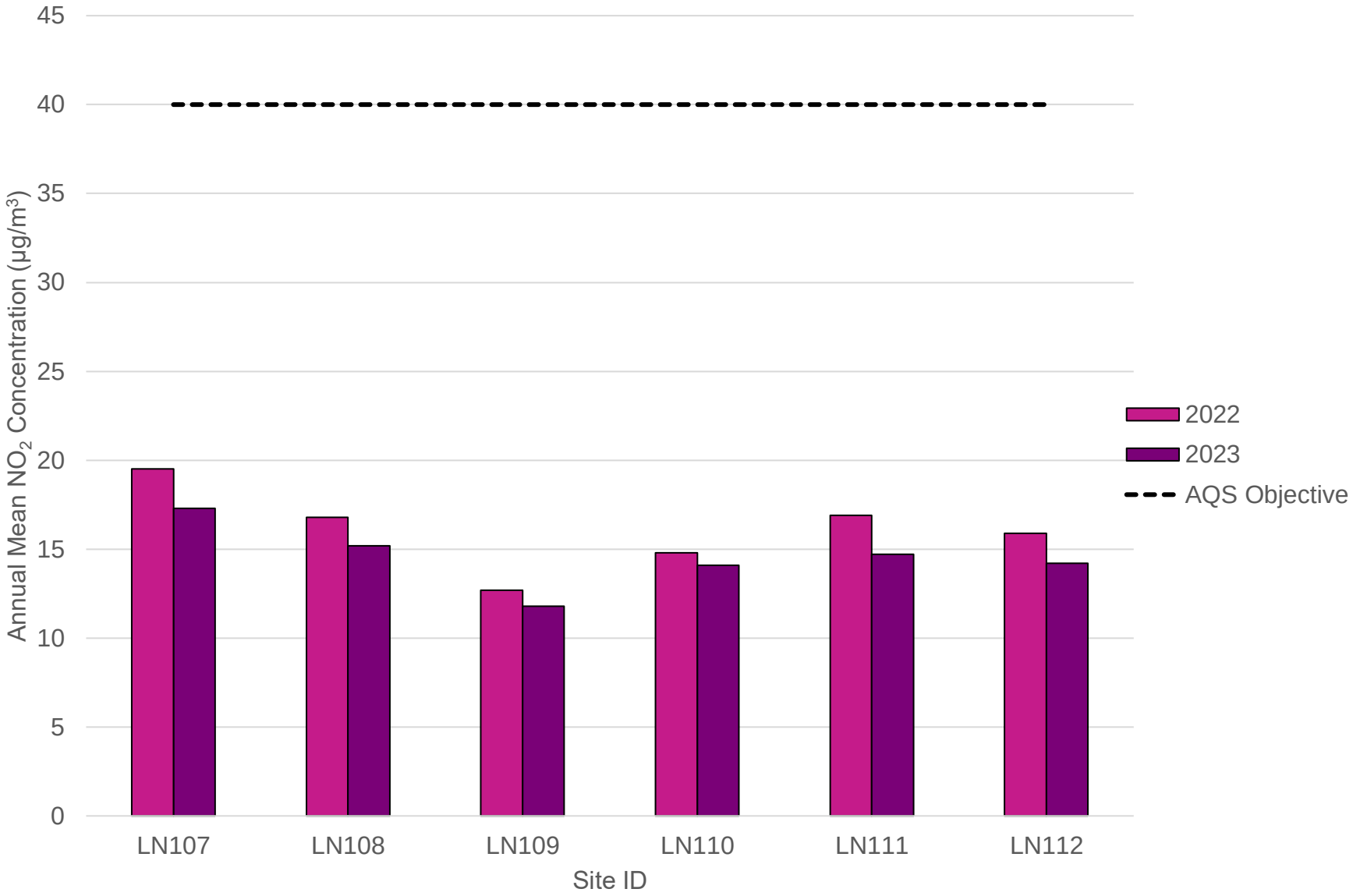
h. Non-AQMA locations in East Luton - Part 1 (Located in Vauxhall & Wigmore Wards)



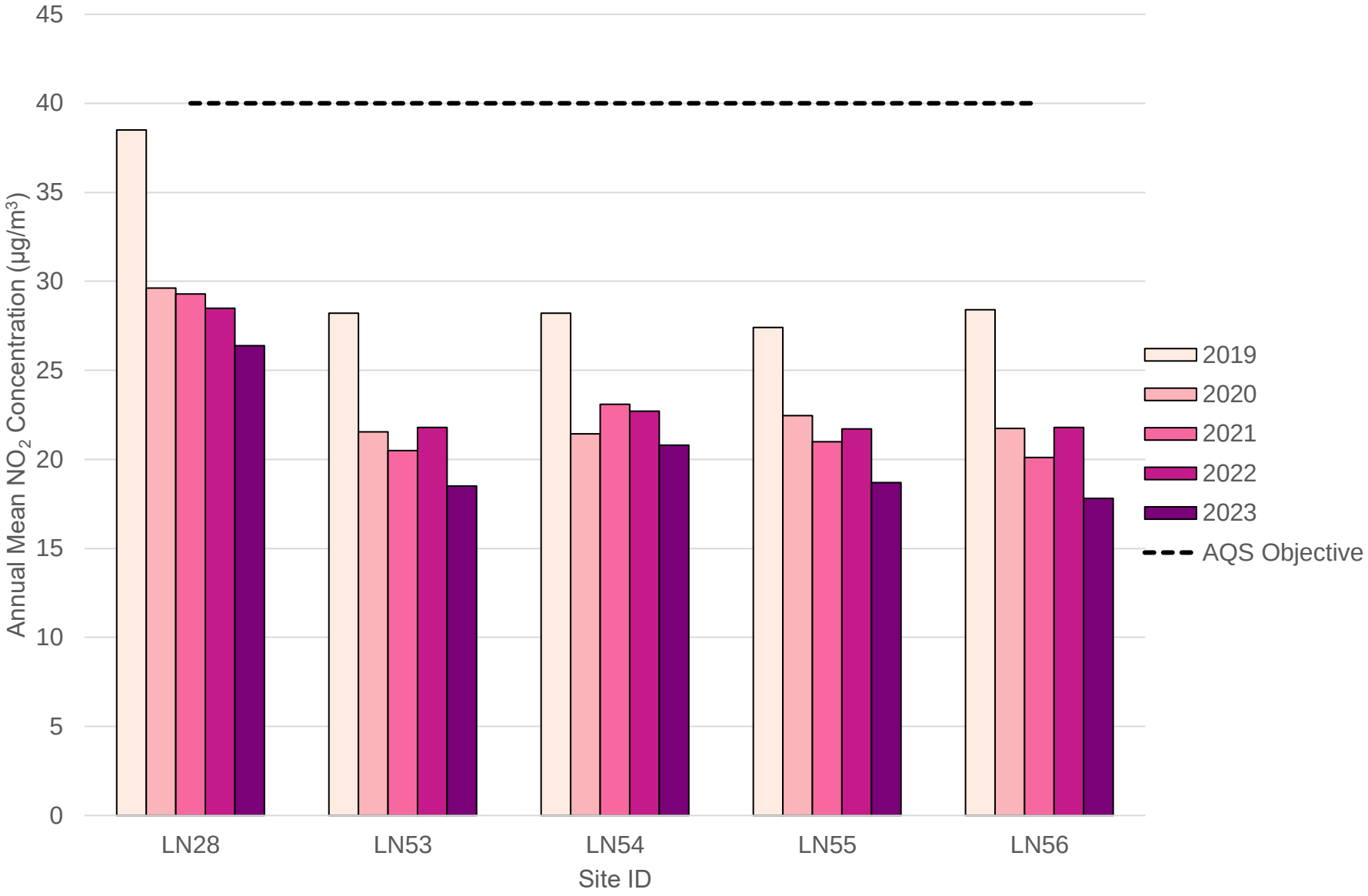
i. Non-AQMA locations in East Luton - Part 2 (Located in Round Green, Stopsley, Vauxhall & Wigmore Wards)



j. Non-AQMA locations in East Luton (Located in Vauxhall & Wigmore Wards – deployed 2022)

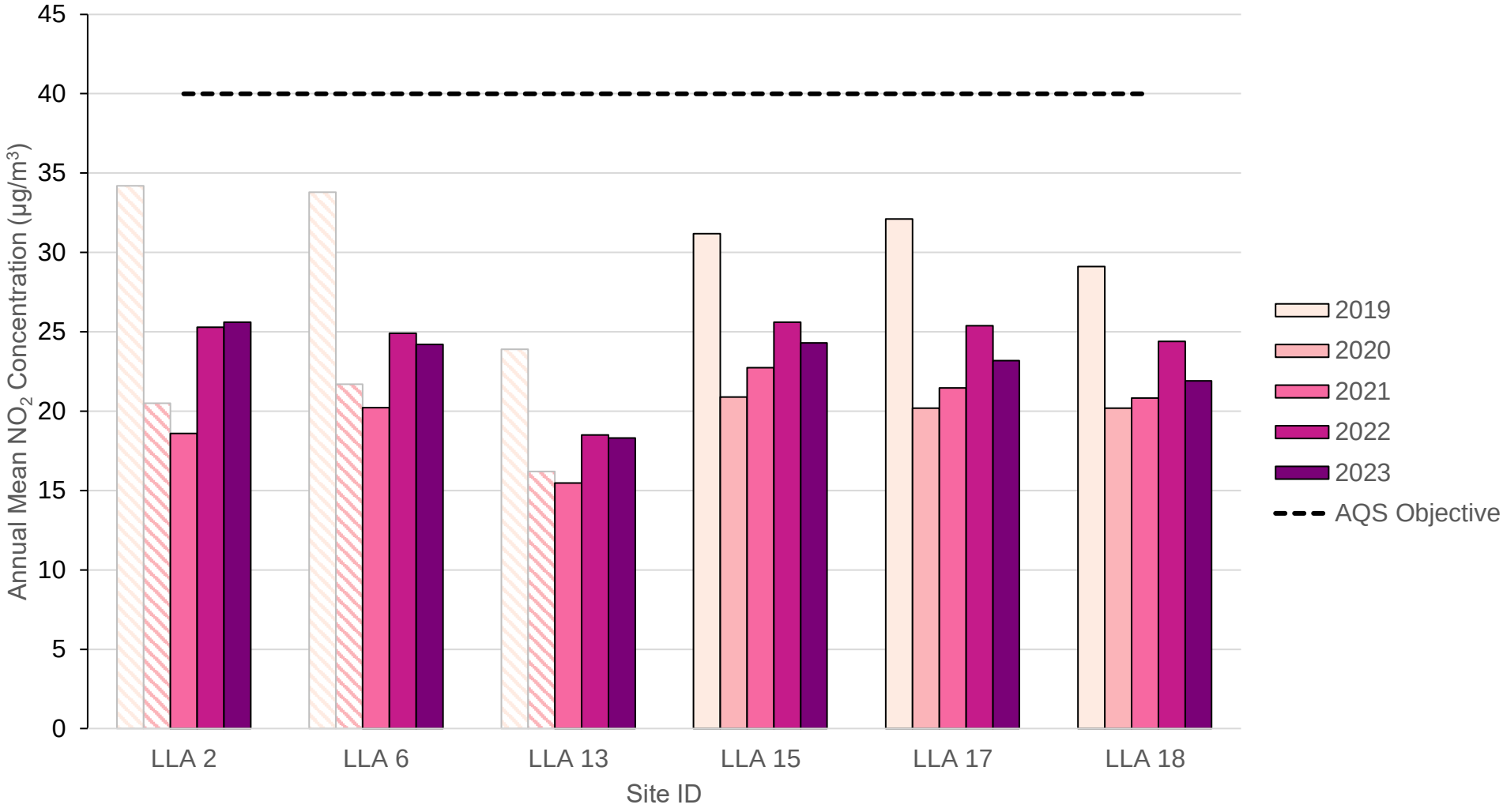


k. Non-AQMA locations in West Luton (Located in Farley Ward)



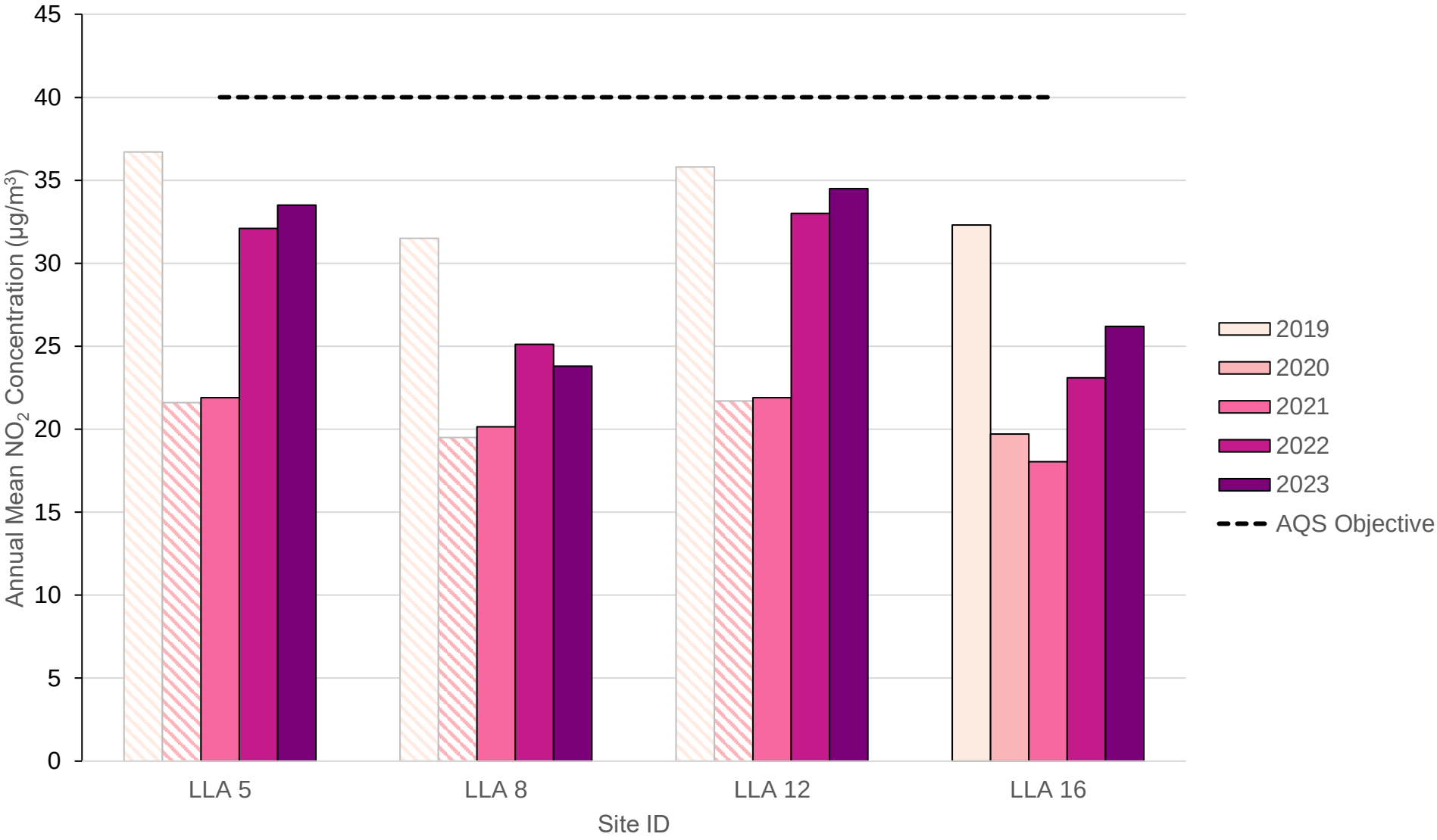
b) LLAOL sites

a. LLAOL Site Group: Access Road



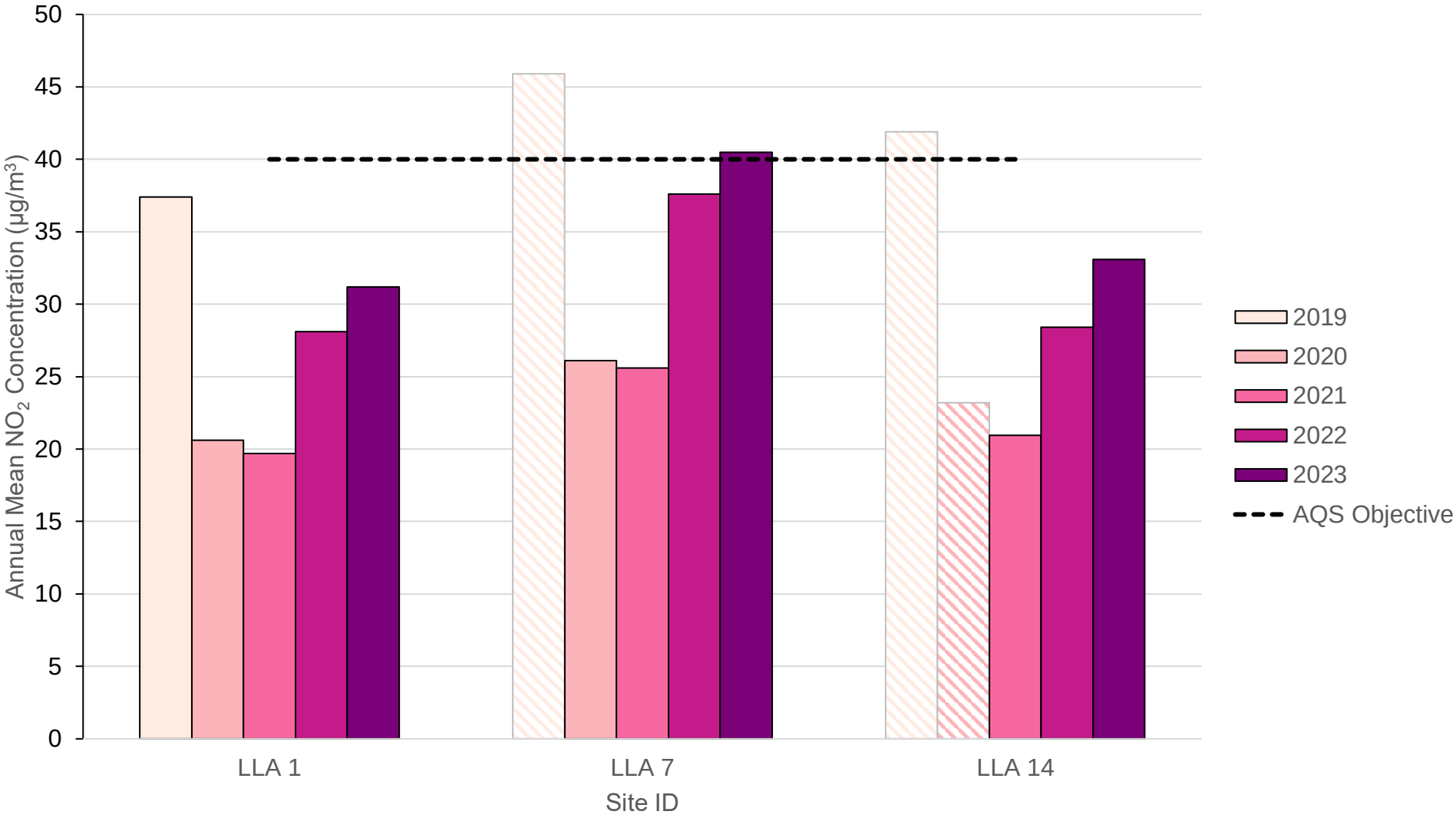
Note: Hatching indicates data from a previous location(s) where tube has been relocated within the last 5 years.

b. LLAOL Site Group: Airfield



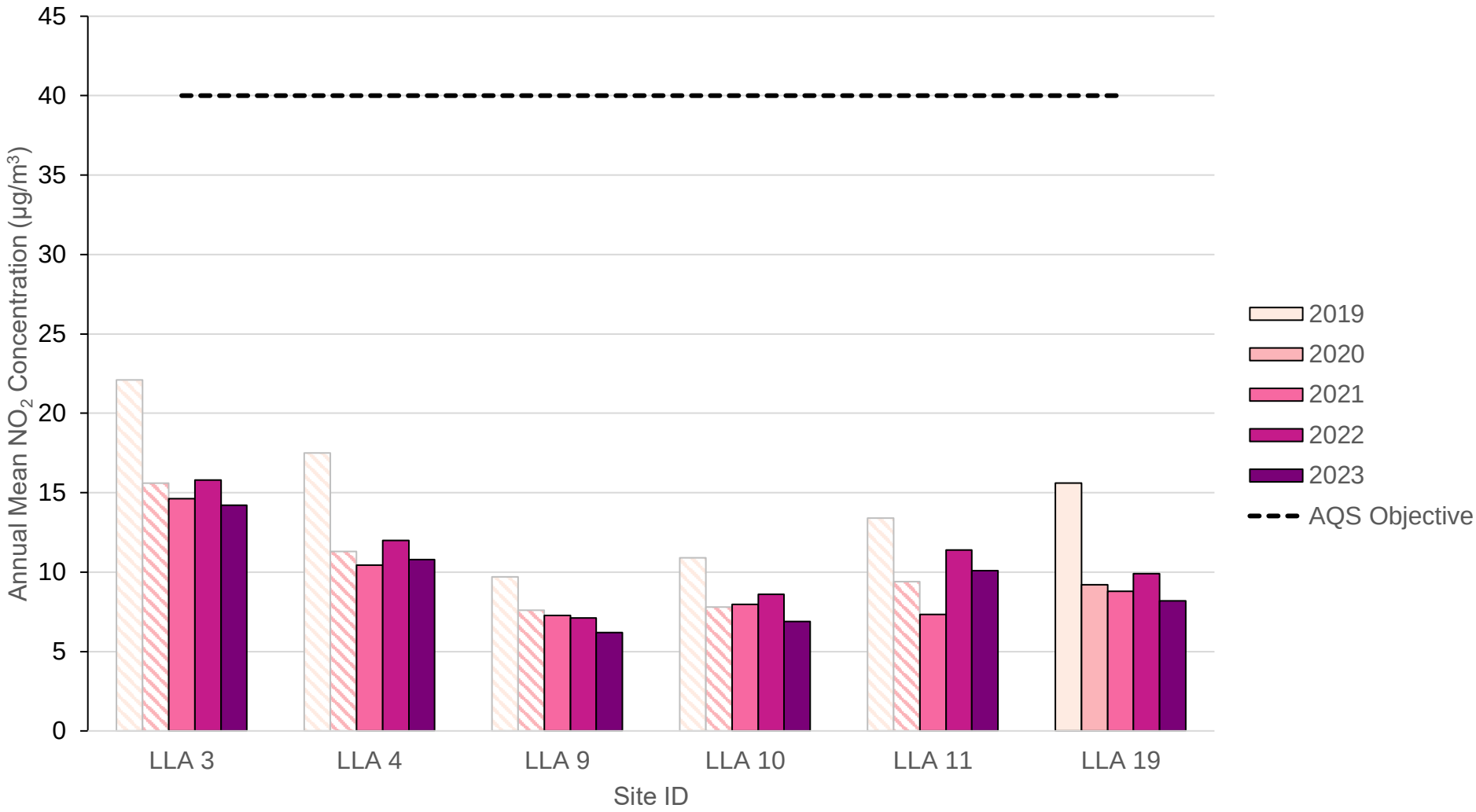
Note: Hatching indicates data from a previous location(s) where tube has been relocated within the last 5 years.

c. LLAOL Site Group: Car Park & Drop-Off



Note: Hatching indicates data from a previous location(s) where tube has been relocated within the last 5 years.

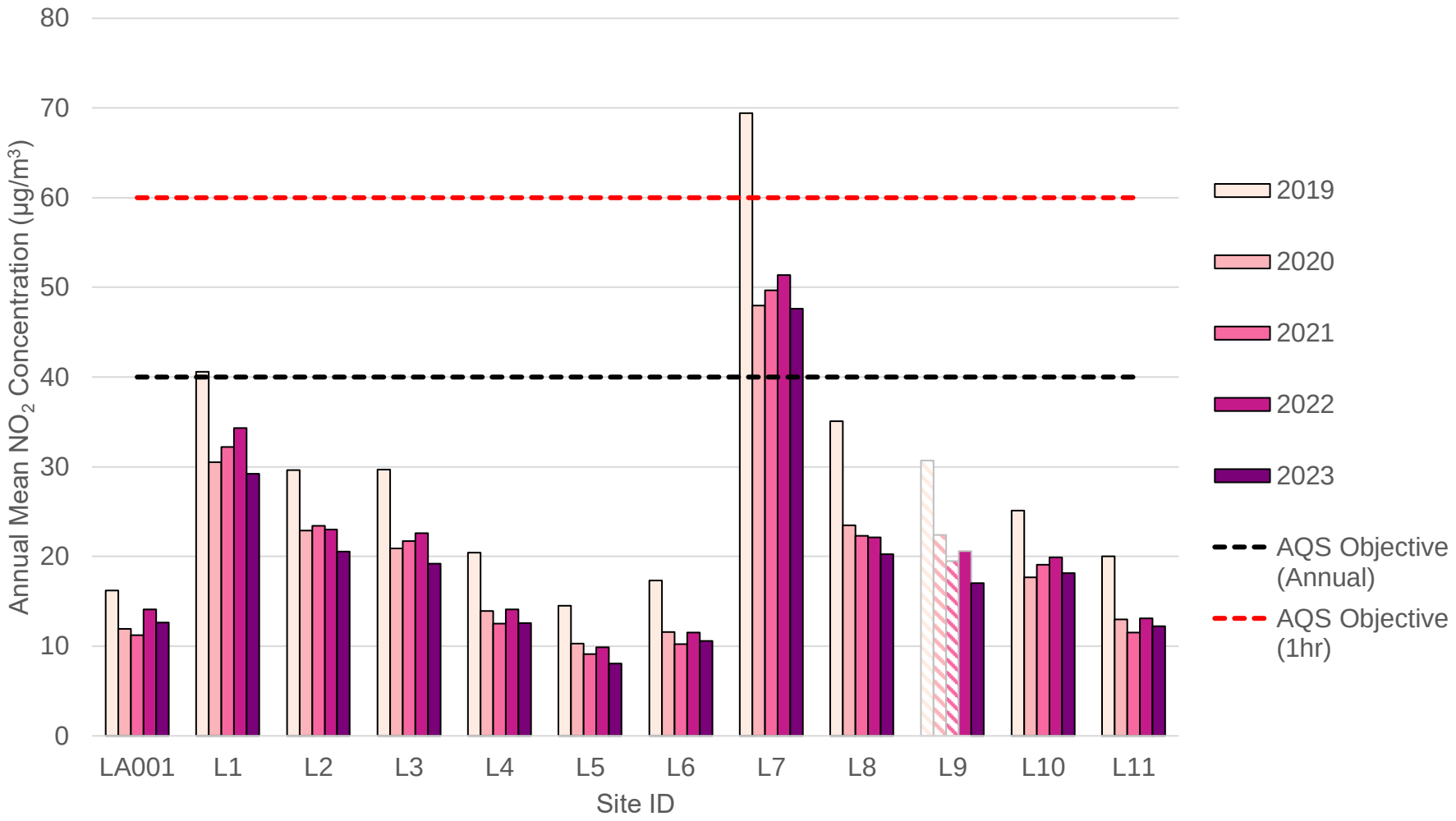
d. LLAOL Site Group: Runway & Flightpath



Note: Hatching indicates data from a previous location(s) where tube has been relocated within the last 5 years.

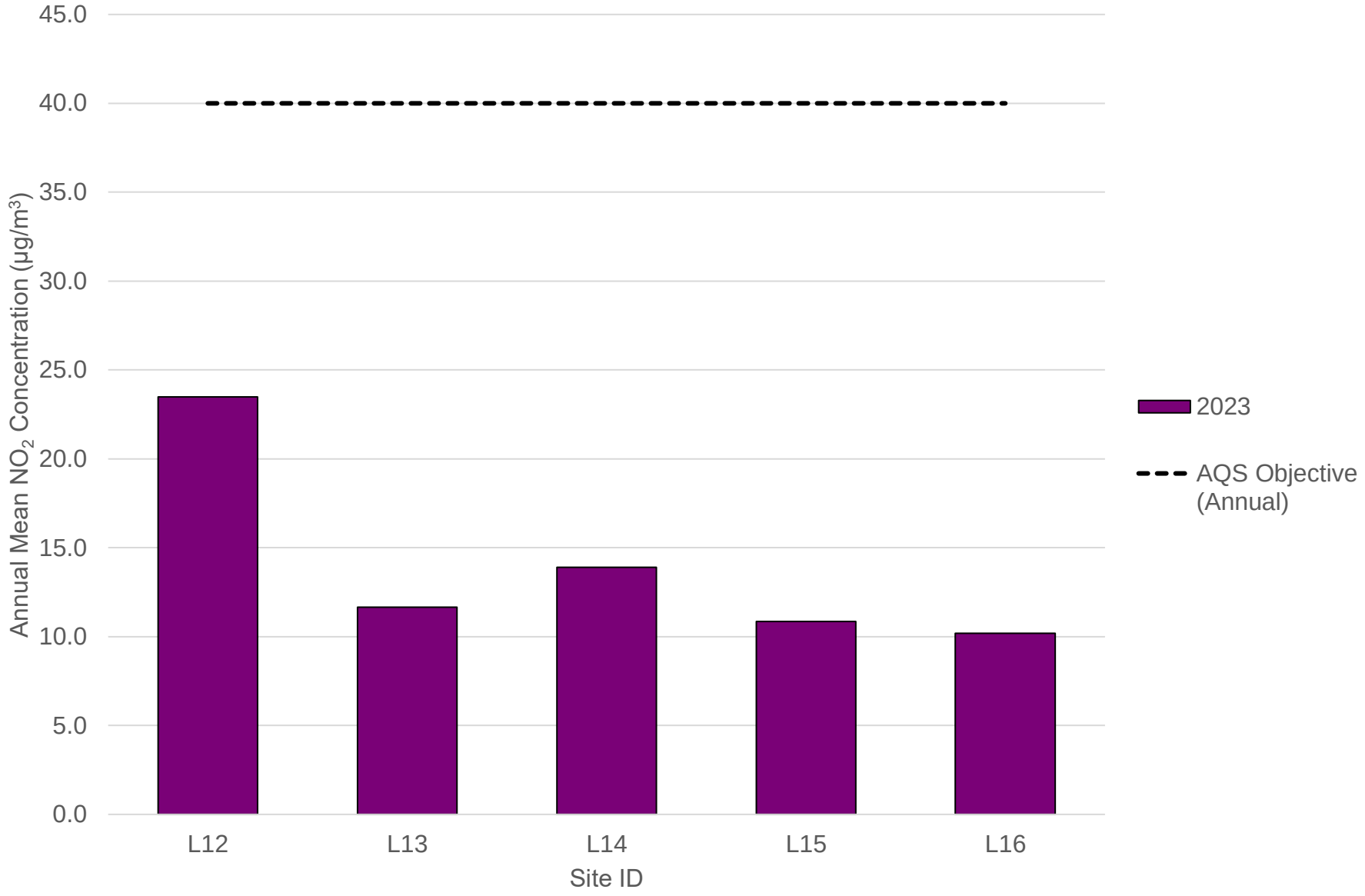
c) Luton Rising sites

a. Pre-existing sites



Note: Hatching indicates data from previous locations where L9 has been relocated by Luton Rising within the last 5 years.

b. Newly established sites at local schools



d) Defra AURN sites

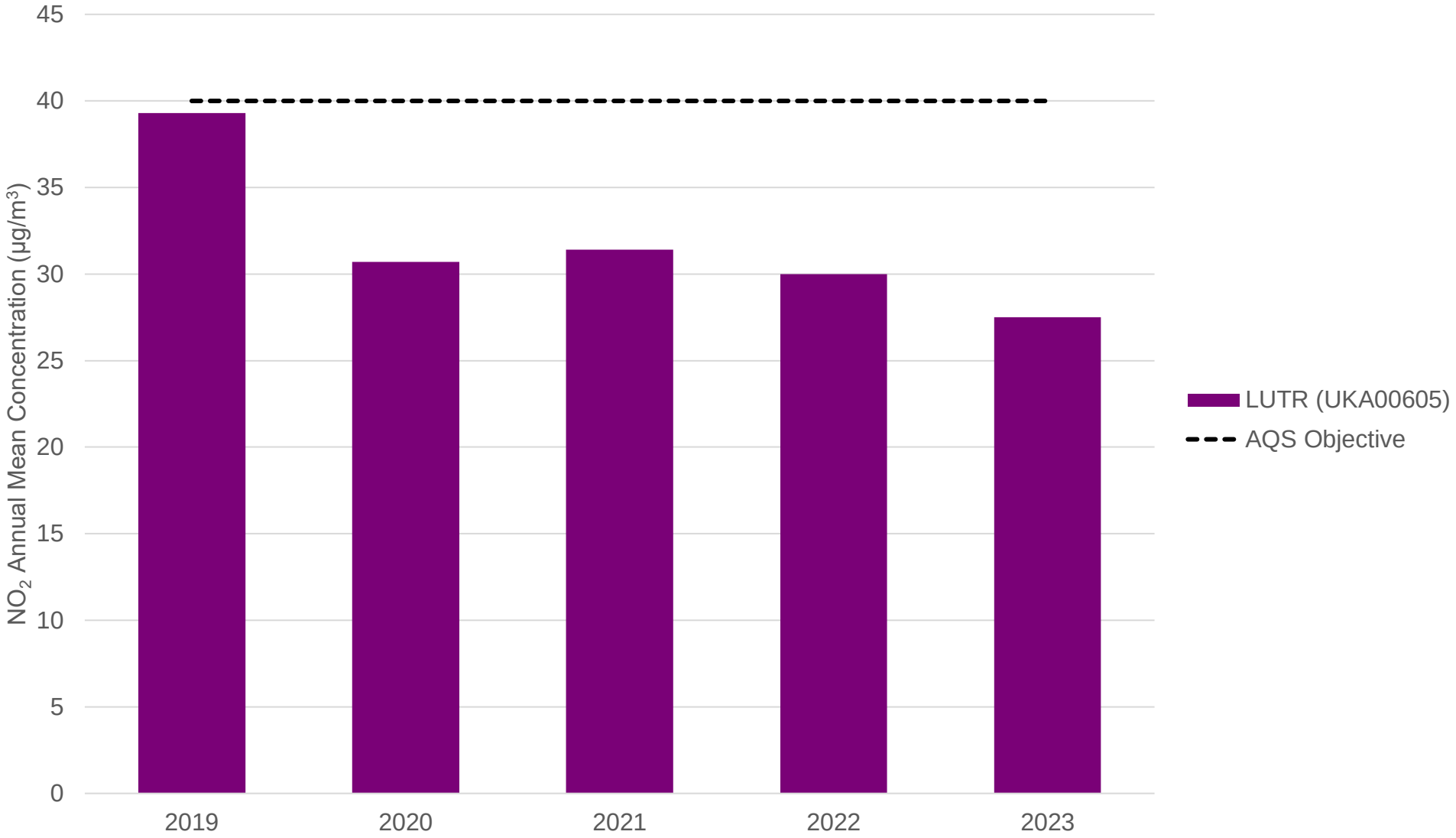
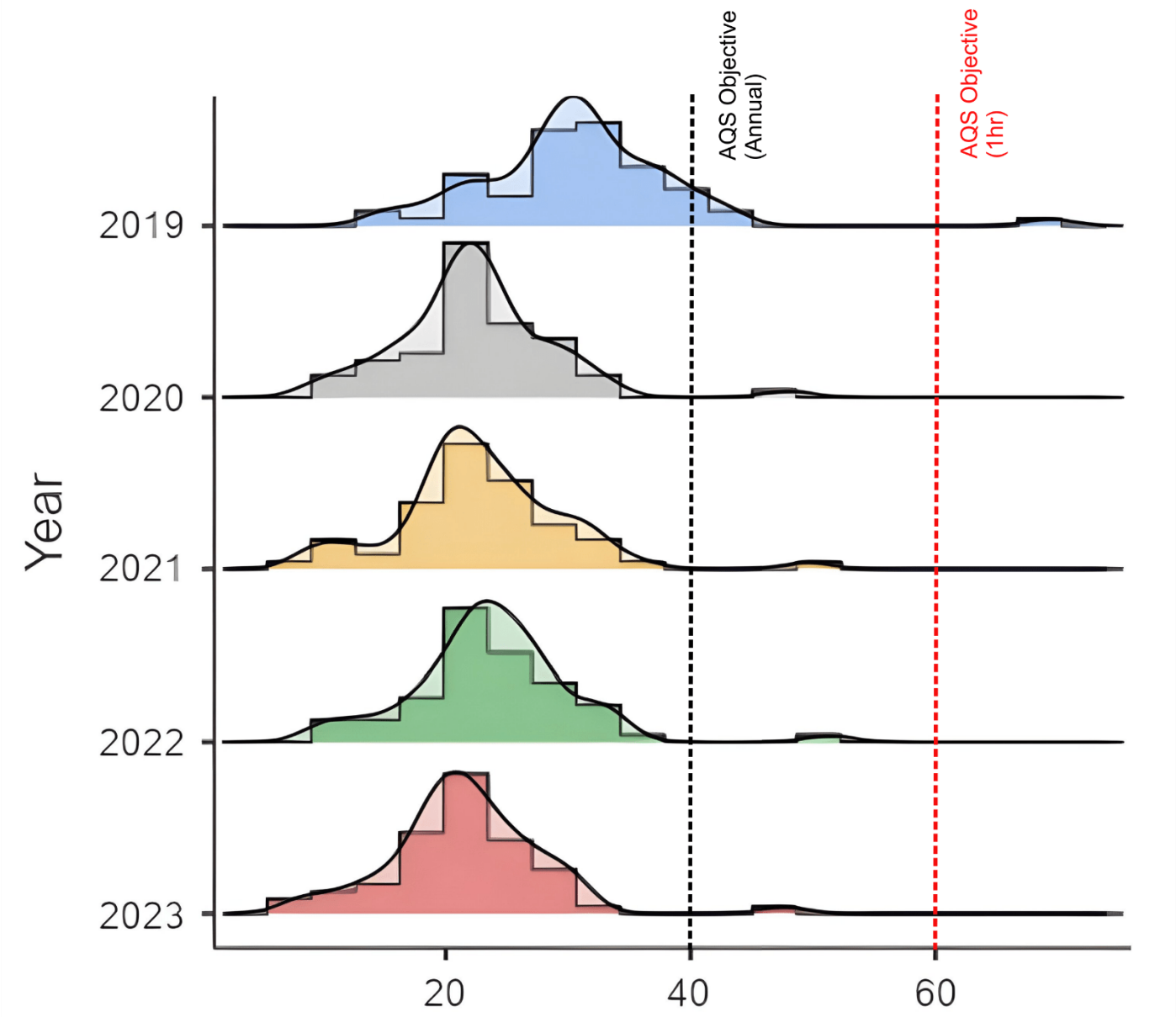


Figure A.2 – Histogram / Density Plots and Descriptive Statistics comparing the distribution of annual mean NO_2 concentrations at all diffusion tube sites in operation at unchanged locations for each of the last five years



Across the council, LLAOL and Luton Rising monitoring programmes, a total of 57 sites have been in operation at the same location for each of the last five years.

Descriptive Statistics

Mean

- 2019 30.8 µg/m^3
- 2020 22.4 µg/m^3
- 2021 23.0 µg/m^3
- 2022 23.8 µg/m^3
- 2023 21.7 µg/m^3

Median

- 2019 30.8 µg/m^3
- 2020 21.9 µg/m^3
- 2021 22.3 µg/m^3
- 2022 23.2 µg/m^3
- 2023 21.3 µg/m^3

Standard deviation

- 2019 8.33 µg/m^3
- 2020 6.33 µg/m^3
- 2021 6.91 µg/m^3
- 2022 6.73 µg/m^3
- 2023 6.36 µg/m^3

Range

- 2019 54.9 µg/m^3
- 2020 38.8 µg/m^3
- 2021 40.9 µg/m^3
- 2022 41.5 µg/m^3
- 2023 39.5 µg/m^3

Minimum

- 2019 14.5 µg/m^3
- 2020 9.20 µg/m^3
- 2021 8.80 µg/m^3
- 2022 9.90 µg/m^3
- 2023 8.10 µg/m^3

Maximum

- 2019 69.4 µg/m^3
- 2020 48.0 µg/m^3
- 2021 49.7 µg/m^3
- 2022 51.4 µg/m^3
- 2023 47.6 µg/m^3

Figure A.3 – Average annual concentration obtained across all Luton urban background and roadside sites between 2016 and 2023 with the corresponding UK figures (95% CI)[3]

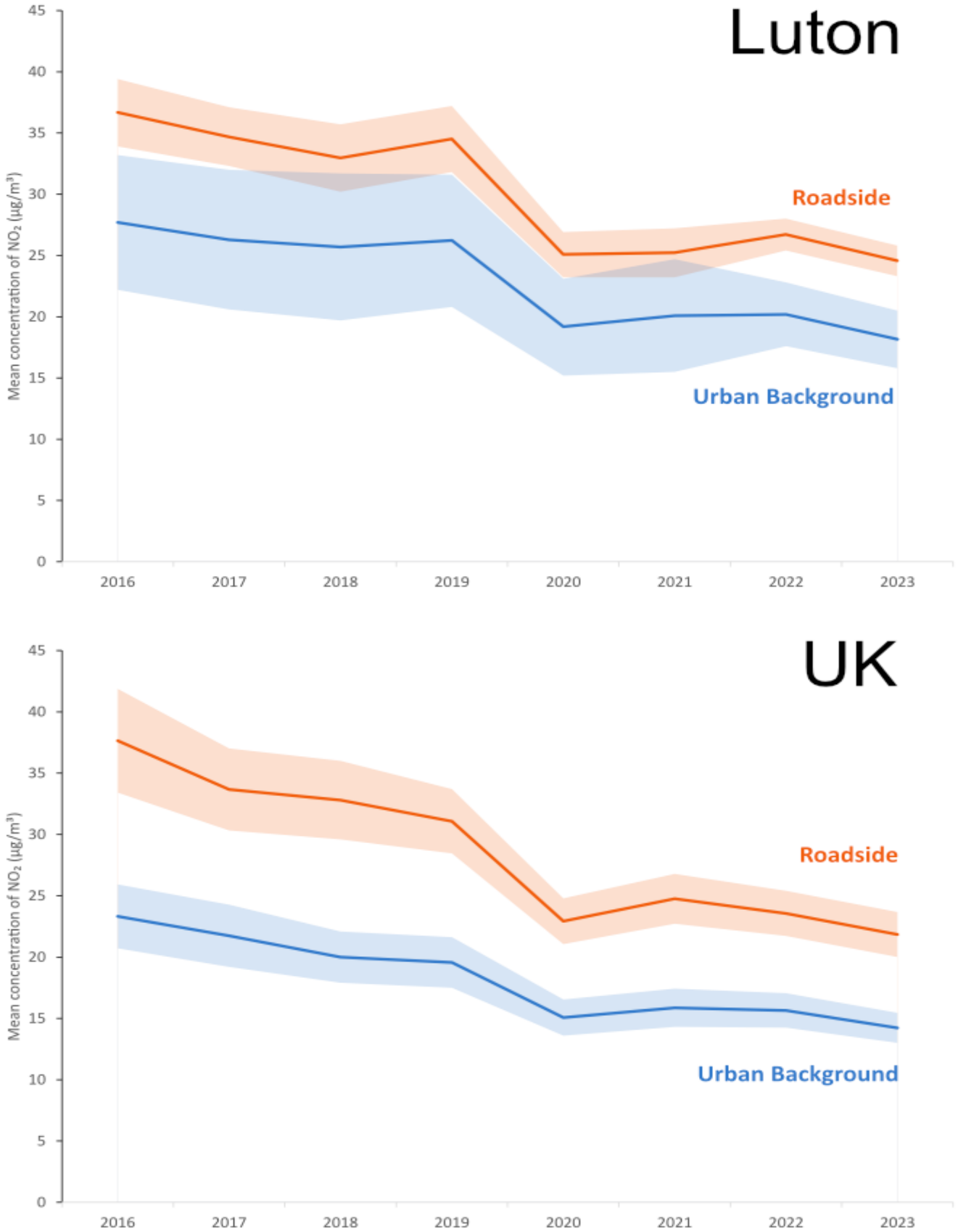


Figure A.4 – Threshold Value Charts; annual mean NO_2 at AQMA N°. 1 passive sites relative to 36µg/m^3 threshold

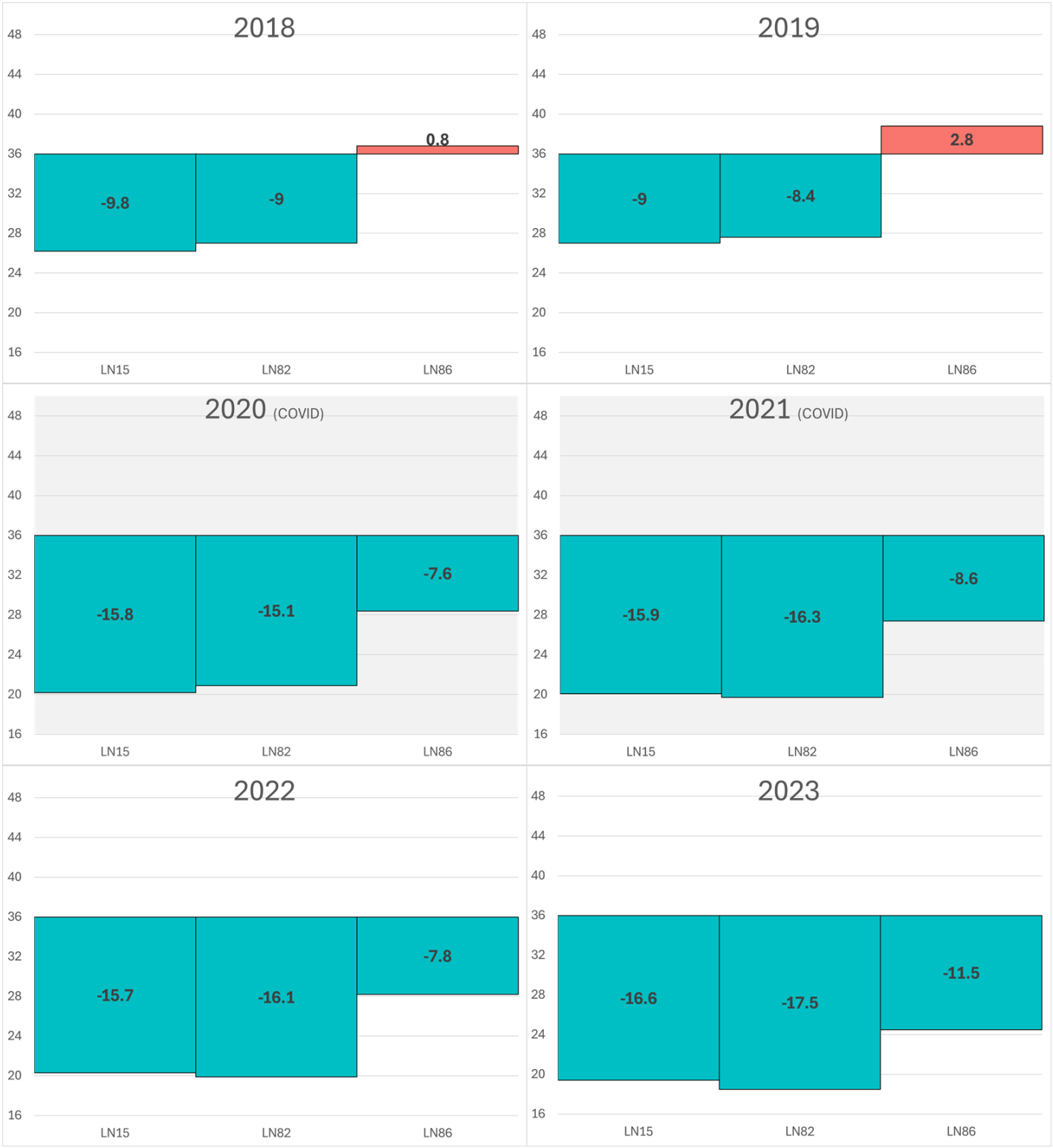


Figure A.5 – Threshold Value Charts; annual mean NO_2 at AQMA N°. 2 passive sites relative to 36µg/m^3 threshold

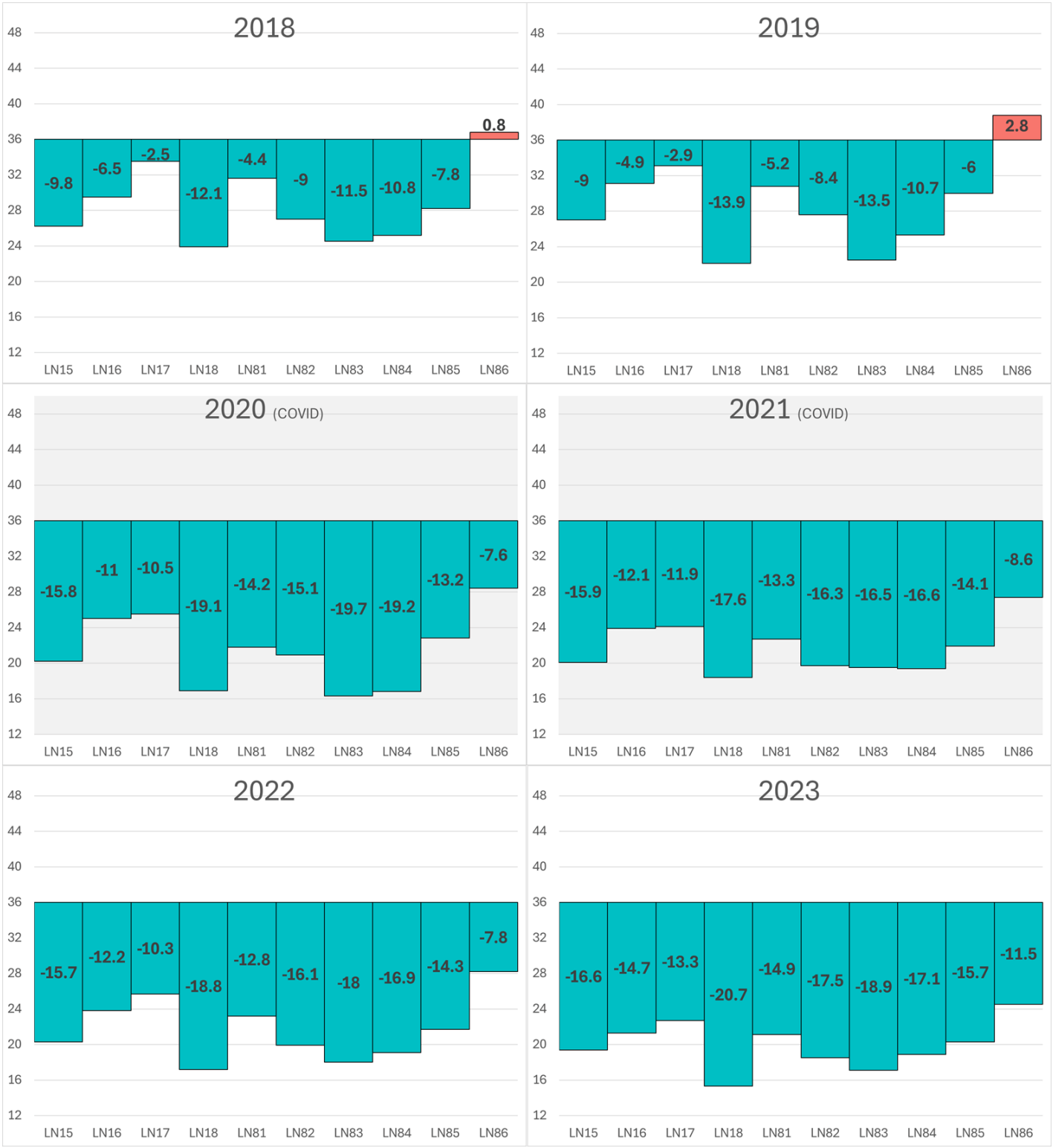


Figure A.6 – Threshold Value Charts; annual mean NO_2 at AQMA N$^{o.}$ 3 passive sites relative to 36µg/m^3 threshold

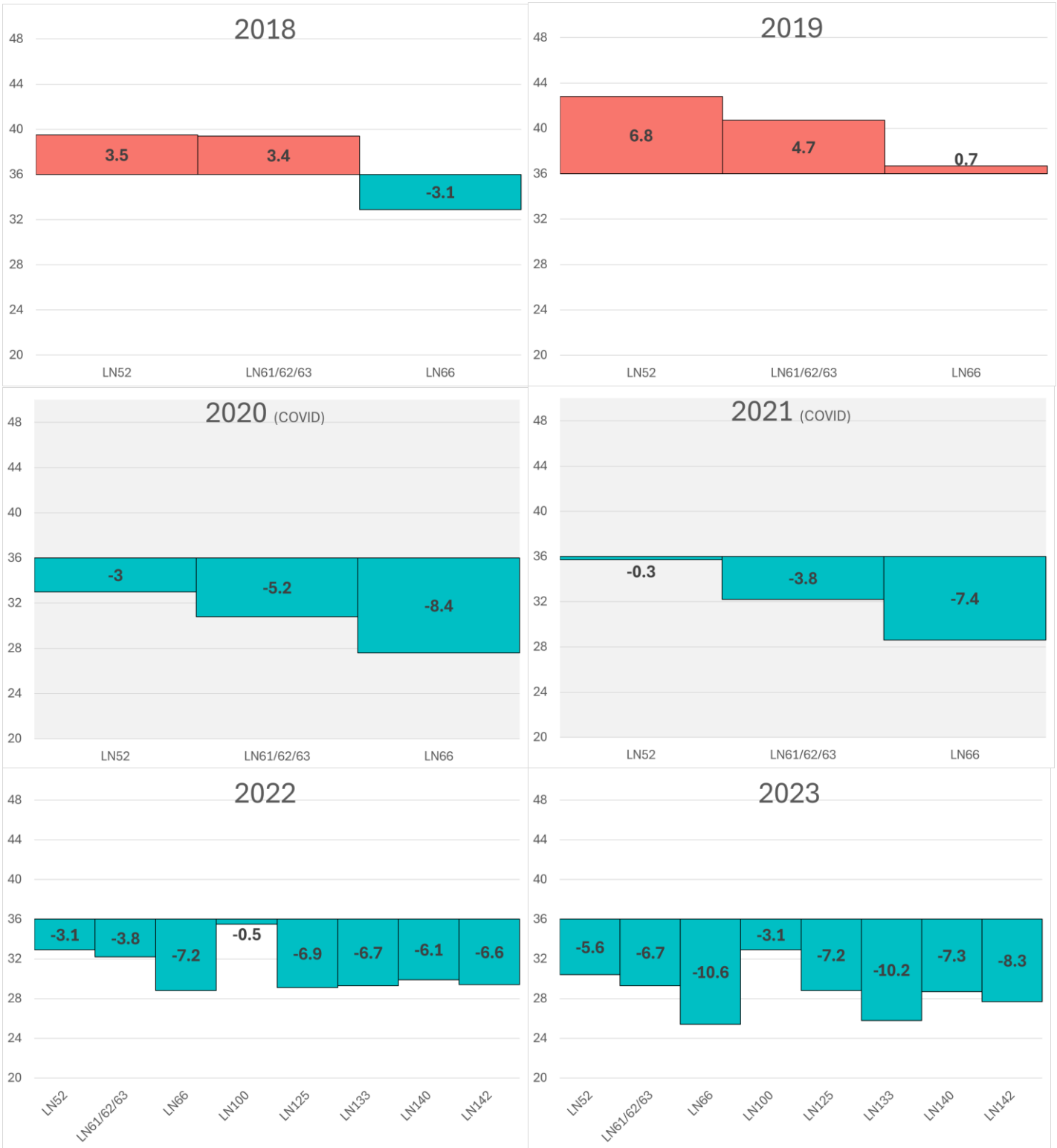


Figure A.7 – Threshold Value Charts; annual mean NO_2 at passive sites in area of potential AQMA N$^{o.}$ 3 expansion relative to 36µg/m^3 threshold

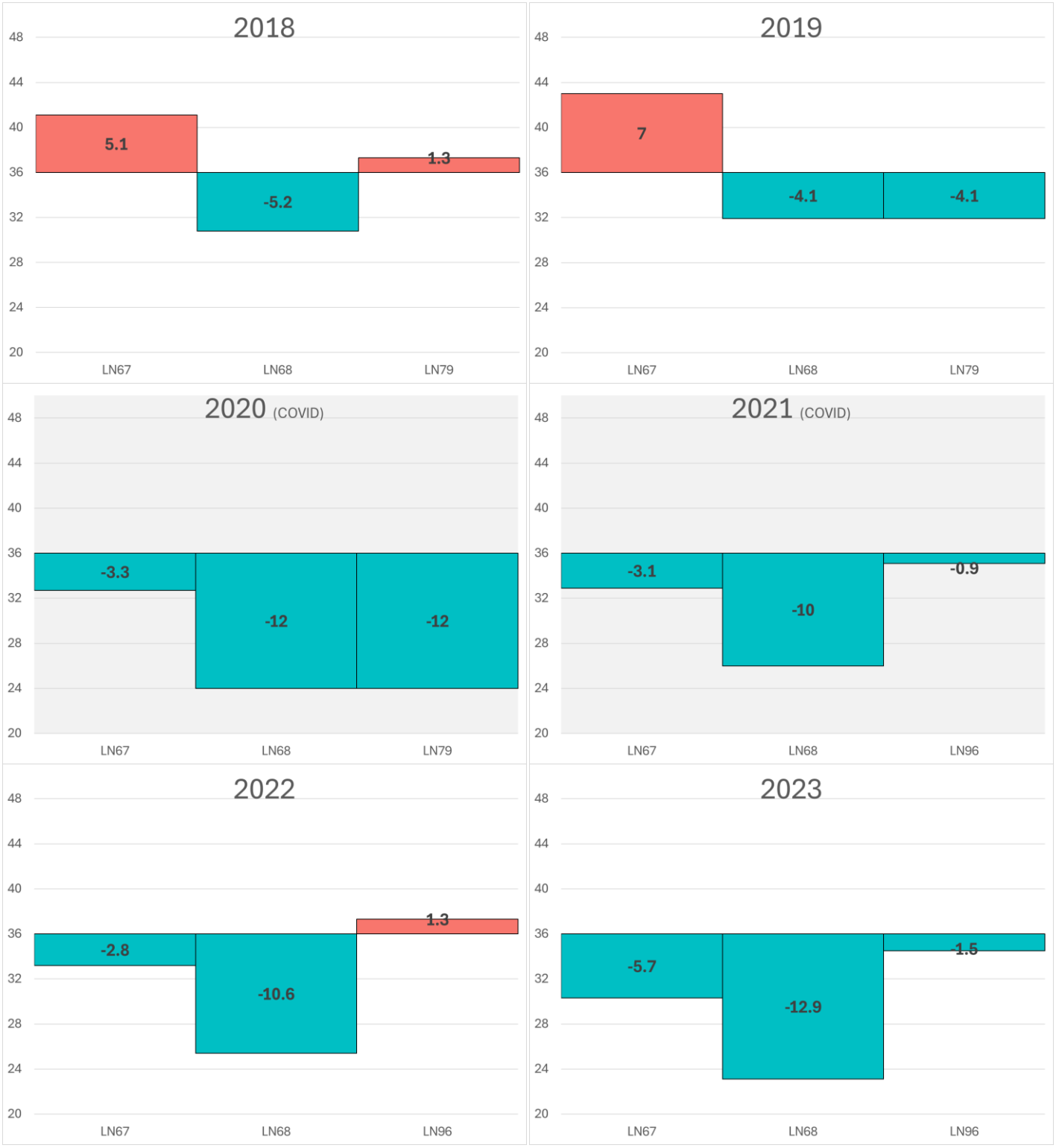


Figure A.8 – Threshold Value Chart; annual mean NO_2 at LN60/HB007 (AQMA No. 3 automatic site) relative to 40µg/m^3 air quality objective

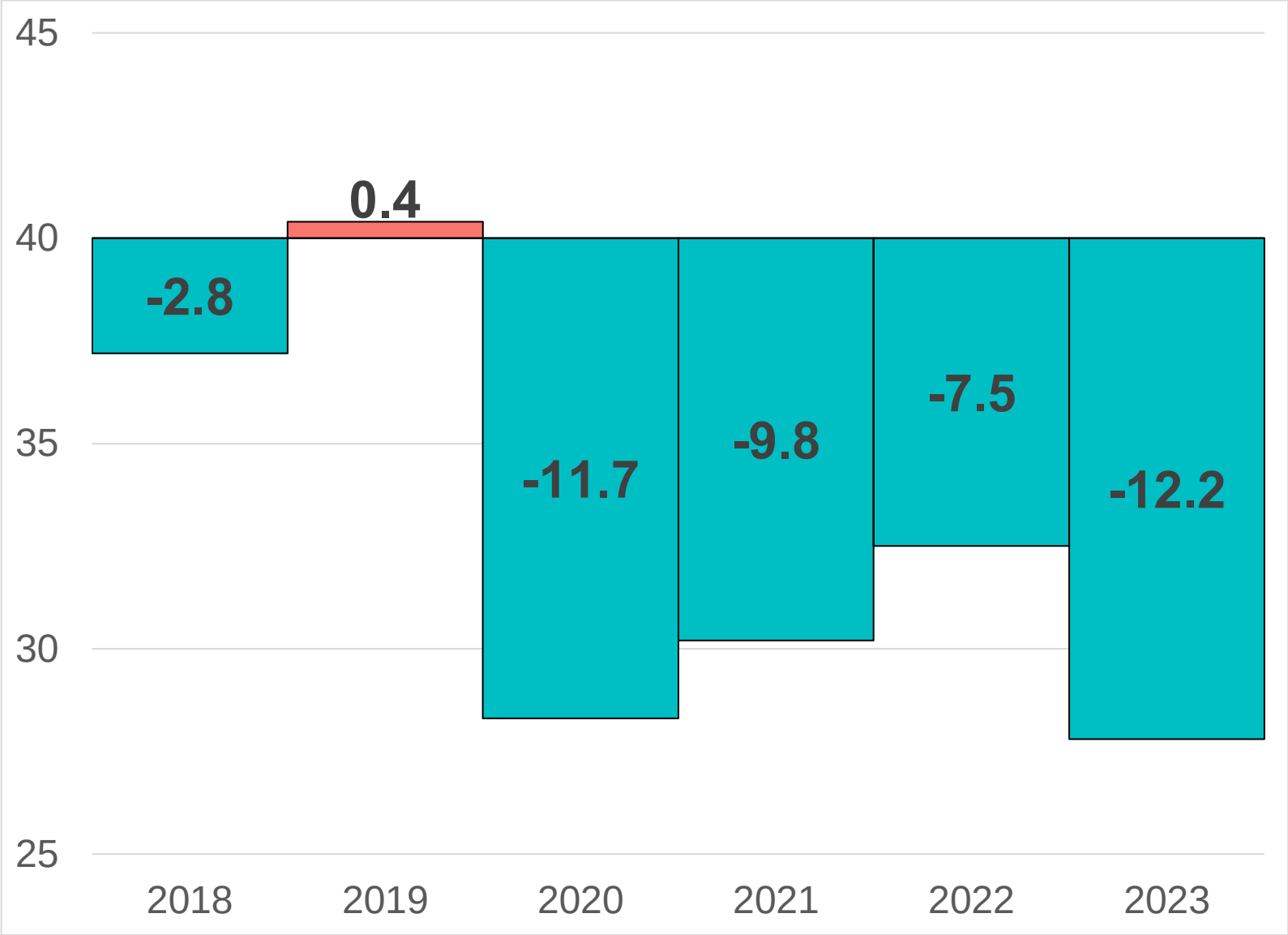


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
LN60 (HB007)	508708	221352	Roadside	99.7	99.7	0	0 (114.0)	0	0	0
LA001	512578	222204	Other	96.6	96.6	0 (65.4)	0	0	0	0
LUTR (UKA00605)	505927	222644	Roadside	99.1	99.1	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

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

Figure A.9 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

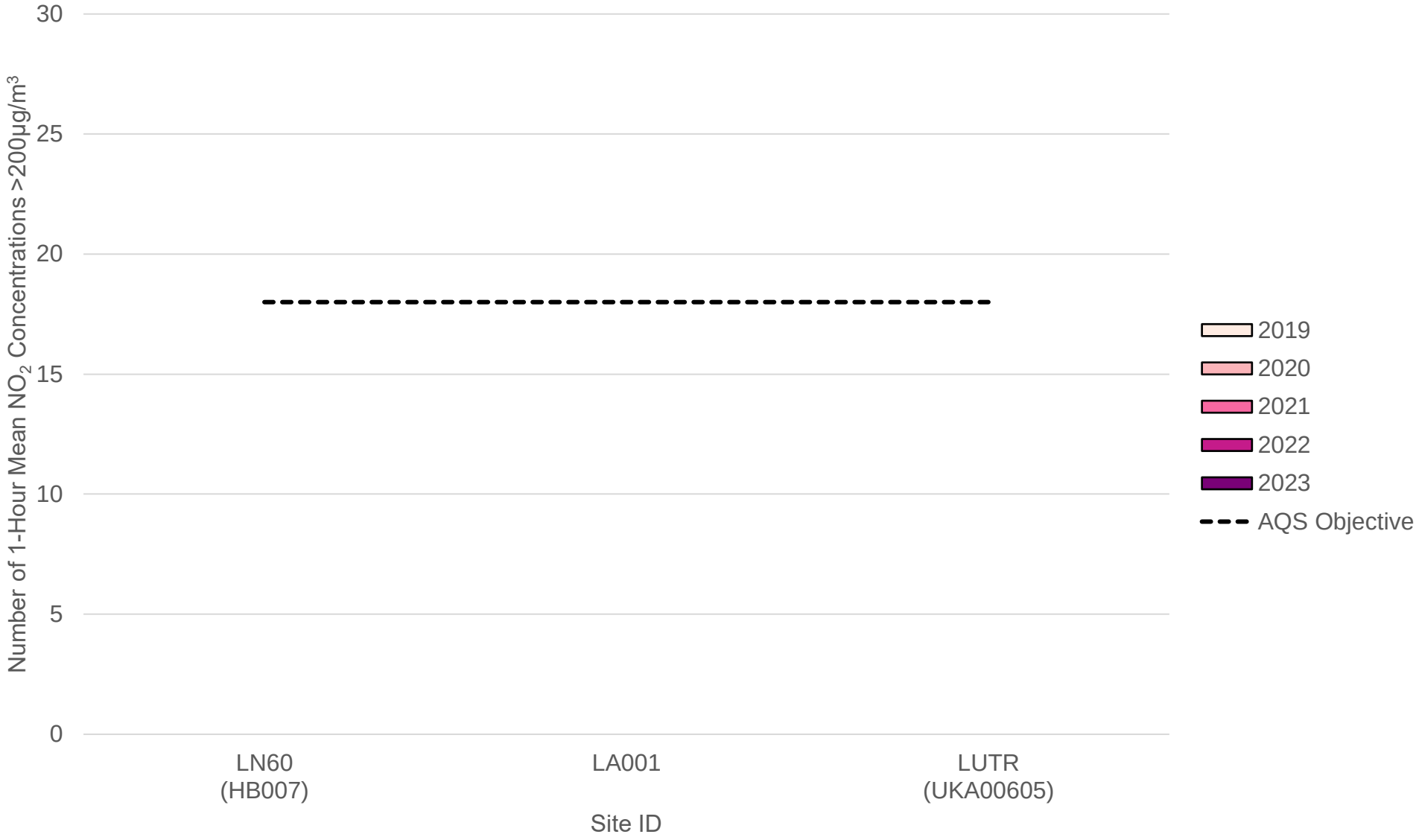


Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
LN60 (HB007)	508708	221352	Roadside	99.0	99.0	15.8	13.8	15.0	15.1	15.0
LA08 (HB006)	511868	221144	Other	77.0	77.0	16.3	13.7	12.3	15.0	14.3
LA001	512578	222204	Other	56.4	56.4	13.5	11.7	10.3	9.3	9.0

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

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**.

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.

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

Figure A.10 – Trends in Annual Mean PM_{10} Concentrations

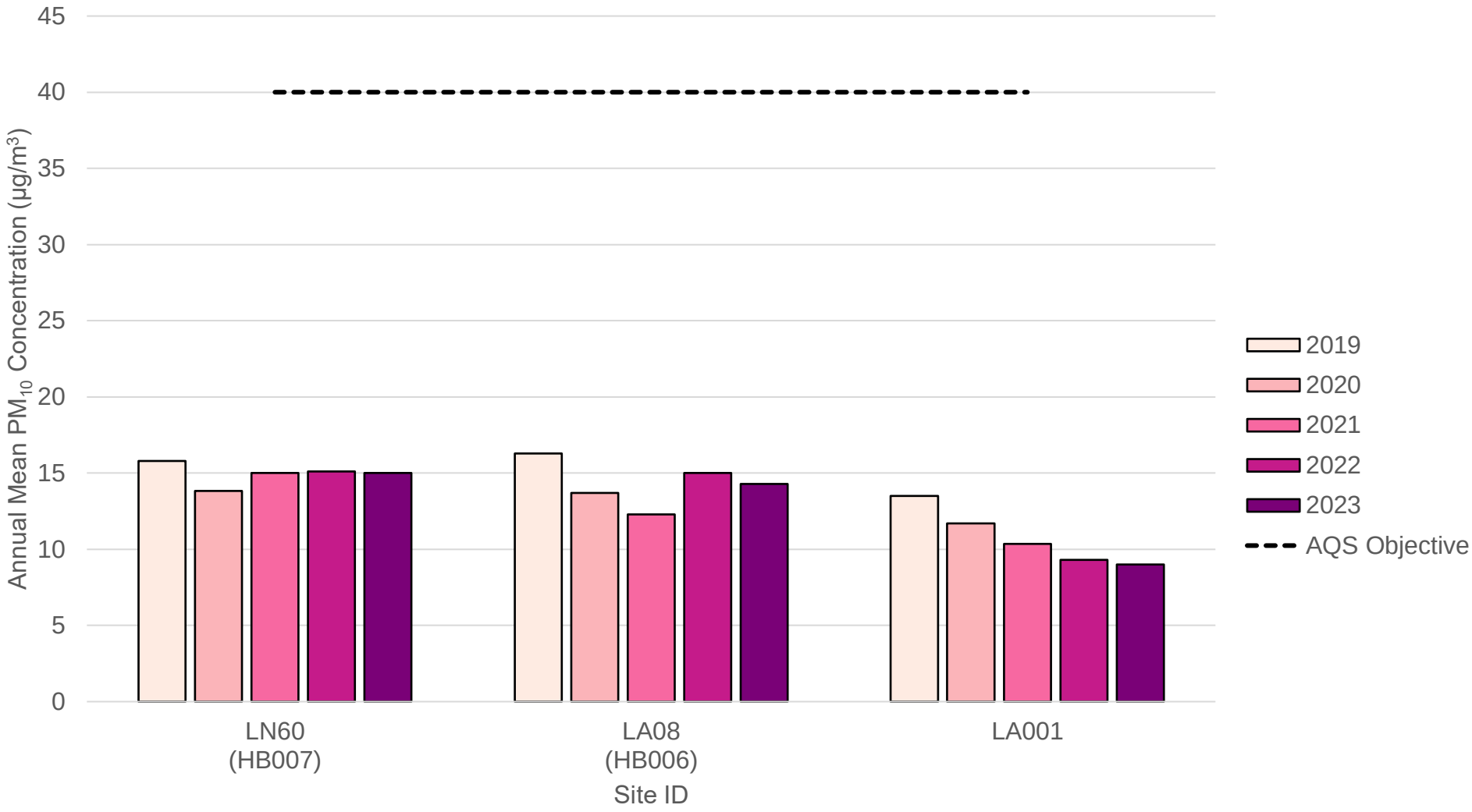


Figure A.11 – Annual mean PM_{10} concentrations measured at automatic sites within Luton between 2016 and 2023 with corresponding mean figures for UK roadside and urban background sites (95% CI)[4]

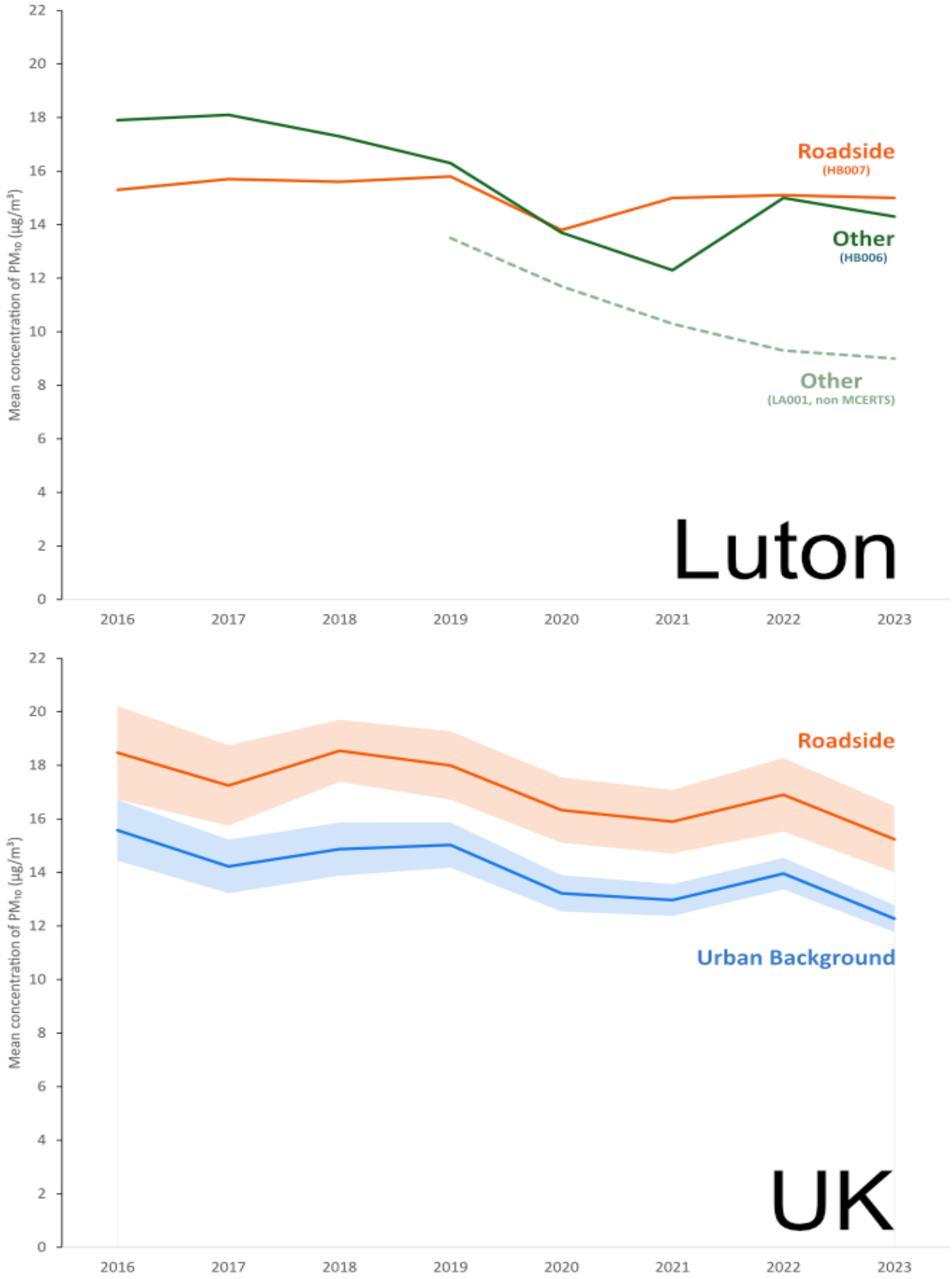


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
LN60 (HB007)	508708	221352	Roadside	99.0	99.0	8	0	2	3	4
LA08 (HB006)	511868	221144	Other	77.0	77.0	1	0	0	0	0 (20.6)
LA001	512578	222204	Other	56.4	56.4	0 (19.6)	1 (20.9)	0	0	0 (14.1)

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

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

Figure A.12 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

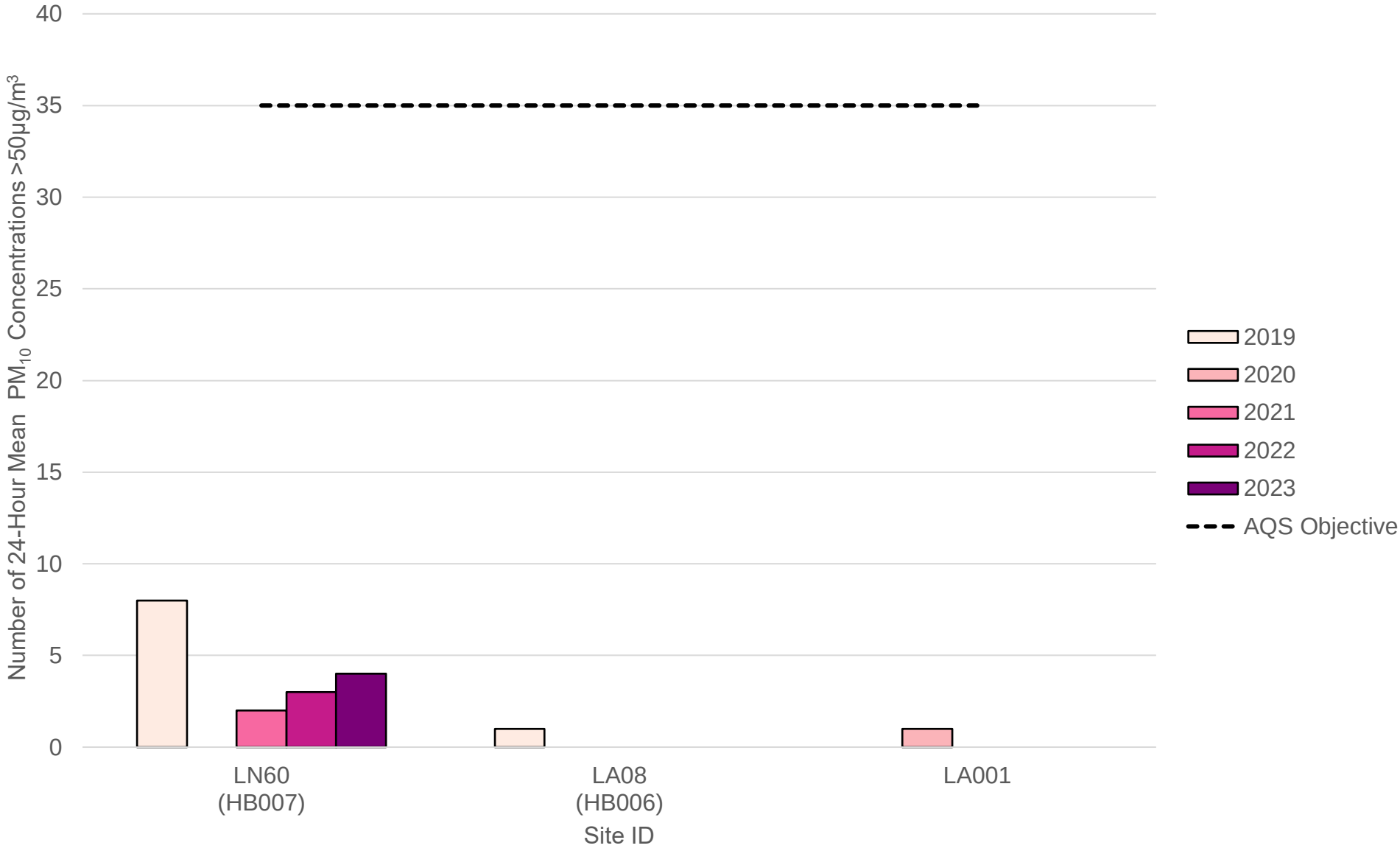


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
LN60 (HB007)	508708	221352	Roadside	99.0	99.0	10.0	8.3	9.2	9.1	8.7
LA001	512578	222204	Other	56.4	56.4	11.6	10.1	9.4	8.4	8.0

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

Notes:

The annual mean concentrations are presented as µg/m^3.

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.

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

Figure A.13 – Trends in Annual Mean $PM_{2.5}$ Concentrations

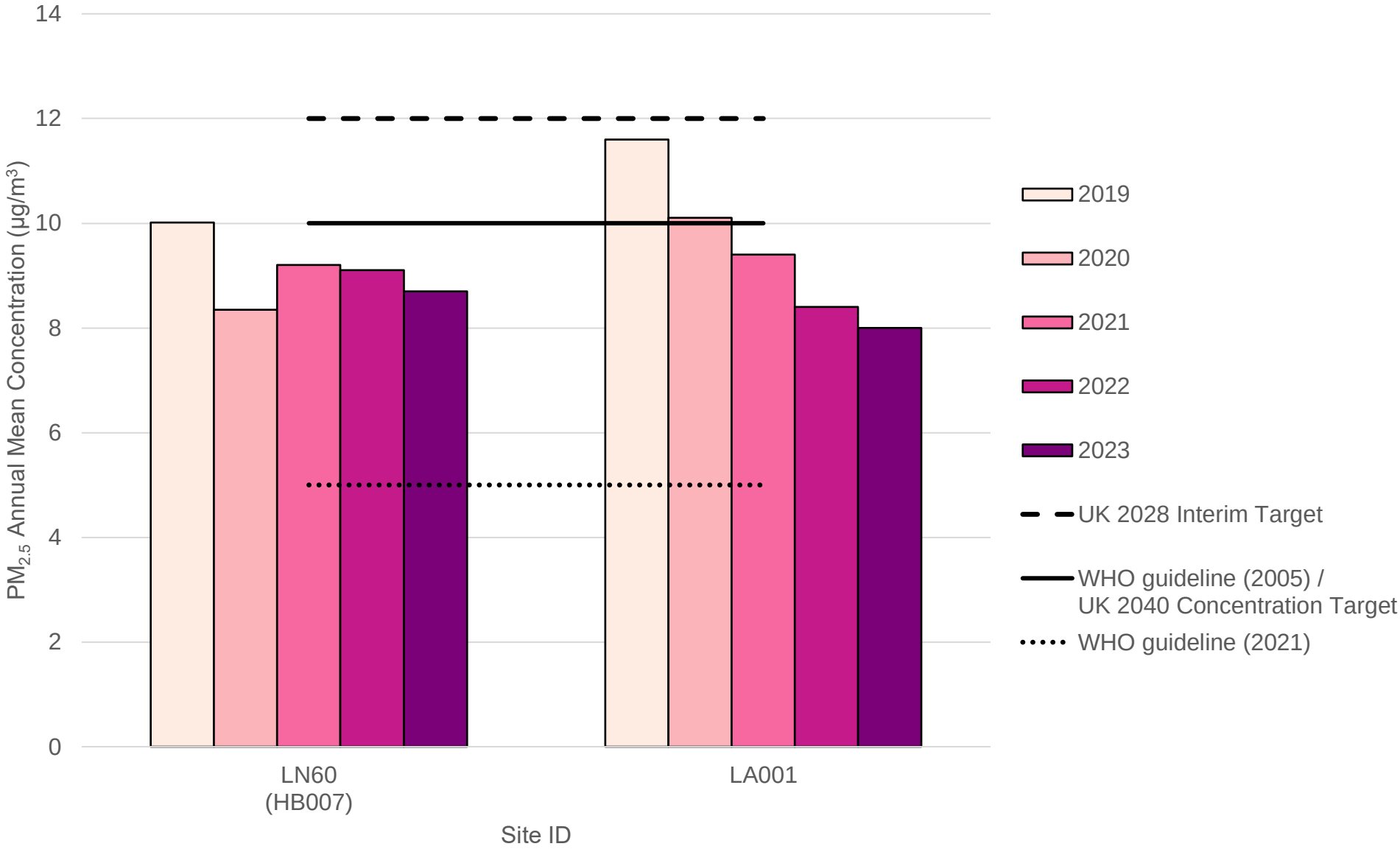


Figure A.14 – Annual mean $PM_{2.5}$ concentrations measured at automatic sites within Luton between 2016 and 2023 with corresponding mean figures for UK roadside and urban background sites (95% CI)[4]

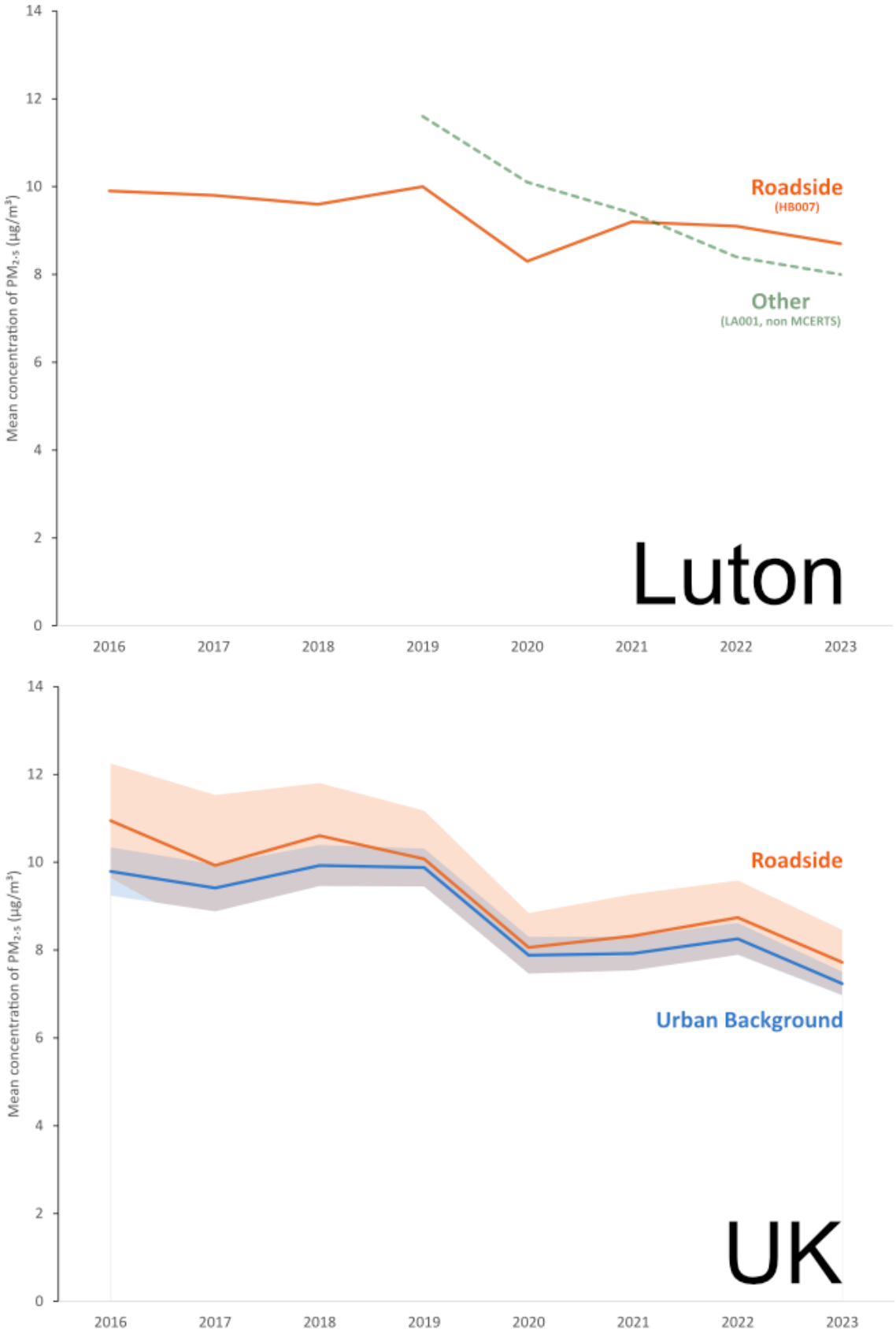


Table A.9 – SO_2 2023 Monitoring Results, Number of Relevant Instances

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	Number of 15-minute Means > 266µg/m³	Number of 1-hour Means > 350µg/m³	Number of 24-hour Means > 125µg/m³
LA001	512578	222204	Other	96.1	96.1	0	0	0

Notes:

Results are presented as the number of instances where monitored concentrations are greater than the objective concentration.

Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year).

If the period of valid data is less than 85%, the relevant percentiles are provided in brackets.

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

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO_2 2023 Diffusion Tube Results ($\mu g/m^3$)

a) Luton Council sites

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Simple Annual Mean: Raw Data	Simple Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LN07	509227	221455	31.6	30.9	21.6	21.7	18.8	18.1	16.7	21.4	23.4	26.6		20.8	22.9	18.5	-	
LN11	508910	221321	42.6	42.0	31.6	32.3	33.0	27.0	22.1	27.3	32.8	35.9	35.8	28.9	32.6	26.4	-	
LN15	505557	222325	30.5	29.4	22.2	21.1	15.5	15.6	18.1	19.6	47.0	23.5	25.1	20.6	24.0	19.4	-	
LN16	505492	222607	34.8	36.7	27.0	25.0	20.3	17.1	23.4	23.4	25.5	26.7	29.8	25.3	26.3	21.3	-	
LN17	505324	222812	31.9	35.8	27.1	31.6	27.7	27.8	19.7	22.2	30.5	31.1	29.5	21.4	28.0	22.7	-	
LN18	505014	223538	23.5	26.0	20.2	20.6	19.3	16.4	11.0	14.9	17.8	20.0	21.1	15.8	18.9	15.3	-	
LN22	511341	221864	22.8	24.6	17.9	19.4	12.1	12.8	13.8	16.3	20.1	23.9		16.6	18.2	14.7	-	
LN23	511377	221814	35.7	35.5	29.5	29.9	23.2	26.6	28.3	30.6	40.1	39.1	34.1	27.9	31.7	25.7	-	
LN24	511902	222144	27.2	27.3	20.8	16.3	11.7	10.9	14.0	14.7	19.9	24.3	25.1	21.2	19.5	15.8	-	
LN25	511893	222068	32.4	33.5	26.2	24.1	18.3	21.2	22.1	22.9	30.6	32.5	30.9	25.8	26.7	21.6	-	
LN26	512109	222234	22.0	21.4	17.9	23.1	11.1	10.7	12.1	14.9	19.2	21.7	20.9	15.4	17.5	14.2	-	
LN27	512134	222198	31.1	28.6	24.1	14.9	17.6	21.2	22.9	23.8	30.7	31.0	28.6	23.8	24.9	20.1	-	
LN28	507798	219832	35.3	38.3	31.0	30.9	24.6	28.2	30.9	33.2	37.3		36.3	31.9	32.5	26.4	-	
LN52	508689	221379	39.4	43.3	37.7	42.7	45.1	40.4	24.6		39.3		36.5	26.0	37.5	30.4	-	
LN53	507717	219923	28.3	30.2	22.6	22.1	16.8	15.3	18.4	21.8	24.9	26.0	27.1	21.0	22.9	18.5	-	
LN54	507712	219915		32.3	24.1	22.6		17.7	22.7	24.8		29.4	30.6		25.5	20.8	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Simple Annual Mean: Raw Data	Simple Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LN55	507732	219886	29.3	29.6	23.0	23.2		17.2	19.6	22.7	20.2		26.6	19.3	23.1	18.7	-	
LN56	507747	219894	28.3	28.9	22.1		15.8	15.9	17.8	20.4	22.5	24.9	26.4	19.5	22.0	17.8	-	
LN61	508708	221352	43.4	44.3	35.9	36.6	34.9	33.6	29.4	33.6	38.2	36.9	35.3	28.6	35.9	-	-	Triplicate Site with LN61, LN62 and LN63 - Annual data provided for LN63 only
LN62	508708	221352	44.4	45.2	34.1	37.7	33.1	32.0	26.9	34.5	38.6	40.3	38.2	28.1	36.1	-	-	Triplicate Site with LN61, LN62 and LN63 - Annual data provided for LN63 only
LN63	508708	221352	46.2	44.2	34.1	37.4	37.0	30.4	28.1	32.6	40.9	38.9	38.1	28.7	36.4	29.3	-	Triplicate Site with LN61, LN62 and LN63 - Annual data provided for LN63 only
LN64	509563	220952	31.5	33.0	25.7	26.2		21.3			28.2				27.7	20.5	-	
LN65	509486	220865	28.4	27.8	20.1	21.7	22.1	19.3	27.1	18.4	19.4	22.3	26.1	14.7	22.3	18.1	-	
LN66	509288	220925	42.9	40.0	29.6	29.1	25.9	29.0	13.0	28.9	33.6	34.7	37.1	33.1	31.4	25.4	-	
LN67	509083	220709		42.9	36.3	42.6	36.9	35.2	28.4	36.5	44.3	43.7	36.0	29.2	37.4	30.3	-	
LN68	508969	220487		37.2		27.1	24.9	25.9	25.4	26.2		31.7	31.8	27.0	28.6	23.1	-	
LN69	509326	221357	33.2	36.0	26.3	29.3	23.7	23.7	21.1	25.8	32.2	31.7	31.0	25.3	28.3	22.9	-	
LN70	509813	221161	34.0	31.2	26.7	29.3	22.4	24.7	22.9	26.8	32.1	31.3	29.9	25.6	28.1	22.7	-	
LN71	509549	221623	32.1	35.7	26.2	26.8	25.2	25.4	21.0	24.1	28.7	28.1	28.8	22.0	27.0	21.9	-	
LN72	508937	221745	34.8	33.5	26.1	26.4	21.4	21.4	22.2	23.8	30.6	29.6	31.5	24.8	27.2	22.0	-	
LN73	508959	221633	37.1	39.8	34.8	34.6	26.9	28.5	30.7	34.5	40.9	39.2	36.9		34.9	28.3	-	
LN74	508165	222002	39.4	38.0	33.4	35.5	26.9	28.6	28.9	34.3	37.1		33.7	30.6	33.3	27.0	-	
LN75	508745	222122	41.6	41.7	35.5	37.1		32.0	28.7	33.4	41.3	38.3	36.8	29.0	35.9	29.1	-	
LN76	507574	222948	34.5	37.5	30.2	33.7	30.4	28.2	20.4	24.6	30.3	29.8	30.5	23.1	29.4	23.8	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Simple Annual Mean: Raw Data	Simple Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LN77	506496	224018	37.6	37.2	30.8	33.4	25.3	24.5	27.5	29.3	36.0	35.7	32.9	28.3	31.5	25.6	-	
LN78	509109	220676	36.1		26.4	26.6	21.8	20.0	19.8	23.2	26.2	29.5		23.6	25.3	20.5	-	
LN80	509038	220719	30.9	34.4	29.3	32.2	27.6	26.0	18.4	25.4	30.2		29.5	19.9	27.6	22.4	-	
LN81	505034	223729	34.4	32.8	26.8	22.9	17.1	17.3	23.3	24.5	27.3	28.4	29.9	27.5	26.0	21.1	-	
LN82	504828	223999	30.4	30.1	21.6	21.0	14.9	15.6		21.3	23.2	24.2	27.3	21.6	22.8	18.5	-	
LN83	505116	223467	24.0	25.1	21.6	23.4	22.1	20.3	11.5					16.5	20.6	17.1	-	
LN84	505230	223304	27.5	29.5	22.5	26.5	36.5	22.6	11.7	17.5	20.5	22.5	25.3	17.0	23.3	18.9	-	
LN85	505481	222545	31.1	33.8	26.4	23.5	17.8	18.1	22.8	22.9	25.4	27.2	28.9	22.9	25.1	20.3	-	
LN86	505586	222235	38.2	37.5	29.9	32.7	23.9	22.3	25.4	27.8	31.9	32.2	33.4	28.0	30.3	24.5	-	
LN87	510170	223162	27.8	27.8	20.9		15.5	13.3	15.0	16.9	20.6	22.1	25.3		20.5	16.6	-	
LN88	510107	223087	31.0	31.7	25.3	22.1	20.0	19.9	18.5	20.8	24.8	27.0	26.6	23.2	24.2	19.6	-	
LN89	510515	222612	28.5	29.5	20.8	21.4	16.4	15.9	12.9	19.3	22.1	23.7	25.7	17.6	21.2	17.1	-	
LN90	510846	222209	30.4	31.0	24.4	25.0	21.8	20.6	18.5	22.7	26.4	25.9	27.2	19.9	24.5	19.8	-	
LN91	511122	221721	26.8	27.5	20.8	21.6		17.3	18.5	21.0	27.0	26.8		19.3	22.6	18.3	-	
LN92	511037	221657	24.6	27.4	21.3	21.4	15.0	16.2	13.2	18.2	23.3	23.6	23.8	15.7	20.3	16.5	-	
LN93	511332	223069	19.3	19.9	13.5	12.4	9.8	9.1	8.2	10.2	13.3	15.8	19.1	12.2	13.6	11.0	-	
LN94	511327	222588	22.7	23.4	15.7		9.5	9.5	10.5	11.5	16.2	19.1	21.7	15.9	16.0	12.9	-	
LN95	511996	222534	24.0	25.3		13.5			11.9	12.9	18.2		22.6	17.9	18.3	14.1	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Simple Annual Mean: Raw Data	Simple Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LN96	509059	220656	40.4	75.3	40.2	44.1	38.8	39.3	31.1	39.7	49.7	45.9	37.7	28.4	42.6	34.5	-	
LN98	506411	222554	35.7	36.9	31.6	39.1	34.5		20.7	23.0	33.7	31.2	30.9	24.9	31.1	25.2	-	
LN100	508380	221764	50.6	46.5	40.1	38.4	30.2	31.7	36.1	39.8	45.1	45.5	43.6	39.6	**40.6**	32.9	-	
LN102	508000	222078	34.3		26.2	34.1	23.4	24.1	22.6		30.8	32.7	31.3	26.1	28.6	23.1	-	
LN104	504987	222805	40.8	38.5		39.5	33.6	34.3							37.3	28.7	-	
LN106	509339	222128	27.0	26.6	20.6	18.4	12.8		15.2	16.7	21.0	23.8		20.0	20.2	16.4	-	
LN107	511573	221897		26.4	21.4	21.7	13.7	15.0	17.9	19.3	25.6	27.1	27.0	20.3	21.4	17.3	-	
LN108	512473	222295	26.4	26.1	21.2	15.2	10.5	10.2	15.5	15.6	20.4		24.6	21.2	18.8	15.2	-	
LN109	512915	222308	20.6	20.2	15.7	10.9	7.8	7.8	11.6	11.7	15.1	17.4	19.1	16.6	14.5	11.8	-	
LN110	512738	222385	24.6	23.4	17.6	14.6		11.2	14.5	13.3	17.9	21.5		31.9	19.1	15.4	-	
LN111	511521	222203	24.8	26.8	18.8	17.8	12.1	10.8	11.8	14.5	18.1	21.4	24.6	16.5	18.2	14.7	-	
LN112	511254	221466	23.1	22.9	17.9	17.2	11.8	12.9	13.4	16.2	17.9	22.0	21.1	13.5	17.5	14.2	-	
LN113	505005	222696	32.3	35.8	26.6	29.3	25.9	27.8	22.3	23.2	28.0	29.4	29.7	20.7	27.6	22.3	-	
LN114	509293	223741	22.2	20.5	14.8	11.7	8.8	7.9	8.4	10.4	13.7	15.5	18.8	13.7	13.9	11.2	-	
LN115	509995	220892	29.6	34.4	26.1	30.8	29.5	25.2	16.5	23.9	27.1	28.6	28.2	16.6	26.4	21.4	-	
LN116	509655	221842		49.7	40.7		41.5	41.6	40.2	37.6		45.5	39.5		**42.1**	35.2	-	
LN117	509136	223217	36.8	40.7	29.5	34.8	33.7	33.6	24.2	27.9	30.6	31.1	32.7	25.3	31.7	25.7	-	
LN118	506407	222732	31.9	30.1	23.4	22.4	17.2	17.0	19.0	21.2	27.2	27.7	26.6	22.9	23.9	19.3	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Simple Annual Mean: Raw Data	Simple Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LN119	505588	222871	27.9	30.0	21.0	19.9	13.5	15.1	16.6	17.5	21.4	24.3	25.3	21.2	21.1	17.1	-	
LN120	505723	223787	32.1	36.1	25.7	30.9	24.8	25.0	17.7	23.6	29.6	31.0	26.6	23.4	27.2	22.0	-	
LN121	506990	223425	31.5	29.8	23.2	20.6	16.0		21.1	23.6	28.0	26.7	27.9	22.7	24.6	19.9	-	
LN122	506918	223295	30.4	33.1	22.7	27.7	25.8		18.2	21.8	24.9	27.4	27.2	20.9	25.5	20.6	-	
LN123	508413	221918	40.7	39.3	31.0	36.2	32.0	30.7	24.1	29.7	35.1	35.9	35.3	27.5	33.1	26.8	-	
LN124	508253	222053	31.3	34.1	24.7	27.8	22.2	20.6	19.5	23.2	28.6	29.3	29.5	23.1	26.2	21.2	-	
LN125	508321	221839	75.1	37.4		32.6	24.9	26.0	27.4	31.9	36.2	36.3	33.6	30.0	35.6	28.8	-	
LN126	508140	222103	37.3	37.6	30.9	36.7	33.1	31.2	23.9	28.2	34.8	34.2	33.2	25.9	32.2	26.1	-	
LN127	508095	222127	32.9	33.7	26.0	33.4	24.9	23.8		27.2	32.2	30.6	30.2	27.0	29.3	23.7	-	
LN128	508065	222182	34.1	38.6	32.4	37.0	35.0	30.9	22.3	25.2	32.8	32.8	33.2	25.2	31.6	25.6	-	
LN129	507973	222289		38.5	28.0	35.4	27.0	26.2	25.4	30.0	32.6	32.9	33.8	29.3	30.8	25.0	-	
LN130	507918	222560	34.3	35.0	27.4	33.2	27.4	27.1	19.5	25.2	30.6	30.2	30.4	21.3	28.5	23.0	-	
LN131	507666	222143	32.1	33.1	26.1	28.0	22.5	20.6	20.1	25.0	28.0	30.3	29.0	24.2	26.6	21.5	-	
LN132	507228	222511	57.7	67.4	36.6	28.6	22.9	20.3	22.2	23.8	29.3	36.5	48.5	39.1	36.1	29.2	-	
LN133	508381	221795	31.5	37.6	33.3	37.5			22.6	30.3	35.3	33.6	31.9	24.6	31.8	25.8	-	
LN134	508156	222053	44.4	43.2	36.7	40.0	28.6		33.7	37.1	40.6	42.4	39.5	36.4	38.4	31.1	-	
LN135	508136	222040	36.7	41.7	32.4	38.3	35.0	33.8	21.6	29.4	33.1	34.1	33.2	26.1	33.0	26.7	-	
LN136	508059	222080	33.0	37.1	29.7	28.8			19.7	26.6	31.7	32.0	31.5	24.0	29.4	23.8	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Simple Annual Mean: Raw Data	Simple Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LN137	507948	222337	33.1	36.2	29.0	34.8	31.2	26.8	19.3	26.3	30.3	29.6	30.3	21.7	29.0	23.5	-	
LN138	508021	222248	35.4	39.1	32.8	41.5	35.6	33.5	22.0	29.7	35.6	34.5	32.9	25.2	33.2	26.9	-	
LN139	508270	221939	39.5	40.1	36.0	45.1	41.7	38.3	26.2	35.2	37.0	36.9	33.7	28.3	36.5	29.6	-	
LN140	508279	221903	43.3	40.4	32.0	37.4	29.7	31.3	30.4	34.6	36.7	36.8	37.5	35.0	35.4	28.7	-	
LN141	508450	221790	38.3	36.4	24.6	27.4	21.4	21.2	19.1	24.3	27.6	30.1	27.5		27.1	21.9	-	
LN142	508751	221714	39.9	40.1	33.0	35.8	28.8	31.6	27.9	31.5	38.5	38.6	34.1	31.0	34.2	27.7	-	
LN143	504993	222790								29.6	38.1	35.8	34.9	27.5	33.2	26.8	-	

☒ **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.**

☒ **Luton 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.

b) LLAOL sites

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Time Weighted Annual Mean: Raw Data	Time Weighted Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LLA 1	511920	221334			42.0	39.8	40.2	37.7		29.5	39.5	35.1		29.2	36.6	31.2	-	
LLA 2	511586	220978		40.9	36.3	32.2	31.6	33.3	28.4	28.9	30.4			37.9	33.2	25.6	-	
LLA 3	511156	220437		31.2	19.0	18.3	19.2	15.0	12.1	15.9	16.6	19.8	22.7	13.3	18.4	14.2	-	
LLA 4	513634	221198		21.5	12.6	11.1	9.2	9.5	11.9	11.0	14.8	16.0	21.4	16.4	14.1	10.8	-	
LLA 5	511703	221320		57.4	50.9	41.1	46.7	42.0	35.4	42.2	46.5	50.0	26.8		43.5	33.5	-	
LLA 6	511645	221679		41.4	31.7	34.9	22.9	25.9	26.8	28.7	36.5	38.5	34.2	25.2	31.4	24.2	-	
LLA 7	512105	221168		54.4	46.4	47.4	41.6	41.4	46.5	55.5	54.4				48.4	**40.5**	-	
LLA 8	511871	221142		42.8	32.4	30.5	26.6	27.2	35.8	23.7	35.0	33.0	27.8	30.0	31.0	23.8	-	
LLA 9	517637	222554		11.7	7.9	6.3	5.7				1.9	12.4	13.2	8.6	8.6	6.2	-	
LLA 10	507623	217724		15.2	12.0	9.0	6.6	4.9	6.5	7.9	6.1	10.0	10.6	9.9	8.9	6.9	-	
LLA 11	513125	220664		23.8	14.3	10.8	11.6	8.8	8.8	13.4	11.3	14.3	14.7	12.5	13.1	10.1	-	
LLA 12	511861	221579		49.9	48.6	46.9	42.2	38.8	36.2	36.0	50.9	53.9	48.1	43.2	44.8	34.5	-	
LLA 13	511899	222051		35.7	26.7	22.5	17.1		16.3	19.3	24.7	32.4	27.5	15.4	23.7	18.3	-	
LLA 14	511954	221313		44.9	44.1	41.3	44.5		26.4	38.1	42.6			38.3	40.1	33.1	-	
LLA 15	511168	221706		40.1	28.9	32.1	25.4		28.6	32.1	35.4	37.2	31.6	25.3	31.6	24.3	-	
LLA 16	512275	221115		41.7	41.7	37.1	39.9	31.9	28.7	32.2	33.9	36.8	26.9	24.5	34.0	26.2	-	
LLA 17	509489	219237		32.8	30.8	29.3	29.5	27.0	28.6	25.4	31.8	38.7	35.0	24.0	30.2	23.2	-	
LLA 18	510779	220279		41.0	29.9	33.0	30.9	28.0	18.3	27.0	29.1	34.2	25.1	16.6	28.4	21.9	-	
LLA 19	515109	221933		19.4	11.2	8.5	6.3		10.0	7.7	7.8	12.2	12.1	11.8	10.6	8.2	-	

☒ **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.**

☒ **Luton 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.

c) Luton Rising sites

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Time Weighted Annual Mean: Raw Data	Time Weighted Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
L1(i)	508710	221353	46.8	41.4	37.0	38.5	35.4	32.2	28.9	35.7	38.7	39.4	47.8	29.6	-	-	-	Triplicate Site with L1(i), L1(ii) and L1(iii) - Annual data provided for L1(iii) only
L1(ii)	508710	221353	48.9	47.1	37.5	35.6	34.0		28.1	34.6	38.4	38.4	37.1	29.9	-	-	-	Triplicate Site with L1(i), L1(ii) and L1(iii) - Annual data provided for L1(iii) only
L1(iii)	508710	221353	49.1	43.8	38.0	37.5	34.0			38.0	37.0	42.1	14.1	29.7	36.1	29.2	-	Triplicate Site with L1(i), L1(ii) and L1(iii) - Annual data provided for L1(iii) only
L2(i)	511155	222445	34.5	33.9	26.3	25.5	22.6	20.5	17.6	20.5	25.2	27.3	29.4	24.3	-	-	-	Duplicate Site with L2(i) and L2(ii) - Annual data provided for L2(ii) only
L2(ii)	511155	222445	35.5				22.5	20.4	17.2	21.7	26.0	26.8	33.9	24.1	25.4	20.6	-	Duplicate Site with L2(i) and L2(ii) - Annual data provided for L2(ii) only
L3(i)	511780	222760	32.3	32.3	26.8	22.6	18.1	17.7	15.7	19.6	26.3	30.6	18.9	23.9	-	-	-	Duplicate Site with L3(i) and L3(ii) - Annual data provided for L3(ii) only
L3(ii)	511780	222760	33.1	29.8	27.4	23.6			16.5		26.1	27.8	30.0	25.4	23.7	19.2	-	Duplicate Site with L3(i) and L3(ii) - Annual data provided for L3(ii) only
L4(i)	513223	222397	20.7	20.9	15.6	12.3	9.5	11.2	13.9	13.6	18.8	17.9	19.7	14.8	-	-	-	Duplicate Site with L4(i) and L4(ii) - Annual data provided for L4(ii) only
L4(ii)	513223	222397	19.5	21.6	15.5	12.3	9.1	10.3	13.9	13.4	18.2	18.7	20.3	17.1	15.5	12.6	-	Duplicate Site with L4(i) and L4(ii) - Annual data provided for L4(ii) only
L5(i)	515047	221904	15.1	16.2	10.5	9.2	6.1	6.0	6.8	7.4	10.6	11.5	12.3	10.7	-	-	-	Duplicate Site with L5(i) and L5(ii) - Annual data provided for L5(ii) only
L5(ii)	515047	221904	14.4	16.9	10.9	7.6	6.0	6.3	6.7	8.0	10.0	11.6	13.5	11.2	10.0	8.1	-	Duplicate Site with L5(i) and L5(ii) - Annual data provided for L5(ii) only
L6(i)	513773	221752	19.8	19.6	14.2	10.2	8.0	8.2	9.7	9.5	14.0	14.8	17.5	15.2	-	-	-	Duplicate Site with L6(i) and L6(ii) - Annual data provided for L6(ii) only
L6(ii)	513773	221752	17.4	20.6	13.7	10.6	8.3	7.4	10.6	10.3	13.8	14.8		16.5	13.1	10.6	-	Duplicate Site with L6(i) and L6(ii) - Annual data provided for L6(ii) only
L7(i)	511057	221386	70.8	67.0	63.9	58.4	52.0	44.5	54.6	55.4	67.4	60.4	63.8	48.3	-	-	-	Duplicate Site with L7(i) and L7(ii) - Annual data provided for L7(ii) only
L7(ii)	511057	221386	72.7	71.3		58.8		54.7		54.0	64.3		62.5	53.2	58.8	**47.6**	-	Duplicate Site with L7(i) and L7(ii) - Annual data provided for L7(ii) only
L8(i)	510543	220706	34.0	31.5	29.8	24.7	19.8	18.0	17.7		24.9	28.5		29.4	-	-	-	Duplicate Site with L8(i) and L8(ii) - Annual data provided for L8(ii) only
L8(ii)	510543	220706	33.7	33.2		23.5		20.1	16.6		24.6			21.3	25.0	20.3	-	Duplicate Site with L8(i) and L8(ii) - Annual data provided for L8(ii) only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Time Weighted Annual Mean: Raw Data	Time Weighted Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
L9(i)	510553	220682	31.0	28.9	24.1		17.0	15.9	13.9	18.5	20.8	22.9	25.8	17.4	-	-	-	Duplicate Site with L9(i) and L9(ii) - Annual data provided for L9(ii) only
L9(ii)	510553	220682	31.1	28.9	22.7		17.1	16.4	14.2	18.2	20.3	24.7	25.4	18.2	21.0	17.0	-	Duplicate Site with L9(i) and L9(ii) - Annual data provided for L9(ii) only
L10(i)	506541	219854	32.7	30.2	23.3	22.3	19.6	18.6	16.5	18.3	19.9	24.6	29.4	19.0	-	-	-	Duplicate Site with L10(i) and L10(ii) - Annual data provided for L10(ii) only
L10(ii)	506541	219854	32.4	29.9	22.2	21.3	20.0	16.8	16.1	19.8	21.8	24.8	30.1	20.5	22.4	18.2	-	Duplicate Site with L10(i) and L10(ii) - Annual data provided for L10(ii) only
L11(i)	512569	222207	20.9	19.9	15.4	10.6	8.0	8.8	12.6	12.1	16.1	20.1	18.6	16.0	-	-	-	Triplicate Site with L11(i), L11(ii) and L11(iii) - Annual data provided for L11(iii) only
L11(ii)	512569	222207	22.2	22.0	13.6	11.7	9.7	9.7	12.3	12.3	15.7	17.9	24.6	19.7	-	-	-	Triplicate Site with L11(i), L11(ii) and L11(iii) - Annual data provided for L11(iii) only
L11(iii)	512569	222207	21.6	19.9	15.2	10.5	8.1	8.7	13.9	12.8	18.4	18.4	22.7	15.0	15.1	12.2	-	Triplicate Site with L11(i), L11(ii) and L11(iii) - Annual data provided for L11(iii) only
L12(i),	510256	220599			28.3	33.0			20.1	26.2	25.5	27.8		22.1	-	-	-	Duplicate Site with L12(i), and L12(ii) - Annual data provided for L12(ii) only
L12(ii)	510256	220599				32.1			20.2	27.9	25.6	28.4		22.7	26.4	23.5	-	Duplicate Site with L12(i), and L12(ii) - Annual data provided for L12(ii) only
L13(i),	509744	220103			15.2	14.5	11.9	11.1	8.8	12.2	14.7	18.0	22.2	13.8	-	-	-	Duplicate Site with L13(i), and L13(ii) - Annual data provided for L13(ii) only
L13(ii)	509744	220103			16.2	14.5	12.4	11.3	8.9	12.3	14.5	18.9	22.5	13.8	14.4	11.7	-	Duplicate Site with L13(i), and L13(ii) - Annual data provided for L13(ii) only
L14(i)	509195	220264			19.7	17.5	14.0		12.1	13.9	17.0	18.8	23.4	15.9	-	-	-	Duplicate Site with L14(i) and L14(ii) - Annual data provided for L14(ii) only
L14(ii)	509195	220264			19.6	17.7	14.3		11.9	14.8	18.7	21.4	21.7	15.4	17.2	13.9	-	Duplicate Site with L14(i) and L14(ii) - Annual data provided for L14(ii) only
L15(i)	506794	219467			11.9	11.7	9.3		6.0	8.1		11.2	18.0		-	-	-	Duplicate Site with L15(i) and L15(ii) - Annual data provided for L15(ii) only
L15(ii)	506794	219467				11.4	8.7		5.9	8.3		12.5	43.1		12.7	10.9	-	Duplicate Site with L15(i) and L15(ii) - Annual data provided for L15(ii) only
L16(i)	515284	222038						7.8	8.4	8.3	11.1	13.9		14.5	-	-	-	Duplicate Site with L16(i) and L16(ii) - Annual data provided for L16(ii) only
L16(ii)	515284	222038						7.5	9.0	8.9	10.9			14.6	10.6	10.2	-	Duplicate Site with L16(i) and L16(ii) - Annual data provided for L16(ii) only

☒ **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.**

☒ **Luton 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 Luton During 2023

Luton Council has not identified any new sources relating to air quality within the reporting year of 2023/24.

Additional Air Quality Works Undertaken by Luton Council during 2023

- Additional NO_2 passive monitoring sites established in the vicinity of AQMA N$^{os.}$ 1 & 2 and AQMA N$^{o.}$ 3;
- Considerable effort was expended on developing a new awareness and communications campaign focusing on $PM_{2.5}$; the project was discontinued when the cancellation of the 2023/24 air quality grant programme resulted in funding being withdrawn.

QA/QC of Diffusion Tube Monitoring

The tubes deployed by both Luton Council and Luton Rising are supplied by Gradko International Ltd. and use a preparation of 20% Triethanolamine (TEA) in deionised water. The exposed tubes are analysed following Gradko's documented in-house *Laboratory Method GLM7,* which complies with the guidelines set out in Defra's *'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance'* [https://tinyurl.com/j6976rah]. The analysis of diffusion tube samples to determine the amount of nitrogen dioxide present on the tubes is within the scope of their UKAS schedule. Gradko participates in the AIR NO_2 PT scheme, with the most recently published results at the time of writing indicating that between September 2021 and September 2023, 100% of QC samples were analysed satisfactorily[14]. For the whole year, reported nitrogen dioxide diffusion

[14] Defra / LGC (Oct 2023) - Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (September 2021 – October 2023); https://tinyurl.com/yns4e9kt

tube co-location studies indicate that the laboratory achieved good precision in 21 of the 23 studies (91%) where tubes prepared with 20% TEA in water were used[15].

The tubes deployed by LLAOL are supplied by SOCOTEC Didcot and are prepared with 50% TEA in acetone. Analysed following SOCOTEC's standard operating procedure ANU/SOP/1015, during 2023, the laboratory achieved good precision in all 28 reported co-location studies where 50% TEA in acetone tubes were used15. Also a participant in the AIR NO_2 PT scheme, from September 2021 to September 2023, all 100% of the QC samples tested by SOCOTEC were deemed to have been analysed satisfactorily[14].

Using the *Diffusion Tube Data Processing Tool v4.0* [https://tinyurl.com/e9zdbnxr] to check the precision of replicate tube data, the results for the triplicate LBC tubes (LN61/62/63) co-located with the continuous analyser on Dunstable Road East were shown to demonstrate *"Good Overall Precision"* [Table C.4(a)]. Undertaking a similar check on the triplicate sets of Luton Rising tubes co-located with the continuous analysers on both Dunstable Road East (*L1*) and Wigmore Valley Park (*L11*), a similar result was obtained with both sets also being shown to have *"Good Overall Precision"* [Table C.4(b)].

During 2023, all LBC and LLAOL diffusion tubes were exposed in adherence with the *Diffusion Tube Monitoring Calendar* [https://tinyurl.com/kawdzjmu].

Adhering to the calendar for most of the year, Luton Rising departed from the specified dates by more than the ±2 day tolerance referred to in the *Important Notes* tab of the *Diffusion Tube Processing Tool* on two occasions:

- once when the initial deployment at the beginning of Period 1 (January) was delayed by 15 days until 19 January; and
- against when the Period 10/11 (October/November) changeover was delayed by five days until 6 November

Consequently, for Period 1, exposure was shorter than the recommended four-week minimum, which may affect the reliability of that month's data.

[15] Defra (March 2024) – National Diffusion Tube Bias Adjustment Factor Spreadsheet version 03/24; https://tinyurl.com/55fkvnxm

Diffusion Tube Annualisation

Annualisation was required for sites with between 25% and 75% annual data capture in each of the LBC, LLAOL and Luton Rising datasets. This was undertaken using whole-year data sets obtained from the *UK Air Data Selector* [https://tinyurl.com/s6fpm8xx] for the following *Automatic Urban & Rural Network* (AURN) monitoring sites (all of which are within a 50-mile radius of Luton and have data capture rates of over 85% for the calendar year):

- London Bloomsbury (*UKA00211*) – Type: Urban Background
- London Hillingdon (*UKA00266*) – Type: Urban Background
- London Westminster (*UKA00435*) – Type: Urban Background
- Oxford St Ebbes (*UKA00518*) – Type: Urban Background

All annualisation was undertaken using the *Diffusion Tube Processing Tool v4.0* (https://tinyurl.com/bd2bz5bb). The output of these corrections is presented in Table C.1.

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

a) Luton Council passive sites

Site ID	Annualisation Factor London Bloomsbury	Annualisation Factor London Hillingdon	Annualisation Factor London Westminster	Annualisation Factor Oxford St Ebbes	Average Annualisation Factor	Raw Data Simple Annual Mean	Annualised Simple Annual Mean	Comments
LN54	1.0057	0.9971	1.0064	1.0127	1.0055	25.5	25.7	
LN64	0.9085	0.9432	0.9003	0.9026	0.9136	27.7	25.3	
LN83	0.9841	1.0511	0.9990	1.0661	1.0251	20.6	21.1	
LN95	0.9570	0.9537	0.9764	0.9268	0.9535	18.3	17.4	
LN104	0.9039	1.0460	0.8839	0.9680	0.9504	37.3	35.5	
LN116	1.0326	1.0384	1.0240	1.0382	1.0333	42.1	43.5	
LN143	1.0413	0.9443	1.0450	0.9566	0.9968	33.2	33.1	

b) LLAOL passive sites

Site ID	Annualisation Factor London Bloomsbury	Annualisation Factor London Hillingdon	Annualisation Factor London Westminster	Annualisation Factor Oxford St Ebbes	Average Annualisation Factor	Raw Data Time Weighted Annual Mean	Annualised Time Weighted Annual Mean	Comments
LLA 1	1.1043	1.0562	1.0975	1.1679	1.1065	36.6	40.5	
LLA 2	1.0816	1.0614	1.0977	1.1503	1.0977	33.2	-	Annualisation factor not applied by Diffusion Tube Processing Tool (Data capture of 74.7%)
LLA 7	1.0811	1.0582	1.0789	1.1295	1.0869	48.4	52.6	
LLA 9	0.9260	0.9513	0.9459	0.9540	0.9443	8.6	8.1	
LLA 14	1.0493	1.0298	1.0856	1.1183	1.0707	40.1	43.0	

c) Luton Rising passive sites

Site ID	Annualisation Factor London Bloomsbury	Annualisation Factor London Hillingdon	Annualisation Factor London Westminster	Annualisation Factor Oxford St Ebbes	Average Annualisation Factor	Raw Data Time Weighted Annual Mean	Annualised Time Weighted Annual Mean	Comments
L12(i),	1.1206	0.9840	1.1537	1.1356	1.0985	-	-	Duplicate Site with L12(i), and L12(ii) - Annual data provided for L12(ii) only
L12(ii)	1.1206	0.9840	1.1537	1.1356	1.0985	26.4	29.0	Duplicate Site with L12(i), and L12(ii) - Annual data provided for L12(ii) only
L14(i)	1.0683	1.0155	1.0843	1.0858	1.0635	-	-	Duplicate Site with L14(i) and L14(ii) - Annual data provided for L14(ii) only
L14(ii)	1.0683	1.0155	1.0843	1.0858	1.0635	17.2	-	Duplicate Site with L14(i) and L14(ii) - Annual data provided for L14(ii) only Annualisation factor not applied by Diffusion Tube Processing Tool (Data capture of 74.2%)
L15(i)	1.0492	1.0351	1.0504	1.0789	1.0534	-	-	Duplicate Site with L15(i) and L15(ii) - Annual data provided for L15(ii) only
L15(ii)	1.0492	1.0351	1.0504	1.0789	1.0534	12.7	13.4	Duplicate Site with L15(i) and L15(ii) - Annual data provided for L15(ii) only
L16(i)	1.2523	1.0387	1.2378	1.1994	1.1821	-	-	Duplicate Site with L16(i) and L16(ii) - Annual data provided for L16(ii) only
L16(ii)	1.2523	1.0387	1.2378	1.1994	1.1821	10.6	12.6	Duplicate Site with L16(i) and L16(ii) - Annual data provided for L16(ii) only

d) Luton Rising automatic PM_{10} site

Site ID	Annualisation Factor London Bloomsbury	Annualisation Factor London North Kensington	Annualisation Factor Oxford St Ebbes	Annualisation Factor London Honor Oak Park	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
LA001	1.1066	1.1511	1.1611	1.132	1.1377	7.9	9.0	

e) Luton Rising automatic $PM_{2.5}$ site

Site ID	Annualisation Factor London Bloomsbury	Annualisation Factor London North Kensington	Annualisation Factor Oxford St Ebbes	Annualisation Factor London Honor Oak Park	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
LA001	1.1339	1.1954	1.2249	1.1699	1.1810	6.7	8.0	

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2024 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 NOx/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Luton Council have applied a national bias adjustment factor of 0.81 to their 2023 monitoring data (National Spreadsheet version 03/24; Gradko; 20% TEA in water; 23 studies). Adopting a precautionary approach, this figure was selected in preference to the lower locally derived value of 0.77 obtained from a triplicate co-location study undertaken at LN60/HB007. By selecting the higher of the two values, the correction output presents a worst-case picture of NO_2 concentrations. The impact of applying the local factor in preference to the national figure has been characterised (Table C.3) and shown graphically relative to last year's results (Figure C.1). The selection of the national factor has no effect in terms of compliance, with all sites remaining below 40µg/m^3 regardless of which factor was applied.

A similar approach was also adopted when processing the Luton Rising data, with Luton Council electing to use the same national factor of 0.81 in preference to a combined local bias adjustment factor of 0.80 obtained from co-location studies at LN60/HB007 and LA001.

The analysis of co-location study data to calculate local bias adjustment factors for both the LBC and Luton Rising monitoring programmes was undertaken using the *Diffusion Tube Data Processing Tools v4.0* (https://tinyurl.com/4dy6jpf4). The output from this analysis is presented in Table C.4.

As it does not include a co-location study, the 2023 LLAOL monitoring data has been bias-corrected using a national factor of 0.77. This factor was also obtained from version 03/24 of the National Spreadsheet and is based on 28 co-location studies using 50% TEA in acetone tubes prepared and analysed by SOCOTEC Didcot.

A summary of bias adjustment factors used by Luton Council over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

a) Luton Council sites

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.81
2022	Local	-	0.85
2021	National	03/22	0.84
2020	National	03/21	0.81
2019	National	03/20	0.93

b) LLAOL sites

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.77
2022	National	03/23	0.76
2021	National	03/22	0.78
2020	National	03/21	0.82 (Gradko) 0.77 (SOCOTEC)
2019	National	03/20	0.87

c) Luton Rising sites

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.81
2022	Local / National*	03/23	0.83
2021	National	03/22	0.84
2020	National	03/21	0.81
2019	National	03/20	0.93

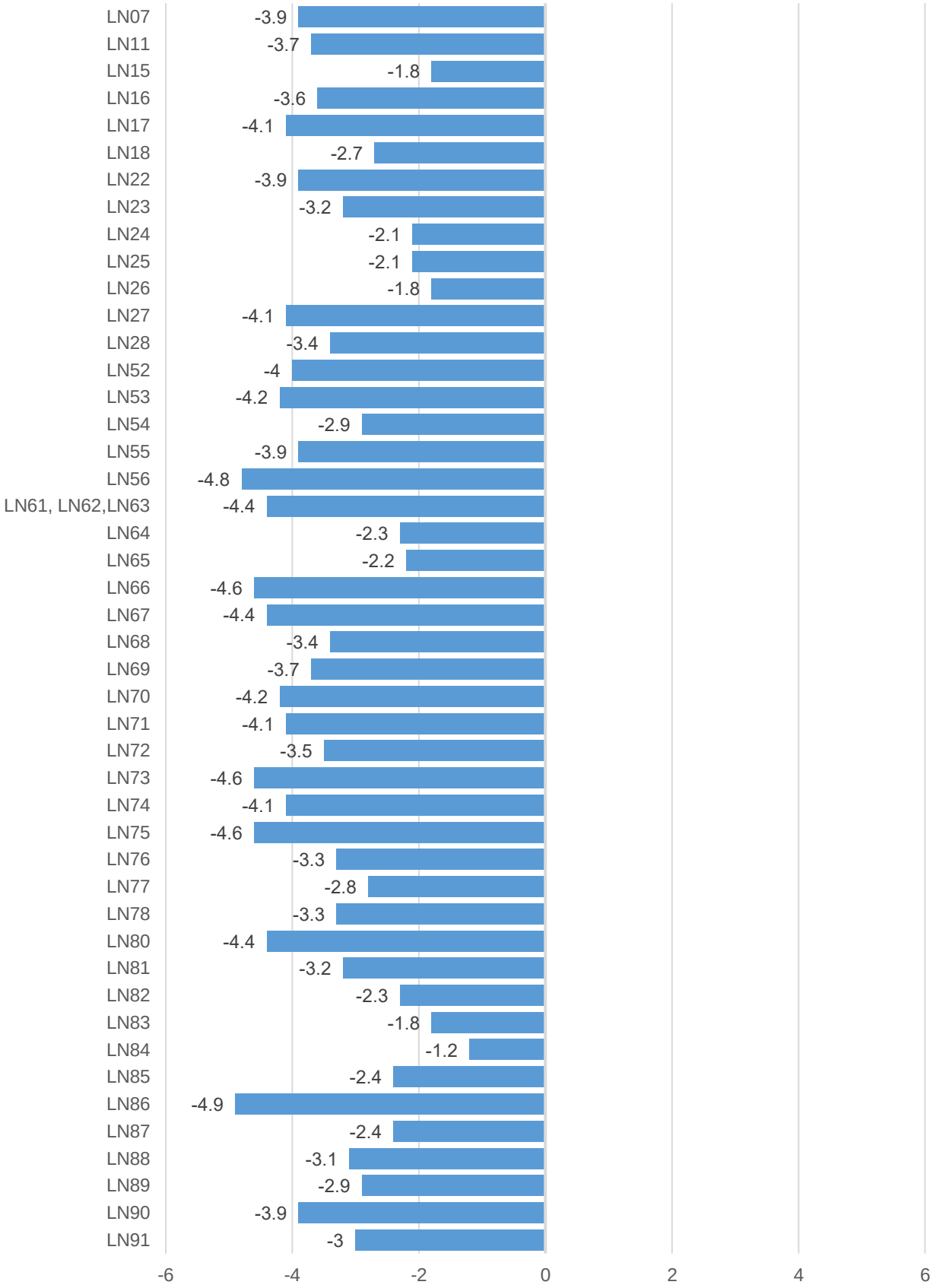
* Local and National adjustment factors are equal

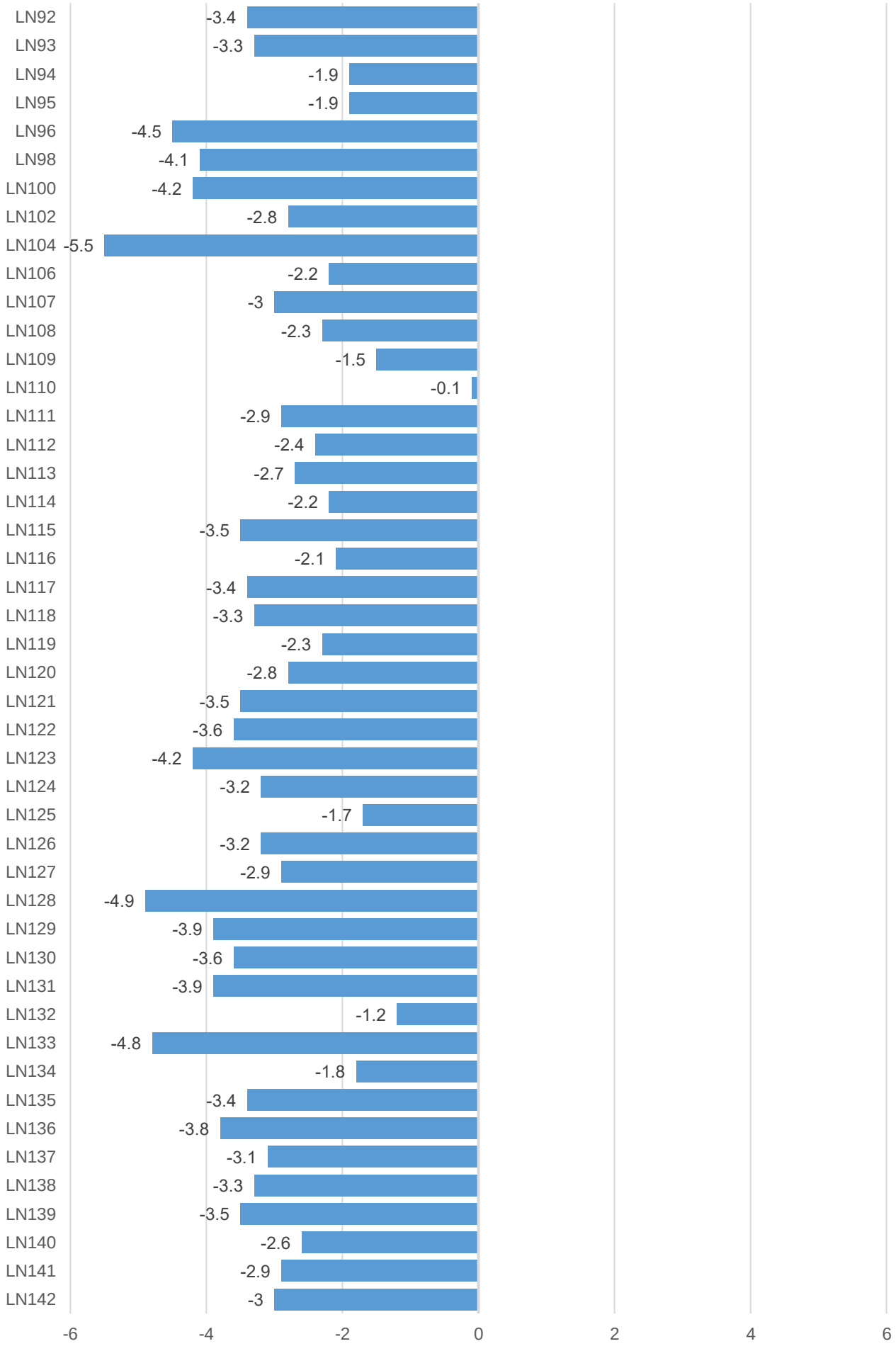
Table C.3 – Comparison of LBC diffusion tube output obtained using local and national bias correction factors

	Local	National
Bias Correction Factor	0.77	0.81
Percentage Difference	5.1%	5.1%
Number of exceedances (excluding co-location sites)	0	0
Number of sites above 36µg/m³ (excluding co-location sites)	0	0
Number of sites above 10µg/m³ (excluding co-location sites)	92	92
Max	33.5µg/m³	35.2µg/m³
Min	10.5µg/m³	11.0µg/m³
Range	23.0µg/m³	24.2µg/m³
Average	21.0µg/m³	22.1µg/m³
Median	20.9µg/m³	21.9µg/m³
Standard Deviation	5.06µg/m³	5.32µg/m³
Higher than previous year (when rounded to 1 decimal place)	0 (0%)	2 (2.2%)
Lower than previous year (when rounded to 1 decimal place)	92 (100%)	90 (97.8%)
Unchanged (when rounded to 1 decimal place)	0 (0%)	0 (0%)
Max increase (cf. 2022)		0.6µg/m³ (LN110, 4%)
Max decrease (cf. 2022)	-5.5µg/m³ (LN104, -17%)	-4.1µg/m³ (LN104, -13%)
Average change (cf. 2022)	-3.2µg/m³	-2.1µg/m³
Median change (cf. 2022)	-3.3µg/m³	-2.2µg/m³

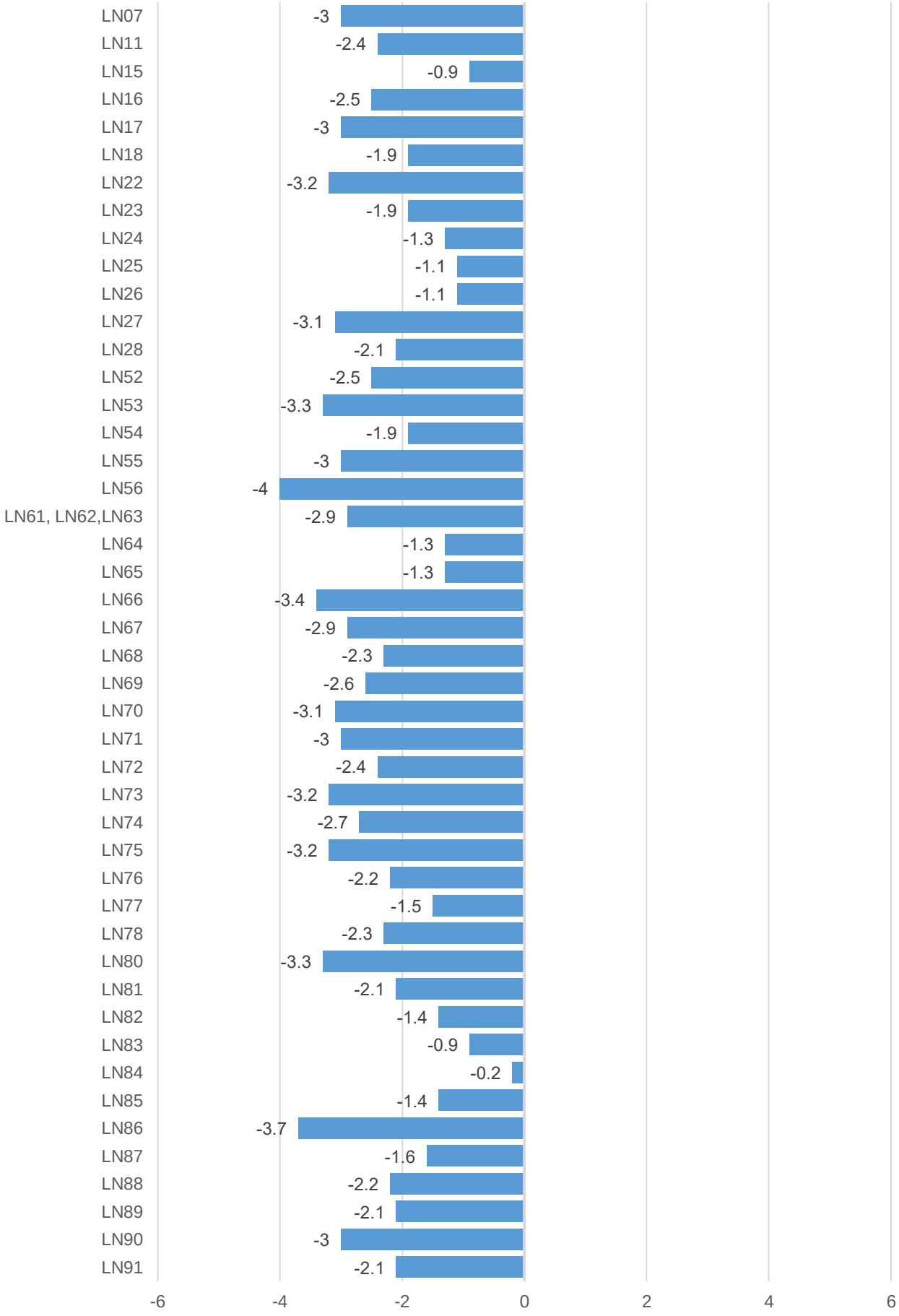
Figure C.1 - Differences in 2023 LBC NO_2 concentrations relative to reported 2022 annual mean values (µg/m^3)

a) 2023 data adjusted using locally derived correction factor (0.77)




LN92 -3.4
LN93 -3.3
LN94 -1.9
LN95 -1.9
LN96 -4.5
LN98 -4.1
LN100 -4.2
LN102 -2.8
LN104 -5.5
LN106 -2.2
LN107 -3
LN108 -2.3
LN109 -1.5
LN110 -0.1
LN111 -2.9
LN112 -2.4
LN113 -2.7
LN114 -2.2
LN115 -3.5
LN116 -2.1
LN117 -3.4
LN118 -3.3
LN119 -2.3
LN120 -2.8
LN121 -3.5
LN122 -3.6
LN123 -4.2
LN124 -3.2
LN125 -1.7
LN126 -3.2
LN127 -2.9
LN128 -4.9
LN129 -3.9
LN130 -3.6
LN131 -3.9
LN132 -1.2
LN133 -4.8
LN134 -1.8
LN135 -3.4
LN136 -3.8
LN137 -3.1
LN138 -3.3
LN139 -3.5
LN140 -2.6
LN141 -2.9
LN142 -3
-6
-4
-2
0
2
4
6

b) 2023 data adjusted using national correction factor (0.81)



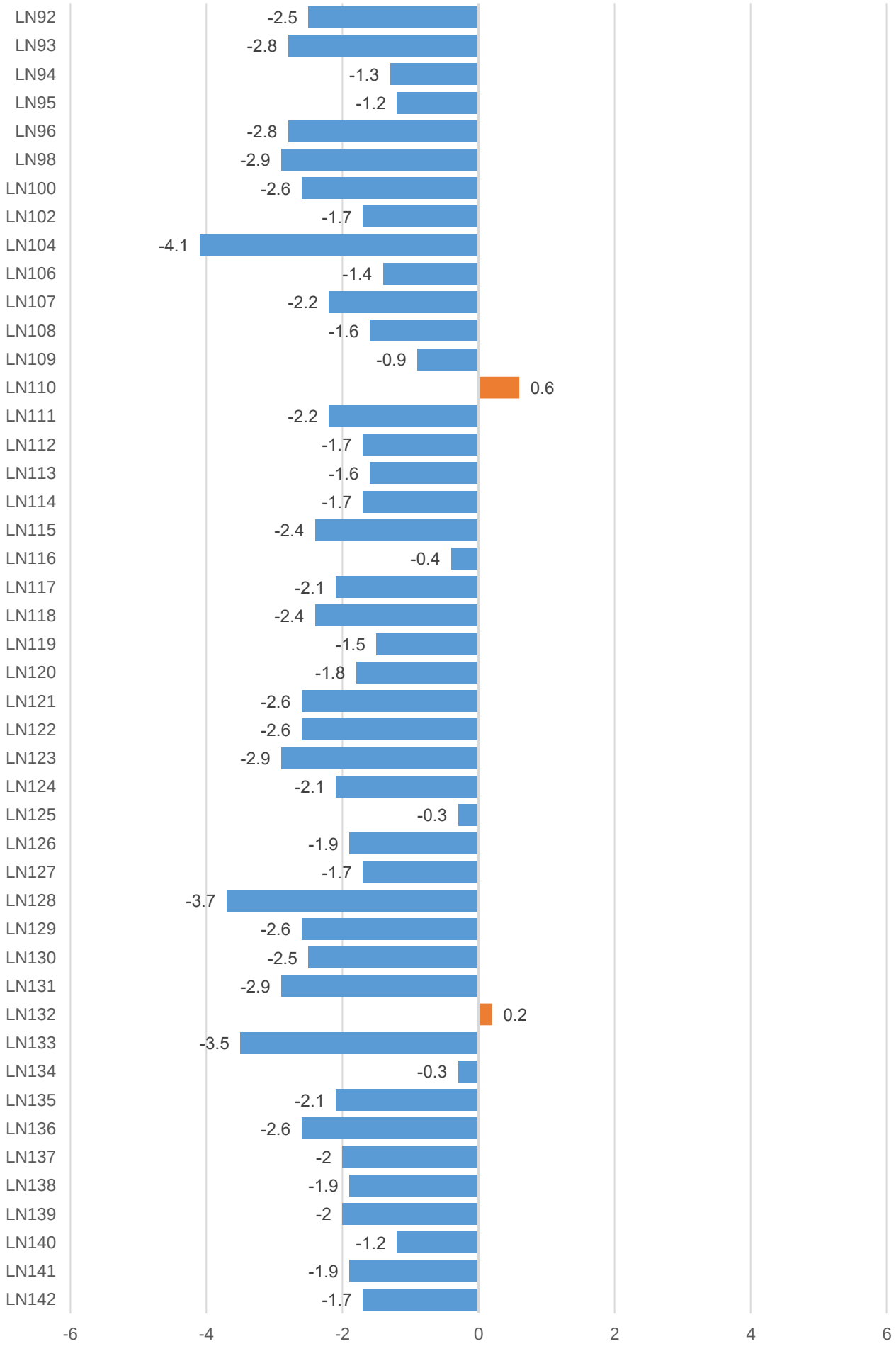

LN92 -2.5
LN93 -2.8
LN94 -1.3
LN95 -1.2
LN96 -2.8
LN98 -2.9
LN100 -2.6
LN102 -1.7
LN104 -4.1
LN106 -1.4
LN107 -2.2
LN108 -1.6
LN109 -0.9
LN110 0.6
LN111 -2.2
LN112 -1.7
LN113 -1.6
LN114 -1.7
LN115 -2.4
LN116 -0.4
LN117 -2.1
LN118 -2.4
LN119 -1.5
LN120 -1.8
LN121 -2.6
LN122 -2.6
LN123 -2.9
LN124 -2.1
LN125 -0.3
LN126 -1.9
LN127 -1.7
LN128 -3.7
LN129 -2.6
LN130 -2.5
LN131 -2.9
LN132 0.2
LN133 -3.5
LN134 -0.3
LN135 -2.1
LN136 -2.6
LN137 -2
LN138 -1.9
LN139 -2
LN140 -1.2
LN141 -1.9
LN142 -1.7
-6
-4
-2
0
2
4
6

Table C.4 – Local Bias Adjustment Calculation

a) Luton Council co-location study

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4
Periods used to calculate bias	12			
Bias Factor A	0.77 (0.73 – 0.81)			
Bias Factor B	30% (23% - 37%)			
Diffusion Tube Mean (µg/m^3)	36.1			
Mean CV (Precision)	3.4%			
Automatic Mean (µg/m^3)	27.8			
Data Capture	100%			
Adjusted Tube Mean (µg/m^3)	28 (26 – 29)			
Overall Diffusion Tube Precision	**Good Overall Precision**			
Overall Continuous Monitor Data Capture	**Good Overall Data Capture**			

Local Bias Adjustment Factor = 0.77

Note:

Adopting a precautionary approach, a national bias adjustment factor (0.81) has been used to bias adjust the 2023 diffusion tube results in preference to this local bias adjustment factor.

b) Luton Rising co-location studies

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4
Periods used to calculate bias	10	11		
Bias Factor A	0.76 (0.71 – 0.83)	0.84 (0.78 – 0.91)		
Bias Factor B	31% (21% - 41%)	19% (10% - 29%)		
Diffusion Tube Mean (µg/m^3)	37.4	15.3		
Mean CV (Precision)	3.1%	7.5%		
Automatic Mean (µg/m^3)	28.5	12.9		
Data Capture	100%	98%		
Adjusted Tube Mean (µg/m^3)	28 (27 – 31)	13 (12 – 14)		
Overall Diffusion Tube Precision	**Good Overall Precision**	**Good Overall Precision**		
Overall Continuous Monitor Data Capture	**Good Overall Data Capture**	**Good Overall Data Capture**		

Combined Local Bias Adjustment Factor = 0.80

Notes:

Adopting a precautionary approach, a national bias adjustment factor (0.81) has been used to bias adjust the 2023 diffusion tube results in preference to this combined local bias adjustment factor.

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO_2 monitoring locations within Luton required distance correction during 2023.

QA/QC of Automatic Monitoring

As far as possible, the nitrogen dioxide analyser on Dunstable Road East (LN60 / HB007) is calibrated by a Luton Council officer on a fortnightly basis. However, during 2023 there was a hiatus between the end of September and the end of November when an administrative error resulted in the purchase of a replacement calibration gas cylinder being delayed. The co-located FIDAS particulate analyser does not require calibration. Acoem maintains both instruments and routinely services them on a six-monthly basis. Additionally, the site is audited twice a year by Ricardo AEA.

Figure C.2 presents a timeline showing the purpose and dates of all the site visits made to the Dunstable Road East monitoring site during 2023. Figure C.3 and Figure C.4 reproduce the *Certificates of Calibration* issued by Ricardo following the site audits undertaken in February and August 2023.

All automatic monitoring data collected at the Dunstable Road East, London Luton Airport (LA08) and Luton A505 Roadside (LUTR) sites is managed by Ricardo Energy & Environment using the quality control procedures utilised by Defra's national air quality network stations. These procedures represent best practice and fully meet the requirements set out in LAQM.TG22. Ricardo Energy & Environment provides UKAS-accredited quality control audits and data management services to all Defra national network (AURN) air quality monitoring stations.

All data collected at the above sites is screened and scaled (based on site calibrations). The final data sets presented within this report (Figure C.5, Figure C.6 and Figure C.7) have benefitted from

a full process of data ratification, including thorough additional data quality checks and a ratification process that corrects data for instrument sensitivity drift between routine calibrations.

All automatic monitoring data collected at Luton Rising's London Luton Airport FutureLuToN (LA001) site during 2023 has been validated and ratified to the standards described in LAQM.TG22. The site datasets published online (summarised in Figure C.8) are managed by Ricardo Energy & Environment in full compliance with the requirements of LAQM.TG22, including the screening, validation, and ratification of the raw data.

Live and historical data for all automatic monitoring sites is available via the Herts & Beds Air Quality Network pages on the Air Quality England website [https://tinyurl.com/khvpphd5].

Figure C.2 – Timeline of site visits made to the air monitoring station at Dunstable Road East (LN60 / HB007) during 2023

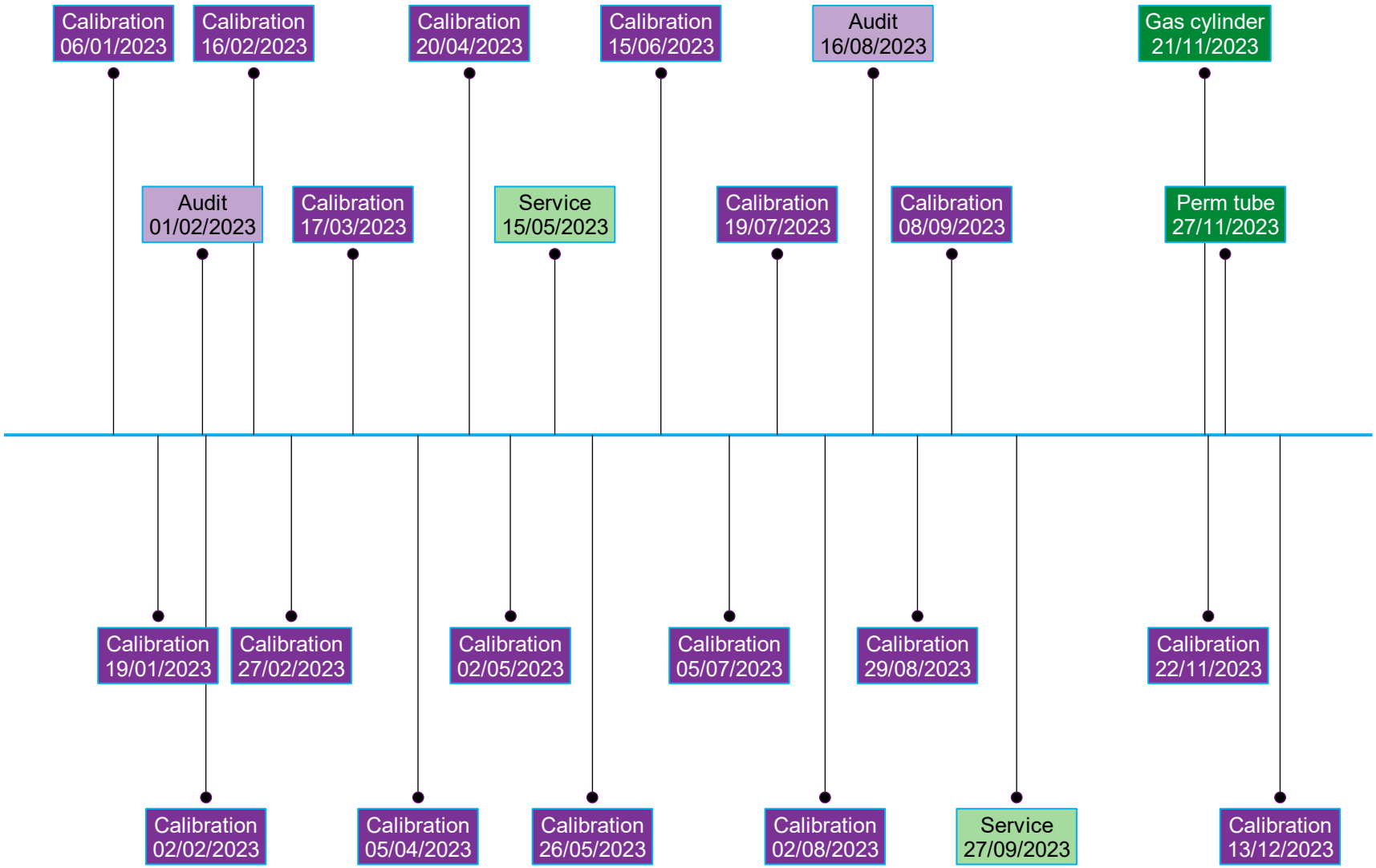


Figure C.3 – Certificate of Calibration issued for air monitoring station at Luton Dunstable Road East (LN60 / HB007) following site audit on 1 February 2023

0401

CERTIFICATE OF CALIBRATION

Ricardo Energy and Environment, Gemini Building, Fermi Avenue Harwell, Didcot, Oxfordshire OX11 0QR. Telephone 01235 753692

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Page 1 of 3

Approved Signatories:

☐	S. Eaton	☐	B Stacey
☐	D Hector	☐	S Stratton
☐	N Rand	☐	S Telfer
☐	B Davies	☐	S Gray
☑	D Lane	☐	T Green
☐	S Copsey		

Signed: [redacted]

Date of issue: 01 Mar 23

Certificate Number: 6174

Customer Name and Address:

Luton Borough Council
Environmental Health
Town Hall
George Street
Luton
LU1 2BQ

Description: Calibration factors for the air monitoring station at Luton Dunstable Road East

Ricardo Energy & Environment ID: ED79001212/February 2023

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95% The uncertainty evaluation has been carried out in accordance with UKAS requirements.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory

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0401

CERTIFICATE OF CALIBRATION

Date of issue: 01 Mar 23

Certificate Number: 6174

Ricardo Energy & Environment ID: ED79001212/February 2023

Luton Dunstable Road East
Date of audit: 01 Feb 2023

Species	Analyser Serial no	Zero Response[1]	Zero uncertainty nmol/mol	Calibration Factor[2]	Factor uncertainty %	Converter efficiency (%)[3]	Converter uncertainty (%)
NOx	1426962911	-0.1	2.5	1.0560	3.5409	100 (266ppb)	0.9
NO	1426962911	-0.1	2.5	1.0561	3.5817	99.2 (131ppb)	0.9

Luton Dunstable Road East
Date of audit: 01 Feb 2023

	Species	Analyser Serial no	Parameter	Specified Value	Measured Value	Deviation %	Uncertainty %
FIDAS	PM	6178	Total Flow[4]	4.8	4.72	-1.7	2.25

0401

CERTIFICATE OF CALIBRATION

Date of issue: 01 Mar 23

Certificate Number: 6174

Ricardo Energy & Environment ID: ED79001212/February 2023

The gaseous ambient analysers listed above have been tested for zero response, calibration factor, linearity and converter efficiency (NOx analysers) by documented methods. The factors have been calculated using certified gas standards. The particulate analysers listed above have been tested for sample flow rates and k_0(where appropriate) by documented methods. Note that the test results are valid on the day of test only, as analyser drift over time cannot be quantified. All results for gaseous species are reported in concentration units of nmol/mol or µmol/mol.

[1] The zero response is the zero reading on the data logging system of the analyser when audit zero gas was introduced to the analysers under test.

[2] The calibration factor is the multiplying factor required to scale the reading on the data logging system of the analyser into reported concentration units (nmol/mol for NO, NOx, SO_2, O_3 and µmol/mol for CO). It should be used in conjunction with the zero response. A corrected concentration is calculated using the following equation:

Concentration = F(Output - Zero Response)
Where F = Calibration Factor provided on this certificate
Output = Reading on the data logging system of the analyser
Zero Response = Zero Response provided on this certificate

[3] Converter eff. is the measured efficiency of the NO_2 to NO converter within the oxides of nitrogen analyser under test.

[4] The measured main flow rate (where this is applicable) is the flow rate through the sensor unit of the TEOM particulate analyser under test. The measured aux flow rate (where this is applicable) is the flow rate through the bypass tubing of the TEOM particulate analyser under test. The measured total flow rate is the total flow rate through the particulate analyser under test. Units of flow are $l.min^{-1}$, reported at prevailing ambient conditions unless otherwise specified. Where flow rates are highlighted in bold, it indicates that measurements were not made at the analyser sample inlet. These measurements therefore may not accurately reflect analyser performance in normal operation.

The calibration results shaded are those that fall within our scope of accreditation, all other results on this certificate are not UKAS accredited, but have been included for completeness.

Figure C.4 – Certificate of Calibration issued for air monitoring station at Luton Dunstable Road East (LN60 / HB007) following site audit on 29 August 2023

0401

CERTIFICATE OF CALIBRATION

Ricardo Energy and Environment, Gemini Building, Fermi Avenue Harwell, Didcot, Oxfordshire OX11 0QR. Telephone 01235 753692

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Page 1 of 3

Approved Signatories:

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☐	D Hector	☐	S Stratton
☐	N Rand	☐	S Telfer
☐	B Davies	☐	S Gray
☑	D Lane	☐	T Green
☐	S Copsey		

Signed: [redacted]

Date of issue: 29 Aug 23

Certificate Number: 6440

Customer Name and Address:

Luton Borough Council
Environmental Health
Town Hall
George Street
Luton
LU1 2BQ

Description: Calibration factors for the air monitoring station at Luton Dunstable Road East

Ricardo Energy & Environment ID: ED79001211/August 2023

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95% The uncertainty evaluation has been carried out in accordance with UKAS requirements.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory

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CERTIFICATE OF CALIBRATION

0401

Date of issue: 29 Aug 23

Certificate Number: 6440

Ricardo Energy & Environment ID: ED79001211/August 2023

Luton Dunstable Road East
Date of audit: 16 Aug 2023

Species	Analyser Serial no	Zero Response[1]	Zero uncertainty nmol/mol	Calibration Factor[2]	Factor uncertainty %	Converter efficiency (%)[3]	Converter uncertainty (%)
NOx	1426962911	1.4	2.6	1.1585	3.6144	98.7 (262ppb)	0.9
NO	1426962911	1.4	2.6	1.1674	3.5904	99.1 (125ppb)	0.9

Luton Dunstable Road East
Date of audit: 16 Aug 2023

	Species	Analyser Serial no	Parameter	Specified Value	Measured Value	Deviation %	Uncertainty %
FIDAS	PM	6178	Total Flow[4]	4.8	4.78	-0.4	2.25

0401

CERTIFICATE OF CALIBRATION

Date of issue: 29 Aug 23

Certificate Number: 6440

Ricardo Energy & Environment ID: ED79001211/August 2023

The gaseous ambient analysers listed above have been tested for zero response, calibration factor, linearity and converter efficiency (NOx analysers) by documented methods. The factors have been calculated using certified gas standards. The particulate analysers listed above have been tested for sample flow rates and k_0(where appropriate) by documented methods. Note that the test results are valid on the day of test only, as analyser drift over time cannot be quantified. All results for gaseous species are reported in concentration units of nmol/mol or µmol/mol.

[1] The zero response is the zero reading on the data logging system of the analyser when audit zero gas was introduced to the analysers under test.

[2] The calibration factor is the multiplying factor required to scale the reading on the data logging system of the analyser into reported concentration units (nmol/mol for NO, NOx, SO_2, O_3 and µmol/mol for CO). It should be used in conjunction with the zero response. A corrected concentration is calculated using the following equation:

Concentration = F(Output - Zero Response)
Where F = Calibration Factor provided on this certificate
Output = Reading on the data logging system of the analyser
Zero Response = Zero Response provided on this certificate

[3] Converter eff. is the measured efficiency of the NO_2 to NO converter within the oxides of nitrogen analyser under test.

[4] The measured main flow rate (where this is applicable) is the flow rate through the sensor unit of the TEOM particulate analyser under test. The measured aux flow rate (where this is applicable) is the flow rate through the bypass tubing of the TEOM particulate analyser under test. The measured total flow rate is the total flow rate through the particulate analyser under test. Units of flow are $l.min^{-1}$, reported at prevailing ambient conditions unless otherwise specified. Where flow rates are highlighted in bold, it indicates that measurements were not made at the analyser sample inlet. These measurements therefore may not accurately reflect analyser performance in normal operation.

The calibration results shaded are those that fall within our scope of accreditation, all other results on this certificate are not UKAS accredited, but have been included for completeness.

Figure C.5 – 2023 Air Pollution Report – LN60: Luton Dunstable Road East (Site ID: HB007)

Source: https://tinyurl.com/mrycaavr

Air Pollution Report

1st January to 31st December 2023

Air Quality England

Luton Dunstable Road East (Site ID: HB007)

These data have been fully ratified
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³	PM_{10} µg/m³	PM_{25} µg/m³
Number Days Low	-	365	-	358	361
Number Days Moderate	-	0	-	4	1
Number Days High	-	0	-	0	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	244	84	458	59	41
Annual Max	637	141	1,100	476	189
Annual Mean	22	28	62	15	9
98th Percentile of daily mean	-	-	-	44	-
90th Percentile of daily mean	-	-	-	26	-
99.8th Percentile of hourly mean	-	110	-	-	-
98th Percentile of hourly mean	126	76	268	46	30
95th Percentile of hourly mean	67	62	161	34	21
50th Percentile of hourly mean	13	24	45	12	7
% Annual data capture	**99.75**	**99.74**	**99.74**	**99.03**	**99.04**

Instruments:
PM_{10}: FIDAS (01/01/2023 to 31/12/2023)
PM_{25}: FIDAS (01/01/2023 to 31/12/2023)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
PM_{10} particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	4	4
PM_{10} particulate matter (Hourly measured)	Annual mean > 40 microgrammes per metre cubed	0	-
$PM_{2.5}$ particulate matter (Hourly measured)	Annual mean > 25 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	**Annual Mean > 40 microgrammes per metre cubed**	**0**	**-**

Annual Graph

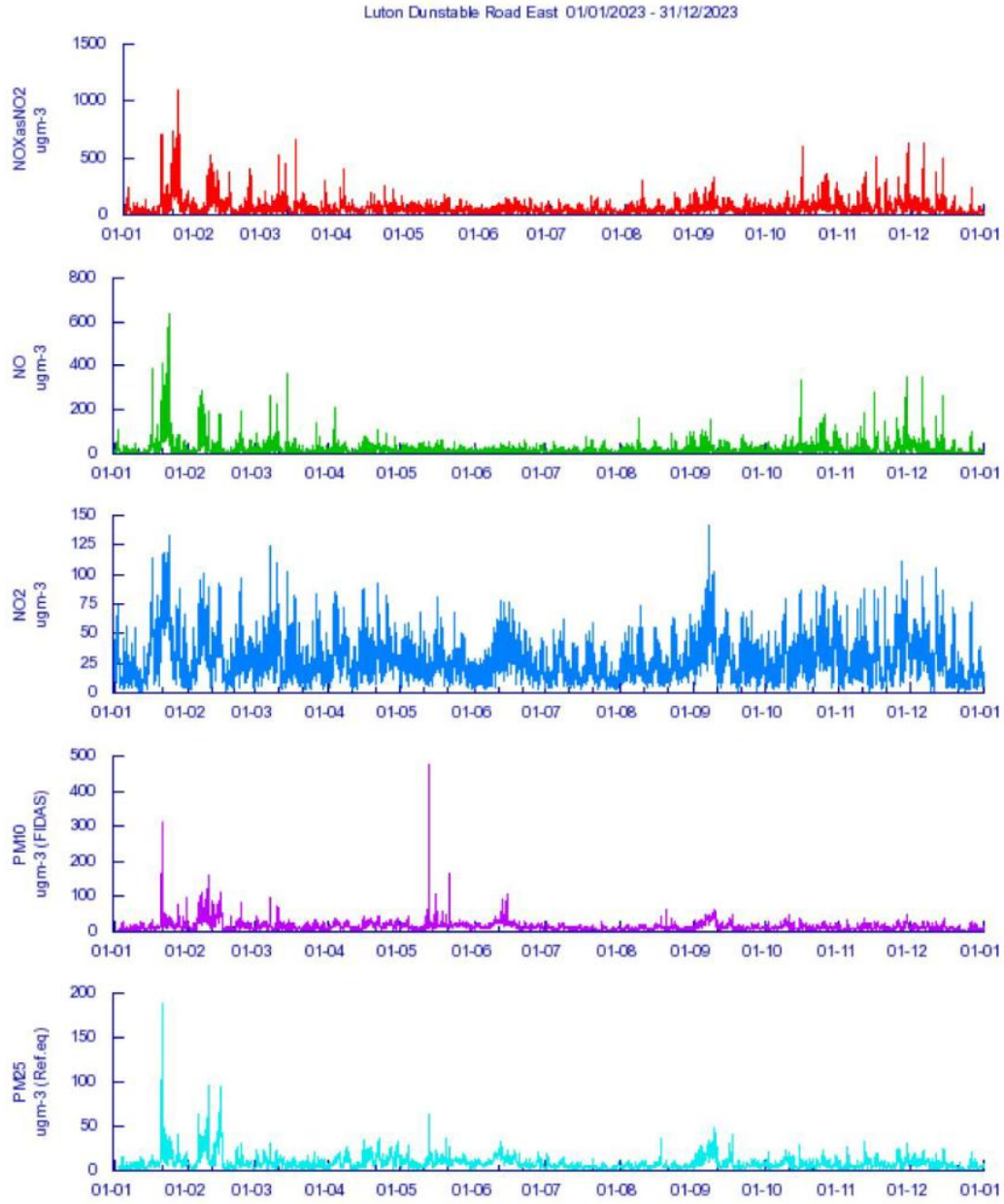


Figure C.6 – 2023 Air Pollution Report – LA08: London Luton Airport (Site ID: HB006)

Source: https://tinyurl.com/mjhs2m4c

Air Pollution Report

1st January to 31st December 2023

Air Quality England

London Luton Airport (Site ID: HB006)

These data have been fully ratified
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	PM_{10} µg/m³
Number Days Low	274
Number Days Moderate	0
Number Days High	0
Number Days Very High	0
Max Daily Mean	36
Annual Max	89
Annual Mean	14
98th Percentile of daily mean	29
90th Percentile of daily mean	21
98th Percentile of hourly mean	35
95th Percentile of hourly mean	29
50th Percentile of hourly mean	13
% Annual data capture	**76.99**

Instruments:
PM_{10}: BAM Gravimetric Equivalent (correction applied) (01/01/2023 to 31/12/2023)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
PM_{10} particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	0	0
PM_{10} particulate matter (Hourly measured)	**Annual mean > 40 microgrammes per metre cubed**	**0**	**-**

Annual Graph

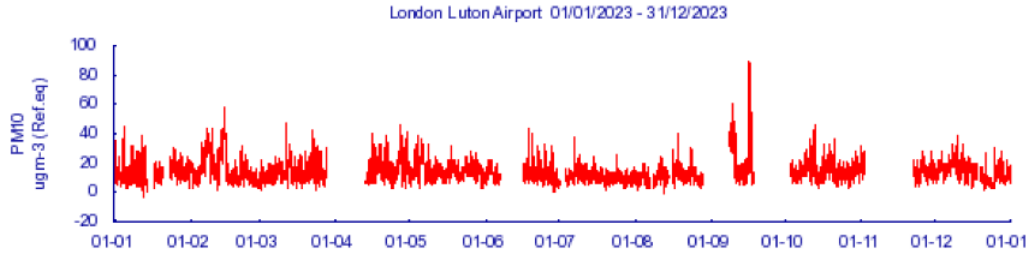
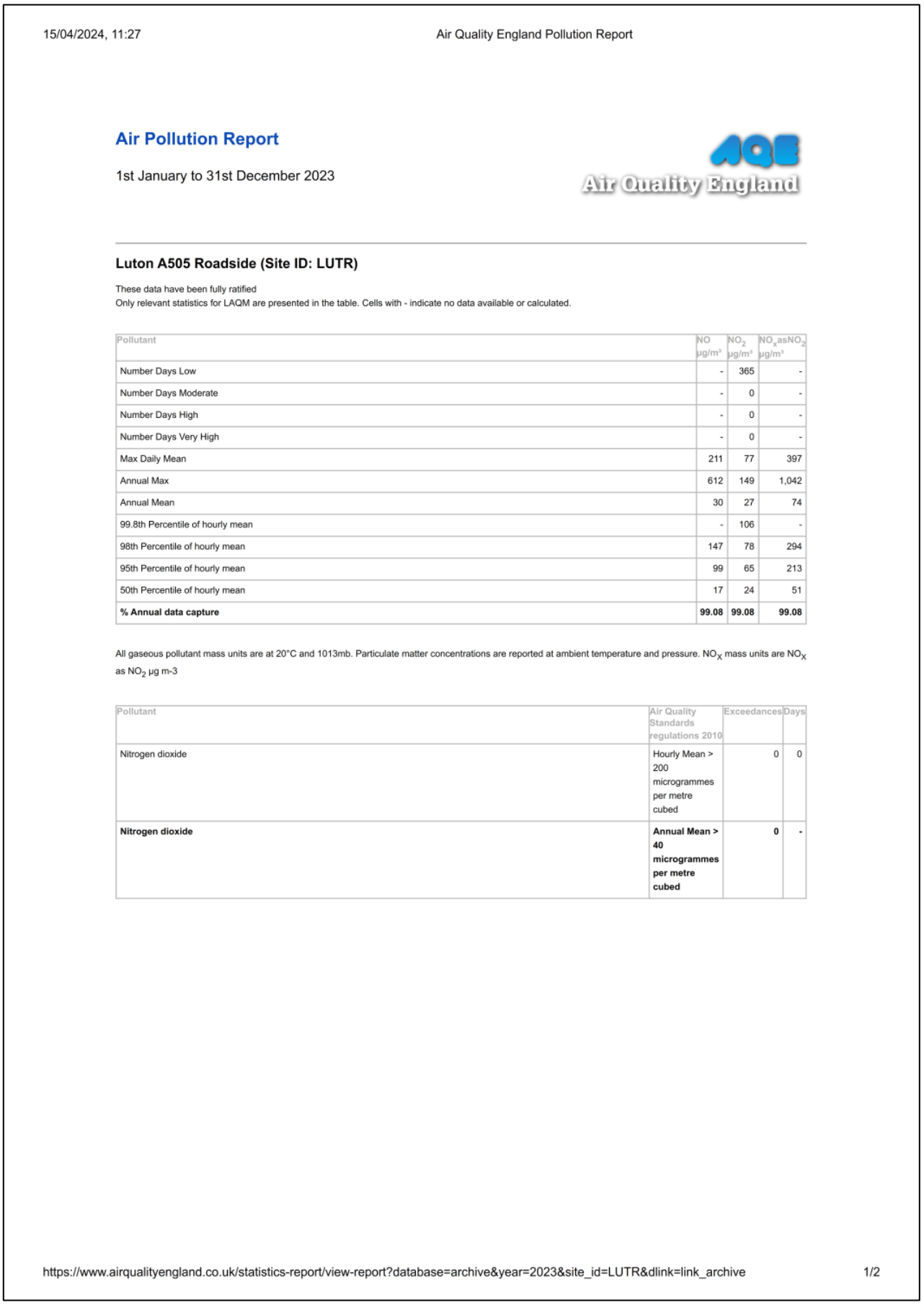


Figure C.7 – 2023 Air Pollution Report – Luton A505 Roadside (Site ID: LUTR)

Source: https://tinyurl.com/4j26dxu3



15/04/2024, 11:27 Air Quality England Pollution Report

Air Pollution Report

1st January to 31st December 2023

Air Quality England

Luton A505 Roadside (Site ID: LUTR)

These data have been fully ratified
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³
Number Days Low	-	365	-
Number Days Moderate	-	0	-
Number Days High	-	0	-
Number Days Very High	-	0	-
Max Daily Mean	211	77	397
Annual Max	612	149	1,042
Annual Mean	30	27	74
99.8th Percentile of hourly mean	-	106	-
98th Percentile of hourly mean	147	78	294
95th Percentile of hourly mean	99	65	213
50th Percentile of hourly mean	17	24	51
% Annual data capture	**99.08**	**99.08**	**99.08**

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	**Annual Mean > 40 microgrammes per metre cubed**	**0**	**-**

https://www.airqualityengland.co.uk/statistics-report/view-report?database=archive&year=2023&site_id=LUTR&dlink=link_archive 1/2

Annual Graph

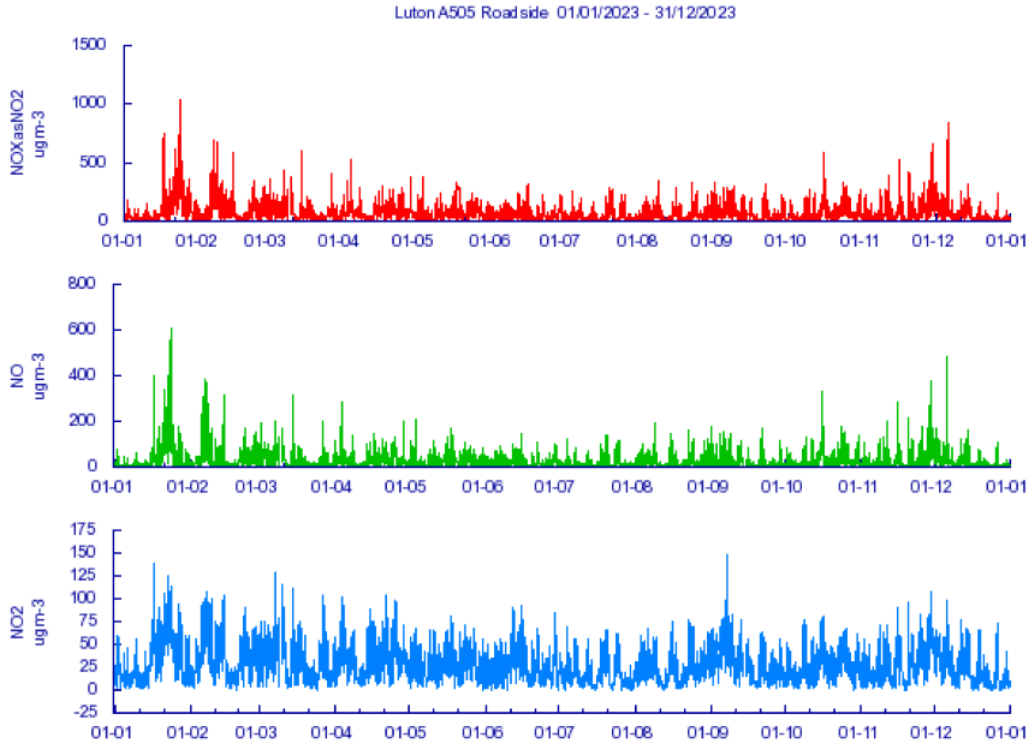


Figure C.8 – 2023 Air Pollution Report – LA001: London Luton Airport FutureLuToN

Source: https://tinyurl.com/4787abwm

Air Pollution Report

1st January to 31st December 2023

Air Quality England

Luton Airport FutureLuToN (Site ID: LA001)

These data have been fully ratified
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

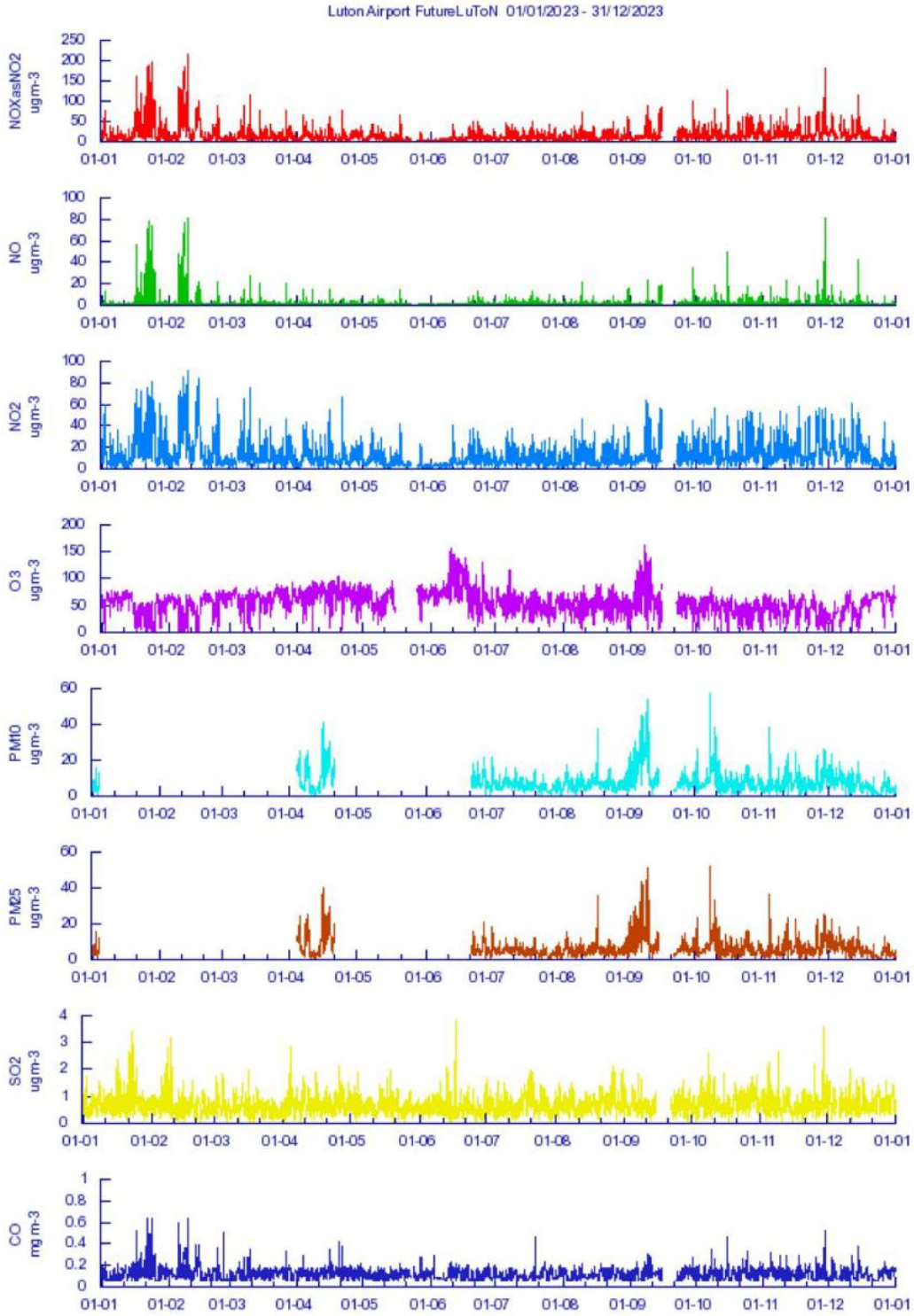
Pollutant	O_3 µg/m³	NO µg/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³	SO_2 µg/m³	CO mg/m³	PM_{10} µg/m³	PM_{25} µg/m³	BC µg/m³	C_6H_6 µg/m³	TOLUENE µg/m³	ETHBENZ µg/m³	mpXYLENE µg/m³	oXYLENE µg/m³	NAPHTH µg/m³
Number Days Low	350	-	357	-	355	0	203	203	0	0	0	0	0	0	0
Number Days Moderate	20	-	0	-	0	0	0	0	0	0	0	0	0	0	0
Number Days High	0	-	0	-	0	0	0	0	0	0	0	0	0	0	0
Number Days Very High	0	-	0	-	0	0	0	0	0	0	0	0	0	0	0
Max 15 min SO2	-	-	-	-	149	-	-	-	-	-	-	-	-	-	-
Max 8 Hour CO	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
Max 8 Hour Ozone	149	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Max Daily Mean	109	29	60	105	2	0	26	20	2	1	2	2	8	2	3
Annual Max	162	82	91	216	4	1	57	53	7	2	16	19	63	19	62
Annual Mean	55	2	13	16	1	0	8	7	0	0	0	0	1	0	0
98th Percentile of daily mean	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-
90th Percentile of daily mean	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-
99.9th Percentile of 15 minute mean	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
99.8th Percentile of hourly mean	-	-	74	-	-	-	-	-	-	-	-	-	-	-	-
99.7th Percentile of hourly mean	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
98th Percentile of hourly mean	104	12	51	68	2	0	25	23	1	1	2	2	7	3	1
95th Percentile of hourly mean	87	6	38	46	1	0	20	17	1	1	1	1	3	1	0
50th Percentile of hourly mean	56	1	9	11	1	0	6	5	0	0	0	0	0	0	0
% Annual data capture	**94.69**	**96.56**	**96.56**	**96.56**	**96.07**	**97.08**	**56.44**	**56.44**	**98.04**	**80.91**	**80.91**	**80.87**	**75.99**	**80.58**	**80.59**

Instruments:
PM_{10}: GRIMM (01/01/2023 to 31/12/2023)
PM_{25}: GRIMM (01/01/2023 to 31/12/2023)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
Carbon monoxide	Daily maximum 8-hour running mean > 10 milligrammes per metre cubed	0	0
PM_{10} particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	0	0
PM_{10} particulate matter (Hourly measured)	Annual mean > 40 microgrammes per metre cubed	0	-
$PM_{2.5}$ particulate matter (Hourly measured)	Annual mean > 25 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-
Ozone	8-hour running mean > 100 microgrammes per metre cubed	171	20
Sulphur dioxide	15 Minute mean > 266 microgrammes per metre cubed	0	0
Sulphur dioxide	Hourly mean > 350 microgrammes per metre cubed	0	0
Sulphur dioxide	Daily Mean > 125 microgrammes per metre cubed	0	0
Sulphur dioxide	Annual mean > 20 microgrammes per metre cubed	0	-
Sulphur dioxide	**Winter Mean > 20 microgrammes per metre cubed**	**0**	**-**

Annual Graph



PM_{10} and $PM_{2.5}$ Monitoring Adjustment

Particulate monitoring is undertaken at three sites within Luton:

i) **LN60 (HB007)** – Dunstable Road East [https://w3w.co/final.much.shots]; Luton Council operated Palas Fidas 200 measuring both PM_{10} and $PM_{2.5}$. No correction applied to PM_{10} data. Correction factor of 0.9434 applied to $PM_{2.5}$ data (ie divide by 1.06).

ii) **LA08 (HB006)** – London Luton Airport [https://w3w.co/client.taxi.super]; LLAOL operated unheated Beta Attenuation Mass Monitor (BAM) measuring PM_{10}, correction factor of 0.8333 applied (i.e. divide by 1.2)**.**

iii) **LA001** – London Luton Airport FutureLuTon (Wigmore Valley Park) [https://w3w.co/feared.same.format]; LLAL operated GRIMM EDM 180 measuring both PM_{10} and $PM_{2.5}$. No correction factor applied to either PM_{10} or $PM_{2.5}$ data. It should be noted that the instrument used at this location is not of a type approved by Defra (as detailed in LAQM.TG22 Para 7.176).

Automatic Monitoring Annualisation

With an annual data capture of 56.4%, it was necessary to annualise the PM_{10} and $PM_{2.5}$ data obtained at Luton Rising's automatic monitoring site in Wigmore Valley Park (Site ID: LA001). This was done using whole-year data sets obtained from the *UK Air Data Selector* [https://tinyurl.com/s6fpm8xx] for the following *Automatic Urban & Rural Network* (AURN) monitoring sites (all of which are within a 50-mile radius of Luton and have data capture rates of over 85% for the calendar year):

- London Bloomsbury (*UKA00211*) – Type: Urban Background
- London N Ken (*UKA00266*) – Type: Urban Background
- Oxford St Ebbes (*UKA00518*) – Type: Urban Background
- London Honor Oak Park (*UKA00656*) – Type: Urban Background

The output of these corrections is presented in Table C.1.

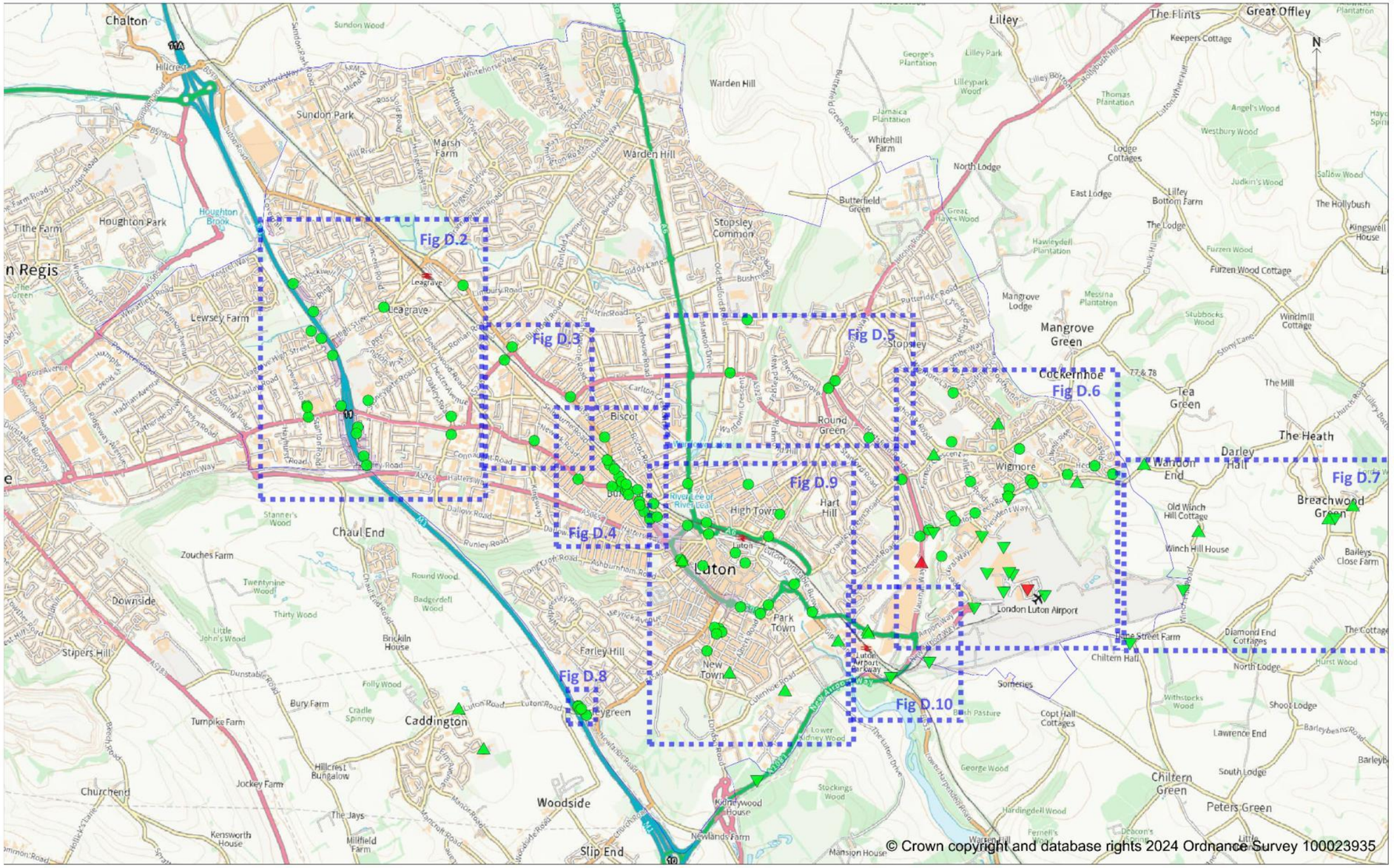
NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table A.3.

No automatic NO_2 monitoring locations within Luton required distance correction during 2023.

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

Figure D.1 – Map of Non-Automatic Monitor Sites - Overview.



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Date: 14/05/2024	

Figure D.2 – Map of Non-Automatic Monitor Sites in and around AQMA N[os.] 1 & 2 along the route of the M1 (Challney, Leagrave, Northwell & Poets wards).

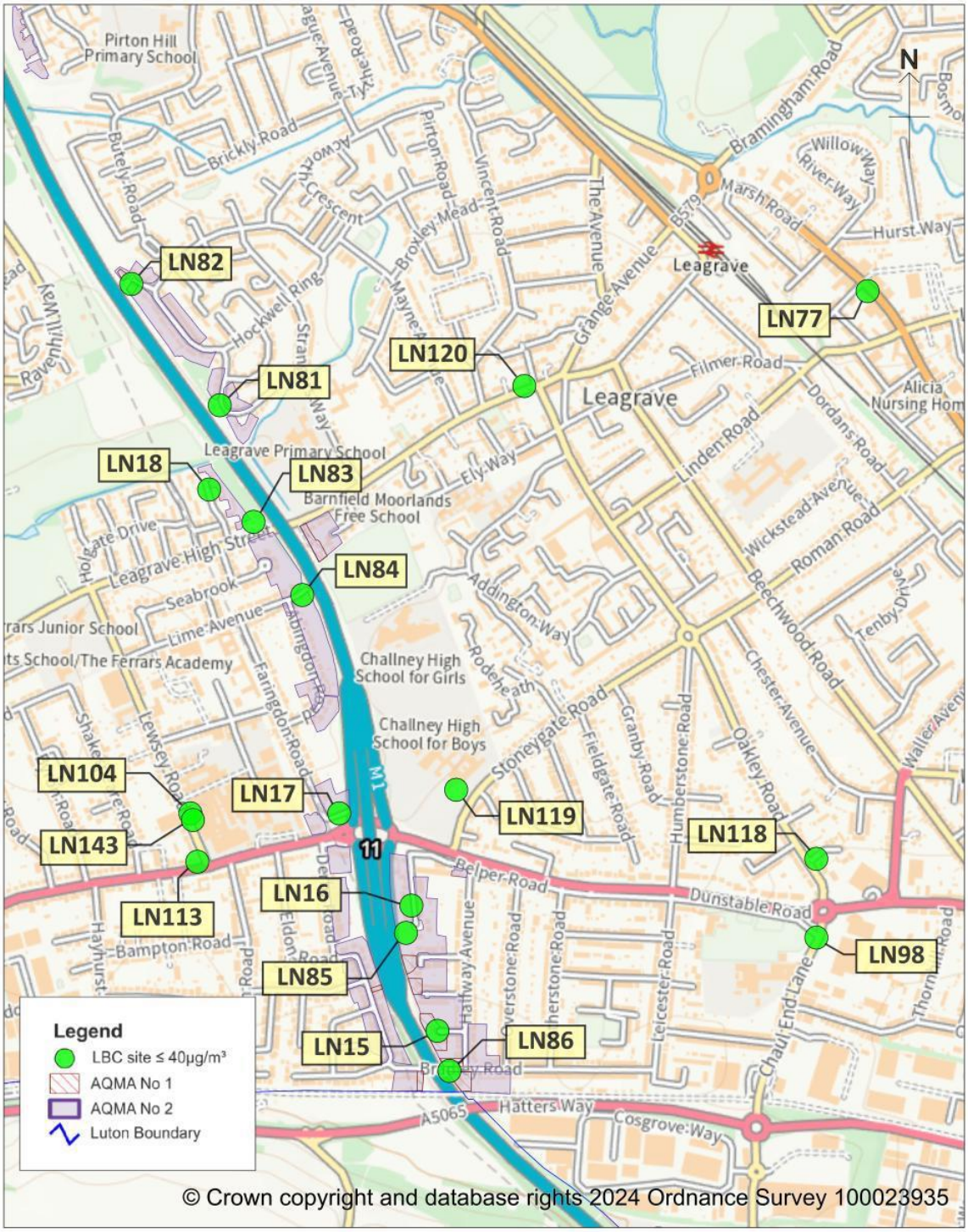

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Figure D.3 – Map of Non-Automatic Monitor Sites in Beech Hill, Challney and Saints wards.

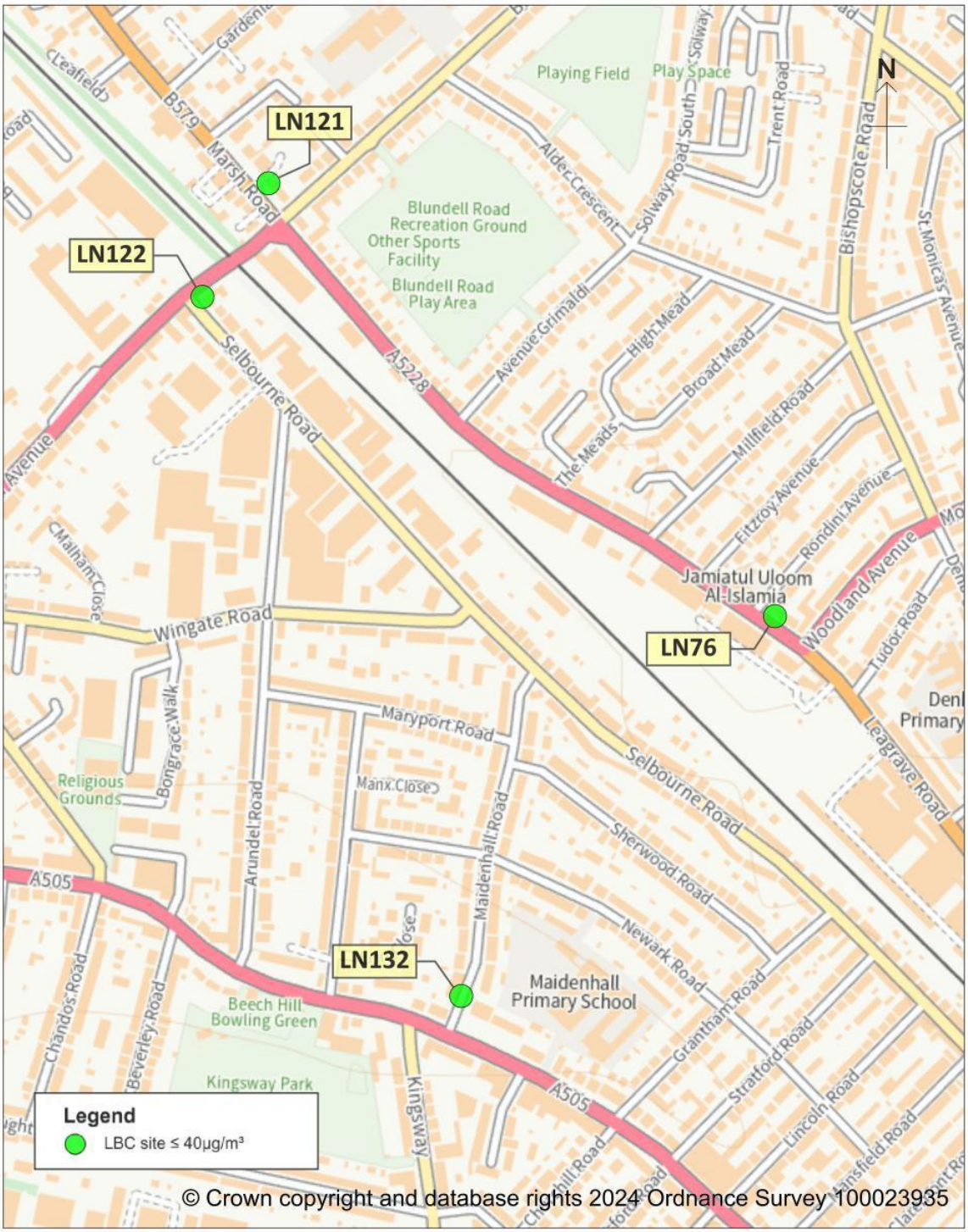

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Figure D.4 – Map of Non-Automatic Monitor Sites in and around Bury Park (Beech Hill, Biscot and Central wards).

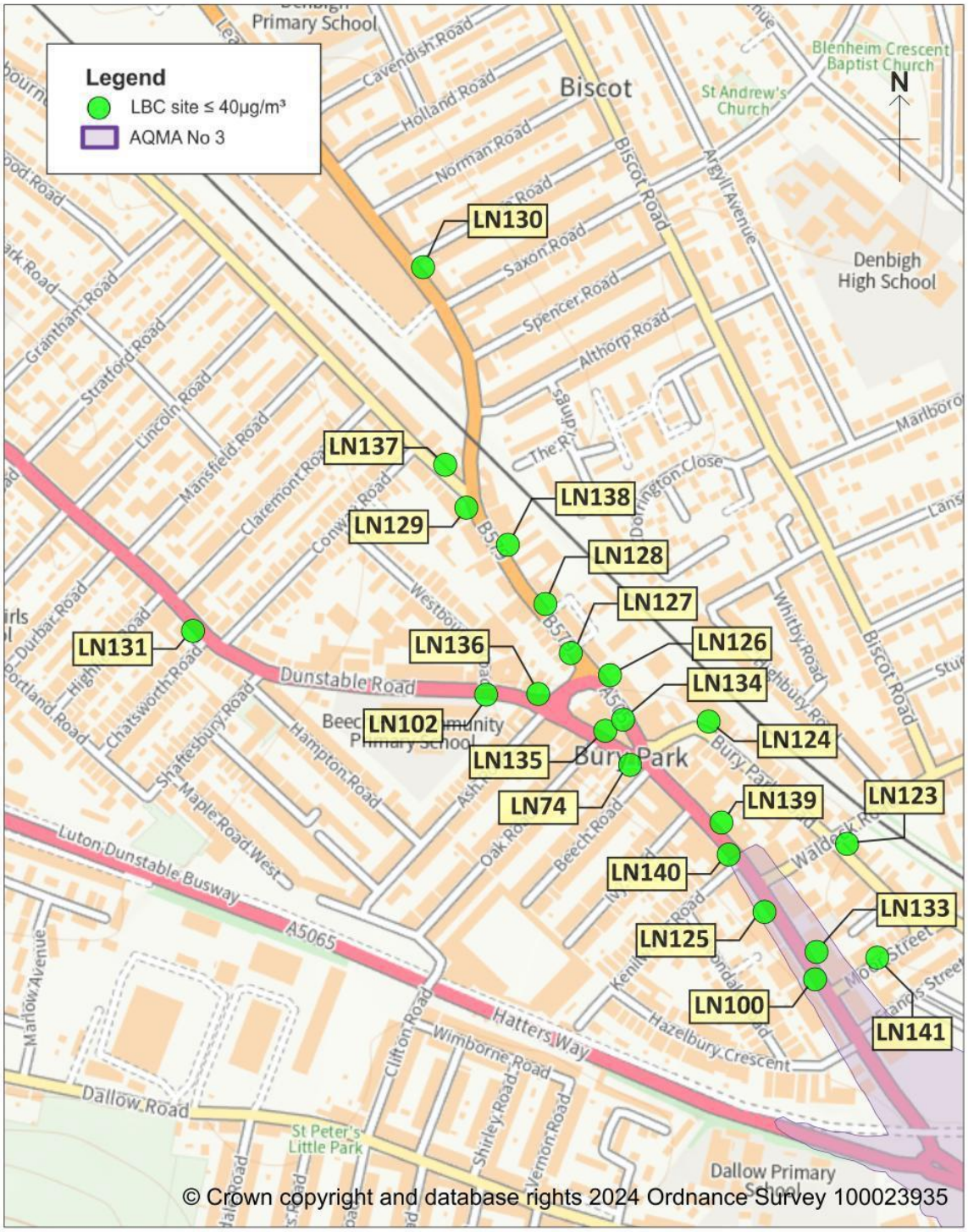

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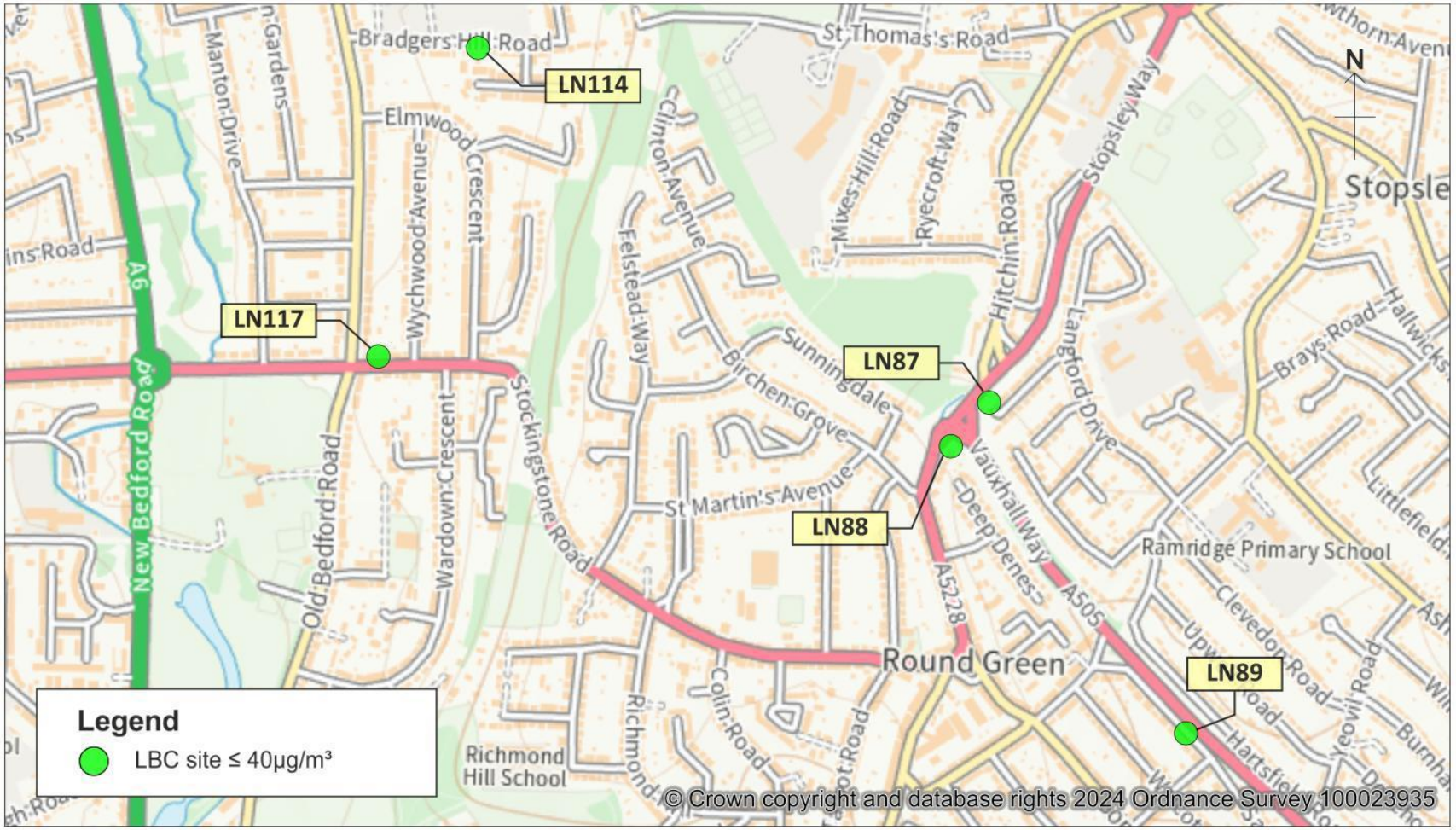
Figure D.5 – Map of Non-Automatic Monitor Sites in Barnfield, Round Green and Stopsley wards.



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Date: 13/05/2024	Scale: 1:15000

Figure D.6 – Map of Non-Automatic Monitor Sites near London Luton Airport (Stopsley, Vauxhall and Wigmore wards).

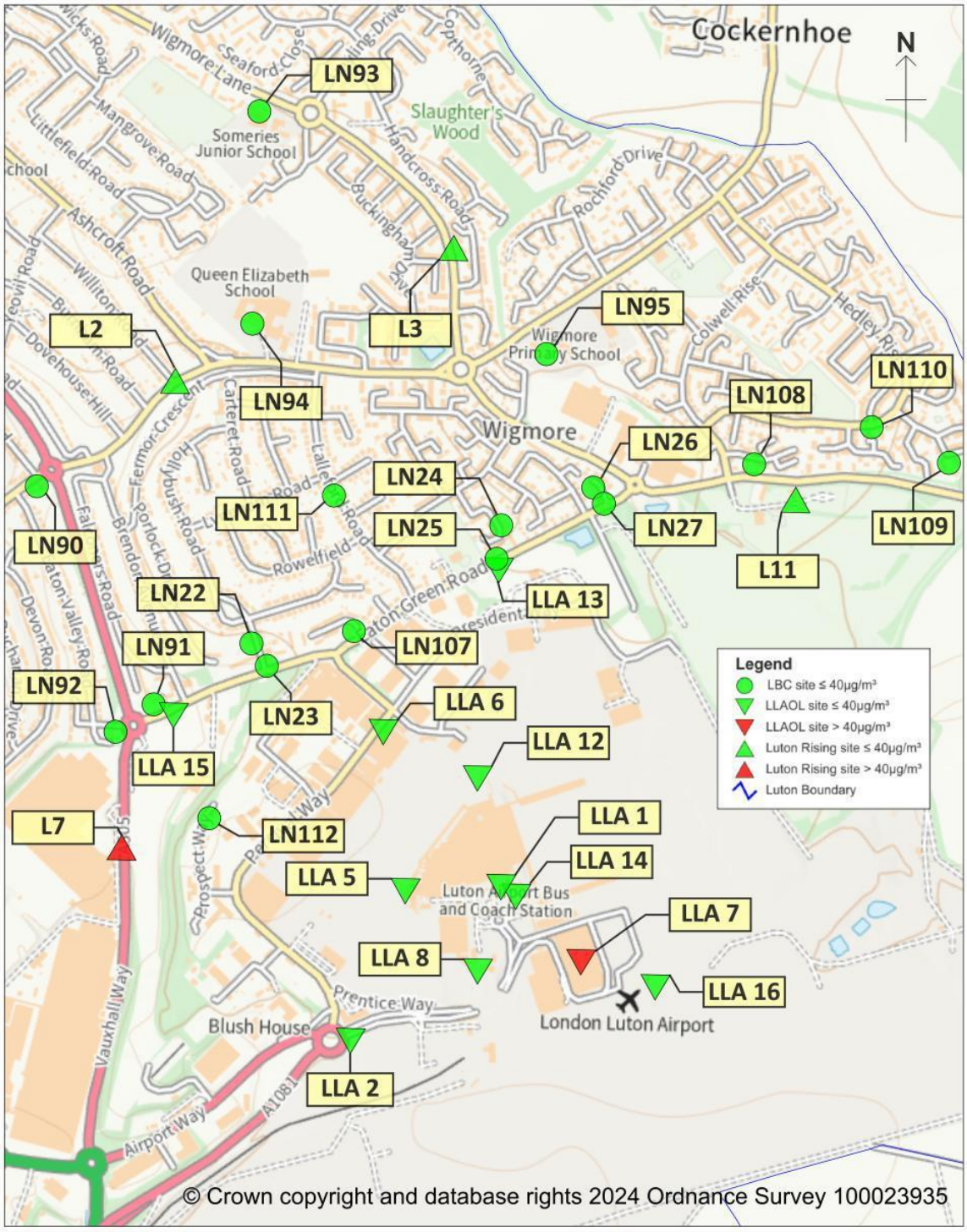

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Figure D.7 – Map of Non-Automatic Monitor Sites to the East of Luton Airport (Wigmore ward and out of borough).

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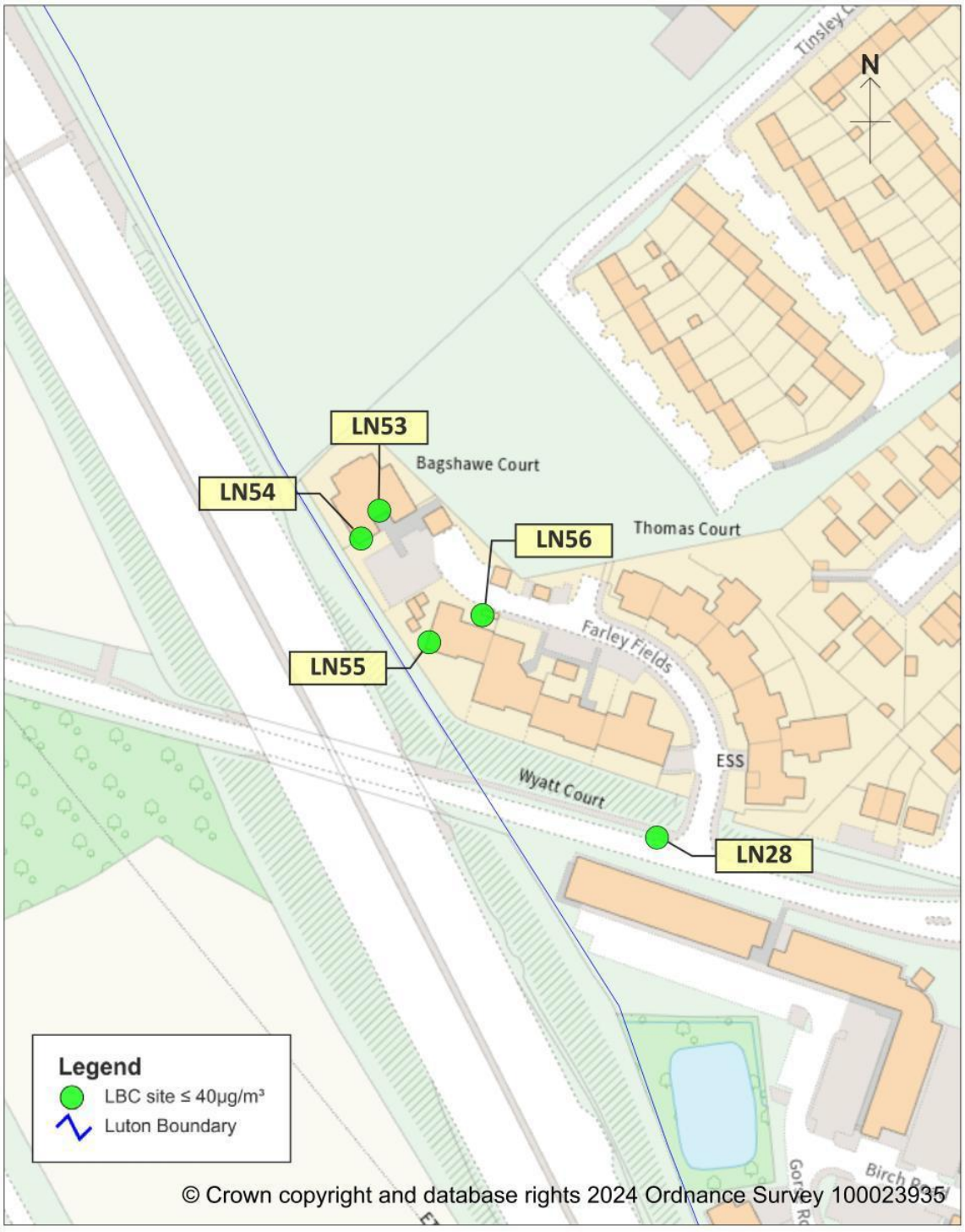
Date: 13/05/2024	Scale: 1:19999

Figure D.8 – Map of Non-Automatic Monitor Sites in Farley Fields (Farley ward).



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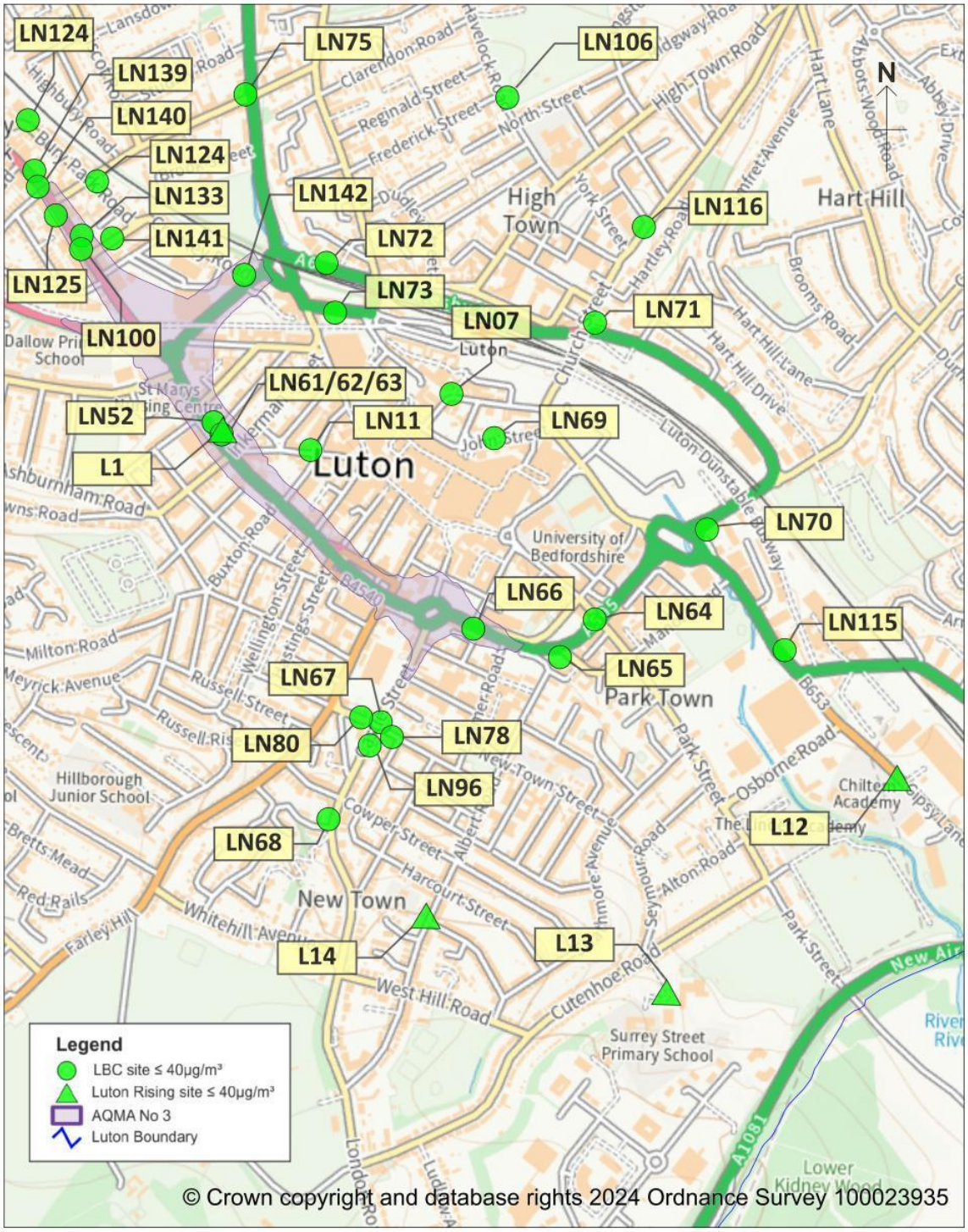
Date: 13/05/2024	Scale: 1:2500

Figure D.9 – Map of Non-Automatic Monitor Sites in the town centre and AQMA No. 3 (Beech Hill, Central, High Town and South wards).



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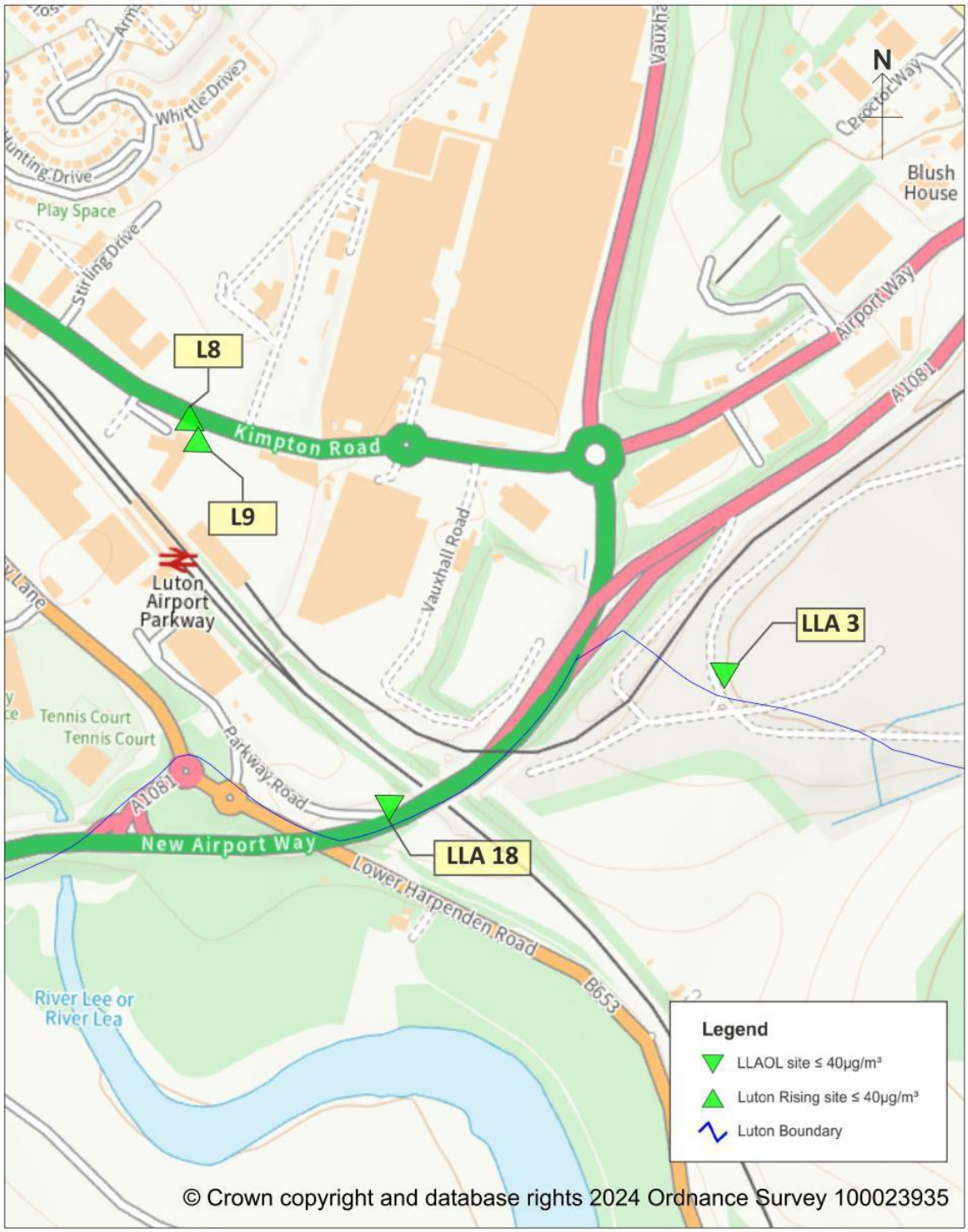
Date: 13/05/2024	Scale: 1:19999

Figure D.10 – Map of Non-Automatic Monitor Sites in South, Vauxhall and Wigmore wards.



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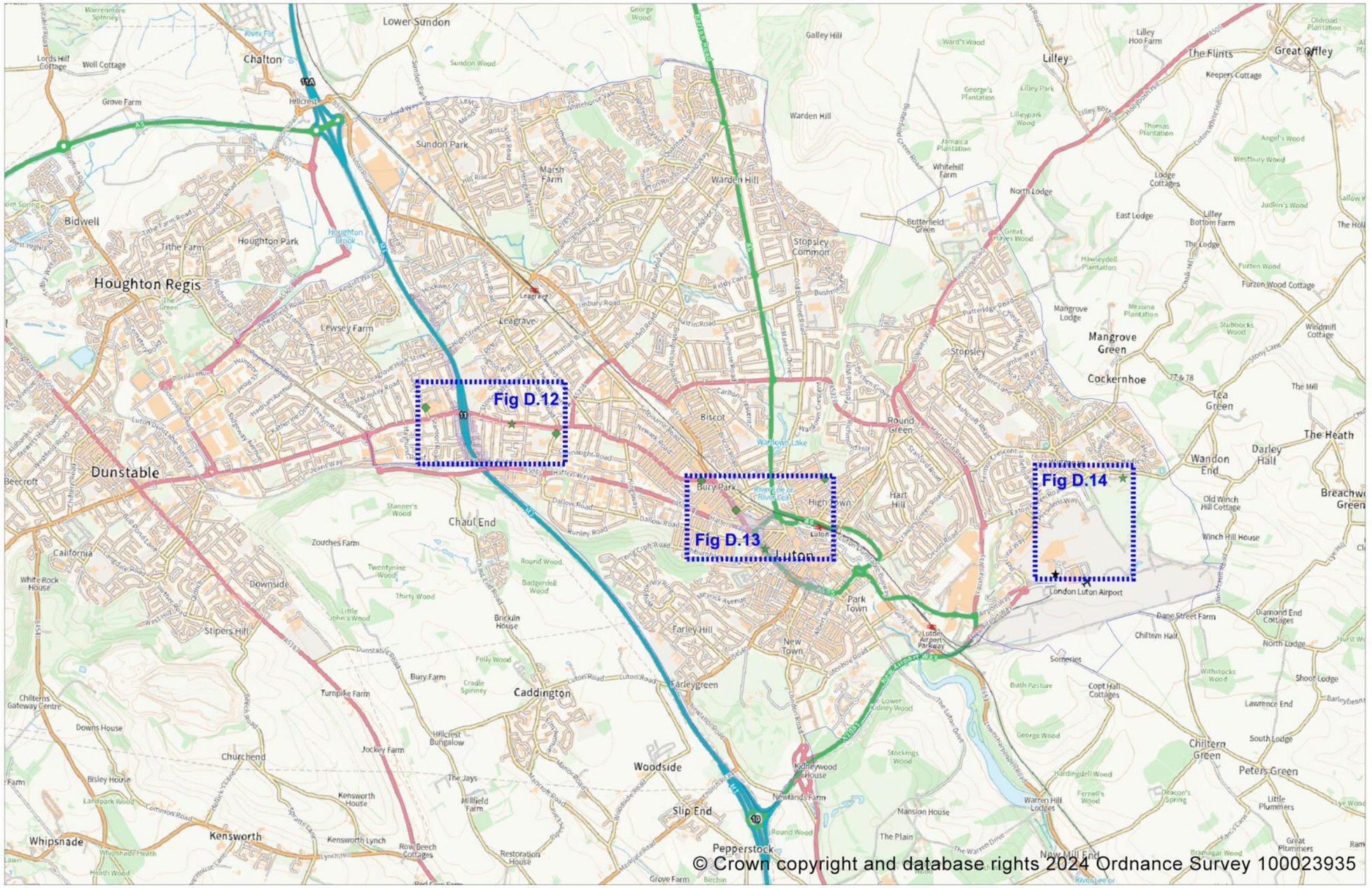
Drawing No:	ASR-2024/11
Date: 14/05/2024	Scale: 1:10000

Figure D.11 – Map of Automatic and Indicative Monitor Sites – Overview.



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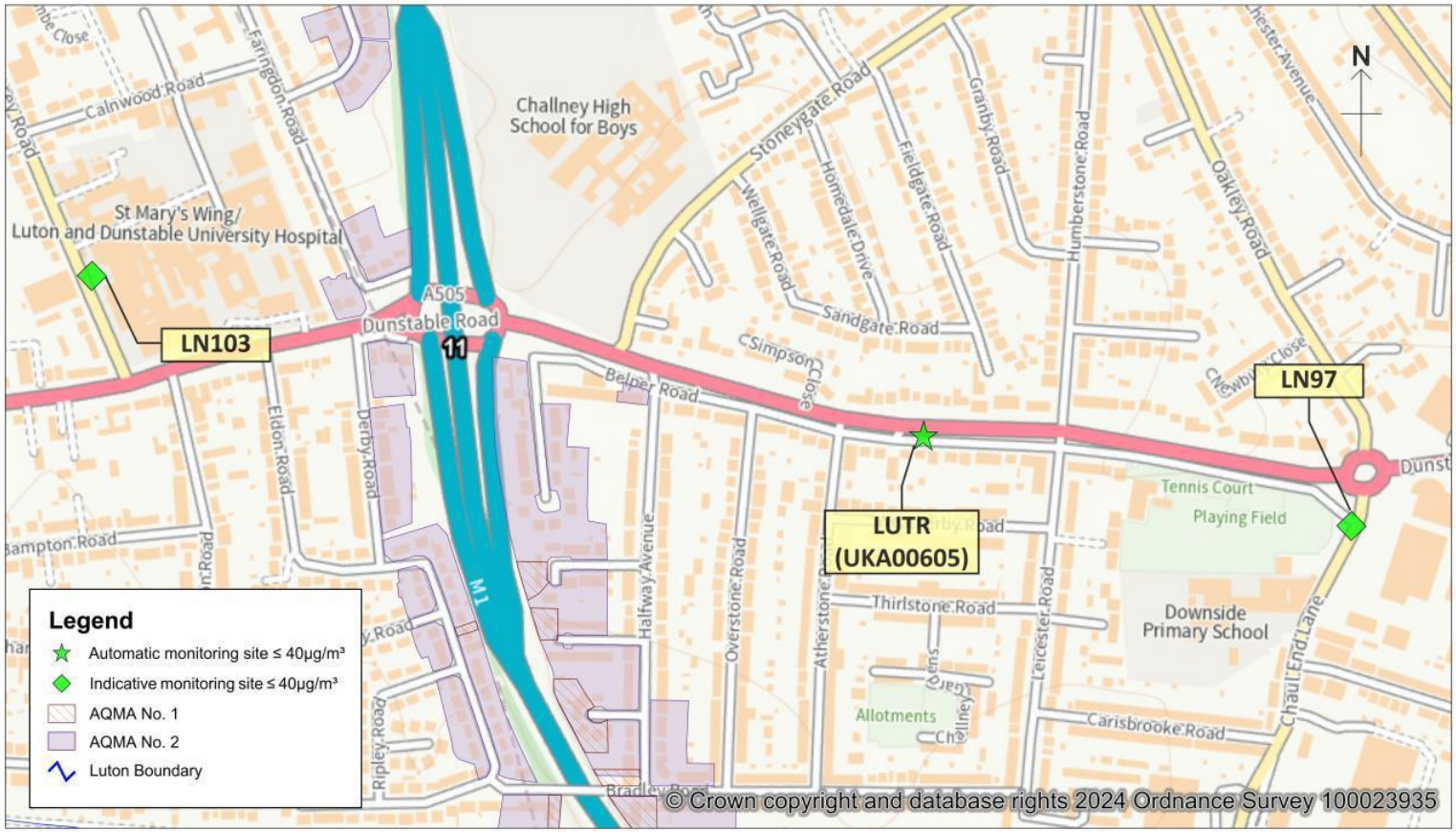
Drawing No:	ASR-2024/c0
Date: 16/05/2024	

Figure D.12 – Map of Automatic and Indicative Monitor Sites in Challney and Poets wards.



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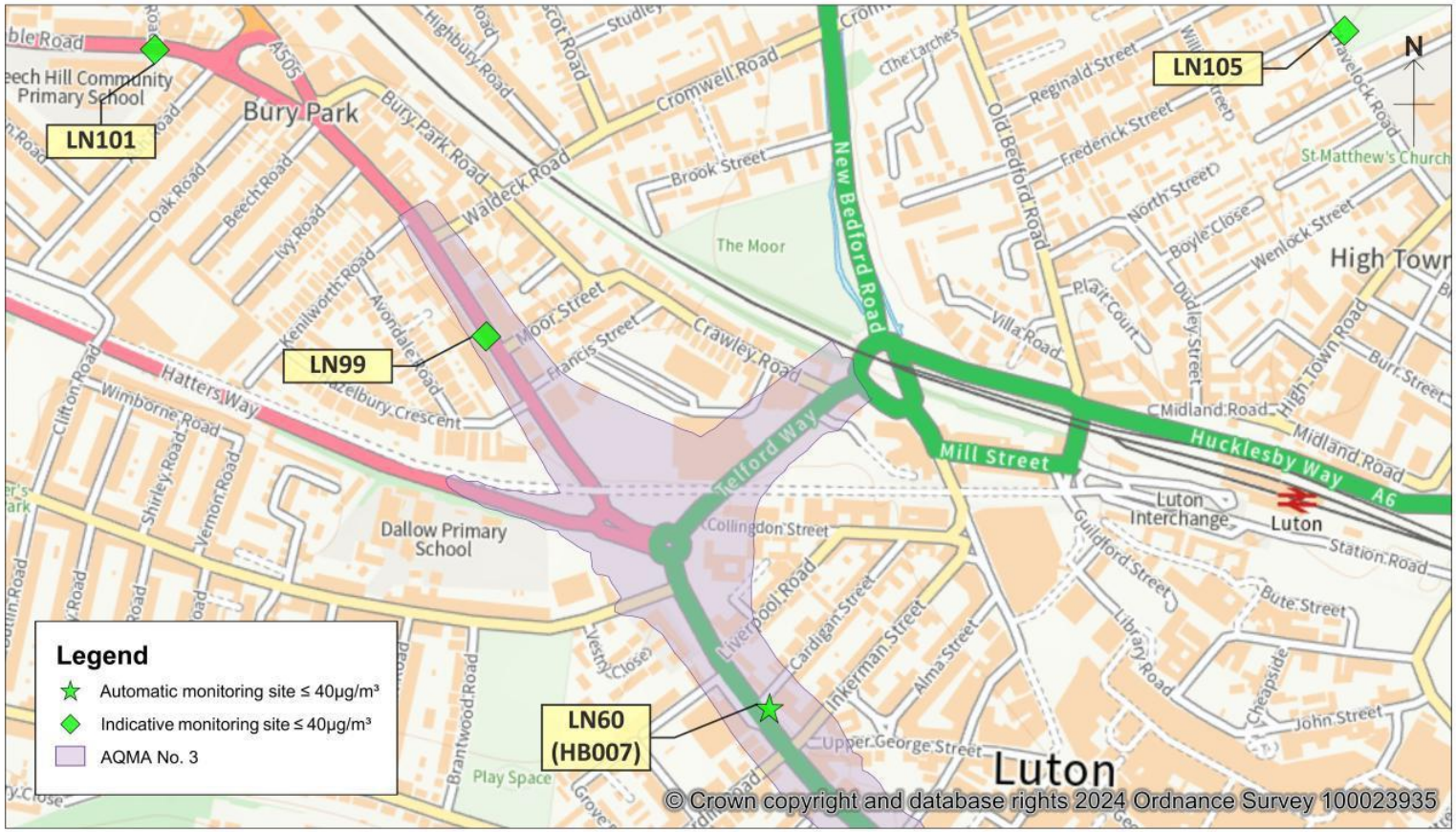
Drawing No:	ASR-2024-c1
Date: 16/05/2024	Scale: 1:10000

Figure D.13 – Map of Automatic and Indicative Monitor Sites in Beech Hill and Central wards.



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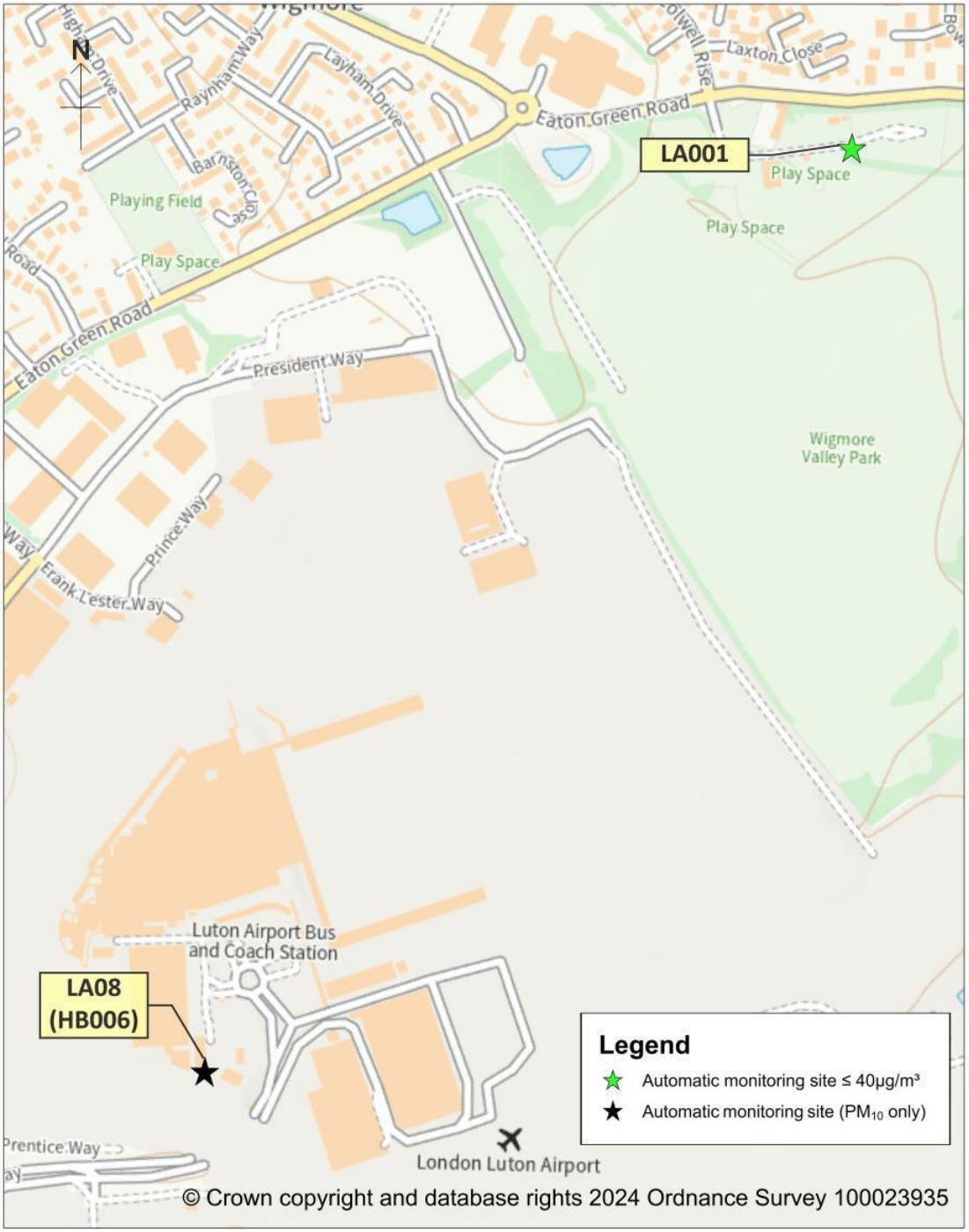
Date: 16/05/2024	Scale: 1:10000

Figure D.14 – Map of Automatic Monitor Sites in Wigmore ward.



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Department:	Env. Protection
Drawing No:	ASR-2024/c3
Date: 16/05/2024	Scale: 1:10000

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objective in England[16]

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

[16] The units are in micrograms of pollutant per cubic metre of air (µg/m^3)

Appendix F: Time Variation Plots for Automatic Monitoring Sites

Consistent with the output of the Openair Time Variation tool implemented on the UK Air website for AURN monitoring site data (https://tinyurl.com/4zn5xfx2), for each automatic monitoring site within the borough the following panel charts show the average variation of NO_2, PM_{10} or $PM_{2.5}$ by:

(i) day of the week and hour of the day combined (the uppermost pane);
(ii) hour of the day (diurnal variation, lower left pane);
(iii) day of the week (lower middle pane); and
(iv) month of the year (seasonal variation, centre right pane).

Additionally, the charts also include:

(v) a plot of monthly percentage data capture (lower right pane).

For each chart, the shading on panes (i) to (iv) shows the 95% confidence intervals of the mean and the line of the mean.

Finally, the plot showing seasonal variation in NO_2 levels at HB007 also shows the average uncorrected value obtained for the three co-located diffusion tubes for the same month (shown in orange).

Nitrogen Dioxide (NO_2)

Figure F.1 – NO_2 data trends at LN60 (HB007) – Luton Dunstable Road East during 2023

Site: HB007 - Luton Dunstable Road East **Pollutant:** NO_2 **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/3zk7ptzs

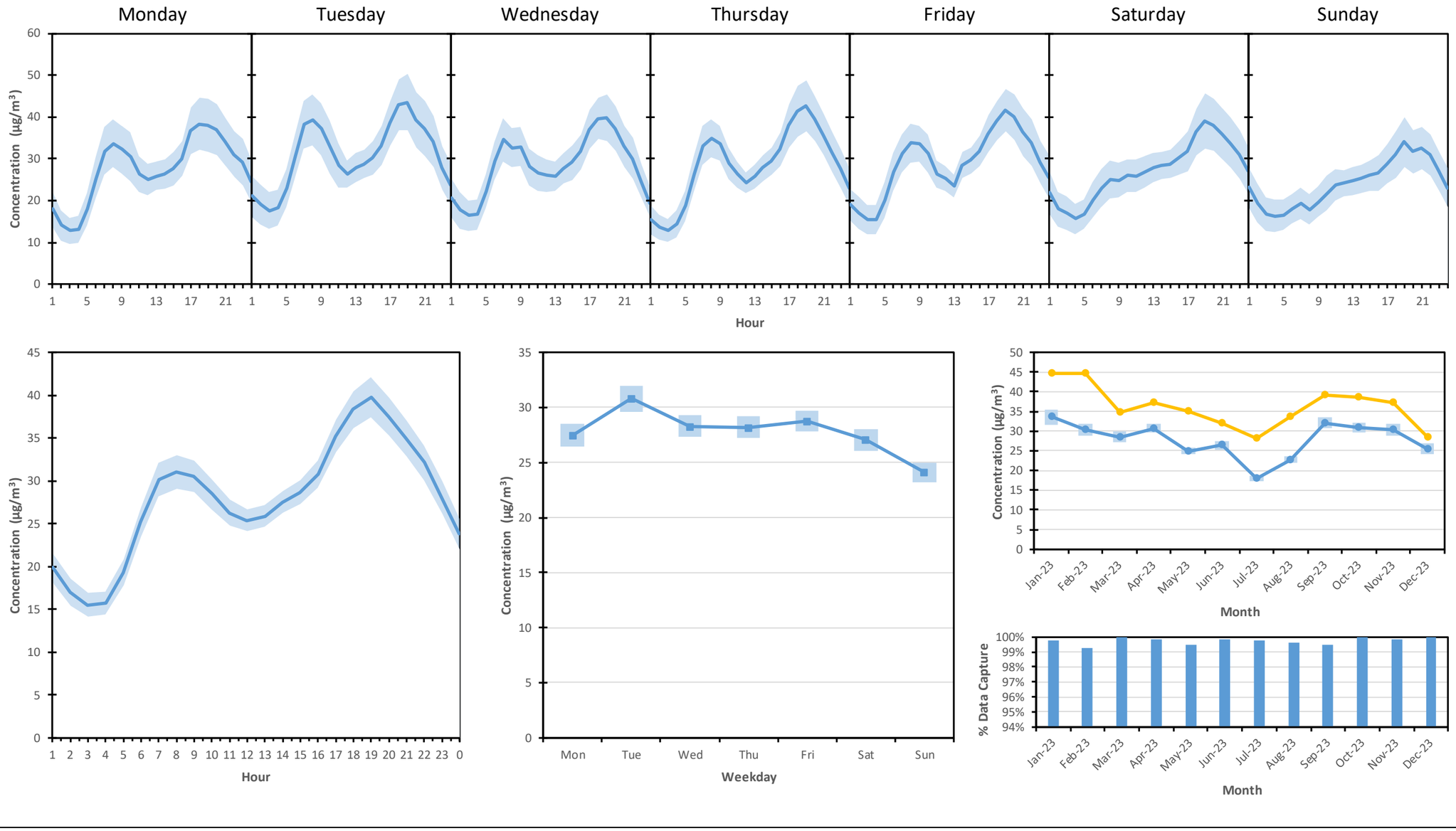
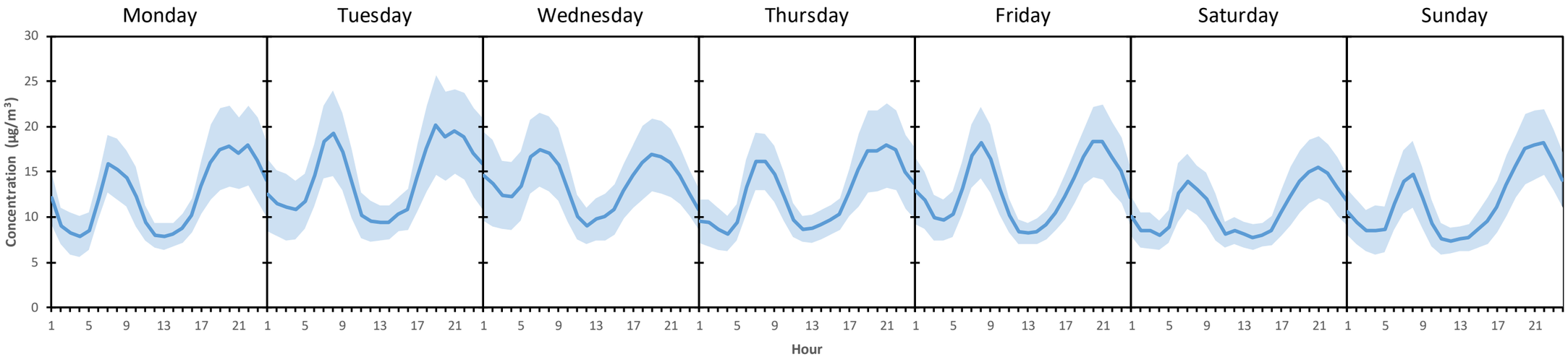


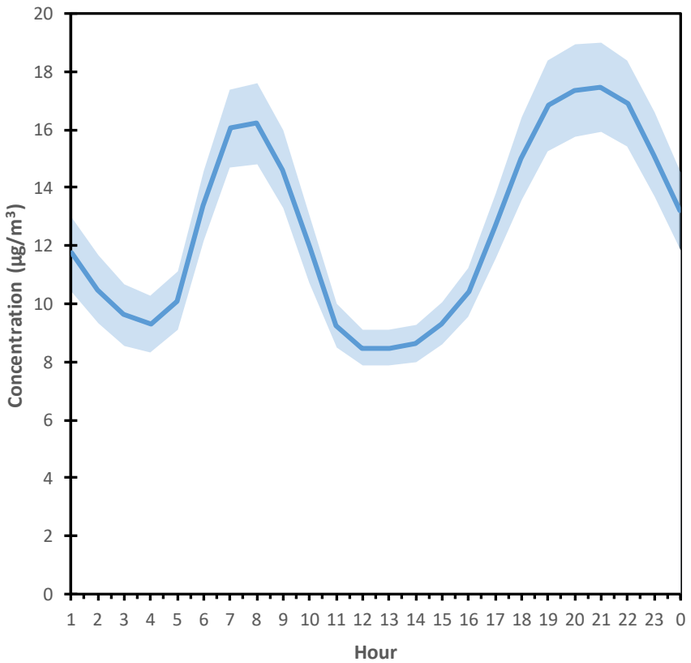
Figure F.2 – NO_2 data trends at LA001 – Luton Airport FutureLuToN during 2023

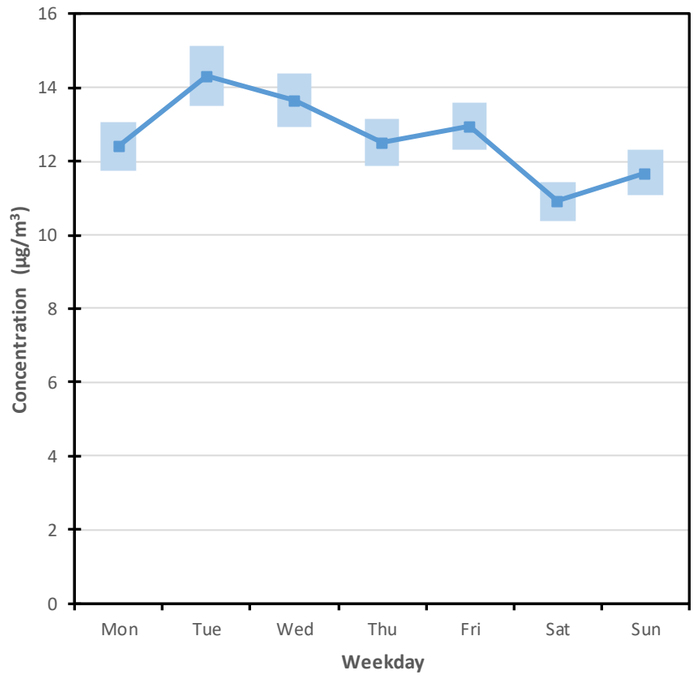
Site: LA001 - Luton Airport FutureLuToN **Pollutant:** NO_2 **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/u66ayv8e







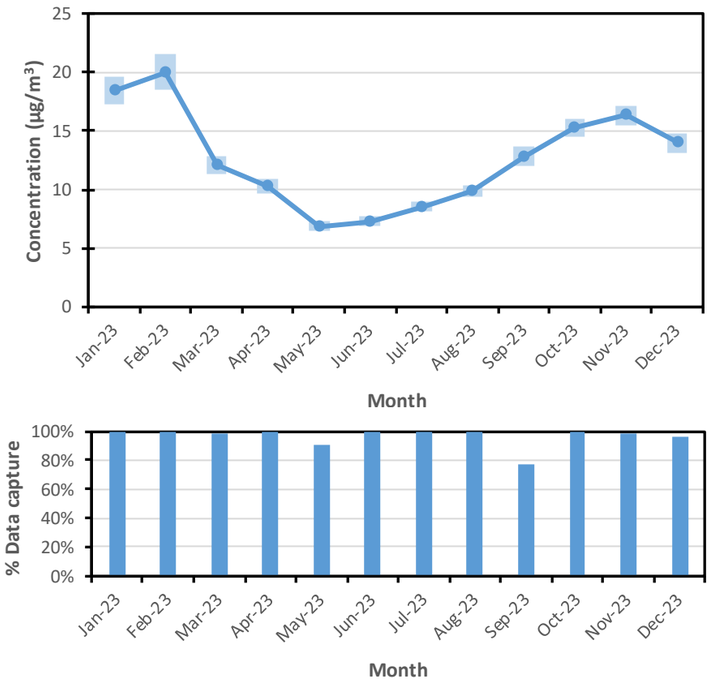
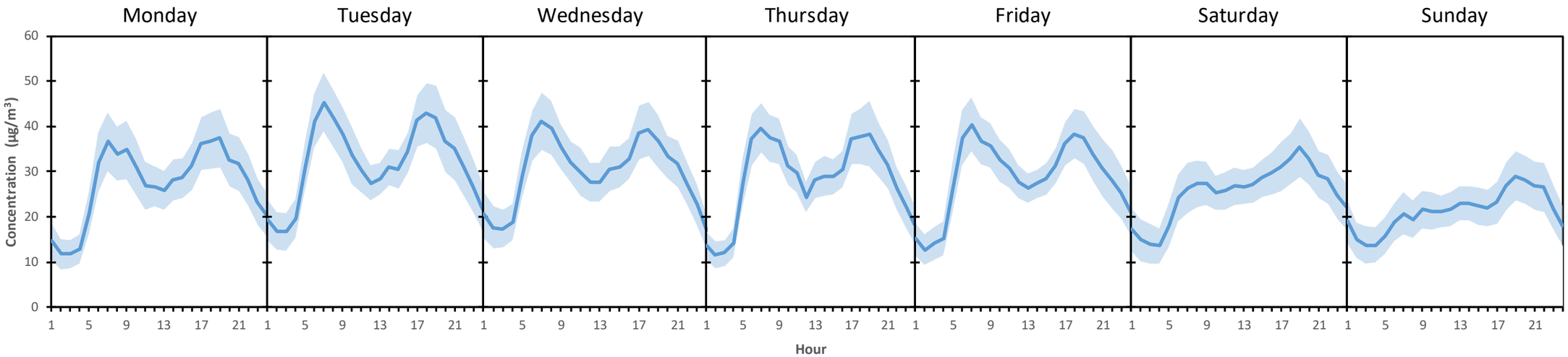


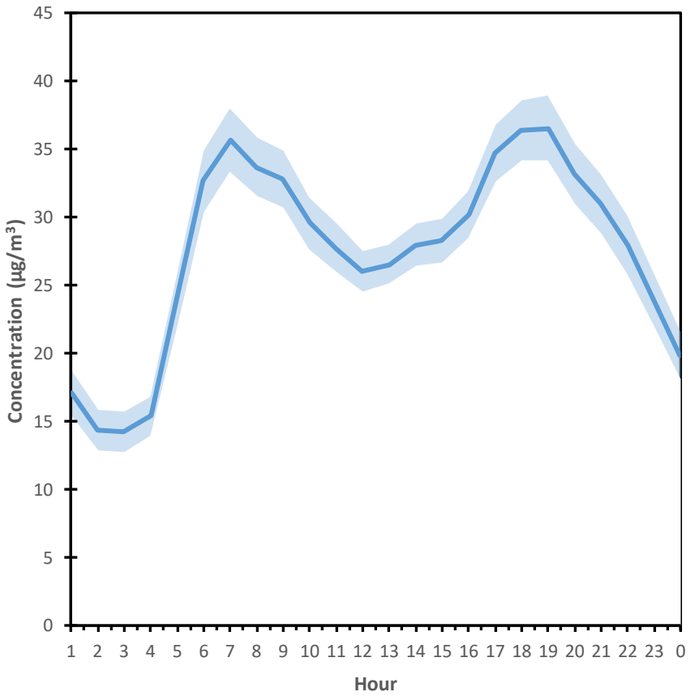
Figure F.3 – NO_2 data trends at LUTR – Luton A505 Roadside during 2023

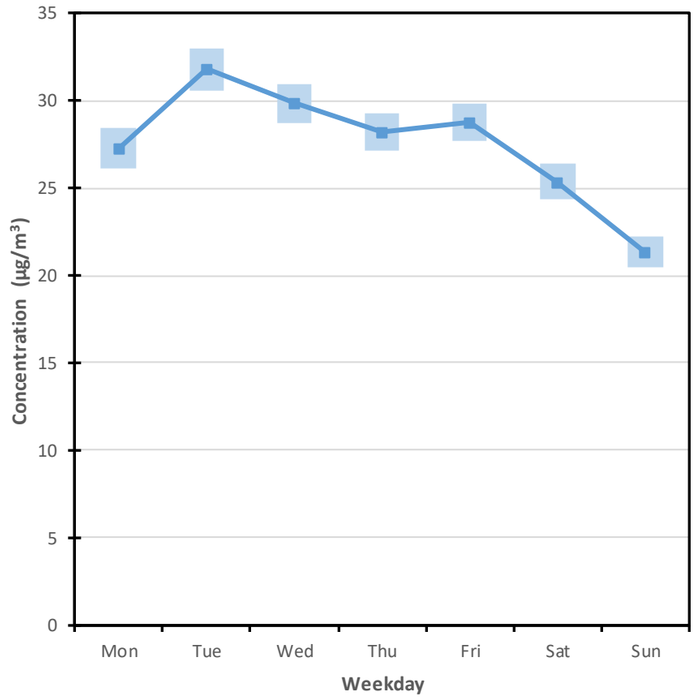
Site: LUTR - Luton A505 Roadside **Pollutant:** NO_2 **Data Status:** R - Ratified Data

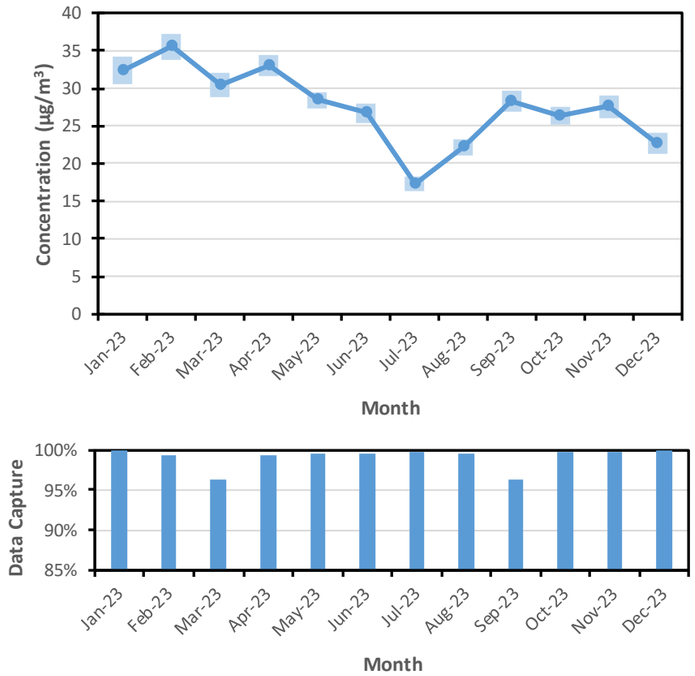
Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/2p98pr45









Particulate Matter (PM_{10})

Figure F.4 – PM_{10} data trends at LN60 (HB007) – Luton Dunstable Road East during 2023

Site: HB007 - Luton Dunstable Road East **Pollutant:** PM_{10} **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/3zk7ptzs

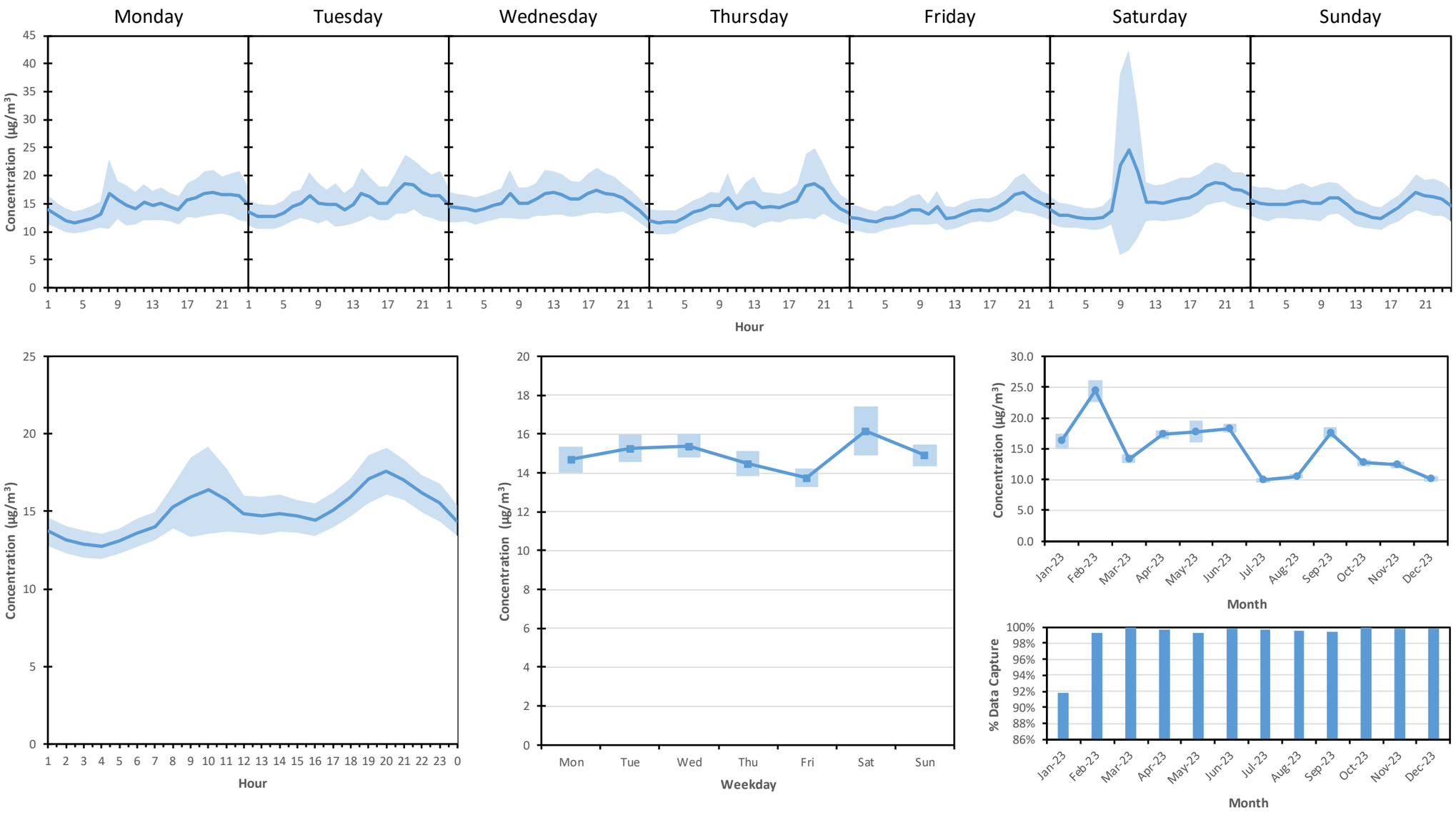


Figure F.5 – PM_{10} data trends at LA08 (HB006) – London Luton Airport during 2023

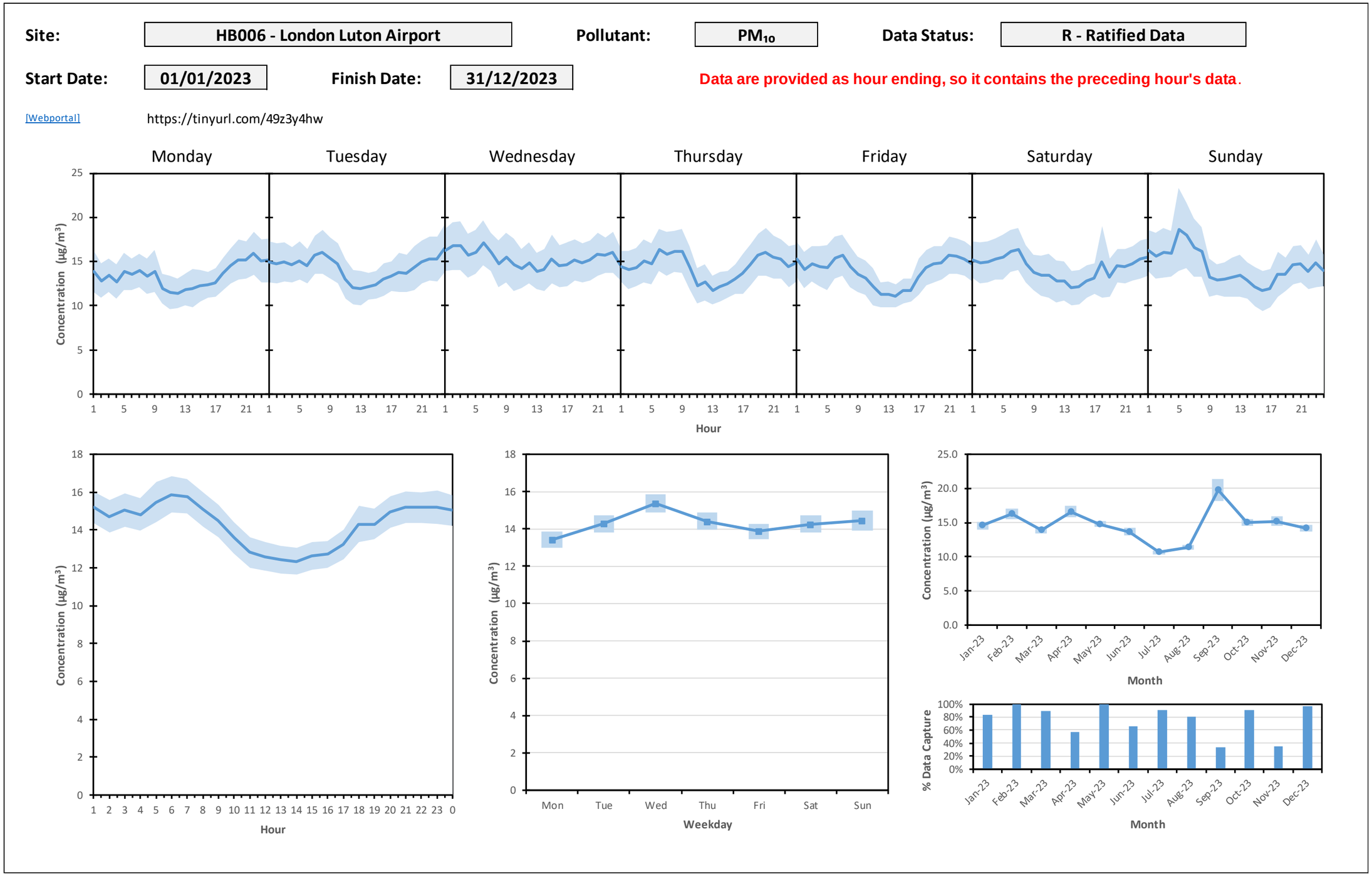
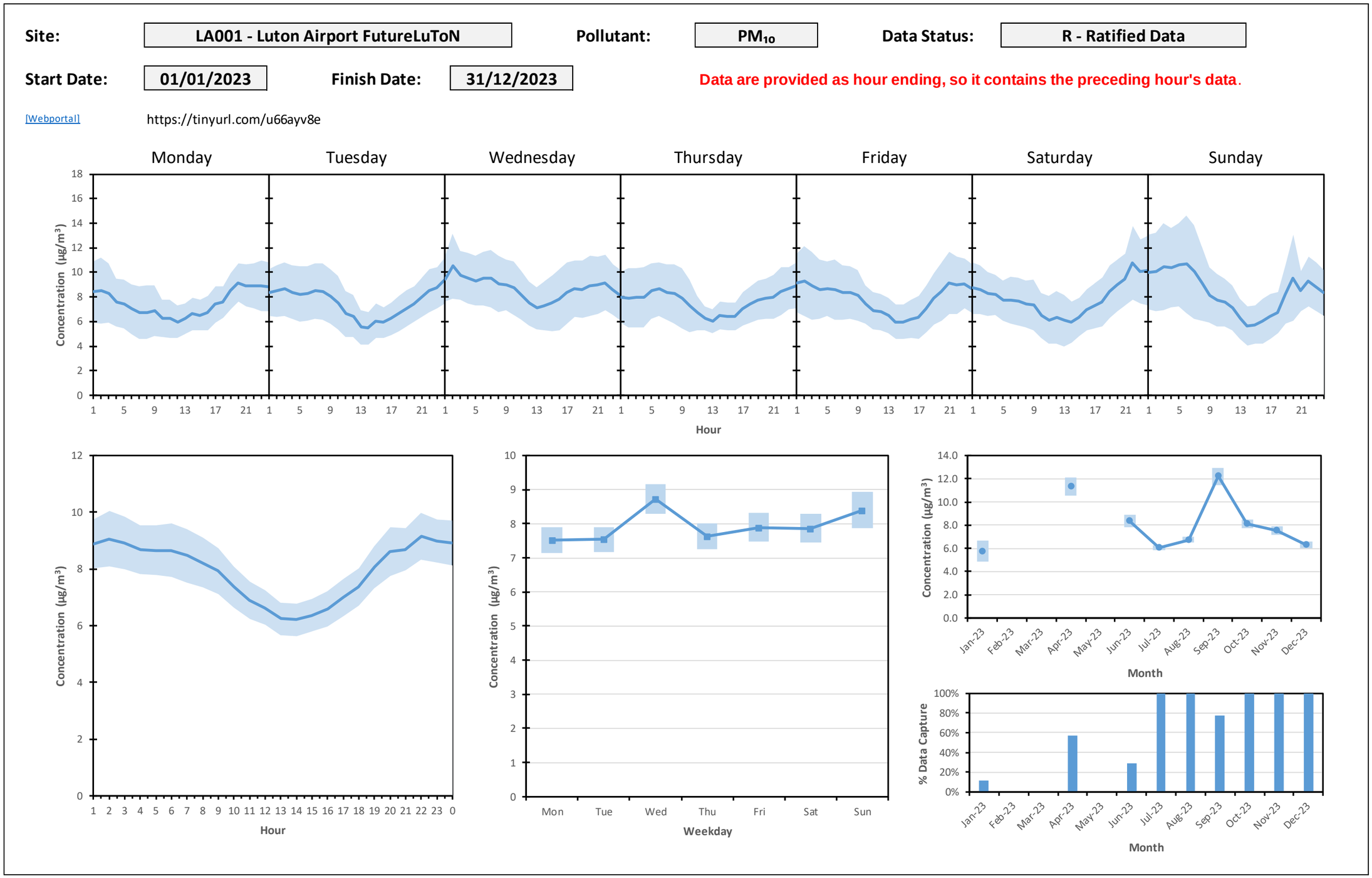


Figure F.6 – PM_{10} data trends at LA001 – Luton Airport FutureLuToN during 2023



Particulate Matter ($PM_{2.5}$)

Figure F.7 – $PM_{2.5}$ data trends at LN60 (HB007) – Luton Dunstable Road East during 2023

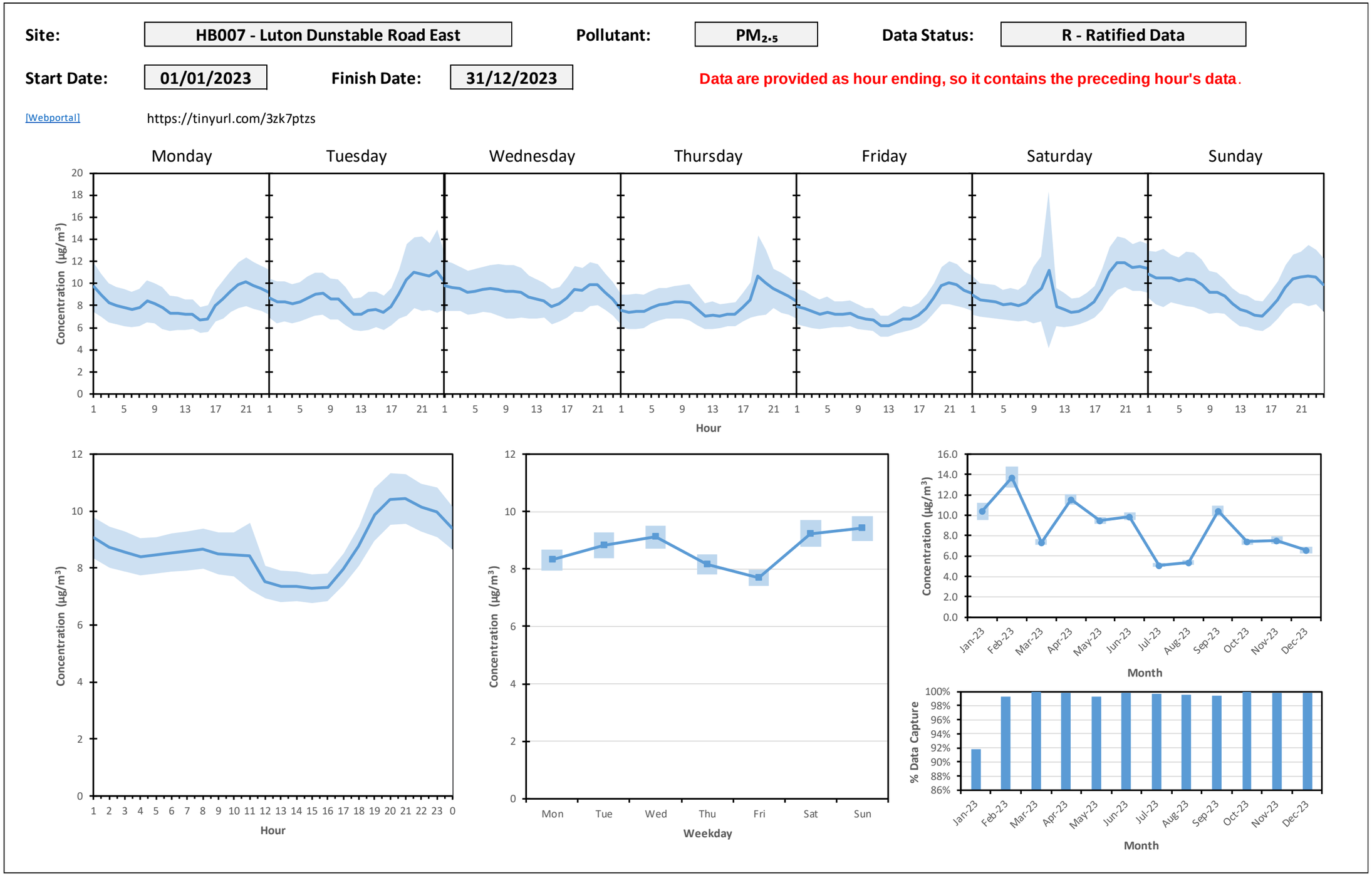
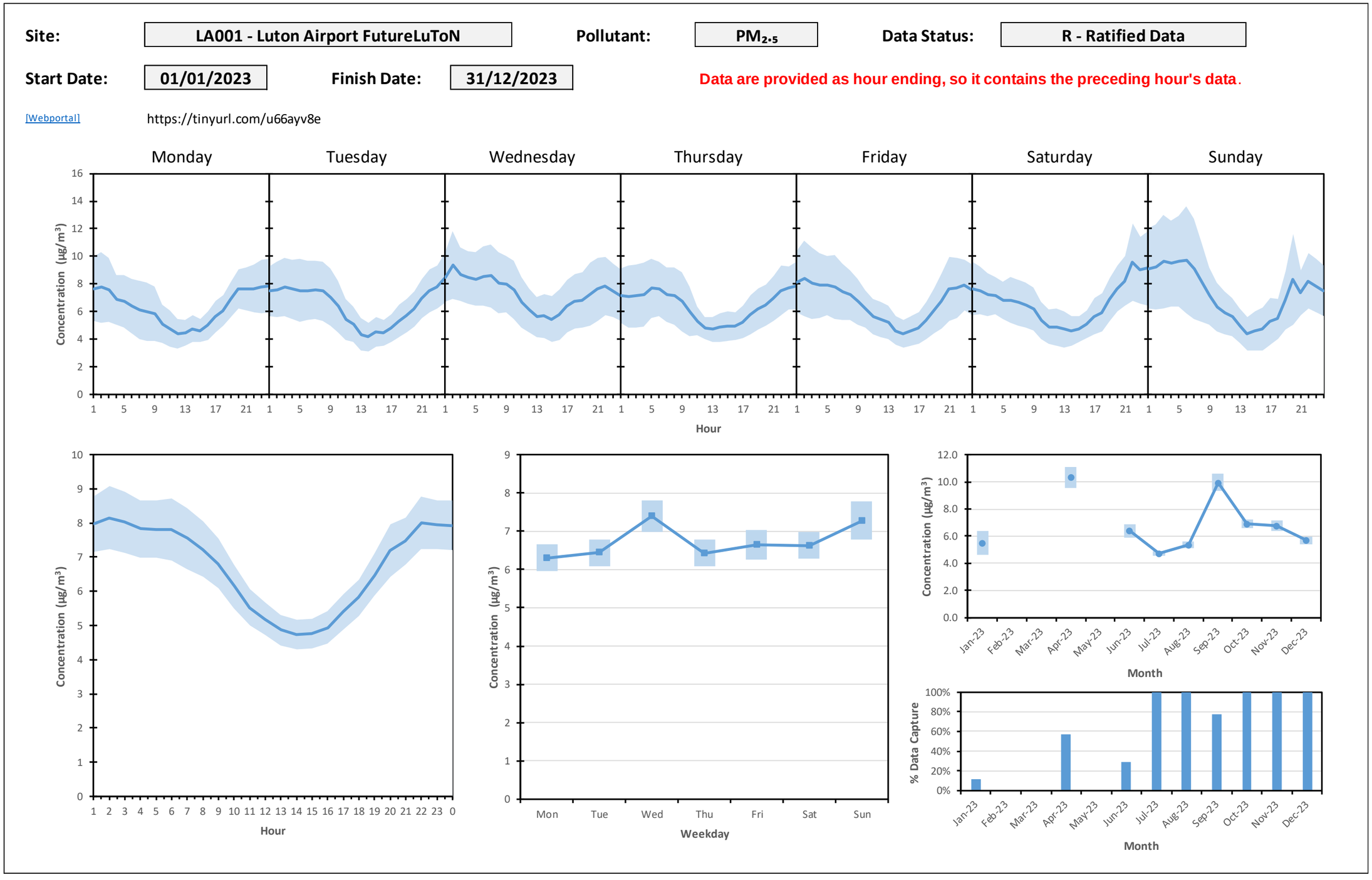


Figure F.8 – $PM_{2.5}$ data trends at LA001 – Luton Airport FutureLuToN during 2022



Appendix G: Indicative Low-Cost Sensor-based monitoring

Installed in late 2021 and funded by LBC Highways, Luton Council operates a network of five South Coast Praxis/Urban sensor-based indicative air quality monitors to measure NO_2, PM_{10} and $PM_{2.5}$ levels in near real-time. With one monitor deployed in an urban background location and the remainder installed at roadside sites flagged for investigation by the Highways Team, full details of these sites are presented in Table G.1**.**

Comparing the mean annual concentrations obtained at each site for each pollutant with the relevant air quality objective levels, only one site was found to have exceeded current or committed UK targets: with an annual mean $PM_{2.5}$ concentration of 10.3µg/m^3, LN103 (L&D Hospital, Lewsey Road) would have marginally exceeded the concentration target of 10µg/m^3 due to come into force in 2040.

However, it should be noted that both LAQM.TG22 and the current Air Quality Expert Group (AQEG) advice on the use of 'low-cost' pollution sensors [https://tinyurl.com/mstdzpyv] advise that indicative sensor-based monitors are not sufficiently accurate for compliance monitoring purposes and are instead more suited to short-term (eg diurnal) trend analysis. To enable the NO_2 level at each indicative monitoring site to be assessed against the air quality objective and to indicate how the sensor-derived NO_2 concentrations compare with passive-derived values, NO_2 diffusion tubes were co-located with each monitor (Table G.3).

Reviewing the diffusion tube data, none of the passively derived annual mean NO_2 concentrations exceeded the objective level of 40µg/m^3. To explore the degree of equivalence between the two monitoring techniques, the results obtained for each monitoring site were plotted on a scatter plot (Figure G.2), and the difference between the two values visualised using a Bland-Altman plot (Figure G.3). Although the latter shows all values to fall within the limits of agreement, the range of differences between the two methods is quite high, with the points fairly spread out across the interval between the upper and lower limits of agreement.

Similar to the treatment of the automatic monitoring site data sets detailed in Appendix F and consistent with the output of the Openair Time Variation tool implemented on the UK Air website for AURN monitoring site data (https://tinyurl.com/4zn5xfx2), for each indicative sensor-based monitoring site, panel charts (Figure G.13 to Figure G.27) have been generated showing the average variation of NO_2, PM_{10} or $PM_{2.5}$by:

(i) day of the week and hour of the day combined (the uppermost pane);

(ii) hour of the day (diurnal variation, lower left pane);

(iii) day of the week (lower middle pane); and

(iv) month of the year (seasonal variation, centre right pane).

Additionally, the charts also include:

(v) a plot of monthly percentage data capture (lower right pane).

For each chart, the shading on panes (i) to (iv) shows the 95% confidence intervals of the mean and the line of the mean.

Finally, the plots showing seasonal variation in NO_2 levels also show the uncorrected value obtained from the co-located diffusion tube for the same month (shown in orange).

Table G.1 – Details of Indicative Low-Cost Sensor-based Monitoring Sites

Site 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)	Co-located NO_2 Diffusion Tube?	Inlet Height (m)
LN97	Chaul End Road	Roadside	506411	222554	NO_2; PM_{10}; $PM_{2.5}$	No	N/A		Yes (LN98)	
LN99	Dunstable Road – Bury Park 2	Roadside	508380	221764	NO_2; PM_{10}; $PM_{2.5}$	Yes AQMA 3	6.5	3.2	Yes (LN100)	2.6
LN101	Beech Hill Community Primary School	Roadside	508000	222078	NO_2; PM_{10}; $PM_{2.5}$	No	9.0	3.5	Yes (LN102)	
LN103	L&D Hospital, Lewsey Road	Roadside	504987	222805	NO_2; PM_{10}; $PM_{2.5}$	No	12.5	2.0	Yes (LN104)	2.6
LN105	Peoples Park	Urban Background	509339	222128	NO_2; PM_{10}; $PM_{2.5}$	No	N/A		Yes (LN106)	2.6

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 G.2 – Annual Mean NO_2 Monitoring Results: Indicative Low-Cost Sensor-based monitoring

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2022	2023
LN97	506411	222554	Roadside	83.1	83.1	21.1	20.7
LN99	508380	221764	Roadside	81.2	81.2	37.6	27.3
LN101	508000	222078	Roadside	83.0	83.0	20.4	29.3
LN103	504987	222805	Roadside	79.0	79.0	**44.9**	27.5
LN105	509339	222128	Urban Background	76.3	76.3	22.7	25.2

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

☒ **Reported concentrations are those at the location of the monitoring site (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**.

All means have been *"annualised"* as per *LAQM.TG22* if valid data capture for the full calendar year is less than 75%.

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%).

Table G.3 – Comparison of Co-located Sensor and Passively Derived Annual Mean NO_2 Levels (concentrations presented in µg/m^3)

Site Name	Site ID (Sensor)	2023 Annual Mean NO_2 (Sensor)	Site ID (Passive)	2023 Annual Mean NO_2 (Passive)	Difference (%)
Chaul End Road	LN97	20.7	LN98	25.2	19.6
Dunstable Road - Bury Park 2	LN99	27.3	LN100	32.9	18.6
Beech Hill Community Primary School	LN101	29.3	LN102	23.1	23.7
L&D Hospital, Lewsey Road	LN103	27.5	LN104	28.7	4.3
Peoples Park	LN105	25.2	LN106	16.4	42.3

Figure G.1 – Trends in Annual Mean NO_2 Concentrations at Indicative Low-Cost Sensor-based monitoring Sites

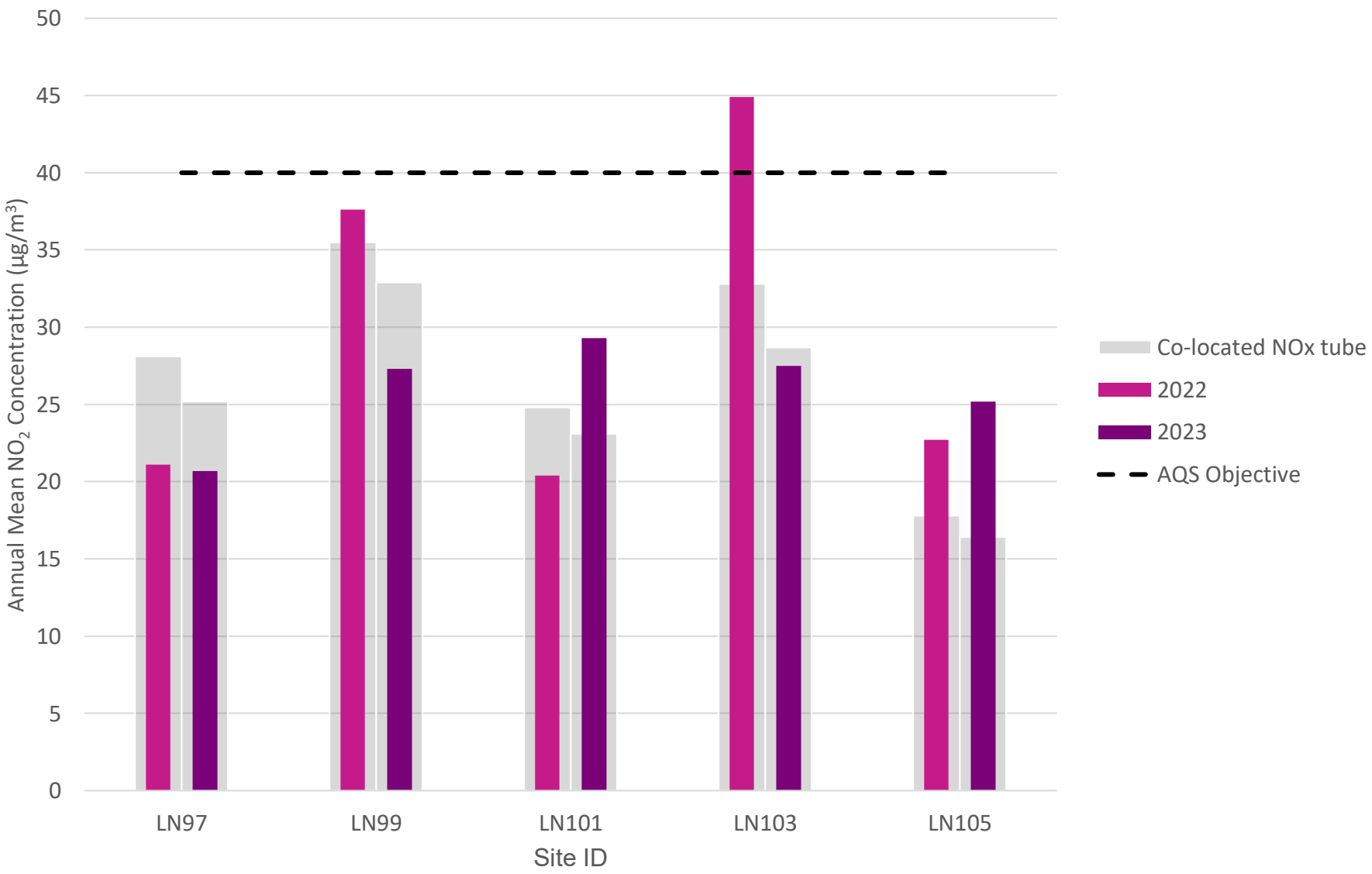


Figure G.2 – Scatter Plot Comparing Diffusion Tube and Sensor Derived Annual Mean NO_2 at Co-located Sites

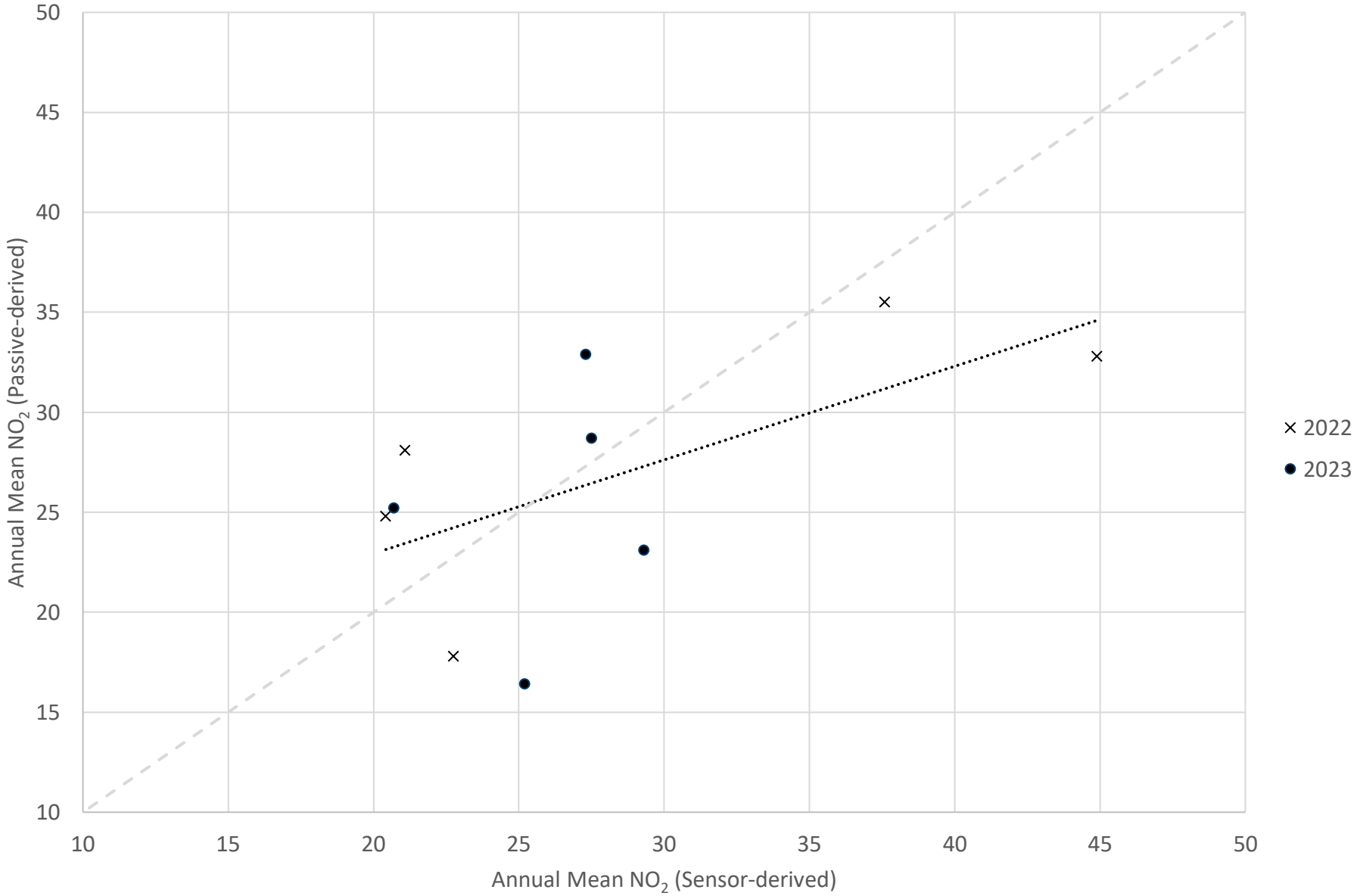


Figure G.3 – Bland-Altman Plot Showing the Difference Between the Diffusion Tube and Sensor Derived Annual Mean NO_2 at Co-located Sites

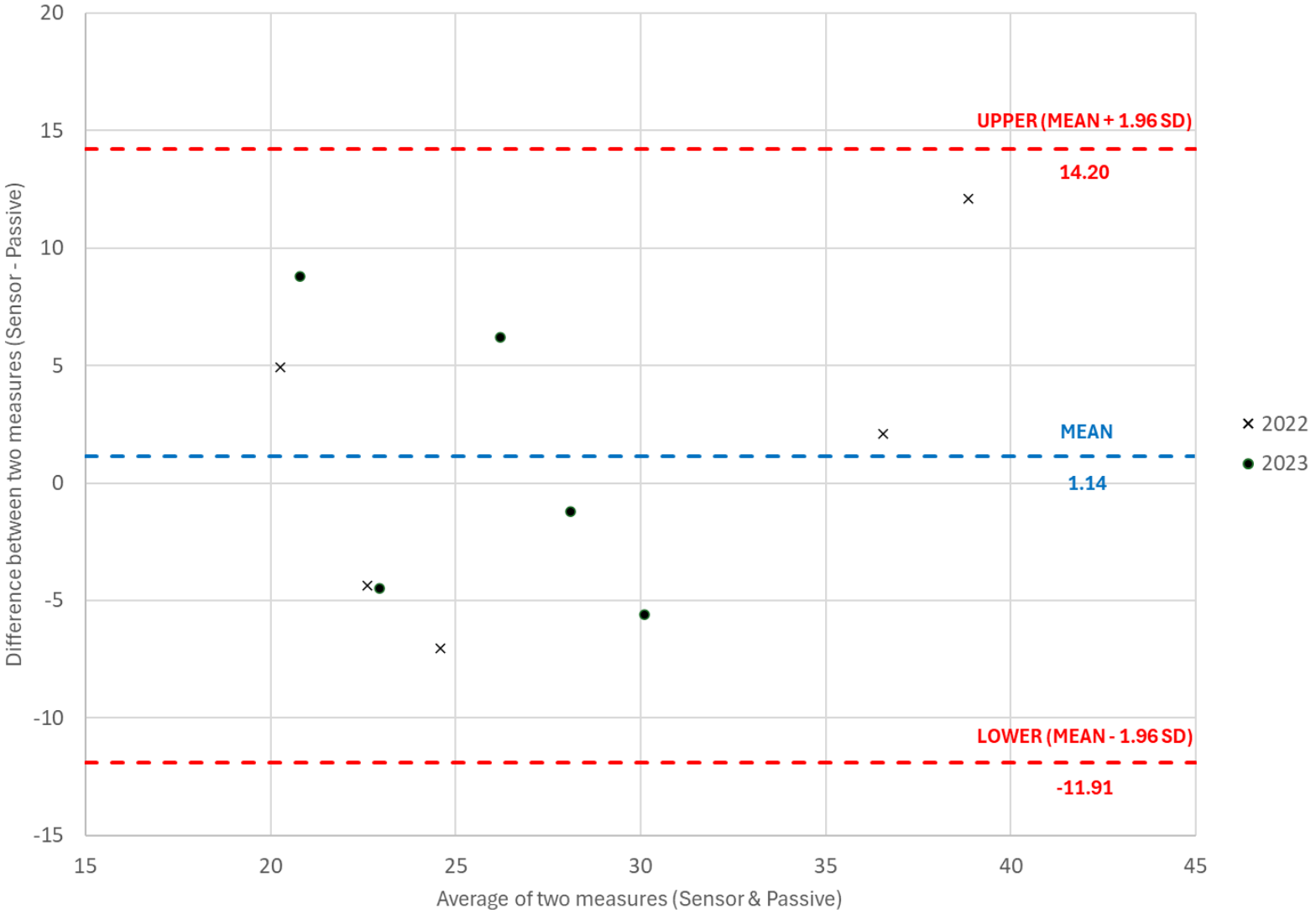


Table G.4 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3: Indicative Low-Cost Sensor-based monitoring

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2022	2023
LN97	506411	222554	Roadside	83.1	83.1	0 (76.4)	0 (68.7)
LN99	508380	221764	Roadside	81.2	81.2	0 (86.4)	0 (63.9)
LN101	508000	222078	Roadside	83.0	83.0	0 (68.6)	0 (144.0)
LN103	504987	222805	Roadside	79.0	79.0	0	0 (89.8)
LN105	509339	222128	Urban Background	76.3	76.3	0 (87.9)	0 (104.5)

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(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 G.4 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3 at Indicative Low-Cost Sensor-based monitoring Sites

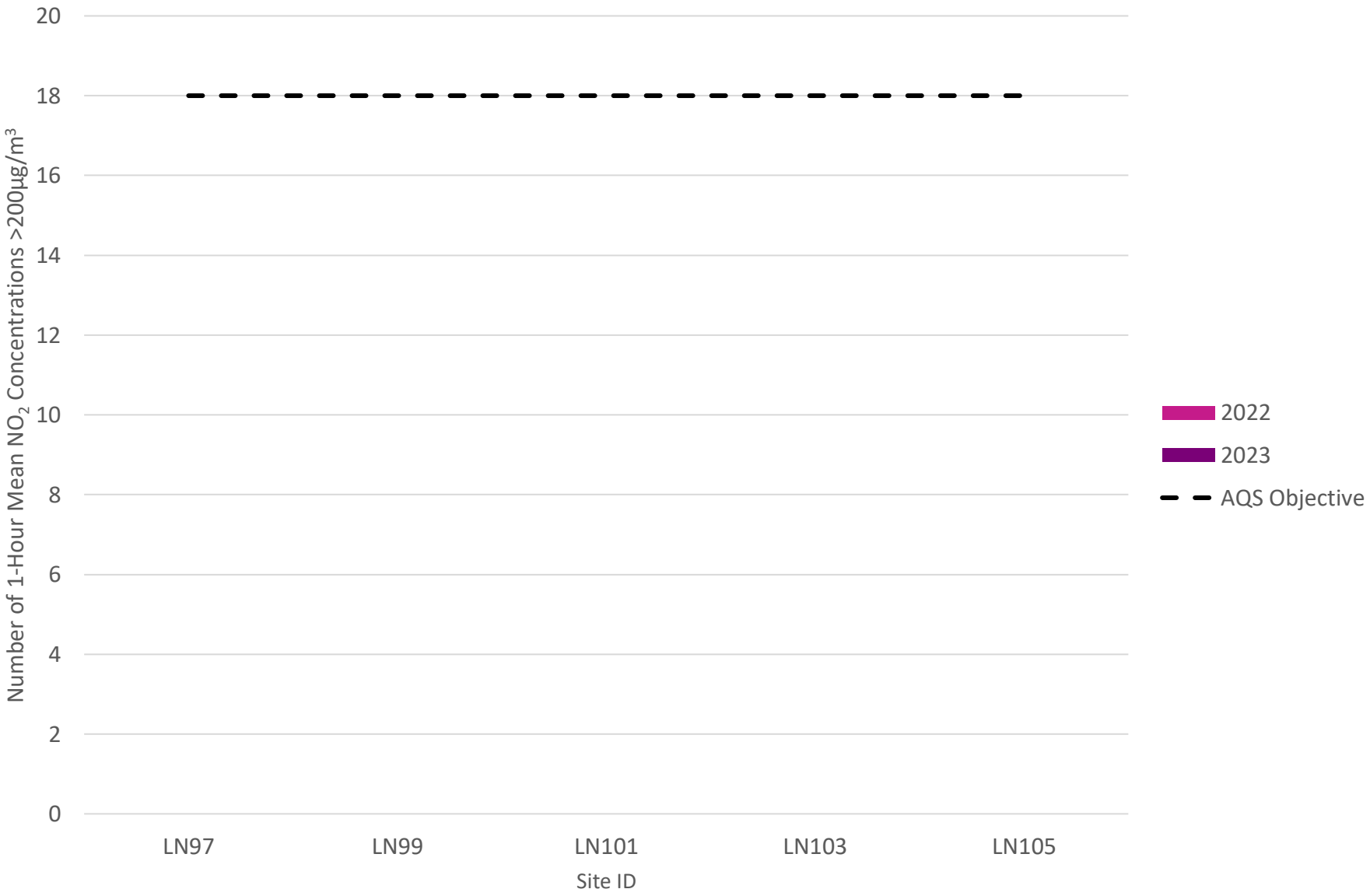


Table G.5 – Annual Mean PM_{10} Monitoring Results: Indicative Low-Cost Sensor-based monitoring

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2022	2023
LN97	506411	222554	Roadside	83.1	83.1	16.0	14.7
LN99	508380	221764	Roadside	83.2	83.2	17.0	16.1
LN101	508000	222078	Roadside	83.0	83.0	13.8	13.5
LN103	504987	222805	Roadside	83.2	83.2	15.4	14.7
LN105	509339	222128	Urban Background	75.2	75.2	12.0	13.4

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

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**.

All means have been *"annualised"* as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%.

(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 G.5 – Trends in Annual Mean PM_{10} Concentrations at Indicative Low-Cost Sensor-based monitoring Sites

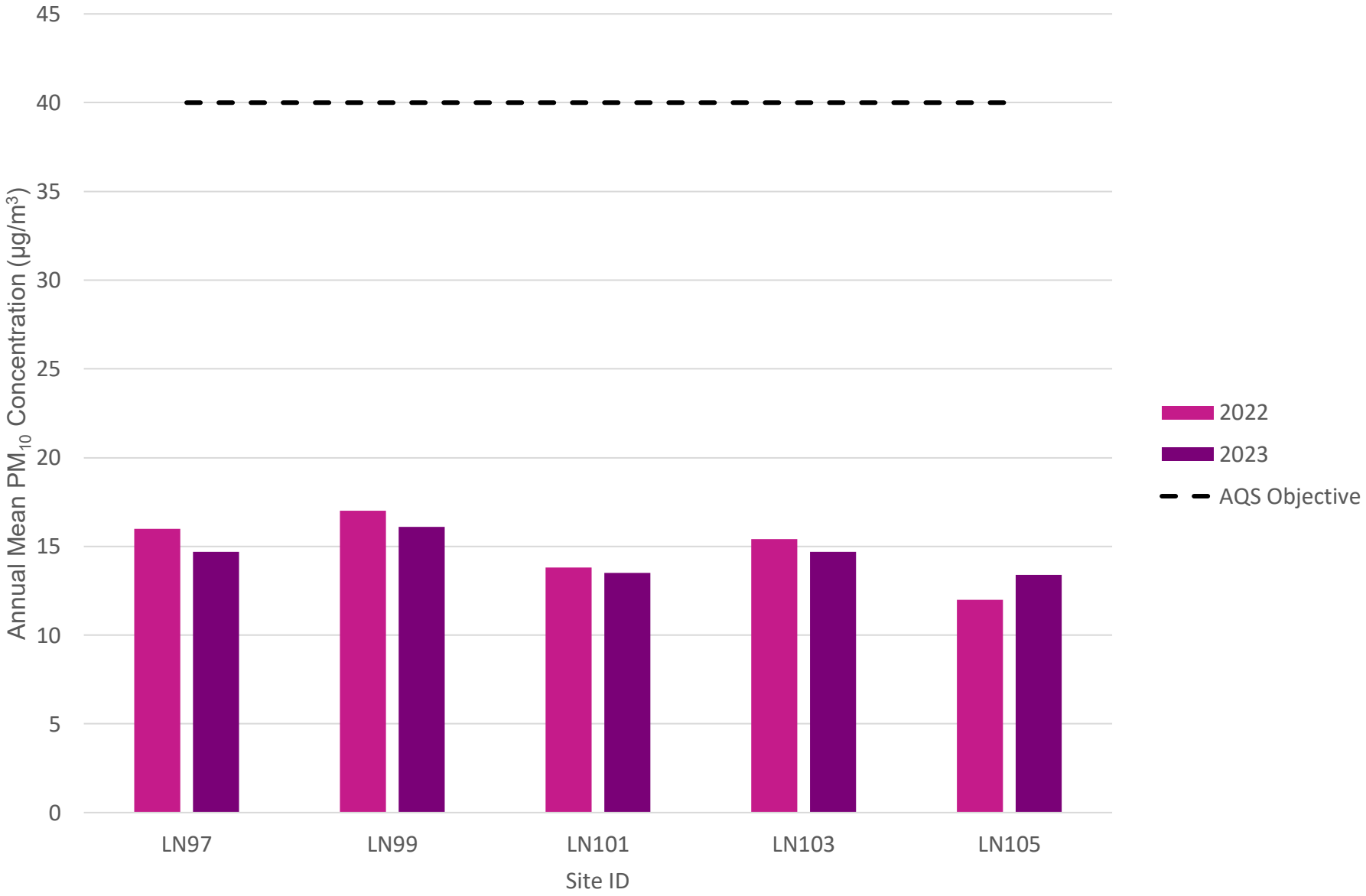


Table G.6 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3: Indicative Low-Cost Sensor-based monitoring

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2022	2023
LN97	506411	222554	Roadside	83.1	83.1	2 (26.7)	0 (22.8)
LN99	508380	221764	Roadside	83.2	83.2	2 (29.5)	1 (27.2)
LN101	508000	222078	Roadside	83.0	83.0	0 (23.4)	1 (23.1)
LN103	504987	222805	Roadside	83.2	83.2	0	0 (25.8)
LN105	509339	222128	Urban Background	75.2	75.2	0 (19.8)	1 (21.0)

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(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 G.6 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3 at Indicative Low-Cost Sensor-based monitoring Sites

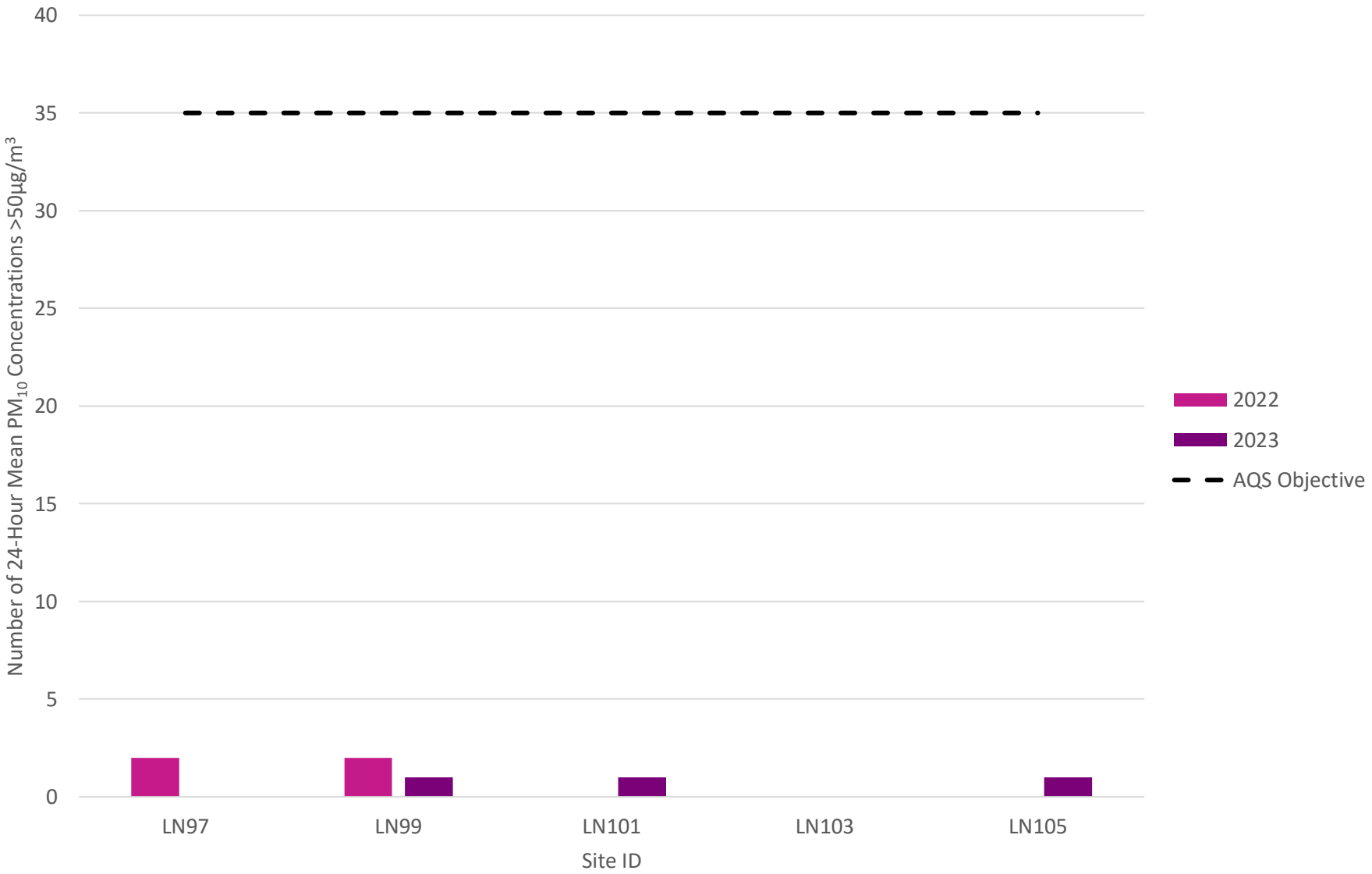


Table G.7 – Annual Mean $PM_{2.5}$ Monitoring Results: Indicative Low-Cost Sensor-based monitoring

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2022	2023
LN97	506411	222554	Roadside	83.1	83.1	8.8	8.3
LN99	508380	221764	Roadside	83.2	83.2	9.8	9.2
LN101	508000	222078	Roadside	83.0	83.0	7.3	7.8
LN103	504987	222805	Roadside	83.2	83.2	11.3	10.3
LN105	509339	222128	Urban Background	75.2	75.2	6.1	7.8

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

Notes:

The annual mean concentrations are presented as µg/m^3.

All means have been *"annualised"* as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%.

(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 G.7 – Trends in Annual Mean $PM_{2.5}$ Concentrations at Indicative Low-Cost Sensor-based monitoring Sites

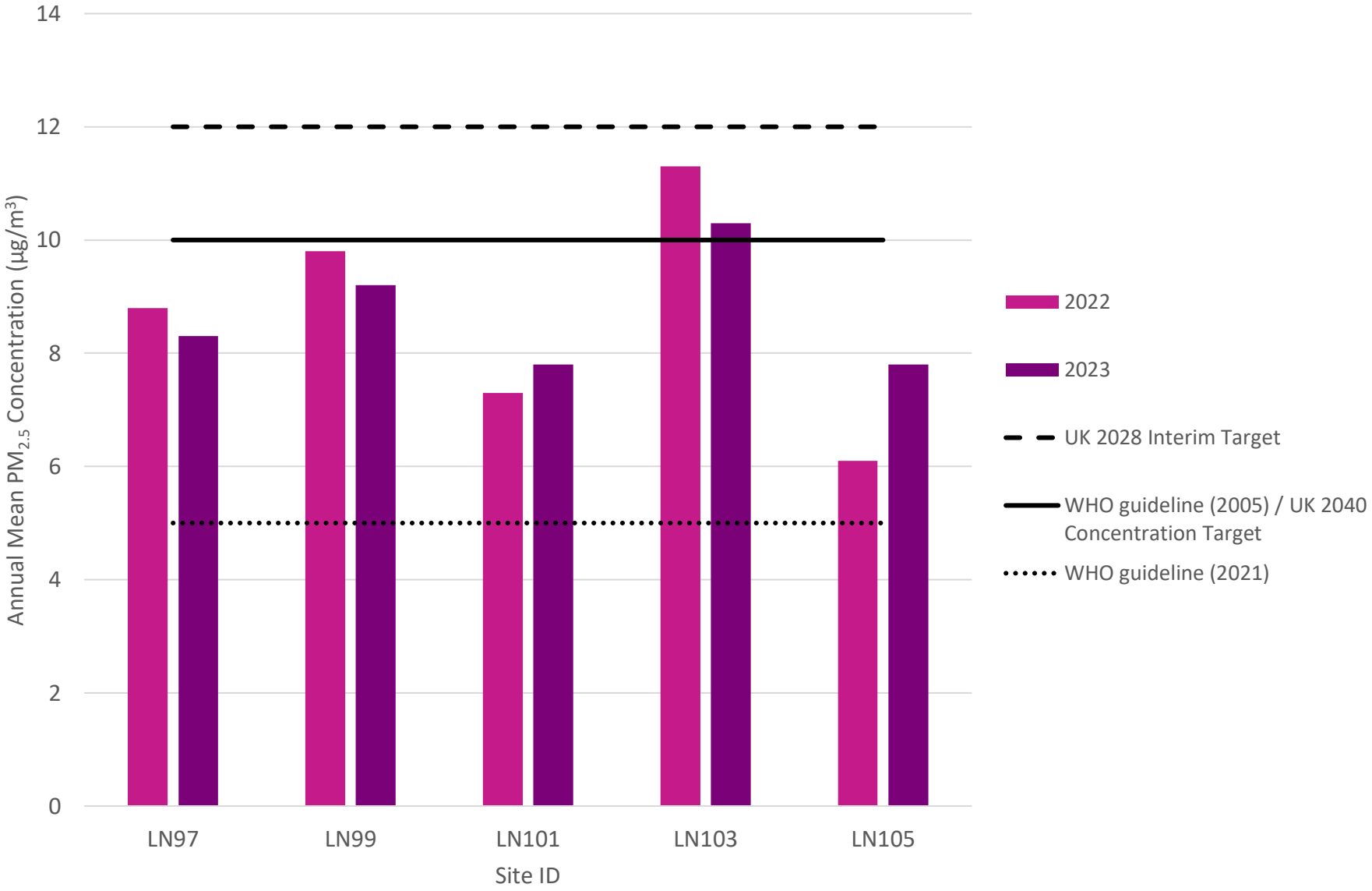
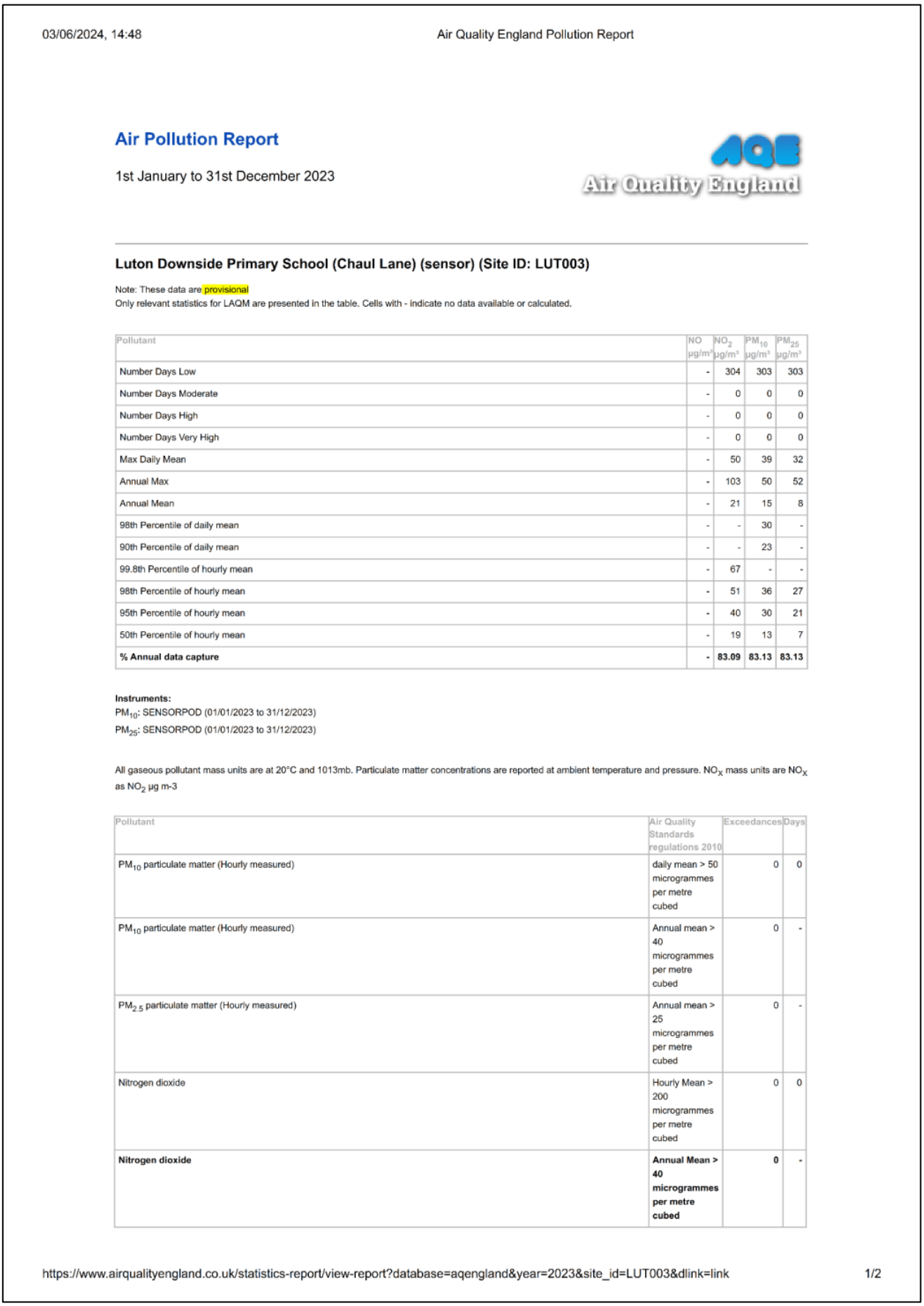


Figure G.8 – 2023 Air Pollution Report - LN97: Chaul End Road

Source: https://tinyurl.com/3xurze7b



03/06/2024, 14:48 Air Quality England Pollution Report

Air Pollution Report

1st January to 31st December 2023

Air Quality England

Luton Downside Primary School (Chaul Lane) (sensor) (Site ID: LUT003)

Note: These data are provisional
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	PM_{10} µg/m³	PM_{25} µg/m³
Number Days Low	-	304	303	303
Number Days Moderate	-	0	0	0
Number Days High	-	0	0	0
Number Days Very High	-	0	0	0
Max Daily Mean	-	50	39	32
Annual Max	-	103	50	52
Annual Mean	-	21	15	8
98th Percentile of daily mean	-	-	30	-
90th Percentile of daily mean	-	-	23	-
99.8th Percentile of hourly mean	-	67	-	-
98th Percentile of hourly mean	-	51	36	27
95th Percentile of hourly mean	-	40	30	21
50th Percentile of hourly mean	-	19	13	7
% Annual data capture	**-**	**83.09**	**83.13**	**83.13**

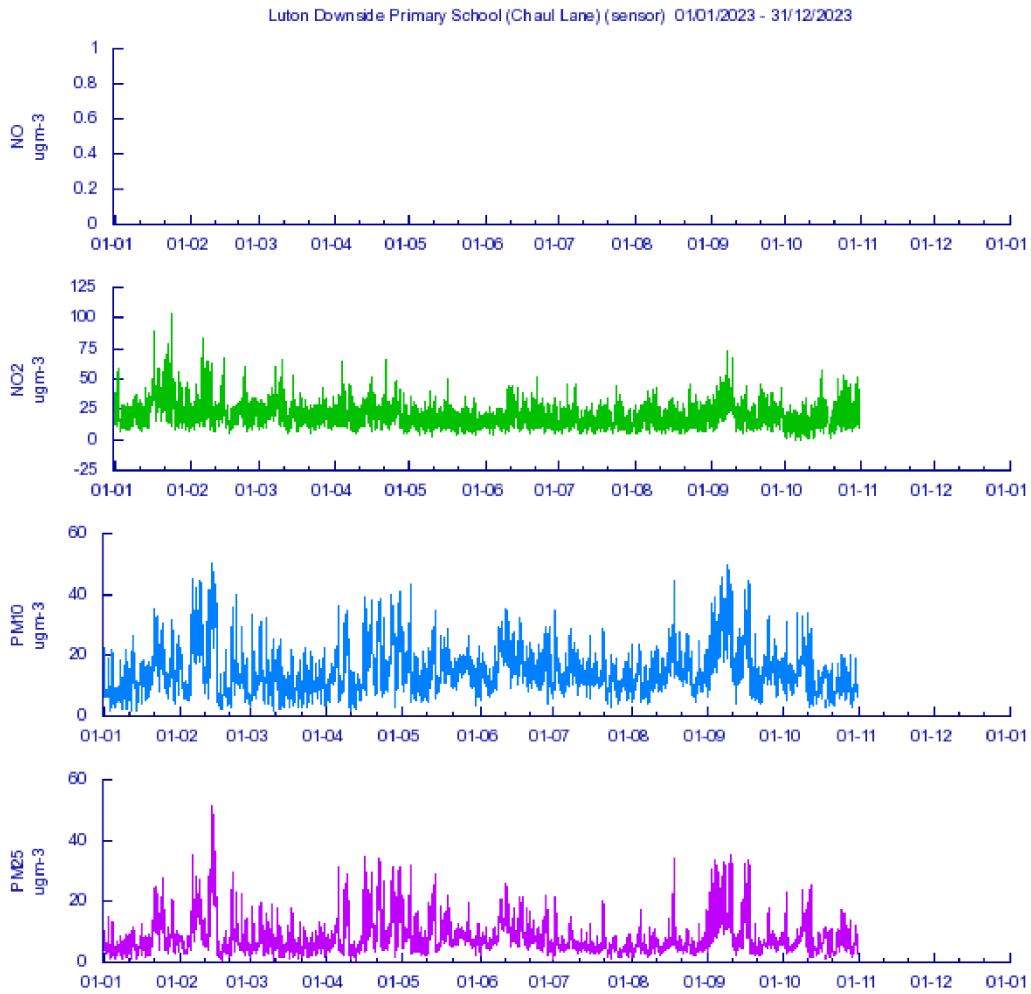
Instruments:
PM_{10}: SENSORPOD (01/01/2023 to 31/12/2023)
PM_{25}: SENSORPOD (01/01/2023 to 31/12/2023)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
PM_{10} particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	0	0
PM_{10} particulate matter (Hourly measured)	Annual mean > 40 microgrammes per metre cubed	0	-
$PM_{2.5}$ particulate matter (Hourly measured)	Annual mean > 25 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	**Annual Mean > 40 microgrammes per metre cubed**	**0**	**-**

https://www.airqualityengland.co.uk/statistics-report/view-report?database=aqengland&year=2023&site_id=LUT003&dlink=link 1/2

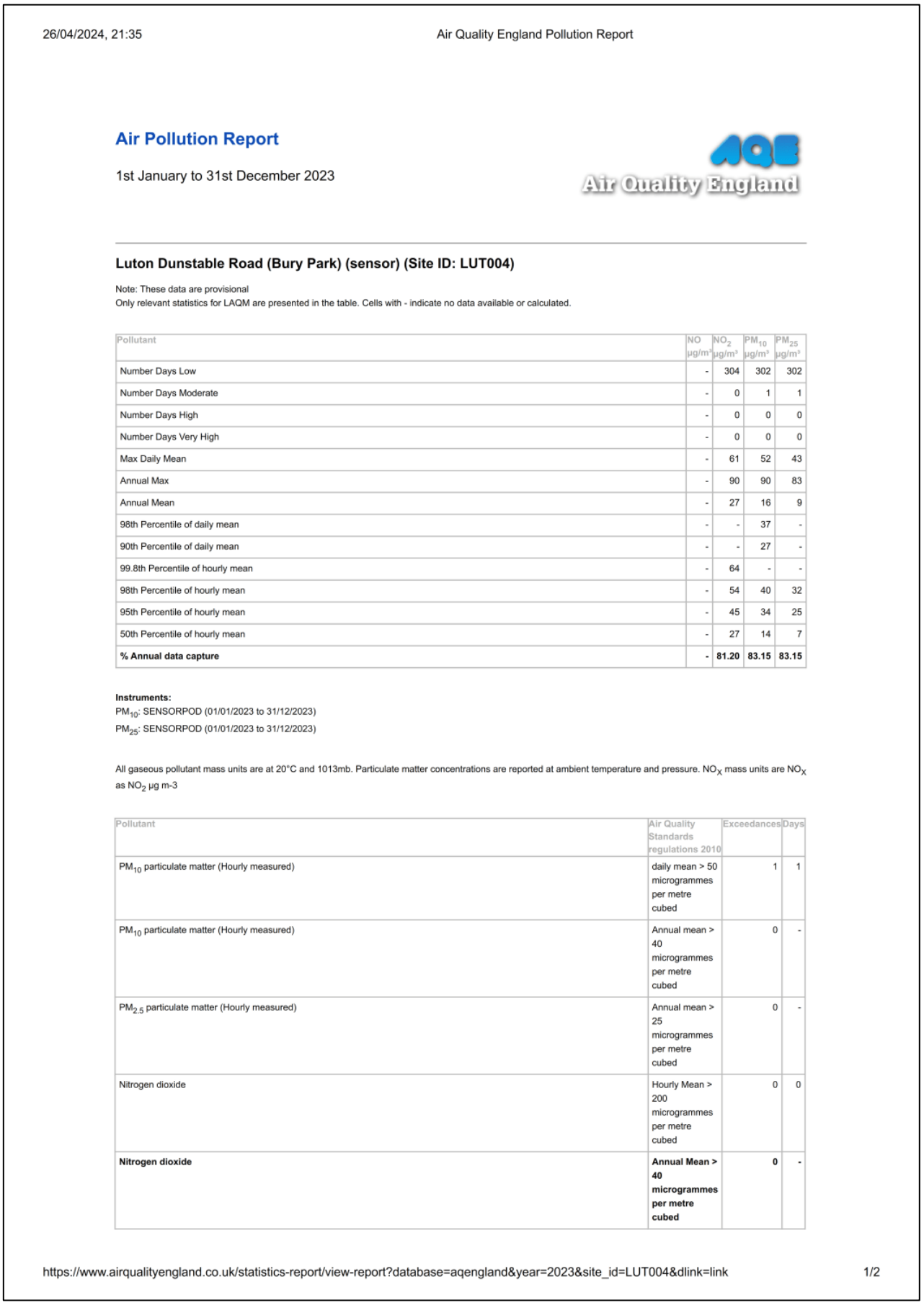
Annual Graph



This report was generated on 03/06/2024. Despite being flagged as “provisional,” when the monitoring data was downloaded on the same date, all values recorded between 01/01/2023 and 31/12/2023 were listed as “ratified.”

Figure G.9 – 2023 Air Pollution Report – LN99: Dunstable Road – Bury Park 2

Source: https://tinyurl.com/294bbeyy



26/04/2024, 21:35 Air Quality England Pollution Report

Air Pollution Report

1st January to 31st December 2023

Air Quality England

Luton Dunstable Road (Bury Park) (sensor) (Site ID: LUT004)

Note: These data are provisional
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	PM_{10} µg/m³	PM_{25} µg/m³
Number Days Low	-	304	302	302
Number Days Moderate	-	0	1	1
Number Days High	-	0	0	0
Number Days Very High	-	0	0	0
Max Daily Mean	-	61	52	43
Annual Max	-	90	90	83
Annual Mean	-	27	16	9
98th Percentile of daily mean	-	-	37	-
90th Percentile of daily mean	-	-	27	-
99.8th Percentile of hourly mean	-	64	-	-
98th Percentile of hourly mean	-	54	40	32
95th Percentile of hourly mean	-	45	34	25
50th Percentile of hourly mean	-	27	14	7
% Annual data capture	**-**	**81.20**	**83.15**	**83.15**

Instruments:
PM_{10}: SENSORPOD (01/01/2023 to 31/12/2023)
PM_{25}: SENSORPOD (01/01/2023 to 31/12/2023)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
PM_{10} particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	1	1
PM_{10} particulate matter (Hourly measured)	Annual mean > 40 microgrammes per metre cubed	0	-
$PM_{2.5}$ particulate matter (Hourly measured)	Annual mean > 25 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	**Annual Mean > 40 microgrammes per metre cubed**	**0**	**-**

https://www.airqualityengland.co.uk/statistics-report/view-report?database=aqengland&year=2023&site_id=LUT004&dlink=link 1/2

Annual Graph

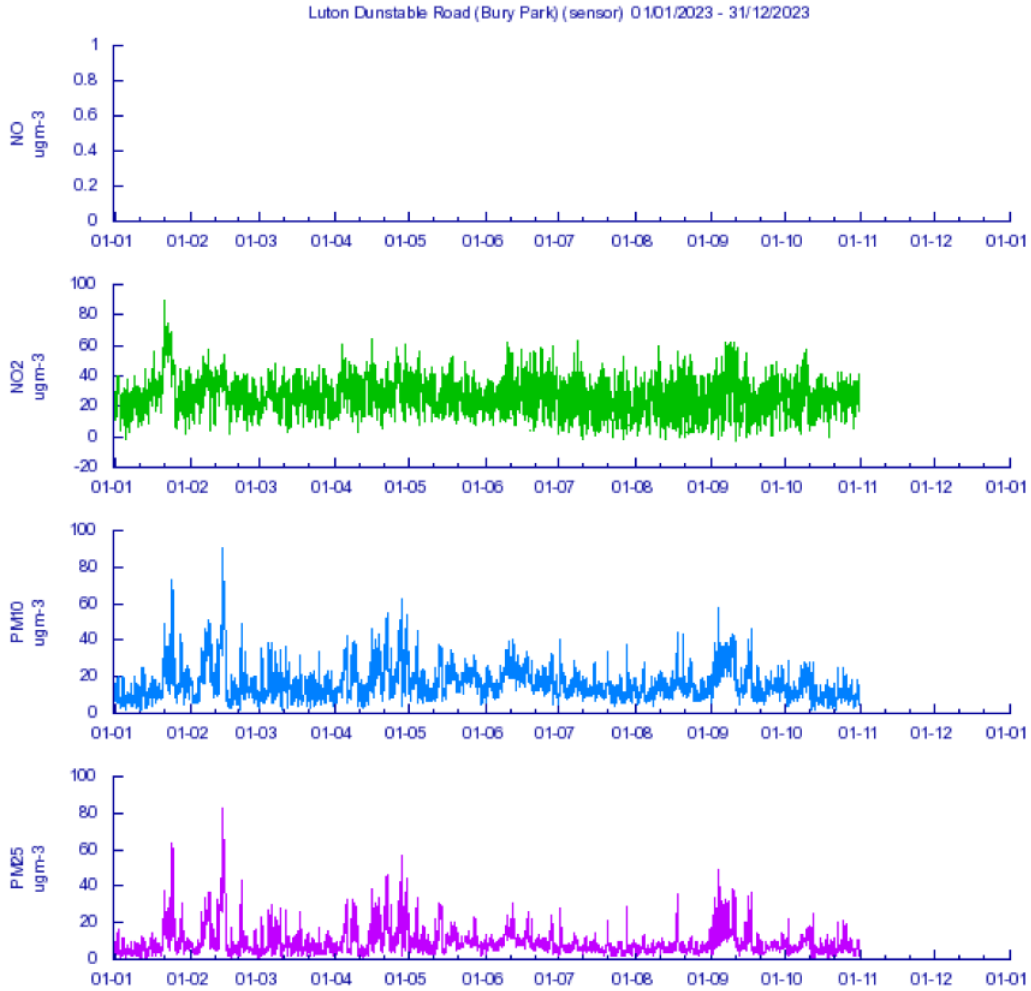


Figure G.10 – 2023 Air Pollution Report – LN101: Beech Hill Community Primary School

Source: https://tinyurl.com/mtbha22u

Air Pollution Report

1st January to 31st December 2023

Air Quality England

Luton Beech Hill (sensor) (Site ID: LUT002)

These data have been fully ratified
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	PM_{10} µg/m³	PM_{25} µg/m³
Number Days Low	-	304	301	301
Number Days Moderate	-	0	1	1
Number Days High	-	0	0	0
Number Days Very High	-	0	0	0
Max Daily Mean	-	111	53	45
Annual Max	-	155	103	90
Annual Mean	-	29	14	8
98th Percentile of daily mean	-	-	31	-
90th Percentile of daily mean	-	-	23	-
99.8th Percentile of hourly mean	-	144	-	-
98th Percentile of hourly mean	-	100	37	29
95th Percentile of hourly mean	-	75	30	22
50th Percentile of hourly mean	-	22	11	6
% Annual data capture	**-**	**82.99**	**83.00**	**83.00**

Instruments:
PM_{10}: SENSORPOD (01/01/2023 to 31/12/2023)
PM_{25}: SENSORPOD (01/01/2023 to 31/12/2023)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
PM_{10} particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	1	1
PM_{10} particulate matter (Hourly measured)	Annual mean > 40 microgrammes per metre cubed	0	-
$PM_{2.5}$ particulate matter (Hourly measured)	Annual mean > 25 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	**Annual Mean > 40 microgrammes per metre cubed**	**0**	**-**

Annual Graph

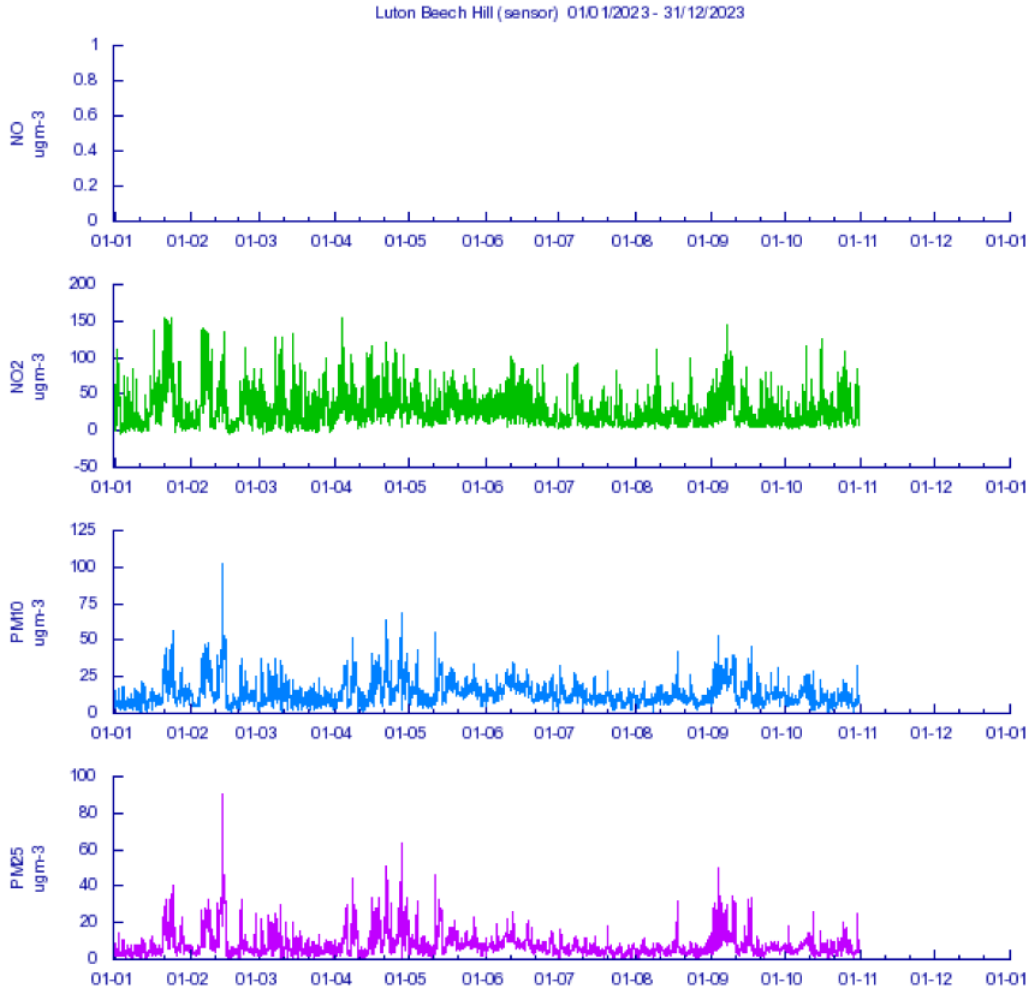


Figure G.11 – 2023 Air Pollution Report – LN103: L&D Hospital, Lewsey Road

Source: https://tinyurl.com/3cnxf82s

Air Pollution Report

1st January to 31st December 2023

Air Quality England

Luton & Dunstable Hospital (Lewsey Road) (sensor) (Site ID: LUT001)

Note: These data are provisional
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

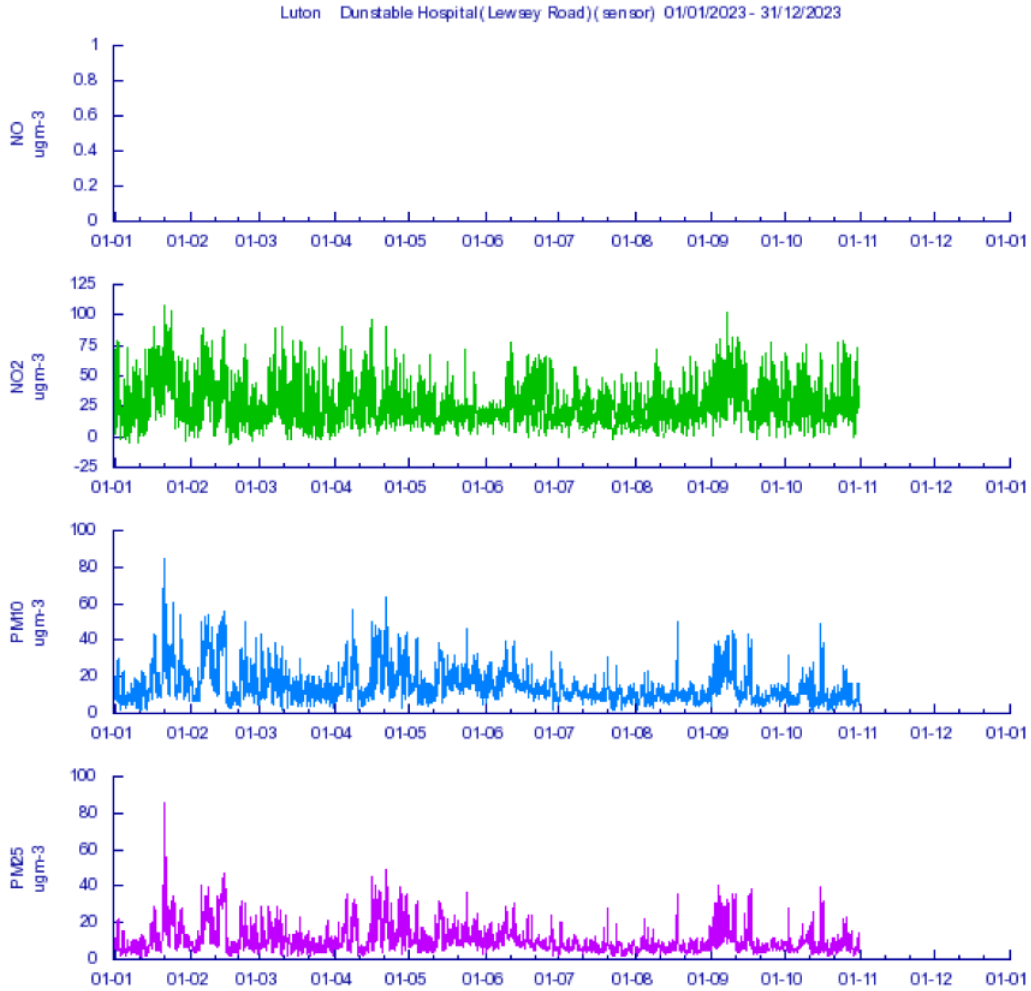
Pollutant	NO µg/m³	NO_2 µg/m³	PM_{10} µg/m³	PM_{25} µg/m³
Number Days Low	-	304	303	302
Number Days Moderate	-	0	0	1
Number Days High	-	0	0	0
Number Days Very High	-	0	0	0
Max Daily Mean	-	70	44	37
Annual Max	-	107	85	85
Annual Mean	-	28	15	10
98th Percentile of daily mean	-	-	36	-
90th Percentile of daily mean	-	-	25	-
99.8th Percentile of hourly mean	-	90	-	-
98th Percentile of hourly mean	-	73	41	32
95th Percentile of hourly mean	-	64	35	27
50th Percentile of hourly mean	-	23	12	8
% Annual data capture	**-**	**79.02**	**83.17**	**83.17**

Instruments:
PM_{10}: SENSORPOD (01/01/2023 to 31/12/2023)
PM_{25}: SENSORPOD (01/01/2023 to 31/12/2023)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
PM_{10} particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	0	0
PM_{10} particulate matter (Hourly measured)	Annual mean > 40 microgrammes per metre cubed	0	-
$PM_{2.5}$ particulate matter (Hourly measured)	Annual mean > 25 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	**Annual Mean > 40 microgrammes per metre cubed**	**0**	**-**

Annual Graph



This report was generated on 03/06/2024. Despite being flagged as “provisional,” when the monitoring data was downloaded on the same date, all values recorded between 01/01/2023 and 31/12/2023 were listed as “ratified.”

Figure G.12 – 2023 Air Pollution Report – LN105: Peoples Park

Source: https://tinyurl.com/4avh5sak

Air Pollution Report

1st January to 31st December 2023

Air Quality England

Luton People's Park (sensor) (Site ID: LUT005)

These data have been fully ratified
Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	PM_{10} µg/m³	PM_{25} µg/m³
Number Days Low	-	280	273	273
Number Days Moderate	-	0	0	0
Number Days High	-	0	0	0
Number Days Very High	-	0	0	0
Max Daily Mean	-	74	40	30
Annual Max	-	114	67	50
Annual Mean	-	25	13	8
98th Percentile of daily mean	-	-	32	-
90th Percentile of daily mean	-	-	21	-
99.8th Percentile of hourly mean	-	104	-	-
98th Percentile of hourly mean	-	78	35	26
95th Percentile of hourly mean	-	61	29	20
50th Percentile of hourly mean	-	21	12	6
% Annual data capture	**-**	**76.27**	**75.17**	**75.17**

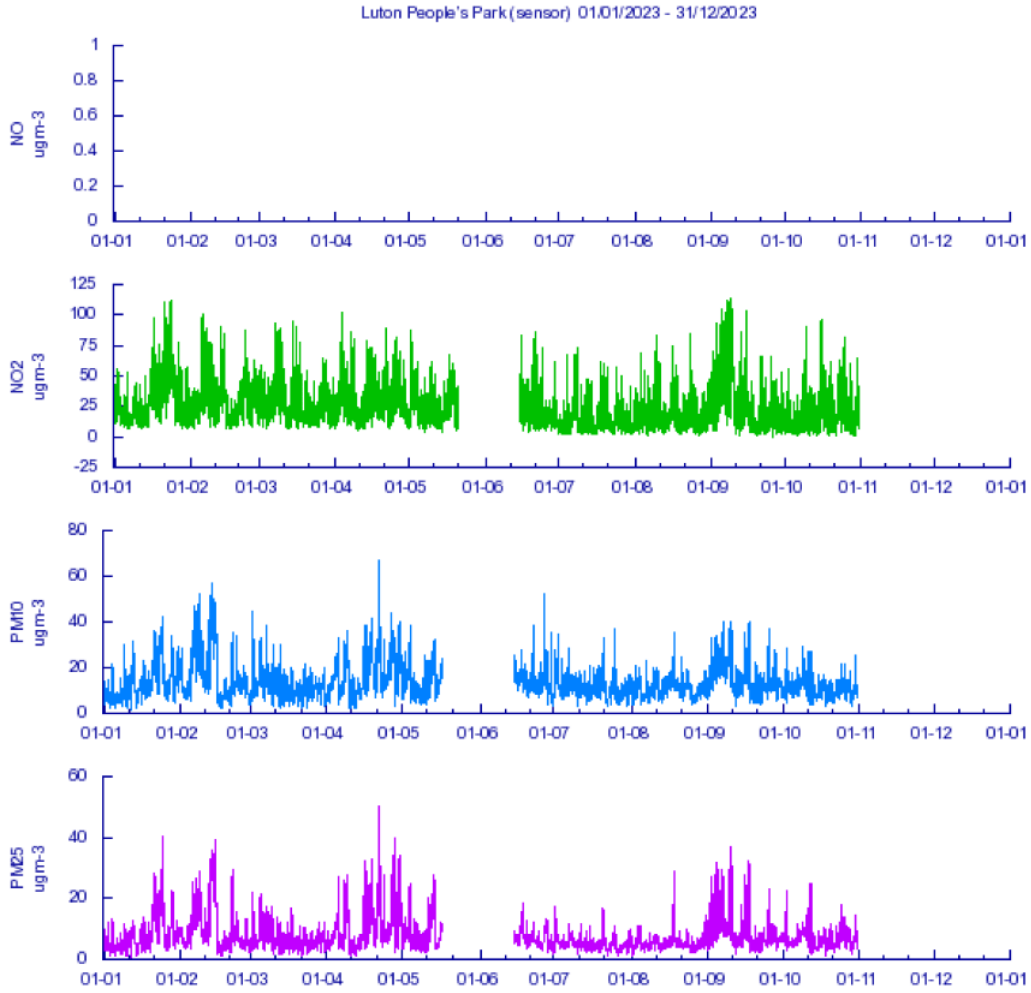
Instruments:
PM_{10}: SENSORPOD (01/01/2023 to 31/12/2023)
PM_{25}: SENSORPOD (01/01/2023 to 31/12/2023)

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
PM_{10} particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	0	0
PM_{10} particulate matter (Hourly measured)	Annual mean > 40 microgrammes per metre cubed	0	-
$PM_{2.5}$ particulate matter (Hourly measured)	Annual mean > 25 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	**Annual Mean > 40 microgrammes per metre cubed**	**0**	**-**

01/05/2024, 14:37 Air Quality England Pollution Report

Annual Graph



https://www.airqualityengland.co.uk/statistics-report/view-report?database=aqengland&year=2023&site_id=LUT005&dlink=link 2/2

Time Variation Plots for Indicative Sensor-based Monitoring Sites

Nitrogen Dioxide (NO_2)

Figure G.13 – NO_2 data trends at LN97 – Chaul End Road during 2023

Site: LN97 - Chaul End Road **Pollutant:** NO_2 **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 Data are provided as hour ending, so it contains the preceding hour's data.

[Webportal] https://tinyurl.com/mr2mh72j

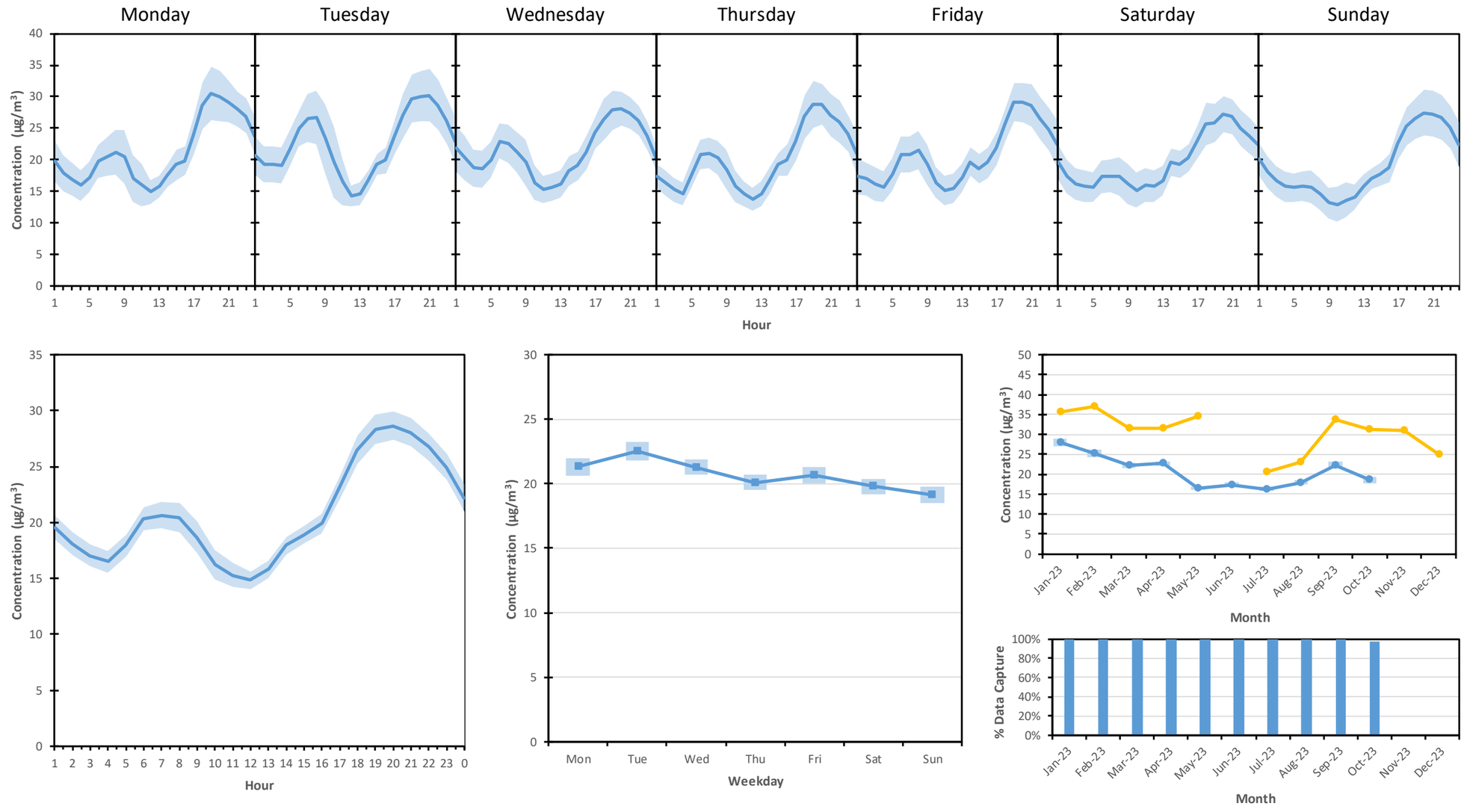
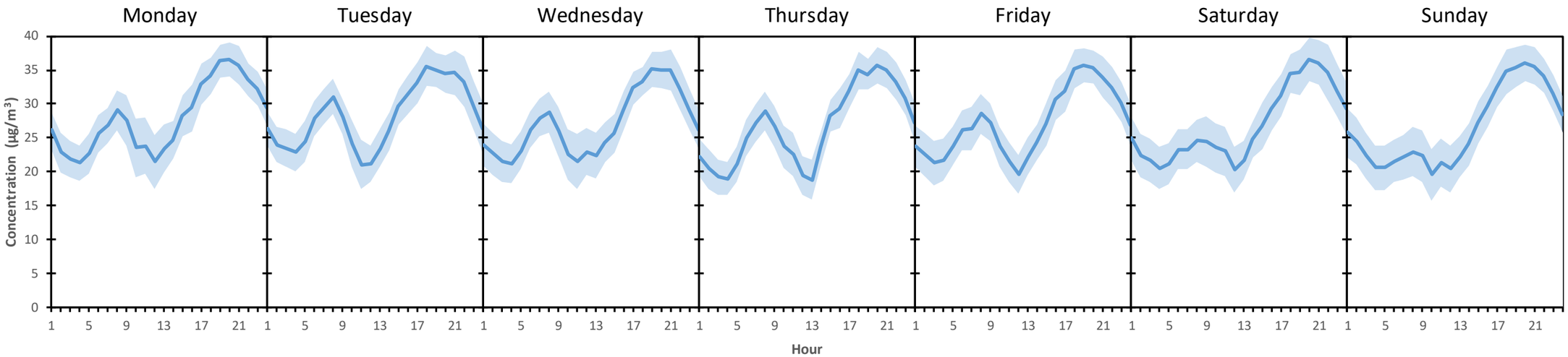


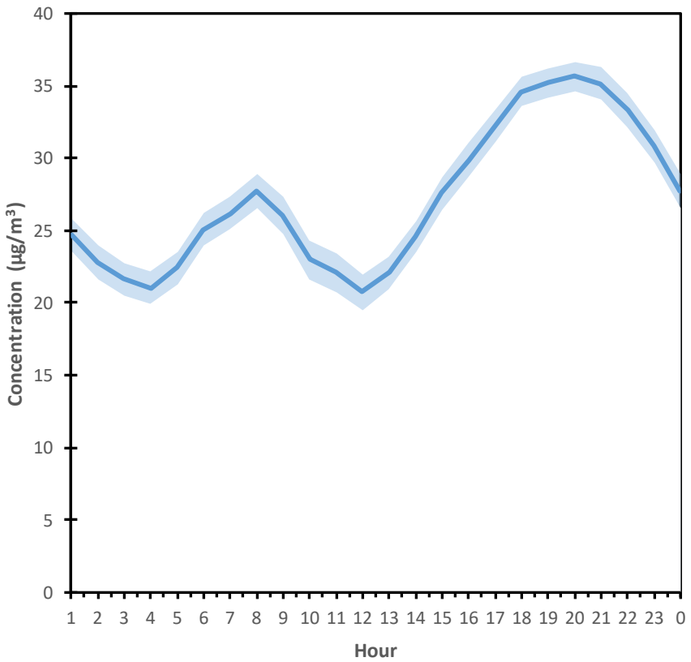
Figure G.14 – NO_2 data trends at LN99 – Dunstable Road – Bury Park 2 during 2023

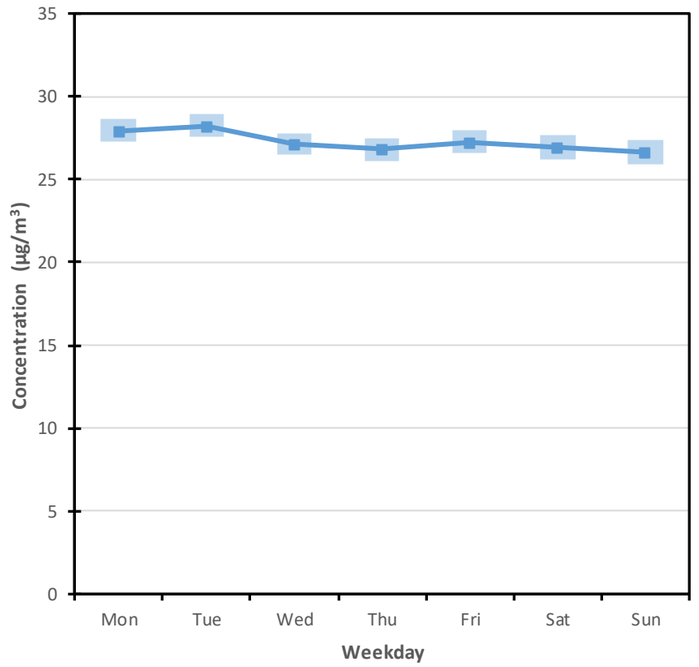
Site: LN99 - Dunstable Road - Bury Park 2 **Pollutant:** NO_2 **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/22raz435







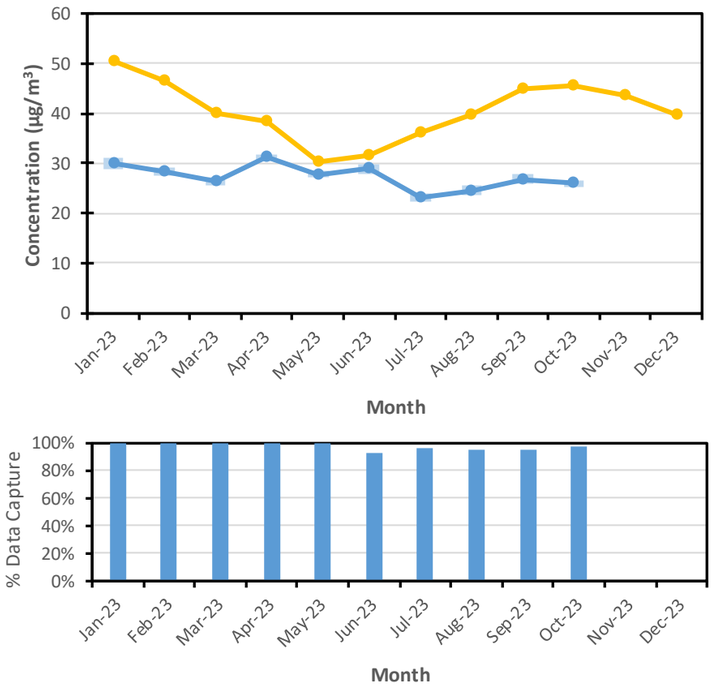
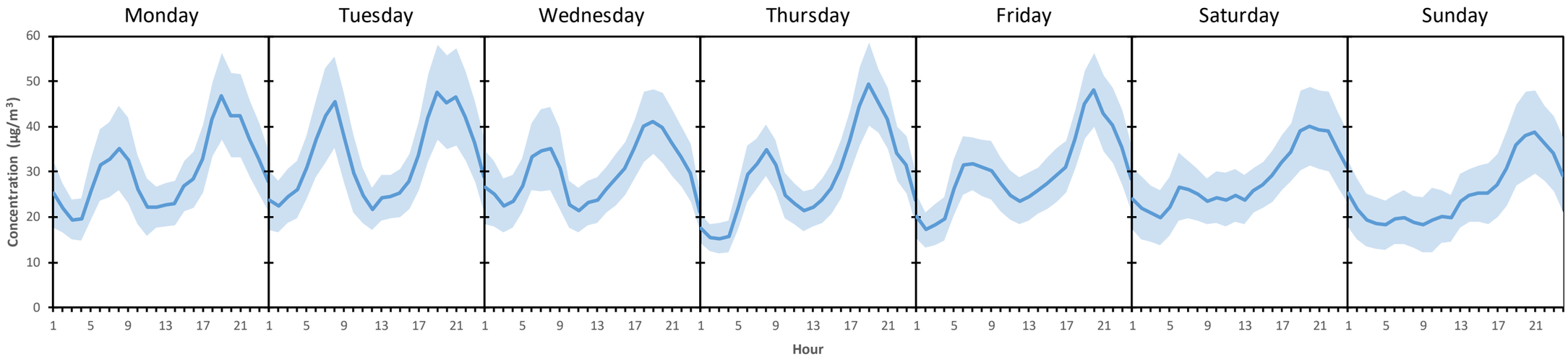


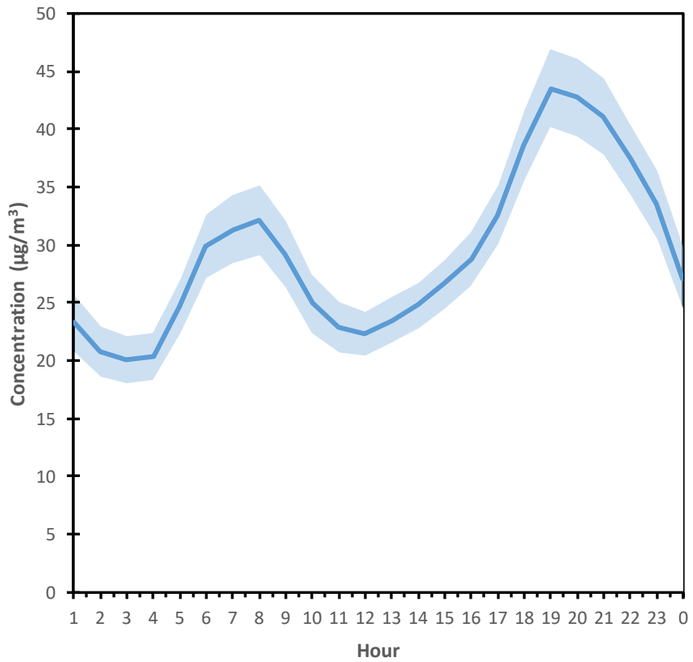
Figure G.15 – NO_2 data trends at LN101 – Beech Hill Community Primary School during 2023

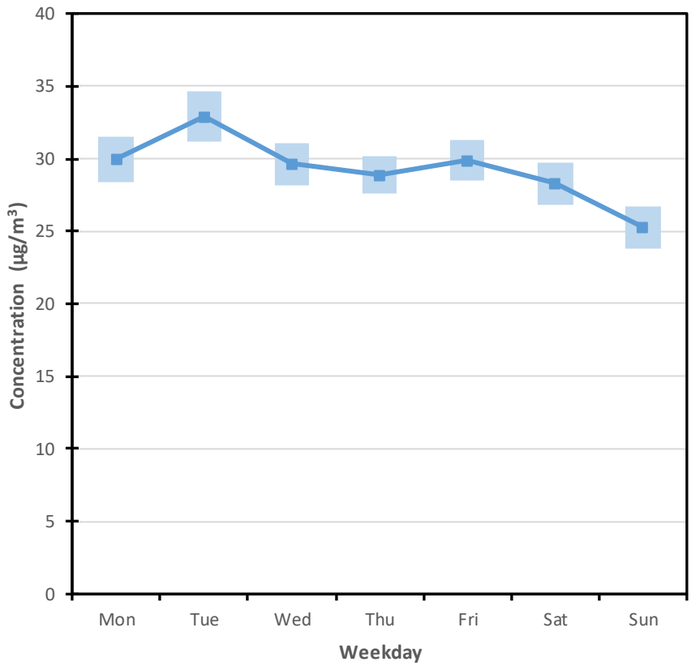
Site: LN101 - Beech Hill Community Primary School **Pollutant:** NO_2 **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/2p8c5jcr







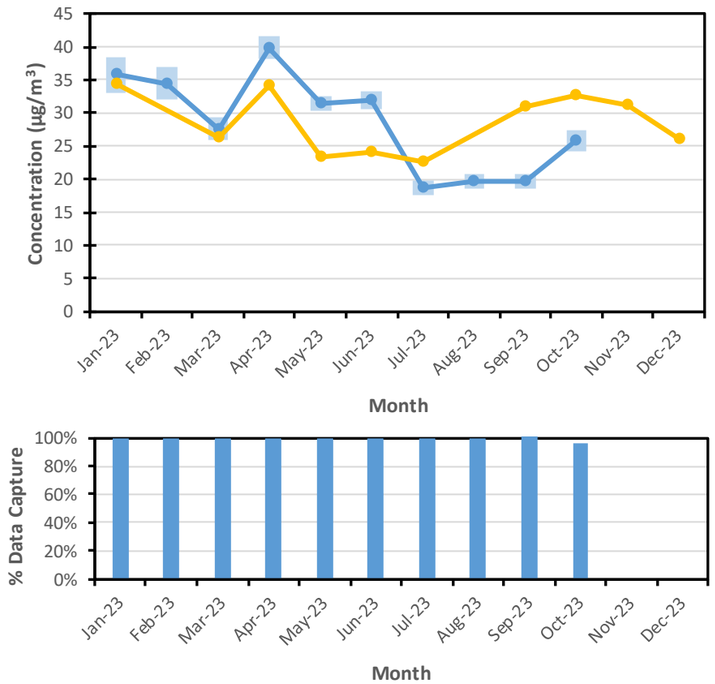
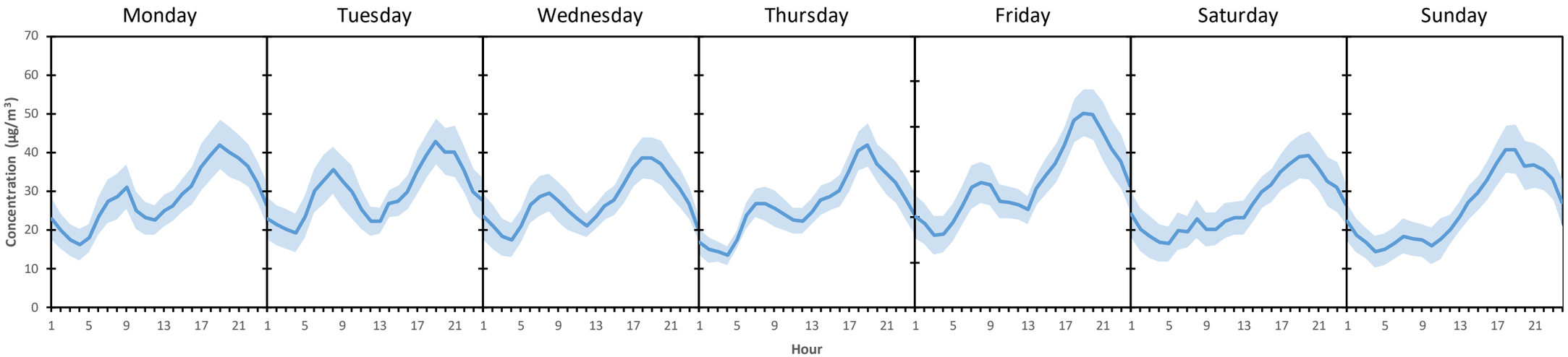


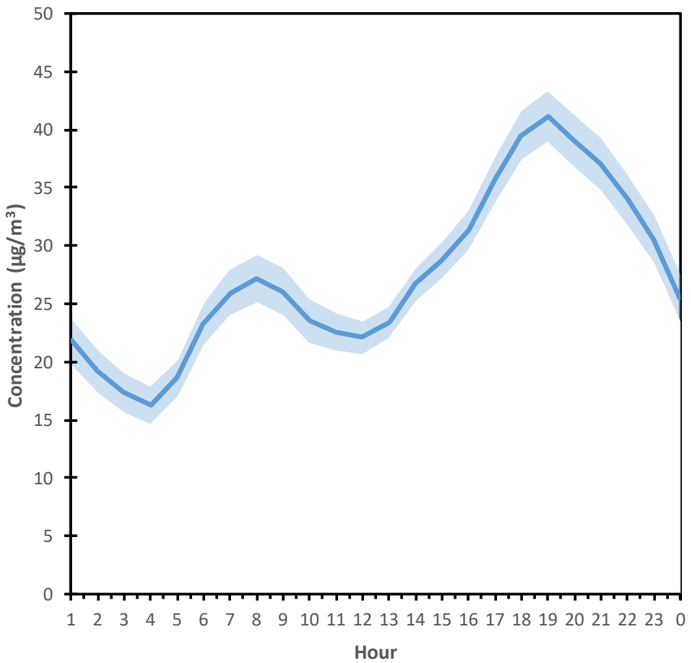
Figure G.16 – NO_2 data trends at LN103 – L&D Hospital, Lewsey Road during 2023

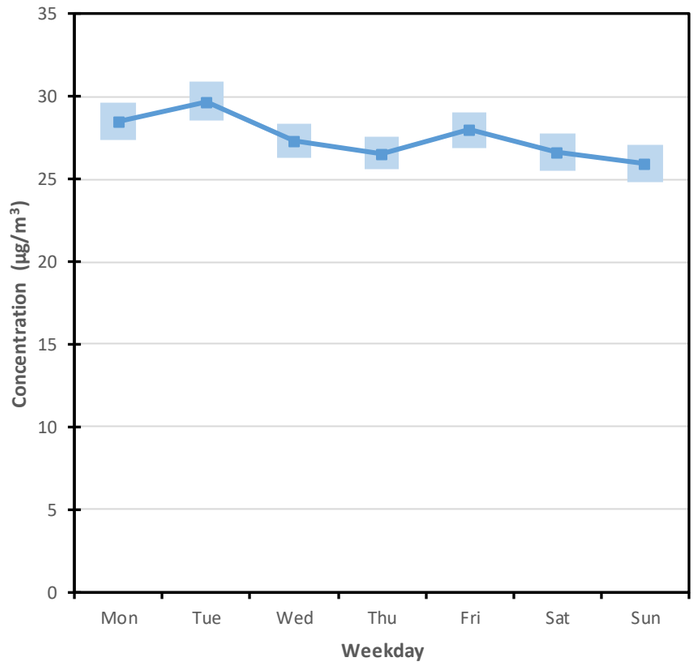
Site: LN103 - L&D Hospital, Lewsey Road **Pollutant:** NO_2 **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/4tf2246y







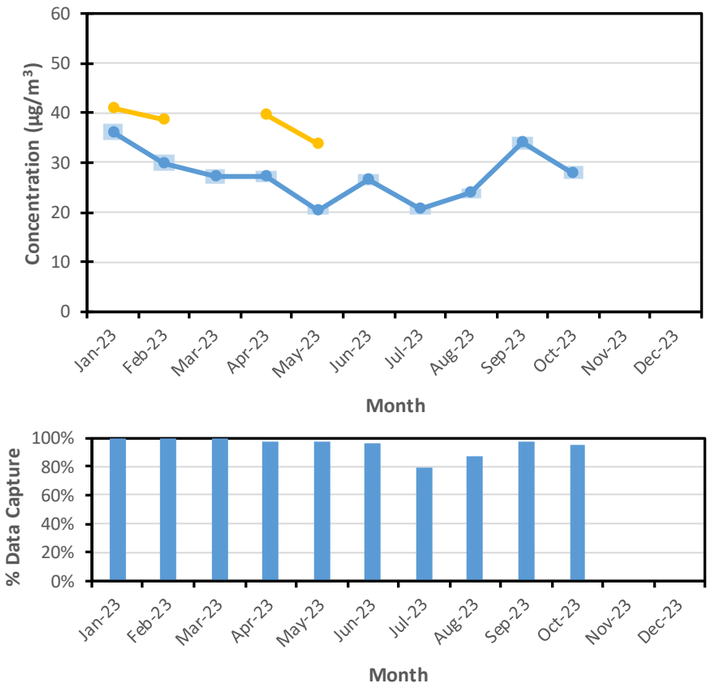
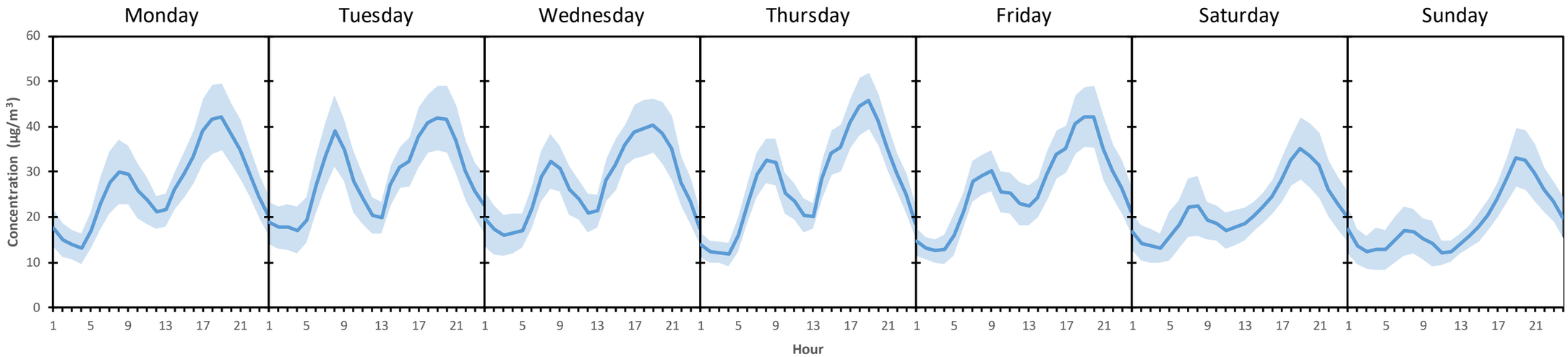


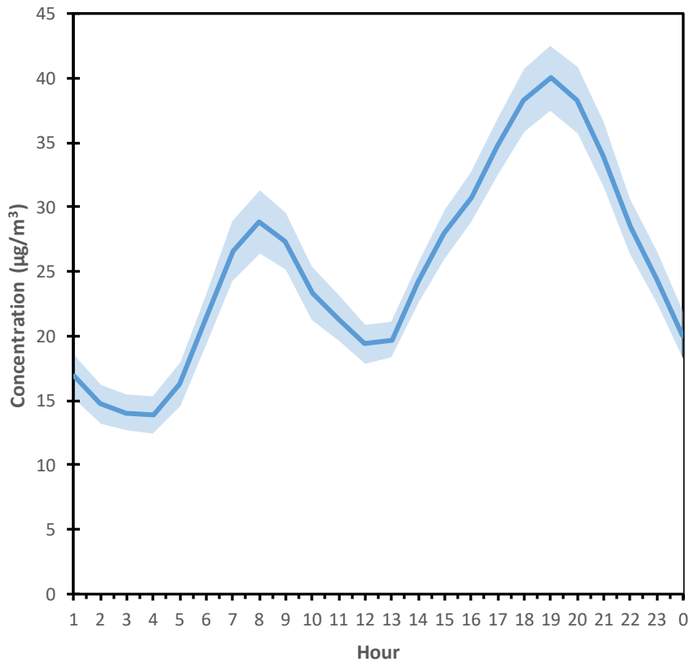
Figure G.17 – NO_2 data trends at LN105 – Peoples Park during 2023

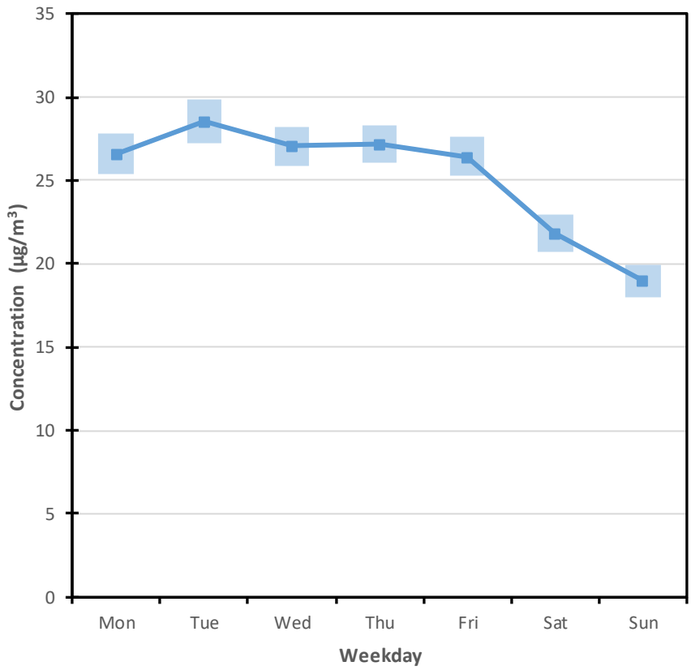
Site: LN105 - Peoples Park **Pollutant:** NO_2 **Data Status:** R - Ratified Data

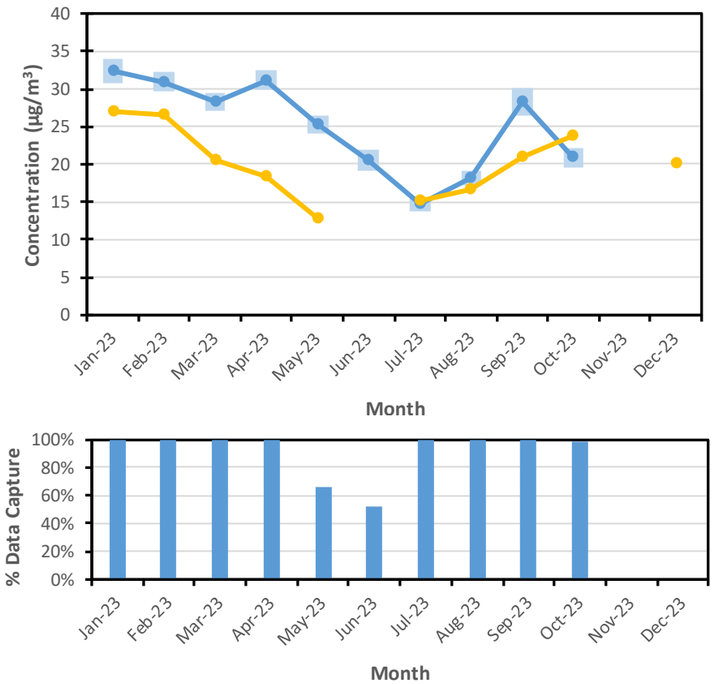
Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/2p869b79









Particulate Matter (PM_{10})

Figure G.18 – PM_{10} data trends at LN97 – Chaul End Road during 2023

Site: LN97 - Chaul End Road **Pollutant:** PM_{10} **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/mr2mh72j

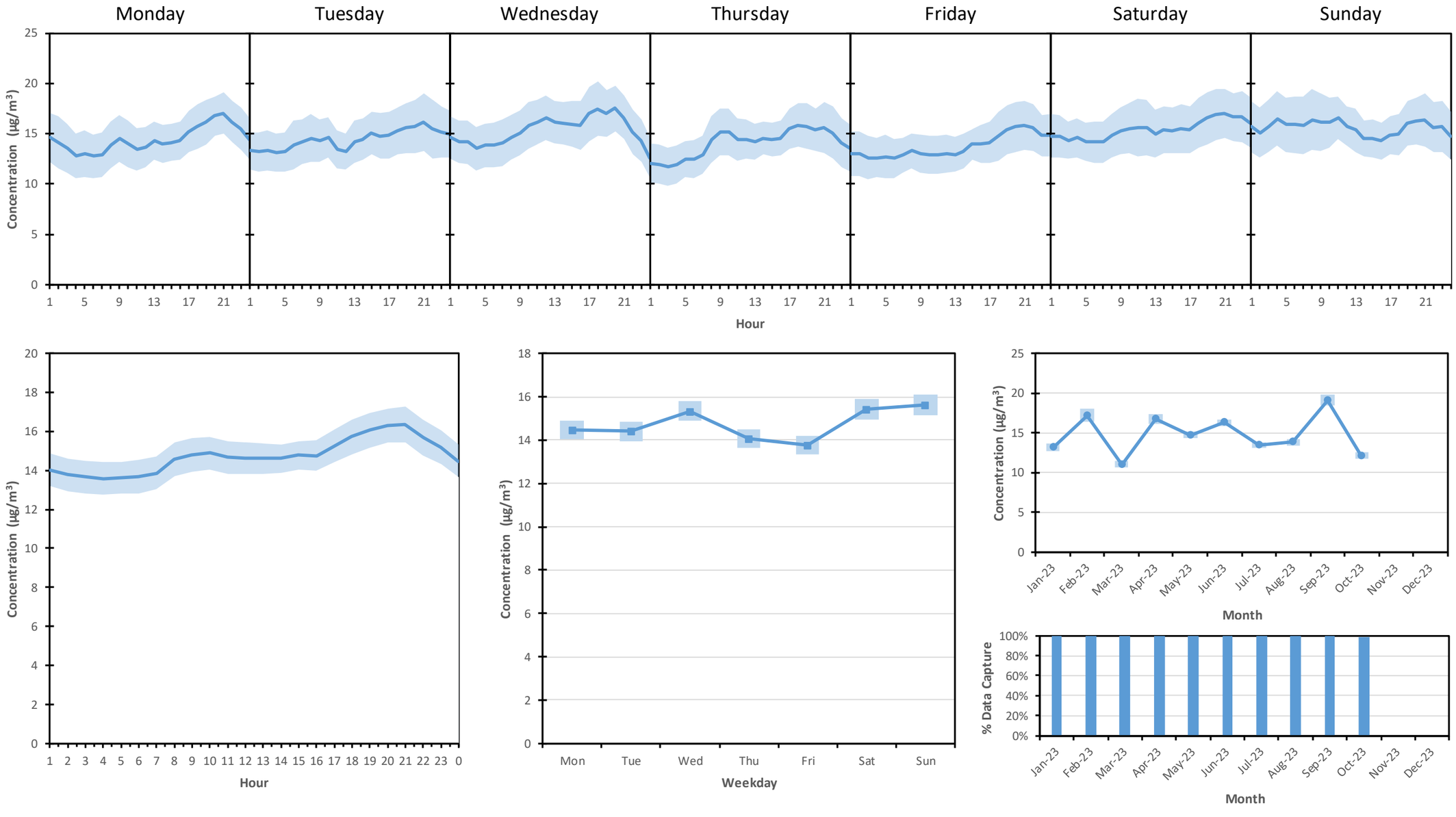
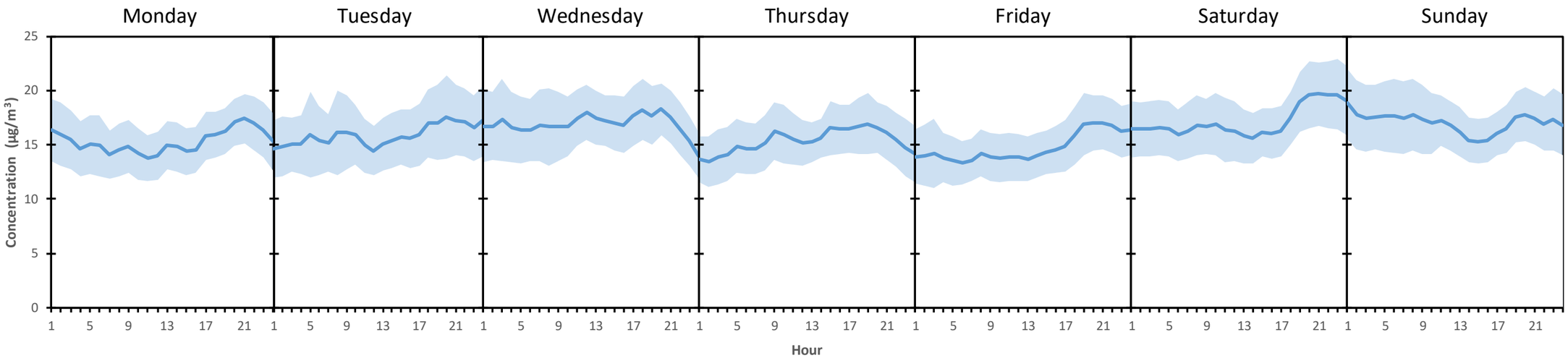


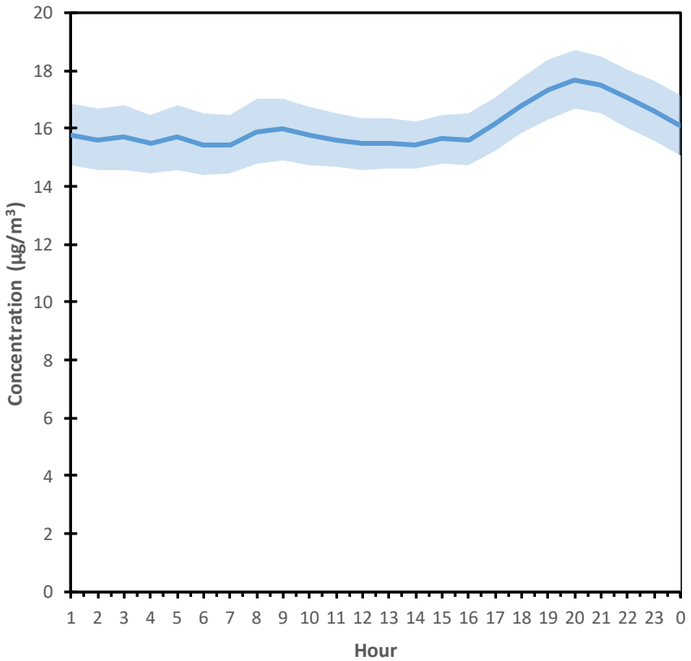
Figure G.19 – PM_{10} data trends at LN99 – Dunstable Road – Bury Park 2 during 2023

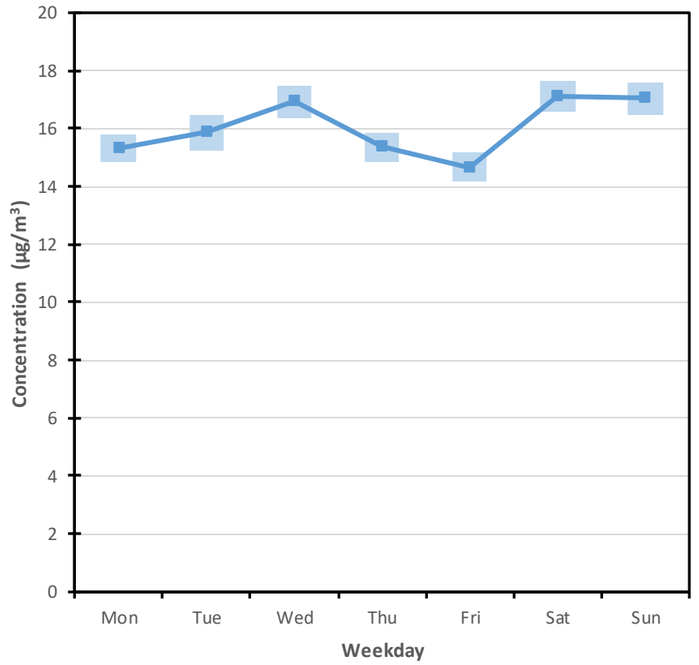
Site: LN99 - Dunstable Road - Bury Park 2 **Pollutant:** PM_{10} **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/22raz435







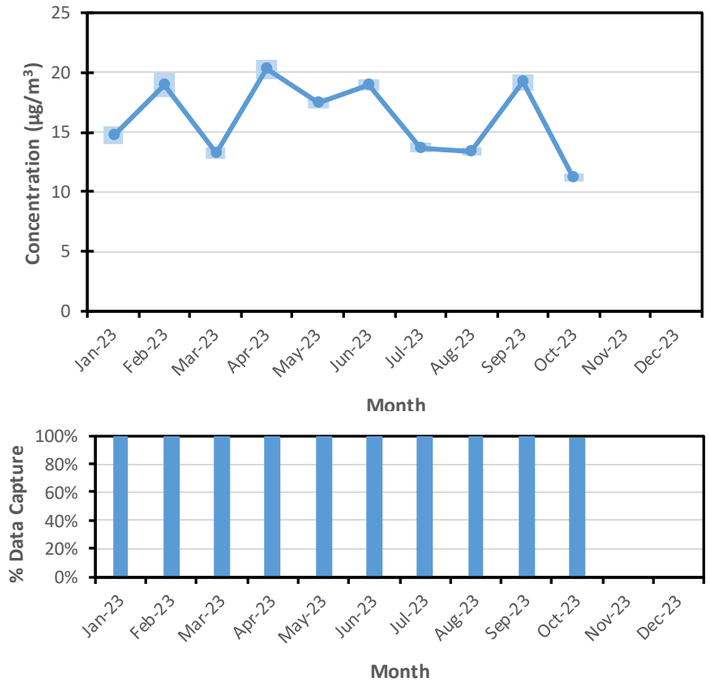


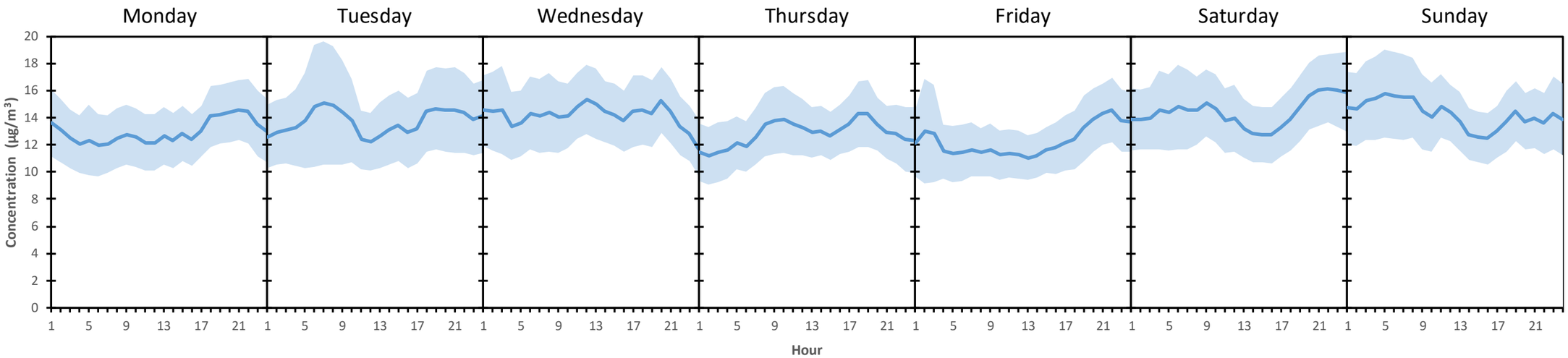
Figure G.20 – PM_{10} data trends at LN101 – Beech Hill Community Primary School during 2023

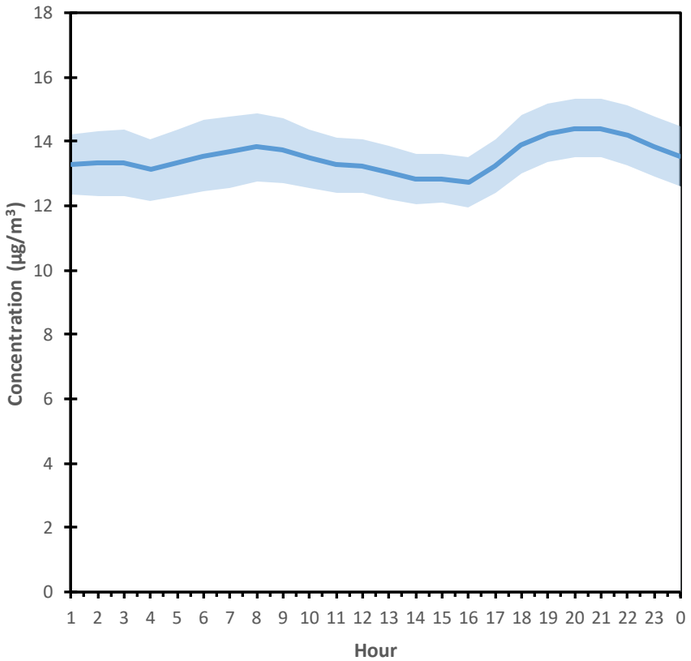
Site: LN101 - Beech Hill Community Primary School **Pollutant:** PM_{10} **Data Status:** R - Ratified Data

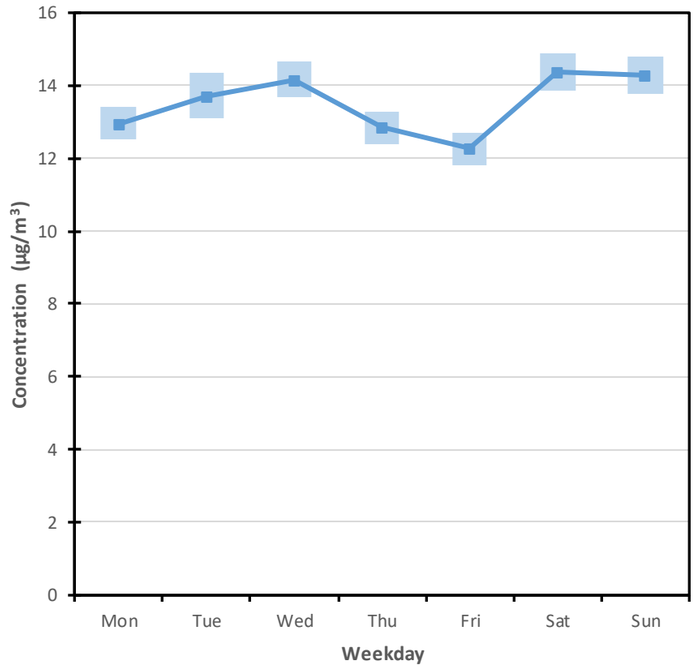
Start Date: 01/01/2023 **Finish Date:** 31/12/2023

Data are provided as hour ending, so it contains the preceding hour's data.

[Webportal] https://tinyurl.com/2p8c5jcr







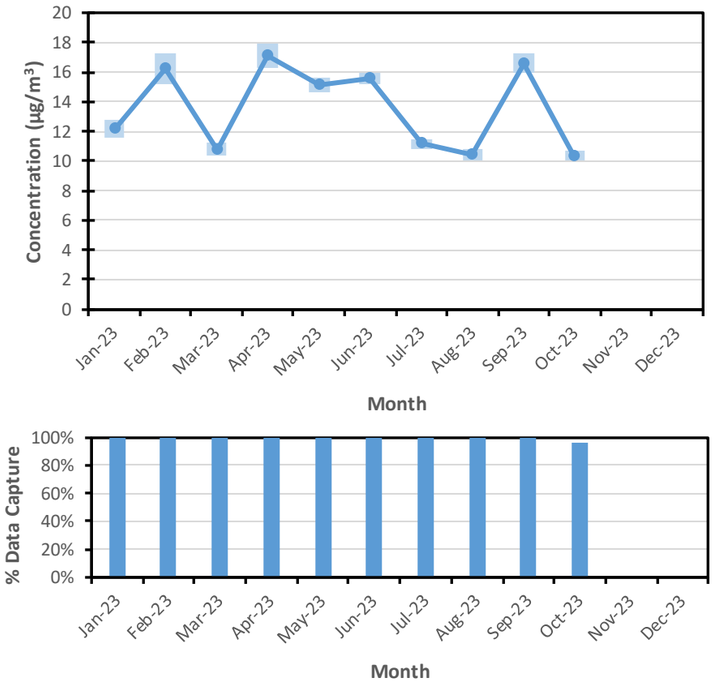
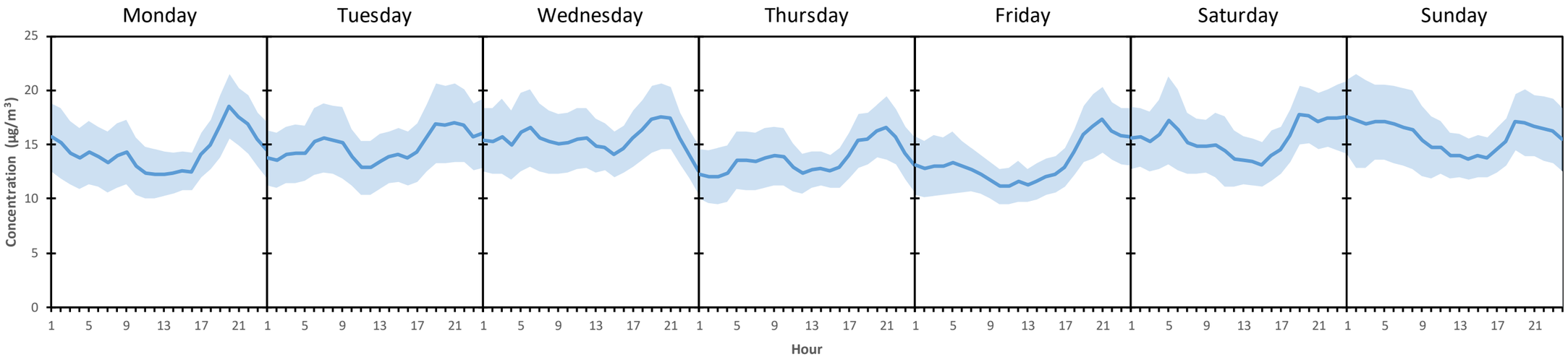


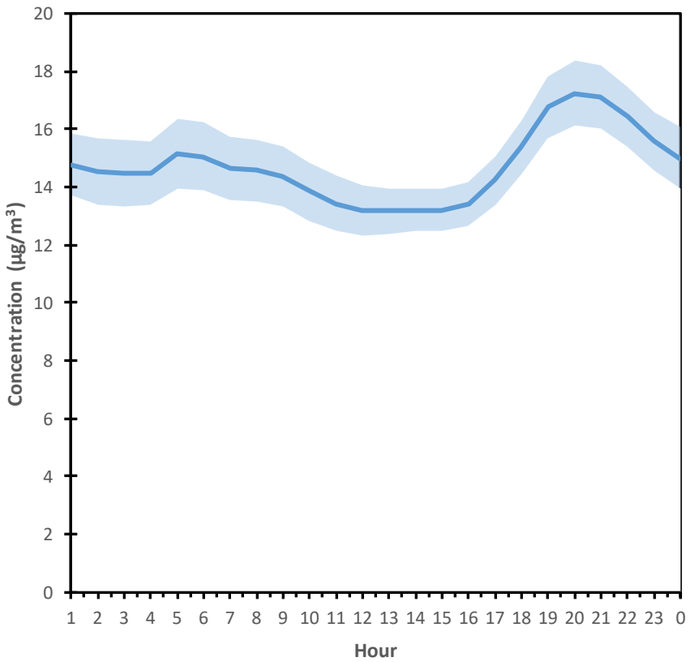
Figure G.21– PM_{10} data trends at LN103 – L&D Hospital, Lewsey Road during 2023

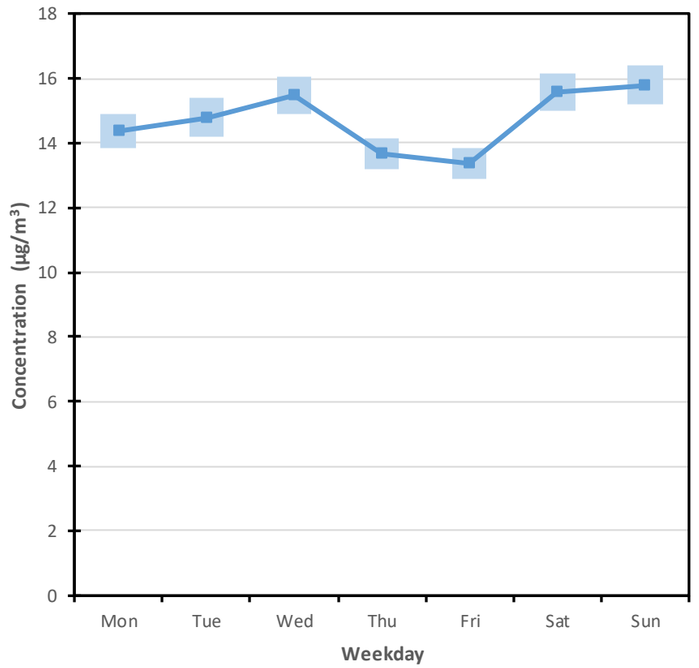
Site: LN103 - L&D Hospital, Lewsey Road **Pollutant:** PM_{10} **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/4tf2246y







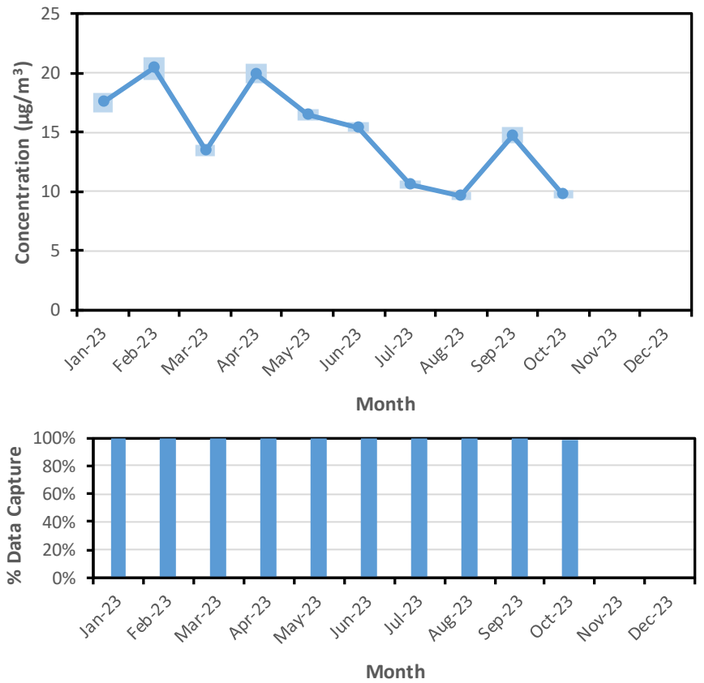
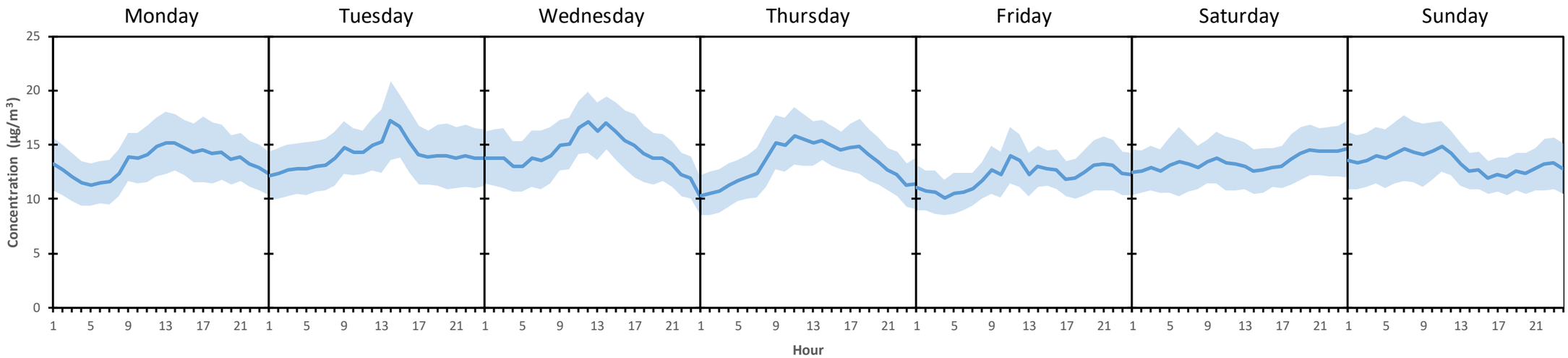


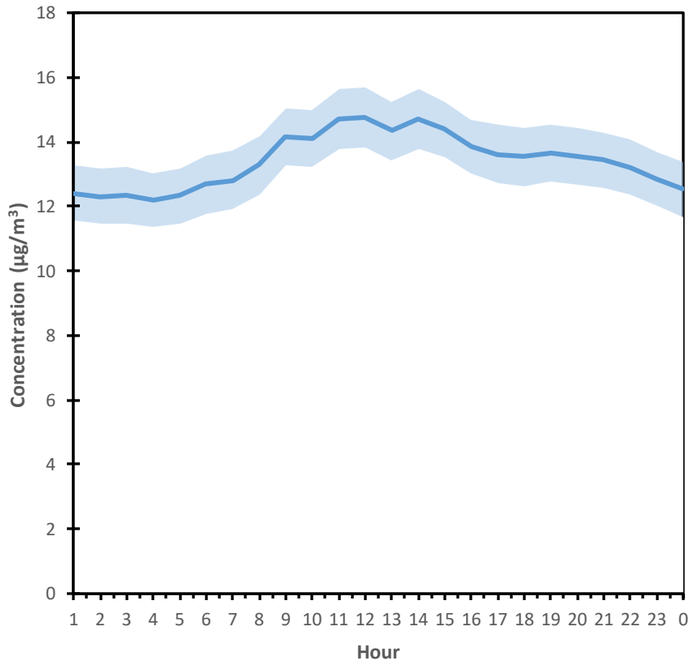
Figure G.22 – PM_{10} data trends at LN105 – Peoples Park during 2023

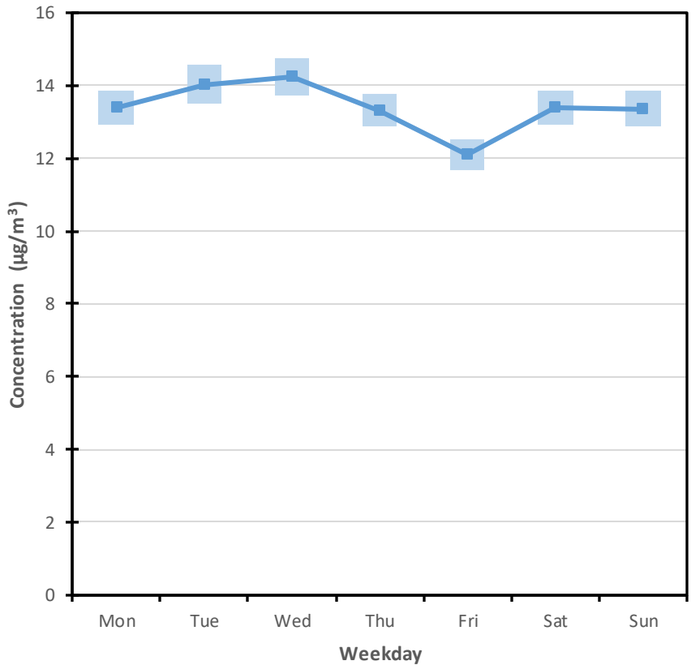
Site: LN105 - Peoples Park **Pollutant:** PM_{10} **Data Status:** R - Ratified Data

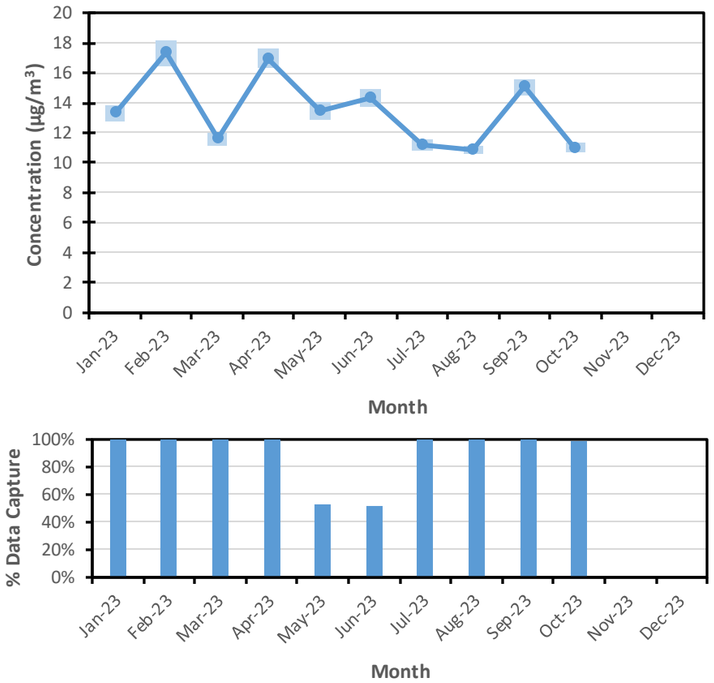
Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/2p869b79









Particulate Matter ($PM_{2.5}$)

Figure G.23 – $PM_{2.5}$ data trends at LN97 – Chaul End Road during 2023

Site: LN97 - Chaul End Road **Pollutant:** $PM_{2.5}$ **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/mr2mh72j

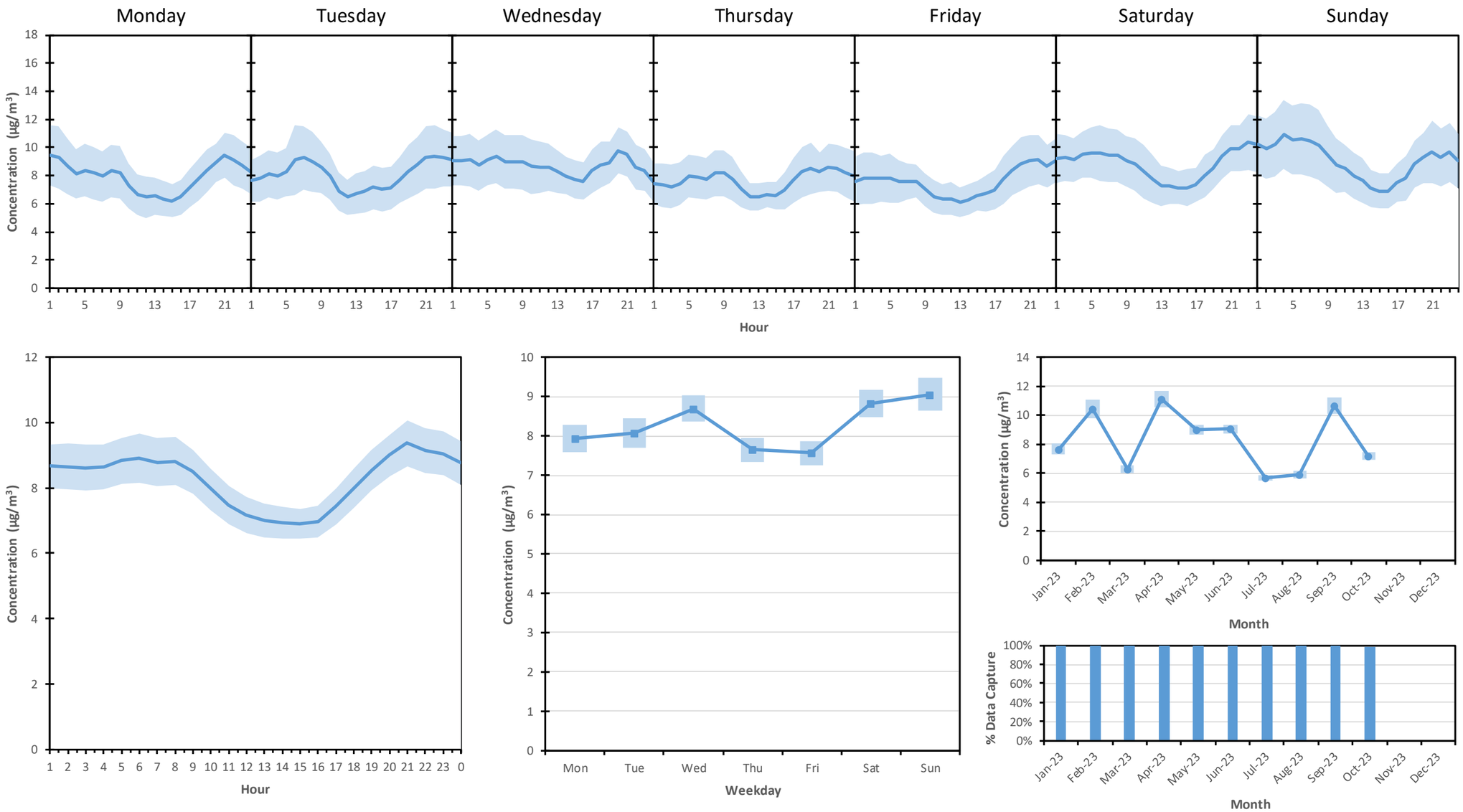
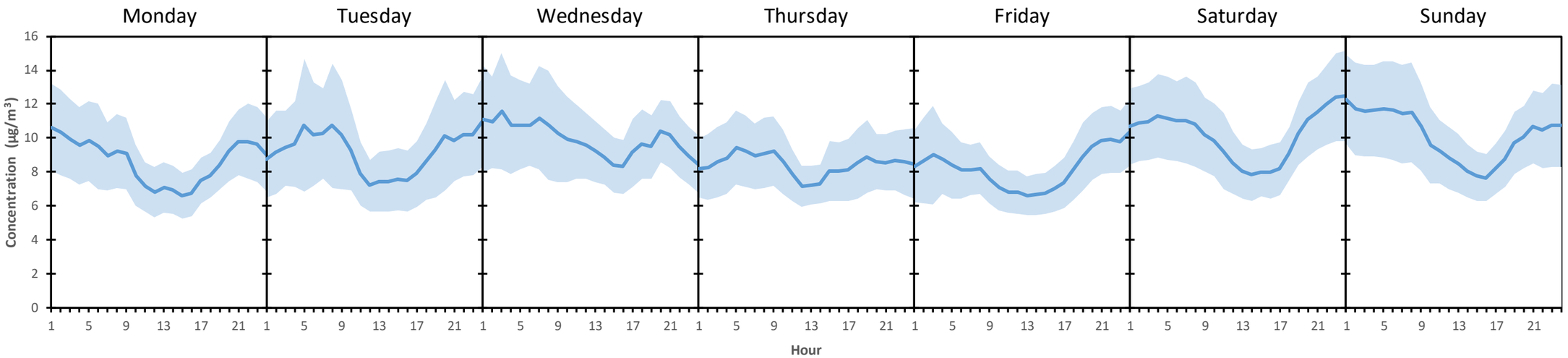


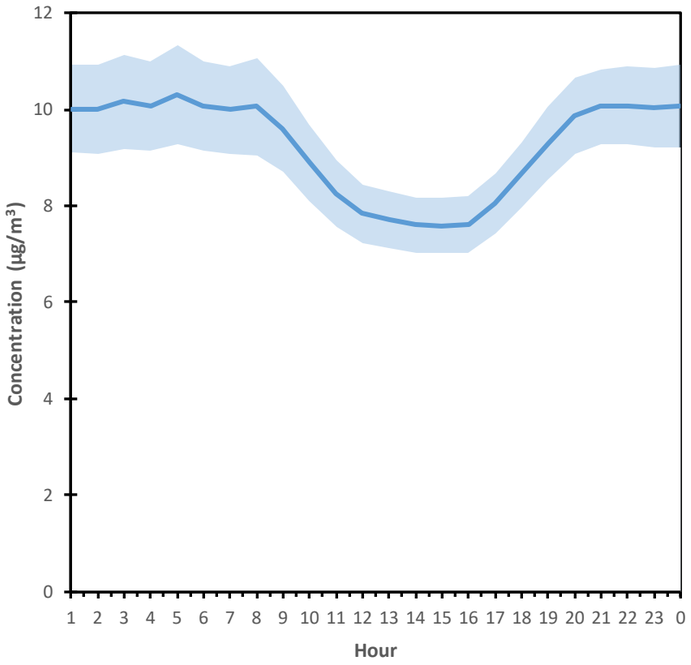
Figure G.24 – $PM_{2.5}$ data trends at LN99 – Dunstable Road – Bury Park 2 during 2023

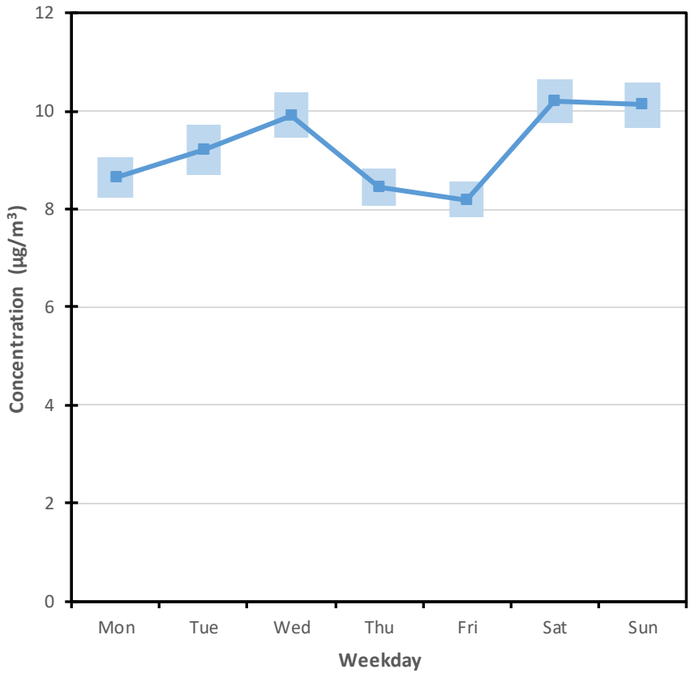
Site: LN99 - Dunstable Road - Bury Park 2 **Pollutant:** $PM_{2.5}$ **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/22raz435







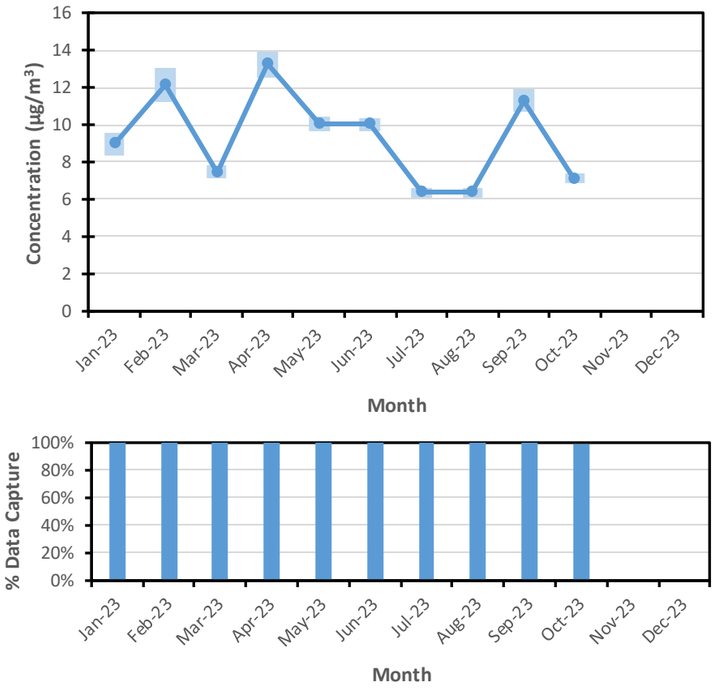


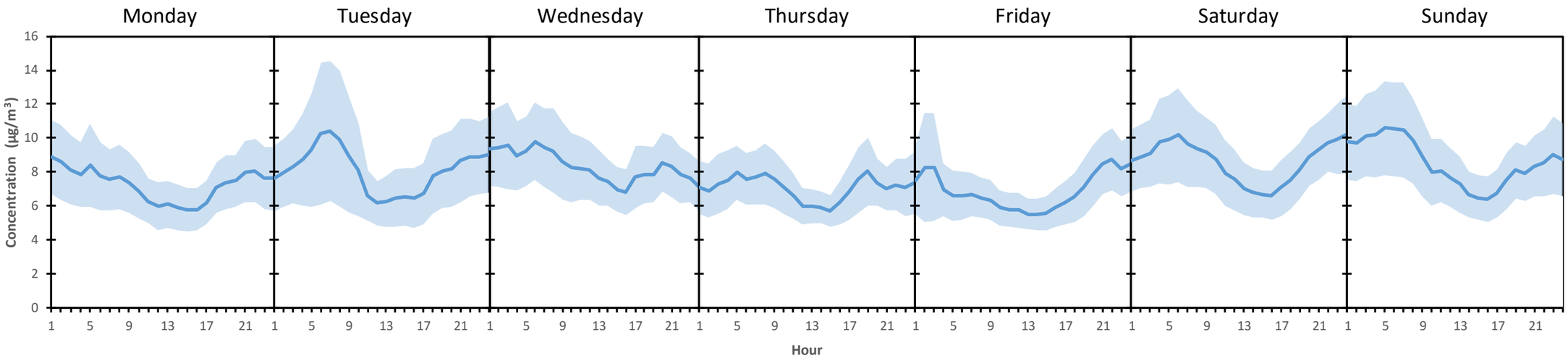
Figure G.25 – $PM_{2.5}$ data trends at LN101 – Beech Hill Community Primary School during 2023

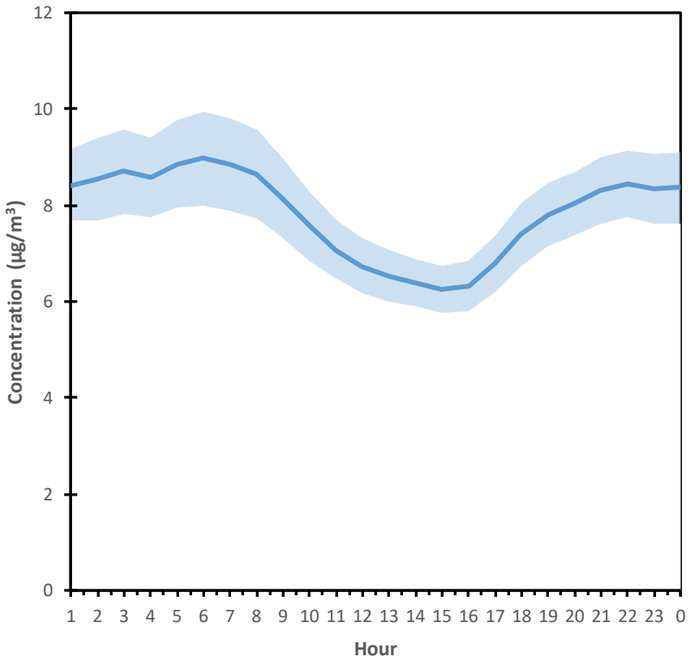
Site: LN101 - Beech Hill Community Primary School **Pollutant:** $PM_{2.5}$ **Data Status:** R - Ratified Data

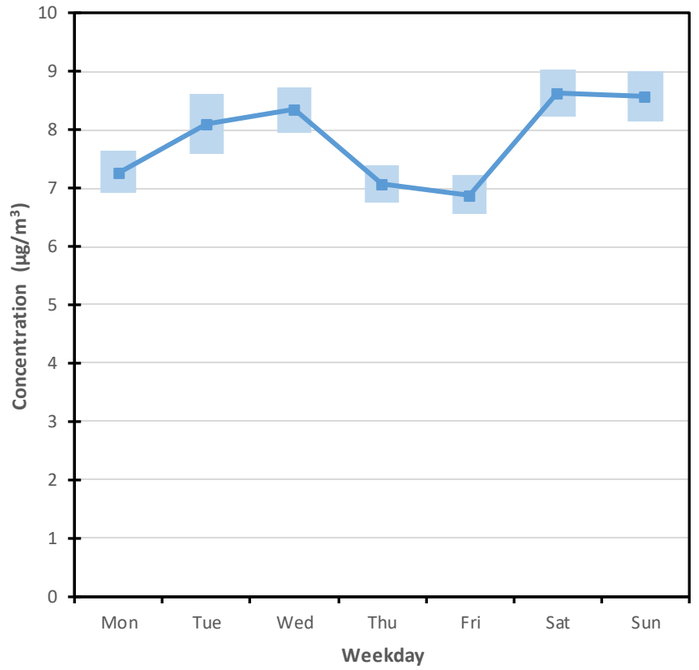
Start Date: 01/01/2023 **Finish Date:** 31/12/2023

Data are provided as hour ending, so it contains the preceding hour's data.

[Webportal] https://tinyurl.com/2p8c5jcr







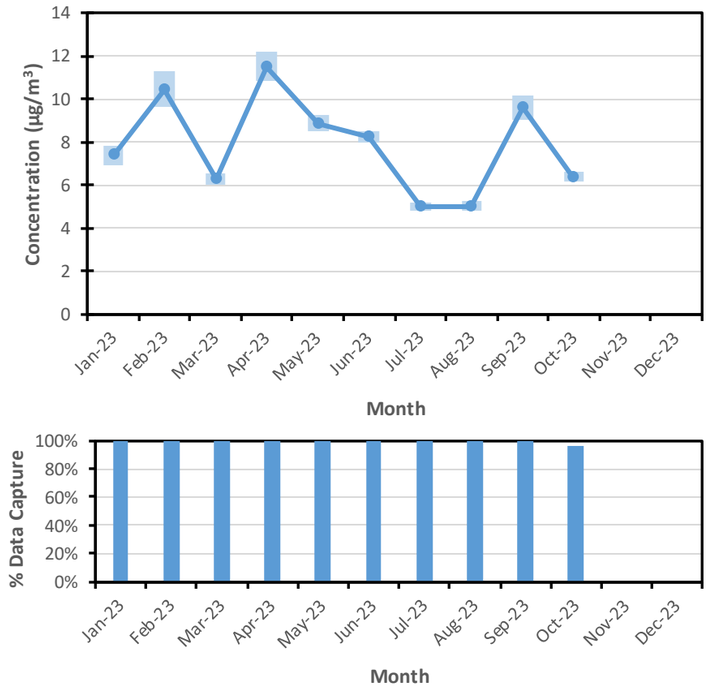
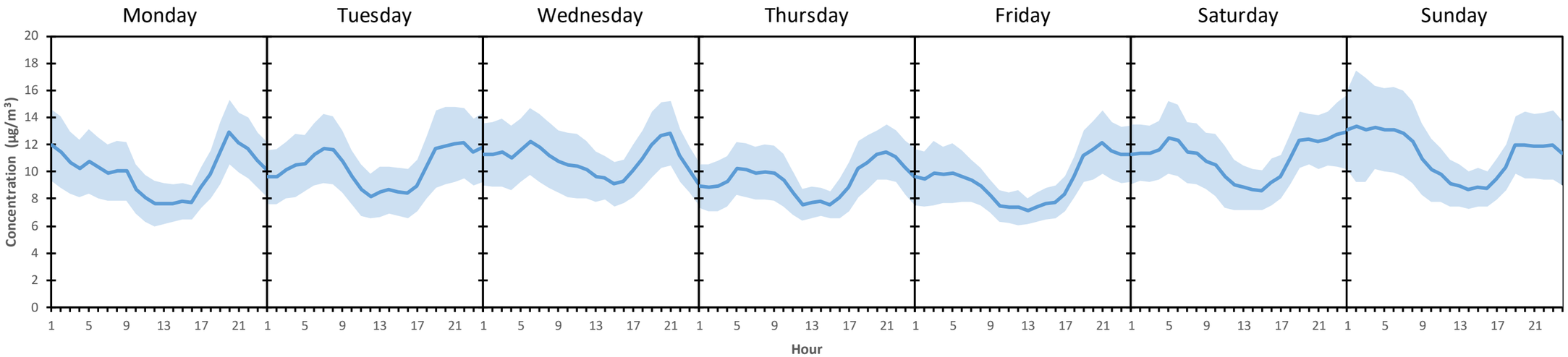


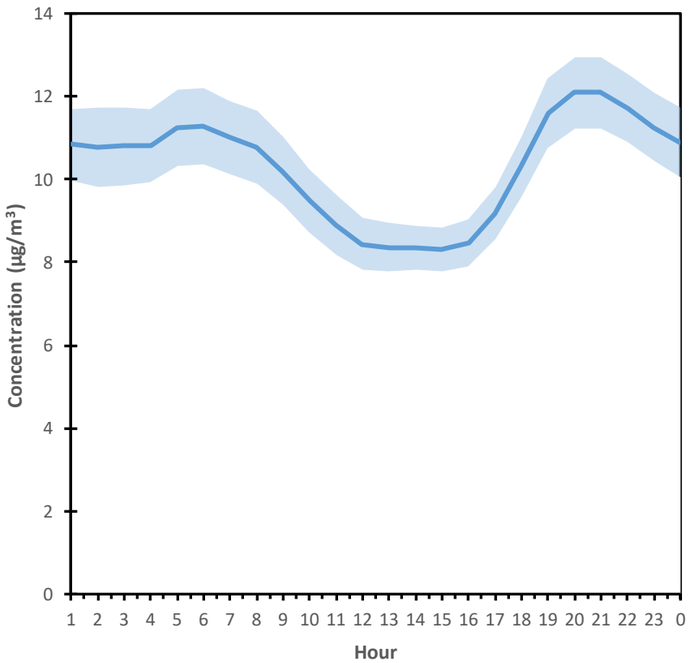
Figure G.26 – $PM_{2.5}$ data trends at LN103 – L&D Hospital, Lewsey Road during 2023

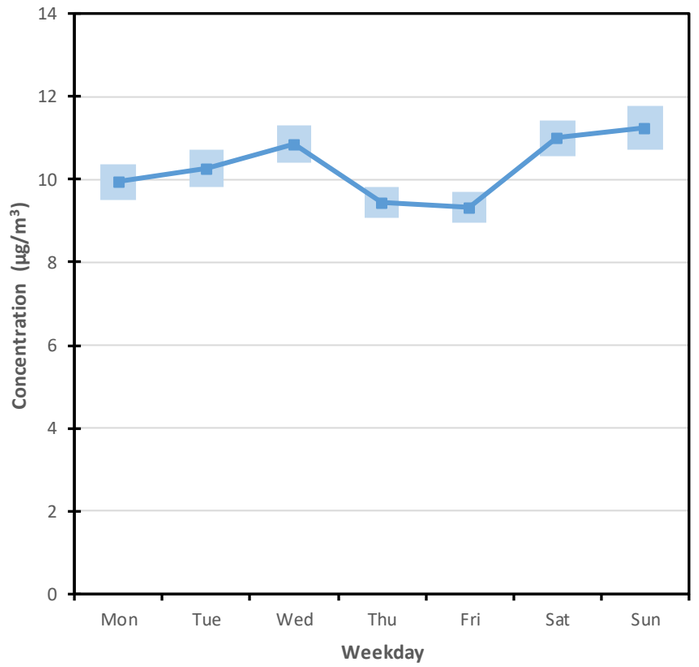
Site: LN103 - L&D Hospital, Lewsey Road **Pollutant:** $PM_{2.5}$ **Data Status:** R - Ratified Data

Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

[Webportal] https://tinyurl.com/4tf2246y







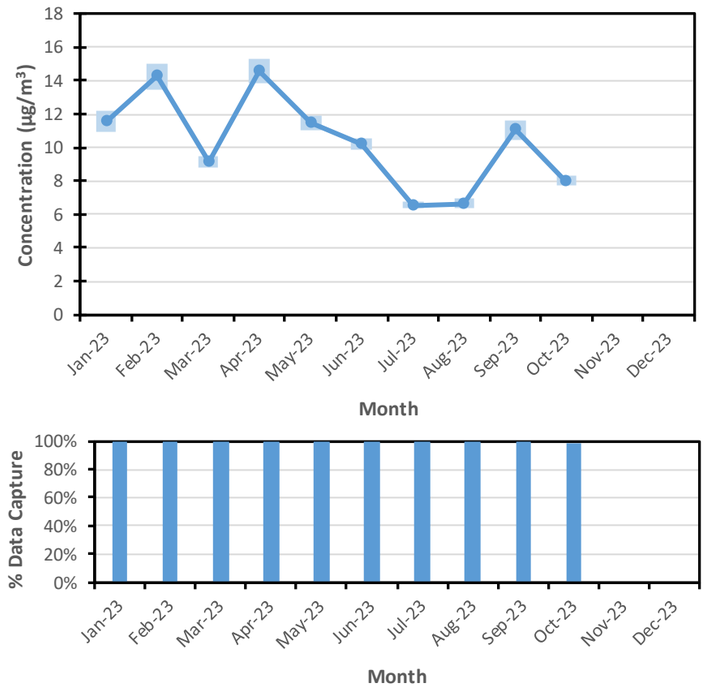
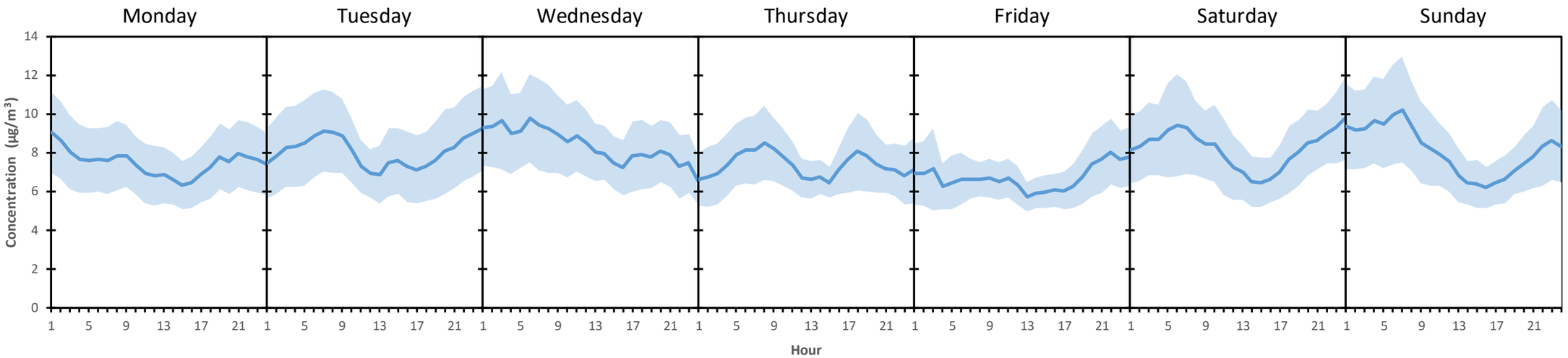


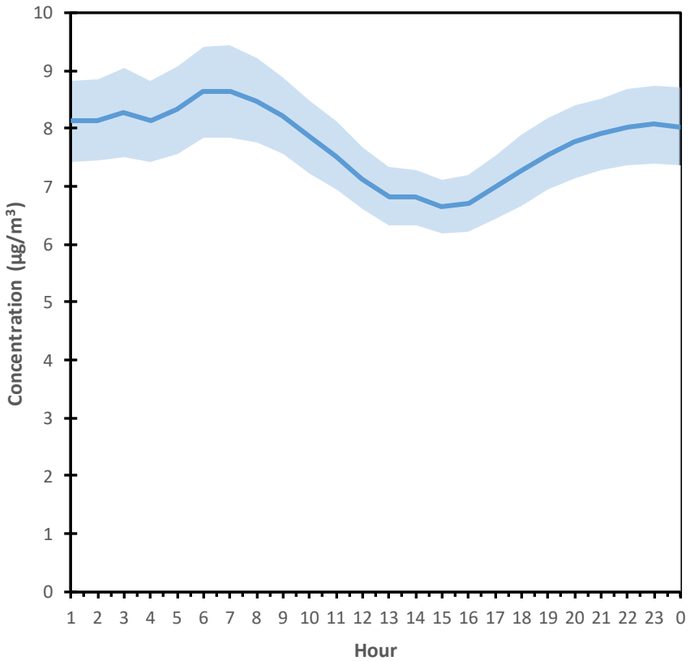
Figure G.27 – $PM_{2.5}$ data trends at LN105 – Peoples Park during 2023

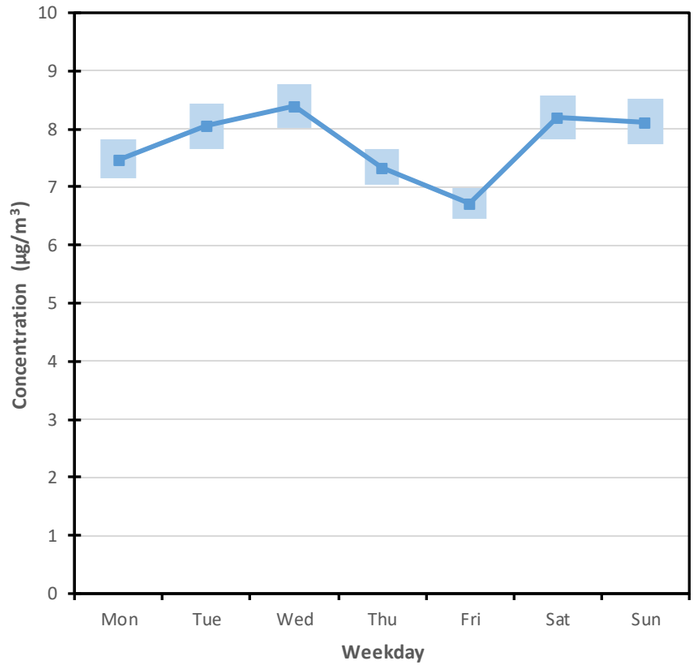
Site: LN105 - Peoples Park **Pollutant:** $PM_{2.5}$ **Data Status:** R - Ratified Data

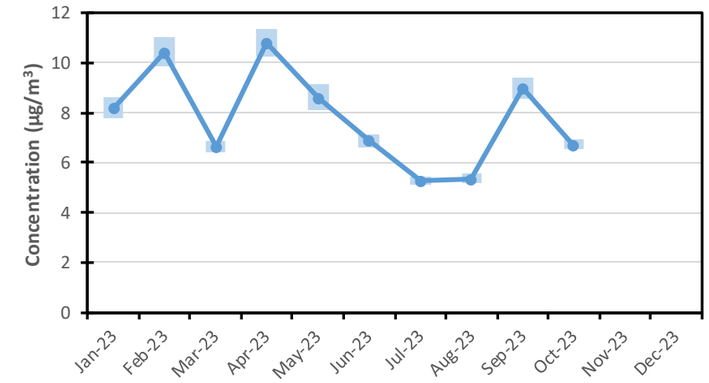
Start Date: 01/01/2023 **Finish Date:** 31/12/2023 **Data are provided as hour ending, so it contains the preceding hour's data.**

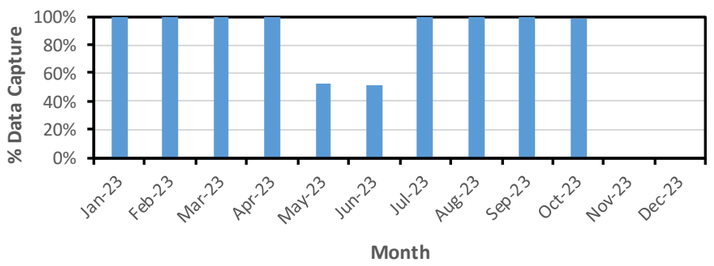
[Webportal] https://tinyurl.com/2p869b79











Glossary of Terms

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.

LLAOL. London Luton Airport Operations Ltd – the company that operates and maintains London Luton Airport.

NO_2. Nitrogen Dioxide.

NOx. 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

- Environmental Improvement Plan 2023. January 2023. Published by Defra [http://tinyurl.com/3fm5a7z8].
- 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 [http://tinyurl.com/y3auek9w].
- 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 [http://tinyurl.com/253sb23p].