2023 Air Quality Annual Status Report (ASR)

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

Date: June 2023

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Executive Summary: Air Quality in Our Area

Air Quality in Calderdale

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

The mortality burden of air pollution within the UK is equivalent to 29,000 to 43,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

The key pollutants of concern in Calderdale are nitrogen dioxide (NO_2) and fine particulates ($PM_{2.5}$ and PM_{10}), with road traffic emissions being the principal local emission source. Emissions from commercial, industrial, and domestic also contribute to pollutant concentrations, with a greater influence in more rural areas, away from roads.

Calderdale has a network of air pollution monitors across the borough, including three automatic (continuous) monitoring stations, monitoring NO_2, PM_{10} and $PM_{2.5}$ and 59 passive NO_2 diffusion tubes. The monitoring results of 2022 highlight that there are still several areas where the NO_2 annual mean objective is exceeded; however, the situation is improving and NO_2 levels continue to fall across the borough. For example, in 2022, the measured concentration of NO_2 decreased at most sites compared to 2021.

Air quality is improving across much of the UK, where road traffic is the major source of emissions, due to the replacement of older, “dirtier” vehicles with those with “cleaner” engines, including electric vehicles. As such, these results are in line with national trends.

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

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

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

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

Measured concentrations of PM_{10} also show a marginal decline over a 5-year period. The National Trend for PM_{10} and $PM_{2.5}$ is more complicated than the trend for NO_2, with decreases in PM_{10} and $PM_{2.5}$ emissions from vehicle exhausts offset by reported increases in emissions from domestic sources[5].

Due to historic exceedances of the of the 40µg/m^3 annual mean objective for NO_2 along major roads, Calderdale has eight Air Quality Management Areas (AQMAs) declared. The most recent AQMA (Calderdale No.8 New Bank) was declared on 26th February 2020 along the A58 at New Bank. Additional information, including further assessment reports, is available on Calderdale Metropolitan Borough Council's AQMA webpage.

AQMAs 4 and 5 have been below the relevant AQS for 4 and 5 years, respectively, and therefore in 2023, Calderdale will explore revoking these AQMA.

Actions to Improve Air Quality

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

The Environmental Improvement Plan[6] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[7] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

[5] Defra. Emissions of air pollutants in the UK – Particulate matter (PM_{10} and $PM_{2.5}$), February 2023: https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25

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

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

Calderdale Metropolitan Borough Council's 2019 Air Quality Action Plan (AQAP) outlines a number of key actions that are being undertaken to tackle sources of air pollution, primarily from road transport. The AQAP focuses on:

- Promoting the uptake and use of ultra-low emission vehicles (ULEVs).
- Facilitating the use of public transport by increasing the interconnectivity of the transport hub to control urban traffic congestion, prioritising public transport.
- Encouraging active travel by improving infrastructure (i.e. developing cycleways).
- Promoting the use of alternative fuels by providing electrical vehicle (EV) charging points and offering incentives such as discounted parking for EVs.
- Providing accessible information to the public to influence behaviour change. s

Calderdale are also a member of the West Yorkshire Low Emission Strategy (WYLES) group and continue to work with the group at improving air quality in the region. In 2023, the group won Defra funding for additional $PM_{2.5}$ monitoring, as well as funding for an engagement programme to increase awareness and encourage behaviour change around domestic burning across the region.

Conclusions and Priorities

Compared to 2021, annual mean NO_2 concentrations in 2022 increased at 13 out of the 57 diffusion tubes sites and one automatic monitor (AQS4 in Sowerby Bridge). Furthermore, measured concentrations of NO_2 were compliant with the annual mean air quality objective at all but two of the AQMAs (AQMA No. 1 Salterhebble and AQMA no.6 Brighouse) in 2022. The maximum annual mean concentration of NO_2, at a location of relevant exposure, was 41.2 $\mu g/m^3$ in AQMA no.6. AQMA no.4 and AQMA no.5 have been complaint with the annual mean Air Quality Standard for NO_2 for four and five years, respectively and Calderdale Metropolitan Borough Council will carefully consider whether these AQMAs could be revoked.

PM_{10} and $PM_{2.5}$ measurements continues to show compliance with the relevant air quality objectives and therefore, the NO_2 continues to be the primary pollutant of concern.

Calderdale Metropolitan Borough Council updated its AQAP in 2019. The AQAP details the methods to minimise pollution concentrations in the AQMAs and across the borough, focusing on minimising emissions from road traffic.

The following actions are considered to be key priorities for Calderdale Metropolitan Borough Council in 2023:

- Carry out detailed air quality modelling to re-assess whether any of the AQMAs could be amended or revoked. This may be undertaken as part of an AQAP review.
- Continue to review the monitoring locations across the Borough, particularly in the AQMAs and in vicinity of new development.
- To get funding to install EV charging.
- Continue collaborating with the West Yorkshire Low Emission Strategy group with monitoring and bids to Defra.

Calderdale Metropolitan Borough Council anticipate that these measures will further contribute to achieving compliance with the NO_2 annual mean objective within the existing AQMAs, as well as contributing to improved pollutant concentrations throughout the rest of the borough.

Local Engagement and How to get Involved

Calderdale Metropolitan Borough Council are committed to raising the awareness of the impacts of poor air quality with the public. For example, improvements to public engagement are underway, ranging from web page improvements to making live monitoring data publicly available. As well as raising awareness, Calderdale Metropolitan Borough Council intend to involve public engagement into policy decisions that impact upon travel. Indeed, Priority 4 in the 2019 AQAP is to encourage public engagement and interest through improved communication and community involvement.

Calderdale libraries obtained funding for a project named ‘Something in the Air?’ which, in partnership with local organisations and academic researchers, aims to educate the public on the impacts of air pollution. The project involves the public in air quality issues in an attempt to make them think more deeply and consider the changes they could make. The focus of the initial project was to engage members of the public in the Sowerby Bridge (AQMA No.2) area, however following the success of the project, this moved to the town of Hebden Bridge (AQMA No.3) in 2022.

Local Responsibilities and Commitment

This ASR was prepared by Greenavon Ltd on behalf of Calderdale Metropolitan Borough Council with the support and agreement of the following officers and departments:

- Derek Benn (Community Safety Partnership Manager)
- Kate Ryley (Senior Environmental Health Manager)

- Arron Hanson (Pollution Control Officer)
- Environmental Health & Community Protection Team

This ASR has been approved by:

- Andrew Pitts (Assistant Director, Neighbourhoods)

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

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1 Local Air Quality Management

This report provides an overview of air quality in Calderdale Metropolitan Borough Council during 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Calderdale Metropolitan Borough Council to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Calderdale Metropolitan Borough Council can be found in Table 2.1. The table presents a description of the eight AQMAs that are currently designated within Calderdale Metropolitan Borough Council Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations is for the NO_2 annual mean.

Calderdale are considering revoking AQMA no.4 and no.5 and this will be subject to a detailed air quality assessment in 2023, to build the evidence base.

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 Year Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Calderdale No. 1 Salterhebble	Declared October 2005, amended April 2014	NO_2 Annual Mean	Stretch of the A629 south of Dryclough Lane	Yes	46 “µg/m^3	40.7µg/m^3	0	AQAP 2019	https://www.calderdale.gov.uk/v2/sites/default/files/Air-Quality-Action-Plan-2019.pdf
Calderdale No.2 Sowerby Bridge	Declared July 2006	NO_2 Annual Mean	A58 through central Sowerby Bridge	Yes	53 µg/m^3	39.4µg/m^3	1	AQAP 2019	https://www.calderdale.gov.uk/v2/sites/default/files/Air-Quality-Action-Plan-2019.pdf
Calderdale No.3 Hebden Bridge	Declared August 2006	NO_2 Annual Mean	A646 through town centre	Yes	48 µg/m^3	31.3 µg/m^3	1	AQAP 2019	https://www.calderdale.gov.uk/v2/sites/default/files/Air-Quality-Action-Plan-2019.pdf
Calderdale No.4 Luddendenfoot	Declared July 2007, amended March 2014	NO_2 Annual Mean	A646 through town centre	Yes	50 µg/m^3	32.7µg/m^3	4	AQAP 2019	https://www.calderdale.gov.uk/v2/sites/default/files/Air-Quality-Action-Plan-2019.pdf

Calderdale No.5 Stump Cross	Declared July 2007	NO_2 Annual Mean	A58 at junction of Leeds Road and Bradford Road	Yes	58 µg/m^3	31.7 µg/m^3	5	AQAP 2019	https://www.calderdale.gov.uk/v2/sites/default/files/Air-Quality-Action-Plan-2019.pdf
Calderdale No.6 Brighouse	Declared July 2007, amended March 2014	NO_2 Annual Mean	Encircling town centre	Yes	51 µg/m^3	41.2 µg/m^3	0	AQAP 2019	https://www.calderdale.gov.uk/v2/sites/default/files/Air-Quality-Action-Plan-2019.pdf
Calderdale No.7 Hipperholme	Declared March 2014	NO_2 Annual Mean	A58 Leeds Road close to junction with Brighouse Road	Yes	47 µg/m^3	39.0 µg/m^3	1	AQAP 2019	https://www.calderdale.gov.uk/v2/sites/default/files/Air-Quality-Action-Plan-2019.pdf
Calderdale No.8 New Bank	Declared February 2020	NO_2 Annual Mean	A58 east of Halifax town centre	Yes	42 µg/m^3	39.3 µg/m^3	1	AQAP 2019	https://www.calderdale.gov.uk/v2/sites/default/files/Air-Quality-Action-Plan-2019.pdf

☒ **Calderdale Metropolitan Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

☒ **Calderdale Metropolitan Borough Council confirm that all current AQAPs have been submitted to Defra**

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

Defra's appraisal of last year's ASR provided commentary on the report, commending its structure, analysis and level of detail. Defra also suggested some points that needed addressing in the 2022 ASR. The commentary and how Calderdale Metropolitan Borough Council have addressed these points are shared below:

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

1. *For Table 2.1, the council has completed the level of exceedance: current year column using exceedance values prior to distance correction. This is incorrect. Instead, the exceedance values should be the maximum monitored concentration after distance correction within the AQMA of the reporting year.*

Table 2.1 has now been corrected to account for this error.

2. *It is acknowledged that the diffusion tube data capture was extremely low this reporting year with a value of 35% through external factors out of the control of the council. AQMA designations should be reviewed in future reporting years when there is greater data capture from non-automatic monitoring sites.*

The data in Table A.3 and A.4 suggests that AQMA 4 and AQMA 5 could be revoked. Further detailed analysis will be undertaken in 2023 to support any evidence base for a revocation order.

Despite LV-AT (the sole monitor outside an AQMA) being in exceedance of 40ug.m^{-3} in the 2022 report, this result was not repeated in 2022 and when distance corrected to a site of relevant exposure using Defra's *NO_2 fall off with distance calculator*, no exceedances are identified. Measured concentrations were, however, within 10% of the AQS and as such, further assessment is being considered in this area. However, based on the current level of evidence, there is no requirement to declare a new AQMA.

Calderdale Metropolitan Borough Council has taken forward a number of direct measures during the current reporting of 2022 in pursuit of improving local air quality.

Details of all measures completed, in progress or planned are set out in Table 2.2. 29 measures are included within Table 2.2, with the type of measure and the progress Calderdale Metropolitan Borough Council have made during the reporting year of 2022

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 the Calderdale Air Quality Action Plan 2019.

Key completed measures from 2022 are:

- The replacement of 4 diesel council vehicles with full EV's. We now have 34 full battery EV's on the Council's fleet.
- We also increased our EV charging infrastructure to 34 x 7kw sockets, for fleet overnight charging.
- As part of the WYLES group, a bid for funding for $PM_{2.5}$ was granted.

Calderdale Metropolitan Borough Council expects the following measures to be completed over the course of the next reporting year:

- To bring air quality monitoring back within the Environmental Health & Community Protection Team.
- To assess whether any of the existing AQMAs can be revoked or amended.
- Roll-out of new parking charges around town centres to manage vehicle movements. This will include a 'Green Contract Parking Permit' which will provide benefits to electric vehicles and will likely include additional costs if households require more than one parking permit.

Calderdale Metropolitan Borough Council 's priorities for the coming year are to continue working with the WYLES on upcoming bids. Other stakeholders we worked with in 2022 included Leeds University, who carry out our air quality data management and analysis.

The principal challenges and barriers to implementation that Calderdale Metropolitan Borough Council anticipates facing relate to resourcing and funding. The changeovers of diffusion tubes will be brought back in-department in 2024.

Calderdale Metropolitan Borough Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in all AQMAs in the coming years.

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Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
AQAP 1 (1)	Achieve better understanding of local air quality, including monitoring and source appointment	Transport and Planning Infrastructure	Other	2009 – 2020	Ongoing	Calderdale MBC, neighbouring authorities, tools from Defra, WYCA	Calderdale MBC, neighbouring authorities, tools from Defra, WYCA	No	Partially funded	< £10k	Implementation	Neutral	Data collection	Monitoring contracts extended. Live data now on website air quality dashboard	Funding ended 2019
AQAP 1 (2)	Traffic flow and network improvements	Traffic Management	UTC, congestion management, traffic reduction	Current	Ongoing	CMBC, Highways England, neighbouring authorities, WYCA	CMBC, Highways England, neighbouring authorities, WYCA	No	Partially funded	< £10k	Implementation	Neutral	Improved traffic flows and reduced queue lengths at key network points	Implementation ongoing	Funding
AQAP 1 (3)	Urban Traffic Control (UTC) Improvements	Traffic Management	UTC, congestion management, traffic reduction	Current	To be included in major projects and corridor improvement plans. Further VMS included in Phase 4 scheme for A629	Calderdale MBC, neighbouring authorities	Calderdale MBC, neighbouring authorities	No	Not funded	< £10k	Implementation	due to improved Some reduction flows of traffic	Improved traffic flows and reduced queue lengths at key network points, less parking space hunting	Proposal to link all signals in centralised system (UTC) based in Leeds. Variable message Signs giving route-specific messages now established. Development of a new parking strategy commended. The Parking Strategy has been adopted . with a 'Green Contract Parking Permit' for EVs..	Modified since original action plan
AQAP 1 (4)	Handling Emissions Data (Emissions Factor Toolkit)	Transport planning and infrastructure	Other	Current	Ongoing	Calderdale MBC, tools from Defra	Calderdale MBC, tools from Defra	No	Not funded	< £10k	Implementation	Neutral	Effectiveness of predictions	Informs annual status report	N/A
AQAP 2 (1)	Improve air quality web pages – access to live data	Public Information	Via the internet	2019	Sep-19	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Completed	Indirect, may influence behavioural change	Web traffic / customer satisfaction	Web pages updated – live data now online	N/A
AQAP 2 (2)	Clean Air Campaign	Public Information	social media / Via the internet / other	Jun-19	Ongoing	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	Moderate impact behaviour change	Social media analytics	Successful event including branded messaging launched in June 2019	N/A
AQAP 2 (3)	Investigate Freight Partnership	Freight and Delivery Management	Freight partnerships for city centre deliveries	2019 onwards	2021	Kirklees MBC, Calderdale MBC, Highways England	Kirklees MBC, Calderdale MBC, Highways England	No	Partially funded	< £10k	Planning	Significant improvements in longer term	Number of partners signed up	Preliminary work with operators	Resources to engage with potential partners
AQAP 3 (1)	Promote high occupancy travel	Transport Planning and Infrastructure	Strategic highways improvement, reprioritising	Ongoing	Ongoing	Calderdale MBC, neighbouring authorities	Calderdale MBC, neighbouring authorities	No	Not funded	< £10k	Planning	Modest reduction in road emissions	Reduction in vehicle numbers	Campaign 2018	Resource and partner commitments
AQAP 3 (2)	Cycling infrastructure improvements and facilities	Promoting Travel Alternatives	Promotion of cycling	2018 onwards	Ongoing	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	Significant improvements in longer term	Increases in numbers cycling and reduction in car use, kilometres of new cycle paths	Calderdale Cycling Forum (CCF) reports into the cabinet transport working party, CCF meets regularly made up of Calderdale cycle reps council officers, members, schools & other stakeholders. Upgrade of Upper Valley Towpath complete to Hebden Bridge – further work planned in Phase 2	Funding and staffing resources. Land ownership

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														to Todmorden is underway. Hebble Trail extension plan now developed. Now incorporated into the WYTF Phase 4	
AQAP 3 (3)	Active Calderdale Campaign	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	Ongoing	2022	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	Low impact on emissions, but reduced exposure	Increases in cycling and walking – most active borough in the North by 2024	Cycling infrastructure installed in key areas (Brighouse, Sowerby Bridge). LCWIP to be used in development	Commitment from communities
AQAP 3 (4)	Metro travel card pool scheme	Alternatives to Private Vehicle Use	Other	Ongoing	Ongoing	Calderdale MBC, Metro	Calderdale MBC, Metro	No	Pfunded artially	< £10k	Implementation	Low initial impact	Increase in public transport use, number of staff car journeys replaced	Calderdale's first LCWIP is complete (Halifax for Walking and Brighouse for cycling)	Further cards purchased 2018
AQAP 3 (5)	20pmh areas	Management Traffic	Reduction of speed limits, 20mph zones	2017	Completed 2017	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Completed	Possible small reduction in road traffic emissions	Number of 20mph zones	Zones completed	Opportunities for further extension
AQAP 3 (6)	Car sharing promotion	Alternatives to Private Vehicle Use	Car & lift sharing schemes	2009 – 2020	Ongoing	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	Small reduction, behaviour change	Reduced private car use, number of car sharing partners	Car sharing scheme up and running – featured in Clean Air Day 2018. Car club up and running for 5-years	Growing interest
AQAP 4 (1)	ULEV Procurement	Promoting Low Emission Transport	Company vehicle procurement – prioritising uptake of low emission vehicles	2023 onwards	After 2023	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	Reduction in emissions around schools	Reduce number of petrol and diesel cars and increase number of chargers (% ULEV in vehicle fleet)	We now have 34 full battery EV's on the Council's fleet.	Funding availability
AQAP 4 (2)	EV recharging provision	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, gas fuel recharging	Current	Ongoing	Calderdale MBC, supported by OLEV etc.	Calderdale MBC, supported by OLEV etc.	No	Partially funded	< £10k	Implementation	Reduced vehicle emissions	Number of EV charging points	Calderdale have increased our EV charging infrastructure to 34 x 7kw sockets, for fleet overnight charging.	Funding availability
AQAP 4 (3)	Retrofit school bus fleet	Promoting Low Emission Transport	Public vehicle procurement – promoting uptake of low emission vehicles	2017	Ongoing	Calderdale MBC, neighbouring authorities	Calderdale MBC, neighbouring authorities	No	Not funded	< £10k	Implementation	Reduced vehicle emissions	Proportion of fleet retrofitted	Implementation ongoing	N/A
AQAP 5 (1)	Travel plans	Promoting Travel Alternatives	Workplace travel planning	Current	Ongoing	Calderdale MBC, neighbouring authorities	Calderdale MBC, neighbouring authorities	No	Not funded	< £10k	Implementation	Potential moderate in long-term	Number of workplaces with travel plans	Planning condition for travel plans created	Enforcement
AQAP 5 (2)	School travel Plans	Promoting Travel Alternatives	School travel plans	onwards 2020	2020	Calderdale MBC, neighbouring authorities	Calderdale MBC, neighbouring authorities	No	Not funded	< £10k	Implementation	Mainly behavioural influence	Number of schools with travel plans	Plan completed pre 2019	Many schools not with Local Authority
AQAP 5 (3)	Local Plan Air Quality Policies	Policy Guidance and Development Control	Air quality planning and policy guidance	2017 onwards	2021	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	Significant improvements in longer-term	Consistent approach to air quality in planning guidance	WYLES adopted and used. Currently being revised by WYLES delivery group	WYLES includes air quality guidance for developers
AQAP 5 (4)	Promote update of electric vehicles e.g. taxis	Promoting Low Emission Transport	Taxi emission incentives	2017 onwards	Ongoing	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	Moderate, especially in town centres	Reduction in number of petrol and/or diesel taxis	1 operating further promotion in place	Engagement of licence trade

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
AQAP 5 (5)	Promote and support use of public transport and improve infrastructure	Promoting Low Emission Transport	Public vehicle procurement – promoting uptake of low emission vehicles	2018	2019	Calderdale MBC, WYCA	Calderdale MBC, WYCA	No	Partially funded	< £10k	Implementation Completed /	Potentially moderate in thelonger term	Passenger journeys on public transport	Clean Bus Technology grants awarded and fleet being upgraded. Development of station at Elland included access and parking (delivery expected 2022/23). Implemented the community rail partnership to encourage more train travel.	Funding
AQAP 5 (6)	Promote good practices is domestic burning	Policy Guidance and Development Control	Other	Current	Ongoing	Calderdale MBC, Defra	Calderdale MBC, Defra	No	Partially funded	< £10k	Implementation	Significant local impact	Number of complaints about smoke from chimneys	Published on website	Enforcement
AQAP 6 (1)	Community renewable energy scheme	Promoting Low Emission Plant	Public procurement of stationary combustion sources	2019 onwards	Ongoing	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	improvements in Significant longer term	Number of schemes approved	Feasibility modelling done	Funding
AQAP 6 (2)	Promote locally grown food, goods and services	Freight and Delivery Management	Other	2018 onwards	Ongoing	Calderdale MBC, local partners including 'Incredible Edible'	Calderdale MBC, local partners including 'Incredible Edible'	No	Partially funded	< £10k	Implementation	Significant improvements in longer term	Policies applied to all developments	Council policy agreed and land use for growing promoted	Ongoing community take up
AQAP 6 (3)	Improved energy efficiency	Other	Other			Calderdale MBC	Calderdale MBC	No	funded Not		< £10k	Implementation	Number of developments incorporating energy efficiency measures	N/A	
AQAP 6 (4)	Compliance checks for environmental permit	Promoting Low Emission Plant	Environmental Permits	Current	Ongoing	Calderdale MBC, Environment Agency	Calderdale MBC, Environment Agency	No	Partially funded	< £10k	Implementation	Significant impact locally	Level of compliance with permit conditions	Part A1, A2, B and Schedule 9 and 13 permits in place	N/A
AQAP 6 (5)	Introduction of green screens	Transport/ Planning/ Infrastructure	Other	Current	Ongoing	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation	Moderate local impact	NO2 monitoring, protection of children in playground from NO2 and PM	First installation May 2019	Finance
AQAP 6 (6)	Pilot school road closure	Transport/ Planning/ Infrastructure	Other	Current	Ongoing	Calderdale MBC, schools	Calderdale MBC, schools	No	Not funded	< £10k	Implementation Completed/	Significant local impact	Air quality monitored	12 in place – more in planning stages. 20% modal shift – following 12-month survey. Expansion around school areas to create Active Travel Neighbourhoods	Community support
AQAP 6 (7)	Tackle idling vehicles	Traffic Management	Congestion Management/Traffic Reduction	Current	Ongoing	Calderdale MBC	Calderdale MBC	No	Not funded	< £10k	Implementation Completed/	Moderate local impact	Number of idling vehicles in key destinations	Confirming legal orders. Within AQMAs, buses given priority and removal of parked cars to improve the flow of traffic/reduce the stopping and starting of traffic on the key route network	Compliance and resource

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The highest $PM_{2.5}$ annual mean concentration of $PM_{2.5}$ in Calderdale, in 2022, was 9.9 µg/m3. This is well below annual mean Air Quality Objective of 20 µg/m^3 and marginally below 2040 Air Quality Target of 10 µg/m3.

The Public Health Outcomes Framework data tool compiled by Public Heath England quantifies the mortality burden of $PM_{2.5}$ within England on a county and local authority scale. The latest available data shows that the 2022 fraction of mortality attributable to $PM_{2.5}$ pollution in Calderdale is 5.0% which is in line with Yorkshire and the Humber's fraction and below the England average of 5.5%.

Calderdale Metropolitan Borough Council is taking the following measures to address $PM_{2.5}$:

- **Biomass Combustion (including domestic wood burning)**
    - Guidance is provided on the appropriate selection of fuels on Calderdale Metropolitan Borough Council 's web pages, and support is provided to the information campaign by Defra surrounding domestic emissions. The latest announcement to phase out coal burning and other fuels has also been made available.
    - A green waste collection service is also in operation to discourage the burning of garden waste. As large parts of Calderdale (especially urban areas) are covered by Smoke Control Areas, households are advised on how to comply with these measures and where additional information can be obtained from.
- **Industrial Sources**
    - Calderdale Metropolitan Borough Council are engaging with local operators who hold environmental permits for combustion plant to ensure that emissions are within limits and, where possible, reduced even further. A

number of premises burning waste below the permitted threshold have been identified, and advice is being provided on obtaining a U4 exemption and, more importantly, reducing the smoke emissions from their appliances. Calderdale Metropolitan Borough Council is also working with the Environment Agency to identify and regularise waste burning in the borough.

- **Public Information**
  - The public are informed by Calderdale Metropolitan Borough Council on less polluting ways of travel, in particular avoiding private vehicle use where possible. Encouraging the use of alternative modes of transport (i.e. walking and cycling) is hoped to assist in reducing fine particles from brake and tyre wear.
- A Climate Change Operational Group has been formed within Calderdale Metropolitan Borough Council, alongside the Air Quality Operational Group to develop ideas that can be implemented to reduce emissions of greenhouse gases across the borough. This will help minimise emissions of $PM_{2.5}$ from combustion.

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Calderdale Metropolitan Borough Council undertook automatic (continuous) monitoring at three sites during 2022. Table A.1 in Appendix A shows the details of the automatic monitoring sites.

The Dataworks page presents automatic monitoring results for Calderdale Metropolitan Borough Council , with automatic monitoring results also available through the UK-Air website.

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

Calderdale Metropolitan Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 57 sites during 2022. Table A.2 in Appendix A presents the details of the non-automatic sites.

One site is however a triplicate, resulting in 59 diffusion tubes being deployed each month.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

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

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

The data in Tables A.3 and A.4, broken down by AQMA, are set out below.

3.2.1.1 AQMA No.1

Of the four locations in AQMA No.1, two were in exceedance of the annual mean air quality objective, in 2022. The highest concentration at a location of relevant exposure was recorded at site AQ21 (40.7µg/m3). Tube CRH recorded a concentration over 40.0µg/m3 for the first time since 2019. As such, Calderdale will not consider revoking or amending this AQMA at this time.

3.2.1.2 AQMA No.2

Of the seven monitors in AQMA No.2, none were in exceedance of the annual mean air quality objective, in 2022. The highest concentration at a location of relevant exposure was recorded at site SB1 (39.4µg/m3). Three sites in AQMA No.2 were, however, within 10% of the objective. The other monitors in AQMA No.2 have recorded annual mean concentrations less than 10% of the objective for at least three years, suggesting the

AQMA could be amended to cover a smaller area. However, concentrations increased at two sites in AQMA relative to 2022 and as such, further measurements will be sought before making further decisions.

3.2.1.3 AQMA No.3

Of the five monitors in AQMA No., none were in exceedance of the annual mean air quality objective, in 2022. The last exceedance occurred in 2022 at tube HQ1. Four of the five tubes recorded a decrease in 2022 compared to 2022 levels. Despite being compliant with the air quality objective, at least three years of compliance will be required before any revocation of this AQMA will be considered.

3.2.1.4 AQMA No.4

Of the two monitors in AQMA No.4, there have been no exceedances of the objective in four years, nor has any tube been greater than 10% below the objective since 2018. There was a minor increase in measured concentrations at one of the two sites in AQMA no.4 in 2022. As such, Calderdale will consider whether there is sufficient evidence to revoke this AQMA in 2023.

3.2.1.5 AQMA No.5

There is one monitor in AQMA No.5 (SC5). There have been no recorded exceedances of the objective in 5 years and concentrations have been less than 10% below the objective since 2019. There has also been a gradual and consistent decline in pollution concentrations at this site. As such, Calderdale will explore whether there is sufficient evidence to revoke this AQMA in 2023

3.2.1.6 AQMA No.6

Of the six monitors in AQMA No.6, only one was in exceedance of the annual mean AQS in 2022. The highest concentration at a location of relevant exposure was recorded at site HXR1 (41.2µg/m3). As such, Calderdale will not consider revoking or amending this AQMA.

3.2.1.7 AQMA No.7

Of the three monitors in AQMA No 7, none were in exceedance of the annual mean air quality objective, in 2022. However, tube HH-LT was only marginally below the AQS. The last exceedance occurred in 2022 at tube HH-LT.

All three tubes recorded a decrease in 2022 compared to 2022 levels. One year of compliance with the air quality objective is insufficient to consider any revocation or amendment to this AQMA.

3.2.1.8 AQMA No.8

Of the five monitors in AQMA No 5, none were in exceedance of the annual mean air quality objective, in 2022, when distance corrected to a location of relevant exposure. However, NB-GR was only marginally below the AQS. The last exceedance occurred in 2022 at tube NB-GR.

All five tubes recorded a decrease in 2022 compared to 2021 levels. One year of compliance with the air quality objective is insufficient to consider any revocation or amendment to this AQMA.

3.2.1.9 Outside of AQMAs

Of the 27 monitors outside of AQMAs, none were in exceedance, pr within 10% below the annual mean air quality objective, in 2022, when distance corrected to a location of relevant exposure. 7 out of the 27 tubes recorded an increase in 2022 compared to 2021 levels. However, the highest 2022 concentration at any of these tubes was only 27.2 µg/m^3 as SB45, which is well below the annual mean AQS.

3.2.2 Particulate Matter (PM_{10})

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

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

PM_{10} is measured at one location in the district (AQS4) and concentrations recorded at this site show no significant trend with respect to annual concentrations and daily exceedances of the short-term air quality standard. Nonetheless, measured concentrations are well below the relevant annual mean and daily mean air quality standard.

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.

$PM_{2.5}$ is measured at two locations in the district (AQS2 and AQS3) and concentrations recorded at this site show a slight downward trend with respect to annual concentrations. Furthermore, measured concentrations in 2022 were well below the relevant annual mean standard (20µg.m^{-3}), and marginally below the 2040 target of 10µg.m^{-3}.

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)
AQS2	Huddersfield Road	Roadside	409485	423430	NO2, PM2.5	YES - AQMA No.1 (Salterhebble)	Chemiluminescent; BAM	N/A	3	1.5
AQS3	Hebden Bridge	Roadside	398990	427210	NO2, PM2.5	YES - AQMA No.3 (Hebden Bridge)	Chemiluminescent; BAM	N/A	3	1.5
AQS4	Sowerby Bridge	Roadside	406075	423615	NO2, PM10	YES - AQMA No.2 (Sowerby Bridge)	Chemiluminescent; BAM	N/A	3	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)
AQ21	AQ21	Roadside	409822	423167	NO2	Yes: AQMA no.1 (Salterhebble)	2.0	2.0	No	2.5
AQC1, AQC2, AQC3	AQC3	Roadside	409485	423431	NO2	Yes: AQMA No.1 (Salterhebble)	2.0	2.0	Yes	1.5
CRH1	CRH1	Roadside	409767	423011	NO2	Yes: AQMA No.1 (Salterhebble)	0.0	2.0	No	2.5
SB1	SB1	Roadside	406135	423639	NO2	Yes: AQMA No.2 (Sowerby Bridge)	0.0	2.0	No	2.5
SB15	SB15	Roadside	406707	423824	NO2	Yes: AQMA No.2 (Sowerby Bridge)	1.0	2.0	No	2.0
SB16	SB16	Roadside	406638	423836	NO2	Yes: AQMA No.2 (Sowerby Bridge)	0.0	2.0	No	2.5
SB22	SB22	Roadside	405823	423395	NO2	Yes: AQMA No.2 (Sowerby Bridge)	0.0	2.0	No	2.0
SB3	SB3	Roadside	405961	423571	NO2	Yes: AQMA No.2 (Sowerby Bridge)	0.0	2.0	No	2.5
SB-AQ	SBAQ	Roadside	406075	423615	NO2	Yes: AQMA No.2 (Sowerby Bridge)	0.5	1.5	Yes	2.0
BS1 HB	BS1HB	Roadside	398990	427210	NO2	Yes: AQMA No.3 (Hebden Bridge)	8.0	3.0	Yes	1.5

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)
HB6	HB6	Roadside	399502	427041	NO2	Yes: AQMA No.3 (Hebden Bridge)	0.0	4.0	No	2.0
HQ1	HQ1	Roadside	398794	427237	NO2	Yes: AQMA No.3 (Hebden Bridge)	0.0	3.0	No	2.0
HQ9	HQ9	Roadside	399236	427176	NO2	Yes: AQMA No.3 (Hebden Bridge)	0.0	2.0	No	2.5
LF1	LF1	Roadside	403810	424977	NO2	Yes: AQMA No.4 (Luddendenfoot)	0.0	2.0	No	2.5
LF2	LF2	Roadside	403738	425110	NO2	Yes: AQMA No.4 (Luddendenfoot)	0.0	1.0	No	2.5
SC5	SC5	Roadside	410823	426265	NO2	Yes: AQMA No.5 (Stump Cross)	0.0	3.0	No	3.0
BE2	BE2	Roadside	414385	422457	NO2	Yes: AQMA No.6 (Brighouse)	0.0	2.0	No	2.5
BE4	BE4	Roadside	414478	422692	NO2	Yes: AQMA No.6 (Brighouse)	0.0	1.0	No	2.5
BH3	BH3	Roadside	414671	422740	NO2	Yes: AQMA No.6 (Brighouse)	3.0	1.5	No	2.5
HXR1	HXR1	Roadside	414218	422957	NO2	Yes: AQMA No.6 (Brighouse)	0.0	4.0	No	2.0

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)
LV-BRD	LVBRD	Roadside	414683	423155	NO2	Yes: AQMA No.6 (Brighouse)	5.0	2.0	No	2.0
WR2	WR2	Roadside	415090	422817	NO2	Yes: AQMA No.6 (Brighouse)	0.0	4.0	No	2.5
HH-1A	HH1A	Roadside	412593	425497	NO2	Yes: AQMA No.7 (Hipperholme)	0.0	1.5	No	2.5
HH-LT	HHLT	Roadside	412450	425435	NO2	Yes: AQMA No.7 (Hipperholme)	0.0	3.0	No	2.5
HH-TC	HHTC	Roadside	412718	425556	NO2	Yes: AQMA No.7 (Hipperholme)	5.0	1.5	No	2.5
LV-NBN	LVNBN	Roadside	409715	425754	NO2	Yes: AQMA No.8 (New Bank)	40.0	1.0	No	2.5
LV-NBS	LVNBS	Roadside	409708	425737	NO2	Yes: AQMA No.8 (New Bank)	25.0	2.0	No	2.5
NB-NBX	NB-NBX	Roadside	409602	425797	NO2	Yes: AQMA No.8 (New Bank)	30.0	1.0	No	2.5
NB-GR	NBGR	Roadside	409957	425642	NO2	Yes: AQMA No.8 (New Bank)	4.0	3.0	No	2.0
NB-NB1	NBNB1	Roadside	409663	425740	NO2	Yes: AQMA No.8 (New Bank)	2.0	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)
AQ20	AQ20	Roadside	409483	423337	NO2	No	0.0	5.0	No	2.0
AT-BR	ATBR	Suburban	411514	419548	NO2	No	6.0	1.0	No	2.0
AT-MR	ATMR	Roadside	411581	419373	NO2	No	10.0	0.5	No	2.5
CL1	CL1	Roadside	413261	420686	NO2	No	0.0	2.0	No	2.5
HTAH	HTAH	Suburban	411494	419594	NO2	No	0.0	2.0	No	2.0
LV-62E	LV62E	Roadside	416717	422113	NO2	No	25.0	4.0	No	2.5
LV-62W	LV62W	Roadside	416172	422282	NO2	No	6.0	3.0	No	2.5
LV-AT	LVAT	Roadside	411533	419358	NO2	No	14.0	4.0	No	2.5
LV-EWB	LVEWB	Roadside	410104	421516	NO2	No	250.0	1.0	No	2.5
LV-LEE	LVLEE	Roadside	417698	420709	NO2	No	200.0	3.0	No	2.0
LV-SAA	LVSAA	Roadside	411201	419429	NO2	No	11.0	0.0	No	2.5
LV-SCA	LVSCA	Roadside	405911	416597	NO2	No	150.0	10.0	No	1.0
MY01	MY01	Roadside	401431	425995	NO2	No	0.0	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)
MY02	MY02	Urban Background	401275	426046	NO2	No	20.0	10.0	No	2.5
MY03	MY03	Roadside	401204	426041	NO2	No	0.0	2.0	No	2.5
MY-04	MY04	Roadside	401059	426179	NO2	No	12.0	2.0	No	2.5
MY-05	MY05	Roadside	401040	426186	NO2	No	19.0	2.0	No	2.5
NB-GL	NBGL	Roadside	410367	425975	NO2	No	17.0	2.0	No	2.5
SB23	SB23	Roadside	405701	423223	NO2	No	3.0	1.5	No	2.5
WV-SR1	WVSR1	Roadside	409598	421167	NO2	No	0.0	2.0	No	2.5
WV-SR2	WVSR2	Roadside	409608	421160	NO2	No	3.0	2.0	No	2.5
SB40	SB40	Roadside	405814	422611	NO2	No	35.0	0.5	No	2.0
SB41	SB41	Roadside	405727	422878	NO2	No	5.0	0.0	No	2.0
SB42	SB42	Roadside	404938	422699	NO2	No	10.0	2.0	No	2.0
SB43	SB43	Roadside	405082	422999	NO2	No	8.0	1.5	No	2.0
SB44	SB44	Roadside	405234	423022	NO2	No	30.0	0.0	No	2.0

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)
SB45	SB45	Roadside	405780	423349	NO2	No	20.0	1.5	No	2.0

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
AQS2	409485	423430	Roadside	99.5	99.5	38.6	39.7	32.1	35.5	34.5
AQS3	398990	427210	Roadside	98.3	98.3	35	34.3	26.7	32.8	30.3
AQS4	406075	423615	Roadside	99.7	99.7	38.1	36	29.6	33	37.2

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

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

Notes:

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

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

All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. 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 NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
AQ21	409822	423167	Roadside	98.7	98.7	**45.0**	**44.0**	**43.0**	**53.1**	**46.1**
AQC1, AQC2, AQC3	409485	423431	Roadside	98.7	98.7	36.0	39.3	32.8	37.1	33.8
CRH1	409767	423011	Roadside	98.7	98.7	**52.0**	**42.0**	38.4	38.9	**40.5**
SB1	406135	423639	Roadside	90.3	90.3	**46.0**	**42.0**	**40.2**	37.0	39.4
SB15	406707	423824	Roadside	98.7	98.7	34.0	34.0	27.9	30.6	27.2
SB16	406638	423836	Roadside	98.7	98.7	**40.0**	36.0	31.2	25.4	30.7
SB22	405823	423395	Roadside	98.7	98.7	**45.0**	**40.0**	34.1	33.5	31.8
SB3	405961	423571	Roadside	98.7	98.7	**43.0**	35.0	35.9	37.0	37.4
SB-AQ	406075	423615	Roadside	98.7	98.7	**-**	**-**	33.5	31.6	32.3
BS1 HB	398990	427210	Roadside	98.7	98.7	37.0	33.0	29.7	30.5	36.7
HB6	399502	427041	Roadside	98.7	98.7	31.0	30.0	26.0	28.5	26.0
HQ1	398794	427237	Roadside	49.9	49.9	**46.0**	**44.0**	38.4	**42.6**	31.3

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
HQ9	399236	427176	Roadside	98.7	98.7	39.0	35.0	29.9	29.8	28.8
LF1	403810	424977	Roadside	98.7	98.7	**41.0**	34.0	33.9	32.0	32.7
LF2	403738	425110	Roadside	98.7	98.7	34.0	29.0	26.3	27.2	26.0
SC5	410823	426265	Roadside	98.7	98.7	39.0	35.0	34.1	32.3	31.7
BE2	414385	422457	Roadside	98.7	98.7	37.0	35.0	31.8	36.5	31.5
BE4	414478	422692	Roadside	98.7	98.7	**45.0**	**42.0**	33.6	**43.2**	36.6
BH3	414671	422740	Roadside	98.7	98.7	**42.0**	**43.0**	38.2	**42.7**	36.7
HXR1	414218	422957	Roadside	98.7	98.7	**49.0**	**42.0**	**43.0**	**43.6**	**41.2**
LV-BRD	414683	423155	Roadside	98.7	98.7	28.0	27.0	23.4	24.1	22.8
WR2	415090	422817	Roadside	98.7	98.7	36.0	33.0	30.9	31.1	28.3
HH-1A	412593	425497	Roadside	98.7	98.7	-	-	31.8	31.5	31.1
HH-LT	412450	425435	Roadside	98.7	98.7	**48.0**	**41.0**	**40.7**	**42.3**	39.0
HH-TC	412718	425556	Roadside	98.7	98.7	35.0	33.0	26.0	27.7	26.1
LV-NBN	409715	425754	Roadside	90.8	90.8	**64.0**	**55.0**	**53.5**	**53.2**	**52.0**

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
LV-NBS	409708	425737	Roadside	98.7	98.7	**44.0**	**41.0**	34.0	**40.7**	36.1
LV-NBX	409602	425797	Roadside	98.7	98.7	39.0	39.0	36.3	36.9	34.3
NB-GR	409957	425642	Roadside	98.7	98.7	**53.0**	**46.0**	**49.4**	**51.9**	**46.1**
NB-NB1	409663	425740	Roadside	98.7	98.7	**42.0**	**40.0**	35.2	36.6	34.1
AQ20	409483	423337	Roadside	98.7	98.7	24.0	22.0	18.7	18.5	18.4
AT-BR	411514	419548	Suburban	98.7	98.7	30.0	28.0	20.4	23.4	19.4
AT-MR	411581	419373	Roadside	98.7	98.7	27.0	25.0	19.9	23.9	20.6
CL1	413261	420686	Roadside	98.7	98.7	33.0	29.0	27.0	28.2	24.9
HTAH	411494	419594	Suburban	98.7	98.7	31.0	27.0	21.1	26.3	22.9
LV-62E	416717	422113	Roadside	98.7	98.7	38.0	36.0	32.2	31.8	30.2
LV-62W	416172	422282	Roadside	98.7	98.7	**40.0**	37.0	30.4	39.2	30.0
LV-AT	411533	419358	Roadside	98.7	98.7	**47.0**	**45.0**	34.7	**41.5**	35.4
LV-EWB	410104	421516	Roadside	98.7	98.7	27.0	27.0	21.2	19.8	19.1
LV-LEE	417698	420709	Roadside	98.7	98.7	30.0	27.0	25.0	26.9	24.9

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 2022 (%) [2]	2018	2019	2020	2021	2022
LV-SAA	411201	419429	Roadside	49.9	49.9	30.0	25.0	23.7	22.4	17.1
LV-SCA	405911	416597	Roadside	89.2	89.2	**46.0**	37.0	33.6	37.1	34.9
MY01	401431	425995	Roadside	98.7	98.7	**52.0**	**44.0**	35.6	33.7	31.5
MY02	401275	426046	Urban Background	98.7	98.7	24.0	21.0	18.8	14.9	14.2
MY03	401204	426041	Roadside	98.7	98.7	**42.0**	39.0	34.8	32.4	30.8
MY-04	401059	426179	Roadside	98.7	98.7	29.0	27.0	23.5	20.6	19.7
MY-05	401040	426186	Roadside	98.7	98.7	33.0	28.0	24.9	22.4	21.1
NB-GL	410367	425975	Roadside	98.7	98.7	**52.0**	**49.0**	**47.6**	**43.5**	**40.4**
SB23	405701	423223	Roadside	98.7	98.7	-	-	23.4	23.4	21.6
WV-SR1	409598	421167	Roadside	98.7	98.7	38.0	38.0	32.8	33.2	31.8
WV-SR2	409608	421160	Roadside	98.7	98.7	31.0	28.0	25.7	22.9	24.8
SB40	405814	422611	Roadside	98.7	98.7	-	-	-	7.9	10.8
SB41	405727	422878	Roadside	98.7	98.7	-	-	-	7.9	10.1
SB42	404938	422699	Roadside	98.7	98.7	-	-	-	23.0	24.7

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 2022 (%) (2)	2018	2019	2020	2021	2022
SB43	405082	422999	Roadside	98.7	98.7	-	-	-	9.0	10.9
SB44	405234	423022	Roadside	98.7	98.7	-	-	-	11.5	13.0
SB45	405780	423349	Roadside	98.7	98.7	-	-	-	27.3	27.2

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

☒ **Diffusion tube data has been bias adjusted**

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

Notes:

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

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

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

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

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations (Automatic Monitors)

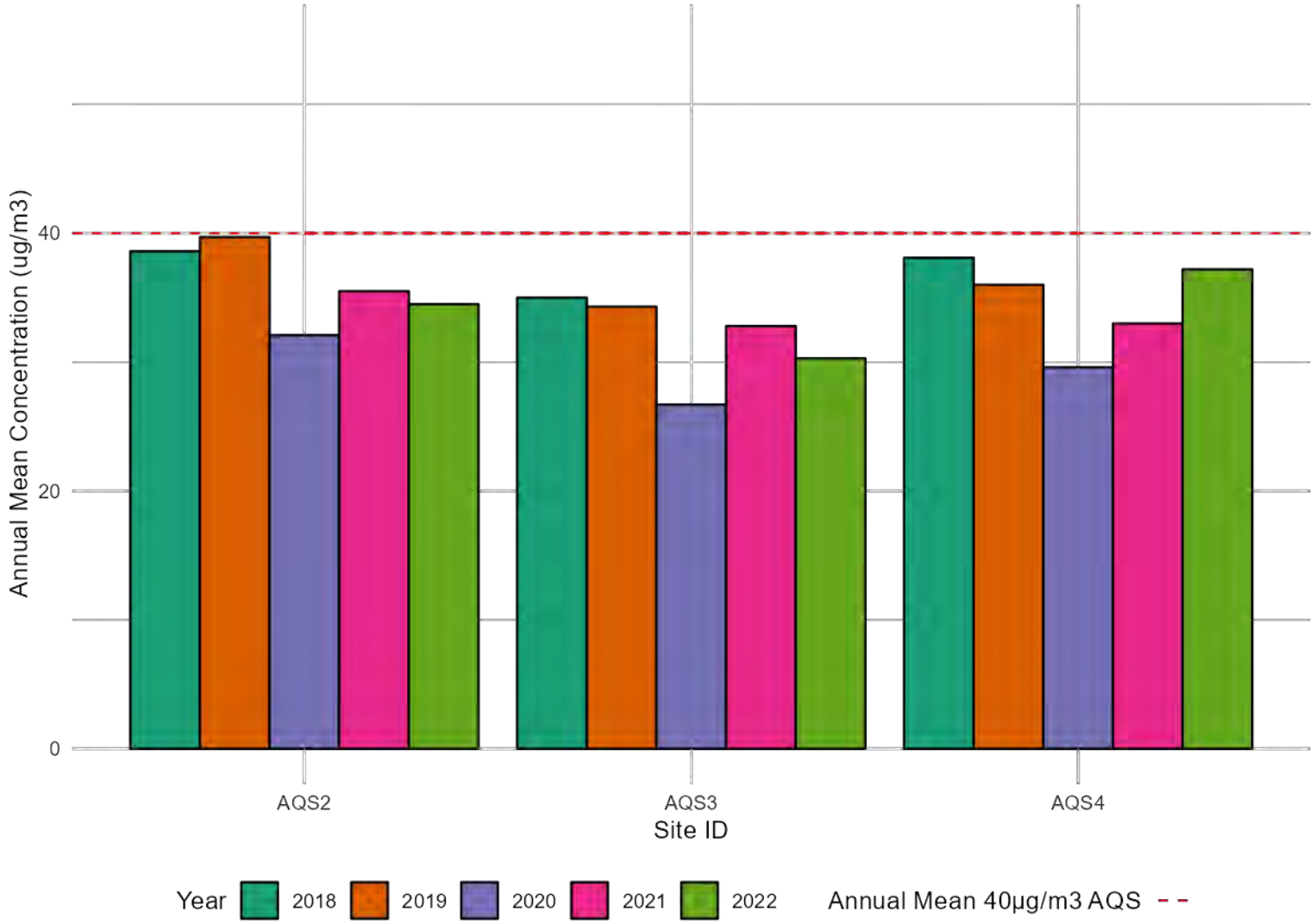


Figure A.2 – Trends in Annual Mean NO_2 Concentrations (AQMA No.1 Salterhebble)

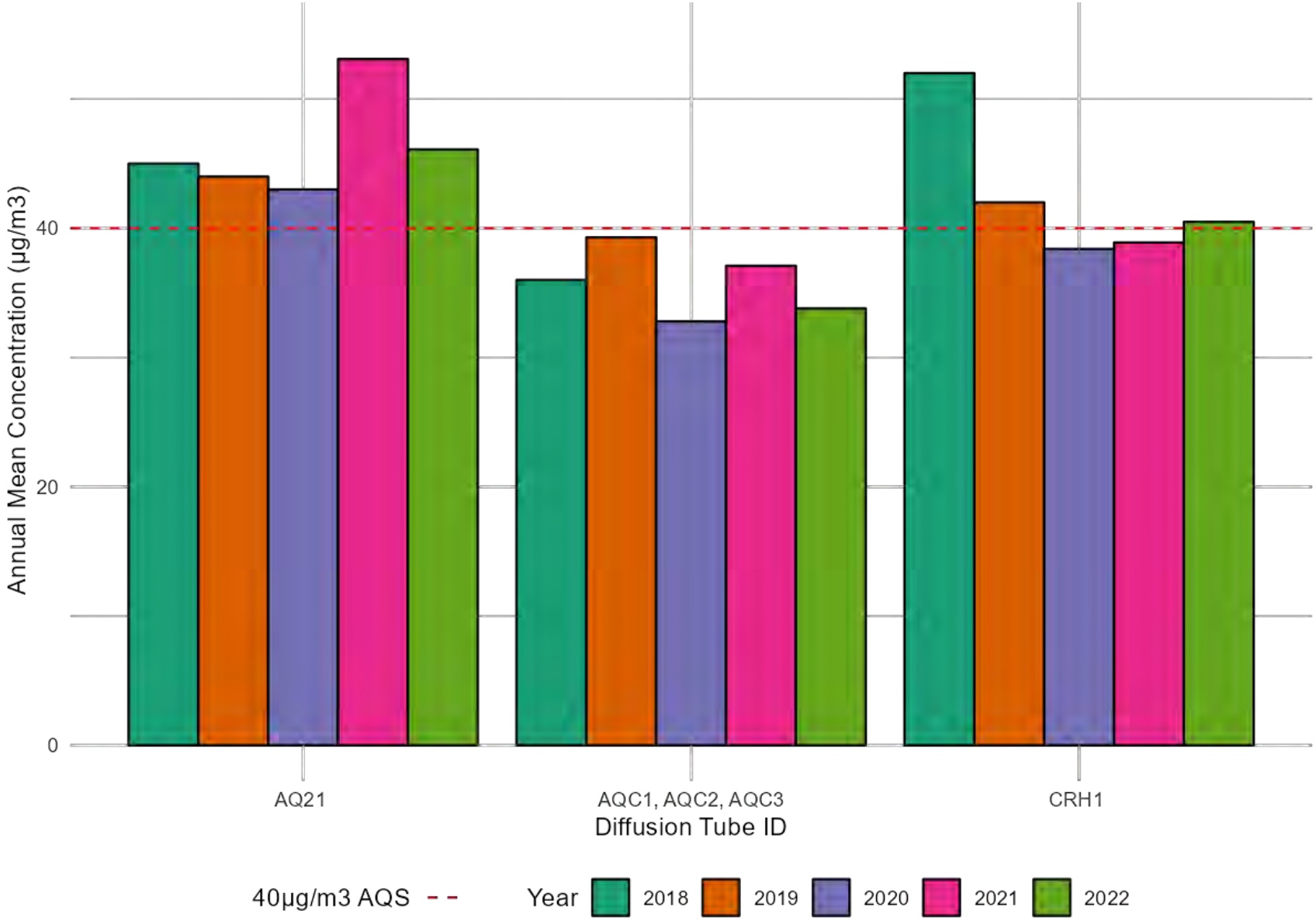


Figure A.3 – Trends in Annual Mean NO_2 Concentrations (AQMA No.2 Sowerby Bridge)

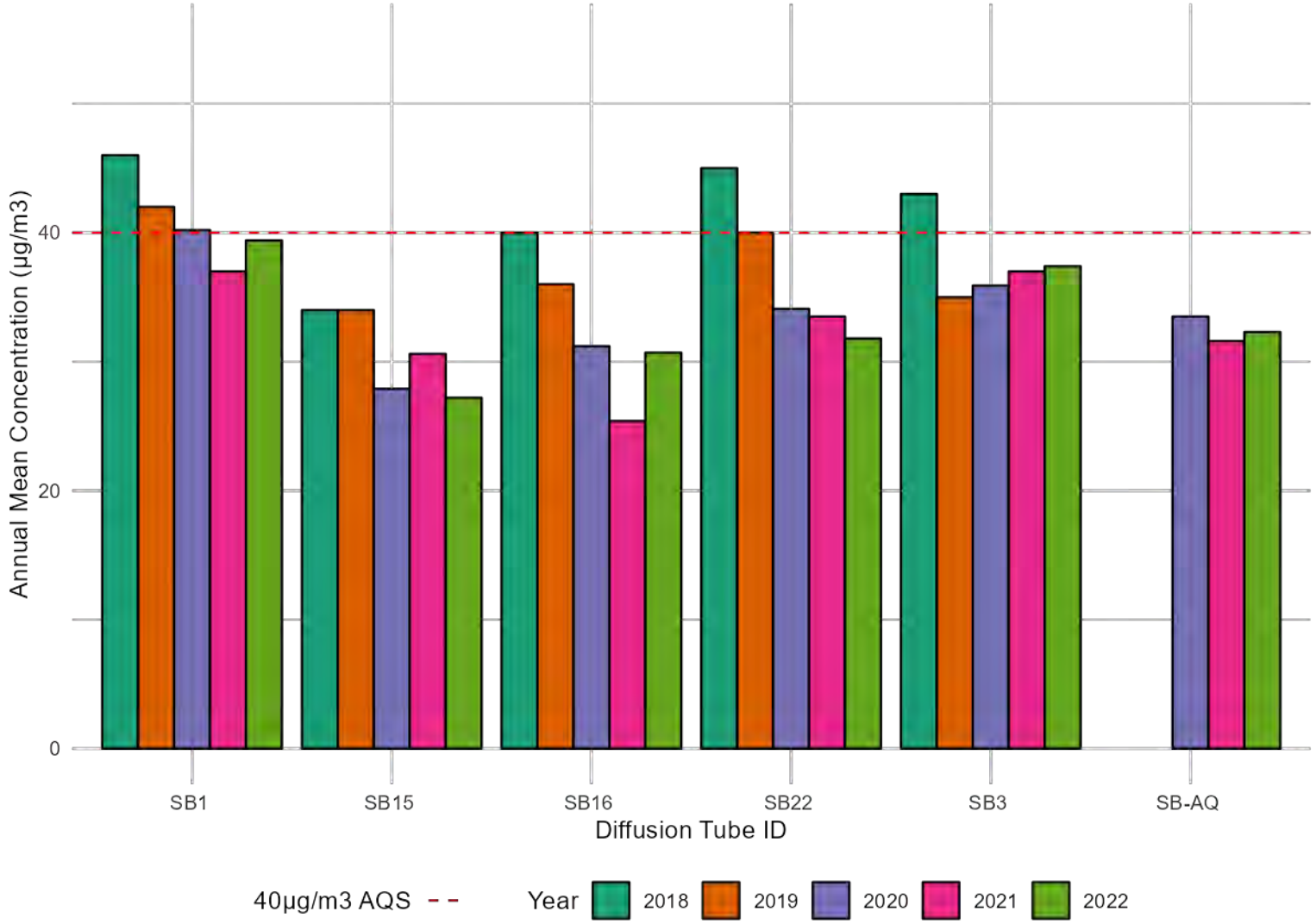


Figure A.4 – Trends in Annual Mean NO_2 Concentrations (AQMA No.3 Hebden Bridge)

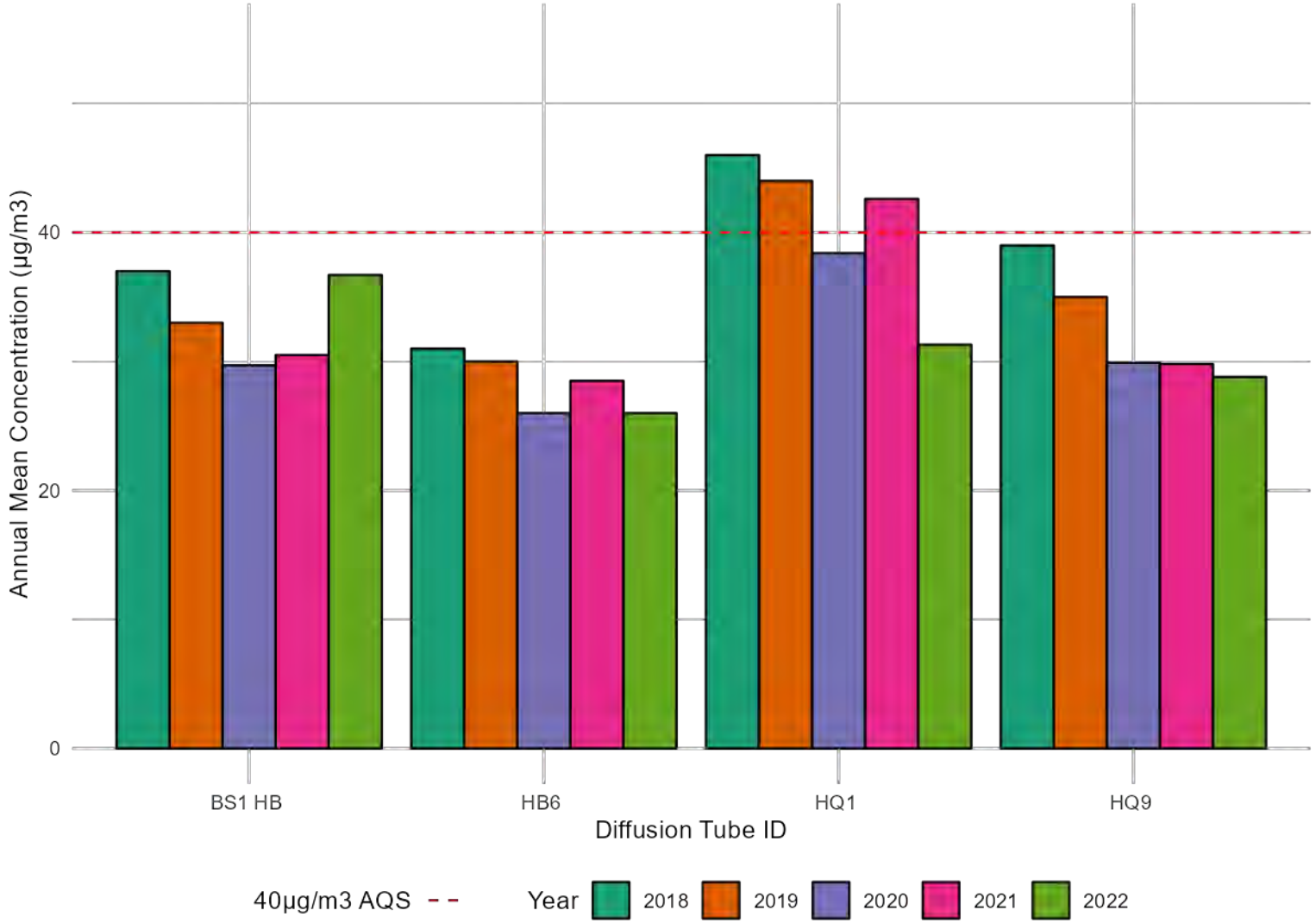


Figure A.5 – Trends in Annual Mean NO_2 Concentrations (AQMA No.4 Luddendenfoot)

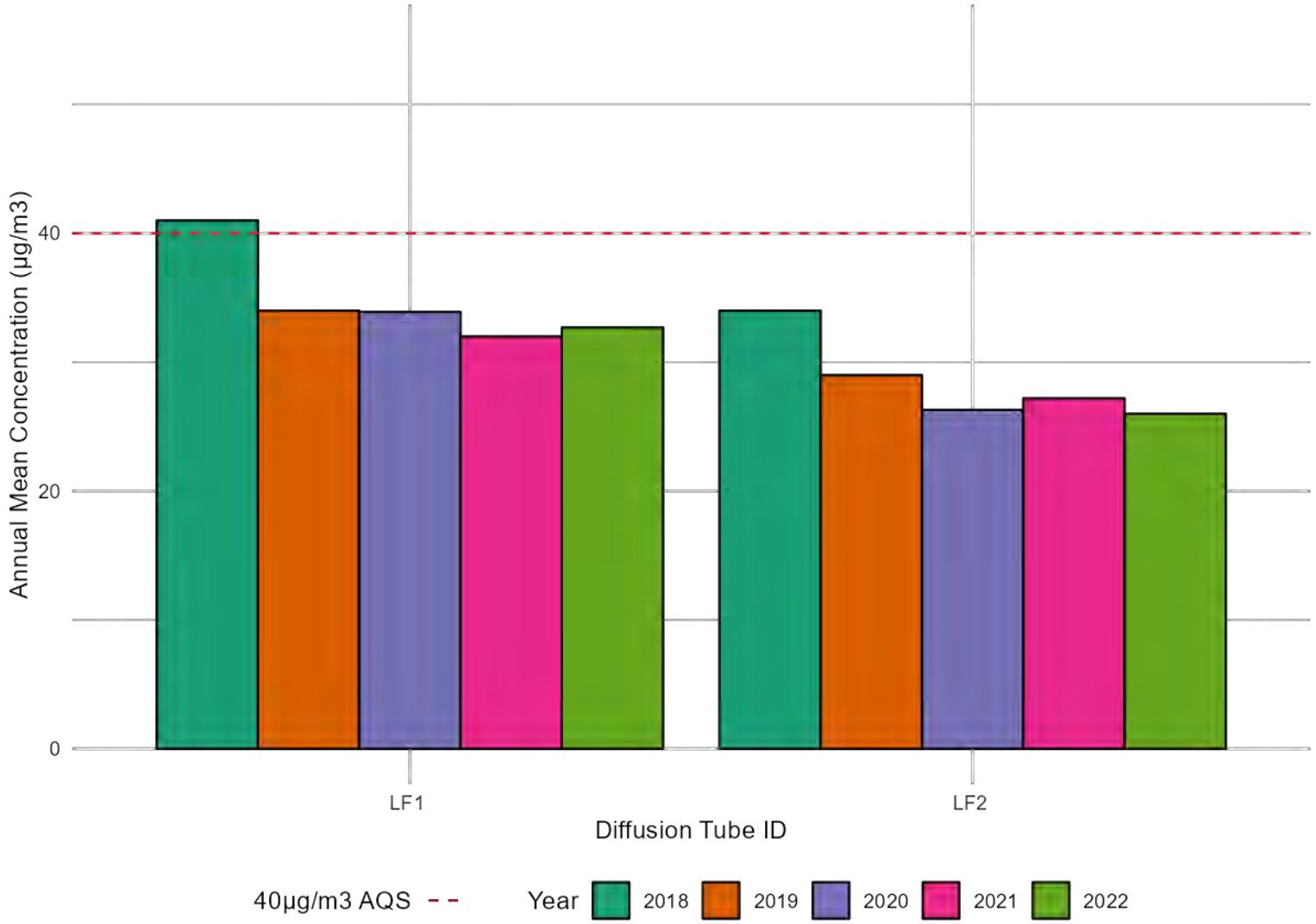


Figure A.6 – Trends in Annual Mean NO_2 Concentrations (AQMA No.5 Stump Cross)

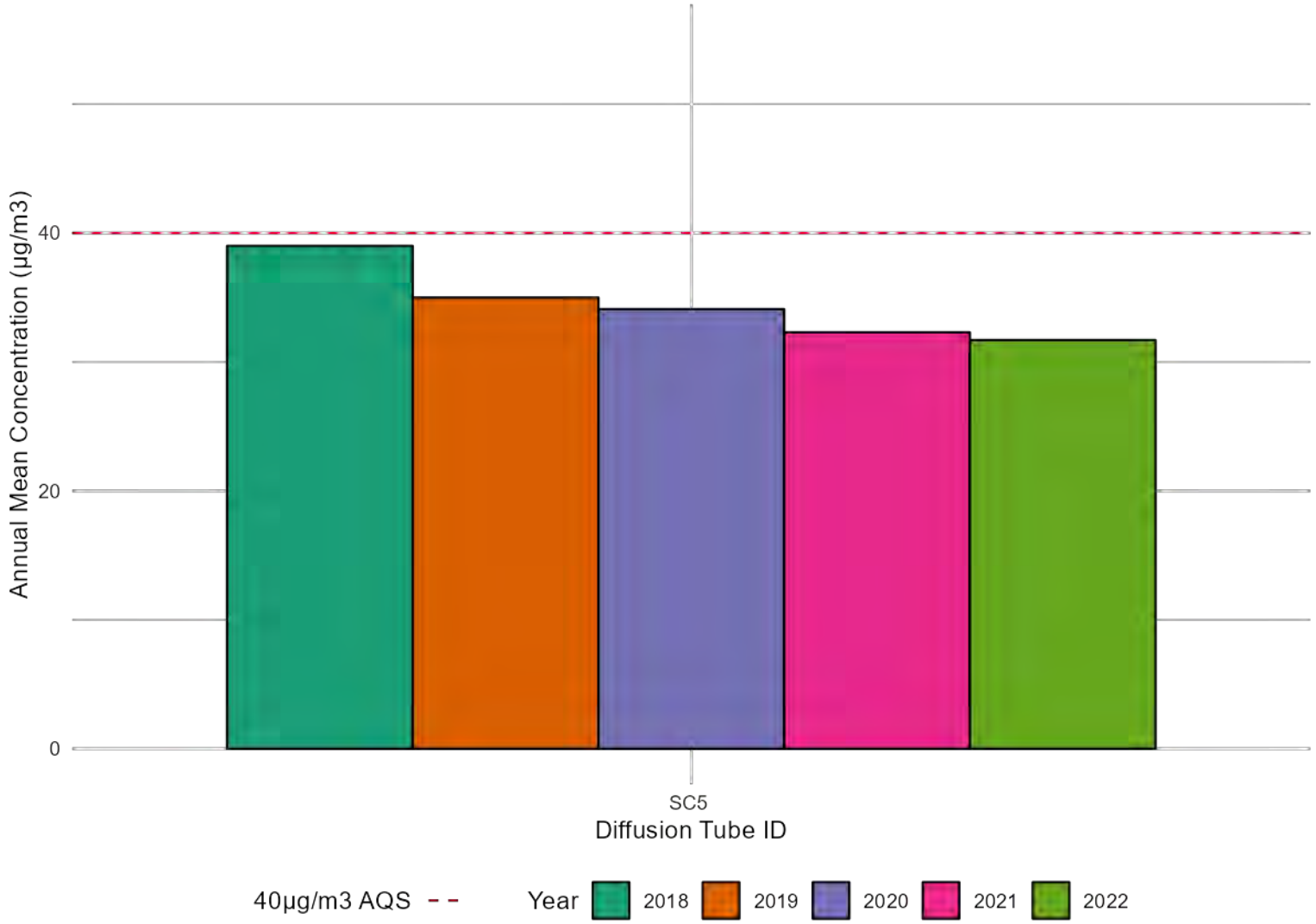


Figure A.7 – Trends in Annual Mean NO_2 Concentrations (AQMA No.6 Brighouse)

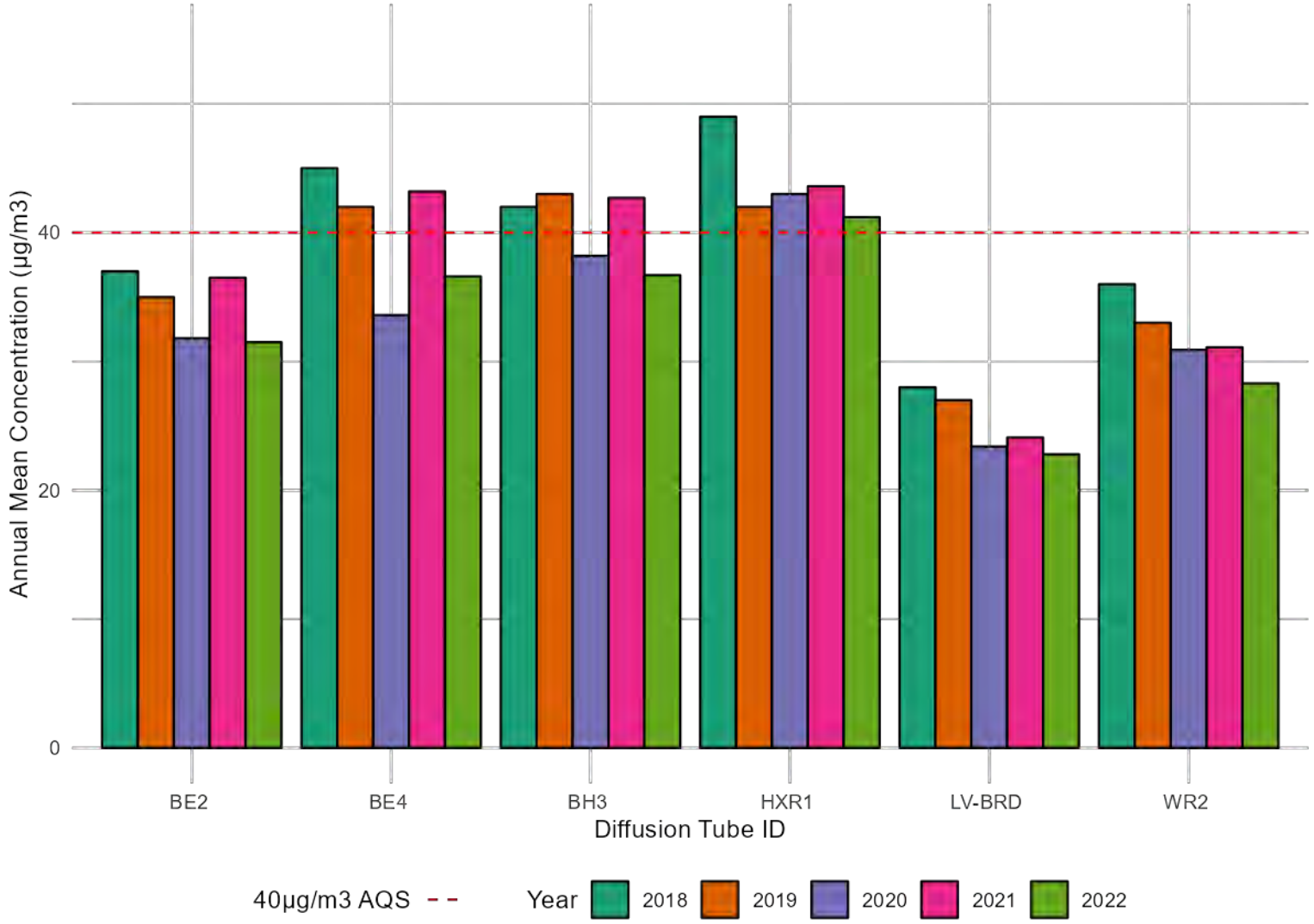


Figure A.8 – Trends in Annual Mean NO_2 Concentrations (AQMA No.7 Hipperholme)

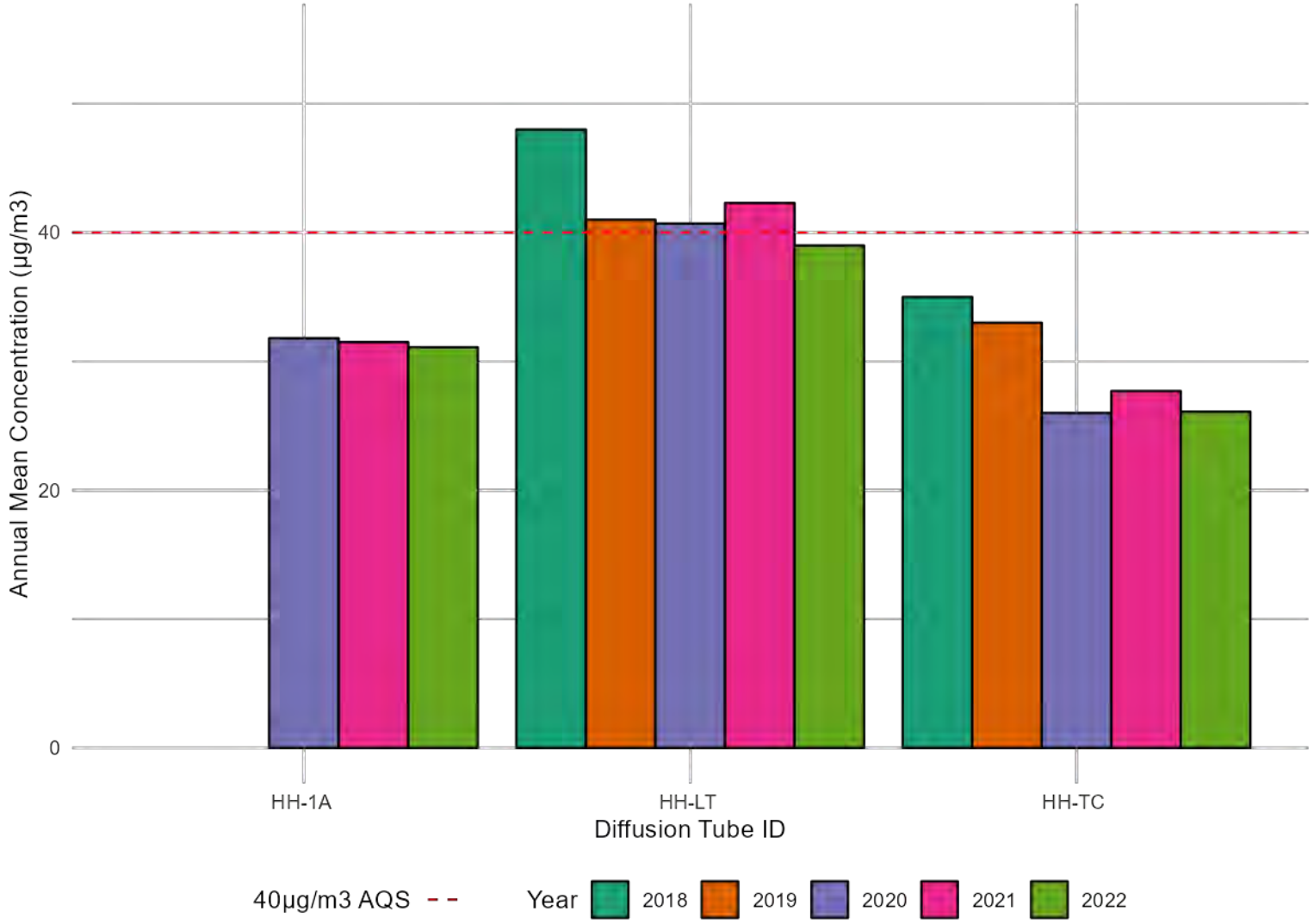


Figure A.9 – Trends in Annual Mean NO_2 Concentrations (AQMA No.8 New Bank)

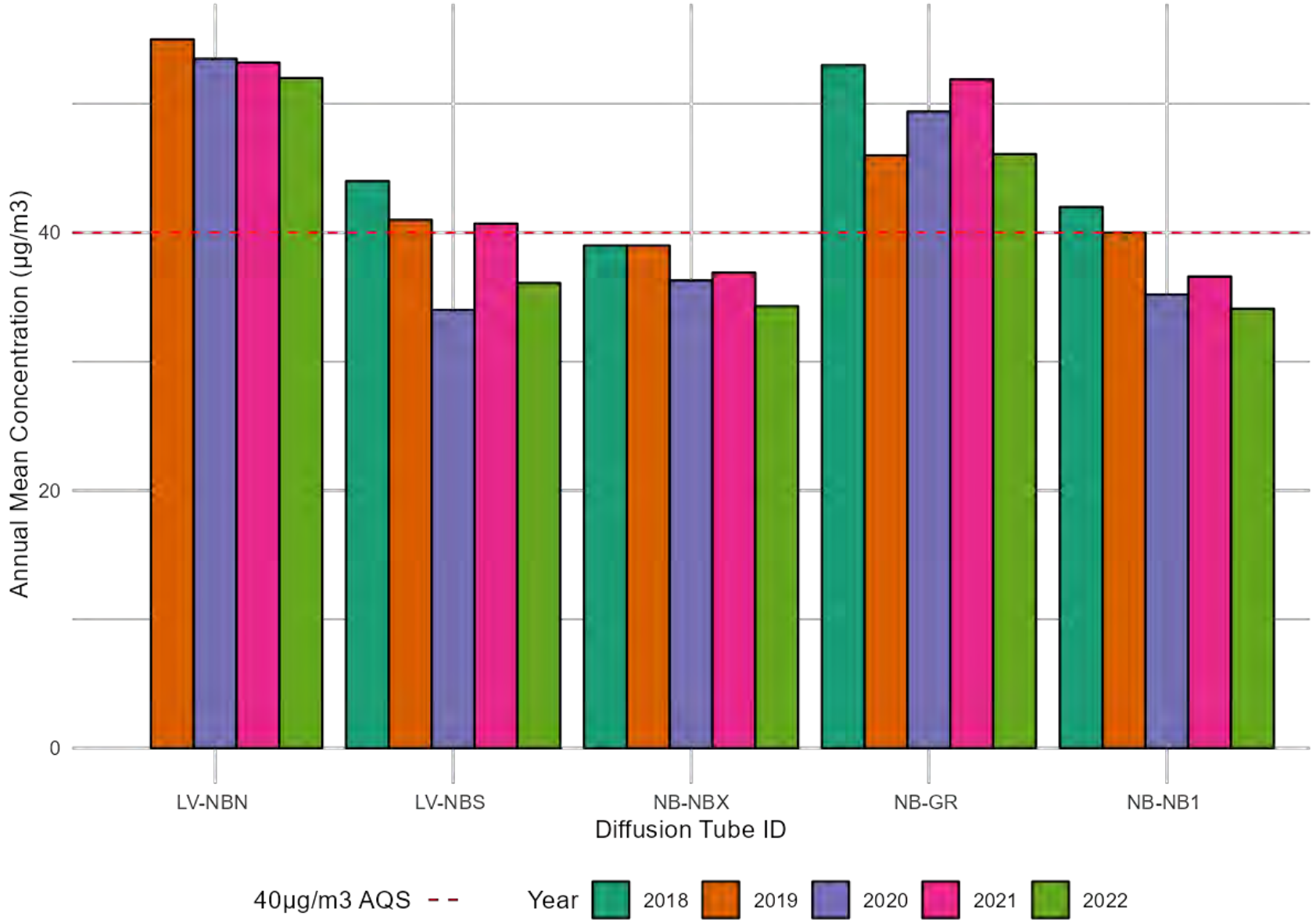


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
AQS2	409485	423430	Roadside	99.5	99.5	4	4	0	0	0
AQS3	398990	427210	Roadside	98.3	98.3	0	0	0	0	0
AQS4	406075	423615	Roadside	99.7	99.7	1	1	0	0	0

Notes:

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

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

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

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

(2) Data capture for the full calendar year (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 PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
AQS4	406075	423615	Roadside	94.4	94.4	25	24	26.4	24.5	24.5

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

Notes:

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

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

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

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

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

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

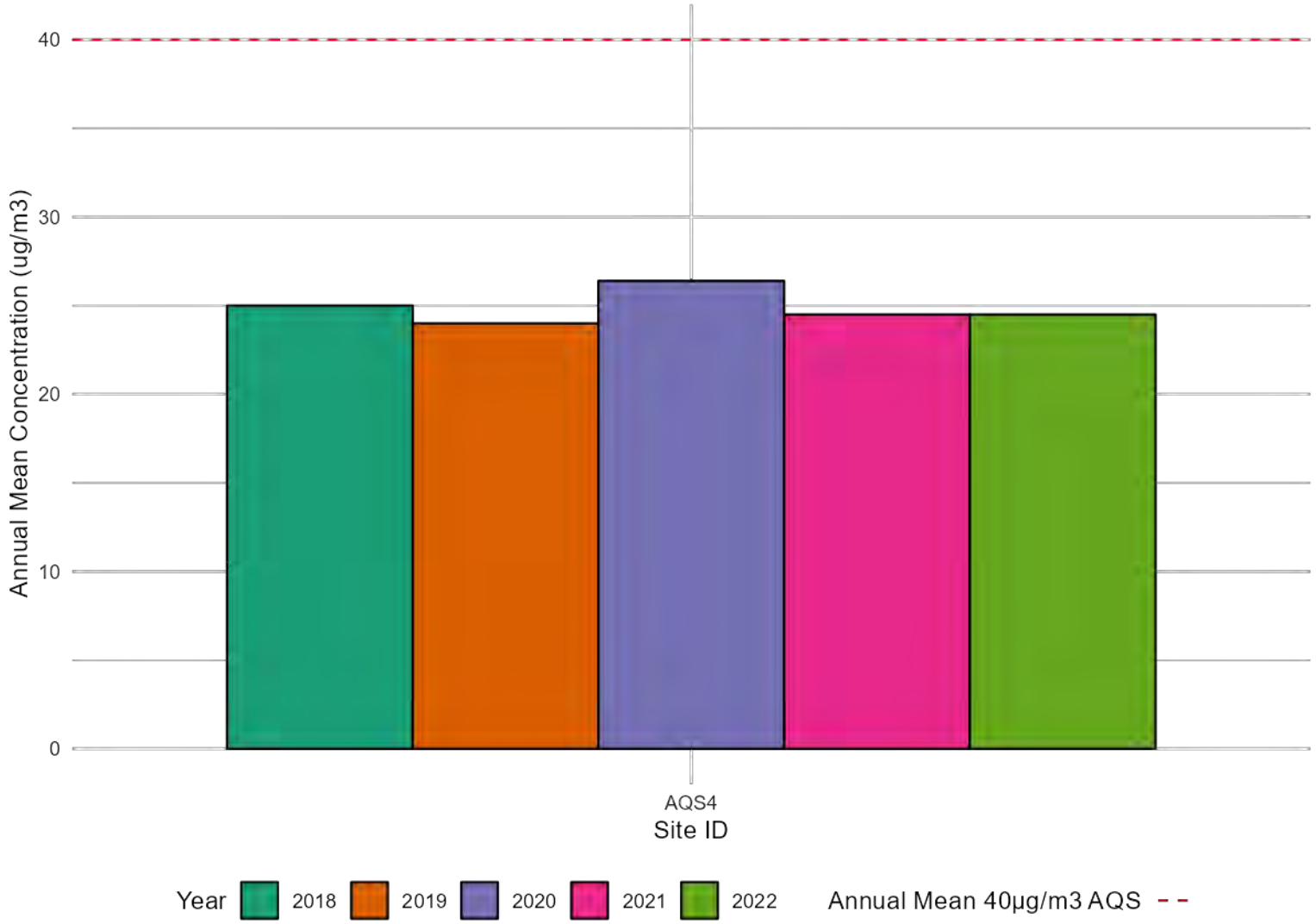


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
AQS4	406075	423615	Roadside	94	94	12	19	20	11	17

Notes:

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

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

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

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

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

Figure A.11 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

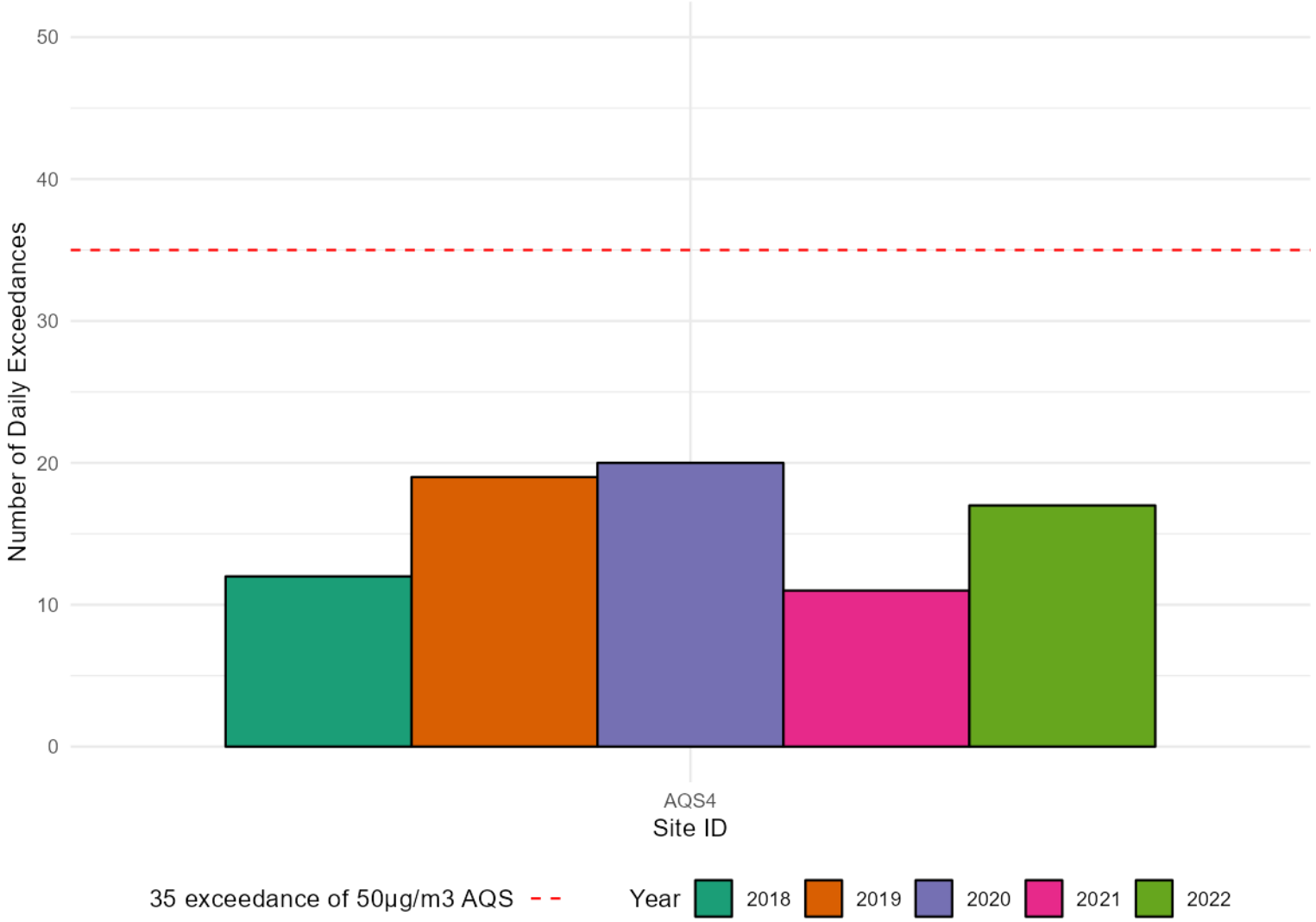


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
AQS2	409485	423430	Roadside	95.8	95.8	13	11	9.6	10	9.3
AQS3	398990	427210	Roadside	95.3	95.3	17	20	11	8.5	9.9

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

Notes:

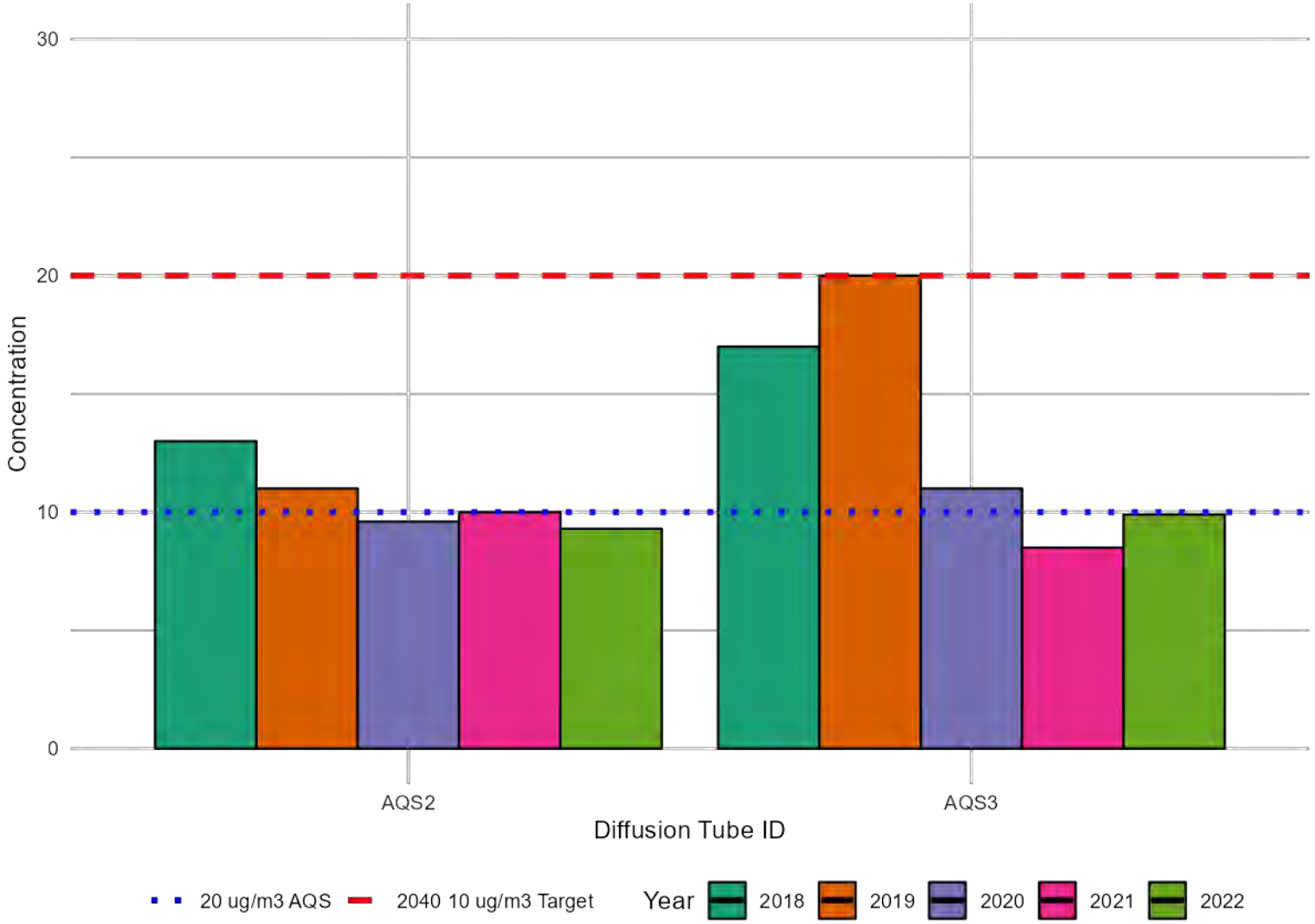
The annual mean concentrations are presented as $\mu g/m^3$.

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

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

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

Figure A.12 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results (µg/m^3) Each result used a bias adjustment factor of 0.76

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 <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
AQ21	409822	423167	58.9	64.6	59.4	60.0	53.8	57.4	57.0	61.8	57.9	61.1	65.4	66.9	60.4	**46.1**	**40.7**	
AQC1	409485	423431	52.0	43.8	52.5	42.0	36.1	32.4	37.4	42.6	41.8	41.9	48.8	46.2	-	-	-	Triplicate Site with AQC1, AQC2 and AQC3 - Annual data provided for AQC3 only
AQC2	409485	423431	57.7	48.2	49.3	43.7	42.2	42.0	40.2	41.1	46.6	46.3	34.6	47.9	-	-	-	Triplicate Site with AQC1, AQC2 and AQC3 - Annual data provided for AQC3 only
AQC3	409485	423431	54.0	45.8	37.4	44.7	42.8	40.7	37.7	44.4	45.5	46.1	49.2	47.4	44.3	33.8	-	Triplicate Site with AQC1, AQC2 and AQC3 - Annual data provided for AQC3 only
CRH1	409767	423011	61.0	59.4	58.2	54.5	49.8	46.4	44.7	54.5	48.2	48.6	58.2	53.4	53.1	**40.5**	-	
SB1	406135	423639	54.0	53.2	58.4	52.1	46.6	-	47.4	55.6	42.3	52.1	53.4	52.0	51.6	39.4	-	
SB15	406707	423824	48.0	40.8	43.4	35.6	30.5	29.1	30.4	31.5	31.5	36.8	38.7	30.6	35.6	27.2	-	
SB16	406638	423836	36.4	43.8	45.0	48.4	33.8	31.4	35.9	50.7	35.9	45.1	33.2	42.5	40.2	30.7	-	
SB22	405823	423395	43.7	45.0	47.2	46.6	38.0	32.1	35.6	46.6	36.7	45.9	49.7	33.5	41.7	31.8	-	
SB3	405961	423571	43.2	47.2	59.3	58.8	41.7	37.4	39.0	58.5	40.0	53.0	61.9	47.6	49.0	37.4	-	
SB-AQ	406075	423615	44.3	44.3	51.1	47.5	34.2	34.3	36.5	51.4	36.0	49.3	41.8	36.8	42.3	32.3	-	
BS1 HB	398990	427210	57.8	51.7	48.8	42.3	44.9	38.3	42.8	44.2	49.5	51.8	53.9	51.7	48.1	36.7	26.7	
HB6	399502	427041	39.9	37.2	34.5	34.2	30.7	29.6	31.7	37.6	30.9	33.6	34.7	34.5	34.1	26.0	-	
HQ1	398794	427237	52.7	57.8	46.5	-	-	-	-	-	-	52.1	52.2	54.9	52.7	31.3	-	
HQ9	399236	427176	31.6	41.5	43.9	38.9	32.5	27.0	33.3	41.8	35.4	42.3	40.3	44.6	37.8	28.8	-	
LF1	403810	424977	42.4	42.9	45.6	45.2	40.6	34.5	38.3	47.5	36.9	42.9	50.5	46.4	42.8	32.7	-	
LF2	403738	425110	41.0	37.1	40.3	31.3	28.7	29.1	30.4	31.5	30.2	31.7	40.9	35.9	34.0	26.0	-	
SC5	410823	426265	41.1	43.8	41.9	47.6	37.0	35.7	36.3	53.9	38.6	39.5	44.6	38.3	41.5	31.7	-	

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 <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
BE2	414385	422457	50.4	45.4	48.6	40.4	35.1	34.9	35.0	41.0	31.4	43.3	45.0	45.1	41.3	31.5	-	
BE4	414478	422692	65.0	51.1	47.5	41.9	41.0	47.2	47.0	45.7	47.1	51.1	43.9	46.1	47.9	36.6	-	
BH3	414671	422740	57.8	51.7	48.8	42.3	44.9	38.3	42.8	44.2	49.5	51.8	53.9	51.7	48.1	36.7	31.5	
HXR1	414218	422957	69.7	56.5	52.5	48.8	54.1	47.9	53.1	58.1	54.4	51.3	51.2	49.8	54.0	**41.2**	-	
LV-BRD	414683	423155	31.4	32.3	35.9	29.5	25.7	21.0	23.2	28.1	29.7	49.3	32.4	19.8	29.9	22.8	-	
WR2	415090	422817	50.7	49.0	41.7	28.8	33.3	32.4	30.5	31.9	28.7	35.5	42.7	38.9	37.0	28.3	-	
HH-1A	412593	425497	46.7	43.4	47.8	43.0	35.5	32.9	32.3	45.3	33.5	42.5	43.6	41.7	40.7	31.1	-	
HH-LT	412450	425435	71.2	52.9	54.0	48.3	48.2	47.2	47.0	46.0	48.2	48.3	49.4	52.4	51.1	39.0	-	
HH-TC	412718	425556	42.8	36.0	42.7	38.5	28.3	24.9	23.0	37.9	31.6	34.5	41.6	28.0	34.2	26.1	-	
LV-NBN	409715	425754	83.2	76.4	70.3	73.6	68.3	64.2	NA	70.8	66.0	71.0	74.6	30.8	68.1	**52.0**	24.2	
LV-NBS	409708	425737	57.7	43.5	45.9	44.4	41.2	48.2	43.8	46.7	50.4	50.1	51.1	44.9	47.3	36.1	23.1	
NB-NBX	409602	425797	61.3	47.6	45.5	45.9	39.8	38.6	39.1	44.4	37.8	47.4	49.1	42.9	45.0	34.3	-	
NB-GR	409957	425642	73.2	60.4	69.6	66.2	54.0	43.8	51.4	68.8	49.6	65.2	73.1	50.0	60.4	**46.1**	39.3	
NB-NB1	409663	425740	57.6	50.2	49.1	43.7	42.4	40.5	41.5	40.9	43.8	51.1	24.6	50.4	44.7	34.1	-	
AQ20	409483	423337	29.3	24.3	32.8	24.5	19.3	17.3	18.6	23.9	20.5	23.2	29.5	26.1	24.1	18.4	-	
AT-BR	411514	419548	39.0	28.9	27.8	25.8	23.3	22.7	21.3	23.5	22.1	23.0	29.9	18.3	25.5	19.4	-	
AT-MR	411581	419373	40.9	29.7	30.7	24.1	22.9	19.6	22.4	23.3	25.1	24.5	31.2	28.8	26.9	20.6	-	
CL1	413261	420686	36.3	37.1	40.6	34.3	30.7	25.3	26.7	35.6	27.6	32.9	38.0	26.9	32.7	24.9	-	
HTAH	411494	419594	37.1	31.0	34.5	30.7	30.4	25.8	25.5	30.2	29.0	27.9	28.7	28.8	30.0	22.9	-	
LV-62E	416717	422113	54.6	43.2	45.3	36.9	31.9	32.2	32.2	38.4	36.3	34.2	44.3	45.3	39.6	30.2	-	
LV-62W	416172	422282	53.3	41.0	45.3	39.7	34.6	32.7	29.8	38.2	35.4	41.6	46.0	34.7	39.4	30.0	-	

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 <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LV-AT	411533	419358	52.8	48.3	56.7	49.3	45.2	39.4	42.1	49.1	45.3	42.1	47.9	38.6	46.4	35.4	-	
LV-EWB	410104	421516	29.6	28.6	31.5	22.9	17.6	17.4	20.2	21.4	20.2	26.7	33.5	31.0	25.1	19.1	-	
LV-LEE	417698	420709	42.1	31.5	34.5	27.6	26.5	26.0	28.0	31.7	33.9	34.2	40.1	36.1	32.7	24.9	-	
LV-SAA	411201	419429	35.3	29.6	37.0	-	-	-	-	-	-	18.3	29.8	23.3	28.9	17.1	-	
LV-SCA	405911	416597	54.6	51.3	47.7	41.4	43.2	43.6	48.7	43.8	39.2	45.5	43.6	-	45.7	34.9	-	
MY01	401431	425995	54.4	41.1	45.4	41.4	35.9	31.8	35.5	40.8	36.8	42.5	48.0	41.4	41.3	31.5	-	
MY02	401275	426046	25.6	21.1	20.3	16.4	13.0	12.2	15.0	17.0	14.9	21.5	25.6	20.9	18.6	14.2	-	
MY03	401204	426041	42.1	39.6	40.2	36.9	34.2	33.8	39.1	42.2	36.8	44.2	49.1	46.4	40.4	30.8	-	
MY-04	401059	426179	32.6	28.3	28.2	23.2	21.2	17.1	20.9	23.2	22.3	29.2	34.4	29.7	25.9	19.7	-	
MY-05	401040	426186	35.4	29.5	32.6	23.8	22.2	20.5	23.7	24.7	23.5	27.8	36.3	32.1	27.7	21.1	-	
NB-GL	410367	425975	63.2	55.2	59.2	54.5	31.6	50.6	50.7	44.1	54.8	59.8	55.7	55.5	52.9	**40.4**	25.0	
SB23	405701	423223	37.7	33.7	32.7	27.6	23.3	21.4	23.1	26.4	25.9	24.2	39.4	24.7	28.3	21.6	-	
WV-SR1	409598	421167	48.9	44.7	47.2	39.4	37.7	36.6	36.4	40.5	40.5	38.0	45.2	44.8	41.7	31.8	-	
WV-SR2	409608	421160	35.0	36.0	38.6	36.2	28.0	23.3	27.2	34.0	27.9	32.9	38.2	33.2	32.5	24.8	-	
SB40	405814	422611	18.3	13.6	16.8	11.8		7.4					18.5		14.4	10.8	-	
SB41	405727	422878	20.5	12.4	14.2	9.7		7.6					16.3		13.5	10.1	-	
SB42	404938	422699	35.9	32.7	34.0	28.9		28.9					37.0		32.9	24.7	-	
SB43	405082	422999	20.2	14.1	15.0	11.2		6.9					19.4		14.5	10.9	-	
SB44	405234	423022	24.1	14.9	19.6	13.4		11.3					20.5		17.3	13.0	-	
SB45	405780	423349	43.1	35.7	37.7	33.4		25.1					42.3		36.2	27.2	-	

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

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

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

☒ **Calderdale Metropolitan Borough Council confirm that all 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Calderdale Metropolitan Borough Council During 2022

Calderdale Metropolitan Borough Council has not identified any new sources relating to air quality within the reporting year of 2022.

However, to ensure that any new development would not adversely impact air pollution, an air quality assessment was requested for the following planning applications:

Additional Air Quality Works Undertaken by Calderdale Metropolitan Borough Council During 2022

Calderdale Metropolitan Borough Council has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes are supplied and analysed by SOCOTEC Didcot using the 50% TEA (triethanolamine) in acetone preparation method. SOCOTEC Didcot takes part in the QA/QC Field Intercomparison, operated on behalf of Defra. SOCOTEC Didcot are a UKAS accredited laboratory.

The precision of the current 26 local authority co-location studies in 2022 (who used the 50% TEA in water method at SOCOTEC Didcot) detailed within the national bias adjustment factor spreadsheet (version 03/22) was rated as ‘good’ (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%), adding to the confidence in the measurements and SOCOTEC Didcot procedures.

During 2022, the diffusion tubes were not deployed in line with the monitoring calendar, owing primarily to the environmental health team outsourcing the changeovers to the Parks team. The changeover will be brought back within the department from 2024. The

tubes in December were actually removed on the 15/01/2023, meaning that the December measurements were over-exposed and reflective of a December 2022/ January 2023 period mean. Over-exposure generally results in a reduction in measured concentrations. As December measurements were generally above the raw annual mean concentration, it was decided to retain December 2022 measurements as their omittance would have likely led to an even greater underprediction of measured concentrations in Calderdale Metropolitan Borough, with potential ramifications for Public Health and the amendment/ revocation of AQMAs.

Diffusion Tube Annualisation

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

Site ID	Annualisation Factor <Site 1 Name>	Annualisation Factor <Site 2 Name>	Annualisation Factor <Site 3 Name>	Annualisation Factor <Site 4 Name>	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
HQ1	0.7795	0.7565	0.7821	0.7931	0.7778	52.7	41.0
LV-SAA	0.7795	0.7565	0.7821	0.7931	0.7778	28.9	22.5
SB40	1.0045	0.9531	0.9794	0.9950	0.9830	14.4	14.2
SB41	1.0045	0.9531	0.9794	0.9950	0.9830	13.5	13.2
SB42	1.0045	0.9531	0.9794	0.9950	0.9830	32.9	32.3
SB43	1.0045	0.9531	0.9794	0.9950	0.9830	14.5	14.2
SB44	1.0045	0.9531	0.9794	0.9950	0.9830	17.3	17.0
SB45	1.0045	0.9531	0.9794	0.9950	0.9830	36.2	35.6

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Calderdale Metropolitan Borough Council have applied a bias adjustment factor of 0.76 for the 2022 monitoring data. The national and local bias adjustment factors in 2022 were equal (0.76), adding confidence to the results. A summary of bias adjustment factors used by Calderdale Metropolitan Borough Council over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	Local/ National	-	0.76
2021	National	03/22	0.78
2020	Local	-	0.87
2019	National	03/19	0.80
2018	National	03/18	0.78

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	11				
Bias Factor A	0.76 (0.69 - 0.85)				
Bias Factor B	31% (17% - 45%)				
Diffusion Tube Mean (µg/m^3)	44.0				
Mean CV (Precision)	8.3%				
Automatic Mean (µg/m^3)	33.6				
Data Capture	100%				
Adjusted Tube Mean (µg/m^3)	33 (30 - 37)				

Notes:

A single local bias adjustment factor has been used to bias adjust the 2022 diffusion tube results.

NO_2 Fall-off with Distance from the Road

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

automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

The NO_2 annual mean concentration was corrected for distance to relevant exposure at 8 diffusion tube sites in 2022. These sites were subject to such calculation as the annual mean concentration was greater than 36 µg/m^3 and the monitoring site is not located at a point of relevant exposure. A summary is provided in Table C.4

Table C.4 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

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
AQ21	2.0	4.0	46.1	12.7	**40.7**	*Predicted concentration at Receptor above AQS objective.*
BS1 HB	3.0	11.0	36.7	6.8	26.7	
BH3	1.5	4.5	36.7	14.8	31.5	
LV-NBN	1.0	41.0	52.0	14.83953	24.2	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
LV-NBS	2.0	27.0	36.1	14.83953	23.1	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
LV-NBX	1.0	31.0	36.1	14.8	21.4	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*

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
NB-GR	3.0	7.0	46.1	14.8	*39.3*	*Predicted concentration at Receptor within 10% the AQS objective.*
NB-GL	2.0	19.0	40.4	11.2	25.0	

QA/QC of Automatic Monitoring

The three automatic monitors are covered by a maintenance and callout contract, allowing six monthly maintenance visits and callouts for any instrument faults. Each site is visited every two weeks by a contractor to routinely monitor and detect any faults whilst checking the instrument nitrogen oxide span and zeros.

Data from all three automatic monitoring sites is collected using WinAQMS and Airodis software, then checked for erroneous readings and backed up to Calderdale Metropolitan Borough Council's secure network. The raw values are checked for inconsistencies before using the span and zero values obtained on site each week to scale the data. Calderdale Metropolitan Borough Council's 2022 automatic air quality monitoring site data has been ratified by Air Quality Data Management to the LAQM TG.22 standards.

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

Measurements of particulate matter are made using a beta attenuation monitor (BAM) with the appropriate inlets for PM_{10} and $PM_{2.5}$ and the data is collected using the same system as the NO_2 analysers. The BAM tape is changed by Council staff when required. Sections of the record where there is a consistent amount of missing data may need to be removed from the data as they are likely to be affected by instrument faults (something which is not normally detected

Automatic Monitoring Annualisation

All automatic monitoring locations within Calderdale Metropolitan Borough Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

NO_2 Fall-off with Distance from the Road

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

No automatic NO_2 monitoring locations within Calderdale Metropolitan Borough Council required distance correction during year.

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

Figure D.1 – Map of Non-Automatic Monitoring Site (Calderdale)

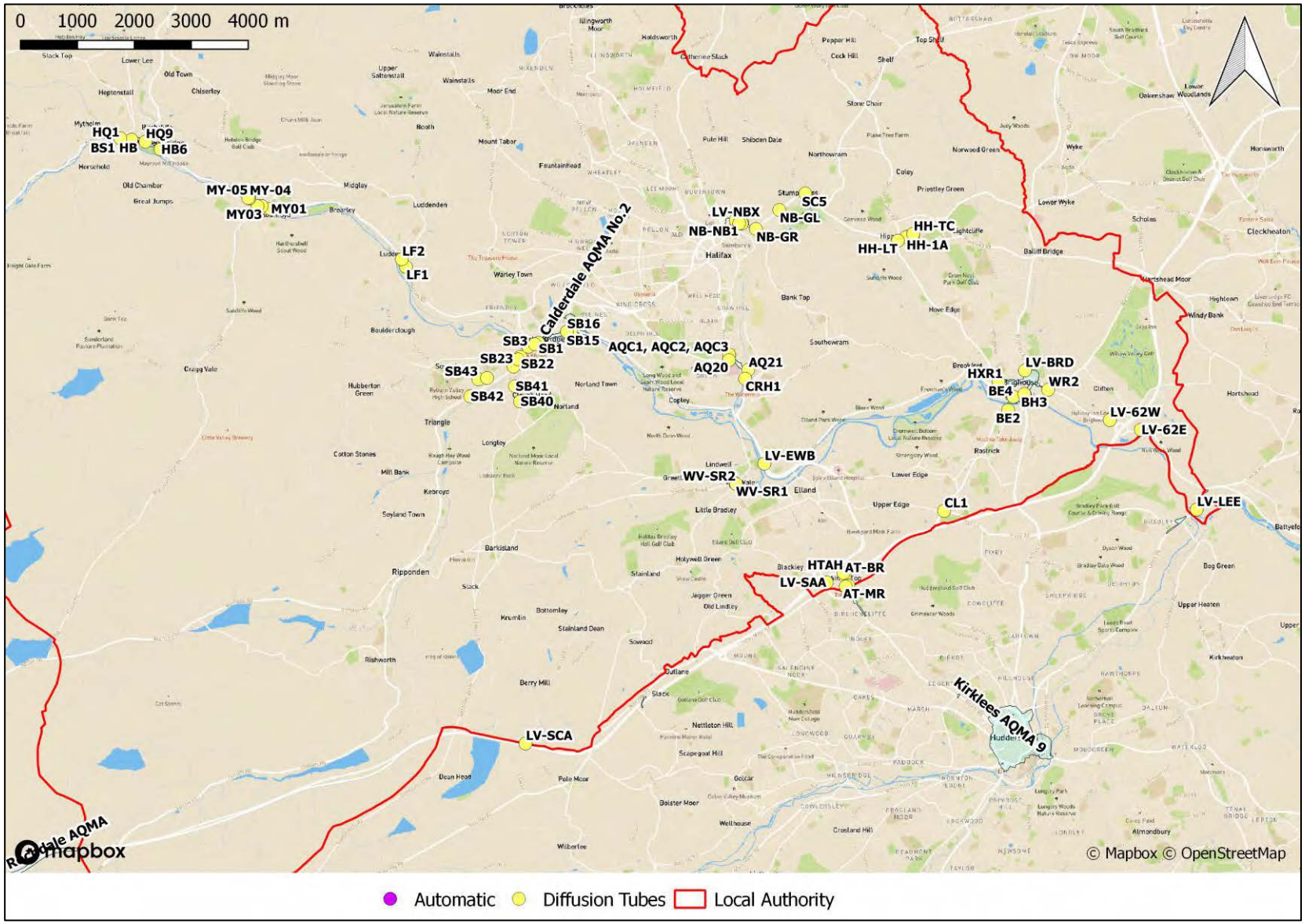


Figure D.2 – Map of Non-Automatic Monitoring Site (AQMA 1)

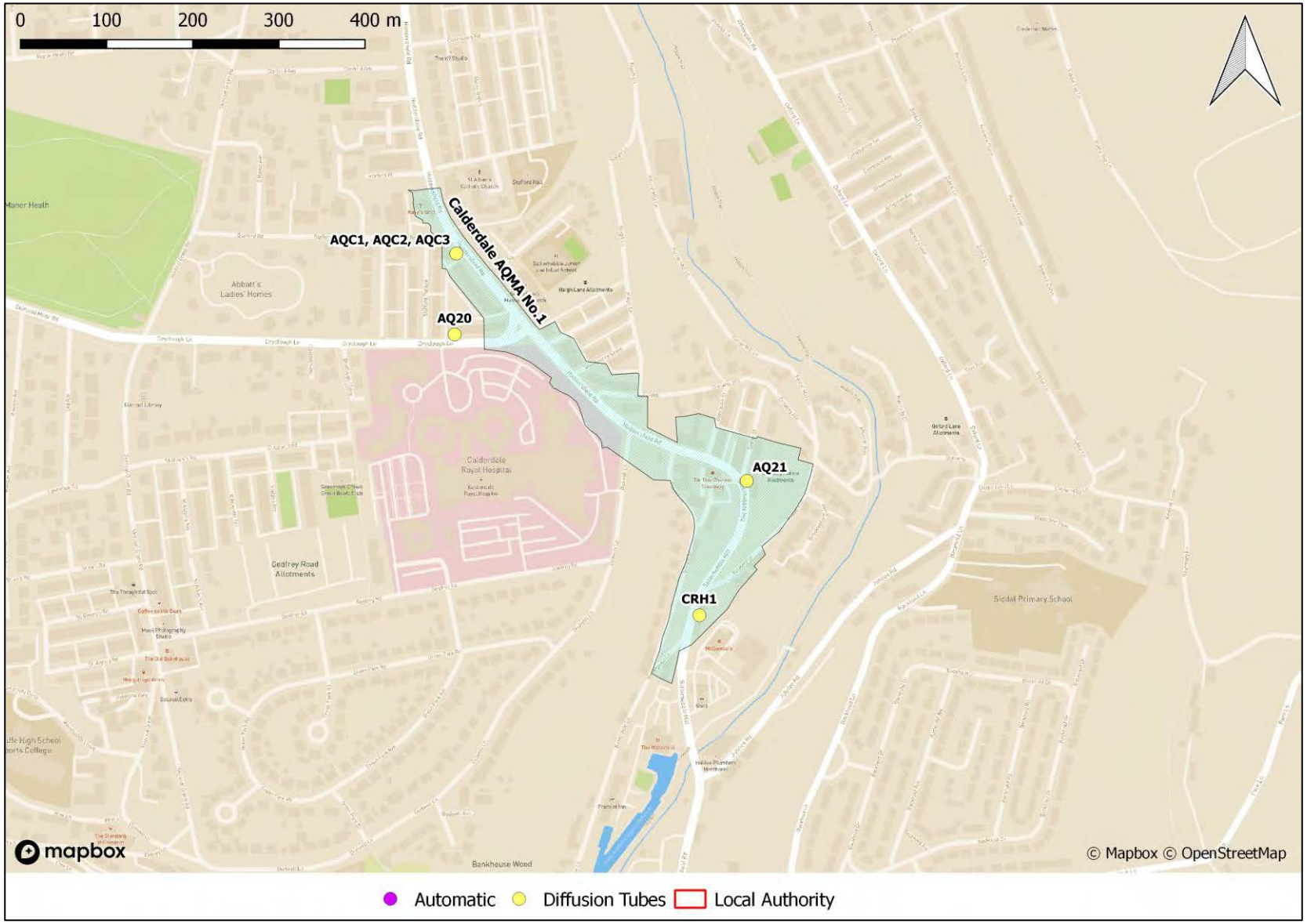


Figure D.3 – Map of Non-Automatic Monitoring Site (AQMA No.2)

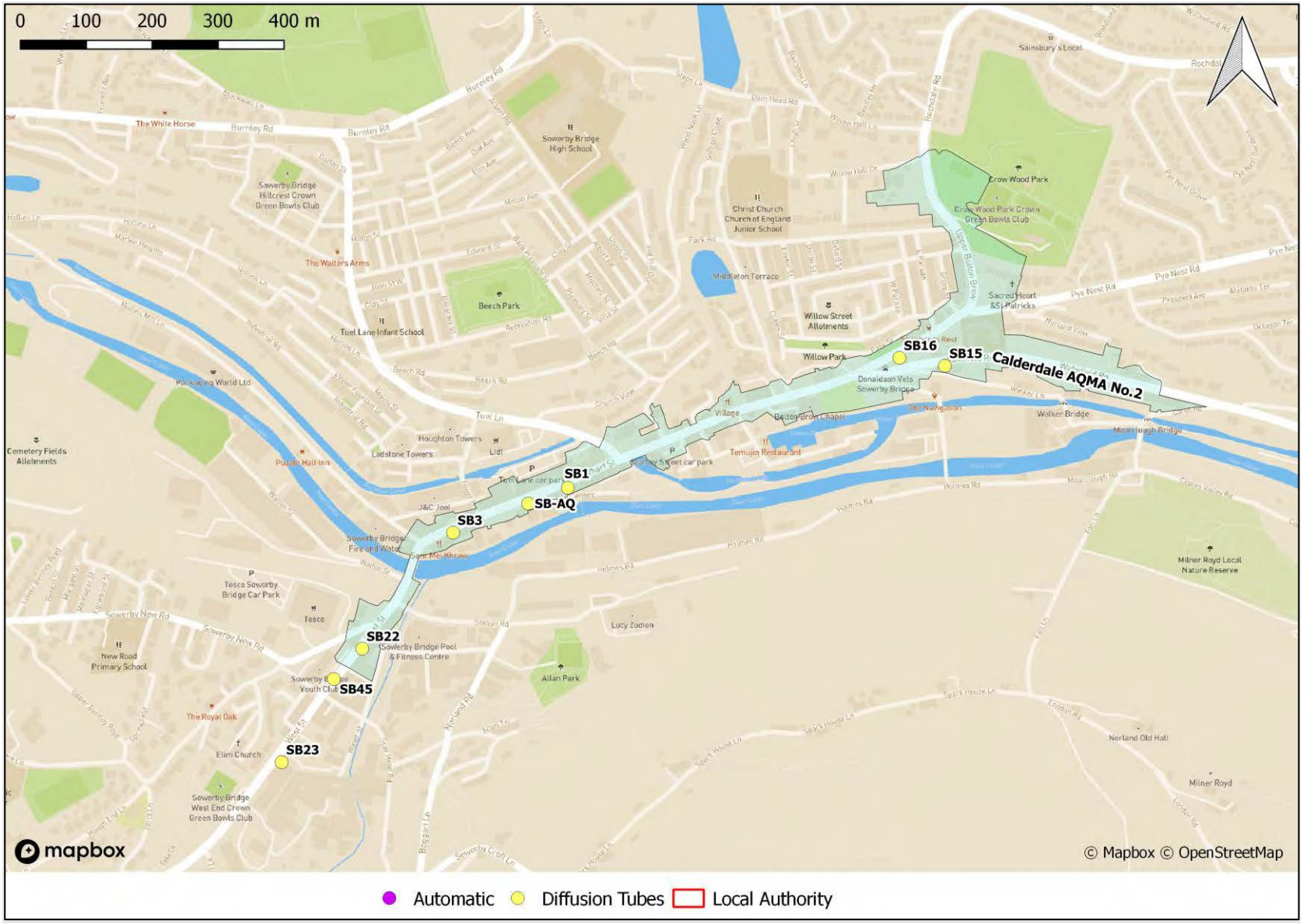


Figure D.4 – Map of Non-Automatic Monitoring Site (AQMA No.2 and South)

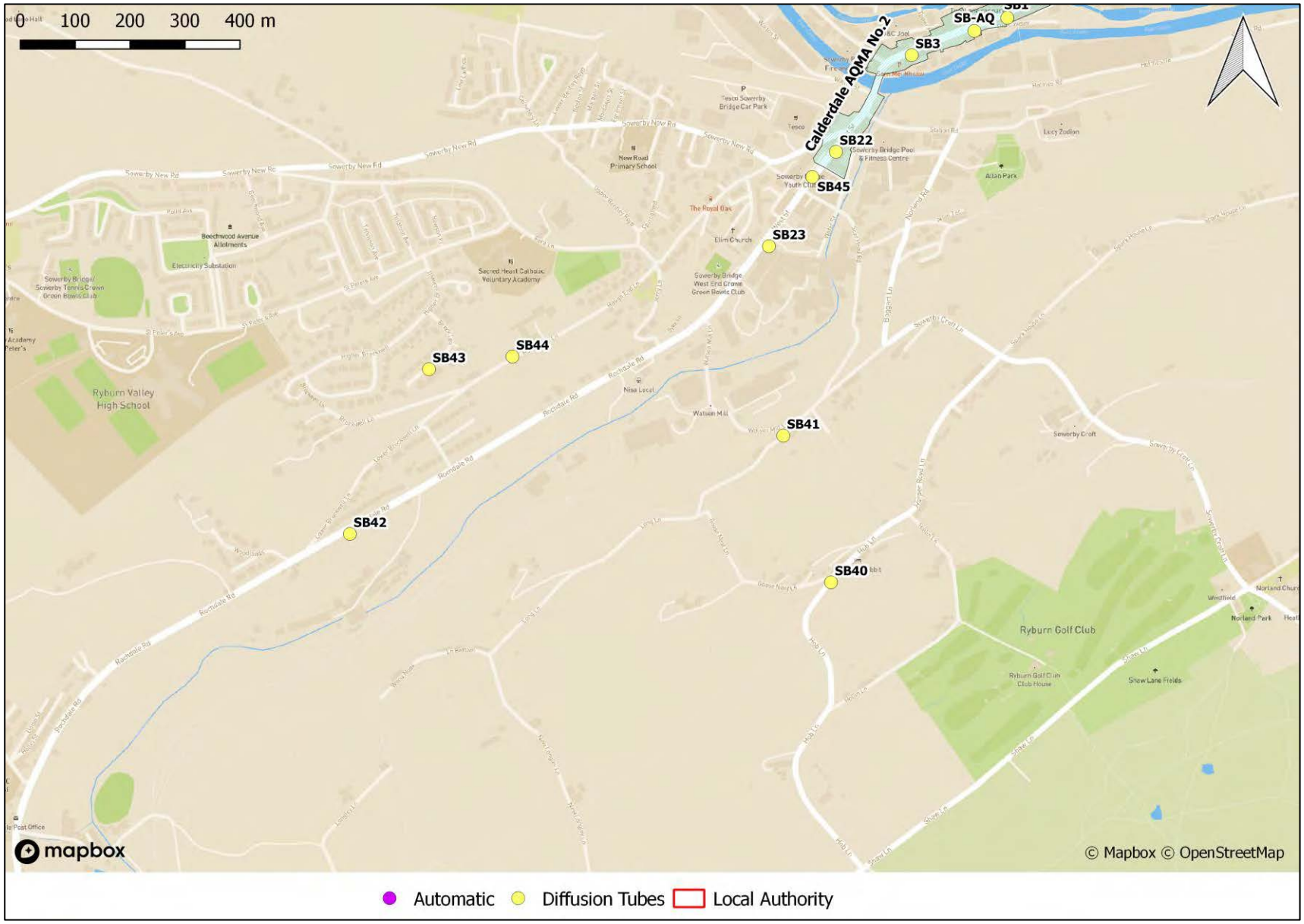


Figure D.5 – Map of Non-Automatic Monitoring Site (AQMA No.3)

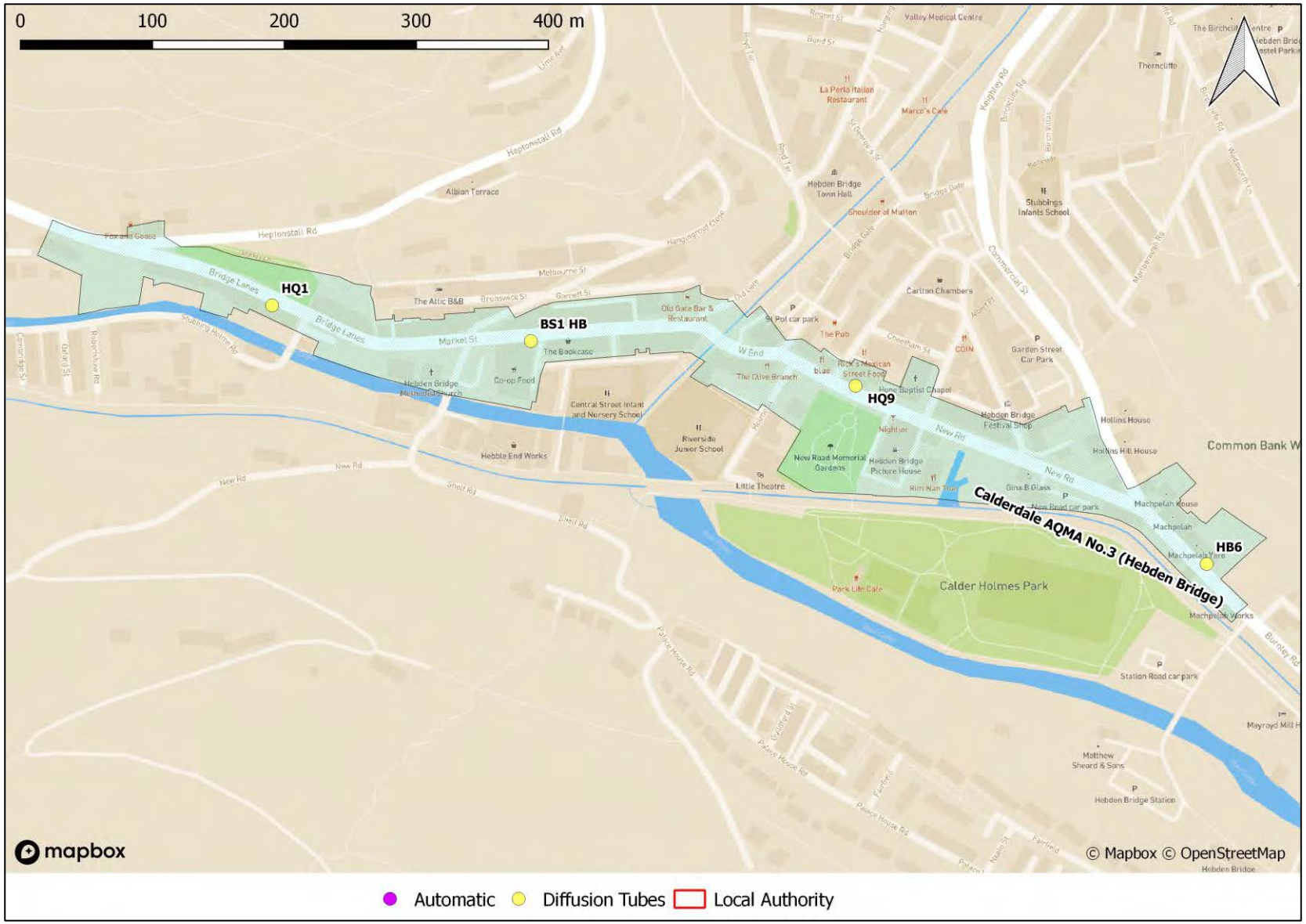


Figure D.6 – Map of Non-Automatic Monitoring Site (AQMA No.4)

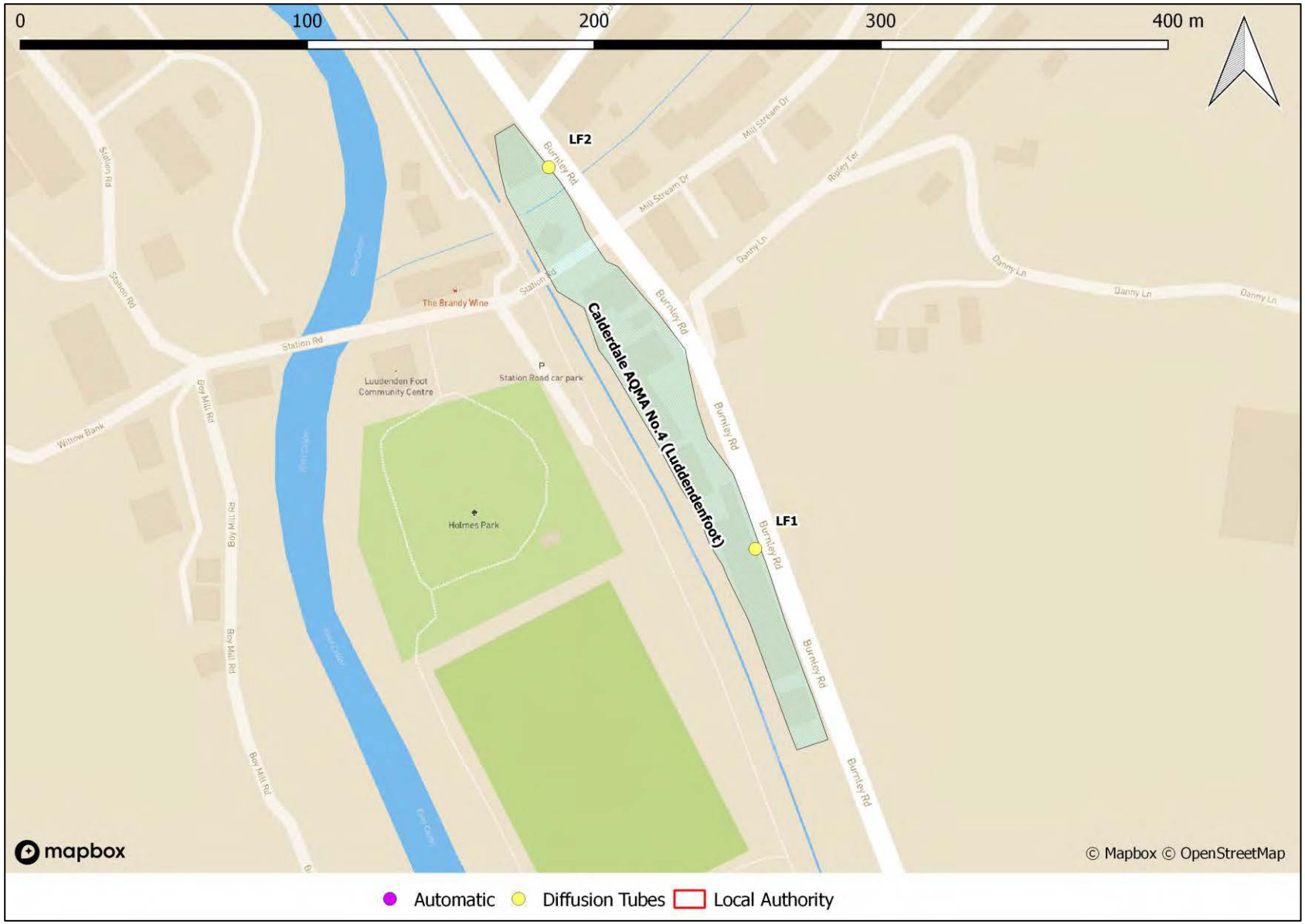

0
100
200
300
400 m
LF2
LF1
Calderdale AQMA No.4 (Luddendenfoot)
Burnley Rd
Station Rd
Mill Stream Dr
Danny Ln
Ripley Ter
The Brandy Wine
Luudenden Foot Community Centre
Station Road car park
Holmes Park
Bog Mill Rd
Willow Bank
mapbox
© Mapbox © OpenStreetMap
Automatic
Diffusion Tubes
Local Authority

Figure D.7 – Map of Non-Automatic Monitoring Site (AQMA No.5)

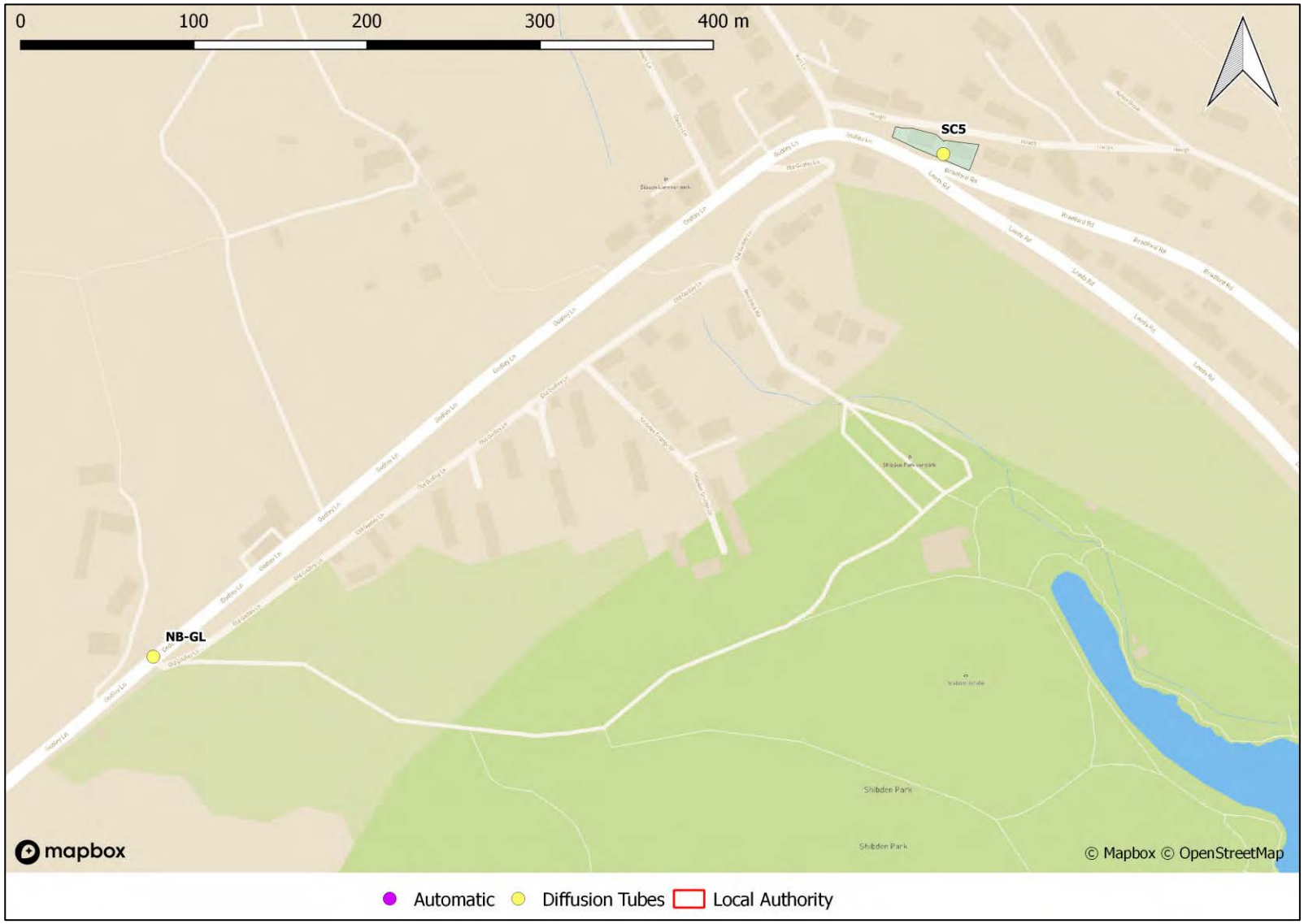


Figure D.8 – Map of Non-Automatic Monitoring Site (AQMA No.6)

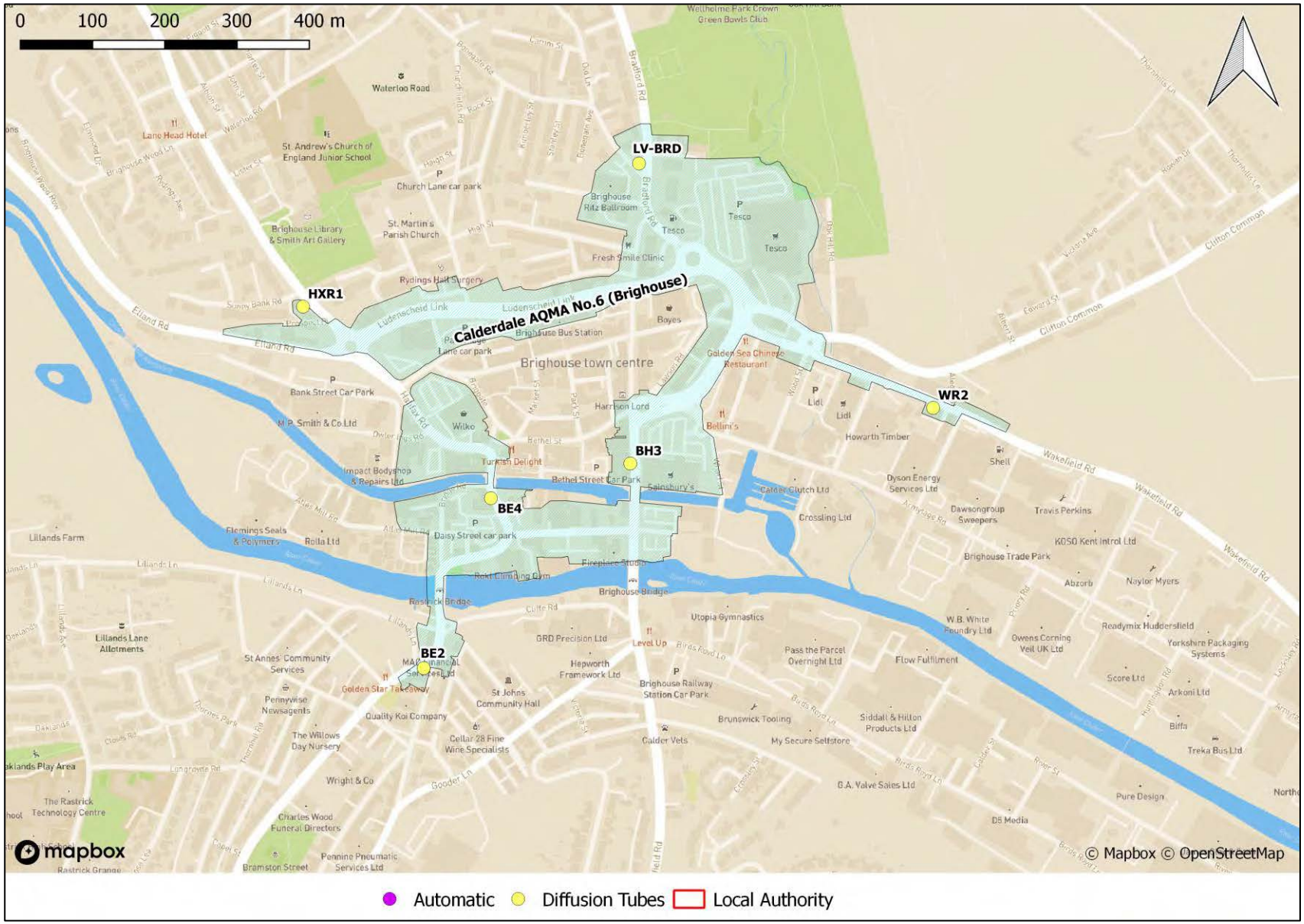


Figure D.9 – Map of Non-Automatic Monitoring Site (AQMA No.6 and South)

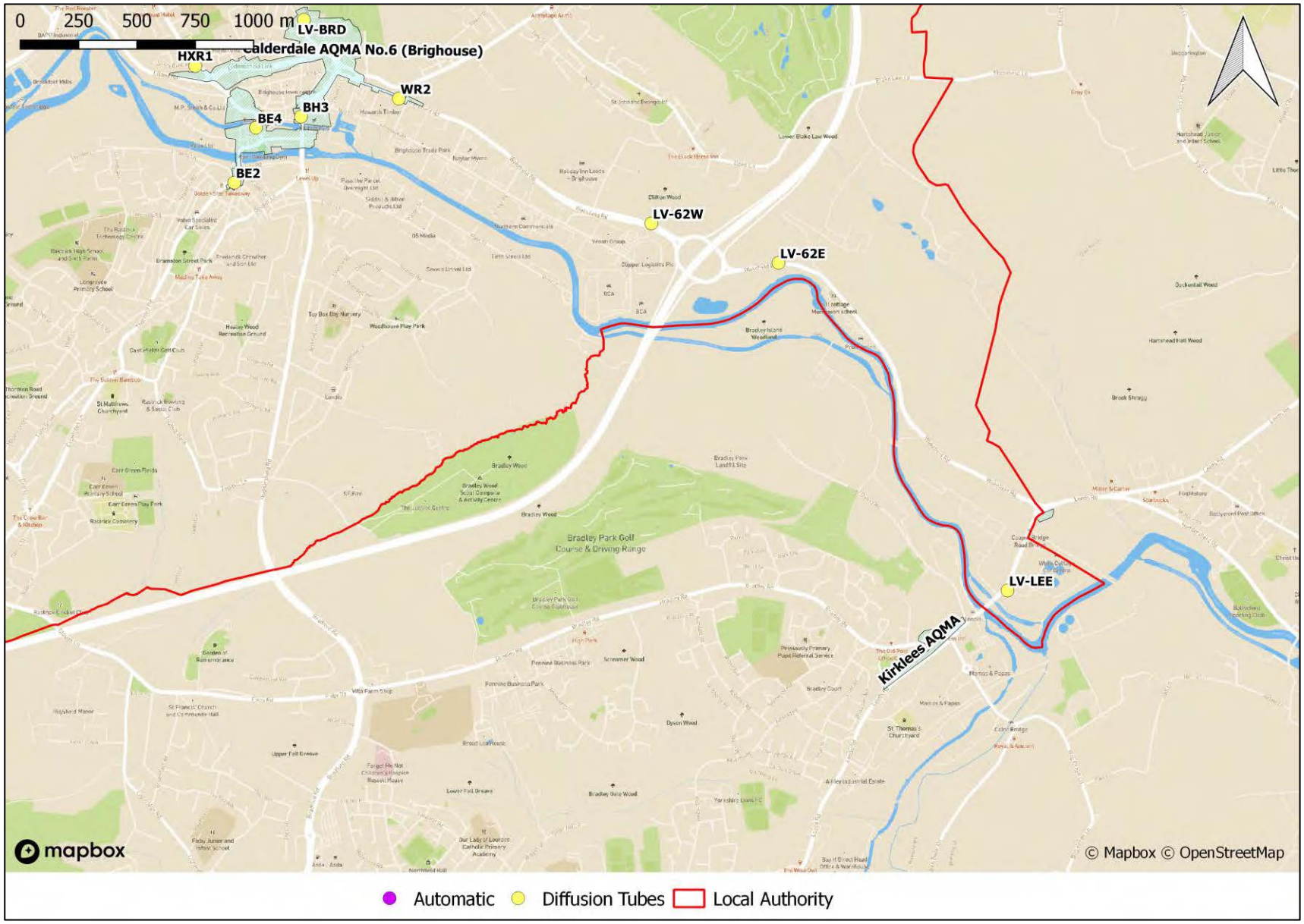


Figure D.10 – Map of Non-Automatic Monitoring Site (AQMA No.7)

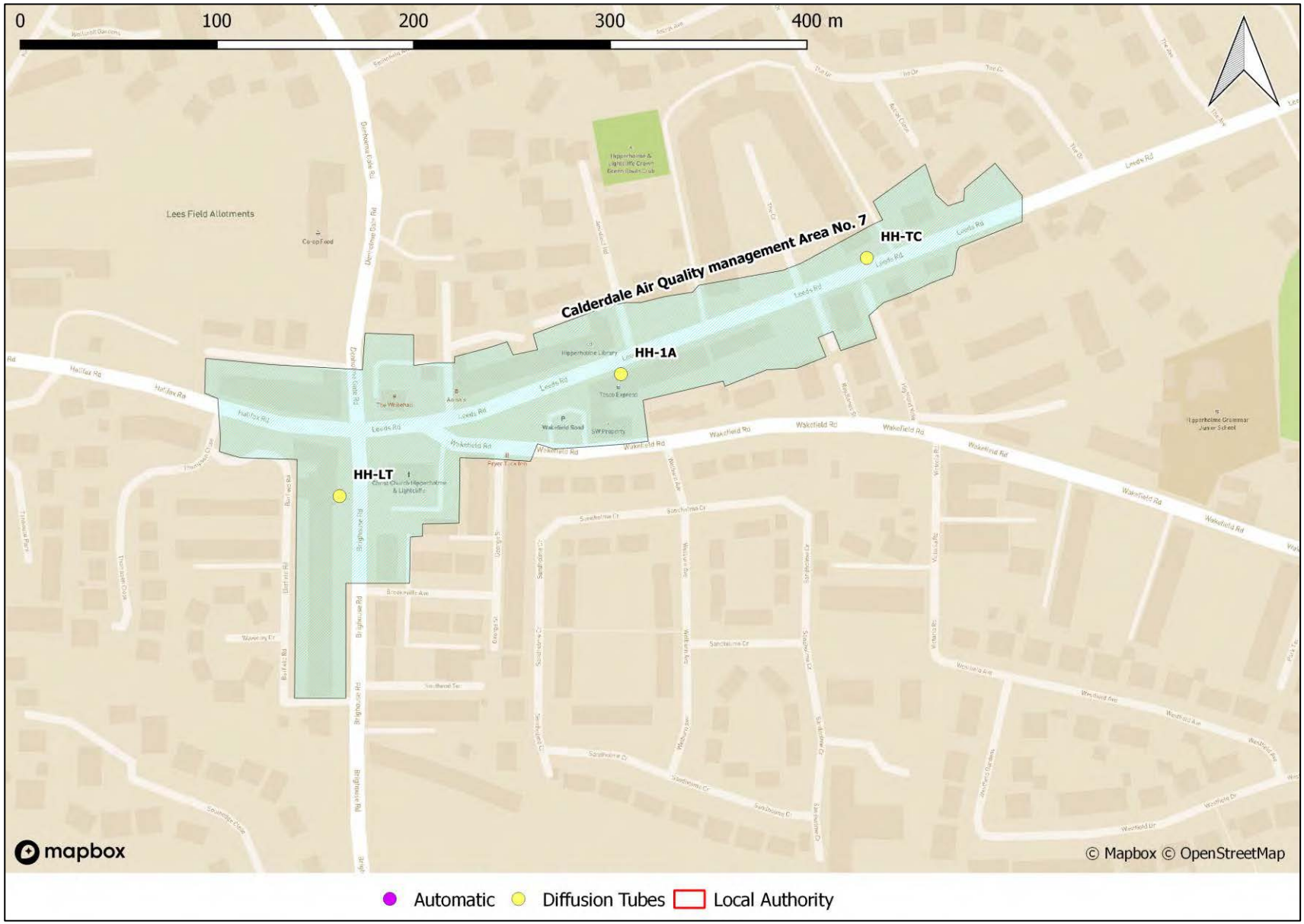
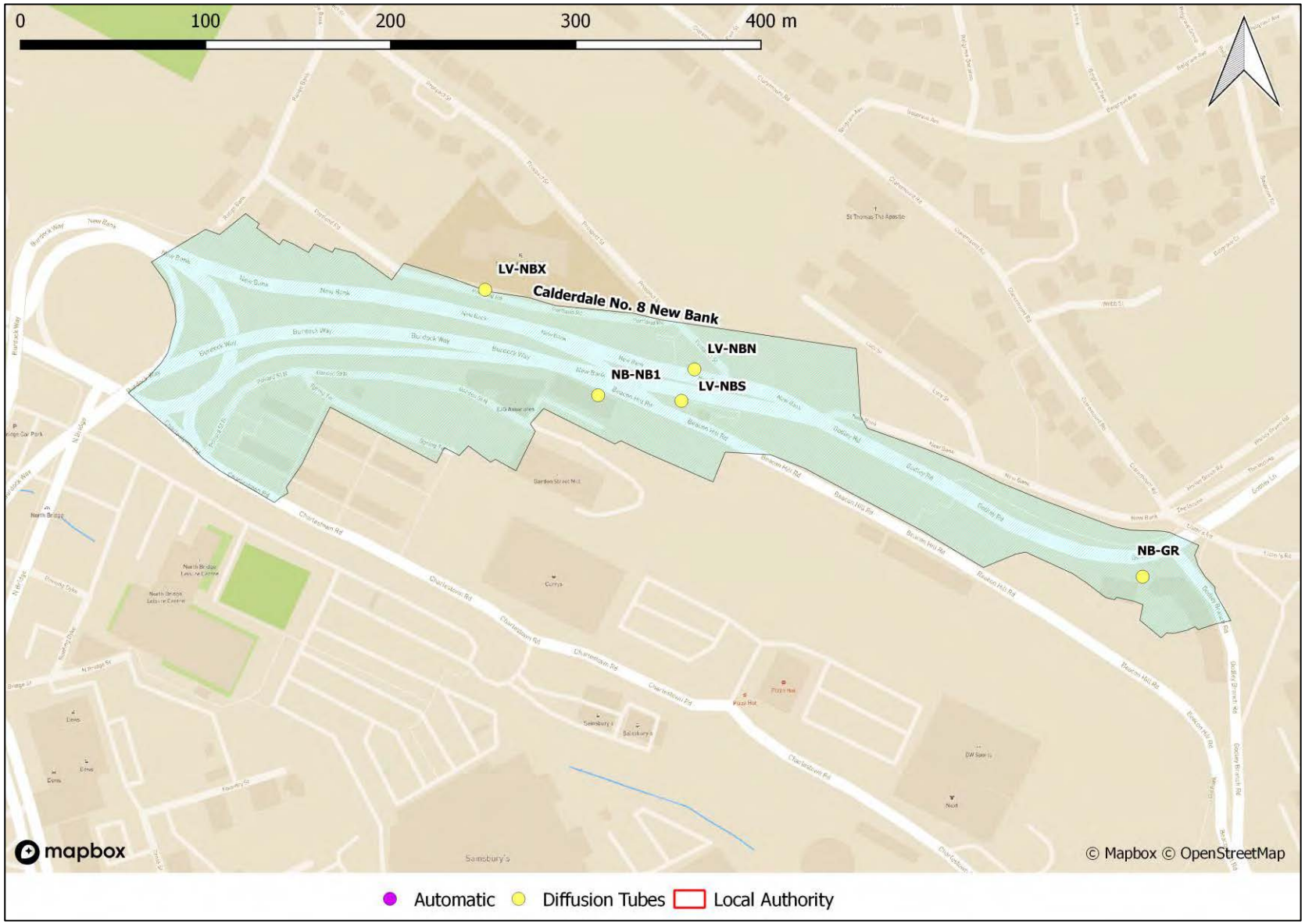


Figure D.11 – Map of Non-Automatic Monitoring Site (AQMA No.8)



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[8]

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

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

Glossary of Terms

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

References

- 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.