



2024 Air Quality Annual Status Report (ASR)

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

Date: 27 September 2024

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Report Reference Number	LCC/ASR/2024v1
Date	Version 1 – 3 July 2024 Version 2 – 27 September 2024

Page / Table	Changes
Table A.1	Corrected date of declaration of AQMA
Table A.2, A.4 and B.1 Appendix C	The monitoring stations used to calculate the annualisation factor have been changed following advice from DEFRA. This has resulted in minor changes to some monitoring results with less than 75% data capture

Executive Summary: Air Quality in Our Area

Air Quality in Liverpool

Breathing in polluted air affects our health and costs the NHS and society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancers 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 year¹.

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 pollution².

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(NO ₂) 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, sand and salt, as well as human made sources such as smoke from fires, emissions from industry and dust from car tyres and brakes. PM₁₀ refers to particles under 10 micrometres in diameter. Fine particulate matter or PM_{2.5} are particles under 2.5 micrometres in diameter.

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

In 2023, NO₂ was measured across Liverpool at 144 Passive Diffusion Tube monitoring locations and seven automatic monitoring sites. The latest data from 2023 shows that NO₂ slightly decreased in most locations for which a direct comparison against 2022 data is possible.

Graphs showing NO₂ trends over the last five years are contained in Appendix A.

Liverpool meets the required European Union (EU) air quality standard for Particulate Matter (PM) for both PM₁₀ and PM_{2.5}. However, there is clear medical evidence that, even at the relatively low concentrations observed in Liverpool, it is highly likely that there is still a health impact on the local population, especially amongst the most vulnerable groups.

The background levels of PM₁₀ and PM_{2.5} decreased slightly in 2023 in comparison to data from 2022. Data recorded over the last ten years shows that there is no significant long term increase or decrease in either PM₁₀ or PM_{2.5}.

Graphs showing PM trends over the last five years are contained in Appendix A.

The actual concentrations observed in the past five years are significantly below the required target values. Details of the Liverpool citywide Air Quality Management Area (AQMA) can be viewed via the following link:

https://uk-air.defra.gov.uk/aqma/details?aqma_id=229

Following on from the declaration of the city wide AQMA in 2009, the 2007 Air Quality Action Plan (AQAP) was reviewed and existing actions that were no longer valid were removed, new actions were added and existing actions that had remained were updated. The revised AQAP was issued in 2011. Liverpool City Council (The Council) is currently undertaking work in collaboration with DEFRA to ensure compliance with air quality standards and as a result of this, the Council is in the process of developing a new Clean Air Plan (CAP). The measures contained within the CAP will also be included in a revised AQAP which will be prepared following the approval of the CAP Full Business Case (FBC).

The Council works in partnership with other Liverpool City Region local authorities, the Liverpool City Region Combined Authority (LCRCA) and Merseytravel, via the Liverpool City Region (LCR) and Cheshire Air Quality Technical Group which consists of Local Authority Operational and Technical Officers.

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 Plan³ sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter (PM_{2.5}), the pollutant of most harmful to human health. The Air Quality Strategy⁴ provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero⁵ 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.

Liverpool Clean Air Plan

In the original citywide AQAP, there were 13 core actions across five categories submitted to and subsequently approved by DEFRA in 2008.

Progress against these actions had been reported in the following years via the yearly Air Quality Annual Status Report (ASR).

In 2018, the Council was mandated by the UK Government to produce a Clean Air Plan (CAP) to investigate how air quality could be improved regarding levels of Nitrogen Dioxide (NO₂) – so that the city could be legally compliant in 'the shortest possible time'.

As part of producing the CAP, Liverpool and all other mandated local authorities are required to look at introducing a charging Clean Air Zone (CAZ) – as it was believed that a charging CAZ would bring forward air quality compliance quicker than any other option.

³ Defra. Environmental Improvement Plan 2023, January 2023

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

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

Despite extensive modelling of different geographical sizes and categories of a charging CAZ, none addressed all the forecast exceedances in Liverpool. In addition, the recent experience of the Greater Manchester charging CAZ highlighted concerns that the effectiveness of a CAZ could be significantly impacted by fleet upgrade delays and affordability issues for residents and businesses – all of which have all been worsened by the current economic climate.

By 2023, air quality monitoring & modelling and transport modelling had forecast nine road lengths in Liverpool which would exceed the required NO₂ annual mean value of 40.45 ug/m³.

Due to the same charging CAZ concerns being relevant to Liverpool, it became clear that the roll out of any charging CAZ scheme could not happen ahead of 2025. By which time, modelling had shown that Liverpool would only have two remaining exceedances, the other exceedances would be resolved through natural compliance in 2024.

The two exceedances at Walton Vale and Hunter Street/Islington are likely to become compliant through minor changes to traffic signalling, and as such various configurations are being trialled during 2024 with a view to implementation in the same year.

However, the most recent ratified air quality data for 2023 has shown that there is possibly a new exceedance in the city centre at Pembroke Place and additional transport and air quality modelling in conjunction with real time air quality monitoring is being undertaken to understand the scale of the issue and whether or not an intervention is required to bring forward compliance in the shortest possible time.

The Full Business Case (FBC) proposing the measures to achieve compliance was approved by Council Cabinet in August 2023, and submitted to Government, who in February 2024 approved the measures proposed for the 2 remaining exceedances and have provided the funding to implement the measures.

As part of the legal mandate, Monitoring & Evaluation (M&E) of the implemented measures will be undertaken for a minimum 2-year period to understand the impact of the measures on compliance. The M&E will be fully funded by Government.

Wider Council Policy and Plans

The Liverpool City Council Plan 2023-27 includes “*climate action & environment*” as one of the three cross-cutting principles will shape and inform delivery across the plan’s six strategic pillars. Examples are provided below.

- *Pillar 1 - A strong and fair economy for all*
 - 1.3 *Neighbourhoods are supported to thrive and grow sustainably.*
- *Pillar 3 - Thriving communities*
 - 3.1 *Greener and cleaner neighbourhoods*
- *Pillar 4 - Healthier lives for children and adults*
 - 4.1 *Increased healthy life expectancy. To reduce the differences in life expectancy and healthy life expectancy between communities within Liverpool and between Liverpool and elsewhere in the UK*
- *Pillar 5 - A well-connected, sustainable and accessible city*
 - 5.1 *Modern, sustainable and connected public travel infrastructure*
 - 5.4 *Connectivity is improved across the city – making places cleaner and better to live in*
 - 5.5 *Significant progress is made on climate action and environmental sustainability – both within the council’s own activity and across the city.*

The City Plan sets out our vision for Liverpool as ‘a thriving, sustainable, fair city for everyone. The City Plan updated in January 2021 has six underpinning aims including “a *low carbon, connected and accessible city*”. The outcomes and priorities within this aim include the following:

Collective action to improve local air quality: we will deliver a comprehensive set of actions via the Liverpool Clean Air Plan to ensure that levels of Nitrogen Dioxide (NO₂) and Particulate Matter (PM) are better than the statutory legal limits.

- *To reduce annual NO₂ emissions and eliminate non-compliant road links.*
- *To reduce levels of air-borne PM*
- *To protect the most vulnerable people from the impacts of poor Air Quality*

Conclusions and Priorities

In 2023, NO₂ concentrations in Liverpool decreased slightly in comparison with 2022. There were four exceedances identified within the City-Wide AQMA and therefore the AQMA cannot be revoked.

There was continued progress against the core AQAP actions and new plans and actions are being planned or are already implemented. As described previously, the CAP will be developed further and will form the basis for future policy and the revised AQAP. The priorities for Liverpool in addressing air quality for 2024 are as follows:

- To develop the CAP in order to meet compliance for NO₂ as an annual mean in the shortest possible time as mandated by Central Government in October 2018.
- To maintain a downward trend in levels of NO₂ as measured at each monitoring location throughout the city.
- To continue to progress actions and initiatives to improve air quality.
- To improve and clarify the information supplied to the public about air quality in Liverpool.

Local Engagement and How to get Involved

Residents and other interested parties can visit the Let's Clear the Air website that includes updates on the CAP, news about the work the Council and its partners are doing to improve air quality and live air quality data from all the automatic air quality monitoring stations in Liverpool. It can be accessed via the link below:

<https://letscleartheairliverpool.co.uk/>

Schools in Liverpool are encouraged to visit the Clean Air Crew website and sign up to receive bespoke educational resources for school age children in the Liverpool City Region.

<https://www.cleanaircrew.co.uk/>

More information about cycling in Liverpool including how to get started, maps, events and rides can be found on the Liverpool City Council website.

<https://liverpool.gov.uk/parking-roads-and-travel/getting-around-liverpool/cycling/>

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection Unit of the Public Protection and Licensing Service of Liverpool City Council with the support and agreement of the following officers and departments:

- Public Health
- Planning
- Environment Services
- Highways and Transportation
- Neighbourhood Services
- Fleet and Transport

It was also prepared with the support of officers from the Liverpool City Region Combined Authority and Merseytravel

If you have any comments on this ASR, please send them to Keith Dooley at:

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1 Local Air Quality Management

This report provides an overview of air quality in Liverpool during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Liverpool City 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 (AQMA) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the local 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 AQMA declared by the Council can be found in Table 2.1. The table presents a description of the single AQMA that is currently designated within Liverpool. Appendix D: Maps of Monitoring Locations and AQMA provides maps of the AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO₂ annual mean

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
City Wide AQMA	01/04/2009	NO ₂ Annual Mean	Covers whole of LCC administrative area	YES	87	42.8	Not compliant	City Wide AQAP January 2011	Upon request

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

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

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

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed, and provides the information specified in the Guidance. The following comments were made by DEFRA, with the Councils response below in red text.

1. QA/QC procedures of diffusion tube monitoring is robust and detailed and included the national bias adjustment spreadsheet which is an example of good practice and should be implemented in future ASRs.
2. The Council have provided an in-depth section discussing the comments from the previous ASR, and the comments have been noted and changes made in the ASR. This should continue this in future ASRs to ensure all reports are to a good standard.
3. The 'Actions to Improve Air Quality' section is detailed and includes many policies in the Liverpool area which aim to improve air quality. The Liverpool Clean Air and the introduction of a Clean Air Zone are examples of policies and procedures which aim to better air quality. This should continue going forward.

We would like to make it clear that Liverpool City Council are not planning to move forward with a Clean Air Zone and the rationale for this is stated in pages iii and iv of the 2023 ASR. It has also been discussed and agreed with Defra/DfT Joint Air Quality Unit (JAQU) as part of the Clean Air Plan work.

4. Reference to the Public Health Outcomes Framework and indicator D.01 has been made and this practice should continue going forward.
5. Local engagement section only provides link to it council website and for future ASRs this section should include examples of schemes or procedures to encourage local engagement.

Noted. Additional information regarding educational resources for schools and active travel engagement have been included in the 2024 ASR.

6. Maps are slightly difficult to read considering the colour choice and the absence of a scale bar and North arrow. This should be considered for future ASRs. Maps should be able to show the monitoring sites in detailed and provide context for the city as a whole.

Noted. These have been changed in the 2024 ASR.

The Council and its partners have taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 39 measures are included within Table 2.2, with the type of measure and the progress the Council and the Liverpool City Region Combined Authority have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Action Plans. Key completed measures are:

- New active travel route completed at Everton Park and major upgrades along Liverpool Loop Line to improve accessibility.
- Delivery of free educational resources and classroom sessions for schools in Liverpool in collaboration with Southport Eco Centre
- Start of School Streets project restricting traffic in drop off / pickup areas around schools
- Enactment of new powers to enforce moving traffic contraventions to reduce congestion in the city.
- Installation of an additional automatic NO₂ analyser in Walton Vale

The Council expects the following measures to be completed over the course of the next reporting year:

- Full revision of Air Quality Action Plan following the confirmation of measures outlined in the Clean Air Plan
- Consolidation of Smoke Control Areas and further work to promote safe domestic burning.
- Delivery of four sites that incorporate greening as part of proposed active travel route schemes on the fringes of the city centre.
- Construction of stage 2 of the City Centre Connectivity Scheme subject to funding.
- Installation of two additional automatic NO₂ analysers on Hunter Street and Pembroke Place

The Council worked to implement these measures in partnership with the following stakeholders during 2023:

- Merseytravel and the Liverpool City Region Combined Authority.
- Liverpool Streetscene Services Ltd (LSSL)
- Schools
- Southport Eco Centre
- Living Streets
- Sustrans
- Arriva, Stagecoach, and other bus companies

The principal challenges and barriers to implementation that the Council anticipates facing are not necessarily in relation to the implementation of actions but having the finance and resource to quantify any reductions in air pollution/improvements in air quality as a direct result of the implementation of any of the actions. In 2020 and 2021 disruption to normal services due to the COVID-19 outbreak had some impact on the council's implementation of air quality improvement projects and continues to be a potential risk in the future.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, the Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of the City-Wide AQMA

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	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	Liverpool Clean Air Plan	Policy Guidance and Development Control	Other policy	2021	Ongoing	LCC / SWECO	DEFRA	NO	Funded	> £10 million	Planning	To ensure compliance with annual mean objective in the shortest possible time	Compliance within the shortest possible time	The remaining 2 exceedances at Walton Vale and Hunter Street/Islington are likely to become compliant through minor changes to traffic signalling, and as such various configurations are being trialled during 2024 with a view to implementation in 2024. The Full Business Case (FBC) proposing the measures to achieve compliance was approved by Council Cabinet in August 2023, and submitted to Government, who in February 2024 approved the measures proposed for the 2 remaining exceedances and have provided the funding to implement the measures.	LCC was mandated in October 2018 to produce a Clean Air Plan which would detail how compliance with the EU annual mean limit value for Nitrogen Dioxide would be met in the shortest possible time.
2	Liverpool City Centre Connectivity Scheme	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2018	2024	LCC	LCC	NO	Not Funded	> £10 million	Implementation	Reduced emissions due to improved traffic flow and modal shift to active travel	N/A	Full Business Case and consultation completed in 2018. Construction works for the Strand Phase 1 and Lime Street were completed in 2022. The Strand Phase 2 is currently in preliminary design stage. It will then progress to detailed design and then construction due to begin in late 2024/25 subject to funding	LCCC is a programme of transport improvements measures at strategic locations across the city centre aimed at supporting the economic growth of Liverpool and its position as a major visitor destination. This will include enhanced cycle and pedestrian routes across the city centre. Funding for the schemes has not yet been agreed and some may come from CRSTS
3	New cycle lanes	Transport Planning and Infrastructure	Cycle network	2023	2025	LCC / LCRCA	Various sources including CRSTS and ATF	NO	Partially Funded	> £10 million	Implementation	Reduced emissions via modal shift	Length of cycle lanes	Detailed design stage has commenced for West Derby Road and Sefton Park. Vauxhall Road to follow. Childwall Route is due to enter detailed design stage.	West Derby Road to the city centre – upgrading a successful pop-up route to permanent cycle infrastructure. Childwall to the city centre – connecting up the university campuses through to the Knowledge Quarter & Lime St. Sefton Park to the city centre – connecting the Ropewalks to Baltic Triangle and on to Dingle and Aigburth
4	Schools Streets	Traffic management	Other	2021	Ongoing	LCC /Schools	Department for Transport and Sustrans	NO	Funded	£100k - £500k	Planning	To be determined	Improvement in air quality at selected sites using PDT"s	This project will involve the closure of streets in the vicinity of 9 schools in the Liverpool area at drop off and collections times with the aim of improving road safety and air quality. Schools have been identified and traffic orders have been implemented	Available staffing numbers to physically enforce the closures could lead to the council introducing school streets reliant on signs only. Some drivers might contravene the restrictions which would impact on the air quality at the gate.

Measure No.	Measure Title	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	Bus Retrofit Programme	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2020	Ongoing	LCC. / Bus Companies	Section 31 of the Local Government Act 2003	NO	Funded	£1 million - £10 million	Implementation	Medium	Number of buses retrofitted	LCC has been awarded in February 2021 a further £3.3 million through the Bus Retrofit Programme for improving bus fleet to at least Euro 6 standard and is in discussion with the bus operators and Mersey Travel on the numbers that are eligible for upgrading and the likely timescale for implementation. Once agreed a roll out of the programme of retrofitting will commence.	This funding is to implement part of the local plan to reach legal nitrogen dioxide compliance in the shortest possible time and reduce exposure. This was presented in the unapproved Outline Business Case of the local plan submitted in October 2019 relating to a Bus Retrofit Programme
6	Anti- Idling enforcement	Traffic Management	Anti-idling enforcement	2018	Ongoing	LCC. Environmental Health and Licensing enforcement	LA	NO	Not Funded	< £10k	Implementation	Reduced emission from vehicles.	Number of people spoken to	Anti-idling enforcement is ongoing.	Anti-idling enforcement and education has focused on taxi ranks with limited activities near to schools.
7	Urban GreenUp project	Transport Planning and Infrastructure	Other	2017-18	2025	LCC / The Mersey Forest / University of Liverpool	EU Funding	NO	Funded	£1 million - £10 million	Ongoing	Reduction in pollutants from modal shift by improving active travel infrastructure	Monitored reduction in NO2 levels	The EU URBAN GreenUP project involved the retrofitting of Nature based solutions into urban city environments to tackle the predicted impacts of future climate change. Several the proposed green interventions aimed to directly tackle issues associated with poor air quality. In 2024, building on URBAN GreenUP, a new EU funding source provided follow on funding for works at 4 sites that incorporated greening as part of proposed active travel route schemes on the fringes of the city centre	PDT's were located in areas that underwent GreenUp improvements with the aim of quantifying any change in AQ. However, the improvement could not be measured due to the impact of COVID skewing monitoring data and masking any improvements due to the interventions.
8	Local Authority Fleet Improvements	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2017	Ongoing	LCC / LSSL	LA Funding	NO	Funded	£500k - £1 million	Implementation	Reduction in emissions	Percentage of vehicles that are LEV	Between 2017 and mid 2024 the number of diesel vehicles in the fleet has reduced from 158 (81% of fleet) to 61 (35%); Over the same time EV and Hybrid increase from 5 (2.5%) to 64 (35%). Additional electric vehicles are at various stages of procurement or approval. There is a feasibility study to increase the parking capacity at the depot with the possibility of increasing the number of dedicated parking/charging bays for electric vehicles	Additional EV fleet models not always available It may be necessary to have limited exemptions for certain diesel vehicles into city centre post 2020 were there are no alternatives. Covid-19 and the Ukraine conflict has created parts shortage that means some vehicles will not be available to procure
9	Schools Air Quality Programme	Public Information	Other	2019-2020	2021	LCC / School Improvement Team/ Schools	Public Health	NO	Funded	£10k - 50k	Completed	Increased public awareness	Number of Schools completing programme	Twelve schools in Liverpool were part of the programme that includes the supply of PDTs for one year for 5 sites. Support included financial support for Clean air Interventions in the schools and technical and educational support from EH. A schools' conference was held in 2021 summarising the pupil's experiences.	Resources and commitment of schools is required. COVID-19 has disrupted the AQ monitoring and timetable for this intervention

Measure No.	Measure Title	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
10	Air Quality in Schools (PM) project	Public Information	Other	2021	2022	LCC / Imperial College London	DEFRA	YES	Funded	£100k - £500k	Completed	Increased public awareness	Number of signups and school visits	In partnership with the Environmental Research Group at Imperial College London, LCC delivered a citizen science project where 200 school children in Liverpool will measure their personal PM2.5 exposure utilising wearable sensors embedded within school backpacks for a school week. Educational support and surveys to assess the pupils understanding of air quality before and after the study were also provided	Delays in installing fixed air quality sensors have occurred but the project is now completed, and the final report has been submitted to DEFRA. The underspend has been allocated to the EcoCentre Collaboration described below.
11	EcoCentre Southport Collaboration - free school visits and online resources.	Public Information	Other	2023	2024	LCC / EcoCentre (part of Sefton Council)	DEFRA	YES	Funded	£10k - 50k	Implementation	Increased public awareness	Percentage of vehicles that are LEV	Schools in Liverpool have been offered a limited number of free visits to the EcoCentre in Southport to receive free educational classroom sessions and to use the centre immersion room. All schools have been offered improved and bespoke on-line educational resources. .	This project is funded by an underspend on the grant funding from DEFRA for the previous air quality in Schools project
12	Improving Taxi emissions	Promoting Low Emission Transport	Taxi emission incentives	2019	Ongoing	LCC Licensing Service	LCC / LEVC	NO	Not Funded	< £10k	Implementation	Medium	Percentage of vehicles that are LEV	As of May 2024 there are 54 licensed electric Hackney carriages which is an increase of 25 from 2023. A register has been compiled of taxis that have older, more polluting engines fitted into the chassis of newer vehicles. A "try-before-you-buy" scheme operated in 2022 with two LEVC's available to encourage uptake of EV's	Resources and commitment of taxi operators are the main restrictions on progress.
13	Air Quality sensors linked to traffic signals	Air Quality sensors	Air Quality Sensors linked to traffic signals	2022	2027	LCRCA and all LCR Local Authorities	Transforming Cities Funding (TCF)	No	Funded	£100k - £500k	Sensors in place	Reduced emissions via improved traffic flow	Number of air quality sensors linked to traffic signals	37 Zephyr AQ sensors have been installed across the Liverpool City Region (10 in Liverpool, 7 Sefton, 5 in St Helens, Knowsley, Halton and Wirral). Baseline data is being gathered before being analysed and strategies will be set up to change traffic signals to help reduce air quality when it becomes high.	Maintenance of sensors funded for 5 years
14	Active travel routes	Promoting Travel Alternatives	Promotion of cycling	2018	Ongoing	LCC/ LCRCA/ Sustrans	Various sources including CRSTS and ATF	NO	Partially Funded	£50k - £100k	Implementation	Reduced emissions via modal shift	Completion	Active travel routes completed at Everton Park. Routes at Crown Street/Smithdown Lane and Catharine Street to be implemented during autumn/ winter 24.	Availability of funding will be a barrier to implementation
15	EV charging and alternative fuels infrastructure	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2019	Ongoing	LCC	On-Street Residential Chargepoint Scheme (ORCS)	NO	Funded	< £10k	Implementation	Reduced emissions via modal shift	Number of sites	LCC have an ORCS grant to install 300 column chargers this year. LCC to procure operator to install more EV column chargers, which will be fully funded by operator	Funding changing so grant will reduce and be via CA

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16	E-bike and E-scooter hire scheme	Transport Planning and Infrastructure	Public cycle hire scheme	2022	Ongoing	LCC / VOI	Private sector	NO	Funded	< £10k	Implementation	Reduced emissions via modal shift	No of rides	Branded the Explorer 2, Liverpool is the first UK city to receive Voi's next-generation e-bike as part of a new multi-modal service that complements the existing and hugely successful e-scooter service.	The contract has been extended until 5 June 2024 and a cabinet report has been prepared to ask to enter into an Interim Contract for six months while a new contract is procured. The DfT trial is being extended until 31 May 2026
17	Smoke Control Area consolidation and enforcement	Other	Other	2023	2025	LCC	LCC	NO	Funded	< £10k	Implementation	Reduction in emissions from domestic burning	Completion	LCC are in the process of consolidating 40 old smoke control areas into a single area that will encompass the entire administrative area. This will aid enforcement of properties that emit smoke and the new regulations focused on the sale of unsuitable fuels	. Plans are subject to public consultation
18	Voluntary Bus Quality Partnership (VQBP)	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	Ongoing	Ongoing	Mersey Travel/ Bus Operators	Mersey Travel/ Bus Operators	NO	Not Funded	Unknown	Implementation	High	Number of Quality Bus Partnerships in place	Six Quality Bus Routes which all effect Liverpool City. This scheme allows Arriva and Stagecoach to coordinate timetables and accept each other's tickets. 471/472 Liverpool to Heswall 53 Liverpool to Crosby 14, 14A, 14B, 14X Liverpool - Croxteth, Kirkby, Tower Hill or Knowsley Village 10, 10A, 10B Liverpool - St Helens or Huyton 82 Liverpool – Liverpool South Parkway or Speke 86, 86A, 86C, 86D Liverpool – Garston, Liverpool South Parkway or John Lennon Airport	There are no Statutory Quality Bus Partnerships in the City Region however, there are several routes which are covered by Voluntary Agreements or Qualifying agreements. The LCRCA now has new powers to improve bus services by taking greater public control of the network – either through an enhanced partnership with bus operators or by introducing bus franchising, which is the preferred option of the CA, following assessment. A consultation on bus reform is live, asking people for their views on bus franchising with a final decision expected by end of 2023.
19	New powers to enforce moving traffic contraventions	Traffic Management	UTC, Congestion management, traffic reduction	2023	Ongoing	LCC	Unknown	NO	Funded	£10k - 50k	Implementation	Reduced congestion leading to reduced emissions	Powers enacted	Automatic Number Plate Recognition (ANPR) cameras have been installed at a number of locations in Liverpool as part of new enforcement powers to help reduce congestion, improve air quality and road safety, and encourage sustainable travel.	The new powers, as set out in Part 6 of the Traffic Management Act (2004), allow local authorities to penalise poor driving habits which previously could only be enforced by the police.
20	£2 bus fares	Promoting Travel Alternatives	Other – incentivise bus travel	2022	2025	LCRCA & LCR Bus Operators	Bus Service Improvement Plan Fund	No	Funded	> £10 million	Implementation	Not quantifiable	Bus Patronage increase	The roll out of the £2 commenced on 18 September 2023 and to date over 10 million £2 adult single fares have been sold.	BSIOP Funding allocation was far less than requested so unable to deliver full suite of measures.

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21	LCR Hybus Trail Project	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2023	2028	LCRCA & LCR Bus Operators	Transforming Cities Fund	No	Funded	> £10 million	Implementation	Reduced emission via cleaner fleet	Reduced NO2 and PM emissions	The first 9 of a fleet of 20 Hydrogen fuelled vehicles have been procured by the LCRCA and will be leased back to local bus operators. An interim hydrogen supply will be in place until late 2024/early 2025 whereby after a permanent refueler supplying green hydrogen will be installed.	Hydrogen supply and lead in time for hydrogen fuelled vehicles. Funding is a constraint to increasing the fleet size
22	Green Bus Routes	Transport Planning Infrastructure	Bus Route Improvements	2022	2027	LCRCA, relevant constituent local authorities & LCR Bus Operators	CRSTS	No	Funded	> £10 million	Implementation	Reduced emission via cleaner fleet	Bus Reliability	The Green Bus Routes programme centres on upgrading key bus corridors across the City Region. It has the ambition to create transport corridors that are fit for a City Region that competes on a world scale, delivering positive social and economic outcomes for residents of the LCR and supporting wider commitments to reaching net zero carbon by 2040. The project aligns with national standards and transport initiatives such as Bus Back Better, National Bus Strategy and most recently LTN 1/20, which has now been included to further support enhanced active travel provisions. This ambition has led to option identification work undertaken in 2018/19	Initial GBR corridors are 10A, 86 and 53 wit future corridors identified as 79 and 20/21.
23	Walk to School Week	Promoting Travel Alternatives	Promotion of walking	2018	Ongoing (Annual)	LCRCA Directly delivered by Living Streets	Active Travel England/DfT	NO	Funded	£10k - 50k	Implementation	Reduced emission via modal shift	Number of Participants	Living Streets worked with 80+ schools across LCR last year	Walk to School Week aims to create healthier, happier and greener schools by encouraging the school community to walk to and from school. The scheme run by Living Streets is promoted by the corporate engagement team at Merseytravel.
24	Let Clear The Air LCR Website launch	Public Information	Via the Internet	2019	2020	LCRCA / St Helens Council	Defra	YES	Funded	£10k - 50k	Implementation	Not quantified	Number of views	Following the launch of the Clear the Air Liverpool in Autumn 2018, Lets Clear the Air LCR was launched in Autumn 2019. This included an educational website aimed at school children. The website was refreshed in 2021 and has continued to be modified	Part of a wider publicity campaign to encourage everyone to take on air pollutants in their latest campaign to improve the health of our residents
25	Bikeability	Promoting Travel Alternatives	Promotion of cycling	2011	Ongoing	LCRCA BikeRight are the training provider who deliver on behalf of Merseytravel	Active Travel England/DfT	NO	Funded	£500k - £1 million	Implementation	Reduced emission via modal shift	Number of participants	Funding for over 10,000 places and this includes National Standard Level 1 &2, Level 3 and the Plus modules (Learn to Ride and Balance Bike). 0% of the funding is for Level 1 & 2 (Primary years 5 & 6).	Bikeability cycle training is delivered in schools across Merseyside. Training is designed to equip school children with the skills and confidence to travel by bike to school, work and for leisure.
26	Adult Cycle Training	Promoting Travel Alternatives	Promotion of cycling	2022	2023	LCRCA	Capability and Ambition Revenue Fund from Active Travel England / DfT	NO	Funded	£50k - £100k	Implementation	Reduced emission via modal shift	Number of Participants	Currently being commissioned for delivery and the aim is to have it up and running by July.	Revenue funding limited to £60k activity targeted toward to target specific adult groups e.g. women/BAME, these groups who feel a barrier to learning to cycle

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27	ULEV Readiness	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	Bid submitted 2015	Completed	LCRCA / LCC / OLEV	OLEV	NO	Funded		Complete	Not quantified	Number of Ultra Low Emission Vehicles in fleets	2 ultra -low emission vehicles have been introduced into the LCC fleet, Nissan Leaf (100% electric) and Mitsubishi Outlander (range extender). Funding contributed 75% to the 2-year lease costs of the vehicles.	Liverpool City Region secured funding from Office for Low Emission Vehicles (OLEV) to introduce 23 ultra-low emission vehicles into local authority fleets across the City Region.
28	Signal Enhancement	Traffic Management	UTC, Congestion management, traffic reduction	2010	2022	LCC / LCRCA / STEP	LCC	NO	Funded	> £10 million	Complete	Low	Traffic Management	Started April 2016 A57 scheme funded by STEP upgrading all older sites from Low Hill To boundary with Knowsley. A565 corridor Phases 1 & 2 scheme completed	A57 scheme funded by STEP scheme April 2017, £80m Highways over 5 years. A565 Scheme due for completion Spring 2019.
29	Workplace Travel Plans	Promoting Travel Alternatives	Workplace travel planning	2011	2020	LCRCA	LCRCA	NO	Not Funded		Aborted	Low	Number of Travel Plans developed	Number of organisations / individuals actively engaged in travel planning: 2011/12 - 12; 2012/13 - 3, 2013/14 - 14, 2014/15 - 16, 2015/16 - 21, 2016/17 - 6, 2018/19 – 8, 2019/20 -3. This scheme was aborted in 2020 due to COVID -19	All activity has now ceased from a Combined Authority perspective.
30	School Travel Plans	Promoting Travel Alternatives	School Travel Plans	2011	2020	LCRCA	LCRCA	NO	Not Funded		Aborted	Low	Number of Travel Plans developed	2019/2020; 4843 Liverpool pupils took part in either a transition session, a Hub visit, a Your Choice conference or schools event. 20 schools worked with Living Streets on their 'WOW' programme me - This scheme was aborted in 2020 due to COVID -19	All activity has now ceased from a Combined Authority perspective.
31	Employers Network	Promoting Travel Alternatives	Personalised Travel Planning	2011	Ongoing	LCRCA	LCRCA	NO	Not Funded		Complete	Not quantified	Number of businesses engaged	Number of participants in Employers Network: 2011/12 - 12; 2012/13 - 24 2013/14 - 48; 2014/15 - 53; 2015/16 - 41 2018/19 - 58 2019/20 - 2 new Liverpool based members joined, totalling 275 across the city.. 22 organisations promoted & had employees take part in a campaign. The Employers Network was reconfigured in 2020, reducing the number and type of participant member orgs.	The Liverpool City Region Employers Network offers businesses across the region access to bespoke consultancy support, helping them to give their staff and visitors choice about how they travel to work, alleviating car parking pressures, increasing health and wellbeing and giving the best advice in order to maximise productivity where staff travel, and transport is concerned. By encouraging modal shift it is hoped that air quality improvements will also be realised.

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32	Sustainable Travel Grants	Promoting Travel Alternatives	Personalised Travel Planning	2012	2020	LCRCA	LCRCA	NO	Not Funded		Complete	Not quantified	Number of grants awarded	"Number of Sustainable Travel Grants awarded: 2012/13 - 1; 2013/14 - 12; 2014/15 - 8; 2015/16 - 13; 2018/19 (EV charge points) - 5 ; 2019/2020 - 0, 2020/21/-o	Grants were available for organisations to apply for funding to assist employees with door-to-door sustainable travel to employment and training up until 2015/16. Latterly grants have been awarded for EV charge points. No grants were available in the last 12 months.
33	Low Emission Bus Scheme	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2018	2020	LCRCA & Arriva	DfT Low Emission Bus Funding	NO	Funded	£1 million - £10 million	Completed	High	Number of low emission buses in fleets	51 - Hybrid Buses (Routes 14, 18, 82) 12 - 100% electric buses (Route 26/27) 9 - Biomethane Buses (Route 82A)	The Liverpool City Region was successful in securing £4.9million of DfT Low Emission Bus Funding. 72 low emission buses were introduced to Arriva's fleet.
34	Baltic Triangle Active travel routes	Promoting Travel Alternatives	Promotion of cycling	2016/17	2018	LCRCA	LCRCA	NO	Funded	£1 million - £10 million	Complete	Low	Number of participants	Complete	Total scheme cost £1,653,520. Improving pedestrian and cycling from Liverpool One to the Baltic Triangle (via Jamaica Street)
35	Green Spaces Network	Promoting Travel Alternatives	Promotion of cycling	2016/17	2019	LCRCA	LCRCA	NO	Funded	£1 million - £10 million	Complete	Low	Number of participants	Complete	Total Scheme Cost £1,650,000 Pedestrian/cycling improvements (Newsham Park - Knowledge Quarter)
36	Princess Avenue Central Reserve	Promoting Travel Alternatives	Promotion of cycling	2016/17	2019	LCRCA	LCRCA	NO	Funded	£1 million - £10 million	Complete	Low	Number of participants	Ongoing	Total Scheme Cost £2,175,000 New pedestrian and cycling route in the central reservation along Princess Avenue, connecting to the Baltic Triangle, Liverpool One, and Liverpool City Centre
37	Clean Vehicle Technology Fund 2016	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2015	2017	LCRCA / Bus Operators/Defra	LCRCA / Bus Operators/Defra	NO	Funded	£100k - £500k	Complete	High	Number of buses retrofitted	Selective Catalytic Reduction and micro hybrid technologies were fitted to 31 buses to bring all buses up to euro 6 standards.	£497,000 of funding was secured to retrofit 31 buses across the City Region to reduce NOx emissions by at least 50% of their current level.
38	Clean Vehicle Technology Fund 2017-18	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2017	2021	LCRCA // Bus Operators	2017-2020	NO	Funded	£1 million - £10 million	Implementation	High	Number of buses retrofitted	There has been a total of 216 vehicles retrofitted with engine upgrades to latest euro 6 conversion and a further 4 vehicles having been converted to full electric buses, some vehicles have received further operator investment for passenger upgrades i.e. Wi-Fi and charging points and new seating. Remaining vehicles due for completion September 2020 (pre Covid) there have been significant delays due to Covid and suppliers, there are 22 retrofits and 2 electric conversions outstanding to complete the project.	The LCR has been successful in securing £2,996,863 of funding through a competitive bidding process to retrofit 149 buses with accredited pollutant reducing technology from the Joint Air Quality Unit (DfT and Defra). In the extension of the fund an additional the LCR secured £2,520,643 of funding through a competitive bidding process to retrofit 129 buses

Measure No.	Measure Title	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
39	Recharging Points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	Bid submitted 2013	Completed February 2018	LCRCA / Bus Operators / OLEV	OLEV	NO	Funded	£500k - £1 million	Completed	High	Number of charging points installed	3 Public points installed within Liverpool: Alder Hey Children's Hospital, Broad Green Hospital, Liverpool Women's Hospital. 2 Private posts have also been installed at Royal Liverpool Hospital and Liverpool Women's Hospital. Public charge points are currently free to use to encourage a greater uptake of electric vehicles.	Funding was secured from UK government (OLEV) to install a network of Electric Vehicle charging points across the Liverpool City Region. Phase 2 of the scheme is now underway, funded by the Local Growth Deal funding. The public recharge network has recently been sold to Franklin Energy to take over day to day running of existing posts.

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 Strategy⁶, 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 in diameter) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Road traffic is a major source of PM_{2.5} and therefore the measures contained within Table 2.2 will contribute to the reduction of this pollutant in Liverpool.

The domestic burning of solid fuels is also a major source of PM_{2.5} in Liverpool. To address this, the Council have utilised the new powers within the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 restricting the supply of certain solid fuels with the aim of reducing air pollution.

For example, Trading Standards Officers are visiting retailers selling solid fuels to advise and educate them regarding the new legislation and to ensure that any fuel on sale complies with the legislation and carries the “Ready to Burn” logo.

In addition, the Council have approved plans to consolidate the existing Smoke Control Area's (SCA's) into one SCA covering the whole of the city will simplify the enforcement and administration of the Clean Air Act 1993 (as amended by the Environment Act 2021).

The existing Smoke Control Orders (SCO's) covering the individual and specific SCA's of the city were enacted between 1966 and 1990 and although these orders cover the whole of the city of Liverpool, the Council's records of these SCO's are fragmented and incomplete and it is not clear which orders apply to which area. The declaration of a new SCO requires a period of public consultation, which will create the opportunity to raise awareness of SCA's and solid fuel combustion.

As recommended by the LAQM Policy Guidance (PG22), Liverpool monitors PM_{2.5} at a local level, a summary of which is in section 3.2.3 of this report and in table A.8 in Appendix A.

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

The Council are also working with the EA and DEFRA to install an additional PM_{2.5} automatic monitoring location in north Liverpool in 2024.

The Liverpool Health Protection Working Group meets to discuss the Public Health Outcomes Framework (PHOF) and as part of this, Air Quality is included in the agenda. The Council's Environmental Health team and other Council colleagues from Highways and Planning also attend this meeting.

The PHOF is a Department of Health data tool for England, intended to focus public health action on increasing healthy life expectancy and reducing differences in life expectancy between communities. The tool uses indicators to assess improvements. Recognising the significant impact that poor air quality can have on health, the PHOF includes an indicator relating to fine particulate matter (PM_{2.5}) – the fraction of all cause adult mortality attributable to anthropogenic fine particulate air pollution (aerodynamic diameter of 2.5µm or less)

Public Health professionals and Environmental Health Officers within Liverpool are fully aware of the PHOF indicator for air pollution D.01. The latest data for Liverpool in 2022 shows that the fraction of adult mortality (new method) that can be attributed to particulate air pollution is 6.0%. This figure is slightly higher than previously reported (5.8% in 2021 using the new method) and is higher than the average across the Northwest region (5.6%) and the average across England (5.8%).

The PHOF indicator for air pollution is about raising awareness of the effect of air pollution on public health. It is intended to encourage promotion of the need for local, regional and national actions to reduce air pollution and to help form a partnership between all delivery partners in pursuit of this. Inclusion of this indicator in the PHOF enables Directors of Public Health to prioritise action on air quality in their local area to help reduce the health burden from air pollution.

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

This section sets out the monitoring undertaken within 2023 by the 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

The Council undertook automatic (continuous) monitoring at seven sites during 2023. Table A.1 in Appendix A shows the details of the automatic monitoring sites.

The Let's Clear the Air page presents automatic monitoring results Liverpool, with automatic monitoring results also available through the UK-Air website .

The Council installed an additional automatic monitoring site in April 2023. This site will monitor NO₂ in the Walton Vale area. Data from this site will be reported in the 2024 ASR for the first time.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

The Council undertook non- automatic (i.e. passive) monitoring of NO₂ at 144 sites during 2023. Table A.2 in Appendix A presents the details of the non-automatic sites.

Monitoring at 18 sites was stopped in 2023. New monitoring was commenced at 32 sites in 2023 leading to a net increase of 14 monitoring sites across Liverpool. Details and justifications for the amendments are included below in Table 3.1.

Table 3.1 Changes to Passive Diffusion Tubes in 2023

Location and Reference	Justification
Liverpool One - C1, C5, C6, C8 and C9 (5 tubes) The Strand – S1-S4 (4 tubes) Lime Street – L1-L4, L6 & L8 (6 tubes) = 15 sites total removed	15 non-automatic Passive Diffusion Tube (PDT) monitoring locations were retained from the original 57 sites that were funded as part of the Urban Green Up project. Monitoring at 42 locations was stopped in June 2022 due to the cessation of funding for this project. The 15 sites were retained with funding for an additional year as they were located where the highest levels that had been recorded and could help assess the impact of the City Centre connectivity schemes. However, these 15 sites were decommissioned in April 2023 due to cessation of the remaining funding from the Urban Green Up project and so that Council resources could be reallocated to the monitoring and evaluation of the Liverpool Clean Air Plan.
Prescot Road -B9, Walton Lane - N8a, Kirkdale Road -N9 = 3 sites total removed	These three PDT monitoring locations were decommissioned in March 2023 so that the diffusion tubes could be reallocated to Walton Vale for a co-location study. They were selected based on ongoing safety concerns from staff changing the diffusion tubes. It was also felt that N8 was made redundant by its proximity to the Everton Valley automatic monitoring site.
Upper Parliament Street (UPS1-4) Tunnel Road (TR1-4) Holt Road (HR 1-5) Pembroke Place (PP1-4) Islington (IS1-4) Hunter Street (HS1-4) Renshaw St (RS1-4) Elliot St (ES1-2) = 31 sites added	These 31 PDT locations were added as part of the monitoring and evaluation of the interventions that will be implemented as part of the Liverpool Clean Air Plan. Monitoring at these locations started in July 2023.

Walton Vale Co-location study (CL4-6) = 1 site added with tubes in triplicate	An additional PDT monitoring location was added in April 2023 at the new real time automatic monitoring location in Walton Vale. This is a triplicate site (i.e. three tubes on one site) and will help derive a local bias correction factor to help improve the accuracy of PDT monitoring in Walton Vale and across Liverpool.
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Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

Maps showing the location of the monitoring sites are provided in Appendix D.

3.1.3 Non- LAQM Monitoring Sites

The Council and other agencies have conducted monitoring that is not part of the LAQM system and therefore it may not be used in compliance with the Environment Act 1995. Therefore, although the full results of this additional monitoring are not included within this report, a short summary is included below in Table 3.2.

Table 3.2 Summary of Non-LAQM monitoring

Agency	Monitoring method	Number of sites in Liverpool	Details
LCRCA & LCC Highways	Earthsense Zephyrs (NO _x , Ozone & PM)	Nine sites	Monitoring since March 2022. No exceedances at any site. Results in Appendix C
University of Liverpool	Aeternum automatic NO ₂ & PM sensors	>50 sensors	Ongoing research and development
LCC	Vortex automatic PM sensors	Eight sensors across four schools	Monitoring since Summer 2022. No exceedances.
LCC	Aeternum automatic NO ₂ & PM sensors	Six sensors across two schools	Monitoring since March 2024 as part of monitoring and evaluation of School Streets project.

Rail Safety and Standards Board (RSSB)	NO ₂ passive diffusion tubes	Five sites	Monitoring in Lime Street Station. Results to be published by RSSB
DEFRA - UK Urban NO₂ Network (UUNN)	NO ₂ passive diffusion tubes	20 sites	Results will be included in later versions of this ASR after data is made available by DEFRA

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40µg/m³. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 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.

In 2023, NO₂ concentrations decreased by an average of 3.81% in comparison to 2022 for sites where an evaluation is possible. There were ten exceedances of the annual mean objective in Liverpool for 2023 at PDT monitoring locations before distance correction was applied. These included four PDT monitoring sites on Pembroke Place (PP1-4), three PDT monitoring sites on Hunter Street (HS2-4) and one PDT monitoring site on Elliot Street (ES2). These eight sites are all located in the city centre. The PDT (N7a) located at the junction of Prescott Road and St Oswald Street in the Old Swan area of the city also exceeded the annual mean objective.

The colocation site at Walton Vale (LC6 & CL4-6) exceeded the annual mean objective with both the automatic and PDT monitoring methods.

Only two sites exceeded the annual mean objective for NO₂ after distance correction is applied to calculate concentrations at relevant receptors. These are sites PP2 and PP3 on Pembroke Place.

Table A.5 in Appendix A compares the ratified continuous monitored NO₂ 1 – hour - mean concentrations for the past five years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year. There were no exceedances of the 1-hour-mean objectives. Furthermore, there were no recorded exceedance of an annual mean greater than 60µg/m³, which indicates that an exceedance of the 1-hour mean objective is also unlikely at these sites

3.2.2 Particulate Matter (PM₁₀)

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past five years with the air quality objective of 40µg/m³. There was no exceedance of the annual mean objective during 2023.

Table A.7 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past five years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year. There was one exceedance of the air quality objective of 50µg/m³ in 2023. This occurred on the 8th of September 2023. This high level of particulate matter occurred at other automatic monitoring stations in Northwest England, including those in St Helens, Wirral Tranmere, Warrington, Wigan and Salford. This suggests that the exceedance was not due to local emissions and was more likely related to transboundary emissions or weather conditions.

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. Although there is no air quality objective for the England, it is noted that the recorded PM_{2.5} level of 8 µg/m³ at the monitoring location in Speke is below the required EU Air Quality standard (25 µg/m³) and World Health Organisation standard (10 µg/m³).

3.2.4 Sulphur Dioxide (SO₂)

Table A.9 in Appendix A compares the ratified continuous monitored SO₂ concentrations for 2023 with the air quality objectives for SO₂. During 2023, there were no exceedances of the three Air Quality Objectives of meeting a 15-minute Objective (266 µg/m³ no more than 35 exceedances per year), a 1-hour Objective (350 µg/m³ no more than 24 exceedances per year) and 24-hour Objective (125 µg/m³ no more than 3 exceedances per year).

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)
AM1	Speke AURN	Urban background	343884	383601	NO2, NOx, SO2, PM 2.5, PM10, PAH	Yes, City Wide AQMA	Chemiluminescent and BAMS	N/A	20	1.5
LC1	Clayton Square	Urban Background	334807	390285	NO2	Yes, City Wide AQMA	Chemiluminescent	N/A	N/A	1.5
LC2	Lime Street	Kerbside	334941	390526	NO2	Yes, City Wide AQMA	Chemiluminescent	N/A	1	1.5
LC3	Speke Road	Kerbside	341056	384213	NO2	Yes, City Wide AQMA	Chemiluminescent	12	1	1.5
LC4	Edge Lane	Roadside	339679	390460	NO2	Yes, City Wide AQMA	Chemiluminescent	6	6	1.5
LC5	Everton Valley	Roadside	335465	393150	NO2	Yes, City Wide AQMA	Chemiluminescent	10	4	1.5
LC6	Walton Vale	Kerbside	336396	396711	NO2	Yes, City Wide AQMA	Chemiluminescent	N/A	1	1.5

Notes:

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co-located with a Continuous Analyser?	Tube Height (m)
A1	Lamppost R/about adjacent to long stay airport parking (NO2)	Roadside	342944	382619	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
A2	Lamp between 115/117 Hale Rd (NO5)	Roadside	343299	382853	NO2	Yes, City Wide AQMA	5.0	2.0	No	2.5
A3	On lamp outside 233 Hale Drive (NO7)	Roadside	344768	382689	NO2	Yes, City Wide AQMA	7.0	2.0	No	2.5
A4	Yewtree Farm Rd/Oglett Ln wooden pole B4 pull in by farm (NO10)	Other	344362	381701	NO2	Yes, City Wide AQMA	45.0	0.0	No	2.5
A5	Home Farm, Speke Hall on security camera pole	Other	342180	382485	NO2	Yes, City Wide AQMA	0.0	270.0	No	2.5
A6	Outside 1 Gerneth Rd L24 (NO3)	Roadside	342956	383445	NO2	Yes, City Wide AQMA	10.0	1.0	No	2.5
A7	Opposite 17 Suttonwood Rd L24 (NO4)	Roadside	343275	383239	NO2	Yes, City Wide AQMA	8.0	1.0	No	2.5
A8	Hale Rd Opposite Almeda Rd/ grass triangle just B4 Hale sign (NO8)	Roadside	345188	382619	NO2	Yes, City Wide AQMA	70.0	1.0	No	2.5
A9	40mph sign opposite Ridley Walk on Hale Rd (NO6)	Roadside	344622	382671	NO2	Yes, City Wide AQMA	30.0	1.0	No	2.5
A10	A10 Baileys Lane Landing Light in field on right at road barrier	Other	345234	382308	NO2	Yes, City Wide AQMA	1.0	1.0	No	2.5
S1	Edge Lane/Jubilee Dr junction 20 MPH sign next to Jubilee Drive road sign	Roadside	336485	390484	NO2	Yes, City Wide AQMA	25.0	1.0	No	2.5

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)
S2	Durning Road, Holt Road, Edge Lane junction. Pedestrian Crossing centre island. Lamppost	Kerbside	336999	390563	NO2	Yes, City Wide AQMA	12.0	1.0	No	2.5
S3	Laurel Road, Edge Lane junction. Central reservation. First Lamppost. Opposite Taskers	Roadside	337846	390705	NO2	Yes, City Wide AQMA	15.0	2.0	No	2.5
S4	St Oswald St/Paraffin Oil Shop Traffic light L13	Roadside	339138	390757	NO2	Yes, City Wide AQMA	8.0	1.0	No	2.5
S5	Edge Lane Drive/Mill Ln L8047 Cent Reservation	Roadside	339382	390651	NO2	Yes, City Wide AQMA	20.0	2.0	No	2.5
S6	Renville Rd/Bowring Park Rd 30MPH sign AQMA2 L14	Roadside	340404	390353	NO2	Yes, City Wide AQMA	7.0	2.0	No	2.5
S7	Bowring Park Road Slip Rd on Give Way sign	Kerbside	340508	390260	NO2	Yes, City Wide AQMA	7.0	0.5	No	2.5
S8a	Queens Drive/Menlove Ave. roundabout. 40mph sign on Menlove	Roadside	339667	388306	NO2	Yes, City Wide AQMA	12.0	2.0	No	2.5
S9a	Cromptons Lane/Menlove Ave. junction. Traffic signals nr Carleton House	Roadside	340552	387955	NO2	Yes, City Wide AQMA	28.0	1.0	No	2.5
S10	Hillfoot Rd/Allerton Rd J Lamp LH p J C2507	Roadside	341967	386375	NO2	Yes, City Wide AQMA	30.0	2.0	No	2.5
S11	Speke Rd 1st Dual Pelican Cross 2672/2673 (JOLODA)	Roadside	340946	384256	NO2	Yes, City Wide AQMA	10.0	2.0	No	2.5

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)
S16a	St. Mary's Rd. Lamppost outside number 231	Roadside	339656	385000	NO2	Yes, City Wide AQMA	20.0	1.0	No	2.5
S17a	Aigburth Rd, Riversdale Rd junction. Pedestrian crossing outside no 482	Roadside	338969	385680	NO2	Yes, City Wide AQMA	20.0	1.0	No	2.5
S19a	Aigburth Rd, Jericho Ln corner on lamppost	Roadside	337915	386637	NO2	Yes, City Wide AQMA	20.0	3.0	No	2.5
S20	Smithdown Road Lamp in central res opp. Budget exhausts	Roadside	338976	388486	NO2	Yes, City Wide AQMA	30.0	1.5	No	2.5
S21	Smithdown Road Lamp outside fridge shop	Roadside	338174	388623	NO2	Yes, City Wide AQMA	3.0	1.0	No	2.5
S22	Smithdown Road info sign outside Sefton Pk pharmacy (by Asda)	Roadside	337910	388918	NO2	Yes, City Wide AQMA	20.0	1.0	No	2.5
S23	Smithdown Road Info sign by Howard Jenkins funerals nr jct with lodge lane	Roadside	337006	389456	NO2	Yes, City Wide AQMA	10.0	0.5	No	2.5
S24	Aigburth Road, Chetwynd St junction. Lamppost outside Bargain Booze	Roadside	336936	387324	NO2	Yes, City Wide AQMA	2.0	1.5	No	2.5
S25	Aigburth Road. 2nd lamppost after entrance to Toxteth Annex car park	Roadside	336533	387586	NO2	Yes, City Wide AQMA	70.0	1.5	No	2.5
S26	Park Rd, Jacob St. Pedestrian crossing at Tesco. Lamppost outside repair shop	Roadside	336012	387912	NO2	Yes, City Wide AQMA	10.0	1.0	No	2.5

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)
S27	Park Rd, Warwick St junction. Lamppost next to CCTV post. Opposite Penta House	Roadside	335507	388654	NO2	Yes, City Wide AQMA	10.0	1.0	No	2.5
S28a	Park Rd, Parliament St Lamppost. At start of filter lane	Roadside	335208	389031	NO2	Yes, City Wide AQMA	35.0	2.0	No	2.5
S29	Upper Parliament St, Catharine St junction. Lamppost just after pedestrian crossing.	Roadside	335733	389246	NO2	Yes, City Wide AQMA	1.5	3.5	No	2.5
S30	Upper Parliament St, Crown St junction. Lamppost at pedestrian crossing	Roadside	336474	389416	NO2	Yes, City Wide AQMA	40.0	2.0	No	2.5
T1	Islington AQ Station Traffic Lights	Roadside	335398	390952	NO2	Yes, City Wide AQMA	25.0	1.5	No	2.5
T3	Crosshall Street Downpipe 2nd along from Dale St.	Roadside	334579	390676	NO2	Yes, City Wide AQMA	0.5	3.0	No	2.5
T4	Liverpool Centre - Old Haymarket	Kerbside	334765	390692	NO2	Yes, City Wide AQMA	15.0	0.5	No	2.5
T5	Covent Garden/Dale St Lamp Post RH side	Kerbside	334073	390442	NO2	Yes, City Wide AQMA	20.0	0.5	No	2.5
T6	Strand Street/Water Street Jct-Road sign L2	Roadside	334006	390359	NO2	Yes, City Wide AQMA	15.0	1.0	No	2.5
T7	Berry St o/s St Luke's Church Pedestrian Lights	Roadside	335229	389892	NO2	Yes, City Wide AQMA	50.0	1.0	No	2.5

Diffusio n 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)
T8	Renshaw St/Bold St Junction Lamp Post Rapid	Kerbside	335224	389938	NO2	Yes, City Wide AQMA	50.0	1.0	No	2.5
T9	Clarence St/Mount Pleasant J LP o/s JMU	Roadside	335417	390281	NO2	Yes, City Wide AQMA	20.0	1.0	No	2.5
T10	Pembroke PI LP o/s main entrance Dental Hospital	Kerbside	335793	390647	NO2	Yes, City Wide AQMA	10.0	0.5	No	2.5
B1	Prescot St opposite Hospital on directions sign	Roadside	336074	390878	NO2	Yes, City Wide AQMA	20.0	1.5	No	2.5
B2	Kensington/Farnworth St Junction	Roadside	336656	390984	NO2	Yes, City Wide AQMA	20.0	1.5	No	2.5
B3	Outside Riverside Housing Kensington / Sheil Rd	Roadside	337346	391033	NO2	Yes, City Wide AQMA	2.5	1.5	No	2.5
B4	On Lamp Post outside Houses opposite Laurel Road	Roadside	337787	391156	NO2	Yes, City Wide AQMA	10.0	0.5	No	2.5
B5	Prescot Rd/Green Ln Junction Lamp Post (Betting Shop)	Roadside	339027	391336	NO2	Yes, City Wide AQMA	4.0	0.5	No	2.5
B6	Lamp post outside Sally Army Prescot Road	Roadside	339137	391279	NO2	Yes, City Wide AQMA	4.0	1.0	No	2.5
B7a	Prescot Rd/St Oswalds St Junction Cent L Post	Kerbside	339348	391135	NO2	Yes, City Wide AQMA	6.0	0.5	No	2.5
B8	Lamp Post by bus stop Blackhorse Lane / Prescot Road	Kerbside	339797	391299	NO2	Yes, City Wide AQMA	10.0	0.5	No	2.5
B9	Central Reservation Prescot Road at jct of light by Sainsburys	Kerbside	340233	391475	NO2	Yes, City Wide AQMA	50.0	0.5	No	2.5

Diffusio n 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)
B10	Corner Finch Lane / East Prescot Road	Kerbside	341810	391852	NO2	Yes, City Wide AQMA	10.0	0.5	No	2.5
B11	Midland Chambers (Everton Road / West Derby Rd) lamppost F8992	Roadside	336104	391260	NO2	Yes, City Wide AQMA	50.0	1.0	No	2.5
B12	Lamp at jct of Everton Rd / Breck Road	Roadside	335797	391856	NO2	Yes, City Wide AQMA	10.0	1.0	No	2.5
B13	Lamp outside Green Cross Pharmacy	Roadside	336430	392270	NO2	Yes, City Wide AQMA	20.0	1.0	No	2.5
B14	Lamp at side of Georgeosons car (Priory Road)	Roadside	336977	392804	NO2	Yes, City Wide AQMA	20.0	1.0	No	2.5
B15	Telegraph pole outside Clubmoor community centre	Kerbside	337805	393432	NO2	Yes, City Wide AQMA	N/A	0.5	No	2.5
B16	Lamp on central reserve opposite Surestart Utting Ave East	Roadside	338357	394424	NO2	Yes, City Wide AQMA	20.0	2.0	No	2.5
B17a	Traffic Lt in central reserve jct of Lowerhouse / Utting Ave East	Roadside	339405	395092	NO2	Yes, City Wide AQMA	18.0	2.5	No	2.5
N1	Millbank/Queens Dr - Junction Lamp Post	Roadside	339065	392668	NO2	Yes, City Wide AQMA	45.0	1.0	No	2.5
N2	Muirhead Ave/Queens Dr central res traffic Lights (by dentist)	Roadside	338704	393216	NO2	Yes, City Wide AQMA	20.0	2.0	No	2.5
N3	Storrington Ave / Stonebridge Ln (on lamp post by traffic lights)	Roadside	340043	395528	NO2	Yes, City Wide AQMA	25.0	3.0	No	2.5

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)
N4	Stonebridge Ln, East Lancs. Rd junction. Lamppost before pedestrian crossing	Roadside	339644	396090	NO2	Yes, City Wide AQMA	80.0	0.5	No	2.5
N5	East Lancs Rd filter lane to Portal Way. Lamppost halfway down filter lane.	Roadside	340569	396577	NO2	Yes, City Wide AQMA	50.0	3.0	No	2.5
N6	East Lancs Rd, Townsend Ave junction. Central triangular island. Lamppost with Stop sign	Roadside	338384	395445	NO2	Yes, City Wide AQMA	37.0	1.0	No	2.5
N7	Walton Hall Ave, Stanley Park Ave junction. Central reservation lamppost kerbside	Kerbside	336970	394737	NO2	Yes, City Wide AQMA	30.0	0.5	No	2.5
N8a	Lamppost on corner of Walton Ln and Walton Breck Rd next to pedestrian crossing	Roadside	335575	393179	NO2	Yes, City Wide AQMA	18.0	3.0	No	2.5
N9	Kirkdale Rd approaching Marwood Towers. Lamppost kerbside. Right of anchor	Roadside	335003	392743	NO2	Yes, City Wide AQMA	30.0	2.0	No	2.5
N10	Scotland Road Service Station. Lamppost outside.	Kerbside	334858	392066	NO2	Yes, City Wide AQMA	40.0	1.0	No	2.5
N11	Hunter St, Byrom St campus. Traffic signals at pedestrian crossing	Kerbside	334819	390975	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
N12	Longmoor Ln/Seeds Ln J L Traffic C2607	Roadside	337403	397230	NO2	Yes, City Wide AQMA	20.0	1.5	No	2.5

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)
N13a	Walton Vale on 20 MPH sign on corner of Regina Street	Roadside	336378	396663	NO2	Yes, City Wide AQMA	3.0	3.0	No	2.5
N14	Lamp post J 3268 outside 324-328 Rice Lane L9	Roadside	336203	396075	NO2	Yes, City Wide AQMA	2.0	1.0	No	2.5
N15	Queens Drive Former Monitoring Station	Roadside	336165	394906	NO2	Yes, City Wide AQMA	15.0	2.0	No	2.5
N16a	Walton Rd nr jct with Spellow column C1498	Roadside	335561	393889	NO2	Yes, City Wide AQMA	20.0	1.5	No	2.5
N17	Melrose Road. Melrose Abbey PH, Lamppost with 2-way traffic sign	Roadside	334993	394192	NO2	Yes, City Wide AQMA	4.0	1.5	No	2.5
N18	Commercial Road. Knowsley PH. Lamppost with bike lane sign	Kerbside	334593	393519	NO2	Yes, City Wide AQMA	10.0	0.5	No	2.5
N22	Lamppost outside Tuebrook Terrace, on West Derby Road/ Muirhead Ave roundabout	Roadside	338424	392496	NO2	Yes, City Wide AQMA	10.0	3.0	No	2.5
N23	Lamppost at end of Scorton St on West Derby Road	Roadside	337484	392149	NO2	Yes, City Wide AQMA	2.5	3.0	No	2.5
N24	Lamppost near MeiMei Fish and Chips (no471) on West Derby Road	Roadside	337795	392269	NO2	Yes, City Wide AQMA	2.0	2.0	No	2.5
N25	Lamppost outside T&S News (no 579) on West Derby Road	Roadside	338153	392406	NO2	Yes, City Wide AQMA	3.0	1.0	No	2.5

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)
N26	Pedestrian Crossing sign near junction with Delamain Road	Roadside	338661	392623	NO2	Yes, City Wide AQMA	9.0	1.0	No	2.5
BH1	On lighting column ref: A9356 outside Lovelocks Café	Kerbside	334698	390675	NO2	Yes, City Wide AQMA	8.0	1.0	No	2.5
BH2	On lighting column ref A9355 by advertising boards south of Travelodge	Roadside	334669	390685	NO2	Yes, City Wide AQMA	22.0	1.0	No	2.5
BH3	On lighting column ref A9354 opposite Travelodge and above Mersey Tunnel portal	Roadside	334652	390705	NO2	Yes, City Wide AQMA	N/A	1.5	No	2.5
BH4	On Bus Stand sign in central area of Bus Hub.	Roadside	334686	390694	NO2	Yes, City Wide AQMA	N/A	4.0	No	2.5
WV1	South (northbound) between Accountant and mobile repair shop. Opposite Church	Roadside	336301	396597	NO2	Yes, City Wide AQMA	N/A	2.8	No	2.5
WV2	Central (Northbound) – between Joseph's Hospice and Home and Bargains.	Roadside	336390	396707	NO2	Yes, City Wide AQMA	N/A	3.0	No	2.5
WV3	Northern (northbound) – between Solicitors and Shush	Roadside	336417	396748	NO2	Yes, City Wide AQMA	N/A	4.5	No	2.5
WV4	Southbound – between Nail Spa thing and café	Roadside	336409	396706	NO2	Yes, City Wide AQMA	N/A	2.5	No	2.5

Diffusio n 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)
CL1, CL2, CL3	Everton Valley Colocation	Roadside	335465	393150	NO2	Yes, City Wide AQMA	11.0	4.0	Yes	2.5
CL4, CL5, CL6	Walton Vale Colocation	Kerbside	336396	396711	NO2	Yes, City Wide AQMA	N/A	1.0	Yes	2.5
ST1	On Water St Traffic island between Cunard and Liver Building	Roadside	333959	390343	NO2	Yes, City Wide AQMA	N/A	8.0	No	2.5
ST2	Central reservation on Strand at end of Water St	Kerbside	333988	390358	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
ST3	No entry sign on Brunswick St at Strand entrance	Roadside	334049	390299	NO2	Yes, City Wide AQMA	N/A	3.5	No	2.5
ST4	Strand central reservation at right turn in Brunswick St	Kerbside	334018	390301	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
L1	St Johns Lane opposite St Johns Garden outside Dr Duncan's pub	Kerbside	334802	390633	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
L2	By St Johns Lane entrance to St Johns Garden	Roadside	334889	390583	NO2	Yes, City Wide AQMA	N/A	3.0	No	2.5
L3	Frontage of St Georges Hall on Lime St opposite Lord Nelson St	Roadside	335005	390653	NO2	Yes, City Wide AQMA	N/A	4.0	No	2.5
L4	A9390 at end of theatre close to jct of Lime St and London Road	Roadside	335053	390704	NO2	Yes, City Wide AQMA	N/A	2.0	No	2.5

Diffusio n 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)
L6	Parking direction sign outside Lime St Station A9422	Kerbside	334975	390502	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
L8	Lime St A1867 by black bin and opposite Worlds Apart	Kerbside	335034	390359	NO2	Yes, City Wide AQMA	4.0	1.0	No	2.5
C1	Lamppost / pedestrian crossing outside Debenhams on corner of Lord St and North John St	Kerbside	334384	390275	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
C5	Pedestrian Crossing near exit of Car Park on Strand	Roadside	334261	390022	NO2	Yes, City Wide AQMA	N/A	3.5	No	2.5
C6	Pedestrian crossing near L1 bus station on Strand	Roadside	334346	389890	NO2	Yes, City Wide AQMA	N/A	6.0	No	2.5
C8	Lamppost near pedestrian crossing at St Thomas Memorial Garden	Kerbside	334509	389819	NO2	Yes, City Wide AQMA	N/A	0.5	No	2.5
C9	Lamppost (ref: SA9229) outside Salt House Tapas, Hanover St and Paradise St junction	Roadside	334542	389987	NO2	Yes, City Wide AQMA	N/A	3.5	No	2.5
UP1	Eastbound on Upper Parliament St opposite Saunders House	Kerbside	336806	389504	NO2	Yes, City Wide AQMA	19.0	0.5	No	2.5
UP2	Eastbound on LC H9192	Roadside	336892	389536	NO2	Yes, City Wide AQMA	12.0	1.0	No	2.5
UP3	Eastbound LC outside no4 Smithdown Rd	Industrial	336997	389478	NO2	Yes, City Wide AQMA	2.5	0.5	No	2.5

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)
UP4	Eastbound LC P2767 outside no11 Smithdown Rd	Kerbside	337018	389466	NO2	Yes, City Wide AQMA	11.0	0.5	No	2.5
TR1	southbound bus stop near junction with Yanwath Street	Kerbside	336952	389419	NO2	Yes, City Wide AQMA	N/A	0.5	No	2.5
TR2	Northbound direction sign before junction with Upper Parliament	Kerbside	336941	389451	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
TR3	Southbound LC G2558 opposite 76 Tunnel Road	Kerbside	337010	389896	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
TR4	Northbound LC outside no70 Tunnel Road	Roadside	337011	389820	NO2	Yes, City Wide AQMA	2.5	2.5	No	2.5
HR1	Northbound LC1536 near jct with Wedgewood street	Roadside	337044	390621	NO2	Yes, City Wide AQMA	2.0	0.5	No	2.5
HR2	Northbound – LC1534 near junction with Ling Street	Kerbside	337063	390691	NO2	Yes, City Wide AQMA	2.0	1.0	No	2.5
HR3	Outside no20 Wedgewood St LC G9237	Kerbside	336983	390617	NO2	Yes, City Wide AQMA	2.0	0.5	No	2.5
HR4	Outside no16 Brae St on LC G9324	Kerbside	337007	390661	NO2	Yes, City Wide AQMA	2.0	0.5	No	2.5
HR5	LC outside 12 Ling Street	Kerbside	337025	390705	NO2	Yes, City Wide AQMA	2.0	0.5	No	2.5
PP1	Westbound lamppost at start of bus stops near public loo	Roadside	335390	390706	NO2	Yes, City Wide AQMA	24.0	0.5	No	2.5
PP2	Westbound LC between Greek Street and bus stop	Kerbside	335421	390684	NO2	Yes, City Wide AQMA	3.0	1.0	No	2.5

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)
PP3	Eastbound LC1688 outside Subway	Kerbside	335463	390675	NO2	Yes, City Wide AQMA	3.0	1.0	No	2.5
PP4	Eastbound LC outside Prime Prams	Kerbside	335548	390677	NO2	Yes, City Wide AQMA	2.5	1.0	No	2.5
IS1	Eastbound – old dot matrix display	Kerbside	335312	390975	NO2	Yes, City Wide AQMA	25.0	1.0	No	2.5
IS2	Eastbound - LC10016 near Birchfield St footpath	Roadside	335433	390992	NO2	Yes, City Wide AQMA	28.0	4.5	No	2.5
IS3	Eastbound LC10168	Roadside	335471	390996	NO2	Yes, City Wide AQMA	41.0	4.5	No	2.5
IS4	LC10172 just past Canterbury Street ped crossing	Roadside	335534	390999	NO2	Yes, City Wide AQMA	55.0	2.0	No	2.5
HS1	Eastbound- Tall lighting column in wall cut out	Roadside	334888	390924	NO2	Yes, City Wide AQMA	N/A	3.5	No	2.5
HS2	Eastbound on “cyclist dismount” sign	Roadside	334925	390923	NO2	Yes, City Wide AQMA	21.0	4.0	No	2.5
HS3	Eastbound Direction sign on incline	Kerbside	335015	390921	NO2	Yes, City Wide AQMA	25.0	1.5	No	2.5
HS4	Eastbound on directional sign near statue	Kerbside	335091	390927	NO2	Yes, City Wide AQMA	29.0	0.5	No	2.5
RS1	LC outside n36 Renshaw between with Heathfield and Newington (Northbound)	Kerbside	335129	390124	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5
RS2	Southbound Renshaw Street near to pub loading bay	Kerbside	335152	390106	NO2	Yes, City Wide AQMA	N/A	4.0	No	2.5

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)
RS3	Southbound Renshaw Street near junction with Benson St	Kerbside	335171	390065	NO2	Yes, City Wide AQMA	N/A	2.5	No	2.5
RS4	Southbound Renshaw Street opposite DEFRA UUNN site	Kerbside	335188	390031	NO2	Yes, City Wide AQMA	N/A	4.0	No	2.5
ES1	LC81 Ranelagh Street southbound	Kerbside	335022	390264	NO2	Yes, City Wide AQMA	N/A	0.5	No	2.5
ES2	Bus Stop near to Ladbroke's	Kerbside	334953	390328	NO2	Yes, City Wide AQMA	N/A	1.0	No	2.5

Notes:

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

(2) N/A if not applicable.

(3) ST1, ST2, L3 and TR1 did not return enough data for an accurate annual mean to be calculated using annualization

(4) Monitoring location A10 is a short distance within the boundary of Halton Borough Council. The location is serviced and recorded by Liverpool City Council for complete coverage of the airport locality and for the mutual convenience of the local authorities.

Table A.3 – Annual Mean NO₂ Monitoring Results: Automatic Monitoring (µg/m³)

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
AM1	343884	383601	Urban Background	96	96	19	11.2	14	15	14
LC1	334807	390285	Urban Background	96.3	96.3	N/A	N/A	23	21	22
LC2	334941	390526	Kerbside	97.9	97.9	N/A	N/A	34	40	40
LC3	341056	384213	Kerbside	91.1	91.1	N/A	N/A	28	28	26.
LC4	339679	390460	Roadside	99.6	99.6	N/A	N/A	31	30	27
LC5	335465	393150	Roadside	79.2	79.2	N/A	N/A	28	28	28
LC6	336396	396711	Kerbside	99.2	74.7	N/A	N/A	N/A	N/A	45

☒ 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.

☒ Where exceedances of the NO₂ annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023.

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the NO₂ annual mean objective of 40µg/m³ 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 (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.4 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
A1	342944	382619	Roadside	93.4	93.1	28.1	17.5	18.6	20.5	19.5
A2	343299	382853	Roadside	92.6	92.3	24.6	17.0	18.0	18.1	17.2
A3	344768	382689	Roadside	100.0	99.7	19.2	13.4	17.8	14.5	13.1
A4	344362	381701	Other	100.0	99.7	15.9	11.9	12.3	12.2	10.9
A5	342180	382485	Other	100.0	99.7	16.7	10.8	12.0	11.6	10.6
A6	342956	383445	Roadside	90.9	90.7	20.9	15.4	15.9	16.0	15.0
A7	343275	383239	Roadside	91.5	91.2	18.6	14.5	14.8	14.4	13.6
A8	345188	382619	Roadside	100.0	99.7	19.5	15.7	15.9	14.5	13.6
A9	344622	382671	Roadside	100.0	99.7	23.7	15.4	16.4	15.8	15.0
A10	345234	382308	Other	48.8	48.6	16.1	10.9	12.3	11.1	9.5
S1	336485	390484	Roadside	100.0	99.7	38.0	29.0	29.1	26.9	25.6
S2	336999	390563	Kerbside	100.0	99.7	37.4	27.3	27.6	26.9	26.3
S3	337846	390705	Roadside	100.0	99.7	42.8	30.2	33.7	31.2	31.2
S4	339138	390757	Roadside	100.0	99.7	52.8	37.0	42.5	39.1	36.9
S5	339382	390651	Roadside	100.0	99.7	49.8	32.8	38.2	36.0	34.8
S6	340404	390353	Roadside	100.0	99.7	44.6	31.4	32.8	32.2	30.0
S7	340508	390260	Kerbside	91.2	90.9	33.1	23.2	28.0	28.8	27.5
S8a	339667	388306	Roadside	93.4	93.1	39.2	29.5	28.6	27.6	26.5

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
S9a	340552	387955	Roadside	100.0	99.7	38.8	24.6	29.4	29.0	27.5
S10	341967	386375	Roadside	100.0	99.7	39.5	29.5	33.3	32.9	30.5
S11	340946	384256	Roadside	100.0	99.7	49.7	34.0	38.1	36.7	34.9
S16a	339656	385000	Roadside	91.7	91.5	39.2	26.2	24.6	22.1	21.9
S17a	338969	385680	Roadside	91.7	91.5	41.5	27.5	26.0	23.2	23.0
S19a	337915	386637	Roadside	100.0	99.7	40.7	27.4	27.9	27.5	25.5
S20	338976	388486	Roadside	81.5	81.3	33.9	26.4	29.5	28.3	27.9
S21	338174	388623	Roadside	100.0	99.7	45.9	33.5	39.4	37.1	37.3
S22	337910	388918	Roadside	100.0	99.7	41.7	31.5	36.9	33.8	33.4
S23	337006	389456	Roadside	82.1	81.9	43.3	32.6	36.3	33.9	35.3
S24	336936	387324	Roadside	100.0	99.7	30.4	20.8	24.9	23.4	22.1
S25	336533	387586	Roadside	92.6	92.3	35.0	22.1	25.3	23.4	22.9
S26	336012	387912	Roadside	100.0	99.7	38.5	26.2	30.2	29.2	27.8
S27	335507	388654	Roadside	100.0	99.7	36.7	24.6	28.1	26.5	26.9
S28a	335208	389031	Roadside	100.0	99.7	40.1	26.1	22.3	22.6	22.3
S29	335733	389246	Roadside	100.0	99.7	44.2	24.9	33.5	31.1	31.6
S30	336474	389416	Roadside	100.0	99.7	36.5	24.3	28.2	27.7	27.5
T1	335398	390952	Roadside	93.4	93.1	44.2	26.1	28.5	27.0	25.0
T3	334579	390676	Roadside	67.2	67.0	35.9	33.2	38.7	36.1	34.7

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
T4	334765	390692	Kerbside	100.0	99.7	32.8	30.6	34.0	34.1	33.8
T5	334073	390442	Kerbside	84.6	84.3	46.1	20.7	23.7	25.1	34.3
T6	334006	390359	Roadside	81.5	81.3	44.1	30.2	28.8	33.0	30.7
T7	335229	389892	Roadside	84.3	84.1	31.9	27.6	30.0	30.4	28.7
T8	335224	389938	Kerbside	81.5	81.3	46.2	30.6	34.3	32.8	33.3
T9	335417	390281	Roadside	84.3	84.1	39.4	23.4	28.4	28.1	26.5
T10	335793	390647	Kerbside	100.0	99.7	42.8	28.1	31.8	31.7	31.3
B1	336074	390878	Roadside	100.0	99.7	37.6	28.3	34.4	33.2	31.4
B2	336656	390984	Roadside	100.0	99.7	38.6	30.5	34.3	33.2	34.8
B3	337346	391033	Roadside	100.0	99.7	42.5	33.4	35.9	33.6	33.6
B4	337787	391156	Roadside	83.5	83.2	38.8	31.9	33.2	31.8	30.8
B5	339027	391336	Roadside	100.0	99.7	41.9	32.1	39.3	37.1	37.6
B6	339137	391279	Roadside	93.4	93.1	41.1	30.0	40.3	38.4	38.7
B7a	339348	391135	Kerbside	100.0	99.7	44.5	34.9	45.6	43.6	42.1
B8	339797	391299	Kerbside	90.4	90.1	46.6	22.6	26.2	25.6	24.8
B9	340233	391475	Kerbside	33.3	33.2	52.4	28.4	29.8	28.5	28.4
B10	341810	391852	Kerbside	91.2	90.9	31.9	29.8	33.5	31.6	29.6
B11	336104	391260	Roadside	91.2	90.9	37.0	29.1	30.3	30.6	27.9
B12	335797	391856	Roadside	100.0	99.7	39.3	24.9	26.1	25.9	23.9

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
B13	336430	392270	Roadside	92.6	92.3	41.5	21.6	22.9	21.9	20.3
B14	336977	392804	Roadside	81.5	81.3	36.0	25.4	27.5	25.6	23.0
B15	337805	393432	Kerbside	100.0	99.7	28.1	21.2	20.7	21.5	20.2
B16	338357	394424	Roadside	100.0	99.7	35.2	25.2	26.5	24.1	23.7
B17a	339405	395092	Roadside	100.0	99.7	28.8	19.5	22.0	21.3	20.1
N1	339065	392668	Roadside	100.0	99.7	53.8	39.9	43.2	40.6	39.8
N2	338704	393216	Roadside	100.0	99.7	48.7	36.6	39.7	37.4	35.0
N3	340043	395528	Roadside	100.0	99.7	37.6	27.1	27.5	27.6	25.4
N4	339644	396090	Roadside	84.6	84.3	35.3	24.8	34.3	30.6	26.2
N5	340569	396577	Roadside	100.0	99.7	50.5	32.4	37.2	36.6	33.6
N6	338384	395445	Roadside	100.0	99.7	39.5	27.3	33.4	29.8	29.2
N7	336970	394737	Kerbside	75.8	75.5	37.9	25.7	31.1	28.6	23.6
N8a	335575	393179	Roadside	24.2	24.2	48.7	33.3	37.5	36.5	39.3
N9	335003	392743	Roadside	24.2	24.2	38.3	24.8	32.7	30.0	31.5
N10	334858	392066	Kerbside	100.0	99.7	48.8	34.2	37.4	37.5	33.9
N11	334819	390975	Kerbside	100.0	99.7	50.2	32.0	37.5	37.4	35.4
N12	337403	397230	Roadside	100.0	99.7	36.4	24.7	27.4	25.3	25.0
N13a	336378	396663	Roadside	91.7	91.5	53.2	21.9	26.7	25.3	24.8
N14	336203	396075	Roadside	100.0	99.7	43.3	29.4	33.4	31.8	31.1

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
N15	336165	394906	Roadside	66.7	66.5	33.2	26.4	27.4	26.2	26.0
N16a	335561	393889	Roadside	93.4	93.1	41.6	28.4	32.5	31.4	31.2
N17	334993	394192	Roadside	100.0	99.7	46.2	28.4	34.3	32.8	31.5
N18	334593	393519	Kerbside	100.0	99.7	37.0	23.0	28.4	27.5	26.0
N22	338424	392496	Roadside	100.0	99.7	N/A	N/A	33.2	31.9	30.4
N23	337484	392149	Roadside	100.0	99.7	N/A	N/A	25.0	25.1	25.2
N24	337795	392269	Roadside	92.6	92.3	N/A	N/A	28.5	27.0	27.4
N25	338153	392406	Roadside	100.0	99.7	N/A	N/A	27.8	26.4	26.4
N26	338661	392623	Roadside	90.9	90.7	N/A	N/A	29.4	27.1	27.3
BH1	334698	390675	Kerbside	100.0	99.7	N/A	N/A	31.7	30.5	29.0
BH2	334669	390685	Roadside	100.0	99.7	N/A	N/A	31.0	28.2	27.8
BH3	334652	390705	Roadside	100.0	99.7	N/A	N/A	31.7	30.4	28.9
BH4	334686	390694	Roadside	100.0	99.7	N/A	N/A	30.8	29.9	29.0
WV1	336301	396597	Roadside	91.2	90.9	N/A	N/A	N/A	38.0	37.0
WV2	336390	396707	Roadside	100.0	99.7	N/A	N/A	N/A	36.7	35.6
WV3	336417	396748	Roadside	100.0	99.7	N/A	N/A	N/A	35.1	32.9
WV4	336409	396706	Roadside	100.0	99.7	N/A	N/A	N/A	38.8	37.8
CL1, CL2, CL3	335465	393150	Roadside	100.0	99.7	N/A	N/A	N/A	N/A	29.9

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
CL4, CL5, CL6	336396	396711	Kerbside	58.4	58.2	N/A	N/A	N/A	N/A	42.7
ST1	333959	390343	Roadside	71.6	23.5	31.8	19.3	22.4	21.3	21.0
ST2	333988	390358	Kerbside	75	24.6	48.6	30.1	31.0	35.6	35.1
ST3	334049	390299	Roadside	100	32.8	42.3	26.4	28.2	30.8	26.8
ST4	334018	390301	Kerbside	100	32.8	42.7	N/A	25.1	31.1	25.5
L1	334802	390633	Kerbside	100	32.8	52.6	38.3	36.5	39.8	35.3
L2	334889	390583	Roadside	77.4	25.4	49.5	37.1	28.5	30.7	28.8
L3	335005	390653	Roadside	71.6	23.5	45.4	31.3	27.7	28.5	29.2
L4	335053	390704	Roadside	100	32.8	50.8	38.4	33.6	37.0	34.0
L6	334975	390502	Kerbside	100	32.8	57.3	37.0	36.4	36.1	33.1
L8	335034	390359	Kerbside	100	32.8	57.3	38.3	N/A	35.1	36.3
C1	334384	390275	Kerbside	100	32.8	50.0	36.7	36.4	37.2	37.1
C5	334261	390022	Roadside	100	32.8	51.6	30.3	33.8	34.2	30.1
C6	334346	389890	Roadside	100	32.8	49.9	35.6	36.5	36.8	35.4
C8	334509	389819	Kerbside	100	32.8	44.0	29.1	32.4	30.6	29.1
C9	334542	389987	Roadside	100	32.8	50.0	35.1	37.8	36.0	34.1
UP1	336806	389504	Kerbside	82.1	41.3	N/A	N/A	N/A	N/A	29.4
UP2	336892	389536	Roadside	100	50.3	N/A	N/A	N/A	N/A	26.6

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
UP3	336997	389478	Industrial	84.7	42.6	N/A	N/A	N/A	N/A	28.7
UP4	337018	389466	Kerbside	100	50.3	N/A	N/A	N/A	N/A	29.4
TR1	336952	389419	Kerbside	46.1	23.2	N/A	N/A	N/A	N/A	31.8
TR2	336941	389451	Kerbside	100	50.3	N/A	N/A	N/A	N/A	30.4
TR3	337010	389896	Kerbside	82.5	41.5	N/A	N/A	N/A	N/A	28.6
TR4	337011	389820	Roadside	100	50.3	N/A	N/A	N/A	N/A	24.8
HR1	337044	390621	Roadside	100	50.3	N/A	N/A	N/A	N/A	29.2
HR2	337063	390691	Kerbside	100	50.3	N/A	N/A	N/A	N/A	28.7
HR3	336983	390617	Kerbside	100	50.3	N/A	N/A	N/A	N/A	18.7
HR4	337007	390661	Kerbside	100	50.3	N/A	N/A	N/A	N/A	17.5
HR5	337025	390705	Kerbside	100	50.3	N/A	N/A	N/A	N/A	16.6
PP1	335390	390706	Roadside	100	50.3	N/A	N/A	N/A	N/A	40.1
PP2	335421	390684	Kerbside	100	50.3	N/A	N/A	N/A	N/A	45.7
PP3	335463	390675	Kerbside	84.1	42.3	N/A	N/A	N/A	N/A	47.5
PP4	335548	390677	Kerbside	100	50.3	N/A	N/A	N/A	N/A	49.7
IS1	335312	390975	Kerbside	66.2	33.3	N/A	N/A	N/A	N/A	36.8
IS2	335433	390992	Roadside	100	50.3	N/A	N/A	N/A	N/A	29.5
IS3	335471	390996	Roadside	100	50.3	N/A	N/A	N/A	N/A	28.8
IS4	335534	390999	Roadside	84.7.	42.6	N/A	N/A	N/A	N/A	32.7

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
HS1	334888	390924	Roadside	100	50.3	N/A	N/A	N/A	N/A	39.1
HS2	334925	390923	Roadside	100	50.3	N/A	N/A	N/A	N/A	40.4
HS3	335015	390921	Kerbside	100	50.3	N/A	N/A	N/A	N/A	44.3
HS4	335091	390927	Kerbside	81.5	41.0	N/A	N/A	N/A	N/A	45.2
RS1	335129	390124	Kerbside	100	50.3	N/A	N/A	N/A	N/A	39.4
RS2	335152	390106	Kerbside	82.5	41.5	N/A	N/A	N/A	N/A	31.3
RS3	335171	390065	Kerbside	100	50.3	N/A	N/A	N/A	N/A	35.0
RS4	335188	390031	Kerbside	100	50.3	N/A	N/A	N/A	N/A	33.5
ES1	335022	390264	Kerbside	100	50.3	N/A	N/A	N/A	N/A	36.5
ES2	334953	390328	Kerbside	66.2	33.3	N/A	N/A	N/A	N/A	40.7

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

☒ Diffusion tube data has been bias adjusted.

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

Notes:

The annual mean concentrations are presented as $\mu\text{g}/\text{m}^3$.

Exceedances of the NO₂ annual mean objective of $40\mu\text{g}/\text{m}^3$ are shown in **bold**.

NO₂ annual means exceeding $60\mu\text{g}/\text{m}^3$, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

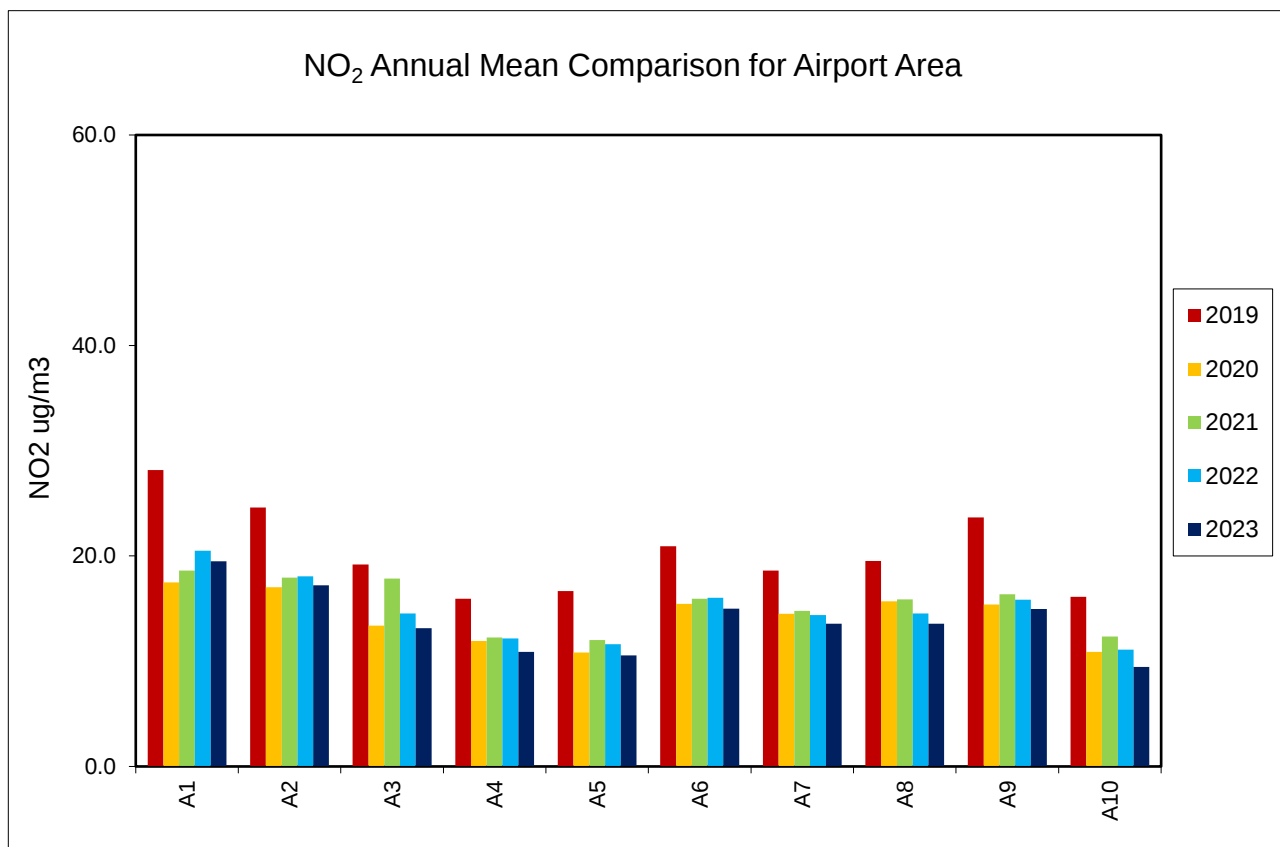
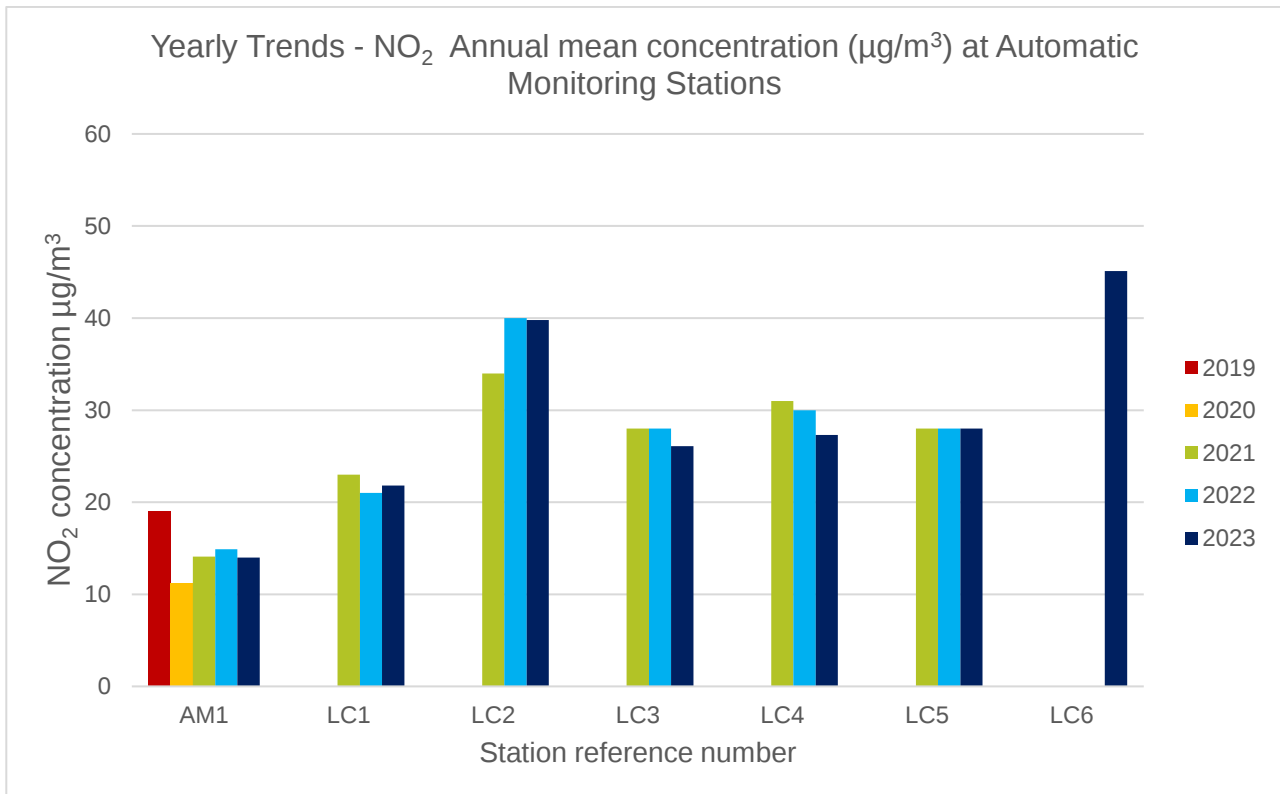
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

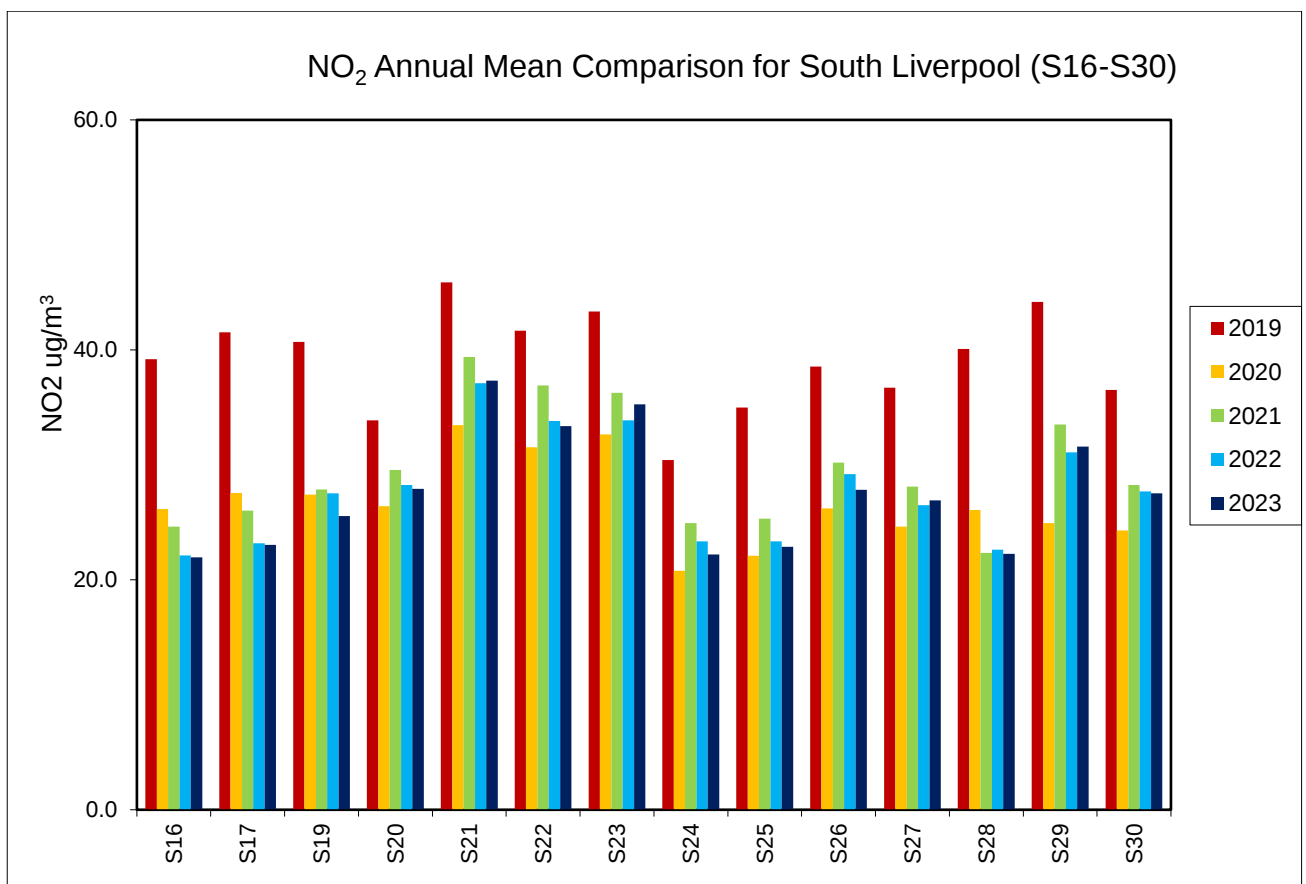
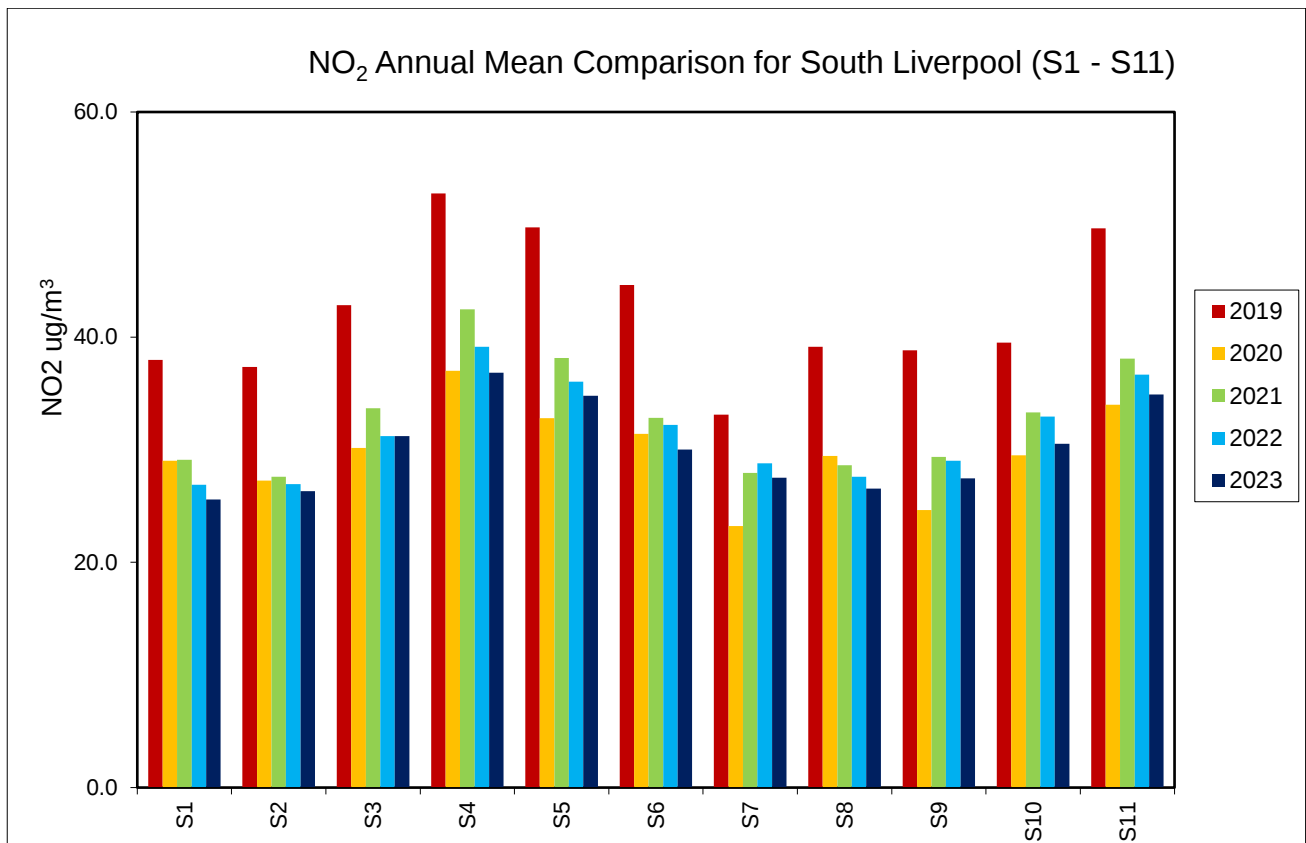
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

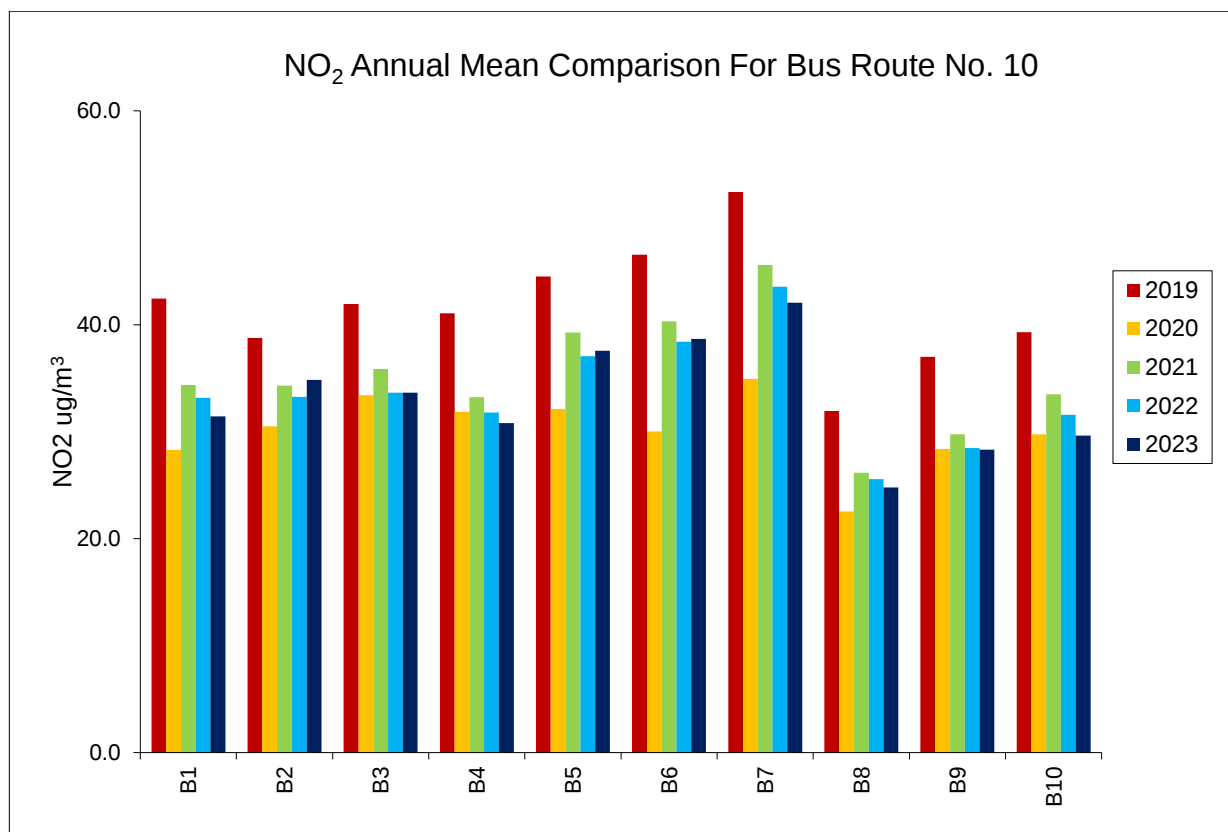
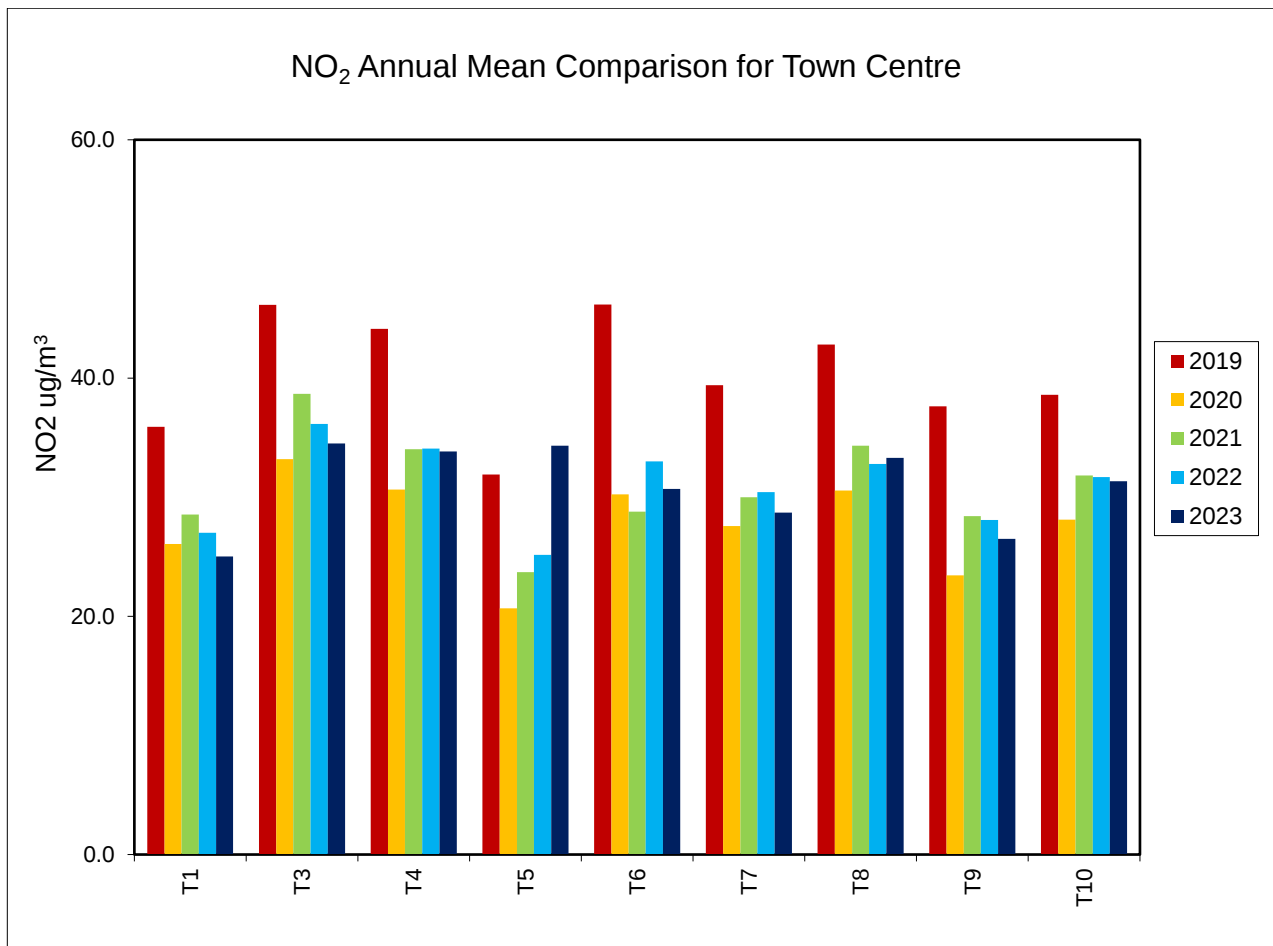
- (1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
- (2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
- (3) Monitoring location A10 is a short distance within the boundary of Halton Borough Council. The location is serviced and recorded by Liverpool City Council for complete coverage of the airport locality and for the mutual convenience of the local authorities.

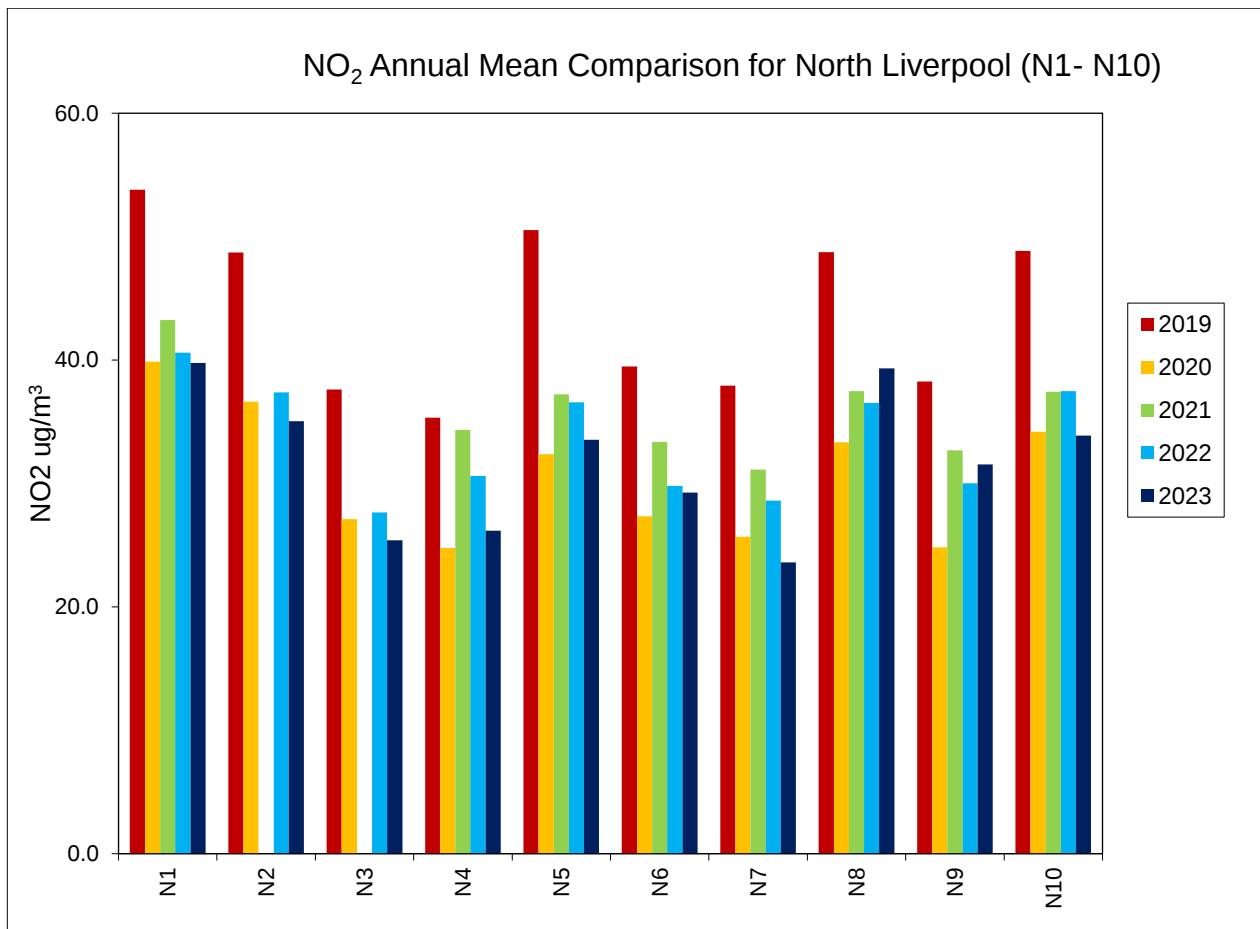
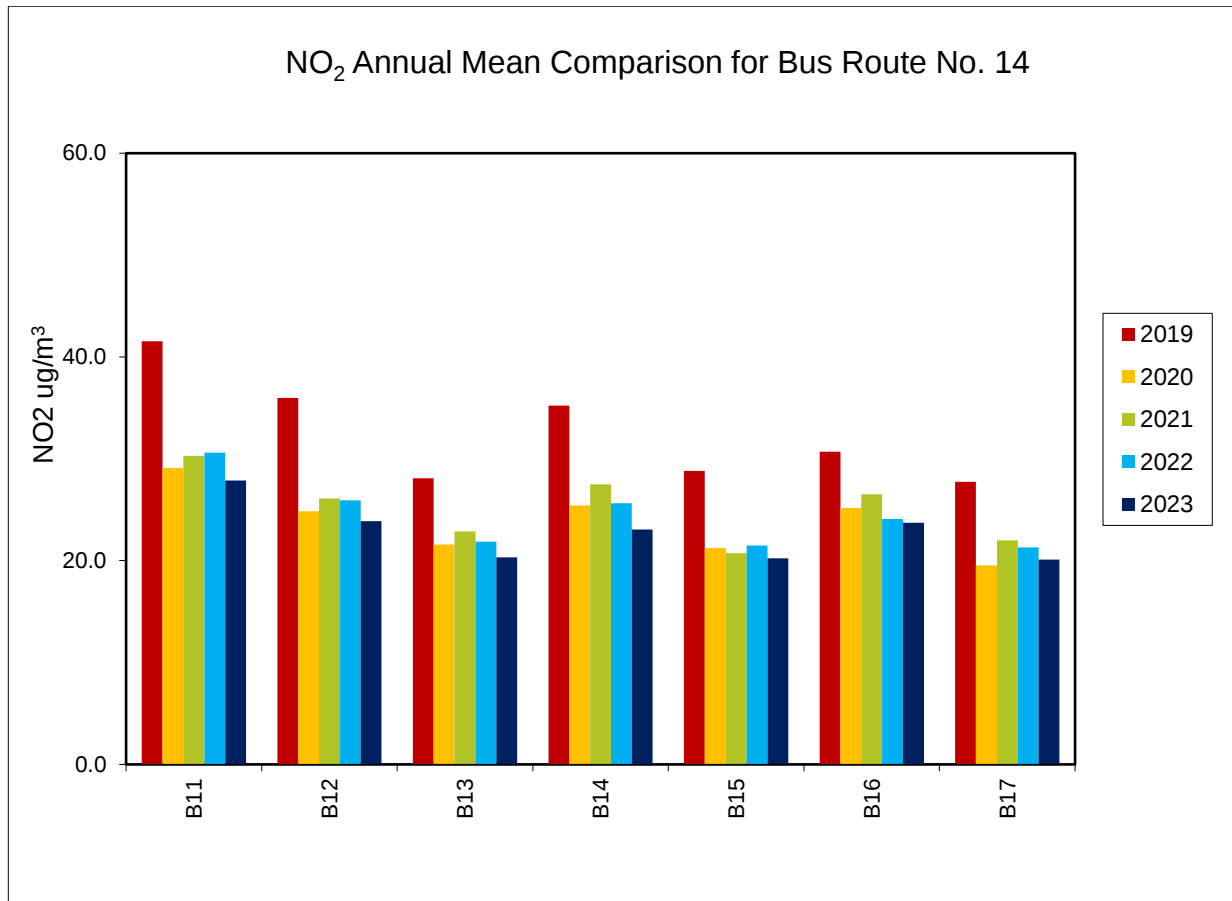
Figure A.1 – Trends in Annual Mean NO₂ Concentrations

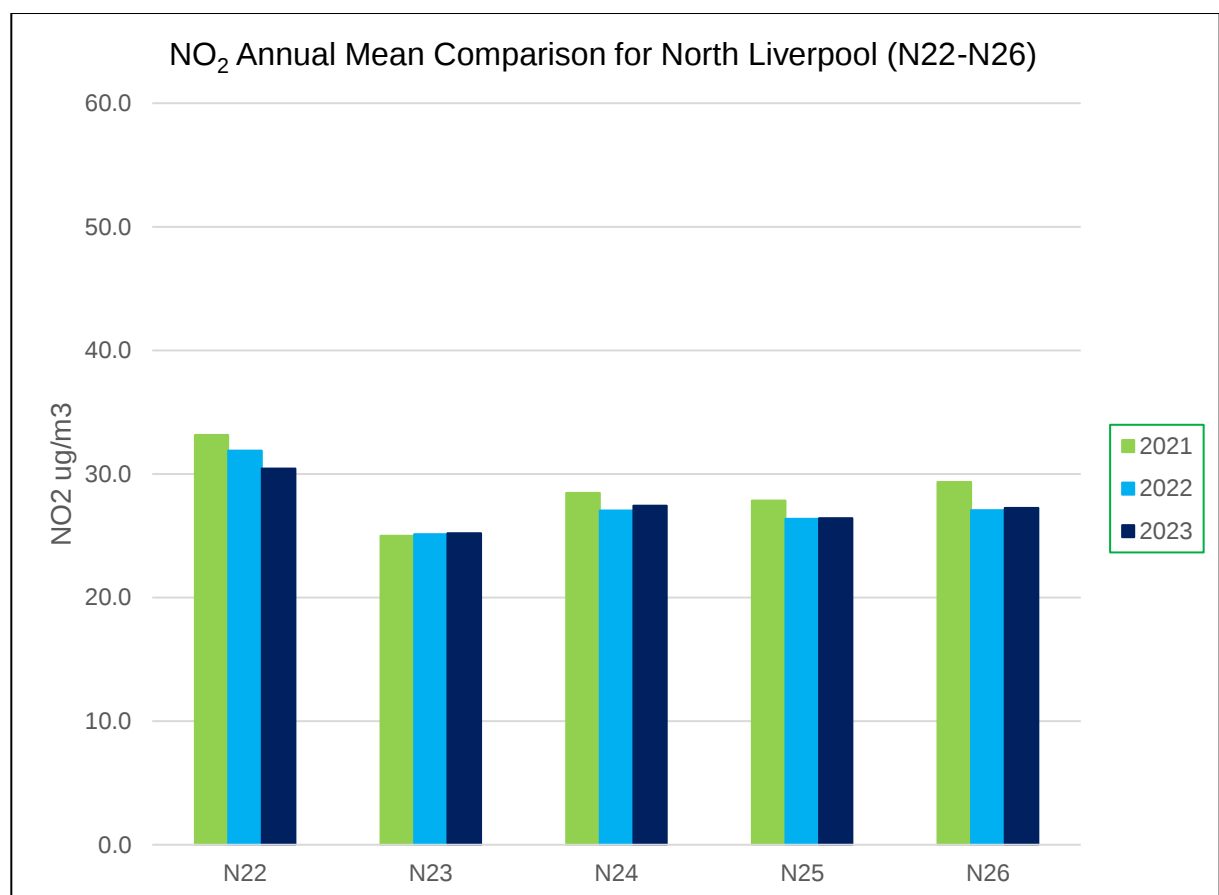
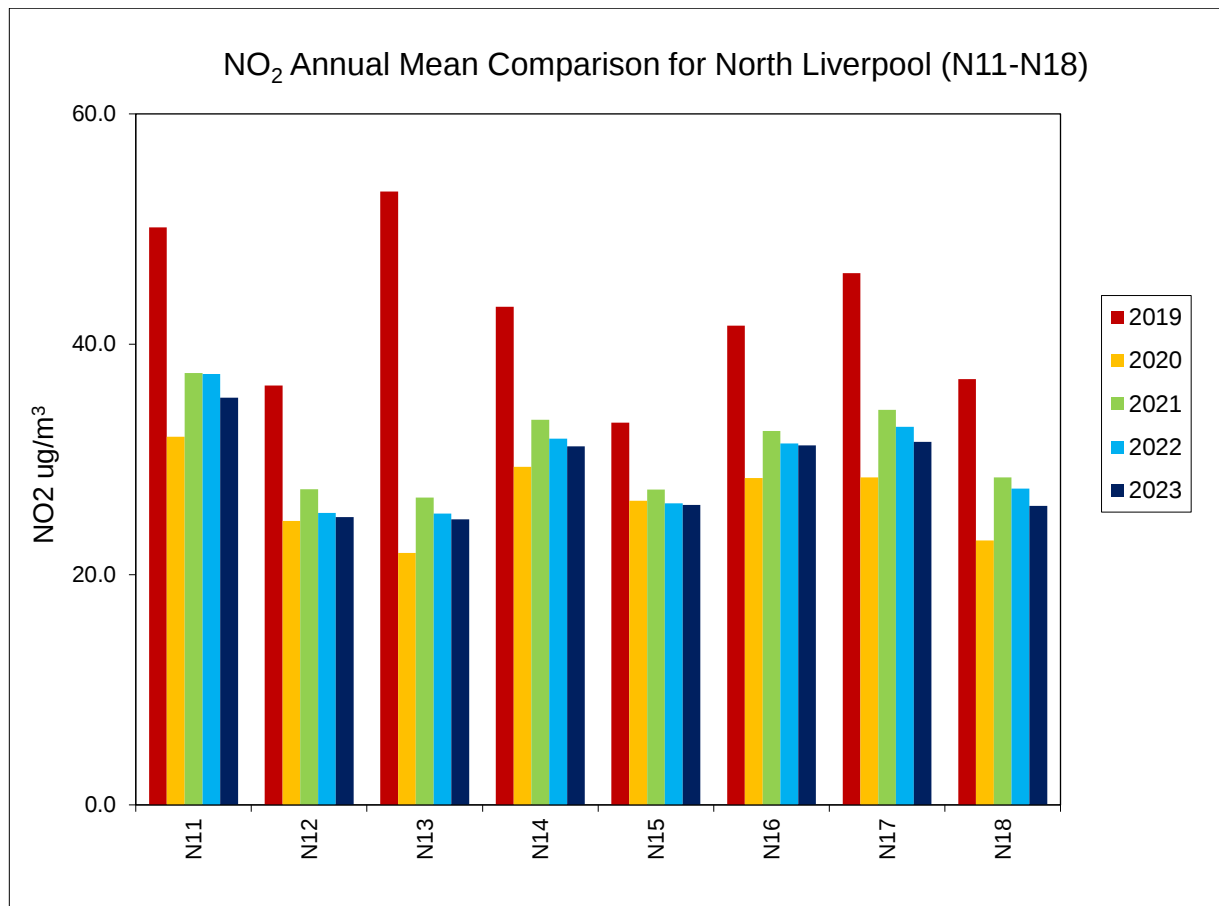
Note that data is only included in the graphs for current monitoring locations with more than two years of data.

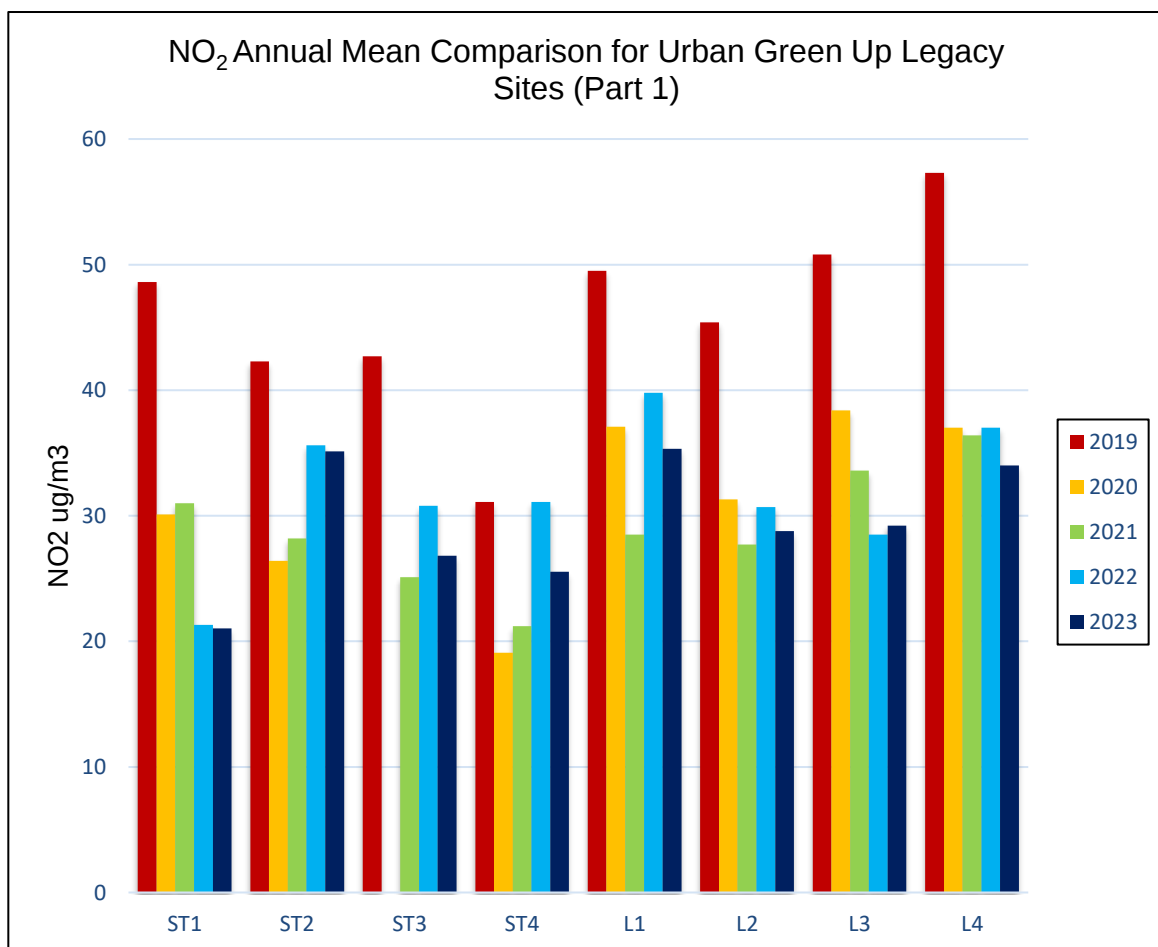
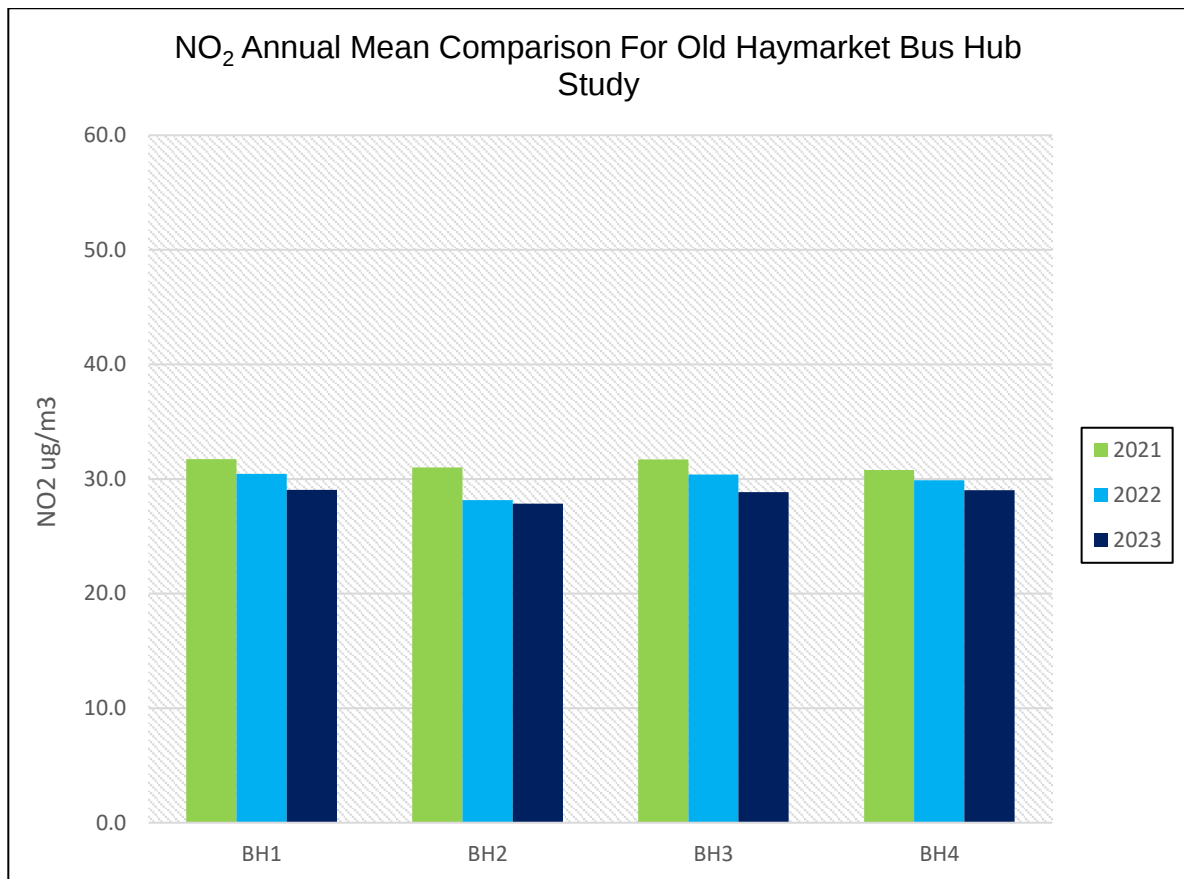












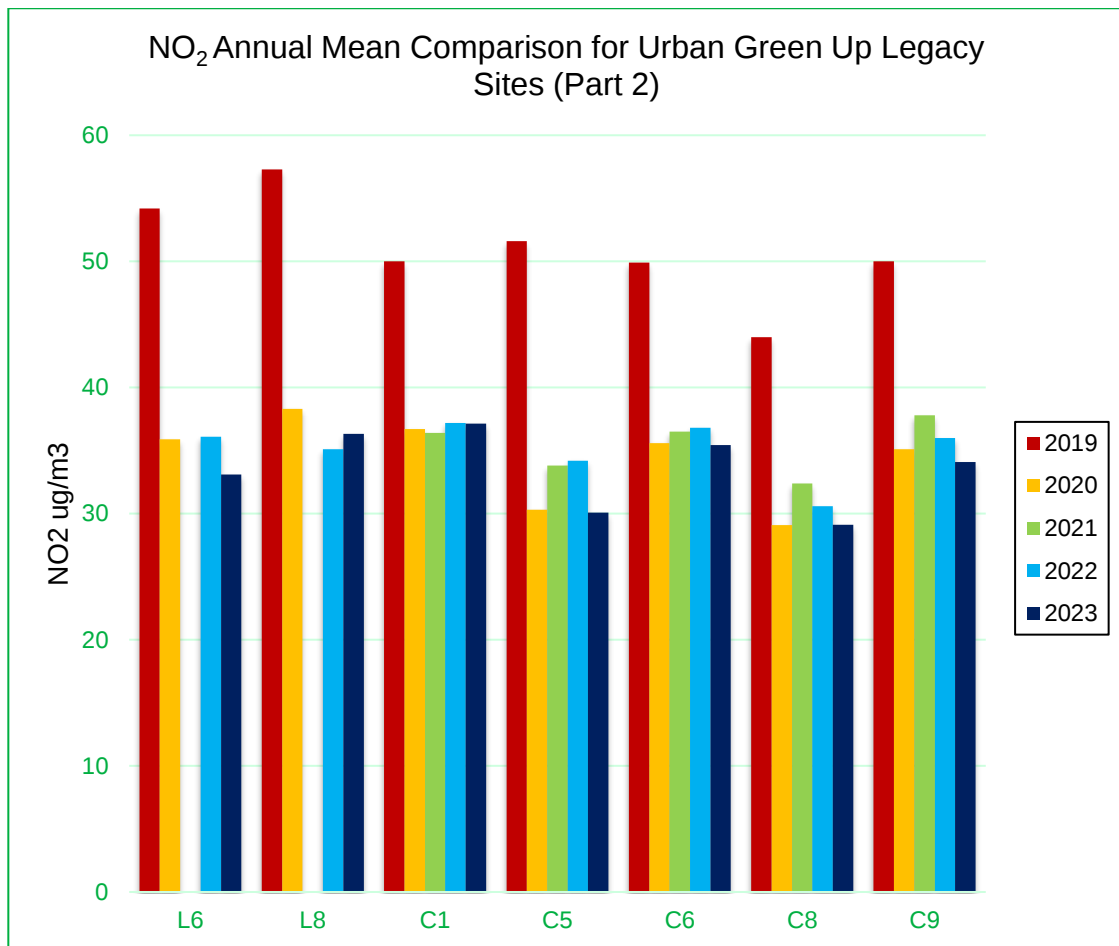


Table A.5 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

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
AM1	343884	383601	Urban Background	96	96	0	0 (68.4)	0 (73)	0	0
LC1	334807	390285	Urban Background	96.3	96.3	N/A	N/A	0	0	0
LC2	334941	390526	Kerbside	97.9	97.9	N/A	N/A	1 (117)	0 (143)	3
LC3	341056	384213	Kerbside	91.1	91.1	N/A	N/A	0	0	0
LC4	339679	390460	Roadside	99.6	99.6	N/A	N/A	0	0	0
LC5	335465	393150	Roadside	79.2	79.2	N/A	N/A	0	0	0 (116.3)
LC6	336396	396711	Kerbside	99.2	74.7	N/A	N/A	N/A	N/A	1 (152.8)

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m³ have been recorded.

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ 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%).

Table A.6 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

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
AM1	343884	383601	Urban Background	97	97	17	15.5	12.2	14.9	14.0

☒ **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/m³.

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ 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 (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.2 – Trends in Annual Mean PM₁₀ Concentrations

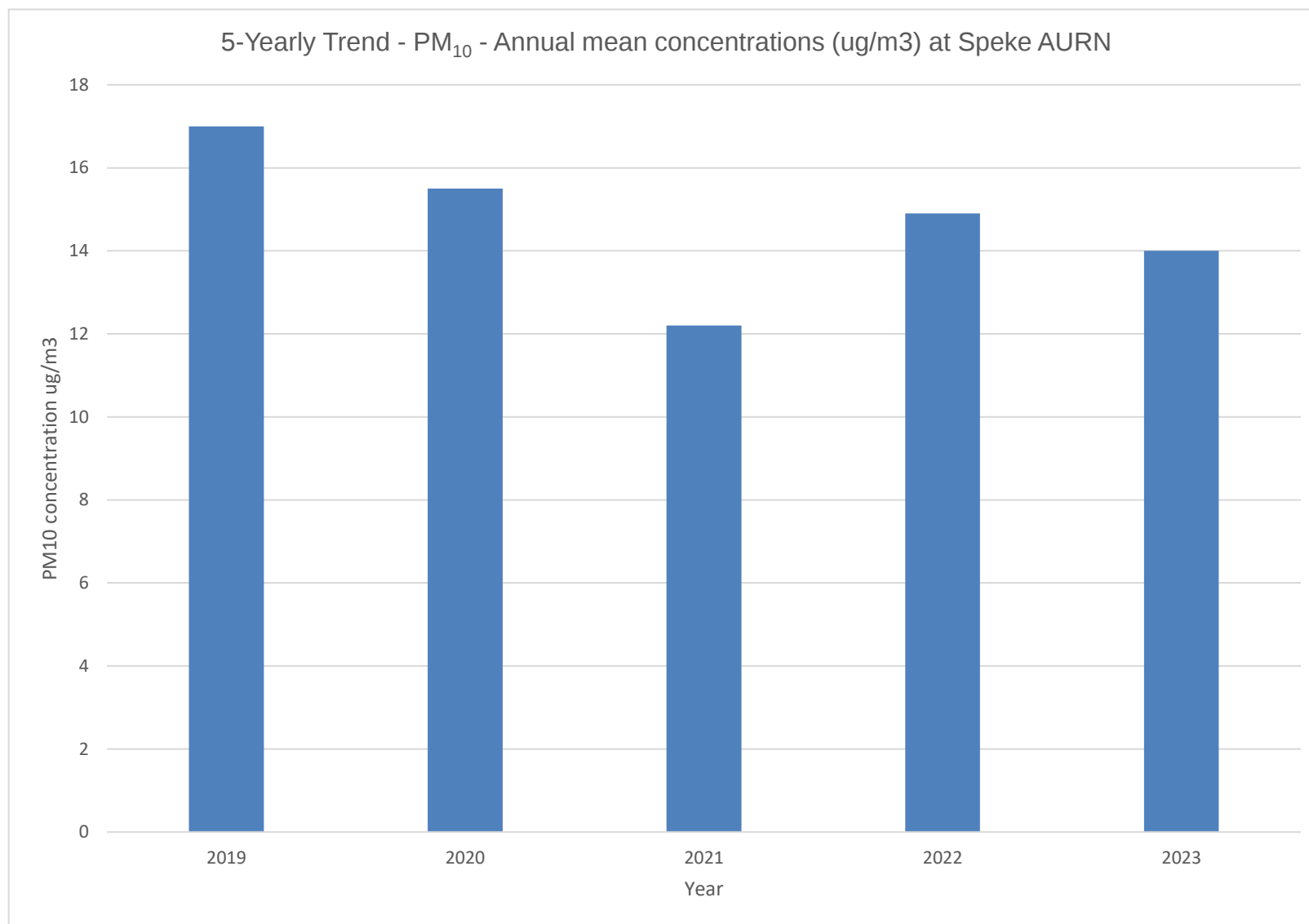


Table A.7 – 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

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
AM1	343884	383601	Urban Background	97	97	7	0 (28.0)	0 (16.0)	2	1

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m³ have been recorded.

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ 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%).

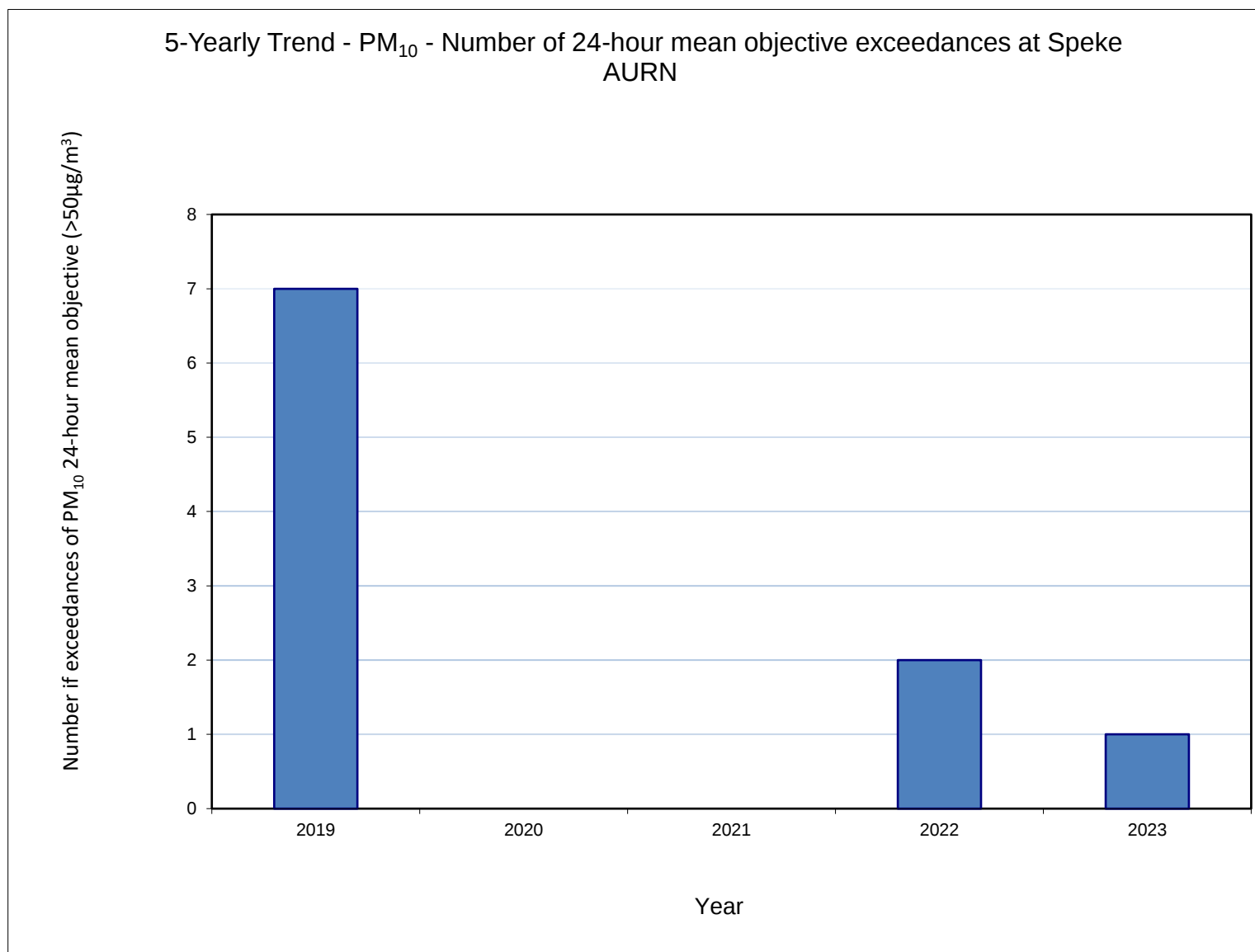
Figure A.3 – Trends in Number of 24-Hour Mean PM₁₀ Results > 50µg/m³

Table A.8 – Annual Mean PM_{2.5} Monitoring Results (µg/m³)

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
AM1	343884	383601	Urban Background	96	96	9.0	6.9	7.3	9.7	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/m³.

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

Figure A.4 – Trends in Annual Mean PM_{2.5} Concentrations

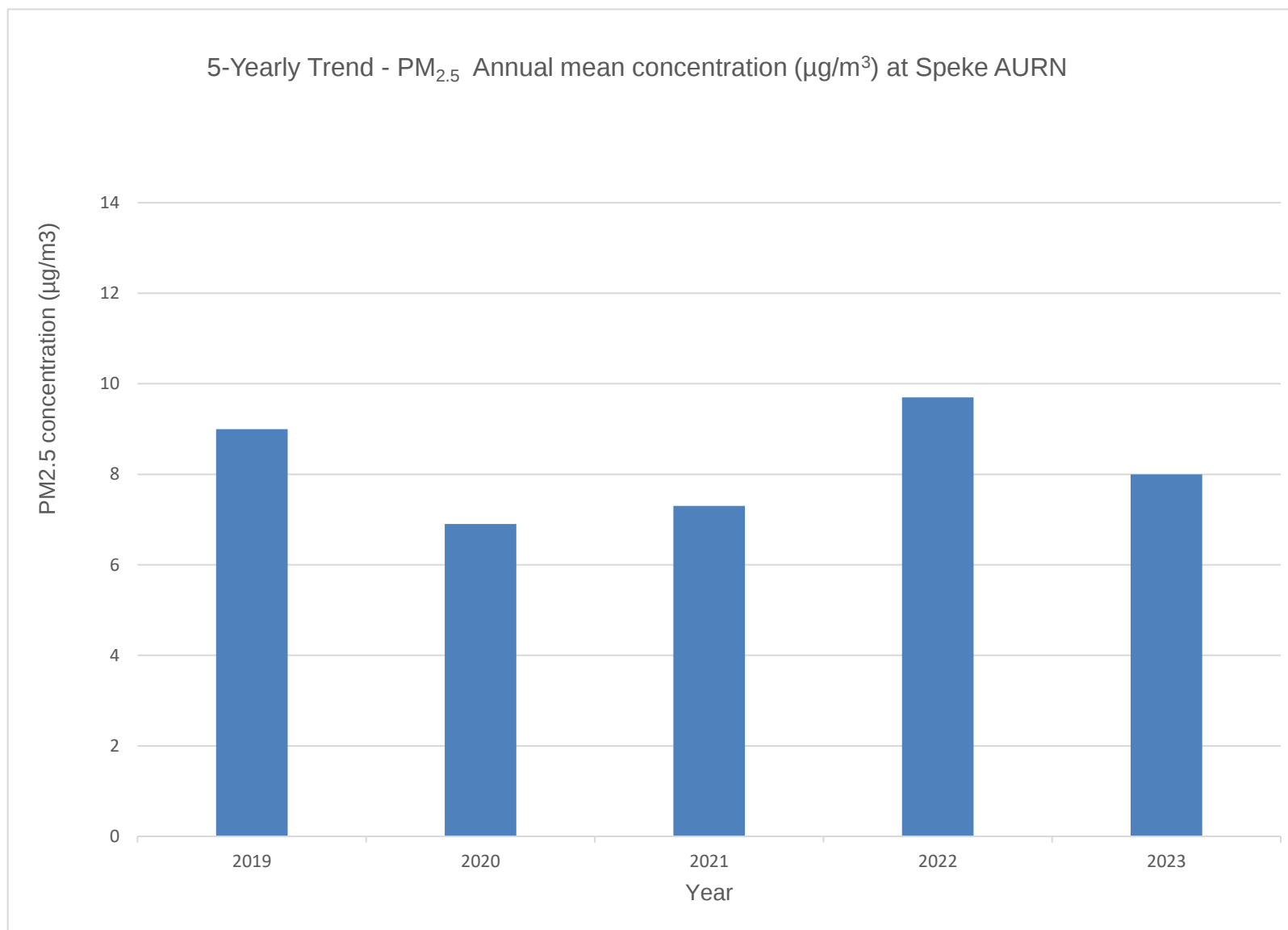


Table A.9 – SO₂ 2023 Monitoring Results, Number of Relevant Instances

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/m ³	Number of 1-hour Means > 350µg/m ³	Number of 24-hour Means > 125µg/m ³
AM1	343884	383601	Urban Background	99	99	0	0	0

Notes:

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

Exceedances of the SO₂ 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 (e.g. 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 – NO₂ 2023 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
A1	342944	382619	20.2	28.4	24.7	26.1	21.2	20.6	17.6	20.6	25.8	29.4	30.0	MT	24.1	19.5	-	
A2	343299	382853	24.5	24.4	20.5	21.7	16.5	MT	14.7	17.4	24.2	24.7	26.8	18.4	21.3	17.2	-	
A3	344768	382689	19.9	19.1	15.3	15.3	13.4	13.7	10.0	12.9	17.1	20.5	22.8	14.7	16.2	13.1	-	
A4	344362	381701	16.9	15.4	13.6	13.0	11.4	10.6	7.6	10.7	13.9	16.7	21.2	10.3	13.4	10.9	-	
A5	342180	382485	15.1	15.2	12.6	14.5	11.9	11.7	6.8	9.7	12.8	18.5	19.1	8.6	13.0	10.6	-	
A6	342956	383445	22.9	22.5	18.1	18.3	MT	14.8	10.8	13.3	18.8	22.8	25.6	15.5	18.5	15.0	-	
A7	343275	383239	21.0	20.5	17.5	MT	12.2	12.3	10.3	12.9	17.8	21.7	24.3	13.4	16.7	13.6	-	
A8	345188	382619	20.8	19.6	17.0	17.0	14.5	14.7	10.7	13.5	16.6	19.0	22.3	15.4	16.7	13.6	-	
A9	344622	382671	22.7	21.5	18.2	17.5	15.7	16.1	12.4	15.5	18.8	22.3	25.0	15.8	18.5	15.0	-	
A10	345234	382308	15.1	14.5	11.7	MT	8.9	MT	MT	MT	12.2	MT	18.3	8.9	12.8	9.5	-	
S1	336485	390484	38.4	37.1	29.8	31.4	28.6	26.9	25.0	24.1	34.0	32.1	40.3	31.4	31.6	25.6	-	
S2	336999	390563	29.5	41.3	34.5	35.9	28.5	31.4	22.0	24.7	35.4	37.8	41.2	27.9	32.5	26.3	-	
S3	337846	390705	46.1	43.5	38.2	38.7	32.9	36.9	30.9	31.4	40.7	40.7	43.0	39.6	38.5	31.2	-	
S4	339138	390757	50.7	51.9	42.8	45.9	42.7	46.8	37.5	37.0	50.6	46.7	50.0	43.4	45.5	36.9	27.3	
S5	339382	390651	54.6	49.3	41.4	39.9	41.3	41.8	37.8	34.7	44.0	43.3	46.1	41.3	43.0	34.8	-	
S6	340404	390353	44.8	42.2	36.7	35.1	30.4	34.4	33.1	30.6	39.0	38.1	42.7	37.7	37.1	30.0	-	
S7	340508	390260	40.2	41.3	35.0	36.3	34.8	31.5	24.2	26.2	38.1	MT	39.0	26.8	34.0	27.5	-	
S8a	339667	388306	37.9	36.7	34.1	34.1	27.8	34.8	26.6	26.8	35.6	31.5	34.5	MT	32.8	26.5	-	
S9a	340552	387955	36.7	39.5	33.5	31.4	32.2	34.5	29.7	30.7	37.9	33.6	36.2	31.1	33.9	27.5	-	
S10	341967	386375	42.2	45.7	38.4	37.8	39.3	40.6	33.7	32.8	38.0	34.7	39.6	29.5	37.7	30.5	-	
S11	340946	384256	47.8	49.4	44.3	44.7	38.0	39.4	34.2	38.4	47.1	45.9	50.2	37.7	43.1	34.9	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
S16a	339656	385000	29.3	31.9	29.4	27.7	24.2	22.4	MT	21.2	27.4	31.5	32.0	20.9	27.1	21.9	-	
S17a	338969	385680	29.8	35.1	28.8	29.0	25.4	27.6	MT	24.3	27.8	29.5	33.7	21.9	28.4	23.0	-	
S19a	337915	386637	36.7	38.4	34.5	32.6	28.5	29.4	20.5	25.6	32.4	33.7	36.2	29.8	31.5	25.5	-	
S20	338976	388486	44.0	40.7	36.8	34.8	31.0	32.0	25.4	27.3	38.7	MT	MT	34.0	34.5	27.9	-	
S21	338174	388623	49.7	52.8	51.1	48.5	45.6	47.3	36.3	37.0	48.5	47.0	52.2	37.0	46.1	37.3	30.8	
S22	337910	388918	46.1	45.7	44.1	43.1	38.8	39.4	32.7	32.5	45.7	41.9	47.8	36.3	41.2	33.4	-	
S23	337006	389456	48.9	53.8	41.6	40.0	40.3	43.7	MT	33.7	45.3	42.8	MT	45.1	43.5	35.3	-	
S24	336936	387324	27.7	32.2	28.5	28.8	25.8	MT	18.2	21.9	28.8	30.4	34.3	23.5	27.3	22.1	-	
S25	336533	387586	28.3	35.3	29.2	30.0	26.3	28.8	19.7	23.1	30.5	32.3	33.3	22.7	28.3	22.9	-	
S26	336012	387912	36.3	40.8	36.4	35.4	33.6	32.8	27.5	30.1	33.7	35.5	37.3	32.7	34.3	27.8	-	
S27	335507	388654	34.8	37.8	33.7	37.8	33.2	33.4	23.2	26.6	36.9	37.0	39.1	25.0	33.2	26.9	-	
S28a	335208	389031	29.1	36.0	29.9	30.7	28.9	22.5	17.0	21.4	27.1	30.7	35.2	21.5	27.5	22.3	-	
S29	335733	389246	41.7	44.3	39.2	43.6	40.4	37.0	29.2	31.9	40.5	42.0	43.3	35.0	39.0	31.6	-	
S30	336474	389416	39.6	40.5	35.7	33.9	25.9	31.2	23.2	25.4	38.5	35.5	41.7	36.7	34.0	27.5	-	
T1	335398	390952	37.3	MT	29.7	30.1	28.9	25.8	24.2	26.5	35.9	34.2	37.4	29.7	30.9	25.0	-	
T3	334579	390676	44.5	MT	MT	47.8	49.5	44.9	MT	MT	47.6	47.8	44.5	33.1	45.0	34.7	-	
T4	334765	390692	44.0	48.3	45.8	41.6	35.0	40.1	34.0	33.6	48.5	43.2	45.8	41.6	41.8	33.8	-	
T5	334073	390442	28.1	MT	29.0	34.3	39.9	61.9	44.1	48.3	63.4	MT	47.2	27.3	42.4	34.3	-	
T6	334006	390359	MT	40.5	36.8	42.4	39.8	42.7	30.5	35.8	42.8	37.9	MT	29.7	37.9	30.7	-	
T7	335229	389892	38.1	38.1	36.7	37.1	MT	29.1	28.6	30.3	37.9	36.6	42.0	MT	35.4	28.7	-	
T8	335224	389938	40.8	45.9	MT	41.1	43.2	39.6	36.4	39.9	45.5	42.8	MT	36.1	41.1	33.3	-	
T9	335417	390281	31.6	35.0	34.2	36.3	32.8	MT	25.5	27.6	MT	37.2	38.7	28.2	32.7	26.5	-	
T10	335793	390647	41.8	46.4	38.4	39.1	36.7	35.7	31.1	32.9	41.6	39.1	45.9	35.6	38.7	31.3	-	
B1	336074	390878	39.1	43.9	42.0	40.3	40.9	39.4	29.2	32.1	42.1	40.8	42.4	33.6	38.8	31.4	-	
B2	336656	390984	43.8	48.0	43.2	43.9	44.8	45.6	36.8	38.5	47.3	46.0	38.1	40.5	43.0	34.8	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
B3	337346	391033	47.7	57.4	41.0	40.2	40.0	38.1	33.0	32.1	44.9	42.7	39.6	41.9	41.5	33.6	-	
B4	337787	391156	43.2	42.2	35.2	36.8	MT	MT	31.2	32.5	40.1	40.0	39.0	40.2	38.0	30.8	-	
B5	339027	391336	48.0	51.1	50.5	50.6	48.1	46.2	34.6	39.9	46.8	50.3	52.6	37.8	46.4	37.6	29.1	
B6	339137	391279	47.4	MT	48.0	54.0	50.5	55.4	34.6	41.9	49.6	55.1	52.7	35.8	47.7	38.7	31.3	
B7a	339348	391135	54.2	60.8	54.0	57.2	52.0	54.7	40.1	46.0	50.6	54.1	57.6	41.8	51.9	42.1	30.1	
B8	339797	391299	34.6	35.7	33.1	35.0	28.1	30.3	18.5	25.1	33.0	37.0	MT	26.4	30.6	24.8	-	
B9	340233	391475	41.6	41.6	34.2	MT	30.7	x	x	x	x	x	x	x	37.0	28.4	-	
B10	341810	391852	MT	41.9	38.4	37.5	36.1	30.7	28.1	31.7	38.8	40.3	46.8	32.1	36.6	29.6	-	
B11	336104	391260	39.8	38.7	MT	38.5	29.1	31.3	28.4	28.3	39.5	35.7	36.5	32.9	34.4	27.9	-	
B12	335797	391856	34.3	32.2	31.4	30.7	24.7	24.0	21.4	23.8	33.3	34.6	36.0	27.2	29.5	23.9	-	
B13	336430	392270	29.6	30.3	25.2	24.8	20.3	MT	14.5	19.1	25.9	31.0	33.4	21.7	25.1	20.3	-	
B14	336977	392804	34.0	35.5	29.4	29.4	28.2	24.6	21.0	24.3	30.1	MT	MT	28.1	28.5	23.0	-	
B15	337805	393432	29.4	29.3	27.0	25.8	17.8	21.1	14.7	18.6	26.0	30.6	35.4	24.1	25.0	20.2	-	
B16	338357	394424	25.4	36.0	29.9	30.4	25.0	27.0	19.8	22.8	31.6	34.4	38.0	31.5	29.3	23.7	-	
B17a	339405	395092	30.8	31.0	24.2	25.0	19.7	20.6	13.4	18.2	24.7	30.0	36.2	24.1	24.8	20.1	-	
N1	339065	392668	50.1	53.7	47.0	52.2	47.8	50.2	36.9	41.9	54.3	53.2	60.4	41.3	49.1	39.8	19.7	
N2	338704	393216	51.2	51.1	41.3	40.2	39.5	43.4	33.4	36.3	45.6	41.3	51.5	44.3	43.3	35.0	-	
N3	340043	395528	38.6	38.7	30.5	32.1	24.5	28.7	23.5	24.7	34.0	33.0	39.0	28.9	31.3	25.4	-	
N4	339644	396090	37.9	45.8	31.5	33.8	29.5	25.1	23.0	26.2	31.9	MT	38.4	MT	32.3	26.2	-	
N5	340569	396577	45.5	47.8	41.1	42.1	39.8	43.1	32.4	34.1	44.7	41.5	47.4	37.6	41.4	33.6	-	
N6	338384	395445	45.1	44.8	36.3	37.4	37.5	33.7	24.4	29.4	34.7	37.2	42.1	30.9	36.1	29.2	-	
N7	336970	394737	MT	MT	Mt	27.0	29.1	26.7	23.0	26.1	30.3	32.5	38.8	28.9	29.1	23.6	-	
N8a	335575	393179	56.3	51.6	37.8	x	x	x	x	x	x	x	x	x	48.6	39.3	27.5	
N9	335003	392743	39.0	43.7	34.2	x	x	x	x	x	x	x	x	x	38.9	31.5	-	
N10	334858	392066	43.5	51.9	42.1	39.7	39.2	35.3	35.1	34.1	47.0	43.1	52.7	38.3	41.8	33.9	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
N11	334819	390975	43.4	49.8	41.9	48.1	43.8	42.1	32.5	38.8	47.8	49.4	49.8	36.6	43.7	35.4	-	
N12	337403	397230	38.3	37.8	31.2	30.4	26.1	25.3	22.6	24.8	30.2	34.9	38.5	30.1	30.8	25.0	-	
N13a	336378	396663	38.6	41.7	29.5	27.1	25.2	23.8	MT	23.6	29.2	30.9	38.1	29.3	30.6	24.8	-	
N14	336203	396075	46.6	45.6	37.0	39.9	36.1	39.9	28.3	29.2	36.0	42.0	47.4	33.5	38.4	31.1	-	
N15	336165	394906	39.9	36.9	32.7	28.8	24.1	26.1	24.3	24.1	MT	MT	MT	MT	29.6	26.0	-	
N16a	335561	393889	40.9	46.2	38.7	40.7	34.3	36.1	27.3	31.0	39.7	43.2	45.8	MT	38.5	31.2	-	
N17	334993	394192	40.7	46.6	38.0	42.2	36.2	41.1	29.0	32.4	42.4	42.9	44.6	30.9	38.9	31.5	-	
N18	334593	393519	34.8	40.1	31.8	33.3	28.1	28.5	23.2	25.5	36.3	34.9	40.9	27.3	32.1	26.0	-	
N22	338424	392496	48.5	44.4	35.4	35.2	29.1	34.1	30.1	34.3	32.2	39.1	45.4	43.4	37.6	30.4	-	
N23	337484	392149	34.5	33.1	29.3	32.0	26.1	28.1	21.1	25.1	39.4	36.1	37.3	31.3	31.1	25.2	-	
N24	337795	392269	39.3	40.5	32.6	32.4	MT	MT	23.5	26.6	38.0	35.1	38.4	32.4	33.9	27.4	-	
N25	338153	392406	38.0	39.2	32.9	33.3	29.3	27.5	22.6	25.4	35.2	37.4	39.8	31.0	32.6	26.4	-	
N26	338661	392623	40.0	37.0	30.1	31.1	26.4	32.9	26.4	28.9	34.9	37.6	42.4	36.3	33.7	27.3	-	
BH1	334698	390675	36.4	42.9	38.8	39.5	30.8	35.1	28.7	30.7	33.6	38.1	42.3	33.3	35.8	29.0	-	
BH2	334669	390685	35.9	36.8	33.7	36.4	29.5	31.3	25.0	28.9	38.4	36.4	48.7	31.3	34.4	27.8	-	
BH3	334652	390705	36.8	39.3	33.5	37.0	30.7	33.8	27.6	29.2	34.3	37.3	53.0	35.0	35.6	28.9	-	
BH4	334686	390694	37.9	39.0	36.3	37.7	31.2	35.4	30.1	31.3	35.8	38.4	44.0	32.9	35.8	29.0	-	
WV1	336301	396597	MT	56.4	45.5	44.8	42.4	43.7	37.6	40.1	49.7	45.8	51.1	44.8	45.6	37.0	-	
WV2	336390	396707	48.9	53.8	50.4	43.5	38.6	41.7	36.9	40.3	41.9	41.4	46.1	44.1	44.0	35.6	-	
WV3	336417	396748	48.0	50.9	42.8	38.7	35.8	38.1	33.1	35.6	40.6	39.4	44.6	39.5	40.6	32.9	-	
WV4	336409	396706	57.8	52.9	52.1	49.9	45.9	44.3	30.6	37.9	48.3	49.3	51.5	38.8	46.6	37.8	-	
CL1	335465	393150	41.2	40.2	36.5	35.3	29.2	31.2	27.1	29.0	42.2	40.1	44.0	34.1	-	-	-	Triplicate Site with CL1, CL2 and CL3 - Annual data provided for CL3 only
CL2	335465	393150	45.9	40.5	37.9	45.9	31.2	36.0	28.1	29.4	39.9	38.6	41.0	32.0	-	-	-	Triplicate Site with CL1, CL2 and CL3 - Annual data provided for CL3 only
CL3	335465	393150	41.5	44.0	36.2	36.6	30.7	33.7	30.2	31.3	38.8	39.7	43.5	44.5	36.9	29.9	-	Triplicate Site with CL1, CL2 and CL3 - Annual data provided for CL3 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	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
CL4	336396	396711	x	x	x	52.3	MT	52.6	MT	45.8	53.2	54.5	63.8	52.6	-	-	-	Triplicate Site with CL4, CL5 and CL6 - Annual data provided for CL6 only
CL5	336396	396711	x	x	x	49.4	MT	51.9	MT	45.4	53.8	55.5	64.5	53.9	-	-	-	Triplicate Site with CL4, CL5 and CL6 - Annual data provided for CL6 only
CL6	336396	396711	x	x	x	53.3	MT	50.5	MT	MT	MT	58.3	62.9	54.7	53.7	42.7	-	Triplicate Site with CL4, CL5 and CL6 - Annual data provided for CL6 only
ST1	333959	390343	26.8	27.5	23.6	MT	x	x	x	x	x	x	x	x	26.0	21.0	-	
ST2	333988	390358	MT	44.8	43.0	42.3	x	x	x	x	x	x	x	x	43.4	35.1	-	
ST3	334049	390299	34.9	39.0	37.7	36.2	x	x	x	x	x	x	x	x	37.0	26.8	-	
ST4	334018	390301	29.4	39.4	34.4	37.7	x	x	x	x	x	x	x	x	35.2	25.5	-	
L1	334802	390633	50.7	54.8	46.0	43.3	x	x	x	x	x	x	x	x	48.7	35.3	-	
L2	334889	390583	44.3	44.2	MT	34.5	x	x	x	x	x	x	x	x	41.0	28.8	-	
L3	335005	390653	38.5	37.9	31.8	MT	x	x	x	x	x	x	x	x	36.1	29.2	-	
L4	335053	390704	44.4	50.5	45.9	46.6	x	x	x	x	x	x	x	x	46.9	34.0	-	
L6	334975	390502	39.9	49.8	43.9	48.9	x	x	x	x	x	x	x	x	45.6	33.1	-	
L8	335034	390359	42.0	51.5	50.2	56.6	x	x	x	x	x	x	x	x	50.1	36.3	32.0	
C1	334384	390275	52.0	56.1	52.3	44.4	x	x	x	x	x	x	x	x	51.2	37.1	-	
C5	334261	390022	44.5	44.4	39.6	37.4	x	x	x	x	x	x	x	x	41.5	30.1	-	
C6	334346	389890	45.8	50.9	49.0	49.7	x	x	x	x	x	x	x	x	48.9	35.4	-	
C8	334509	389819	39.4	39.5	39.4	42.3	x	x	x	x	x	x	x	x	40.1	29.1	-	
C9	334542	389987	32.9	60.3	47.6	47.2	x	x	x	x	x	x	x	x	47.0	34.1	-	
UP1	336806	389504	x	x	x	x	x	x	24.0	MT	39.8	41.8	46.3	41.6	38.7	29.4	-	
UP2	336892	389536	x	x	x	x	x	x	23.2	23.5	37.6	40.5	40.3	32.4	32.9	26.6	-	
UP3	336997	389478	x	x	x	x	x	x	24.8	27.3	MT	41.5	45.4	37.8	35.3	28.7	-	
UP4	337018	389466	x	x	x	X	x	x	27.5	30.0	37.4	39.2	45.6	38.5	36.4	29.4	-	
TR1	336952	389419	x	x	x	X	x	x	27.0	MT	42.1	MT	48.7	MT	39.3	31.8	-	
TR2	336941	389451	x	x	x	X	x	x	33.1	35.7	37.3	39.5	46.1	34.0	37.6	30.4	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
TR3	337010	389896	X	X	X	X	X	X	25.9	27.1	39.0	MT	42.4	35.1	33.9	28.6	-	
TR4	337011	389820	X	X	X	X	X	X	22.1	25.2	32.5	36.1	39.0	29.5	30.7	24.8	-	
HR1	337044	390621	X	X	X	X	X	X	30.2	31.2	38.8	35.2	44.7	36.5	36.1	29.2	-	
HR2	337063	390691	X	X	X	X	X	X	28.0	28.0	37.4	35.8	47.6	35.8	35.5	28.7	-	
HR3	336983	390617	X	X	X	X	X	X	14.4	16.9	23.9	27.6	30.2	25.8	23.2	18.7	-	
HR4	337007	390661	X	X	X	X	X	X	14.2	15.4	23.1	26.0	28.3	23.2	21.7	17.5	-	
HR5	337025	390705	X	X	X	X	X	X	14.5	15.1	21.4	24.5	23.3	24.1	20.5	16.6	-	
PP1	335390	390706	X	X	X	X	X	X	44.0	46.4	50.5	52.0	59.0	45.9	49.6	40.1	27.9	
PP2	335421	390684	X	X	X	X	X	X	48.7	46.7	61.1	66.1	60.4	56.2	56.5	45.7	39.2	
PP3	335463	390675	X	X	X	X	X	X	MT	50.6	68.9	67.2	68.4	58.2	62.7	47.5	40.5	
PP4	335548	390677	X	X	X	X	X	X	54.1	59.3	58.1	73.7	70.3	53.5	61.5	49.7	42.8	
IS1	335312	390975	X	X	X	X	X	X	37.7	34.9	45.8	44.4	MT	MT	40.7	36.8	27.7	
IS2	335433	390992	X	X	X	X	X	X	28.4	29.1	40.7	41.4	43.9	35.5	36.5	29.5	-	
IS3	335471	390996	X	X	X	X	X	X	26.3	26.0	40.0	38.7	45.8	37.1	35.6	28.8	-	
IS4	335534	390999	X	X	X	X	X	X	33.7	33.0	MT	44.2	48.1	42.1	40.2	32.7	-	
HS1	334888	390924	X	X	X	X	X	X	40.0	44.8	53.9	54.2	54.5	43.2	48.4	39.1	-	
HS2	334925	390923	X	X	X	X	X	X	42.9	46.0	54.8	56.3	57.2	42.9	50.0	40.4	31.2	
HS3	335015	390921	X	X	X	X	X	X	49.8	46.9	58.7	61.6	63.6	48.3	54.8	44.3	30.5	
HS4	335091	390927	X	X	X	X	X	X	42.8	47.1	64.4	58.8	63.6	MT	55.3	45.2	28.8	
RS1	335129	390124	X	X	X	X	X	X	44.9	43.7	51.5	49.6	57.4	45.4	48.8	39.4	-	
RS2	335152	390106	X	X	X	X	X	X	31.1	34.4	43.8	MT	41.4	34.3	37.0	31.3	-	
RS3	335171	390065	X	X	X	X	X	X	35.3	37.0	47.6	49.9	51.9	38.0	43.3	35.0	-	
RS4	335188	390031	X	X	X	X	X	X	31.3	34.2	45.2	49.8	49.0	39.6	41.5	33.5	-	
ES1	335022	390264	X	X	X	X	X	X	38.1	36.8	50.5	47.7	51.1	47.0	45.2	36.5	-	
ES2	334953	390328	X	X	X	X	X	X	41.4	42.0	46.9	49.8	MT	MT	45.0	40.7	-	

- ☒ All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1
- ☒ Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22
- ☐ Local bias adjustment factor used
- ☒ National bias adjustment factor used
- ☒ Where applicable, data has been distance corrected for relevant exposure in the final column
- ☒ Liverpool City Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System

Notes:

MT = Missing Tube

X = No monitoring for this period

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Liverpool during 2023

Major developments that resulted in an air quality assessment being considered or completed in 2023 are summarised in the table below.

Planning Ref no.	Location	Proposed Development Description	Air Quality Assessment and Conclusion
22F/3047	Estuary Business Park, 2a Leeward Drive, Liverpool	To erect B2/B8 unit (use class e g) (ii) (iii) / b2 / b8) with ancillary e g/ (i) office space, new sub-station, car parking and vehicular, pedestrian circulation with access onto Leeward Drive	Hydrock Consultants Limited – Air Quality Assessment (ref: 27240-HYD-ZZ-XX-RP-Y-2001_P02; date: 27 January 2023 No significant AQ impact but 16 EV spaces will be included within the development
22F/2748	Land Bordered By Kings Dock Street, Sparling Street & Wapping, Liverpool, L1 8LE	To erect building rising from 5 to 13 storeys to provide 261 apartments (Class C3), 5 commercial units (Classes E, F2 and sui generis) with associated car parking, cycle parking, landscaping, amenity space, landscaping, and external works (AMENDED SCHEME)	Ensafe Ltd – Air Quality Assessment (ref: AQ79975; date: 24 June 2016 No significant AQ impact but 10 EV spaces and storage for 280 bicycles will be included within the development
22F/3433	Proposed residential development comprising 420 No. apartments in four blocks ranging from 8-10 storeys in height with associated access, car parking, servicing and hard and soft landscaping	Land At Blackstock Street, Bevington Bush And Paul Street, Liverpool, L3 6EP	Delta Simmons – Air Quality Assessment (ref: 22-1115.01; date: 31st August 2022 No significant AQ impact
23F/0408 Variation application number: EPR/FP313 3GL/V007	Veolia Environmental Services King Street, Liverpool, L19 8EG	Installation of two fractionation towers and associated access platforms	Garston Solvent Recovery Facility Expansion – Fichtner Consulting Engineers - Change of Fuel EP Variation / Air Quality Assessment (ref:

Planning Ref no.	Location	Proposed Development Description	Air Quality Assessment and Conclusion
Permit number: EPR/FP313 3GL			S2985-0030-00105MN; date: 07/02/2023) No significant AQ impact. Permitted by Environment Agency
22F/0907	Land Bounded By Lanyork Road, Pall Mall and Chadwick Street, Liverpool, L3	To erect a residential led mixed-use development comprising two blocks; Block A (eight to seventeen storeys) and Block B (eight to ten storeys), providing 550 residential dwellings (Use Class C3) and commercial/retail floorspace to ground floor (Use Class E and F) with associated parking, access, servicing and landscaping following demolition of existing structures	Redmore Environmental, Air Quality Assessment Report - Pall Mall, Liverpool, (ref: 4254r7; date: 2nd February 2023) No significant AQ impact
23F/1190	109 - 111 Mulberry Street, Liverpool, L7 7EF	To carry out demolition of existing buildings, remediation works, foundation/piling and other engineering works; erect an 8-storey student accommodation building (242 bedroomed) (Sui-Generis) with associated communal facilities; and infrastructure works, including sub-station and associated utilities works, service yard, amended vehicular/pedestrian access and public realm areas with hard and soft landscaping.	Hydrock – Air Quality Assessment (ref: 27039-HYD-XX-ZZ-RP-Y-2001_P04; date: 21 April 2023) No significant AQ impact
22F/2806	Garston Industrial Estate Blackburne Street, Liverpool, L19 8JB	To use site for open storage and/or re-purposing of shipping containers and other open storage purposes (Use Class B8).	Martin Environmental Solutions – Air Quality Assessment (ref: 2448-2_P04; date: Feb 2023) No significant AQ impact
23F/0520	25, 31 To 33, 35 To 39 Naylor Street, Liverpool, L3 6DR	To erect a 9-12 storey building containing 62 x 1, 2 and 3 bed flats, 2 x commercial units with associated parking and first floor roof terrace for use as a communal amenity area involving hard and soft landscaping and associated works.	Delta Simmons – Air Quality Technical Note (ref: 17-1265.01a_P04; date: 4th Jan 2023) Delta Simmons – Air Quality Assessment; ref: 17-1190.01; 3rd issue; 22nd March 2019
23F2052	Land At Love Lane And Pall Mall, Liverpool,	Demolition of redundant and vacant buildings and structures, erection of four residential blocks (part 9 and part 11 storeys) comprising 507 apartments (C3 use), 1707sqm of ground floor flexible E and F2 class commercial floorspace, and cycle and vehicle parking with associated hard and soft landscaping. Repurposing of existing railway arches and subterranean tunnels for 1,159 sqm of flexible E class commercial uses and storage associated with the C3 use	Wardell Armstrong – Air Quality Assessment (ref: ST18401-001-V2.0; date: January 2023) No significant AQ impact
23F/1905	Springfield Gardens Alder Road, Liverpool, L12 2BB	To erect development of between two and six storeys comprising 31 dwellinghouses; 8 supported living apartments and 59 retirement apartments with parking and	Redmore Environmental – Air Quality Assessment (ref: 3085-1; date: 4th May 2023)

Planning Ref no.	Location	Proposed Development Description	Air Quality Assessment and Conclusion
		associated works (alternative to previous permissions).	No significant AQ impact
23F/2123	Carnatic Halls Elmswood Road, Mossley Hill, Liverpool, L18 8DG	To erect 162no. residential dwellings following demolition of existing buildings, with associated parking, open space, landscaping and infrastructure works.	RSK – Air Quality Assessment (ref: 444820-01 (00); date: 17th July 2023) No significant AQ impact
23L/2434	Former Magistrates Court Corner Hatton Garden And Dale Street, Liverpool, L2	To convert former Magistrates Court to 91-bedroom hotel, including a bar/restaurant, leisure and function rooms, with associated internal alterations and demolition to facilitate these works. In addition, erection of a new build element containing a further short-term accommodation and ancillary leisure uses.	Wardell Armstrong – Air Quality Screening Assessment (ref: GM12889; date: September 2023) No significant AQ impact
23F2153	Land Edged By Audley Street, Kempston Street, Ilford Street And Gildart Street, Liverpool	To erect 7 storey building to be used as student accommodation for 250 bed spaces (Sui Generis) to use ground floor as commercial/retail (use Class E) with associated parking, access and servicing, following demolition of existing structures.	Redmore Environmental – Air Quality Assessment (ref: 5404r1; date: 15th March 2023) No significant AQ impact
23F2500	Plot A, Land Off Stirling Road, Liverpool, L24	To erect 7 general industrial and storage distribution units (Use Classes B2/B8) with ancillary offices, access, car parking, service yards, electricity sub-station and landscaping.	Cundall – Air Quality Screening Assessment (ref: 1031163 – P02; date: 27 October 2023) No significant AQ impact
23F0694	Vacant Land Between Lancaster Street And Great Mersey Street, Liverpool, L5	To erect three buildings of 3, 3 and 5 storeys, containing 56 apartments with associated parking and landscaping **amended plans and description	Wardell Armstrong – Air Quality Screening Assessment (ref: GM12889; date: September 2023) No significant AQ impact
23F/1939	The Grafton Rooms And Associated Land, Between West Derby Road, Farnworth Street, Boaler Street, Liverpool, L6 9BY	To erect new residential building comprising of 90no. flats with associated parking.	Redmore Environmental – Air Quality Screening Assessment (ref: 6668; date: 9 October 2023) No significant AQ impact
23F/2887	Littlewoods Building Edge Lane, Old Swan, Liverpool, L7 9LH	Full Planning Permission for the refurbishment of former Littlewoods building and adjacent land to provide: i) film studios including new-build sound stages (Sui Generis); ii) offices (Use Class E (g)); and iii) flexible office or education within the southern West Wing (Use Class E (g) or F1 (a)) alongside car parking, hard and soft landscaping, and associated works.	BWB Consulting – Air Quality Assessment (ref: LWL-BWB-XX-ZZ-LA-RP-0001_AQA; date: 19/9/23) No significant AQ impact

No other new sources of air pollution have been identified, as defined by the screening criteria specified in Chapter 7 in Technical Guidance LAQM.TG22

QA/QC of Diffusion Tube Monitoring

The passive diffusion tubes for 2023 were supplied, collected, prepared, and analysed by Gradko laboratories. The preparation method used was 20% TEA in water. Gradko are UKAS accredited and participate in the Air-PT scheme.

Diffusion Tube Annualisation

Annualisation was required for 47 of the passive diffusion tube's locations and the annualisation data is presented in Table C.2

Annualisation was calculated using the Diffusion Tube Data Processing Tool using the AURN background sites at Wirral Tranmere and Wigan Centre, the LCC background site at Clayton Square, and the AURN industry site at Liverpool Speke. Industry sites are not usually suitable for use in annualisation this site has many characteristics of a background site and the annualisation factor was similar to the other monitoring locations. Therefore it was felt that this site was representative for use in the annualisation.

Table C.1 – Annualisation Summary (concentrations presented in $\mu\text{g}/\text{m}^3$)

Site ID	Annualisation Factor Wirral Tranmere	Annualisation Factor Liverpool Speke	Annualisation Factor Wigan Centre	Annualisation Factor Clayton Square	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
A10	0.9268	0.9151	0.8788	0.9582	0.9197	12.8	11.8
T3	0.9730	0.9326	0.9412	0.9610	0.9520	45.0	42.8
B9	0.9646	0.9575	0.9208	0.9533	0.9491	37.0	35.1
N15	1.0924	1.1055	1.1021	1.0397	1.0849	29.6	32.1
CL4-CL6	0.9980	0.9549	0.9841	0.9886	0.9814	53.7	52.7
ST3	0.8934	0.9199	0.8326	0.9362	0.8955	37.0	33.1
ST4	0.8934	0.9199	0.8326	0.9362	0.8955	35.2	31.5
L1	0.8934	0.9199	0.8326	0.9362	0.8955	48.7	43.6
L2	0.8638	0.8952	0.8018	0.9068	0.8669	41.0	35.5
L4	0.8934	0.9199	0.8326	0.9362	0.8955	46.9	42.0
L6	0.8934	0.9199	0.8326	0.9362	0.8955	45.6	40.9
L8	0.8934	0.9199	0.8326	0.9362	0.8955	50.1	44.8

Site ID	Annualisatio n Factor Wirral Tranmere	Annualisati on Factor Liverpool Speke	Annualisati on Factor Wigan Centre	Annualisati on Factor Clayton Square	Average Annualisati on Factor	Raw Data Annual Mean	Annualised Annual Mean
C1	0.8934	0.9199	0.8326	0.9362	0.8955	51.2	45.8
C5	0.8934	0.9199	0.8326	0.9362	0.8955	41.5	37.1
C6	0.8934	0.9199	0.8326	0.9362	0.8955	48.9	43.8
C8	0.8934	0.9199	0.8326	0.9362	0.8955	40.1	35.9
C9	0.8934	0.9199	0.8326	0.9362	0.8955	47.0	42.1
UP1	0.8889	0.9340	0.9338	0.9956	0.9380	38.7	36.3
UP2	0.9696	0.9984	1.0049	1.0180	0.9977	32.9	32.8
UP3	0.9708	1.0047	1.0056	1.0343	1.0039	35.3	35.5
UP4	0.9696	0.9984	1.0049	1.0180	0.9977	36.4	36.3
TR2	0.9696	0.9984	1.0049	1.0180	0.9977	37.6	37.5
TR3	1.0138	1.0638	1.0350	1.0588	1.0428	33.9	35.3
TR4	0.9696	0.9984	1.0049	1.0180	0.9977	30.7	30.7
HR1	0.9696	0.9984	1.0049	1.0180	0.9977	36.1	36.0
HR2	0.9696	0.9984	1.0049	1.0180	0.9977	35.5	35.4
HR3	0.9696	0.9984	1.0049	1.0180	0.9977	23.2	23.1
HR4	0.9696	0.9984	1.0049	1.0180	0.9977	21.7	21.7
HR5	0.9696	0.9984	1.0049	1.0180	0.9977	20.5	20.4
PP1	0.9696	0.9984	1.0049	1.0180	0.9977	49.6	49.5
PP2	0.9696	0.9984	1.0049	1.0180	0.9977	56.5	56.4
PP3	0.9410	0.9116	0.9287	0.9646	0.9365	62.7	58.7
PP4	0.9696	0.9984	1.0049	1.0180	0.9977	61.5	61.4
IS1	1.0823	1.1335	1.1987	1.0497	1.1160	40.7	45.4
IS2	0.9696	0.9984	1.0049	1.0180	0.9977	36.5	36.4
IS3	0.9696	0.9984	1.0049	1.0180	0.9977	35.6	35.6
IS4	0.9708	1.0047	1.0056	1.0343	1.0039	40.2	40.4

Site ID	Annualisation Factor Wirral Tranmere	Annualisation Factor Liverpool Speke	Annualisation Factor Wigan Centre	Annualisation Factor Clayton Square	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
HS1	0.9696	0.9984	1.0049	1.0180	0.9977	48.4	48.3
HS2	0.9696	0.9984	1.0049	1.0180	0.9977	50.0	49.9
HS3	0.9696	0.9984	1.0049	1.0180	0.9977	54.8	54.7
HS4	0.9719	1.0095	1.0566	0.9959	1.0085	55.3	55.8
RS1	0.9696	0.9984	1.0049	1.0180	0.9977	48.8	48.6
RS2	1.0138	1.0638	1.0350	1.0588	1.0428	37.0	38.6
RS3	0.9696	0.9984	1.0049	1.0180	0.9977	43.3	43.2
RS4	0.9696	0.9984	1.0049	1.0180	0.9977	41.5	41.4
ES1	0.9696	0.9984	1.0049	1.0180	0.9977	45.2	45.1
ES2	1.0823	1.1335	1.1987	1.0497	1.1160	45.0	50.2

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 NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Liverpool City Council have applied a national bias adjustment factor of 0.81 to the 2023 monitoring data. A summary of bias adjustment factors used by Liverpool City Council over the past five years is presented in Table C.2.

National Diffusion Tube Bias Adjustment Factor Spreadsheet					Spreadsheet Version Number: 03/24						
Follow the steps below <u>in the correct order</u> to show the results of <u>relevant</u> co-location studies Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet <u>This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.</u> The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.								This spreadsheet will be updated at the end of June 2024 LAQM Helpdesk Website			
					Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.						
Step 1:		Step 2:	Step 3:	Step 4:							
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor ² shown in blue at the foot of the final column.							
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data ²	If you have your own co-location study then see footnote ⁴ . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953							
Analysed By ¹		Method	Year ²	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ⁴	Bias Adjustment Factor (A) (Cm/Dm)
Gradko		20% TEA in water	2023		Overall Factor ² (23 studies)				Use	0.81	

A local bias correction factor was calculated for the Everton Valley as shown in Table C.3. It was decided not to use the local bias adjustment factor due to poor data collection from the automatic monitor, due to electrical faults from June to August. A separate colocation study was also started in April 2023 at Walton Vale. It is anticipated that improved data collection in 2024 will allow for two local bias correction factors to be calculated.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.81
2022	National	03/23	0.83
2021	National	06/22	0.84
2020	National	03/21	0.81
2019	Local	-	0.98

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	9
Bias Factor A	0.72 (0.67 – 0.78)
Bias Factor B	38% (28% - -49%)
Diffusion Tube Mean (µg/m³)	39
Mean CV (Precision)	7%
Automatic Mean (µg/m³)	28.0
Data Capture	96%
Adjusted Tube Mean (µg/m³)	28 (26 – 30)

NO₂ Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure

has been estimated using the Diffusion Tube Data Processing Tool/NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO₂ concentrations corrected for distance are presented in Table B.1.

Fall-off-with-distance calculations were required for the non-automatic monitoring sites at location referenced S21, B5, B6, B7a, N1, N8a, PP1-4, IS1 and H2-4. The output data from the LAQM NO₂ fall-off with distance from the Diffusion Tube Data Processing Tool is presented in Table C.4. Distance correction was considered at any monitoring site where the annual mean concentration is greater than 36µg/m³ and the monitoring site is not located at a point of relevant exposure (taking the limitations of the calculator into account). Distance correction was not undertaken at sites WV1, WV4, CL4-6 C1, HS1, RS1, ES1 and ES2 as there was no relevant receptor nearby.

Table C.4 – Non-Automatic NO₂ Fall off With Distance Calculations (concentrations presented in µg/m³)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted)	Background Concentration	Concentration Predicted at Receptor	Comments
S4	1.0	9.0	36.9	15.3	27.3	
S21	1.0	4.0	37.3	13.9	30.8	
B5	0.5	4.5	37.6	15.8	29.1	
B6	1.0	5.0	38.7	15.8	31.3	
B7a	0.5	6.5	42.1	15.8	30.1	
N1	1.0	46.0	39.8	13.7	19.7	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
N8a	3.0	21.0	39.3	15.9	27.5	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
L8	1.0	5.0	36.3	23.0	32.0	
PP1	0.5	24.5	40.1	22.4	27.9	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
PP2	1.0	4.0	45.7	22.4	39.2	Predicted concentration at Receptor within 10% the AQS objective.

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted)	Background Concentration	Concentration Predicted at Receptor	Comments
PP3	1.0	4.0	47.5	22.4	40.5	<i>Predicted concentration at Receptor above AQS objective.</i>
PP4	1.0	3.5	49.7	22.4	42.8	<i>Predicted concentration at Receptor above AQS objective.</i>
IS1	1.0	26.0	36.8	23.0	27.7	<i>Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.</i>
HS2	4.0	25.0	40.4	22.4	31.2	<i>Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.</i>
HS3	1.5	26.5	44.3	22.4	30.5	<i>Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.</i>
HS4	0.5	29.5	45.2	22.4	28.8	<i>Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.</i>

QA/QC of Automatic Monitoring

The Speke site forms part of DEFRA's Automatic Urban and Rural Network (AURN), and the network quality assurance and control procedures are implemented.

The five sites that are owned and operated by the Council, are calibrated by trained council officers every two weeks. They are also maintained and serviced every six-months by Enviro Technology Services. The data from these sites is managed, validated and ratified by Air Quality Data Management Limited (AQDM) on behalf of the Council. AQDM's validation and ratification procedures have been copied below

Validation

This process operates on data during the data collection stage. All data are continually screened algorithmically and manually for anomalies. There are several techniques

designed to discover spurious and unusual measurements within a very large dataset. These anomalies may be due to equipment failure, human error, power failures, interference or other disturbances. Automatic screening can only safely identify spurious results that need further manual investigation.

Raw data from the gaseous instruments (e.g. NO_x, O₃, SO₂ and CO) are scaled into concentrations using the latest values derived from the manual and automatic calibrations. These instruments are not absolute and suffer drifts. Both the zero baseline (background) and the sensitivity may change over time. Regular calibrations with certified gas standards are used to measure the zero and sensitivity. However, these are only valid for the moment of the calibration since the instrument will continue to drift.

Ratification

This is the process that finalises the data to produce the measurements suitable for reporting. All available information is critically assessed so that the best data scaling is applied, and all anomalies are appropriately edited. Generally this operates at three-, six- or twelve-month intervals. However, unexpected faults can be identified during the instrument routine services or independent audits which are often at 6-monthly intervals. In practice, therefore, the data can only be fully ratified in 12-month or annual periods. The data processing performed during the three- and six-monthly cycles helps build a reliable dataset that is finalised at the end of the year.

There is a diverse range of additional information that can be essential to the correct understanding and editing of data anomalies. These may include:

- the correct scaling of data
- ignoring calibrations that were poor e.g. a spent zero scrubber
- closely tracking rapid drifts or eliminating the data
- comparing the measurements with other pollutants and nearby sites
- corrections due to span cylinder drift
- corrections due to flow drifts for the particulate instruments
- corrections for ozone instrument sensitivity drifts
- eliminating measurements for NO₂ conversion inefficiencies
- eliminating periods where calibration gas is in the ambient dataset
- identifying periods when instruments are warming-up after a power cut
- identification of anomalies due to mains power spikes
- correcting problems with the date and time stamp

- observations made during the sites visits and services

The identification of data anomalies, the proper understanding of the effects and the application of appropriate corrections requires expertise gained over many years of operational experience. Instruments and infrastructure can fail in numerous ways that significantly and visually affect the quality of the measurements. There are rarely simple faults that can be discovered by computer algorithms or can be understood without previous experience.

Further information about air quality data management, expert data ratification and examples of bad practices are given on the Air Quality Data Management (AQDM) website <http://www.aqdm.co.uk>

Live and historic data for these sites can be found at [Let's Clear the Air](#)

PM₁₀ and PM_{2.5} Monitoring Adjustment

PM₁₀ as measured by a heated Beta Attenuation Monitor (BAM) with data divided by 1.035 for Indicative Gravimetric Equivalence.

PM_{2.5} as measured by a heated BAM without any correction factor for Indicative Gravimetric Equivalence.

All mass units are at 20°C and 1013mb:

Automatic Monitoring Annualisation

Annualisation was required for the automatic monitoring site at Walton Vale for NO₂ because the data capture was 74.7% which slightly below the recommended threshold of 75%. The low data capture was due to the monitoring equipment being commissioned in April 2023 and therefore it was only operational for part of the year.

Site ID	Annualisation Factor Birkenhead Borough Road	Annualisation Factor Liverpool Speke	Annualisation Factor St Helens Linkway	Annualisation Factor Wirral Tranmere	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
Walton Vale (NO ₂)	0.910728	0.965665	0.979406	0.94304	0.94971	47.7	45.3

NO₂ Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure has been estimated using the NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, automatic annual mean NO₂ concentrations corrected for distance are presented in Table A.3. Distance correction is not possible at the Walton Vale site as no relevant receptors are in the vicinity of the monitor.

Non-LAQM monitoring results

LCC and LCRCA conducted air quality monitoring using nine Earthsense Zephyrs sensors in 2023. These sensors are not approved for use by local authorities for compliance monitoring according to TG22, however they can provide indicative air quality data to support our work in reducing vehicle emissions by improving the local road network. The results for 2023 are shown in the table below.

Table C.5 – NO₂, PM₁₀ and PM_{2.5} results for 2023 from Earthsense Zephyr Sensors

Street	Latitude	Longitude	NO ₂	PM _{2.5}	PM ₁₀
Edge Lane	339638	390496	19.9	12.1	11.0
County Road	335831	394753	15.7	10.0	6.6
Pembroke Place	335495	390677	20.4	11.4	10.4
Everton Valley	335422	393109	18.8	11.8	10.8
Erskine Street	336188	390890	26.1	11.7	10.6
Speke Road	341336	384102	32.0	7.5	4.9
Walton Vale	336284	396539	22.0	12.3	11.2
The Strand	334087	390198	20.8	12.7	11.3
Byrom Street	334764	390811	26.8	12.1	11.0

Appendix D: Maps of Monitoring Locations and AQMAs

Key – Blue circle ● = Passive Diffusion Tube Monitoring Location Red Circle ● = Automatic Monitoring Location

Figure D.1 – Map of Monitoring Sites – South Liverpool including Speke and Garston



Figure D.2 – Map of Monitoring Sites – South Liverpool including Sefton Park, Mossley Hill and Allerton

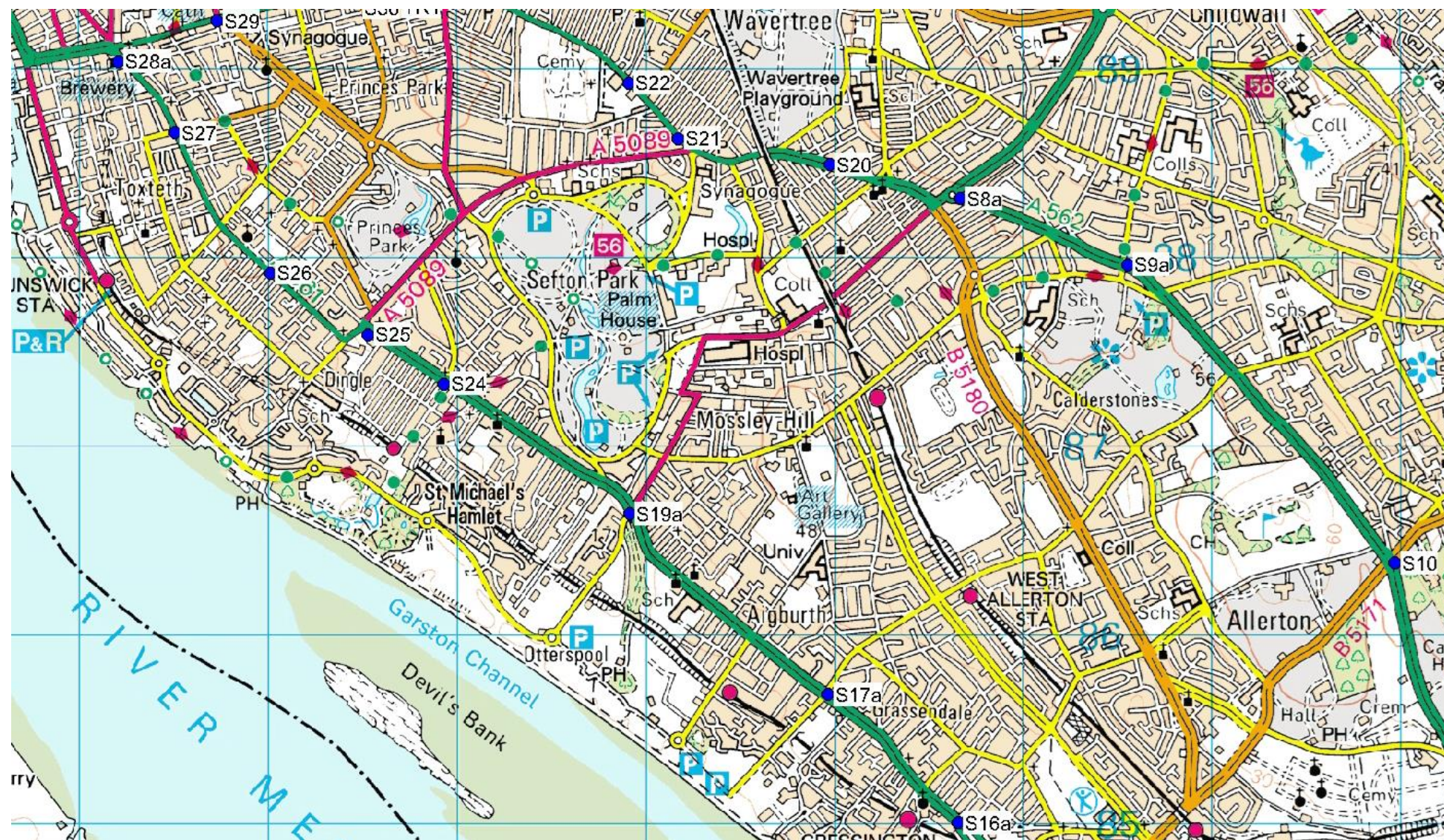


Figure D.3 – Map of Monitoring Sites – Tunnel Road and Upper Parliament Street

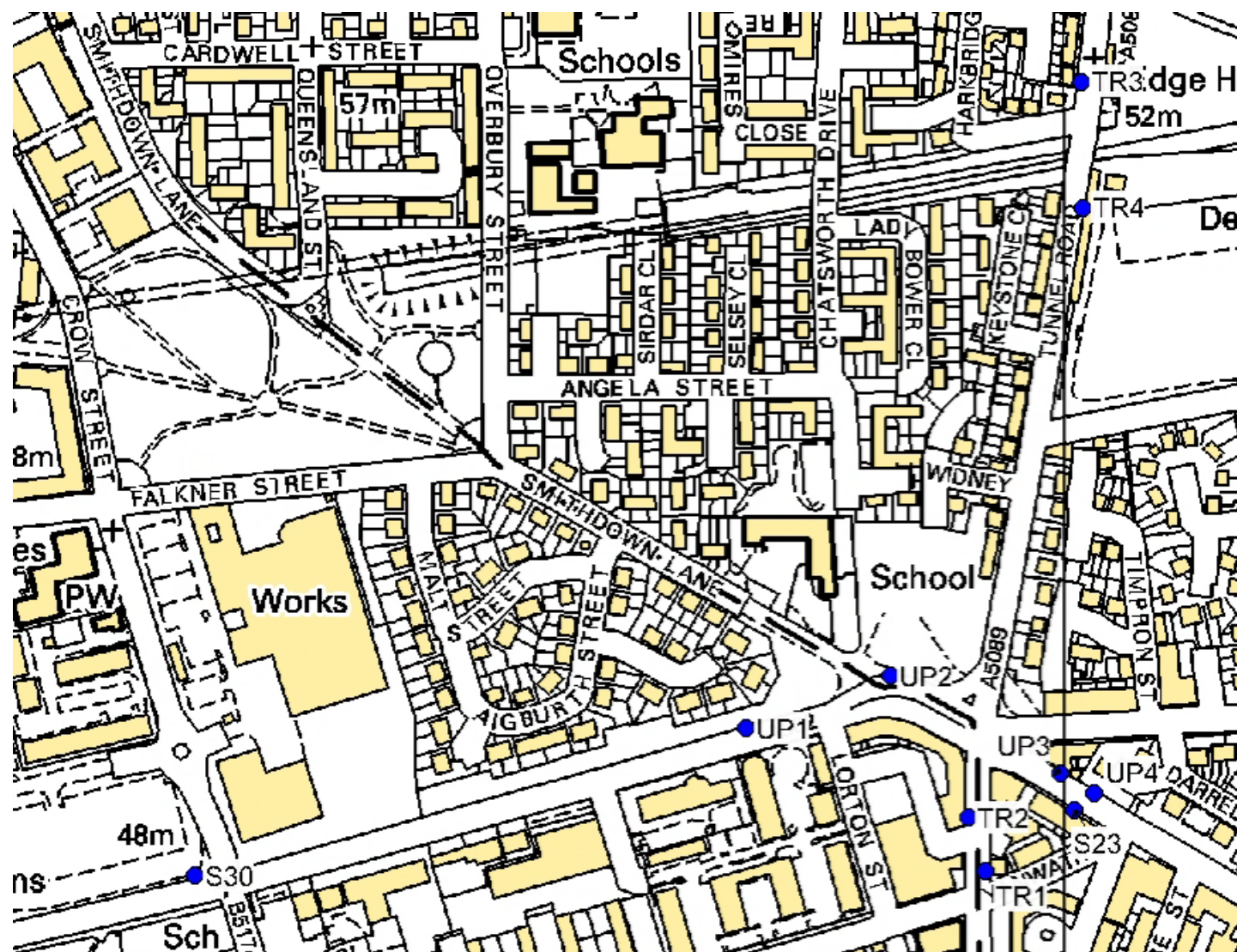


Figure D.4 – Map of Monitoring Sites – Town Centre 1 including Renshaw St, Strand and Shopping area

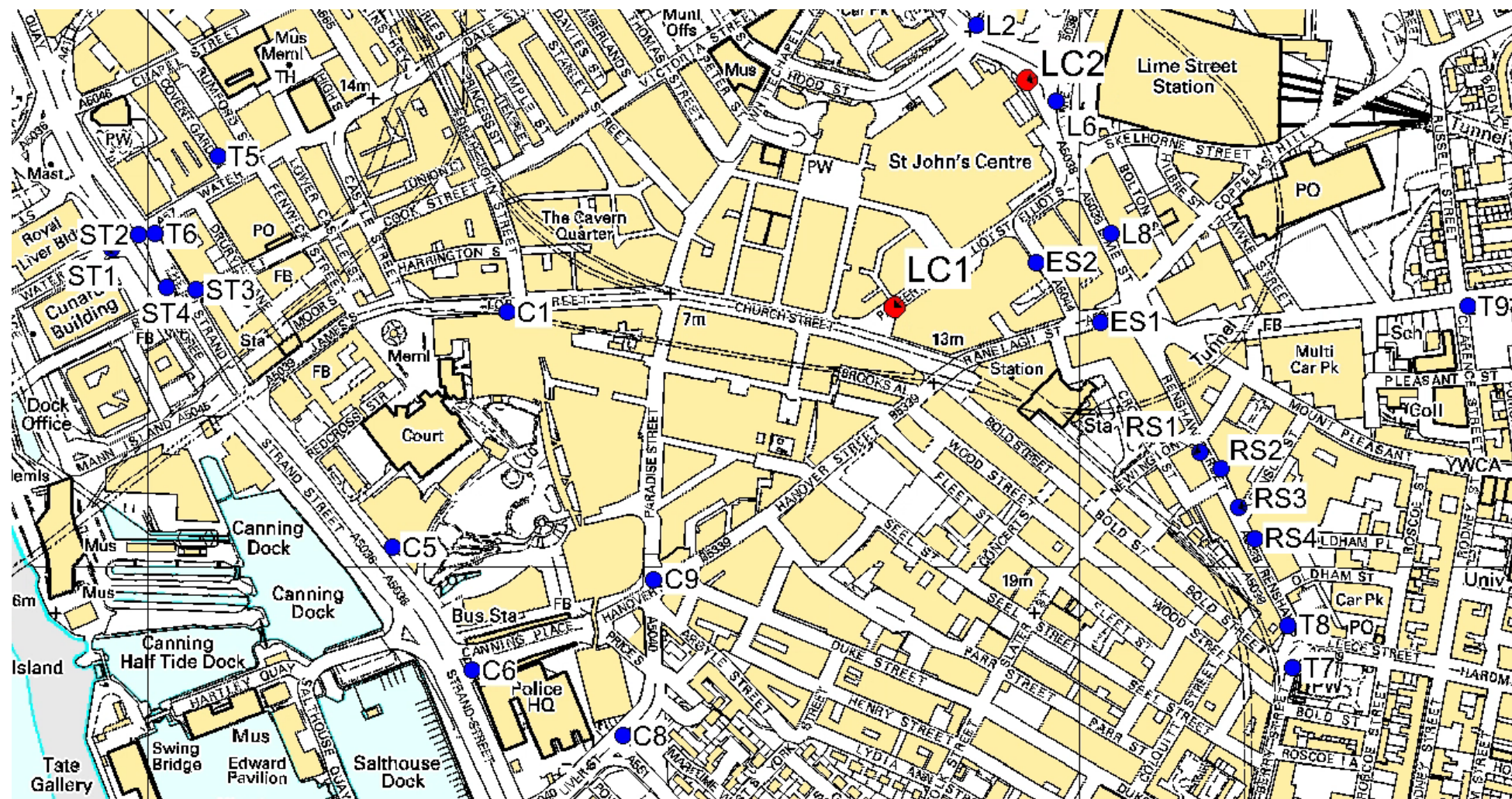


Figure D.5 – Map of Monitoring Sites – Town Centre 2 including Hunter Street, Lime Street and Islington

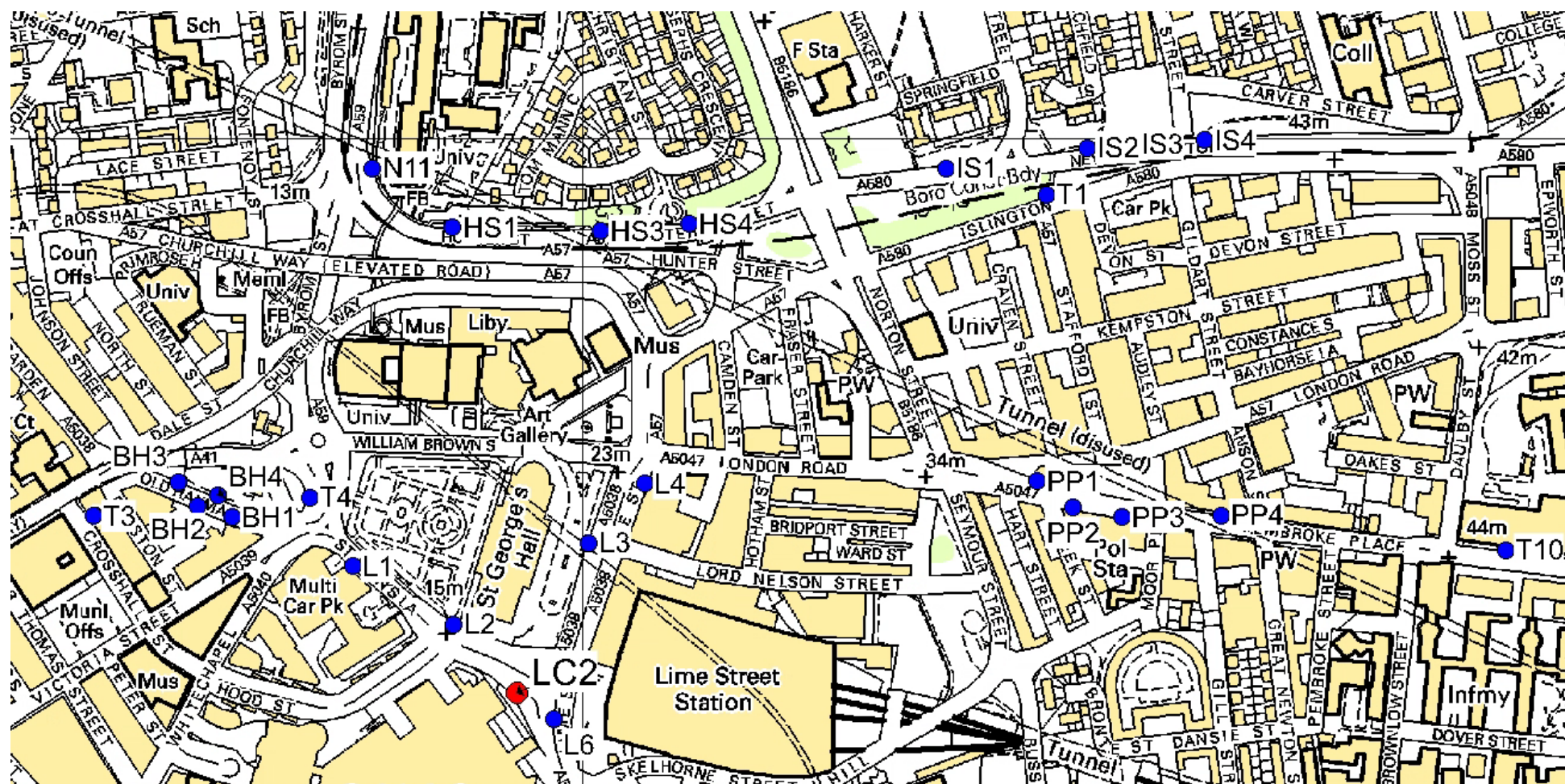


Figure D.6 – Map of Monitoring Sites – East Liverpool including Old Swan, Knotty Ash and Tuebrook

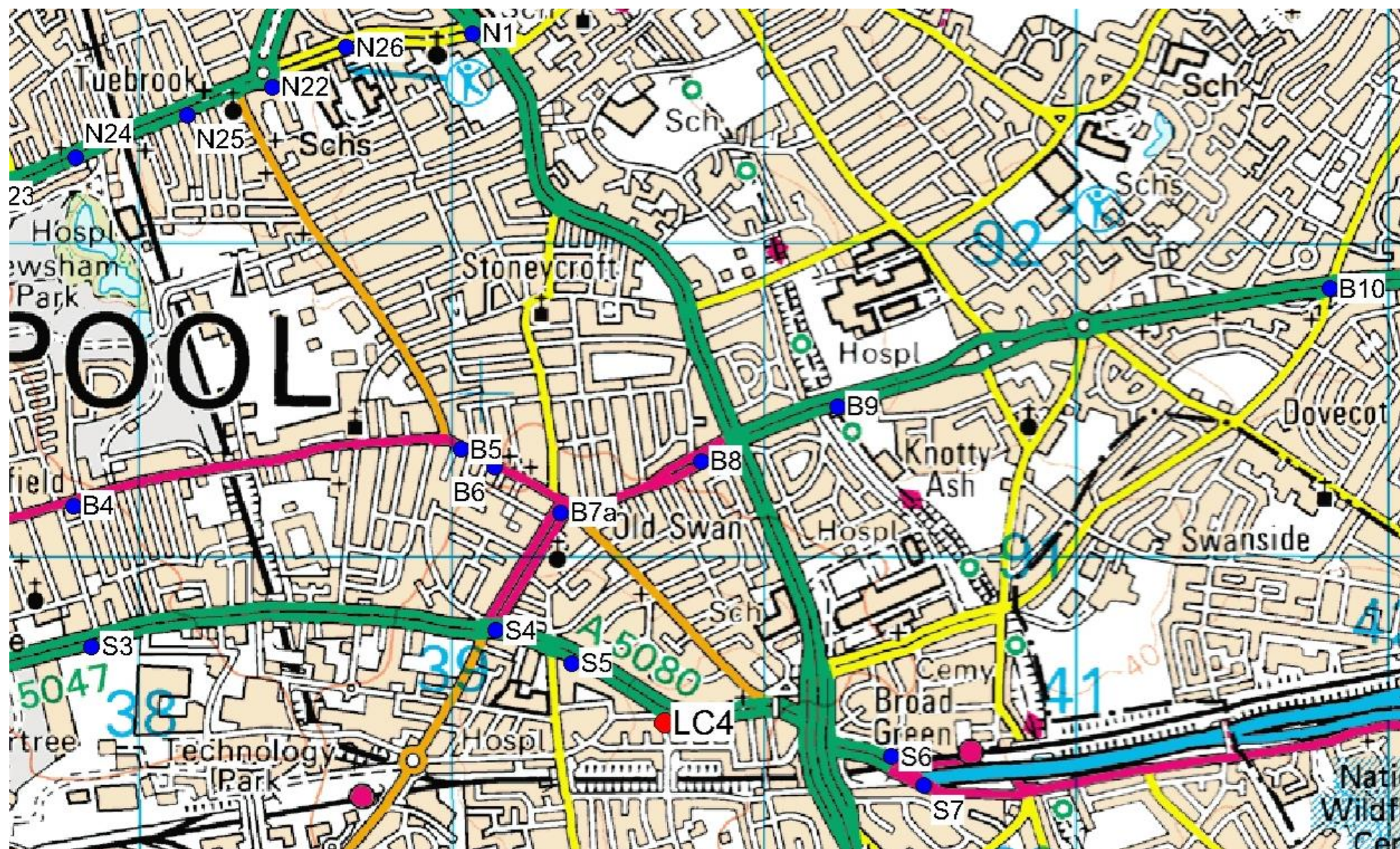


Figure D.7 – Map of Monitoring Sites – East Liverpool including Kensington and Newsham Park



Figure D.8 – Map of Monitoring Sites – North Liverpool including Walton, Croxteth and Fazakerley

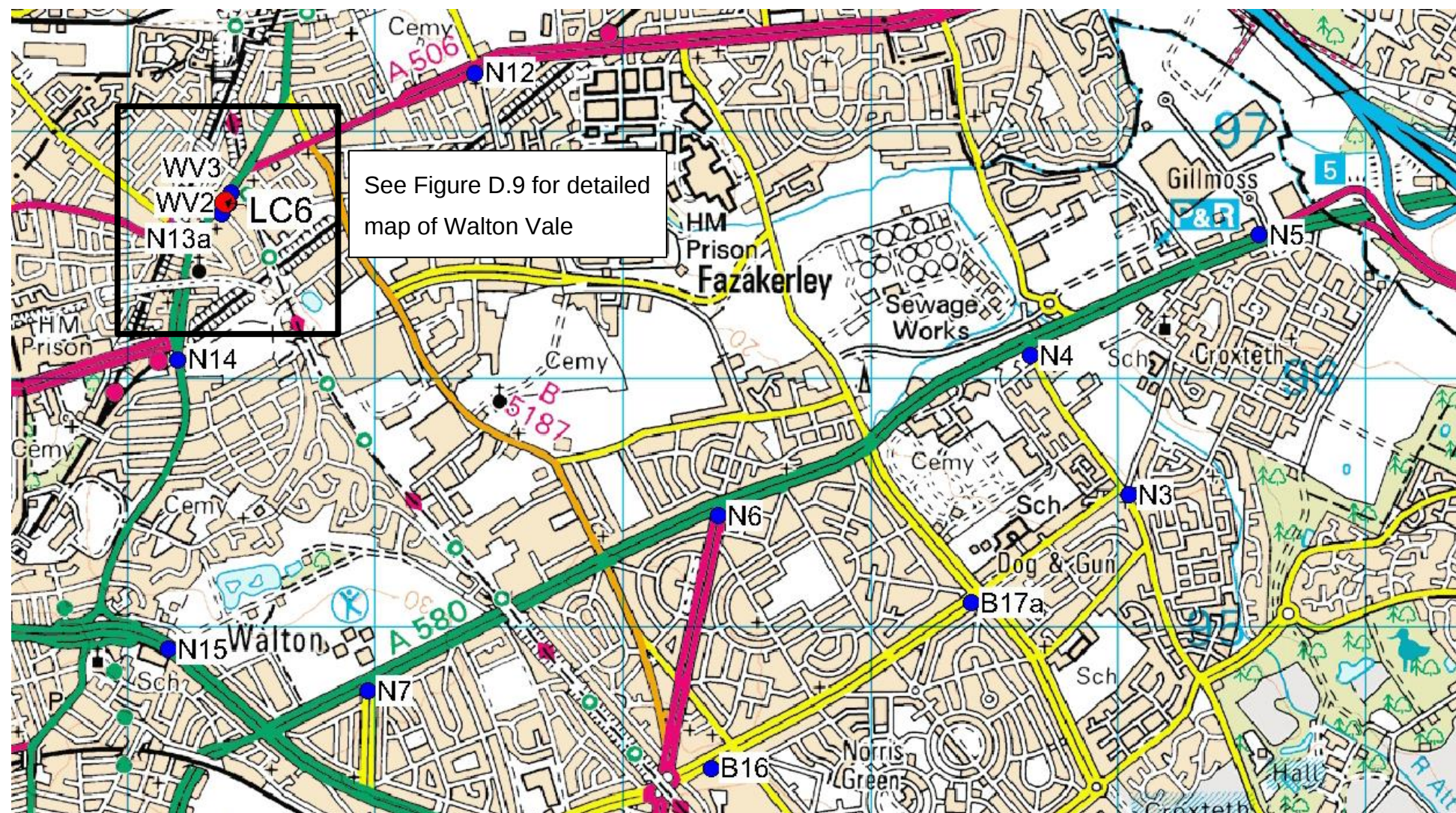


Figure D.9 – Map of Monitoring Sites – Walton Vale

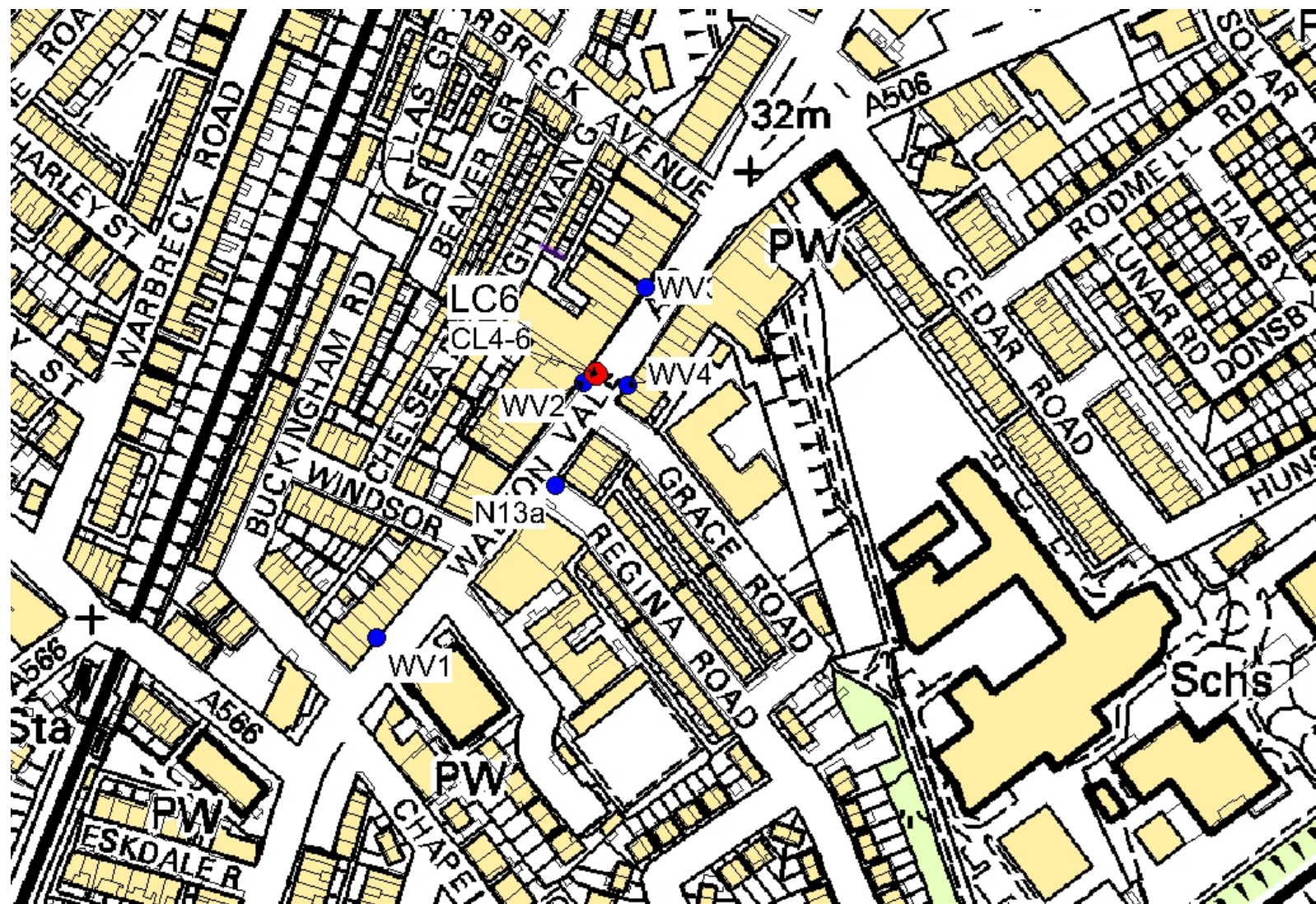


Figure D.10 – Map of Monitoring Sites – North Liverpool including Everton, Vauxhall and Anfield

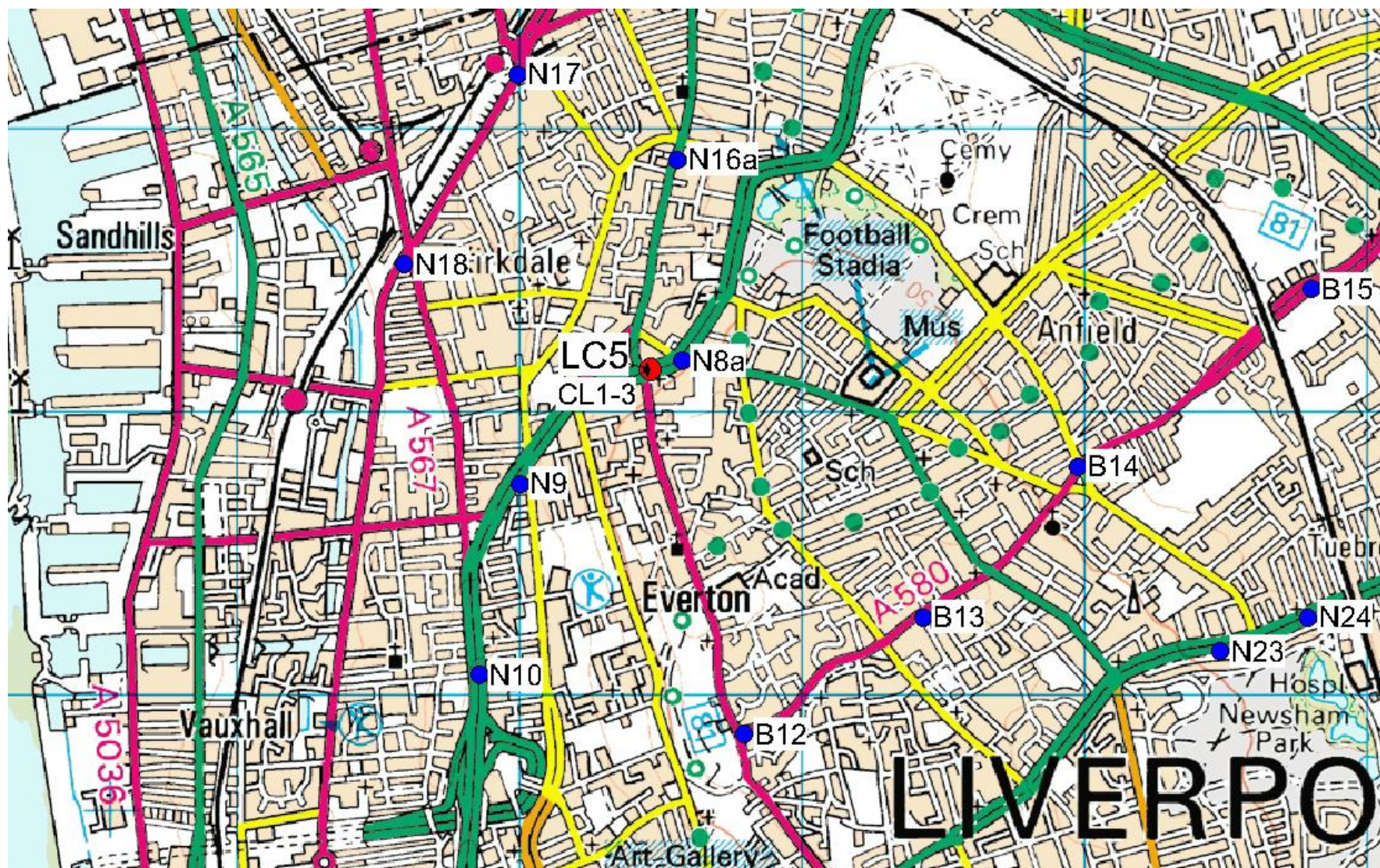


Figure D.11 – Map of Automatic Monitoring Sites in 2023 and AQMA



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁷

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
ATF	Active Travel Fund
CAP	Clean Air Plan
CRSTS	City Region Sustainable Transport Settlements
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EV	Electric Vehicle
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
LCC	Liverpool City Council
LCAP	Liverpool Clean Air Plan
LCRCA	Liverpool City Region Combined Authority;
LSSL	Liverpool Streetscene Services Ltd
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide
UUNN	UK Urban NO2 Network

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.