2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management

Date: June, 2022

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Executive Summary: Air Quality in Our Area

Air Quality in Barnsley Metropolitan Borough Council

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

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

The Barnsley Metropolitan Borough Council area covers 32,853 hectares (127 square miles) and has an estimated population of approximately 239 300.

Barnsley Metropolitan Borough Council's air quality issues are typical of an urban location, with emissions from road transport being a major source of air pollution, and the underlying reason for declaration of the six Air Quality Management Areas (AQMAs). Emissions from industrial and domestic sources are still of importance however, and continue to be subject to the relevant regulation, where appropriate.

Previous assessment of the Barnsley Metropolitan Borough Council's air quality revealed the breaching (exceedance) of the annual average objective (standard) for nitrogen dioxide gas (NO_2) at receptors (mainly houses). These areas are close to several arterial roads and junctions near to Barnsley town centre and close to the M1 motorway. Nitrogen

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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, July 2021

[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

dioxide is strongly associated with traffic emissions in particular. This polluting gas is associated with respiratory symptoms[5]. All Barnsley's current AQMAs are summarised in the table below:

AQMA No.	Adjacent Roads / Junctions	Year Declared	Estimated Number of Domestic Dwellings within AQMA
1	M1 Motorway, 100 metres either side of the central reservation within the Barnsley Borough	2001	265
2A	A628 Dodworth Road	2005	285
4	A61 Harborough Hill Road	2008	42
5	Junction of A633 Rotherham Road and Burton Road	2008	16
6	A616 passing through Langsett	2012	7
7	Junction of A61 Sheffield and A6133 Cemetery Road	2012	2

Further details of our AQMAs can be found at List of Local Authorities with AQMAs - DEFRA, UK.

The Council has an Air Quality Action Plan (AQAP), completed in May 2017 (Updated 2019) available at https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/, which contains measures designed to improve air quality within the AQMAs and within the Council as a whole, as it is important to continually drive down emissions and reduce air pollution, even below legal standards to protect public health.

As with last year's Annual Status Report (ASR), this ASR is being written during a period of change within air quality management. The Government released the Clean Air Strategy[6] in 2019, which proposed new ways to tackle air pollution, particularly domestic emissions, and the Council await further direction from the forthcoming Environment Act on how air pollution can be further reduced. Furthermore, Clean Air Zones are still being

[5] DEFRA, February 2015 – Getting to grips with air pollution – the latest evidence and techniques – A briefing for Directors of Public Health

[6] Available at Clean Air Strategy 2019 - GOV.UK (www.gov.uk)

considered for neighbouring cities (Leeds, Greater Manchester, Sheffield-Rotherham), and the Council will monitor these developments for any potential impact on Barnsley Metropolitan Borough Council.

In 2021, there was still notably lower NO_2 concentrations compared with previous years within Barnsley Metropolitan Borough Council. As traffic emissions are the major source of NO_2 within urban areas, the reduction of traffic during the various 2020 and 2021 Covid-19 lockdowns resulted in reduced concentrations of NO_2. These reductions within Barnsley Metropolitan Borough Council are consistent with similar reductions occurring nationally.

Barnsley Metropolitan Borough Council will continue to monitor concentrations in future years, and further monitoring is required in order to continue assessing longer term trends, particularly as traffic flows are now returning back to pre-Covid-19 levels. Concentrations of other air pollutants such as particulate matter 10 (PM_{10}) were not impacted significantly by the Covid-19 lockdowns, due to the greater number of particulate matter sources and this pollutants transboundary nature.

Further details of Barnsley's local air quality, including up-to-date local data and comparison of these data with the Daily Air Quality Index (which tells us the daily pollution concentrations and their impacts on our health), can be found at our Barnsley Metropolitan Borough Council air quality webpage or Air Quality in England webpage. The Council believes it is important that Barnsley residents are made aware of their quality of the air they breathe and how it may impact on them.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[7] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given

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

that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

During 2020 and 2021, the Council has had significant financial and staff resources to deal with the local impact of the pandemic. This has had impact (either directly or indirectly) on the Councils' ability to deliver front line services to the same level as delivery pre-Covid-19. This includes the Councils' local air quality management duties. Nevertheless, the Council has been able to continue with the implementation of actions within the Air Quality Action Plan and continue air quality monitoring.

The Councils' Air Quality Action Plan Steering Group, consisting of Council officers from those services best placed to deliver local air quality improvement, continues to meet to progress actions to improve air quality. The group is chaired by Barnsley's Director of Public Health and the group oversees progress within the Councils' Air Quality Action Plan. The Plan contains 17 actions designed to improve the quality of the air we breathe, and we report annually to Government on progress on improving local air quality. The actions in the Plan are based around five key themes, with an aim assigned to each of them:

Key Theme	Aim
Reduce Traffic	We aim to improve air quality by promoting public transport and other travel alternatives to the use of the private car
Behavioural Change	We aim to improve air quality by encouraging people who live, work or learn in Barnsley to take steps to reduce their impact
Increase Efficiency	We aim to improve air quality by ensuring our transport networks operate as efficiently as possible by smoothing traffic flows and reducing congestion
Improve Fleet	We aim to improve air quality by reducing emissions from our Barnsley MBC fleet and other assets
Regulation	We aim to improve air quality by ensuring that industrial and domestic air pollution is correctly and fairly regulated, and ensuring that businesses are aware of their statutory requirements

In 2019, Barnsley Metropolitan Borough Council (MBC), along with our partners at Doncaster MBC, were awarded DEFRA air quality grant to undertake an eco-driver training project, encouraging local drivers who use their vehicles for business purposes to

adopt eco-driving techniques in a bid to lower emissions (Eco Business Driving (eco-businessdriving.co.uk)). Prior to Covid-19, this project was progressing well, but had to be halted as the training involved face-to-face tuition. Following discussions with DEFRA, the Council are now proceeding with the project by use of an online training module.

In November 2019, Barnsley Metropolitan Borough Council formally adopted a Sustainable Travel Supplementary Planning Document in order to further facilitate green travel options for new development within the Council, including the requirement for electric vehicle charge points. This should increase the availability of charge points in the Council, both at new houses development for future residents, but also at future commercial and retail development. In 2021, the electric vehicle charge points were installed throughout Barnsley Metropolitan Borough Council, please visit Zap-Map (Map of charging points for electric car drivers in UK: Zap-Map) to find the nearest charging point to you. Barnsley Metropolitan Borough Council will also be developing a project to install further charge points across the borough using available government grant funding. For information visit https://www.barnsley.gov.uk/services/roads-travel-and-parking/parking/electric-vehicle-charging-faqs/. Additionally, the Sustainable Travel Supplementary Planning Document was updated in November 2021, which now reflects latest developments in provision of electric vehicle charge points.

In conjunction with South Yorkshire partners Doncaster MBC, in 2020 the Council was successful in gaining DEFRA air quality grant funding for a “School Streets” project, designed to highlight the benefits of active travel for the daily “school-run”. This project successfully ran in 2021, with the roads around Shawlands, Holy Rood and Joseph Locke Primary Schools being closed to encourage families to leave their car at home and walk, scoot or cycle to school instead, this was the fourth out of ten planned school road closure events. For more information visit School Streets project continues its mission to create healthier and safer environments outside our schools (barnsley.gov.uk), Successful School Streets project sets the scene for future schemes (barnsley.gov.uk) or watch the School Streets video by Barnsley Metropolitan Borough Council here, which will provide you with more information about the project itself, including some great feedback from parents, pupils and school staff.

In 2020, the Sheffield City Region was awarded £166 million from the Government's "Transforming Cities Fund" to encourage an increase in journeys made by low carbon, sustainable modes and tackle air pollution. In forthcoming years up to 2022, the Council will be able to bid into this fund for ambitious schemes in the Borough in order to assist in the changes to more sustainable forms of transport, with schemes to be completed by March 2023.

Following the Councils' declaration of a Climate Emergency in 2019, in September 2020 the Council released its first Sustainable Energy Action Plan (SEAP) 2020 -2025. SEAP will aid the Council in becoming net zero carbon emissions by 2040 (if not earlier if possible) and the Council net zero by 2045. Projects undertaken following the SEAP over the next five years will also benefit local air quality as well as carbon reduction, as the Council seeks to reduce emissions because of more sustainable transport, energy efficiency, and promotion of renewable energy. Further information can be found at Reducing carbon emissions (barnsley.gov.uk).

In 2021, Barnsley Metropolitan Borough Council were in the process of revoking (removing) AQMA 5 at the junction of Burton Road and Rotherham Road, Monk Bretton. This AQMA was successfully revoked in February 2022.
Barnsley Metropolitan Borough Council will continue to work with partner organisations, such as neighbouring local authorities, the City Region, the Environment Agency and Highways England in order to continue our work to improve the quality of the air we breathe.

Finally, Barnsley Metropolitan Borough Council understand that the forthcoming Environment Bill is currently undergoing the Committee Stage at Parliament. The Council will take account of any air quality requirements of the Bill going forward.

Conclusions and Priorities

In 2021, only four non-automatic monitoring sites exceeded the Air Quality (AQ) objective of 40 µg/m^3, these were diffusion tubes 41 and 43 located within the Air Quality Management Area (AQMA) 4 and diffusion tubes 53 and 62. Though, once distance corrected to the nearest relevant receptor, they were found to be below the AQ objective.

Barnsley Metropolitan Borough Council are still seeing the impacts of Covid-19 traffic restrictions throughout 2021, overall, the annual mean concentrations have risen slightly higher than 2020 concentrations but are all still significantly lower than pre-Covid-19 concentrations. It is anticipated that traffic emissions will continue to rise as traffic flows return to pre-Covid-19 levels. Therefore, the Council cannot yet predict with certainty that air pollution concentrations will continue to meet legal standards in future years.

Currently, there is not any monitoring of $PM_{2.5}$ completed within Barnsley Metropolitan Borough Council. However, as recommended within Chapter 7 of LAQM Technical Guidance (TG) (16), in order to obtain an estimate of $PM_{2.5}$ concentrations within Barnsley Metropolitan Borough Council, a national PM_{10} to $PM_{2.5}$ annual mean conversion factor of 0.7 was applied to the automatic site ‘Barnsley A635 Kendray Roadside’ PM_{10} annual mean which found that the $PM_{2.5}$ AQ objective was not being breached.

For PM_{10}, there have been no exceedances of the annual and 24-hour mean AQ objectives for the past 10 years, taking into account that the 24-hour mean AQ objective should not be exceeded more than 35 times per year.

The ratified continuously monitored NO_2 annual mean and hourly mean concentrations for the past five years have also been consistently below the AQ objective.

AQMA 5 at the junction of Burton Road and Rotherham Road, Monk Bretton was successfully revoked in February 2022.

Barnsley Metropolitan Borough Council have further work to do, which includes improving air quality within the AQMAs in order to achieve long-term compliance (particularly in those AQMAs where road traffic emissions are increased due to gradient), whilst continuing to improve air quality as a whole.

Local Engagement and How to get Involved

Further information on local air quality can be obtained from the Councils' air quality web page Air quality (barnsley.gov.uk) and South Yorkshire Clean Air Campaign web page (Care4Air | Barnsley).

The Council also has an active travel hub, https://barnsley.activetravelhub.co.uk/, which promotes cycling and walking activity in the Borough.

Local stakeholders are invited to contact the Council regarding local air quality issues. Contact details are given below. Therefore, if you would like more information on our current and past air quality and what we are doing to improve the quality of the air we breathe, please contact us.

Send an e-mail to pollutioncontrol@barnsley.gov.uk

Call us on 01226 773743 Monday to Thursday 8:30am to 5pm Friday 8:30am to 4:30pm Please note, there is no answering service outside normal office hours.

Or write to:

Barnsley MBC Regulatory Services Pollution Control PO Box 634, Barnsley, S70 9GG

Local Responsibilities and Commitment

This ASR was prepared by Ricardo Energy and Environment with the support, agreement and approval of the following officers and departments:

John Scott, Service Manager (Pollution Control) – Regulatory Services

This ASR has not been signed off by a Director of Public Health.

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

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1 Local Air Quality Management

This report provides an overview of air quality in Barnsley Metropolitan Borough Council during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) 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 pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Barnsley 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

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 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Barnsley Metropolitan Borough Council can be found in Table 2.1. The table presents a description of the six AQMAs that were designated within Barnsley Metropolitan Borough Council in the reporting year 2021. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of the AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean;
- NO_2 1-hour mean (AQMA 6 only)

In February 2022, Barnsley Metropolitan Borough Council successfully revoked AQMA 5, originally declared in 2008 due to exceeding the NO_2 annual mean concentration (see monitoring/additional section).

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 National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
No.1	03/10/2001	NO_2 Annual Mean	An area encompassing residential properties one hundred metres either side of the central reservation of the M1 motorway in Barnsley	YES	46.4 µg/m^3	25.0 µg/m^3	Barnsley MBC Air Quality Action Plan	https://www.barnsley.gov.uk/media/18071/air-quality-action-plan.pdf
No. 2A	16/06/2005	NO_2 Annual Mean	Residential properties along Dodworth Road between Junction 37 of the M1 motorway and Town End Roundabout, including a portion of Summer Lane	NO	49.7 µg/m^3	34.6 µg/m^3	Barnsley MBC Air Quality Action Plan	https://www.barnsley.gov.uk/media/18071/air-quality-action-plan.pdf
No. 4	07/07/2008	NO_2 Annual Mean	Residential properties along the uphill carriageway of Harborough Hill Road from the gyratory	NO	58.6 µg/m^3	51.3µg/m^3	Barnsley MBC Air Quality Action Plan	https://www.barnsley.gov.uk/media/18071/air-quality-action-plan.pdf

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
No.5	07/07/2008	NO_2 Annual Mean	Residential properties along the uphill carriageway of Burton Road adjacent to the junction with the A633 Rotherham	NO	41.1 µg/m^3	34.8 µg/m^3	Barnsley MBC Air Quality Action Plan	https://www.barnsley.gov.uk/media/18071/air-quality-action-plan.pdf
No.6	30/08/2012 (Date amended: 27/10/2016 to include NO_2 1-hour mean)	NO_2 Annual Mean	Residential properties along the A616 Manchester Road in Langsett	YES	77.1 µg/m^3	36.3 µg/m^3	Barnsley MBC Air Quality Action Plan	https://www.barnsley.gov.uk/media/18071/air-quality-action-plan.pdf
No.7	30/08/2012	NO_2 Annual Mean	Residential properties at the junction of Sheffield Road and the A6133 Cemetery Road	NO	48.5 µg/m^3	33.6 µg/m^3	Barnsley MBC Air Quality Action Plan	https://www.barnsley.gov.uk/media/18071/air-quality-action-plan.pdf

Progress and Impact of Measures to address Air Quality in Barnsley Metropolitan Borough Council

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

1. The Council have provided a thorough, comprehensive report which contains the required content.
2. Comments from last year's ASR were mentioned and addressed in the 2021 ASR. The Council is encouraged to continue this.
3. The report clearly details the Councils review of AQMAs. The discussion of trends is discussed isolating patterns with each AQMA, and graphs group diffusion tubes by AQMA. This makes the interpretation of trends in AQMAs clear to the reader and demonstrates a thorough and well-considered review of AQMAs. Decisions regarding revocation of AQMAs No. 1 and No. 5, and the maintaining of remaining AQMAs is supported.
4. QA/QC procedures have been applied appropriately and accurately, with justifications outlined sufficiently in the Appendix. The Council have compared their local bias adjustment factor to prior years, noting a lower value this year. The Council may consider including a comparison to the national bias adjustment factor to interrogate the lower adjustment factor further and provide a more comprehensive justification for the chosen factor.
5. Overall, the report is detailed, concise and satisfies the criteria of relevant standards. The Council should continue their good and thorough work.

Barnsley Metropolitan Borough Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 17 measures are included within Table 2.2, with the type of measure and the progress Barnsley Metropolitan Borough Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers slowing the progress of the implementation improvement measures, these are also presented within Table 2.2.

More detail on these measures can be found in the Air Quality Action Plans, available at Air quality action plan (barnsley.gov.uk), which includes important links to other local and regional strategies which have contributed to the Plan.

Key completed measures are:

- ECO Stars - we intend however to keep this within the Action Plan, should funding to continue become available in future years
- ECO Stars taxis
- Barnsley Intelligent Transport System
- Promoting Travel Alternatives
- Anti-Idling Policy Feasibility Study
- Revocation of AQMA No. 5

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

- Eco-driver training project – a DEFRA Air Quality Grant funded project working with local grey fleet drivers (drivers who use their personal car for business use) in order to reduce emissions using Eco-driver training techniques. A final report will be submitted to DEFRA by December 2021.

The Council continue to be aware of proposals for Clean Air Zones (CAZs) within nearby local authorities in South and West Yorkshire. Whilst CAZs are not proposed for Barnsley, we will continue to work with these authorities in order to fully understand the impact of the implementation of these zones on Barnsley.

Barnsley Metropolitan Borough Council's priorities for the coming year are:

- Where appropriate the Council will bid for funding for actions within our Air Quality Action Plan, as and when this funding become available.
- Following a successful DEFRA joint air quality grant bid with our partners Doncaster MBC and Sheffield City Region, we will be completing a scheme involving temporary road closures around local schools, along with active travel initiatives in order to highlight the benefits of cycling and walking.

- To continue to work with developers to minimise the air quality impact of new development, and to ensure that this development takes account of future sustainable transport modes, and in particular refine the Councils' requirement of electric vehicle charge points for new development in the Borough, in order ensure installation of the most optimum charge point schemes.

- To align the Air Quality Action Plan with the Councils' Sustainable Energy Action Plan to ensure that the co-benefits of improved air quality and reduction in Carbon emissions in the Borough are maximised.

- Continue monitoring both inside and outside of AQMAs to gauge progress with actions and ensure continued compliance outside of our AQMAs, and assess the continued direct and indirect impact of the pandemic and subsequent recovery on air pollution concentrations

- To work with Public Health colleagues in order to raise awareness of poor air quality and action that can be taken to reduce emissions and develop programmes such as anti-idling and promotion of Clean Air Day.

- To work with nearby local authorities who may be required to implement Clean Air Zones, to understand the impact of these zones may have on Barnsley.

- To re-draft the Action Plan, in light of completion of the previous Action Plan 2016 to 2021 and development of the Councils' Sustainable Energy Action Plan

The principal challenges and barriers to implementation that Barnsley Metropolitan Borough Council anticipates facing are engaging with stakeholders (especially face-to-face) as we continue to deal with the impacts of the Covid-19 pandemic. Working with local business (including bus fleets) will be affected by their striving to recover from the impact of the pandemic, for example, the bus fleets are expecting future projections of patronage post pandemic to be lower than previously, and this situation will be monitored closely by the Barnsley Bus Partnership.

Progress on the following measures has been slower than expected due to:

- Eco-driver training project – this project should have been completed by June 2020. As the training was primarily face-to-face, the project was halted due to the various lockdown restrictions. Following discussions with DEFRA an online training module was developed to encourage remote training, however this has resulted in extending the deadline for completion of the project to July 2021.
- Barnsley Bus Partnership Agreement – this has been a very difficult time for bus companies and this voluntary agreement will be reviewed in light of the pandemic, trends in patronage etc. Consequently, the voluntary agreement is being considered for a replacement with an enhanced statutory agreement. Further renewal to younger less polluting fleet will form part of this consideration.
- Encourage uptake of lower emission vehicles and alternative fuels - electric vehicle charging points capable of charging up to 40 vehicles at various car parks across Barnsley. This work was supposed to be undertaken in 2020, but was delayed until 2021 due to the pandemic

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Barnsley Metropolitan Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of AQMA 4 (Harborough Hill Road) and AQMA 6 (A616 Langsett), assuming that traffic flows return to at least pre-pandemic levels.

Barnsley Council has taken forward several direct measures during the current reporting year of 2020 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

Details of all measures completed, in progress or planned are set out in Table 2.2.
Other ongoing challenges and barriers to implementation that the Council have encountered continue to be identifying solutions to increased emissions due to gradients within two of AQMAs, without causing displacement of emissions elsewhere.
Previous ASRs have discussed at length the issues of increased emissions due to uphill gradient within two of AQMAs (AQMAs 4 and 6). With regard to AQMA 4 our position remains the same as detailed within last years' ASR, which is:

"We have discussed this with DEFRA officials, suggesting further national guidance be issued on how to deal with this issue. We believe that local circumstances dictate it would be extremely difficult to reduce the impact of gradient on emissions within this AQMA,

without significant displacement of emissions elsewhere to nearby roads also with roads, significant gradient and adjacent relevant exposure.

This issue was previously raised within our 2017 and 2018 ASRs, and consequently, should opportunity arise, we would be happy to discuss issue at length with DEFRA and its representatives in order to identify a way forward." This position remains.

Monitoring data obtained within all our AQMAs are discussed in detail within 'Section 3: Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance' of this report.

Barnsley Metropolitan Borough Council are aware that previous predictions of improved air quality have proved incorrect due to then unknown issues, such as primary NO_2 from vehicle exhausts, failure by Euro standards to achieve expected improvements etc. Furthermore, any predictions for compliance in Barnsley are based upon trends obtained from roadside diffusion tube data

In previous ASR appraisals' DEFRA have stated that *"it will remain an important focus in future ASR reports, that Action Plan measures should be reviewed in relation to their impacts on air quality, and whether there are adequate measures in place to provide the levels of emission reductions required to meet the air quality objectives"*.

For our 2018 ASR, Barnsley MBC therefore sought further clarification from the LAQM helpdesk on how this could be undertaken, particularly with regard to quantifying anticipated emission reduction in Table 2.2. To summarise this correspondence, the Helpdesk proposed the use of the below matrix in order quantify air quality impacts:

Figure 2.2 Quantification of Emission Reduction

Costs		Air Quality Impacts		Timescale	
Score	Approximate Cost (£)	Score	Indicative Reduction in NO_2 Concentration		Years
7	<100k	7	>5 µg/m³	Short (S)	< 2
6	100-500k	6	2-5 µg/m³	↓	↓
5	500k-1million	5	1-2 µg/m³		
4	1-10 million	4	0.5 - 1 µg/m³		
3	10-50 million	3	0.2 – 0.5 µg/m³	Medium (M)	2-5
2	50-100 million	2	0 - 0.2 µg/m³	↓	↓
1	>100million	1	0 µg/m³	Long (L)	>5

We therefore applied the criteria contained within this matrix to each of our actions within our Action Plan within previous Annual Status Reports and have continued using this matrix in our 2020 Annual Status Report. This comparison is detailed within Table 2.2. We note that this matrix provides an indicative reduction of NO_2. Clearly the highest scoring impacts are the most effective in improving air quality and moving towards compliance with the air quality objectives in the Borough. Table 2.2 below therefore details the progress with actions over the past year.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	DEFRA AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Carriageway Improvements	Traffic Management	UTC, Congestion management, traffic reduction	2018	2021	LA Highways and Major Projects departments	Funding from Sheffield City Region Infrastructure Fund	NO	Funded	£1 million - £10 million	Implementation	4, but scheme specific	Date of completion	Commencement of construction of the scheme	None
2	Barnsley Bus Agreement	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2016	2022	LA Transport Dept. and private company	Private funding source	NO	Funded	£1 million - £10 million	Implementation	3 (estimated)	Uptake in Euro VI	Uptake in Euro VI buses, target 2022 49% or better. 2016/17 - 14%. 2017/18 18%. 2018/19 17%, end of 2019 21%	Potential Impact of Covid-19 and lockdown on fleet renewal. Estimated funding cost due to funding from private source
3	Encourage uptake of lower emission vehicles and alternative fuels	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2019	2021	LA Housing & Energy Dept.	Joint funding from Office for Zero Emissions Vehicles (OZEV) grant award and BMBC funding	NO	Funded	£100k - £500k	Implementation	2 (estimated)	Date of completion 2021	BMBC received OZEV funding to deliver 43 dual 7 kW EVCPs (on-street charging infrastructure), with match funding also from BMBC. All of the Barnsley Council EV chargepoints and other available public chargepoints are featured on Zap-Map (https://www.zap-map.com/live/)	2021. BMBC are committed to ensuring charging infrastructure in Barnsley meets the needs of residents and visitors and we already have plans to deliver additional rapid and fast charging in the town centre including the new Glassworks multi-storey car park. We will also be developing a project to install further chargepoints across the borough using available government grant funding. For information visit **https://www.barnsley.gov.uk/services/roads-travel-and-parking/parking/electric-vehicle-charging-faqs/?opt-in-translate=True**
4	Planning applications - air quality mitigation and assessment	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2015	2032	LA Environmental Health and Planning Departments	BMBC	NO	Funded	£10k - 50k	Implementation	2 (estimated)	No of Planning Applications where AQ actions have been agreed / conditioned / recommended	17 planning applications in 2016, where AQ actions have been agreed / conditioned / recommended,35 in 2017, 40 in 2018, 43 in 2019, 213 in 2020	This action will be ongoing as BMBC guidance and planning documents continually are refined
5	Control over emissions from Part B and A2 processes, and act as consultees for Part A1 processes	Other	Other	2012	2032	LA Environmental Health Department	BMBC	NO	Funded	£10k - 50k	Implementation	2 (estimated)	N/A	Ongoing	We await the Environmental Bill for any potential impacts on this action
6	Enforcement of Clean Air Act with regards to industrial smoke	Other	Other	2010	2032	LA Environmental Health Department	BMBC	NO	Funded	£10k - 50k	Implementation	2 (estimated)	N/A	Ongoing	We await the Environmental Bill for any potential impacts on this action
7	Enforcement of Clean Air Act with regards to domestic smoke	Other	Other	2010	2032	LA Environmental Health Department	BMBC	NO	Funded	£10k - 50k	Implementation	2 (estimated)	N/A	Ongoing	We await the Environmental Bill for any potential impacts on this action
8	Investigation of nuisance complaints, including appropriate action to resolve the complaint	Other	Other	2010	2032	LA Environmental Health Department	BMBC	NO	Funded	£10k - 50k	Implementation	2 (estimated)	N/A	Ongoing	We await the Environmental Bill for any potential impacts on this action
9	BMBC Fleet improvements	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2016	2025	LA Fleet Operations Department	BMBC	NO	Funded		Implementation	2 (estimated)	Number of Electric Vehicles purchased (minimum of 30)	30 procured so far	Vehicle Replacement Programme for 2021/22 should see a further 5 added to the Council fleet.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	DEFRA AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
10	ECO Stars HDV Fleet Recognition scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2012	2020	LA Transportation Department	Local Authority contribution and DEFRA AQ grant fund award	YES	Funded	£50k - £100k	Completed	2 (estimated)	No of operators and vehicles signed up to the scheme. In 2018-19 These have been submitted to DEFRA in the final report.	2018-19 ECO Stars business targets met by Aug 19. ECO Stars NRMM feasibility study being undertaken, along with Future Business Model	Internal discussions on future of Eco Stars scheme and brand
11	ECO Stars Taxi Fleet Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2018	2019	LA Transportation Department	DEFRA AQ grant fund award	YES	Funded	£10k - 50k	Completed	2 (estimated)	No of operators and vehicles signed up to the scheme. In 2018-19 These have been submitted to DEFRA in the final report.	Completed	Internal discussions on future of Eco Stars scheme and brand
12	Eco Driver Training Scheme	Vehicle Fleet Efficiency	Driver training and ECO driving aids	2019	2020	LA Public Health and Environmental Health Departments	DEFRA AQ grant fund award	YES	Funded	£50k - £100k	Implementation	2 (estimated)	No of operators and drivers signed up to the scheme	Scheme was progressing satisfactorily until Covid-19. Following discussions with DEFRA, training is now online	Completion now expected July 2021, with final report to follow this date
13	Barnsley Intelligent Transport Systems	Traffic Management	UTC, Congestion management, traffic reduction	2010	2020	LA Highways Department	BMBC	NO	Funded	£1 million - £10 million	Completed		Installation of intelligent systems (SCOOT / MOVA) within AQMAs. Several of our AQMAs now have SCOOT / MOVA installed, with performance reviewed	Completed	Ongoing maintenance along with minor upgrades when funding allows
14	Encourage cycling and walking (developing infrastructure and campaigns)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2022	2023	LA Highways Department	Transforming Cities Fund for cycling and walking infrastructure	NO	Funded	> £10 million	Planning	2 (estimated)	Completion of schemes	Successful Sheffield City Region bid for £166 million. Barnsley to submit and implement schemes to this funding with schemes completed by March 2023	One scheme is designed to enhance walking and cycling routes to retail estates located close to AQMA 4.
15	Assessment of air quality impact of major traffic schemes	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2018	2032	LA Environmental Health Department	BMBC	NO	Funded	< £10k	Implementation	Assessment of proposed major road schemes	Assessment of air quality impact of major road schemes with allotted timescale	Assessments completed to allotted timescales	Ongoing subject to future road schemes
16	Promoting Travel Alternatives (Workplace travel planning; encourage/facilitate home-working; personalised travel planning; school travel plans)	Promoting Travel Alternatives	Workplace Travel Planning	2017	2019	LA Transportation Department	BMBC and developer contributions	NO	Funded	£10k - 50k	Completed	2 (estimated)	Adoption of Sustainable Travel Supplementary Planning Document (SPD)	Adoption of SPD in 2019	SPD updated in November 2021, currently in Draft available at https://www.barnsley.gov.uk/media/20294/draft-sustainable-travel-spd-2021.pdf , which now reflects latest developments in provision of electric vehicle charge points,
17	Anti-idling policy feasibility study	Traffic Management	Anti-idling enforcement	2017	2020	LA Public Health and Environmental	BMBC	NO	Funded	£10k - 50k	Aborted	2 (estimated)	Number of participating organisations	None	This action intended to be renamed anti-idling raising awareness and run campaigns based on this theme. Unable to proceed due to Covid-19 and funding withdrawn to be used elsewhere

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	DEFRA AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
						Health Departments									

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), 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.

Currently, there is not any monitoring of $PM_{2.5}$ completed within Barnsley Metropolitan Borough Council.

However, as recommended within Chapter 7: Estimating $PM_{2.5}$ from PM_{10} Measurements of LAQM Technical Guidance (TG) (16)[8], in order to obtain an estimate of $PM_{2.5}$ concentrations within Barnsley Metropolitan Borough Council, a national PM_{10} to $PM_{2.5}$ annual mean conversion factor of 0.7 has been applied to the automatic site 'Barnsley A635 Kendray Roadside' PM_{10} annual mean (Table 2.3).

Table 2.3 Estimated $PM_{2.5}$ from PM_{10} measurements for Barnsley Metropolitan Borough Council, 2017 - 2021

Year	2017	2018	2019	2020	2021
PM_{10} annual mean (µg/m^3)	17	18	20	20	19
$PM_{2.5}$ annual mean (µg/m^3)	11.9	12.6	14	14	13.3

Furthermore, the current DEFRA background mapping resource[9] can be used to provide maximum background annual mean $PM_{2.5}$ concentrations within Barnsley Metropolitan Borough Council. The current DEFRA 2021 background maps for Barnsley Metropolitan Borough Council (2018 based) show that all background concentrations of $PM_{2.5}$ are below the annual mean Air Quality (AQ) objective for $PM_{2.5}$. The highest concentration is predicted to be 9.2 µg/m^3 within the 1 x 1km grid square with the centroid grid reference of

[8] Available at UK Regions (exc. London) Technical Guidance | LAQM (DEFRA.gov.uk)

[9] Available at Background Mapping data for local authorities - 2018 - DEFRA, UK

440500, 408500. This is an area in Grimethorpe, northeast Barnsley, that is surrounded by the A6195 and A628, but is mainly compromised of residential and commercial properties.

The Public Health Outcomes Framework (PHOF) is a Public Health England data tool that has been designed to aid in improving the nation's health and improve the health of the poorest communities faster. For more information, please visit https://fingertips.phe.org.uk/profile/public-health-outcomes-framework.

The PHOF indicator for the fraction of deaths attributable to particulate air pollution in Barnsley Metropolitan Borough Council was 4.7% during 2020 (latest available data), which is below the regional average of 5.0% and national average of 5.6% for 2020. Table 2.3 compares data from Barnsley Metropolitan Borough Council with Yorkshire and the Humber regional area and England, which shows that Barnsley Metropolitan Borough Council fraction of mortality attributable to particulate air pollution has always been lower than the Yorkshire and the Humber region and England, except for 2019 when the region and Barnsley Metropolitan Borough Council were the same.

Table 2.3 Comparison of fraction of mortality attributable to particulate air pollution (new method), 2018 - 2020

	Barnsley	Yorkshire and the Humber	England
2018	5.6%	6.1%	7.1%
2019	6.6%	6.6%	7.1%
2020	4.7%	5.0%	5.6%

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

Barnsley MBC has addressed the reducing emissions of $PM_{2.5}$ within the Council's AQAP, updated in 2019. Appendix G of the Council's AQAP includes a further evaluation of actions, including an assessment of actions with regard to their effect of reducing $PM_{2.5}$ concentrations, in accordance with Table A.1 of LAQM TG (16), Action Plan Toolbox.

By applying the measures detailed in Table A.1 of LAQM TG (16), all of the actions within the AQAP will assist in reducing $PM_{2.5}$ concentrations, including those actions in the AQAP which deal with industrial and domestic emissions, particularly actions five to eight which specifically target domestic and industrial $PM_{2.5}$ emissions. These actions are becoming increasingly important in reducing $PM_{2.5}$ emissions as domestic emissions have recently

been identified as a significant source of $PM_{2.5}$ within the recently published Clean Air Strategy. The entire Barnsley Metropolitan Borough Council is a designated ‘smoke control area’ to help improve air quality and reduce pollution from burning coal, oil or wood as fuel, more information is available at https://www.barnsley.gov.uk/services/pollution/air-pollution/.

The Clean Air Strategy, published in 2019, demonstrated further commitment to reducing $PM_{2.5}$ concentrations, particularly domestic emissions. Barnsley Metropolitan Borough Council wait for the forthcoming Environment Bill and subsequent clarification of the future role of local authorities and any additional duties in reducing emissions, particularly from domestic sources. Barnsley Metropolitan Borough Council understand that the Environment Bill will become law in 2022. Barnsley Metropolitan Borough Council also understand that the Government intends launching a consultation in early 2022 for a new legal target for $PM_{2.5}$ particles, with the further intention of making this law by October 2022.

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

This section sets out the monitoring undertaken within 2021 by Barnsley 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 2017 and 2021 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Barnsley Metropolitan Borough Council undertook automatic (continuous) monitoring at three sites during 2021. Table A.1 in Appendix A shows the details of the automatic monitoring sites. Please note that in August 2021, Barnsley A628 Pogmoor Roadside (BAR6)[10] site was relocated approximately 5m west to Barnsley A628 Roadside Site 2 (BAR11)[11], still within the boundary of AQMA 2A, due to the new junction gyratory improvement works being installed in the position of the original monitor.

The Air Quality in England page presents automatic monitoring results for Barnsley 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.

Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a

[10] Historic data available at Barnsley A628 Pogmoor Roadside [Closed] Latest Data - Air Quality monitoring service (airqualityengland.co.uk)

[11] Available at Barnsley A628 Roadside Site 2 Latest Data - Air Quality monitoring service (airqualityengland.co.uk)

problem. Barnsley Metropolitan Borough Council do not have a requirement to monitor any of these pollutants at this time.

3.1.2 Non-Automatic Monitoring Sites

Barnsley Metropolitan Borough Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 64 sites during 2021. **Table A.2** in Appendix A presents the details of the non-automatic sites. Please note that all five of 2020 Burton Road diffusion tubes were re-allocated in 2021 due to the upcoming AQMA 5 revocation, the five new diffusion tubes locations are now situated along A61 Sheffield Road to aid in identifying any further pollution hotspots and also assist with a potential future dispersion modelling study. Additionally, Table 3.1.1 highlights a further six diffusion tube location changes that occurred throughout the reporting year 2021 and the explanation as to why they occurred.

Table 3.1. 1. Diffusion tube changes throughout Barnsley MBC in 2021

Existing		New		Month moved	Reason for moving
33	Westway - Town Centre	33a	48 Sheffield Road, Barnsley	Nov-21	Westway had been well below AQ Objective for several years
42	Mottram Street / Eldon Street	42a	11 Eldon Street North	Sep-21	Relocated due to lamppost being replaced
45	Mexborough Road, Bolton-u-Dearne	45a	Dodworth Rd, J37, Outbound	Sep-21	Mexborough site was not breaching any AQ Objectives, modelling as part of the planning application, showed this new site would not be a problem, but reassurance modelling has been agreed around several locations of the new gyratory scheme.
51	Carlton Road (W'fd Road junction) downhill	51a	Hoyland Common Primary School	Sep-21	Following large development of at Hoyland, again modelling undertaken shown development will not have an impact, but reassurance modelling has been agreed next to school
54	Langsett	54a	PPP, Play Area	Nov-21	This have been located on the new gyratory development road, next to a children's play area following reassurance monitoring requests.
56	Langsett	56a	PPP Play Area	Nov-21	This have been located on the new gyratory development road, next to a children's play area following reassurance monitoring requests.

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.

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.

3.1.3 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 2021 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 200 µg/m^3, not to be exceeded more than 18 times per year.

Non-Automatic NO_2 Analysis

As mentioned above, NO_2 monitoring at Barnsley A628 Pogmoor Roadside (BAR6) was relocated to Barnsley A628 Roadside 2 (BAR11) at the end of August 2021. The data captures for the automatic instrument at each location were 64.7 % and 34.5 %, respectively. Both automatic sites BAR6 and BAR11 were used in the Diffusion Tube Data Processing Tool to derive a combined local adjustment factor of 0.87. This adjustment factor is similar to the value used in the 2021 ASR (0.84).

The national bias adjustment spreadsheet[12] for 2021 and 2020 had only one intercomparison study listed for the diffusion tube supplier (South Yorkshire Air Quality Samplers) and that was for London Marylebone Road. For both years, the adjustment factors were 0.77.

[12] Available at National Bias Adjustment Factors | LAQM (DEFRA.gov.uk) (version 03/22)

This was not considered representative for use in Barnsley so the local bias factor was used..

More information regarding the local and national bias adjustment factors is provided in Appendix C.

AMQA 1

In line with the previous five years Annual Status Reports (ASRs), the 2021 NO_2 annual mean objective within AQMA 1 has been below the AQ objective for all four diffusion tubes. Maps showing the location of these diffusion tubes are in Appendix D and are considered to be representative exposure throughout the AQMA. **Figure A.1. 2** charts a five-year trend in concentrations, which illustrates a downward trend in NO_2 concentrations, especially throughout 2020 and 2021 due to the ongoing Covid-19 imposed travel restrictions. Noting that diffusion tube site 10 was not changed throughout 2020 due to the pandemic, therefore not included in Figure A.1.1.

In their 2014 autumn statement, the Department for Transport announced proposals to extend the managed motorway scheme along the M1 motorway from Junction 35a to Junction 39, which encompasses the majority of the Barnsley's AQMA No. 1. In 2020, the Department of Transport published its Route Investment Strategy 2020 -2025 (RIS2)[13]. As there will not be any development of a scheme to increase capacity on this section of motorway until after 2025 and monitored concentrations within AQMA 1 continue to be below the annual mean objective for NO2, Barnsley Metropolitan Borough Council are considering revocation of this AQMA, even though any subsequent scheme may move emissions closer to receptors due to the potential for use of the current hard shoulder as a running lane. Barnsley Metropolitan Borough Council recommended in the 2020 ASR that we would subsequently draft a detailed assessment to provide the evidence and justification to revoke this AQMA. This approach was approved when our 2020 ASR was appraised by DEFRA. Unfortunately this detailed assessment has yet to be undertaken, but will be an action for the 2022 ASR.

In undertaking such an assessment Barnsley Metropolitan Borough Council believe that account should be taken of any future scheme which may involve moving emissions closer to receptors by the addition of an all lane running scheme utilising the hard shoulder of the

[13] Available at Road Investment Strategy 2 (RIS2): 2020 to 2025 - GOV.UK (www.gov.uk)

motorway. Consequently, we have been seeking Highways England comment regarding this situation, but as yet, have yet to receive their response. This has consequently delayed working on this detailed assessment.

AQMA 2A

All diffusion tubes within AQMA 2A recorded concentrations below the NO_2 AQ objective of 40 µg/m^3 in 2021, the highest NO_2 concentration occurred at diffusion tube 22 (34.6 µg/m^3), which is 13.5 µg/m^3 lower than 2019 NO_2 concentration (pre-Covid-19). **Figure A.1. 3** charts a five-year trend in concentrations, which illustrates that 2021 NO_2 concentrations have increased slightly from 2020 concentrations, though are all still lower than previous years.

Further monitoring is required before revocation can be considered for this AQMA, as the Covid-19 influenced 2020 and 2021 data cannot be used to provide further evidence of compliance of the objective within this AQMA.

AQMA 4

Figure A.1. 4 charts a five-year trend in concentrations, which illustrates that annualised and bias adjusted 2021 NO_2 concentrations for all diffusion tubes are higher than 2020 concentrations, but still significantly lower than previous years concentrations (i.e., pre-Covid-19). Diffusion tubes 41 and 43 annualised and bias adjusted NO_2 concentrations were 51.3 µg/m^3 and 47.9 µg/m^3, respectively. The fall off with distance concentrations for diffusion tubes 41 and 43, which predicts the NO_2 concentration at the receptor, are within 10% of the AQ objective, at 37.9 µg/m^3 and 38.5 µg/m^3 respectively. Diffusion tube 44 has increased slightly to 30.3 µg/m^3.

As discussed in detail within previous ASRs, NO_2 concentrations within AQMA 4 (Harborough Hill Road) are significantly affected by increased emissions due to an uphill gradient of the road.

AQMA 5

AQMA 5 is located near to the junction of Rotherham Road and Burton Road on the outskirts of Barnsley town centre. Data from this AQMA has showed compliance for the last eight years, (as distance corrected for exposure in accordance with LAQM TG (16) guidance). This AQMA was discussed at length in our 2020 Annual Status Report. DEFRA's 2020 appraisal agreed that Barnsley Metropolitan Borough Council could proceed to revocation of this AQMA, however revocation was delayed in 2021. The consultation exercise has been completed and this AQMA was successfully revoked in

February 2022. Monitoring of NO_2 concentrations within this AQMA will continue to demonstrate ongoing compliance for future years.

As previously mentioned, all five of 2020 Burton Road diffusion tubes were re-allocated in 2021 due to the upcoming AQMA 5 revocation, the five new diffusion tubes locations are now situated along A61 Sheffield Road. The remaining diffusion tube 39 situated within AQMA 5 was below the AQ objective for 2021 (34.8 $\mu g/m^3$).

AQMA 6

All diffusion tubes within AQMA 6 recorded concentrations below the NO_2 AQ objective of 40 $\mu g/m^3$ in 2021, the highest NO_2 concentration occurred at diffusion tube 8 (36.3 $\mu g/m^3$), which is within 10% of the AQ objective. The fall off with distance for diffusion tube 8 was 33 $\mu g/m^3$. **Figure A.1. 6** charts a five-year trend in concentrations, which illustrates that 2021 NO_2 concentrations have increased slightly from 2020 concentrations 2020, except for diffusion tube 2 which is the same as it was in 2020. Though are still, overall, lower than previous years monitoring.

AQMA 6 was declared due to exceedances of both the NO_2 annual mean and 1-hour mean NO_2 objectives. LAQM.TG (16) states that concentrations over 60 $\mu g/m^3$ are at risk of exceeding the 1-hour NO_2 mean subject to exposure, as was the case in 2017 when diffusion tube 3 and 8 measured 60.9 $\mu g/m^3$ and 65.4 $\mu g/m^3$. In 2021, roadside concentrations did not exceed 60 $\mu g/m^3$ for the fourth year in succession, which indicates that an exceedance of the 1-hour mean objective (200 $\mu g/m^3$) is unlikely at these sites.

Barnsley Metropolitan Borough Council previous ASRs informed on a study undertaken by Highways England to ascertain differences in traffic emissions along the A616 in Langsett with changing traffic flow, partly due to the impact of a junction within the AQMA on traffic emissions (right hand turn causing queuing traffic on an uphill gradient). The aim of this assessment was to determine whether traffic flow restrictions (removal of right-hand turn) at this junction would reduce traffic emissions, and subsequently consider a traffic scheme to address this.

It was concluded that the air quality monitoring data indicated that annual mean NO_2 concentrations are slightly higher when vehicles on the A616 are delayed by other vehicles turning right compared to vehicles that don’t experience a delay. This change in concentrations is, however, considered likely to be beyond what could be reasonably monitored in terms of attributing any change to a specific intervention. Given the impact of

any right turn ban or road closure Highways England have therefore concluded that it would not be proportional to pursue such an intervention.
Further ongoing roadside NO_2 monitoring data are required to assess future trends. However, the 2020 and 2021 data will not provide a true reflection of long-term trends due to the impact of the Covid-19 lockdown on traffic flows. Barnsley Metropolitan Borough Council intend to continue roadside monitoring at Langsett for future years.

Both Highways England and Barnsley Council will continue seeking feasible actions which could be implemented at Langsett, however, this is proving increasingly challenging as the Council consider the viability of actions, such as implementation of the right-hand turn discussed earlier. Highways England have implemented or considered various air quality interventions on their road network (Summary of research projects to improve air quality on or close to the strategic road network), and consideration has been given to applying these to the situation at Langsett. Unfortunately, for various reasons, these actions have been considered unworkable at Langsett.

AQMA 7

In 2018, for the first time since declaration of AQMA 7 in 2012, diffusion tube 48 located within this AQMA at the junction of Sheffield Road and Cemetery Road near Barnsley town centre was below 40 $\mu g/m^3$ (when concentrations were distanced corrected back to nearest residential building façade). In 2019 however, distance corrected concentrations exceeded the annual mean objective within this AQMA. In 2020 and 2021, the NO_2 annual mean (annualised and bias adjusted only) complied with the NO_2 AQ objective of 40$\mu g/m^3$ AQ objective, measuring 32.1 $\mu g/m^3$ and 33.6 $\mu g/m^3$ respectively.

Maps showing the location of these diffusion tubes are found in Appendix D, whilst **Figure A.1. 7** charts a five-year trend in concentrations.

Barnsley Metropolitan Borough Council also carry out non-automatic NO_2 monitoring out with the AQMAs. In 2021, apart from the aforementioned diffusion tubes within the AQMAs, there were two diffusion tubes that exceeded the NO_2 AQ objective and one diffusion tube that was highlighted as being at risk of exceeding the AQ objective as they measured concentrations within 10% of the NO_2 AQ objective, these were diffusion tube 53 (45 $\mu g/m^3$), new 2021 diffusion tube 61 (38.9 $\mu g/m^3$) and 62 (42.6 $\mu g/m^3$). Distance correction analysis concluded the NO_2 predicted at receptor for diffusion tube 53 is 33.0 $\mu g/m^3$, 61 $\mu g/m^3$ is 20.0 and 62 is 30.4 $\mu g/m^3$, which are all below the NO_2 AQ objective.

In the 2020 ASR, Barnsley Metropolitan Borough Council reported on diffusion tube 53, which is located at roadside on the outbound carriageway of the A61 Sheffield Road between the Alhambra Roundabout and the junction with the A635 Taylor Row (Doncaster Road), Barnsley town centre (see maps in Appendix D). A potential exceedance of the annual mean NO_2 objective was possible at this location in 2019 (as the measured concentration was 59 µg/m^3, distance corrected was 48.4 µg/m^3). Therefore, Barnsley Metropolitan Borough Council proposed to undertake a detailed assessment with a view to declare an additional AQMA. After discussion with the LAQM Helpdesk and further clarification on whether the monitoring location is considered to be representative, it was agreed to, initially, increase monitoring in 2021 within this area to determine any further pollution hot spots and assist any future dispersion modelling studies. Therefore, the five diffusion tubes along Burton Road (from AQMA5) were relocated to Sheffield Road in early 2021. One of the new diffusion tubes is diffusion tube 62, as previously discussed diffusion tube 62 was above the NO_2 AQ objective in 2021 but is predicted to be below the objective at the receptor. More year's data is required to see a trend at these five new locations, as well as more data from a typical traffic flow year (i.e., pre-Covid-19) before Barnsley can proceed with any detailed assessments. As Covid-19 lockdown restrictions continued throughout 2020 and 2021, the Council will await future year measurements to gain insight into a "typical" traffic flow year. In order to better address the issue of relevant exposure at above ground floor height, the Council have identified a suitable location to locate additional diffusion tubes at height, and data is being collected to inform any future decisions made.

Automatic NO_2 Analysis

Table A.13 in Appendix A compares the ratified continuous monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 µg/m^3, which have consistently been below the objective. Noting that automatic site BAR6 (relocated in August 2021 to BAR 11) lies within AQMA 2A.

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 200 µg/m^3, not to be exceeded more than 18 times per year, which have consistently been below this objective.

3.1.4 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.
There have been no exceedances of the annual and 24-hour mean objectives for PM_{10} for the past 10 years, taking into account that the 24-hour mean objective should not be exceeded more than 35 times per year.

3.1.5 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ monitoring is not currently undertaken by Barnsley Metropolitan Borough Council, please see section *'PM2.5 – Local Authority Approach to Reducing Emissions and/or Concentrations'* of this report which details the estimated $PM_{2.5}$ concentrations within the Council.

3.1.6 Sulphur Dioxide (SO_2)

Table A.9 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2021 with the air quality objectives for SO_2.

There have been no measured exceedances of the SO_2 24-hour, 1-hour and 15-minute objectives.

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)
BAR9	Barnsley A635 Kendray Roadside	Roadside	436298	405691	PM10	No	Beta Attenuation	N/A	5	1.45
BAR6	Barnsley A628 Pogmoor Roadside (closed August 2021)	Roadside	432684	406173	NO_2	Yes, AQMA 2A	Chemiluminescent	N/A	3.5	1.7
BAR11	Barnsley A628 Roadside 2 (began September 2021)	Roadside	432584	406085	NO_2	Yes, AQMA 2A	Chemiluminescent	N/A	7	1.8
BAR3	Barnsley Gawber	Urban Background	432525	407475	NO2, SO2, O3	No	Chemiluminescent, UV Fluorescence UV Absorption	N/A	N/A	4.0 (estimated)

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)
1	Midhopestones 1 Eastbound	Roadside	423621	399817	NO2	No	3.0	2.5	No	2.9
2	Langsett 1, Stanley Cottages	Roadside	421102	400496	NO2	Yes, AQMA 6	0.0	1.5	No	3.0
3	Footpath Sign, School House, Langsett	Roadside	421143	400481	NO2	Yes, AQMA 6	0.0	3.5	No	1.9
4	Langsett 2, School House	Roadside	421126	400485	NO2	Yes, AQMA 6	N/A	2.0	No	2.8
5	Langsett 3, Café	Roadside	421291	400482	NO2	Yes, AQMA 6	0.0	2.0	No	2.9
6	Langsett 4, Wagon and Horses	Roadside	421282	400471	NO2	Yes, AQMA 6	N/A	3.0	No	2.6
7	Gilbert Hill - Langsett	Roadside	421117	400501	NO2	No	7.5	2.5	No	2.6
8	Langsett - Footpath Sign Bus Stop	Roadside	421215	400475	NO2	Yes, AQMA 6	2.0	2.0	No	2.1
9	Claycliffe Road / Barugh Lane	Kerbside	431468	408579	NO2	No	0.0	1.5	No	2.8
10	Lansdowne Crescent, Darton	Urban Background	430820	409453	NO2	Yes, AQMA 1	0.0	N/A	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)
11	23 Dodworth Road	Roadside	434000	406292	NO2	Yes, AQMA 2A	0.0	N/A	No	2.7
12	53 Dodworth Road	Roadside	433910	406290	NO2	Yes, AQMA 2A	0.0	N/A	No	2.8
13	Traffic Lights Dodworth Road	Roadside	433820	406278	NO2	Yes, AQMA 2A	2.5	2.5	No	2.9
14	Dodworth Road - SE of Cross Roads	Roadside	432702	406160	NO2	Yes, AQMA 2A	13.0	3.0	No	2.7
15, 16, 17	Pogmoor Crossroads	Roadside	432680	406174	NO2	Yes, AQMA 2A	N/A	N/A	Yes	1.7
15a, 16a, 17a	Barnsley A628 Roadside Site 2	Roadside	432584	406085	NO2	Yes, AQMA 2A	N/A	7.0	Yes	1.7
18	Pogmoor Road	Roadside	432603	406312	NO2	No	N/A	5.3	No	2.8
19	Post Office, Crown Hill Rd	Roadside	432481	406068	NO2	Yes, AQMA 2A	0.0	N/A	No	2.8
20	Dodworth Road - Outbound - LC 54	Roadside	432535	406071	NO2	Yes, AQMA 2A	7.5	1.5	No	3.0
21	305 Dodworth Road	Roadside	432402	406013	NO2	Yes, AQMA 2A	8.0	3.0	No	2.9

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)
22	315 Dodworth Rd, Pogmoor	Kerbside	432351	405985	NO2	Yes, AQMA 2A	11.5	2.5	No	2.9
23	329 Dodworth Rd, Pogmoor	Roadside	432281	405951	NO2	Yes, AQMA 2A	8.0	2.0	No	3.0
24	A6135, Hoyland	Kerbside	435274	400384	NO2	No	6.5	1.0	No	2.8
25	A61 Sheffield Road, Birdwell	Roadside	434832	400405	NO2	No	3.0	1.5	No	2.9
26	A61 Sheffield Road, Birdwell	Roadside	434820	400421	NO2	No	3.0	1.5	No	2.8
27	A61 Sheffield Road, Birdwell	Roadside	434823	400398	NO2	No	N/A	N/A	No	2.9
28	Tankersley School	Roadside	434652	400231	NO2	Yes, AQMA 1	0.0	N/A	No	2.8
29	5, Moor Lane, Birdwell	Urban Background	434721	400352	NO2	Yes, AQMA 1	0.0	N/A	No	2.7
30	Cock Inn, Birdwell	Roadside	434309	401032	NO2	Yes, AQMA 1	0.0	N/A	No	2.6
31	Sheffield Rd - LC 32	Roadside	434595	401107	NO2	No	3.5	2.5	No	3.0
32	Sheffield Rd – Chapel Street, Birdwell	Roadside	434559	401274	NO2	No	0.0	N/A	No	2.8

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)
33	Westway - Town Centre	Roadside	434251	406199	NO2	No	0.0	N/A	No	2.9
33a	48 Sheffield Road, Barnsley	Roadside	434831	406001	NO2	No	5.0	3.0	No	2.8
34	Wakefield Road / Carlton Road	Roadside	435011	408281	NO2	No	7.0	2.0	No	3.5
35	Wakefield Road - South of Carlton Road	Roadside	435027	408190	NO2	No	N/A	N/A	No	2.8
36	Wakefield Road / Smithies Lane (North)	Roadside	435027	408104	NO2	No	6.5	2.0	No	2.7
37	Wakefield Rd – app. Burton Rd junc.	Roadside	435174	407499	NO2	No	5.8	1.7	No	2.8
38	Old Mill Lane / Honeywell Street	Kerbside	434757	406995	NO2	No	3.0	0.3	No	2.8
39	Burton Road – app Rotherham Rd junc.	Kerbside	436072	407320	NO2	Yes, AQMA 5	2.5	0.5	No	2.7
40	Grange Lane, near to Cundy Cross junc.	Roadside	437122	406557	NO2	No	6.0	1.4	No	2.8

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)
41	49 Harborough Hill Road	Roadside	434933	406695	NO2	Yes, AQMA 4	8.0	2.0	No	2.7
42	Mottram Street / Eldon Street	Roadside	434727	406753	NO2	No	0.0	0.5	No	2.8
42a	11 Eldon Street North	Kerbside	434735	406773	NO2	No	4.0	0.5	No	2.7
43	Harborough Hills Road – near to bakery	Roadside	434955	406769	NO2	Yes, AQMA 4	5.0	2.0	No	2.9
44	119 Harborough Hills	Roadside	435049	407047	NO2	Yes, AQMA 4	0.0	N/A	No	2.9
45	Mexborough Road, Bolton-u-Dearne	Urban Background	445699	402140	NO2	No	0.0	N/A	No	3.2
45a	Dodworth Rd, J37, Outbound	Roadside	432280	405928	NO2	No	8.1	1.8	No	2.9
46	Tesco, Wwell Lane	Kerbside	437554	405291	NO2	No	4.0	0.7	No	3.2
47	Sheffield Road / Park Road Xrds	Roadside	434958	405672	NO2	No	0.0	N/A	No	2.8
48	Sheffield Road / Cemetery Road Xrds	Roadside	434964	405709	NO2	Yes, AQMA 7	1.5	2.0	No	2.7
49	Doncaster Road, Ardsley	Kerbside	437528	405675	NO2	No	3.9	0.5	No	2.8

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)
50	Carlton Road (W'fd Road junction) uphill	Roadside	435062	408244	NO2	No	5.5	1.5	No	2.8
51	Carlton Road (W'fd Road junction) downhill	Roadside	435049	408229	NO2	No	0.0	1.3	No	2.4
51a	Hoyland Common Primary School	Roadside	435486	400218	NO2	N/A	6.0	1.4	No	2.8
52	Wakefield Road / Bar Lane junction	Roadside	434112	409625	NO2	No	2.8	1.6	No	2.8
53	Sheffield Road, town centre	Roadside	434809	406023	NO2	No	2.5	0.3	No	2.7
54	Langsett	Roadside	421053	400489	NO2	No	N/A	3.0	No	2.8
54a	PPP, Play Area	Roadside	432663	406325	NO2	Yes, AQMA 6	N/A	15.0	No	?
55	Wombwell Lane, adj. Keel Inn	Roadside	437369	405456	NO2	No	2.4	1.6	No	2.7
56	Langsett	Roadside	420982	400495	NO2	No	N/A	1.8	No	2.7
56a	PPP Play Area	Roadside	432628	406311	NO2	No	N/A	12.0	No	2.8
57	Grange Lane, Stairfoot, northbound	Roadside	437242	405772	NO2	No	1.5	1.5	No	?

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co located with a Continuous Analyser?	Tube Height (m)
58	Grange Lane, Stairfoot, southbound	Roadside	437250	405813	NO2	No	2.3	2.3	No	2.8
59	Entrance to Horizon, sign	Roadside	432876	406260	NO2	Yes, AQMA 2A	52.0	3.0	No	2.9
60	LC41, opp Horizon Entrance	Roadside	432839	406259	NO2	Yes, AQMA 2A	90.0	3.0	No	2.1
61	LC16, Manx Arms. S. Rd	Roadside	434780	406055	NO2	No	40.0	1.5	No	3.1
62	LC22, Junc. Quarry St., S. Rd	Roadside	434855	405957	NO2	No	5.1	1.4	No	3.0
63	LC35, Smokey Sam's, S. Rd	Roadside	434917	405818	NO2	No	0.0	4.6	No	2.9
64	LC32, Lidia Supermarket, S. Rd	Roadside	434933	405781	NO2	No	12.0	4.6	No	3.2

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 2021 (%) (2)	2017	2018	2019	2020	2021
BAR11	432584	406085	Roadside	100	34.46	-	-	-	-	24
BAR3	432525	407475	Urban Background	88.9	88.9	16	16	17	12	13
BAR6	432684	406173	Roadside	100	64.7	35	32	32	25	22.1

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.TG16 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 (%)	Valid Data Capture 2021 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2017	2018	2019	2020	2021
1	423621	399817	Roadside	100.0	92.3	35.9	29.5	29.3	18.1	19.3
2	421102	400496	Roadside	100.0	92.3	37.4	34.5	33.8	23.5	23.5
3	421143	400481	Roadside	100.0	92.3	**60.9**	**49.5**	**49.0**	31.2	34.4
4	421126	400485	Roadside	100.0	92.3	**57.0**	**48.2**	**48.8**	31.5	34.8
5	421291	400482	Roadside	100.0	92.3	39.5	31.8	31.9	21.1	22.5
6	421282	400471	Roadside	100.0	92.3	**45.1**	39.3	38.8	24.2	27.7
7	421117	400501	Roadside	100.0	92.3	32.7	28.5	28.3	18.6	18.8
8	421215	400475	Roadside	100.0	92.3	**65.4**	**55.7**	**55.6**	36.2	36.3
9	431468	408579	Kerbside	45.0	42.3	31.9	27.7	31.7	19.2	20.0
10	430820	409453	Urban Background	36.0	34.6	26.9	22.2	24.4	-	17.1
11	434000	406292	Roadside	100.0	92.3	38.5	35.0	39.1	26.5	29.1
12	433910	406290	Roadside	100.0	92.3	**41.8**	38.9	38.9	25.3	29.0

13	433820	406278	Roadside	100.0	92.3	**43.9**	39.0	**43.3**	29.3	31.8
14	432702	406160	Roadside	100.0	92.3	**44.4**	39.4	**40.5**	26.6	29.7
15, 16, 17	432680	406174	Roadside	100.0	57.7	32.6	33.6	31.9	24.6	26.6
15a, 16a, 17a	432584	406085	Roadside	100.0	34.6	**-**	**-**	**-**	**-**	21.3
18	432603	406312	Roadside	100.0	92.3	34.1	27.6	30.3	16.2	17.3
19	432481	406068	Roadside	100.0	92.3	28.7	25.7	27.2	18.1	19.1
20	432535	406071	Roadside	82.0	75.0	**40.9**	37.0	39.6	29.3	31.0
21	432402	406013	Roadside	100.0	92.3	**49.1**	**45.8**	**46.2**	29.5	31.8
22	432351	405985	Kerbside	100.0	92.3	**50.0**	**44.2**	**48.1**	32.6	34.6
23	432281	405951	Roadside	100.0	92.3	**52.0**	**43.4**	**47.0**	28.9	31.5
24	435274	400384	Kerbside	100.0	92.3	**40.0**	30.2	30.3	20.6	24.4
25	434832	400405	Roadside	100.0	92.3	**40.2**	34.3	38.6	26.0	32.4
26	434820	400421	Roadside	100.0	92.3	**43.2**	**40.1**	**40.3**	25.7	32.5
27	434823	400398	Roadside	100.0	92.3	38.6	39.1	39.8	23.9	27.4
28	434652	400231	Roadside	73.0	67.3	22.6	23.9	23.6	15.1	16.6

29	434721	400352	Urban Background	100.0	92.3	32.1	27.6	28.3	17.8	19.0
30	434309	401032	Roadside	55.0	50.0	36.2	29.5	33.4	20.1	25.0
31	434595	401107	Roadside	91.0	82.7	31.8	29.7	29.7	19.1	21.7
32	434559	401274	Roadside	73.0	67.3	38.5	32.8	35.5	23.0	24.7
33	434251	406199	Roadside	82.0	75.0	30.9	29.0	31.2	18.7	19.6
33a	434831	406001	Roadside	100.0	17.3	-	-	-	-	-
34	435011	408281	Roadside	100.0	92.3	35.2	33.1	32.2	21.6	24.3
35	435027	408190	Roadside	100.0	92.3	38.7	37.4	35.9	25.7	28.9
36	435027	408104	Roadside	100.0	92.3	**43.4**	**40.1**	**40.3**	27.4	31.7
37	435174	407499	Roadside	100.0	92.3	33.4	30.2	32.3	21.0	23.7
38	434757	406995	Kerbside	100.0	92.3	**43.4**	**40.4**	37.8	24.7	29.5
39	436072	407320	Kerbside	100.0	92.3	**45.0**	**44.4**	**41.9**	28.9	34.8
40	437122	406557	Roadside	91.0	84.6	-	-	**42.2**	30.0	35.4
41	434933	406695	Roadside	100.0	92.3	**68.7**	**59.3**	**60.3**	**42.4**	**51.3**
42	434727	406753	Roadside	64.0	57.7	33.6	31.4	28.1	21.9	33.2

42a	434735	406773	Kerbside	100.0	34.6	-	-	-	-	28.2
43	434955	406769	Roadside	100.0	92.3	**65.8**	**59.7**	**58.9**	**41.4**	**47.9**
44	435049	407047	Roadside	100.0	92.3	**42.6**	37.2	39.1	27.4	30.3
45	445699	402140	Urban Background	50.0	7.7	24.8	21.7	22.6	-	-
45a	432263	405951	Roadside	36.0	34.6	-	-	-	-	27.3
46	437554	405291	Kerbside	100.0	92.3	**48.1**	38.4	**42.2**	29.0	29.4
47	434958	405672	Roadside	100.0	92.3	38.6	30.3	33.5	22.5	24.9
48	434964	405709	Roadside	100.0	92.3	**48.4**	**43.4**	**47.4**	32.1	33.6
49	437528	405675	Kerbside	100.0	92.3	**46.4**	39.0	**41.9**	30.2	31.2
50	435062	408244	Roadside	91.0	84.6	-	-	37.4	25.0	27.1
51	435049	408229	Roadside	9.0	7.7	-	-	31.0	20.4	-
51a	435486	400218	Roadside	36.0	34.6	-	-	-	-	23.8
52	434112	409625	Roadside	100.0	92.3	-	-	35.4	24.3	25.0
53	434809	406023	Roadside	100.0	92.3	-	-	**59.0**	38.6	**45.0**
54	421053	400489	Roadside	82.0	75.0	-	-	-	24.1	26.4

54a	432663	406325	Roadside	100.0	17.3	-	-	-	-	-
55	437369	405456	Roadside	100.0	92.3	-	-	**42.6**	27.0	30.2
56	420982	400495	Roadside	73.0	65.4	-	-	-	25.9	34.2
56a	432628	406311	Roadside	100.0	17.3	-	-	-	-	-
57	437242	405772	Roadside	91.0	82.7	-	-	38.9	29.1	27.9
58	437250	405813	Roadside	91.0	84.6	-	-	37.4	26.1	26.6
59	432876	406260	Roadside	100.0	92.3	-	-	-	-	22.2
60	432839	406259	Roadside	91.0	82.7	-	-	-	-	23.0
61	434780	406055	Roadside	100.0	92.3	-	-	-	-	38.9
62	434855	405957	Roadside	100.0	92.3	-	-	-	-	**42.6**
63	434917	405818	Roadside	100.0	92.3	-	-	-	-	24.2
64	434933	405781	Roadside	100.0	92.3	-	-	-	-	26.4

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.TG16 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 Concentration (µg/m^3) (Non-Automatic)

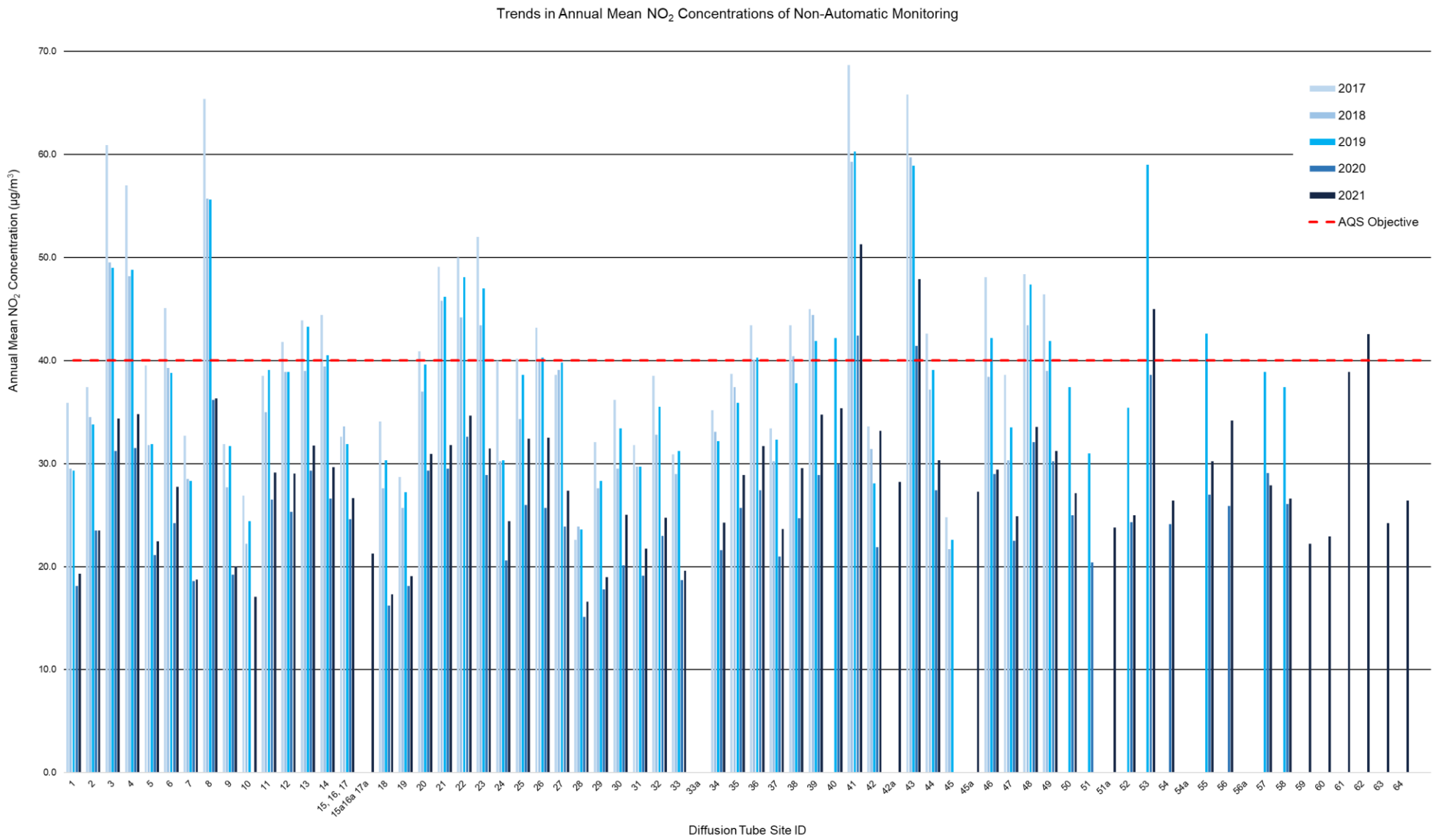


Figure A.1. 1 – Trends in Annual Mean NO_2 Concentrations (Automatic)

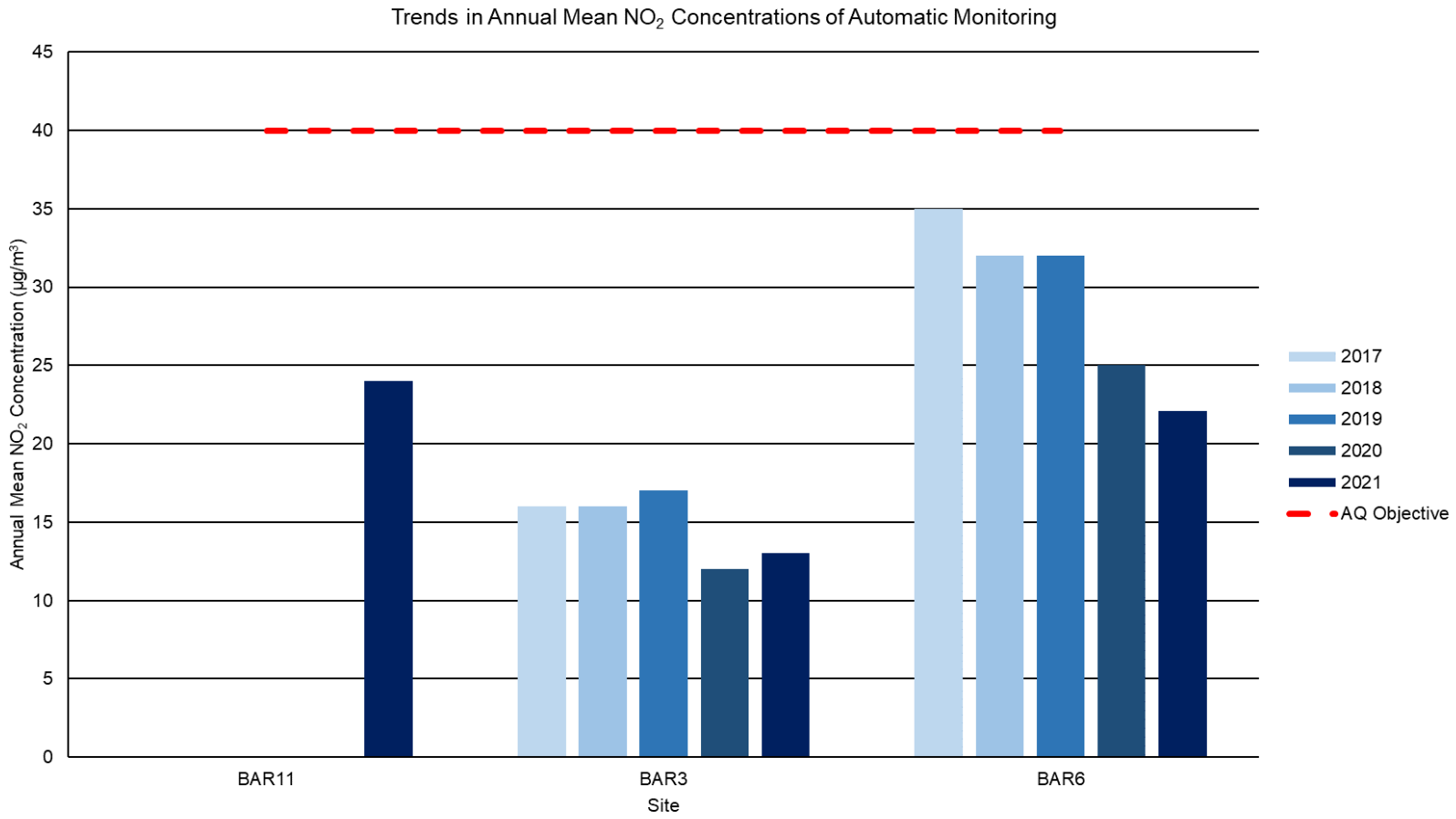


Figure A.1. 2 - Annual Mean NO_2 Concentration (µg/m^3) in AQMA 1

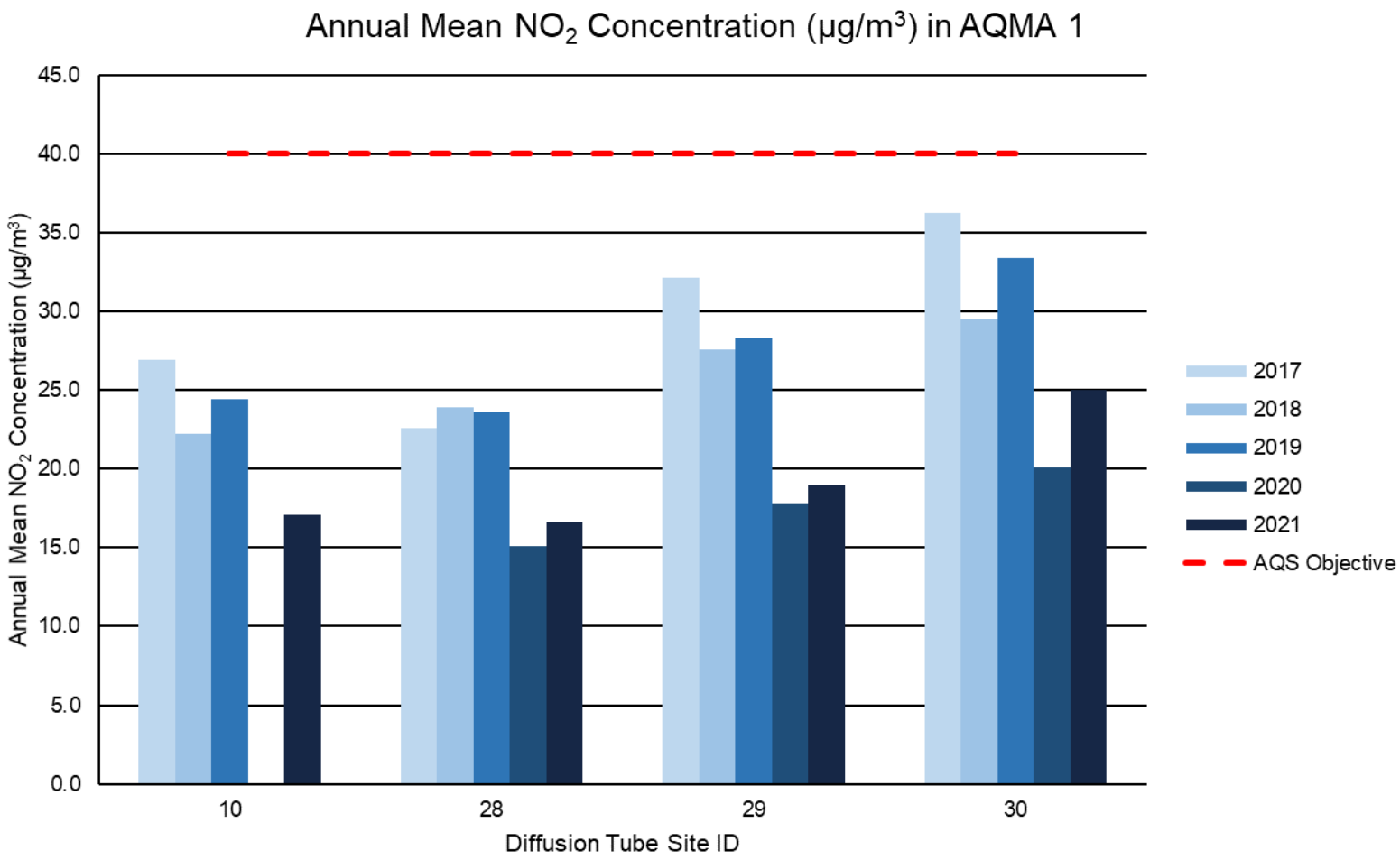


Figure A.1. 3 – Annual Mean NO_2 Concentration (µg/m^3) in AQMA 2A

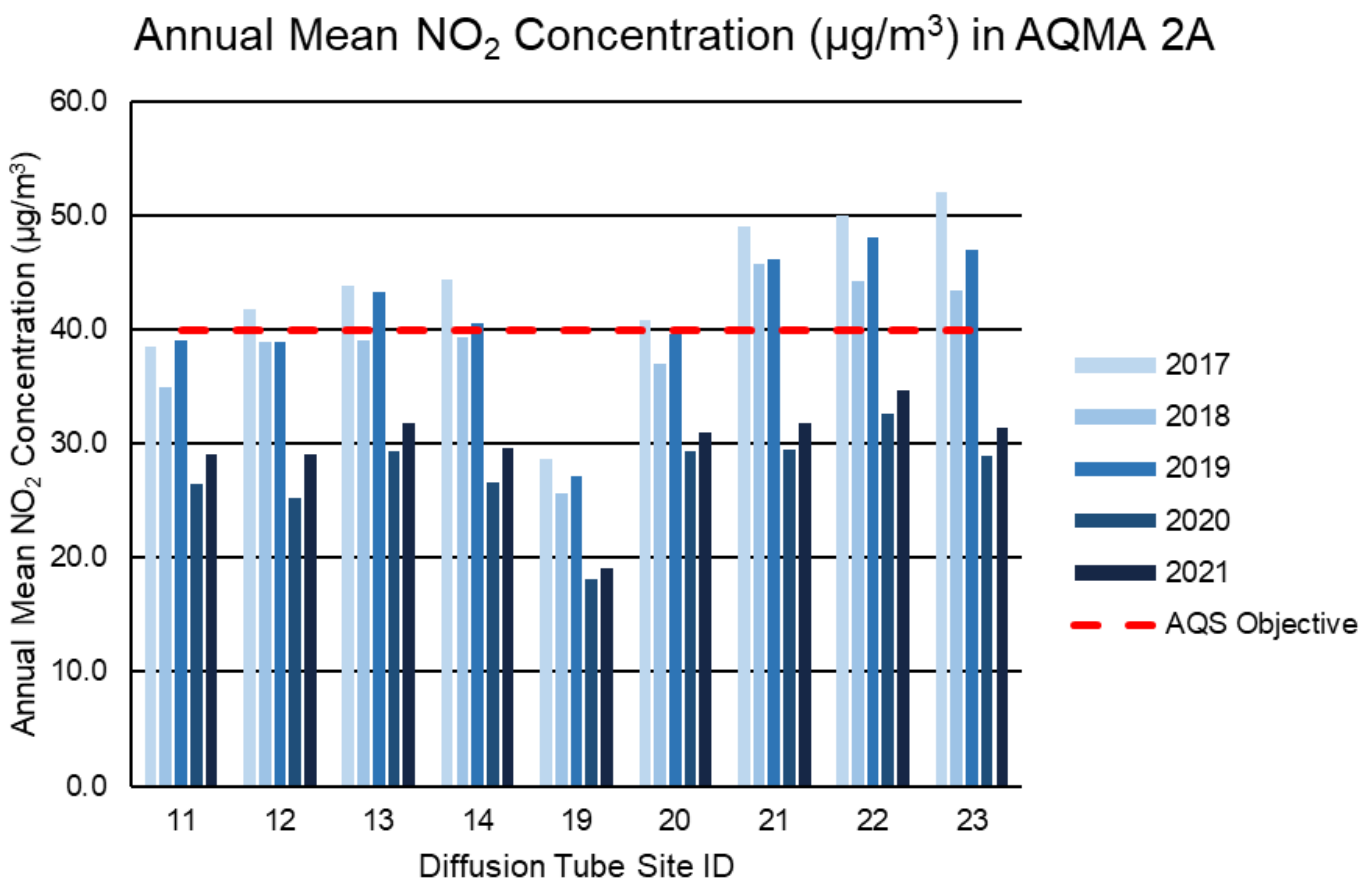


Figure A.1. 4 – Annual Mean NO_2 Concentration (µg/m^3) in AQMA 4

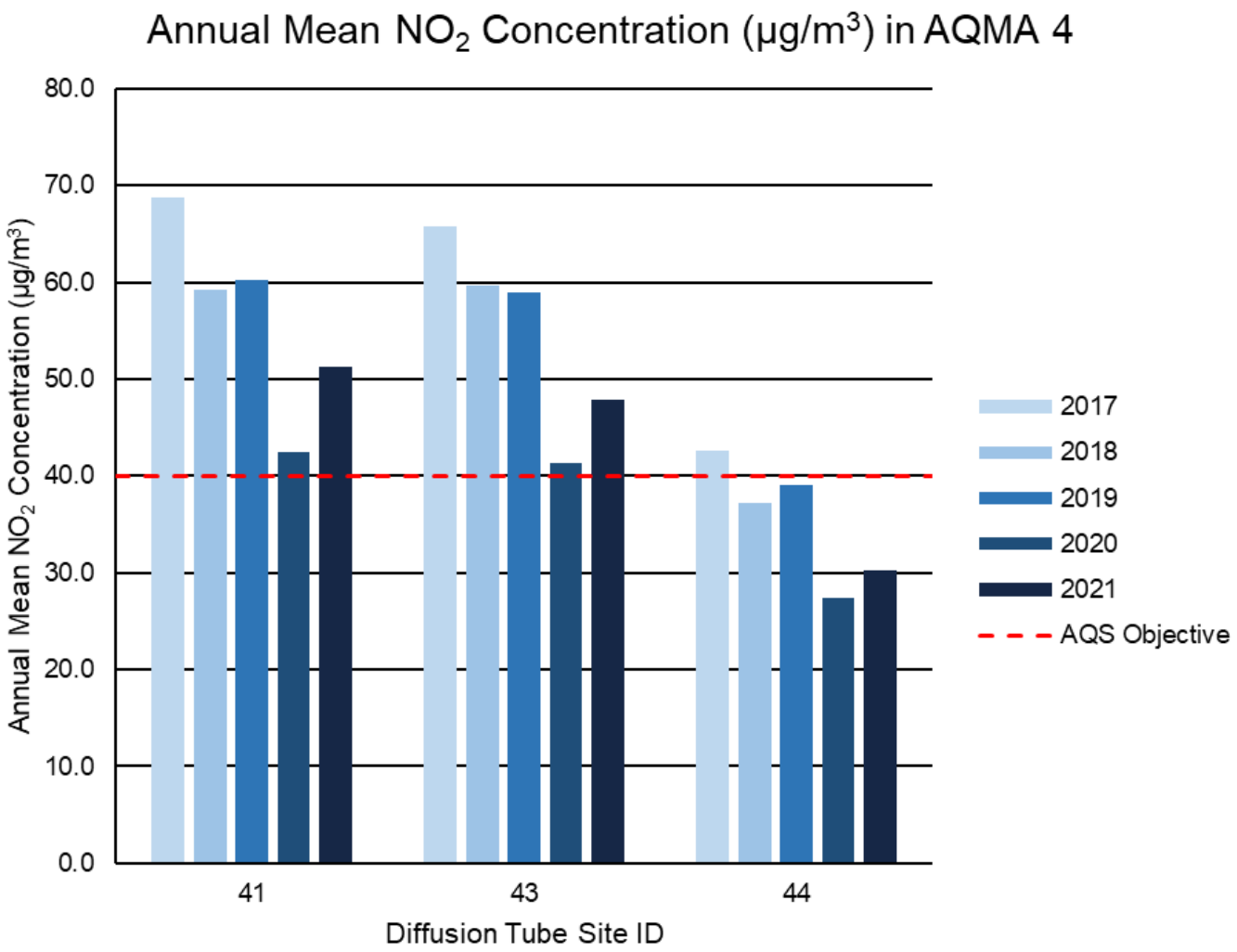


Figure A.1. 5 – Annual Mean NO_2 Concentration (µg/m^3) in AQMA 5

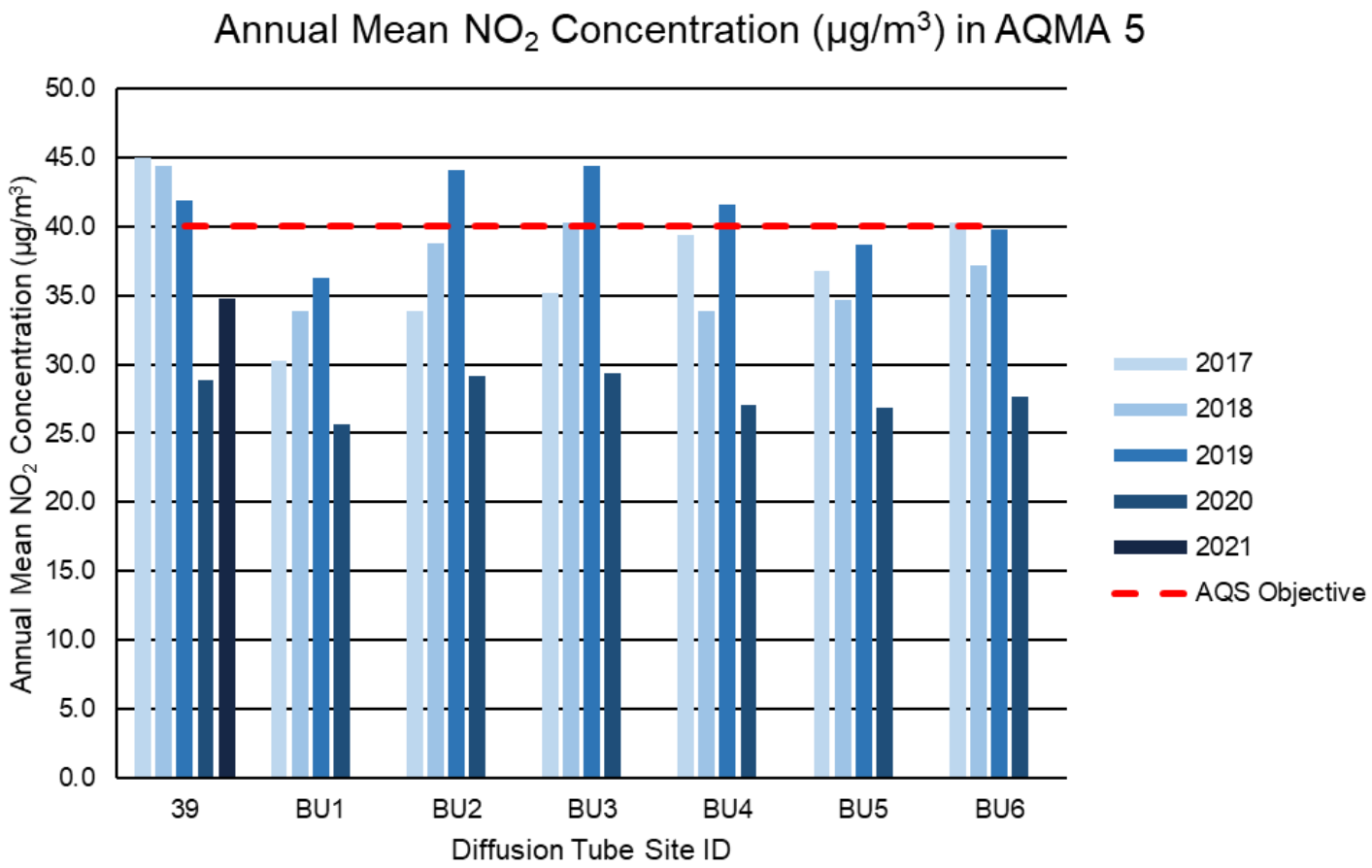


Figure A.1. 6 – Annual Mean NO_2 Concentration (µg/m^3) in AQMA 6

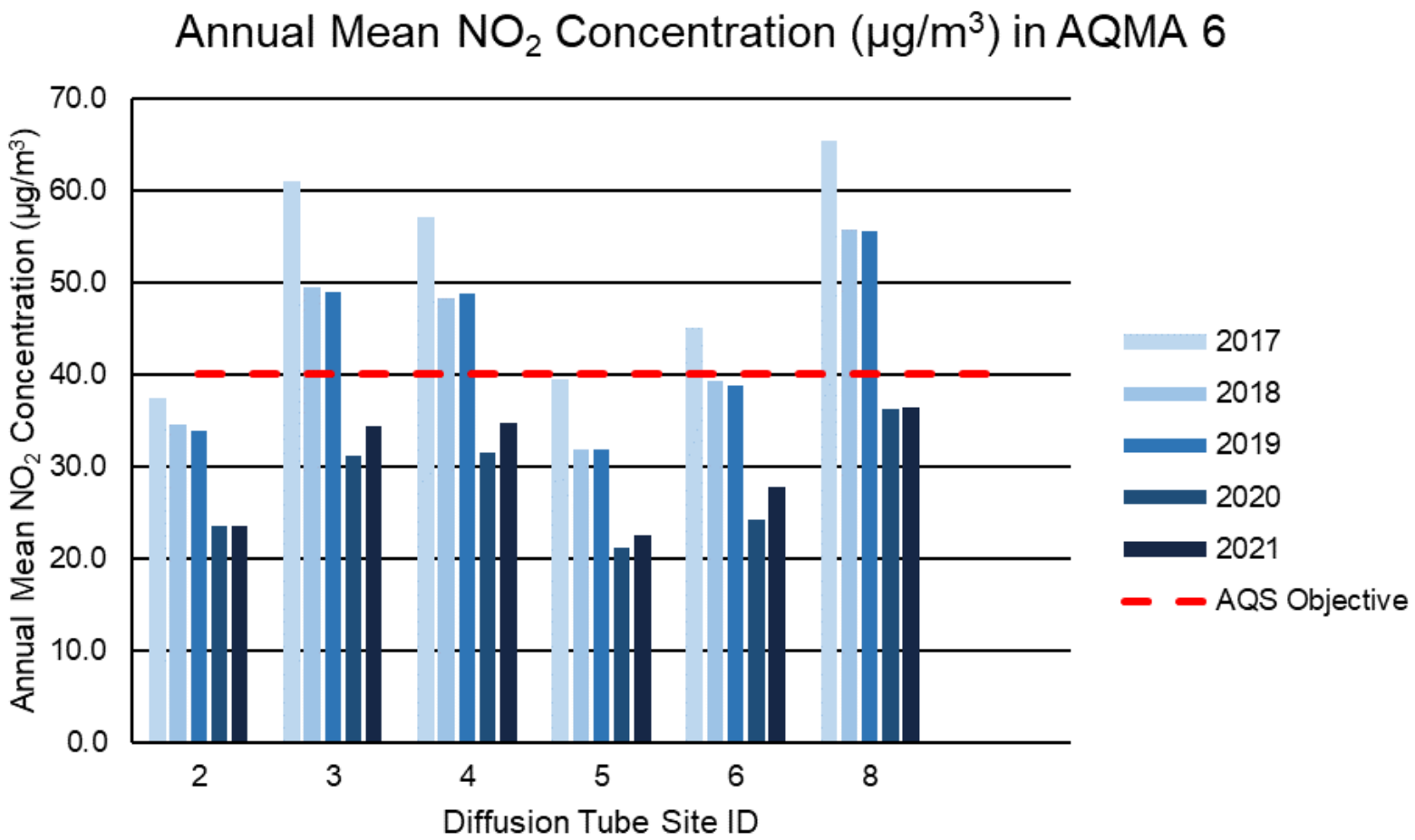


Figure A.1. 7 – Annual Mean NO_2 Concentration (µg/m^3) in AQMA 7

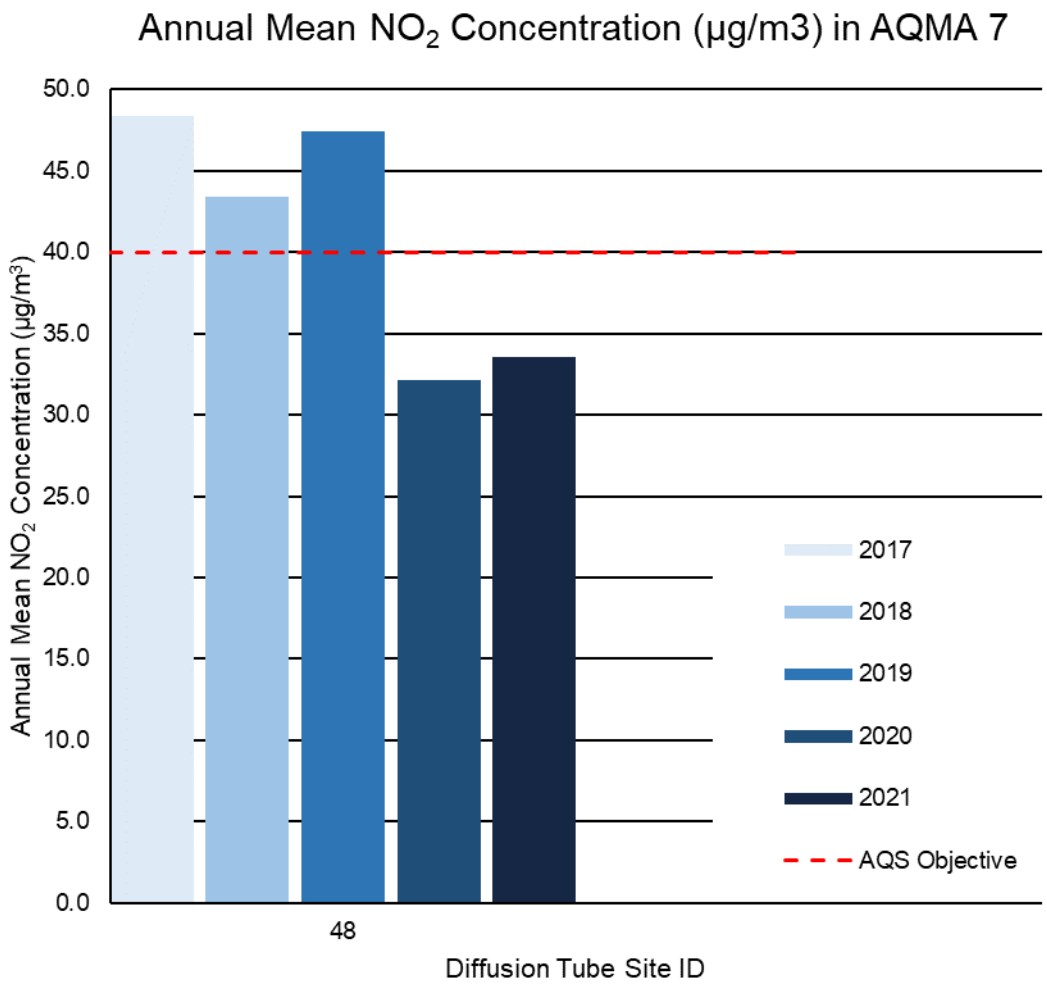


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
BAR11	432680	406174	Roadside	100	34.46	-	-	-	-	**0 (105)**
BAR3	432525	407475	Urban Background	88.9	88.9	0	0	0	0	0
BAR6	432684	406173	Roadside	100	64.7	4	0	0	0	**0 (99)**

Notes:

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

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

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

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

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

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

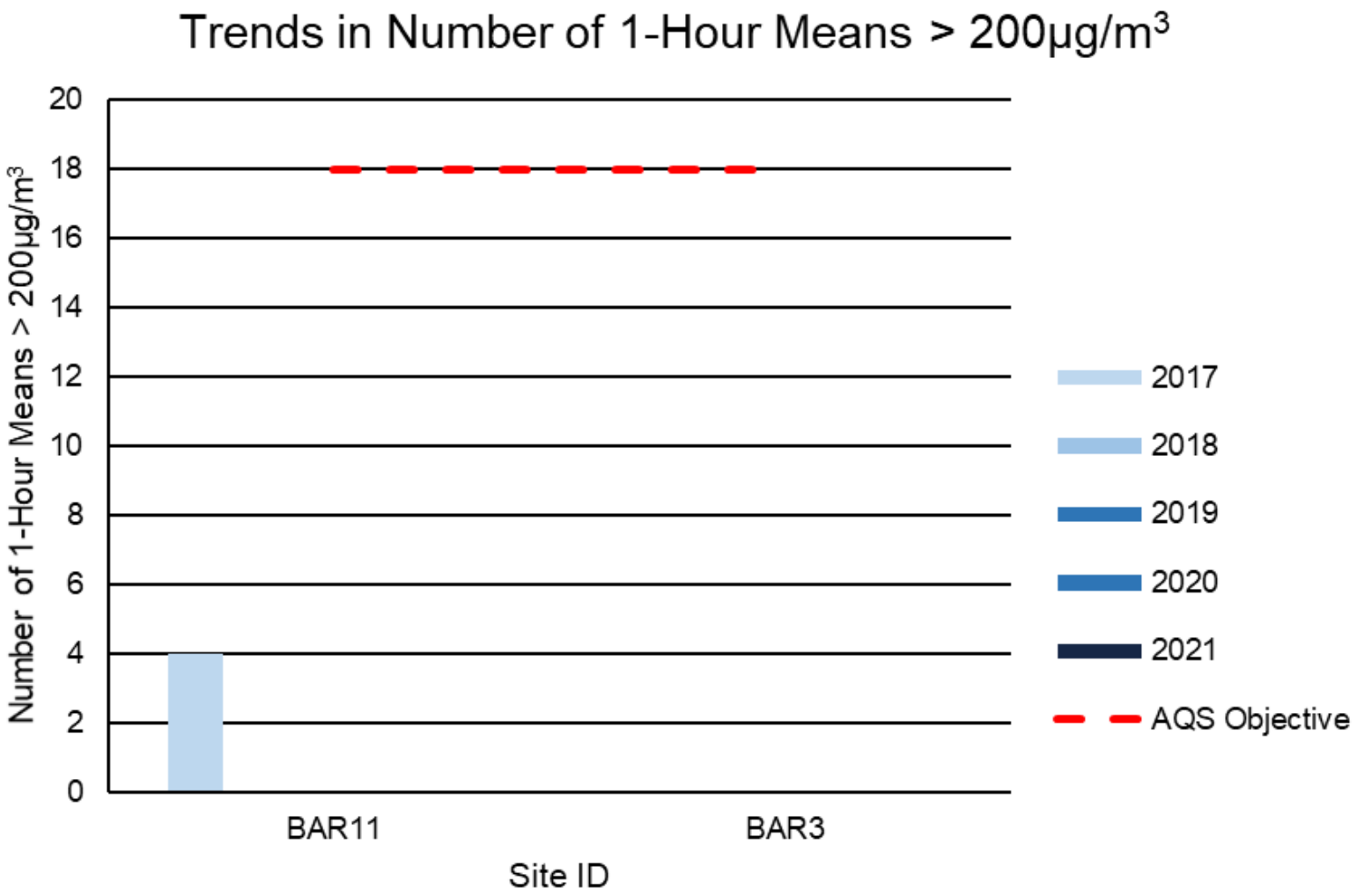


Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
BAR9	436298	405691	Roadside	99.1	99.1	17	18	20	20	19

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.TG16 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.3 – Trends in Annual Mean PM_{10} Concentrations

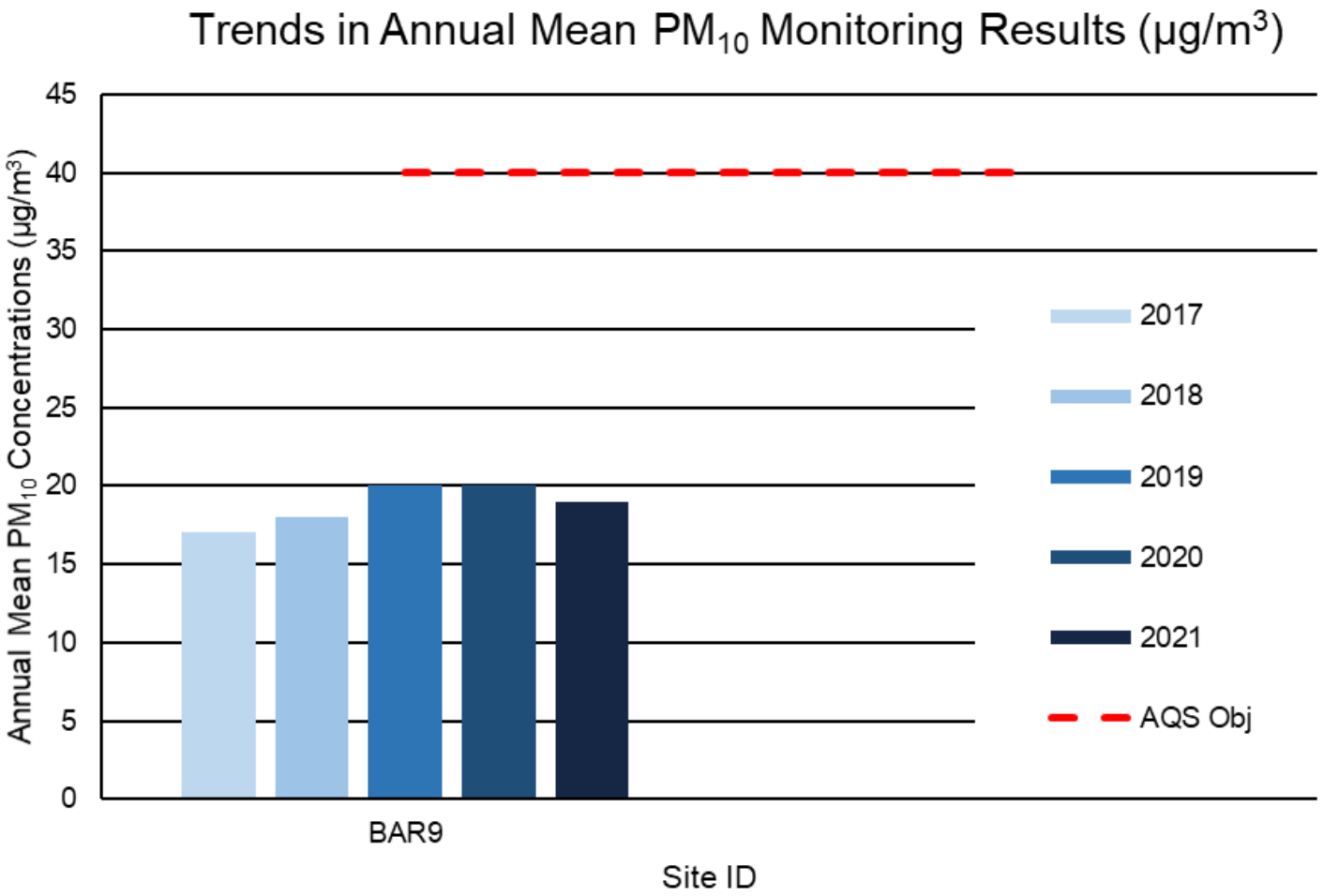


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
BAR9	436298	405691	Roadside	99.1	99.1	5	5	11	3	1

Notes:

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

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

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

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

(2) Data capture for the full calendar year (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 Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

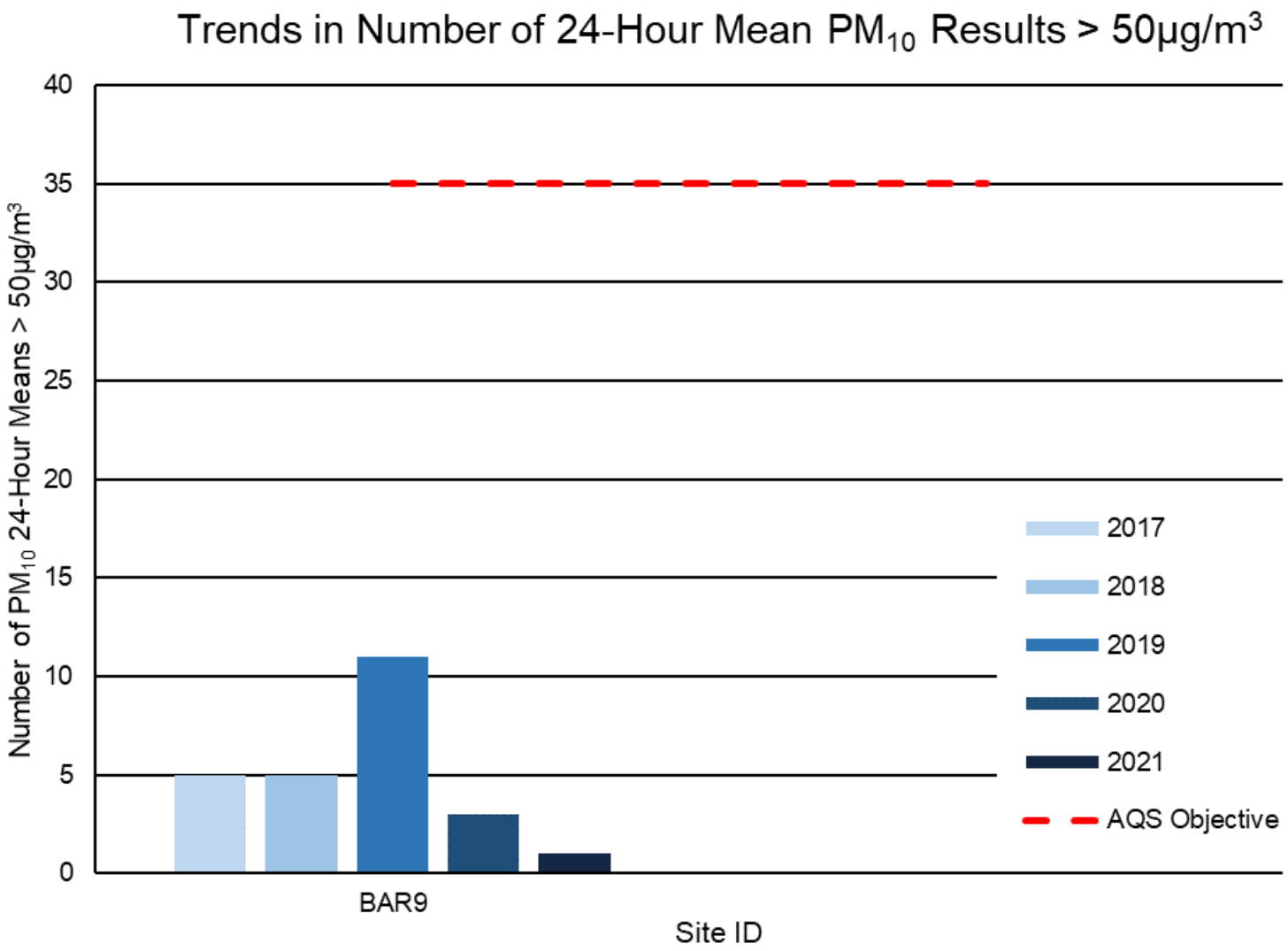


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Barnsley Metropolitan Borough Council does not currently undertake $PM_{2.5}$ monitoring.

Table A.9 – SO_2 2021 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 2021 (%) (2)	Number of 15 minute Means > 266µg/m³	Number of 1 hour Means > 350µg/m³	Number of 24 hour Means > 125µg/m³
BAR3	432525	407475	Urban Background	97.67	97.67	0	0	0

Notes:

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

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

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

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

(2) Data capture for the full calendar year (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 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m^3)			Comment
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.87) and Annualised	Distance Corrected to Nearest Exposure	
1	423621	399817		21.8	18.6	22.5	21.3	23.4	23.0	21.0	29.8	21.6	19.6	21.8	22.2	19.3	-	No passive monitoring was carried out in Barnsley Metropolitan Borough Council for January 2021 due to a supplier issue.
2	421102	400496		27.8	18.7	27.3	27.9	24.4	27.0	27.1	40.9	27.2	21.3	27.4	27.0	23.5	-	
3	421143	400481		37.2	28.5	32.6	41.6	42.2	38.0	48.3	48.8	38.9	36.9	41.6	39.5	34.4	-	
4	421126	400485		37.5	29.4	36.8	42.4	41.4	40.0	50.3	51.9	37.1	36.2	37.1	40.0	34.8	-	
5	421291	400482		26.9	17.5	26.1	29.6	21.9	29.0	27.2	29.5	25.4	24.0	27.0	25.8	22.5	-	
6	421282	400471		28.1	23.7	29.6	38.2	32.5	34.0	34.6	40.5	28.8	28.6	32.1	31.9	27.7	-	
7	421117	400501		24.5	19.0	17.3	24.1	15.4	20.0	21.7	24.5	22.6	22.8	25.5	21.6	18.8	-	
8	421215	400475		40.3	33.7	41.6	39.4	39.4	42.0	47.7	54.6	38.9	39.0	42.9	41.8	36.3	33.0	
9	431468	408579								18.9	30.1	19.1	23.2	26.6	23.6	20.0	-	
10	430820	409453									22.7	19.1	22.0	23.2	21.7	17.1	-	
11	434000	406292		35.4	30.2	34.0	31.0	30.7	32.0	36.5	39.5	32.8	31.7	34.9	33.5	29.1	-	
12	433910	406290		34.7	30.7	39.1	34.1	32.3	34.0	30.1	37.9	28.7	34.4	31.5	33.4	29.0	-	
13	433820	406278		40.9	33.0	36.8	42.5	33.1	32.0	31.0	42.2	32.5	36.0	41.6	36.5	31.8	-	
14	432702	406160		35.0	32.1	31.9	37.2	30.3	28.0	34.1	37.8	32.2	38.1	38.4	34.1	29.7	-	
15	432680	406174		30.9	26.9	25.6	30.1	17.6	20.0	25.7					-	-	-	Triplicate Site with 15, 16 and 17 - Annual data provided for 17 only
16	432680	406174		32.9	27.9	27.0	30.7	22.2	22.0	24.1					-	-	-	Triplicate Site with 15, 16 and 17 - Annual data provided for 17 only
17	432680	406174		34.1	27.3	29.8	31.9	23.0	20.0	26.7					26.5	26.6	-	Triplicate Site with 15, 16 and 17 - Annual data provided for 17 only
15a	432584	406085									26.2	25.8	25.7	31.0	-	-	-	Triplicate Site with 15a, 16a and 17a - Annual data provided for 17a only

16a	432584	406085									28.2	25.2	24.8	29.1	-	-	-	Triplicate Site with 15a, 16a and 17a - Annual data provided for 17a only
17a	432584	406085									28.0	25.4	24.9	31.3	27.1	21.3	-	Triplicate Site with 15a, 16a and 17a - Annual data provided for 17a only
18	432603	406312		27.0	16.3	21.9	20.7	13.9	16.0	17.1	18.8	20.4	20.6	26.5	19.9	17.3	-	
19	432481	406068		30.7	17.5	20.0	22.1	18.5	17.0	17.7	24.2	22.2	21.2	29.9	21.9	19.1	-	
20	432535	406071		36.7	31.5		35.7		29.0	31.5	48.4	35.3	34.8	37.7	35.6	31.0	-	
21	432402	406013		40.5	32.1	36.7	37.1	31.3	31.0	36.3	41.6	35.2	36.4	43.8	36.5	31.8	-	
22	432351	405985		41.3	35.3	35.4	43.3	33.6	35.0	35.1	52.2	45.6	36.8	44.5	39.8	34.6	-	
23	432281	405951		39.6	34.0	36.2	36.2	29.8	26.0	35.4	41.9	37.2	41.4	40.0	36.2	31.5	-	
24	435274	400384		28.2	24.2	21.8	29.2	20.6	14.0	49.1	33.6	26.7	30.8	30.8	28.1	24.4	-	
25	434832	400405		41.7	27.4	40.6	35.7	32.6	25.0	66.9	42.1	31.4	30.0	36.6	37.3	32.4	-	
26	434820	400421		40.4	31.3	38.6	38.1	30.2	25.0	64.3	40.0	30.2	35.3	37.7	37.4	32.5	-	
27	434823	400398		34.6	22.7	32.3	31.7	28.0	24.0	40.8	38.4	28.5	30.4	35.1	31.5	27.4	-	
28	434652	400231		26.9	14.2	20.7	19.1	17.9	16.0				15.3	20.0	18.8	16.6	-	
29	434721	400352		27.9	15.9	21.6	22.7	18.7	18.0	17.7	23.6	23.0	22.4	28.7	21.8	19.0	-	
30	434309	401032					25.3	20.4	22.0	19.8	28.3	27.5			23.9	25.0	-	
31	434595	401107		32.9	21.7		24.1	18.4	19.0	23.0	32.0	25.2	24.4	28.9	25.0	21.7	-	
32	434559	401274		31.7	23.6	24.4	27.6		24.0	27.8			31.0	34.1	28.0	24.7	-	
33	434251	406199		29.9	21.8	24.3	22.7	16.9	20.0	17.5	28.0	21.7			22.5	19.6	-	
33a	434831	406001											24.9	31.1	-	-	-	
34	435011	408281		38.8	30.7	26.7	26.5	22.0	22.0	23.2	31.3	23.3	30.8	31.5	27.9	24.3	-	
35	435027	408190		42.1	34.3	30.8	32.1	28.7	30.0	29.2	32.2	33.0	35.9	37.1	33.2	28.9	-	
36	435027	408104		39.6	35.2	35.0	37.9	31.7	32.0	31.5	43.5	32.6	40.1	42.0	36.5	31.7	-	
37	435174	407499		31.7	28.2	28.6	26.0	23.2	24.0	14.2	30.1	25.0	34.4	34.0	27.2	23.7	-	

38	434757	406995		40.0	33.4	35.9	34.4	27.0	30.0	27.6	36.2	31.5	40.0	37.8	34.0	29.5	-	
39	436072	407320		42.8	34.6	44.5	39.6	41.0	43.0	37.7	43.6	32.8	39.2	40.9	40.0	34.8	-	
40	437122	406557		47.7	38.1	47.4	39.8	35.3	41.0	38.2		36.0	41.6	41.5	40.7	35.4	-	
41	434933	406695		63.3	52.5	62.0	64.5	55.5	59.0	64.4	70.7	62.0	37.0	57.6	59.0	**51.3**	37.9	
42	434727	406753		36.4	25.8	37.5	37.6	36.0	30.0	27.6					33.0	33.2	-	
42a	434735	406773									41.6	34.6	28.6	39.0	35.9	28.2	-	
43	434955	406769		61.3	41.1	66.2	62.3	55.4	55.0	55.5	55.1	55.3	41.6	57.0	55.1	**47.9**	38.5	
44	435049	407047		40.4	28.6	37.2	40.2	33.5	32.0	31.6	36.8	31.4	31.9	40.0	34.9	30.3	-	
45	445699	402140											38.2		-	**-**	-	
45a	432263	405951									26.4	31.9	42.7	38.0	34.8	27.3	-	
46	437554	405291		37.0	30.2	35.1	36.6	28.5	31.0	30.5	36.7	36.2	28.3	42.0	33.8	29.4	-	
47	434958	405672		33.8	21.2	20.9	30.5	24.9	24.0	28.1	23.6	29.7	43.1	35.0	28.6	24.9	-	
48	434964	405709		29.5	32.6	39.4	40.4	32.8	38.0	43.4	51.3	33.2	37.8	46.0	38.6	33.6	-	
49	437528	405675		39.2	30.6	41.0	39.1	28.5	36.0	40.4	36.8	33.1	26.2	44.0	35.9	31.2	-	
50	435062	408244		37.8		32.0	33.6	23.0	30.0	31.4	31.5	32.4	26.0	34.0	31.2	27.1	-	
51	435049	408229		29.0											-	**-**	-	
51a	435486	400218									31.7	32.5	21.0	36.0	30.3	23.8	-	
52	434112	409625		34.8	22.2	33.8	33.7	21.0	24.0	25.1	34.3	26.7	26.3	34.0	28.7	25.0	-	
53	434809	406023		58.6	39.8	62.2	59.6	50.5	51.0	58.7	55.1	45.7	37.1	51.0	51.8	**45.0**	33.0	
54	421053	400489		29.6	19.0	27.5	35.9	30.1	35.0	34.2	31.4	30.7			30.4	26.4	-	
54a	432663	406325											26.4	25.0	-	**-**	-	
55	437369	405456		32.9	29.2	36.7	36.3	31.4	33.0	36.1	43.5	28.9	35.1	39.0	34.7	30.2	-	
56	420982	400495		34.4	20.3		41.7	31.3	39.0	38.4	44.5	28.1			34.7	34.2	-	

56a	432628	406311										23.0	27.0	-	**-**	-	
57	437242	405772		39.4	31.3	28.8	30.0	23.1	25.0	26.6	37.9		33.8	45.0	32.1	27.9	-	
58	437250	405813		40.2	28.0	34.1	28.5	23.3	26.0		33.0	25.8	29.2	38.0	30.6	26.6	-	
59	432876	406260		27.3	22.4	25.5	22.1	19.5	16.0	36.9	27.1	22.1	29.0	33.0	25.5	22.2	-	
60	432839	406259		37.9	26.4	36.9	34.3	23.7	16.0	26.2	23.9	19.7	19.0		26.4	23.0	-	
61	434780	406055		54.0	34.4	44.4	48.4	36.7	42.0	40.4	45.4	46.2	47.0	53.0	44.7	38.9	20.0	
62	434855	405957		57.7	42.0	60.6	47.6	49.9	52.0	49.7	54.6	44.0	36.1	44.0	48.9	**42.6**	30.4	
63	434917	405818		38.9	24.6	25.3	30.3	21.3	24.0	25.1	32.3	24.1	27.6	33.0	27.9	24.2	-	
64	434933	405781		39.6	21.2	36.4	32.0	26.7	28.0	25.8	37.5	27.4	26.7	33.0	30.4	26.4	-	

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.

No passive monitoring was carried out in Barnsley Metropolitan Borough Council for January 2021 due to a supplier issue.

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

New or Changed Sources Identified Within Barnsley Metropolitan Borough Council During 2021

Air quality assessments have been undertaken in support of various planning applications in 2021, which have potential to impact on local air quality. In 2021, the following significant planning applications were assessed for air quality impact:

- …

Barnsley Metropolitan Borough Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additionally, following adoption of the Councils' Local Plan in 2019, the Council has been developing Masterplan Frameworks as Barnsley's Local Plan includes some site allocations which require the production of such a framework. Masterplan frameworks are subject to public consultation and approval by the Council prior to the determination of any planning applications on the affected sites. Air quality impact has been included within these frameworks in order to ensure that this is considered appropriately at subsequent planning stage.

The Council has its own Air Quality and Emissions Good Practice Planning Guidance (https://www.barnsley.gov.uk/media/16257/pdc-2020-mar-bmbc-aqe-technical-planning-guidance-v12.pdf) which requires that air quality impact from future development are reasonably mitigated.

Additional Air Quality Works Undertaken by Barnsley Metropolitan Borough Council During 2021

Throughout 2021, Barnsley Metropolitan Borough Council has continued with the intention to revoke AQMA 5, successful continuation has allowed the AQMA to pass revocation and will be officially revoked in 2022.

QA/QC of Diffusion Tube Monitoring

Nitrogen dioxide diffusion tubes for 2021 were analysed by the South Yorkshire Air Quality Samplers. This laboratory uses the analytical technique of the grid adsorbent being 50% triethanolamine (TEA) in acetone. Reagents used in the analysis are sulphanilamide and NEDA. The analytical technique used is spectrometry, at a wavelength of 540 nanometres.

South Yorkshire Air Quality Samplers participates in the WASP / AIR PT[14] scheme for nitrogen dioxide and has previously participated within the survey's inter laboratory comparison scheme. The current version was released in March 2021[15], therefore only includes round AIR PT AR042 for January – March 2021 (100%) results and were determined to be **satisfactory** based upon a z-score of $\leq \pm 2$.

The most important factors to be considered when deciding which bias-adjustment factor to use are:

- Tube exposure time (one month)
- Length of the monitoring study (one year)
- QA/QC of the chemiluminescence analyser (carried out locally by Ricardo including data ratification, as part of our "Calibration Club" contract)
- QA/QC of diffusion tubes (AIR PT NO_2)
- Siting of the co-location study (if roadside tubes are being factored it is important to use a roadside factor)
- Siting of other tubes in the survey

Diffusion Tube Annualisation

Annualisation is required for any site with data capture less than 75% but greater than 25%. Barnsley Metropolitan Borough Councils 2021 diffusion tube data has been annualised where required using DEFRA's Diffusion Tube Data Processing Tool v2.0, following guidance within Chapter 7 of LAQM.TG (16): NO_x and NO_2 Monitoring, including the procedure laid out in Box 7.10. The four background continuous monitoring sites within 50 kilometres in order to calculate the annualisation factors were Barnsley Gawber,

[14] WASP – Annual Performance Criteria for NO2 Diffusion Tubes (DEFRA.gov.uk)

[15] QA QC Framework | LAQM (DEFRA.gov.uk)

Dewsbury Ashworth Grove, Sheffield Tinsley and Leeds Centre. The diffusion tubes sites that required annualisation in 2021 were DT9, DT10, DT 15, DT16, DT17, DT15a, DT16a, DT17a, DT28, DT30, DT32, DT42, DT42a, DT45a, DT51a and DT56. Annualised data is presented in Table C.2 below

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within this 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.TG (16) 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.

Barnsley Metropolitan Borough Council have applied a combined local bias adjustment factor of 0.87, despite the resulting overall poor data capture from the relocation of the automatic site from BAR6 to BAR11, and subsequently the relocation of the triplicate diffusion tubes. However, the overall diffusion tube precision was found to be “good”.

The 2021 national bias factor[16] was **0.77** for 2021, which is notably lower than the local bias adjustment factor that was generated by the Diffusion Tube Data Processing Tool for 2021 (**0.87**), the 2020 (**0.84**) and 2019 (**0.98**) ASR. A summary of bias adjustment factors used by Barnsley Metropolitan Borough Council over the past five years is presented in Table C.1.

Figure C. 1 shows that the national bias adjustment factor for 2021 and 2020 only had one comparison study available and both years created a national bias adjustment factor of 0.77, which is significantly different to the 2019 national bias adjustment factor of 1.01, when three studies were used in the calculation. As the 2019 to 2020/21 national bias adjustment factors vary so much and the local adjustment factor is more representative of the local authority’s air quality, the local bias adjustment factor was chosen.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	-	0.87
2020	Local	-	0.84
2019	Local	-	0.98
2018	Local	-	0.95
2017	Local	-	1.03

Figure C. 1. National Bias Adjustment Spreadsheet (03/22)

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/22

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

This spreadsheet will be updated at the end of June 2022
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

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

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List — If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List — If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List — If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
South Yorkshire Air Quality Samplers	50% TEA in acetone	2019	KS	Marylebone Road Intercomparison	12	84	65	28.7%	G	**0.78**
South Yorkshire Air Quality Samplers	50% TEA in acetone	2019	R	Barnsley MBC	11	33	33	1.7%	G	**0.98**
South Yorkshire Air Quality Samplers	50% TEA in acetone	2019	SU	Blaby District Council	10	23	31	-24.8%	G	**1.33**
South Yorkshire Air Quality Samplers	50% TEA in acetone	2020	KS	Marylebone Road Intercomparison	12	56	43	30.4%	G	**0.77**
South Yorkshire Air Quality Samplers	50% TEA in acetone	2021	KS	Marylebone Road Intercomparison	11	55	42	30.5%	G	**0.77**
South Yorkshire Air Quality Samplers	50% TEA in acetone	2019		**Overall Factor[3] (3 studies)**				**Use**		**1.01**
South Yorkshire Air Quality Samplers	50% TEA in acetone	2020		**Overall Factor[3] (1 study)**				**Use**		**0.77**
South Yorkshire Air Quality Samplers	50% TEA in acetone	2021		**Overall Factor[3] (1 study)**				**Use**		**0.77**

For comparison, **Table C.1 1** highlights the difference in concentrations between using the 2021 national bias adjustment factor of 0.77 and the 2021 Diffusion Tube Data Processing Tool calculated local bias adjustment factor of 0.87 (Table C.3).

Table C.1 1 National bias to local bias comparison

Diffusion Tube ID	X OS Grid Ref	Y OS Grid Ref	Simple Annual Mean (µg/m³)				
			Raw Data	Local Bias Adjusted (0.87) and Annualised	Local Bias Distance Corrected to Nearest Exposure	National Bias Adjusted (0.77) and Annualised	National Distance Corrected to Nearest Exposure
1	423621	399817	22.2	19.3	_	17.1	_
2	421102	400496	27.0	23.5	_	20.8	_
3	421143	400481	39.5	34.4	_	30.4	_
4	421126	400485	40.0	34.8	_	30.8	_
5	421291	400482	25.8	22.5	_	19.9	_
6	421282	400471	31.9	27.7	_	24.6	_

7	421117	400501	21.6	18.8	_	16.6	_
8	421215	400475	41.8	36.4	33.0	32.2	_
9	431468	408579	23.6	20.1	_	17.7	_
10	430820	409453	21.7	17.1	_	15.1	_
11	434000	406292	33.5	29.1	_	25.8	_
12	433910	406290	33.4	29.1	_	25.7	_
13	433820	406278	36.5	31.8	_	28.1	_
14	432702	406160	34.1	29.7	_	26.3	_
15	432680	406174	-	-	_	-	_
16	432680	406174	-	-	_	-	_
17	432680	406174	26.7	23.2	_	20.6	_
18	432603	406312	19.9	17.3	_	15.3	_
19	432481	406068	21.9	19.1	_	16.9	_
20	432535	406071	35.6	31.0	_	27.4	_
21	432402	406013	36.5	31.8	_	28.1	_
22	432351	405985	39.8	34.6	_	30.7	_
23	432281	405951	36.2	31.5	_	27.9	_
24	435274	400384	28.1	24.4	_	21.6	_
25	434832	400405	37.3	32.4	_	28.7	_
26	434820	400421	37.4	32.5	_	28.8	_
27	434823	400398	31.5	27.4	_	24.2	_
28	434652	400231	18.8	16.6	_	14.7	_
29	434721	400352	21.8	19.0	_	16.8	_
30	434309	401032	23.9	25.0	_	22.2	_
31	434595	401107	25.0	21.7	_	19.2	_
32	434559	401274	28.0	24.7	_	21.9	_
33	434251	406199	22.5	19.6	_	17.3	_
33a	434831	406001	-	-	_	-	_
34	435011	408281	27.9	24.3	_	21.5	_
35	435027	408190	33.2	28.9	_	25.6	_
36	435027	408104	36.5	31.7	_	28.1	_
37	435174	407499	27.2	23.7	_	20.9	_
38	434757	406995	34.0	29.6	_	26.2	_
39	436072	407320	40.0	34.8	_	30.8	_
40	437122	406557	40.7	35.4	_	31.3	_
41	434933	406695	59.0	**51.3**	37.9	**45.4**	34.3
42	434727	406753	33.0	33.2	_	29.4	_
42a	434735	406773	35.9	28.2	_	25.0	_
43	434955	406769	55.1	**47.9**	38.5	**42.4**	34.6
44	435049	407047	34.9	30.3	_	26.8	_
45	445699	402140	-	-	_	-	_
45a	432263	405951	34.8	27.3	_	24.2	_
46	437554	405291	33.8	29.4	_	26.1	_
47	434958	405672	28.6	24.9	_	22.0	_
48	434964	405709	38.6	33.6	_	29.7	_
49	437528	405675	35.9	31.2	_	27.6	_
50	435062	408244	31.2	27.1	_	24.0	_
51	435049	408229	-	-	_	-	_

51a	435486	400218	30.3	23.8	_	21.1	_
52	434112	409625	28.7	25.0	_	22.1	_
53	434809	406023	51.8	**45.0**	33.0	39.9	31.2
54	421053	400489	30.4	26.4	_	23.4	_
54a	432663	406325	-	**-**	_	**-**	_
55	437369	405456	34.7	30.2	_	26.7	_
56	420982	400495	34.7	34.2	_	30.3	_
56a	432628	406311	-	**-**	_	**-**	_
57	437242	405772	32.1	27.9	_	24.7	_
58	437250	405813	30.6	26.6	_	23.6	_
59	432876	406260	25.5	22.2	_	19.7	_
60	432839	406259	26.4	23.0	_	20.3	_
61	434780	406055	44.7	38.9	20*	34.4	_
62	434855	405957	48.9	**42.6**	30.4	37.7	27.4
63	434917	405818	27.9	24.2	_	21.5	_
64	434933	405781	30.4	26.4	_	23.4	_

**Warning: your receptor is more than 20m further from the kerb than your monitor – treat result with caution*

When using the local bias adjustment factor (0.87), diffusion tubes 8, 41, 43, 53, 61 and 62 are all highlighted as being above the NO_2 AQ objective or are within 10% of the objective, though once distance corrected they are all below 40 µg/m^3, noting that for diffusion tubes 41 and 43, the distance corrected concentrations are 37.9 µg/m^3 and 38.5 µg/m^3, which is still within 10% of the AQ objective. This is different to the concentrations when the national bias adjustment factor (0.77) is used, when only diffusion tubes 41, 43, 53 and 62 are highlighted as being above the NO_2 AQ objective or are within 10% of the objective, though once distance corrected they are all below 40 µg/m^3.

Overall, the maximum increase in annual mean concentration when using the local bias adjustment factor for 2021 data was seen at diffusion tube 41, with an increase of 5.9 µg/m^3, the minimum increase in annual mean concentration was seen at diffusion tube 28, with an increase of 1.9 µg/m^3. The average increase across the diffusion tube network was 3.3 µg/m^3.

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 Tools (v2.0)[17] NO_2 fall-off

[17] Available at Diffusion Tube Data Processing Tool | LAQM (DEFRA.gov.uk)

with distance calculator. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

Barnsley Metropolitan Borough Council utilised the Diffusion Tube Data Processing Tool and the distance corrected diffusion tube data is available in Table C.4. The diffusion tubes sites that required NO_2 fall-off with distance analysis in 2021 are DT 41, DT43, DT53 and DT62. Please note, the distance correction has only been applied for our monitoring sites where the roadside / kerbside annual mean concentration is greater than 36µg/m^3 and the sites are not located at a point of relevant exposure (taking the limitations of the calculator into account).

QA/QC of Automatic Monitoring

This section provides the automatic data, which is used to derive the locally derived bias adjustment factor discussed above, live and historic data can be viewed at the Air Quality England website (https://www.airqualityengland.co.uk/). All 2021 data have been ratified.

Barnsley A628 Pogmoor Road / Barnsley A628 Roadside 2

Site	Type	Address	Grid Ref.
Barnsley A628 Pogmoor Roadside (closed August 2021)	Roadside	Pogmoor Crossroads, A628 Dodworth Road	432684, 406173

Relocated to:

Site	Type	Address	Grid Ref.
Barnsley A628 Roadside 2 (began August 2021)	Roadside	A628 Dodworth Road	432675, 406179

Details of the analyser QA/QC are contained in the table below:

Site	A628 Pogmoor Roadside / A628 Roadside 2
Analyser Model	Thermo Scientific 42i Oxides of Nitrogen analyser
Logging System	Internal to Thermo Scientific 42i
Calibration Gas	NO in NO_2
Routine Calibration	Calibrations undertaken by Barnsley MBC personnel as Local Site Operator (LSO)

Daily Zero and Span Check	Yes
Air Conditioning	Yes
Service Contract	2 x 6 monthly service, + repair call out (Matts Monitors)
Third Party Audit and Data Ratification	Ricardo Energy and Environment as part of Calibration Club – 2 x 6 monthly audits to investigate the analysers, calibration gas mixture and site infrastructure, along with full data ratification and reporting of the dataset

Barnsley Gawber

Site	Type	Address	Grid Ref.
Barnsley Gawber	Urban Background	Wood View, Gawber, Barnsley	432524, 407478

Further details on the location criteria of the Barnsley Gawber site can be found on the UK Air website, https://uk-air.DEFRA.gov.uk/, along with live and historic data.

All 2021 data have been ratified. Details of the analyser QA/QC are contained in the table below:

Site	Barnsley Gawber
Analyser Model (NO_2)	Thermo Scientific 42i
Analyser Model (SO_2)	Thermo Scientific 42i
Logging System (SO_2 & NO_2)	Internal to Thermo Scientific 42i
Calibration Gas (NO2)	NO in NO_2
Calibration Gas (SO2)	SO_2 in air
Routine Calibration (SO_2 & NO_2)	Calibrations undertaken by Barnsley MBC personnel as Local Site Operator (LSO)
Daily Zero and Span Check (SO_2 & NO_2)	Zero air scrubber and permeation tube

Air Conditioning (SO_2 & NO_2)	Yes
Service Contract (SO_2 & NO_2)	2 x 6 monthly service and repair call out (ACOEM)
Third Party Audit and Data Ratification (SO2 & NO2)	Ricardo Energy and Environment as part of AURN

Barnsley A635 Kendray Roadside

Site	Type	Address	Grid Ref.
Barnsley A635 Kendray Roadside	Roadside	A635 Doncaster Road, Kendray	436298, 405691

Automatic monitoring of PM10 using a beta attenuation monitor (BAM) is undertaken at the A635 Kendray Roadside site. live and historic data can be viewed at the Air Quality England website (https://www.airqualityengland.co.uk/).

All 2021 data have been ratified. QA/QC for the Kendray site is detailed below:

Site	Barnsley A635 Kendray Roadside
Analyser Model	BAM 1020
Logging System	Internal to BAM
Routine Calibration (filter change)	Calibrations undertaken by Barnsley MBC personnel as Local Site Operator (LSO), in accordance with manufacturer's specification and AURN procedure.
Daily Zero and Span Check	Yes
Air Conditioning	Yes
Service Contract	2 x 6 monthly service & repair call out (Matts Monitors)
Third Party Audit and Data Ratification	Ricardo Energy and Environment as part of Calibration Club – 2 x 6 monthly audits to investigate the analysers and site infrastructure, along with full data ratification and reporting of the dataset

PM_{10} Monitoring Adjustment

Automatic monitoring of PM_{10} using a beta attenuation monitor (BAM) is undertaken at the A635 Kendray Roadside site. The PM_{10} BAM analyser in the automatic is unheated, therefore the PM_{10} data reported within this Annual Status Report is multiplied by a correction factor of 0.833 following the LAQM TG (16) method by the QA/QC contractor who undertakes ratification of the Council's PM_{10} data.

Live and historic data can be viewed at the Air Quality England website (https://www.airqualityengland.co.uk/).

Automatic Monitoring Annualisation

All automatic monitoring locations within Barnsley Metropolitan Borough Council recorded data capture for the monitoring period 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 Barnsley Metropolitan Borough Council required distance correction during 2021.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Barnsley Gawber	Annualisation Factor Dewsbury Ashworth Grove	Annualisation Factor Sheffield Tinsley	Annualisation Factor Leeds Centre	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
9	1.0134	1.0049	0.9666	0.9236	0.9772	23.6	23.0	
10	0.9410	0.9120	0.8958	0.8616	0.9026	21.7	19.6	
15	1.1408	1.1499	1.1473	1.1856	1.1559	-	-	*Triplicate Site with 15, 16 and 17 - Annual data provided for 17 only*
16	1.1408	1.1499	1.1473	1.1856	1.1559	-	-	*Triplicate Site with 15, 16 and 17 - Annual data provided for 17 only*
17	1.1408	1.1499	1.1473	1.1856	1.1559	26.5	30.6	*Triplicate Site with 15, 16 and 17 - Annual data provided for 17 only*
15a	0.9410	0.9120	0.8958	0.8616	0.9026	-	-	*Triplicate Site with 15a, 16a and 17a - Annual data provided for 17a only*
16a	0.9410	0.9120	0.8958	0.8616	0.9026	-	-	*Triplicate Site with 15a, 16a and 17a - Annual data provided for 17a only*
17a	0.9410	0.9120	0.8958	0.8616	0.9026	27.1	24.5	*Triplicate Site with 15a, 16a and 17a - Annual data provided for 17a only*
28	0.9965	1.0239	1.0123	1.0380	1.0177	18.8	19.1	
30	1.2584	1.2141	1.1945	1.1522	1.2048	23.9	28.8	
32	0.9929	1.0241	1.0149	1.0241	1.0140	28.0	28.4	
42	1.1408	1.1499	1.1473	1.1856	1.1559	33.0	38.1	
42a	0.9410	0.9120	0.8958	0.8616	0.9026	35.9	32.4	

Site ID	Annualisation Factor Barnsley Gawber	Annualisation Factor Dewsbury Ashworth Grove	Annualisation Factor Sheffield Tinsley	Annualisation Factor Leeds Centre	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
45a	0.9410	0.9120	0.8958	0.8616	0.9026	34.8	31.4	
51a	0.9410	0.9120	0.8958	0.8616	0.9026	30.3	27.4	
56	1.1601	1.1427	1.1235	1.1018	1.1320	34.7	39.3	

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	7	4			
Bias Factor A	0.87 (0.81 - 0.93)	0.87 (0.78 - 0.97)			
Bias Factor B	15% (7% - 23%)	15% (3% - 28%)			
Diffusion Tube Mean (µg/m^3)					
Mean CV (Precision)	26.5	27.1			
Automatic Mean (µg/m^3)	6.0%	2.8%			
Data Capture					
Adjusted Tube Mean (µg/m^3)	23.1	23.5			

Overall Diffusion Tube Precision	**Good Overall Precision**	**Good Overall Precision**
Overall Continuous Monitor Data Capture	**Poor Overall Data Capture**	**Poor Overall Data Capture**

Local Bias Adjustment Factor	**0.87**	*Warning - One or more Co-location studies has Poor Overall Continuous Monitor Data Capture (i.e. <90%). Local Bias Adjustment Factor should be treated with caution.*

Notes:

Local bias adjustment factor has not been used to bias adjust the 2021 diffusion tube results due to the poor overall continuous monitor data capture. Instead, the national bias adjustment factor has been utilised (0.77)

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
8	2.0	4.0	36.3	15.9	33.0	
41	2.0	10.0	51.3	15.9	37.9	Predicted concentration at Receptor within 10% the AQS objective.
43	2.0	7.0	47.9	15.9	38.5	Predicted concentration at Receptor within 10% the AQS objective.
53	0.3	2.8	45.0	11.9	33.0	
61	2.5	42.5	38.9	11.9	20.0	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
62	0.7	5.8	42.6	11.9	30.4	

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

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

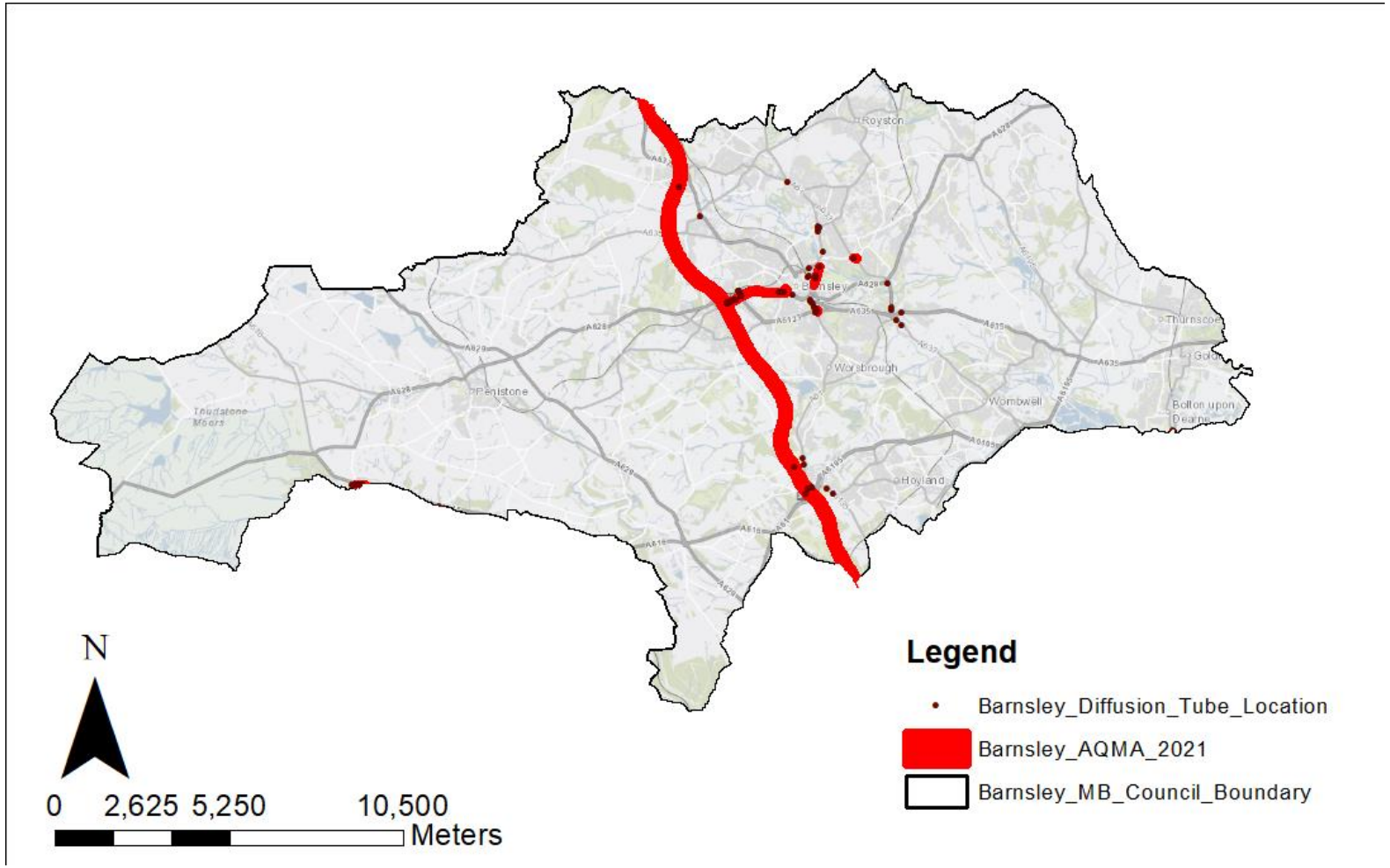


Figure D. 2 – Map of Non-Automatic Monitoring in and around AQMA 1

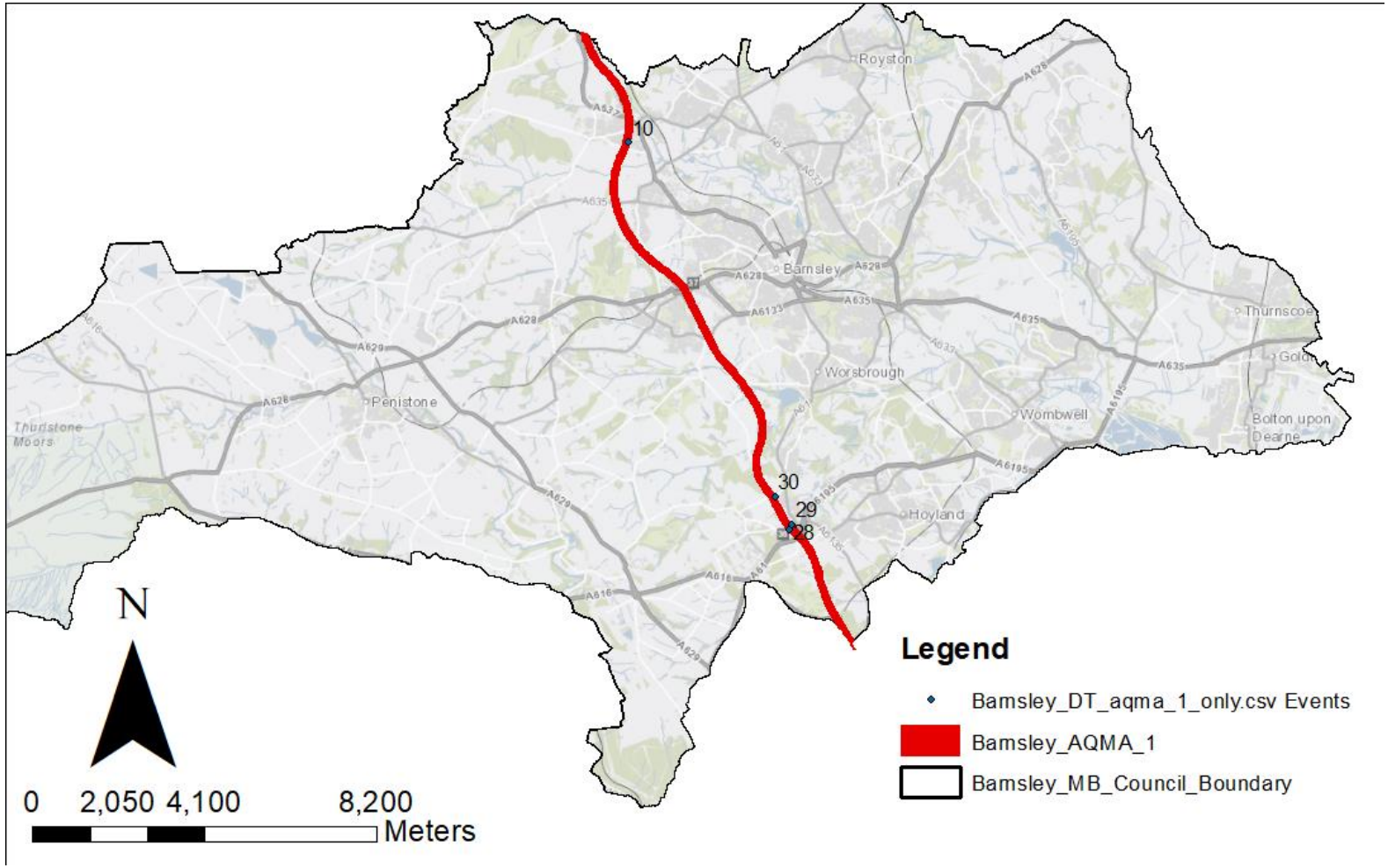


Figure D. 3 – Map of Non-Automatic Monitoring in and around AQMA 2A (West)

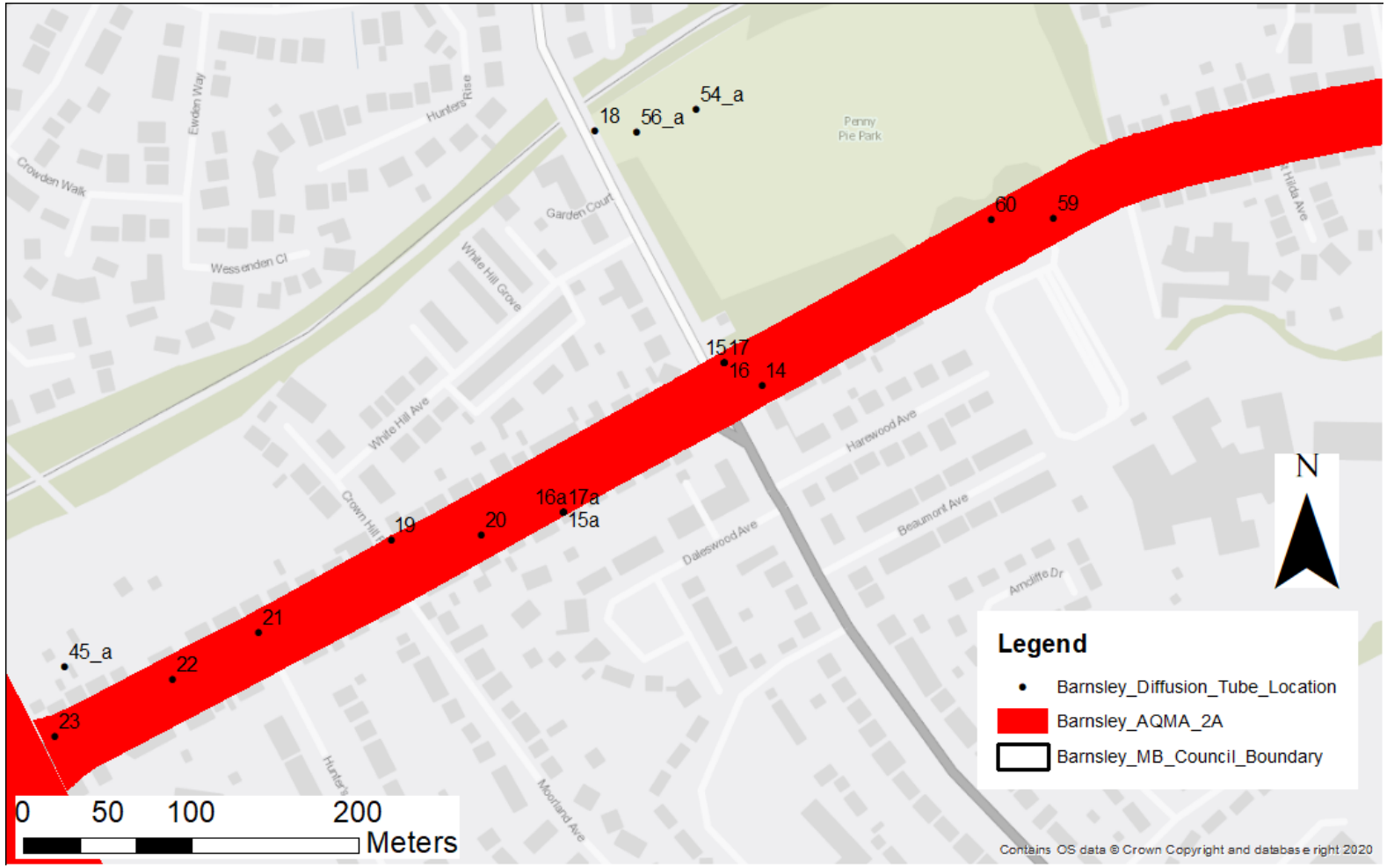


Figure D.3 1 – Map of Non-Automatic Monitoring in and around AQMA 2A (East)

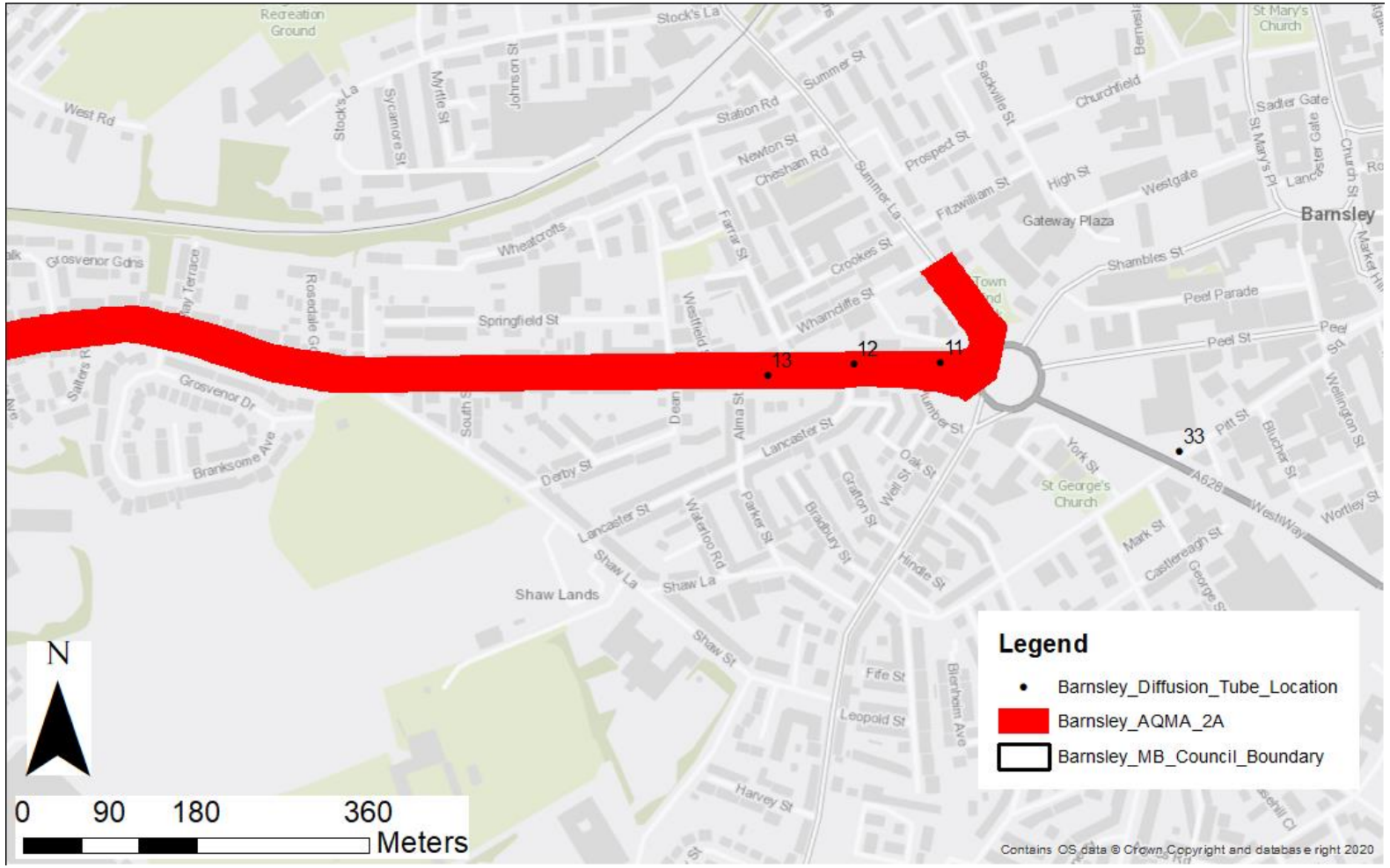


Figure D. 4 – Map of Non-Automatic Monitoring in and around AQMA 4

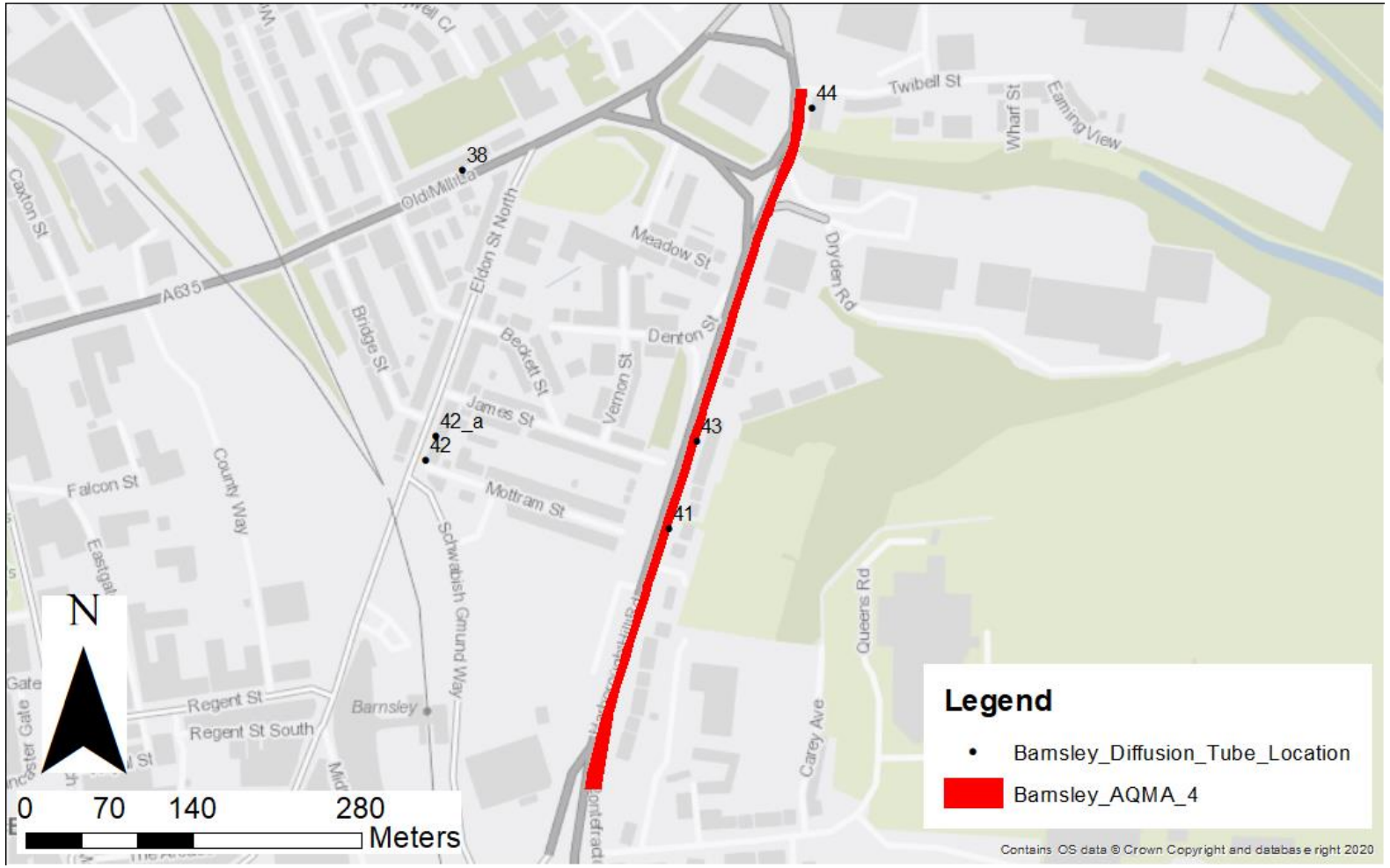


Figure D. 5 – Map of Non-Automatic Monitoring in and around AQMA 5

Figure D. 6 – Map of Non-Automatic Monitoring in and around AQMA 6

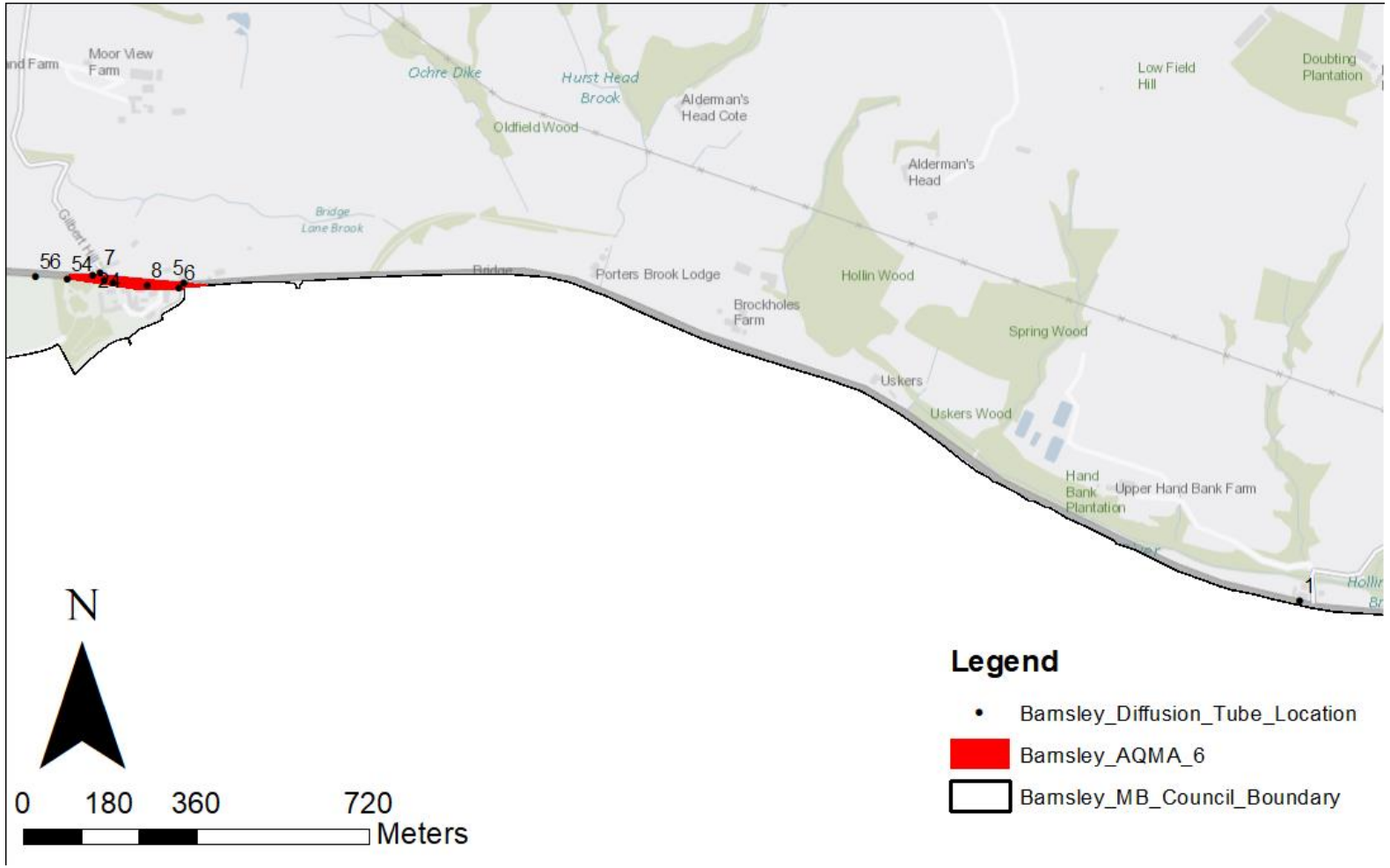


Figure D. 7 – Map of Non-Automatic Monitoring in AQMA 7

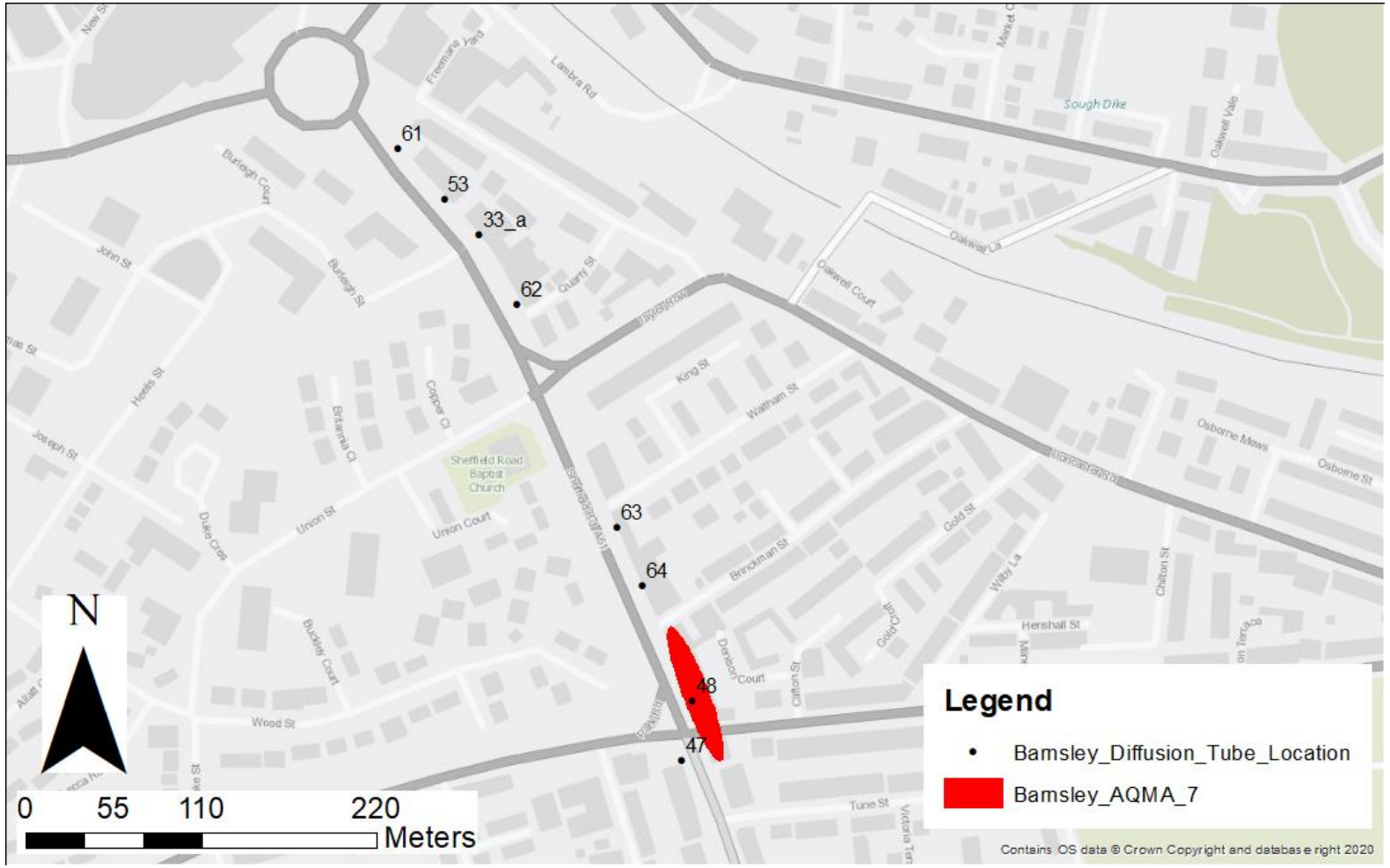
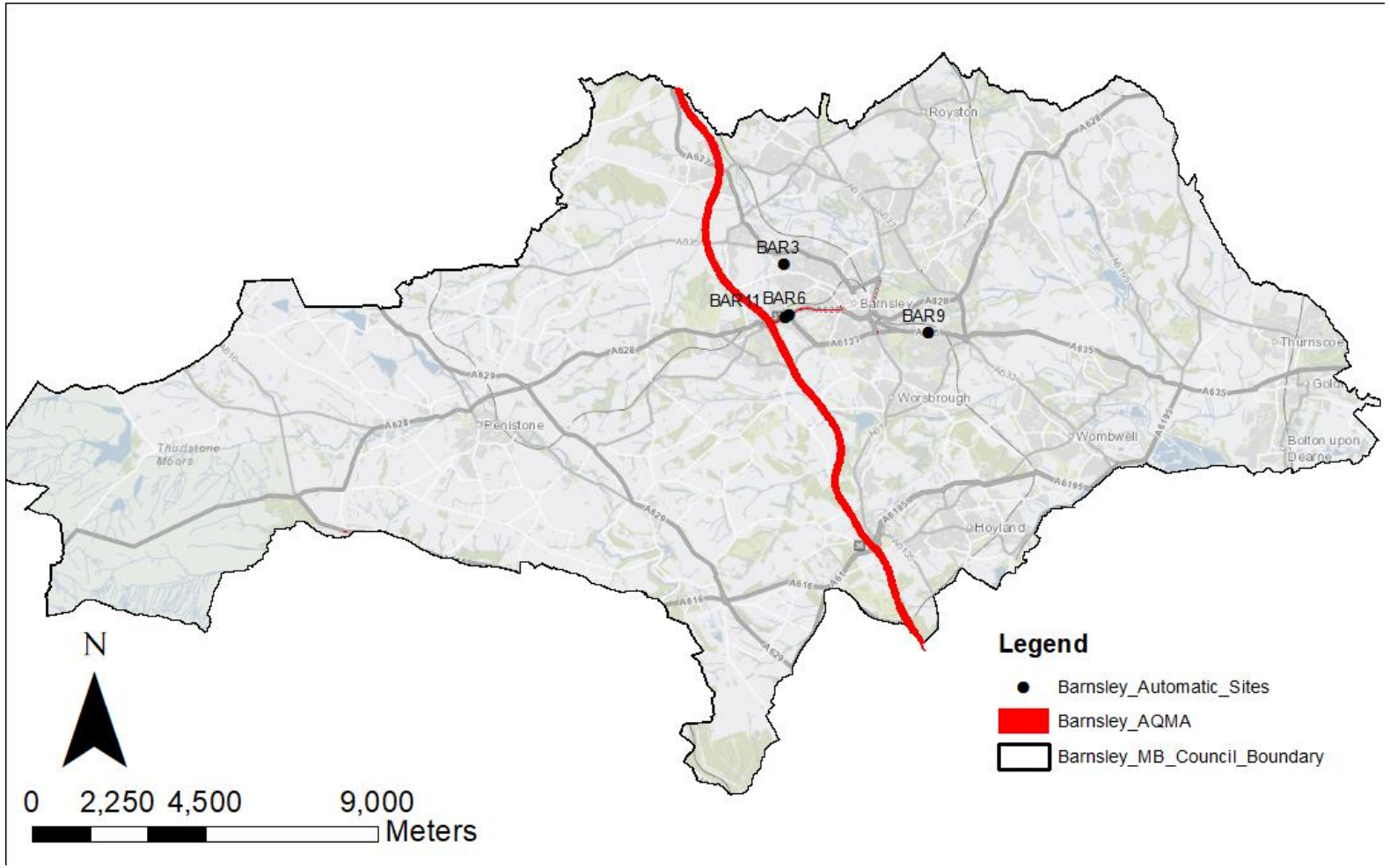


Figure D. 8 - Map of Automatic Monitoring in Barnsley



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[18]

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

18 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
LSO	Local Site Operator
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

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- Barnsley Metropolitan Borough Council AQAP, available at https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/
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- Clean Air Strategy, available at Clean Air Strategy 2019 - GOV.UK (www.gov.uk)
- DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018
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- Barnsley Metropolitan Borough Council Sustainable Travel Supplementary Planning Document, available at https://www.barnsley.gov.uk/media/15728/sustainable-travel-spd-adopted-2019.pdf
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