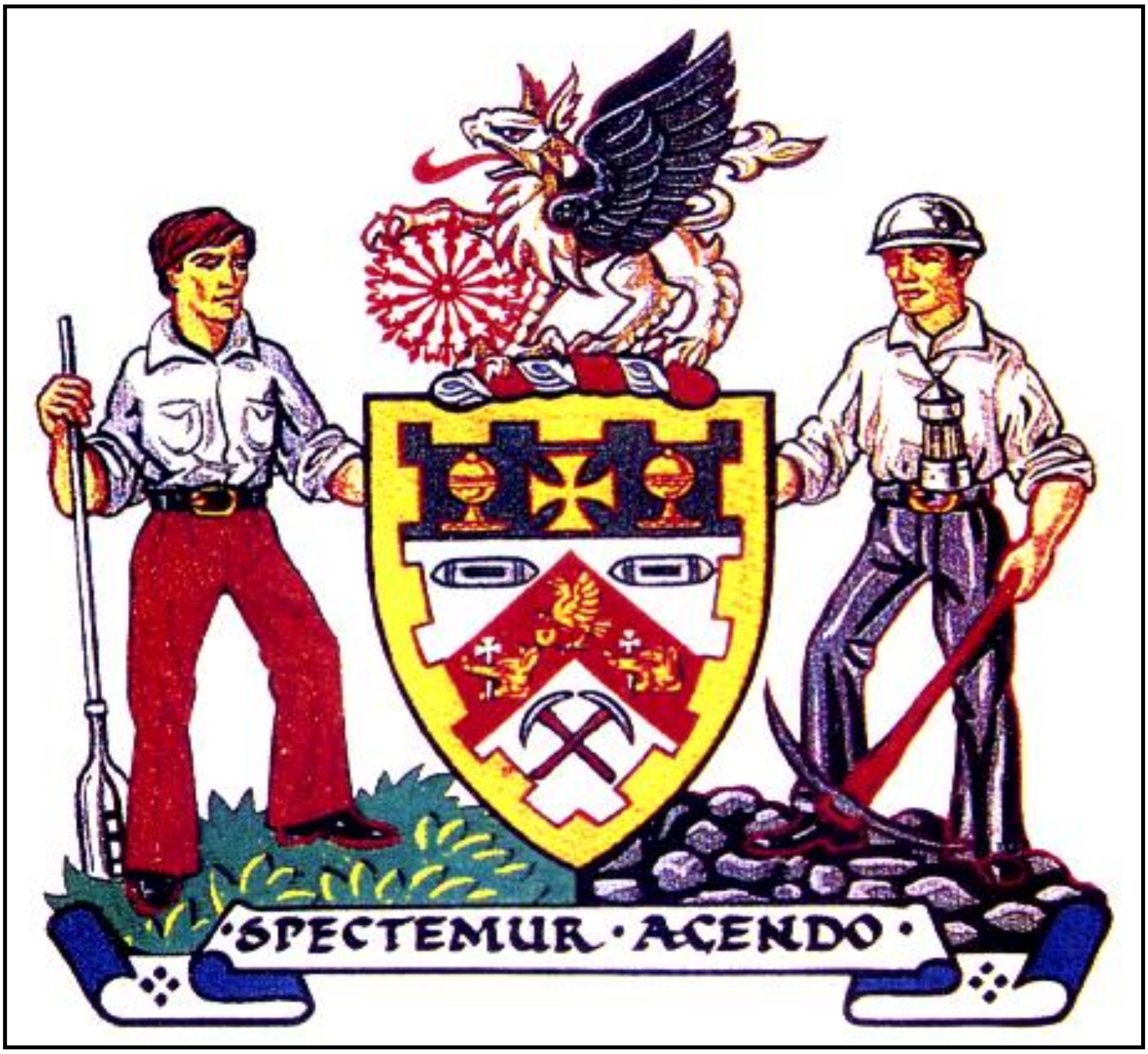

2020 Air Quality Annual Status Report (ASR)

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

June, 2020

Local Authority Officer	Pollution Control
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Date	June, 2020

Executive Summary: Air Quality in Our Area

Air Quality in Barnsley

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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

In order to improve air quality in the Barnsley Borough, we have an Air Quality Action Plan. This report details our work to improve air quality in Barnsley over the past year.

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

The Borough'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 all our 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 borough'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 dioxide is strongly associated with traffic emissions in particular. This polluting gas is associated with respiratory symptoms[4].

All Barnsley's current AQMAs are summarised in the table below:

---

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013
[4] Defra, February 2015 – Getting to grips with air pollution – the latest evidence and techniques – A briefing for Directors of Public Health

Table ES1: Barnsley's Air Quality Management Areas

AQMA No.	Adjacent roads / junctions	Year declared	Estimated no. 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

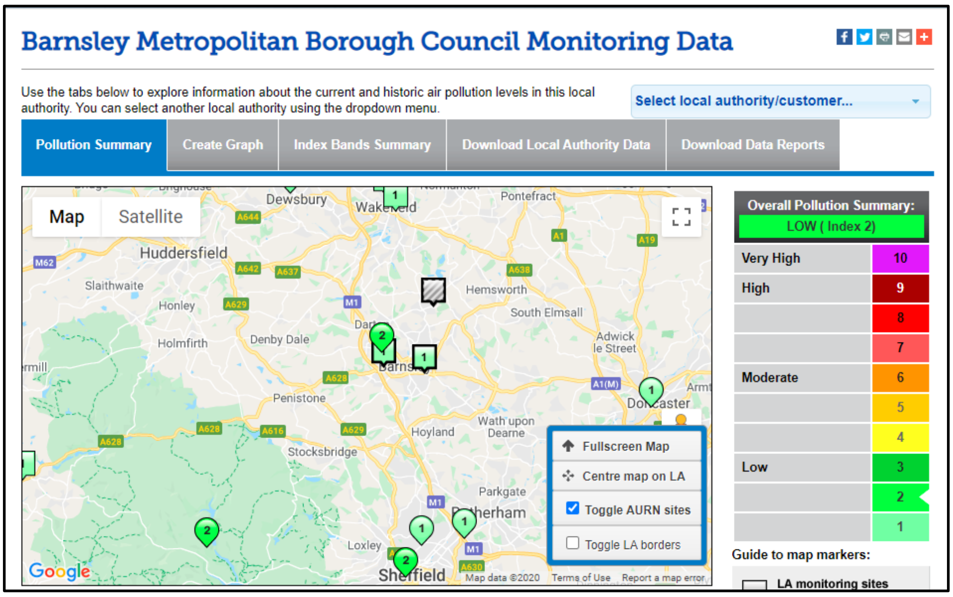
Further details of our AQMAs can be found at http://uk-air.defra.gov.uk/aqma/list.

The Council has an action plan, completed in May 2017 https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/, containing measures designed to improve air quality within our AQMAs and within the Borough as a whole, as it is important to continually drive down emissions and reduce air pollution, even below legal standards to protect public health.

This annual status report is being written during a period of change within air quality management. The Government released the Clean Air Strategy last year, which proposed new ways to tackle air pollution, particularly domestic emissions, and we await further direction from the forthcoming Environment Act on how air pollution can be further reduced. Furthermore, Clean Air Zones are still being considered for neighbouring cities (Leeds, Greater Manchester, Sheffield-Rotherham), and we will monitor these developments for any potential impact on Barnsley. As this report is being written, the Covid-19 crisis and lockdown has provided a new focus for air quality, which may impact on how air quality improvement is delivered in subsequent years.

We continue to work to improve air quality, however in 2019, there has been a" levelling off" in nitrogen dioxide (NO_2) concentrations within the Borough, including within our AQMAs, when compared to previous years. We will continue to monitor concentrations in future years, and further monitoring is required in order to continue assessing longer term trends.

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 Council air quality webpage at https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/. 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

We have set up our Air Quality Action Plan Steering Group, consisting of council officers from those services best placed to deliver local air quality improvement. The group is chaired by Barnsley's Director of Public Health. The group oversees progress within the Council's Air Quality Action Plan. The Plan contains twenty 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 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

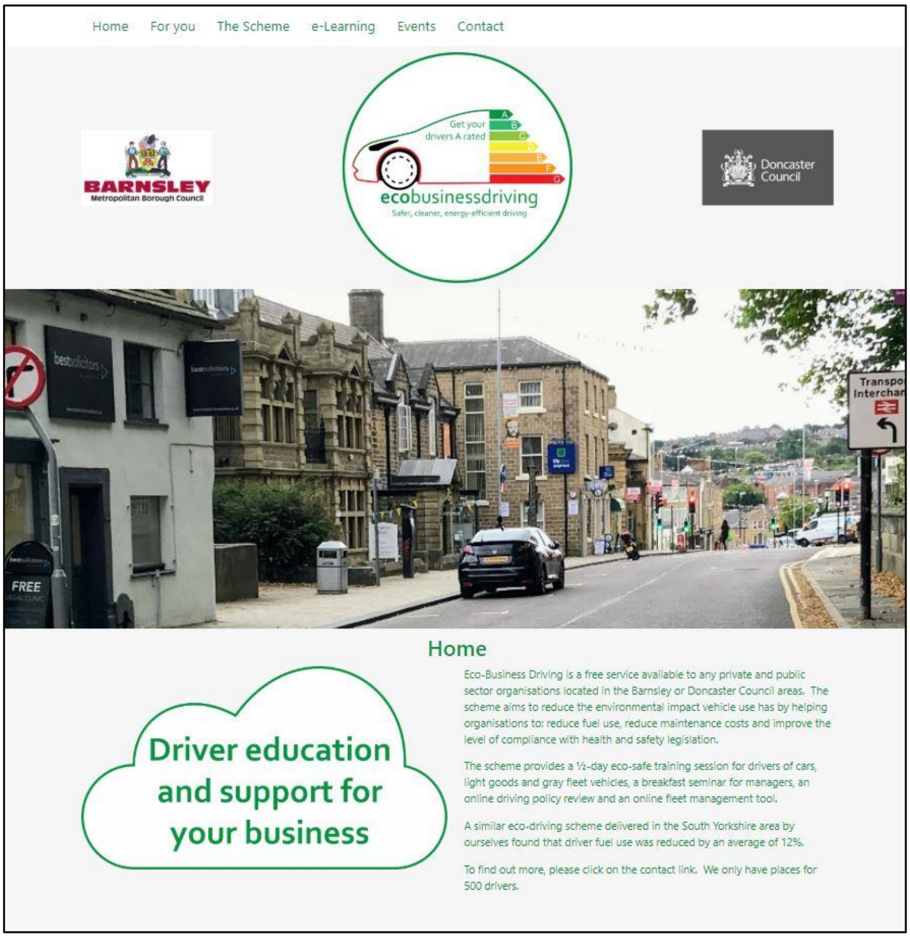
Increase Efficiency	We aim to improve air quality by ensuring our transport networks operate as efficiently as possible by smoothing traffic flows and reducing congestion
Improve Fleet	We aim to improve air quality by reducing emissions from our Barnsley MBC fleet and other assets
Regulation	We aim to 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

We have been liaising with Highways England regarding a localised air quality issue on the trans-Pennine A616 in the village of Langsett – Highways England being the authority for this road.

In 2018, Highways England undertook further assessment of road traffic emissions in this AQMA by installing traffic cameras to closely assess the nature of traffic movement along the A616. In addition, a vehicle, specially designed to monitor air quality whilst being driven in traffic, was also deployed to measure differences in traffic emissions along the A616 in Langsett with changing traffic flow. These data has now been analysed alongside traffic flow data and whilst the results of the air quality monitoring data shows on average 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, the change is very small and 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.

The data did however give a useful insight into another issue in terms of the impact of 'gross emitters' on NO_2 concentrations. Over the survey period the vehicle did record some very high NO_2 concentrations which are likely to be linked to very highly polluting vehicles travelling on the network. As such we do think this is an issue that could be worthy of further exploration, although this is dependent on traffic levels and patterns starting to return to normal following the outbreak of Covid-19.

Barnsley was awarded Defra air quality grant funding in 2018 in order to continue the ECO Stars Heavy Duty Vehicle scheme in Barnsley and Doncaster, along with funding to pilot a taxi scheme and develop a methodology for non-road mobile machinery (NRMM). Furthermore, funding was obtained to develop a future business model for these schemes. This work was completed in 2019. We are now attempting to secure further funding in order to continue the scheme for the benefit of local air quality and local heavy-duty fleet operators.



We submitted a bid for Defra air quality grant funding in 2018 for an eco-driver training scheme in Barnsley and Doncaster for "grey" fleet drivers (drivers who use their cars for work related purposes), in order to reduce emissions from this fleet sector. Subsequently, in 2019, this bid was successful, and the scheme has been rolled out in 2019 and 2020. The scheme has been progressing well (https://www.eco-businessdriving.co.uk/), engaging with local business, however the Covid-19 crisis has currently curtailed further progress with this scheme.

Conclusions and Priorities

There has been a "levelling off" of reductions of NO_2 concentrations were recorded within our AQMAs and within the Borough as a whole, compared to previous years.

We continue to meet air quality standards within AQMAs 1 and 5, continuing the trend from recent years. We have consulted with Central Government (Defra) following the carrying out of further monitoring within AQMA 5 in 2018 to obtain sufficient evidence to revoke this AQMA. This report therefore considers whether these two AQMAs should now be revoked.

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

Going forward, our priorities are the following:

1. Where appropriate we will bid for funding for actions within our Air Quality Action Plan, as and when this funding become available.
2. 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.
3. To continue to work with Highways England to improve air quality in Langsett.
4. Continue monitoring both inside and outside of AQMAs to gauge progress with actions and ensure continued compliance outside of our AQMAs.
5. 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.
6. 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.
7. To continually review the Action Plan, in order that our efforts are targeted towards those actions most effective in reducing emissions and improving air quality.

Local Engagement and How to get Involved

Further information on local air quality can be obtained from the Councils' air quality web page https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/.

Those organisations wishing to join the ECO Stars Fleet Recognition scheme can find more information at http://www.ecostars-uk.com/, whilst those businesses considering participating in the free, voluntary eco driver training scheme can find more information at https://www.eco-businessdriving.co.uk/. 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

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1 Local Air Quality Management

This report provides an overview of air quality in Barnsley during 2019. 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 to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Barnsley MBC can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/list. Alternatively, see Appendix D: Maps of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMAs.

We propose to revoke AQMA 1 and AQMA 5, subject to Defra appraisal of this report (see monitoring section) and agreement of our proposal, along with our justification for revocation.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
No. 1	3rd October 2001	NO2 Annual Mean	Barnsley	An area encompassing residential properties one hundred metres either side of the central reservation of the M1 motorway in Barnsley	YES	46.4	µg/m3	33.4	µg/m3	Barnsley MBC Air Quality Action Plan	April, 2017	https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/
No. 2A	16th June 2005	NO2 Annual Mean	Barnsley	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/m3	39.1	µg/m3	Barnsley MBC Air Quality Action Plan	April, 2017	https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/

No. 4	7th July 2008	NO2 Annual Mean	Barnsley	Residential properties along the uphill carriageway of Harborough Hill Road from the gyratory	NO	58.6	µg/m3	44.1	µg/m3	Barnsley MBC Air Quality Action Plan	April, 2017	https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/
No. 5	4th July 2008	NO2 Annual Mean	Barnsley	Residential properties along the uphill carriageway of Burton Road adjacent to the junction with the A633 Rotherham Road	NO	41.1	µg/m3	35.7	µg/m3	Barnsley MBC Air Quality Action Plan	April, 2017	https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/
No. 6	30th August 2012, amended 27th October 2016 to include NO2 1-hour mean	NO2 Annual Mean	Barnsley	Residential properties along the A616 Manchester Road in Langsett	YES	77.1	µg/m3	49	µg/m3	Barnsley MBC Air Quality Action Plan	April, 2017	https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/

No. 7	30th August 2012	NO2 Annual Mean	Barnsley	Residential properties at the junction of Sheffield Road and the A6133 Cemetery Road	NO	48.5	µg/m3	40.2	µg/m3	Barnsley MBC Air Quality Action Plan	April, 2017	https://www.barnsley.gov.uk/services/pollution/air-pollution/air-quality/

☒ **Barnsley MBC confirm the information on UK-Air regarding their AQMAs is up to date**

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

Defra's appraisal of last year's ASR stated that the conclusions within last year's (2018) ASR were acceptable for all sources and pollutants, subject to certain provisos, including:

- *The diffusion tube mapping is comprehensive; however, the maps are difficult to interpret and AQMA boundaries could be labelled more clearly on maps. In the future maps should be more uniform with one another for ease of interpretation.* We have endeavoured to undertake this for this ASR.
- *Annual mean NO_2 concentrations within some AQMAs have fallen below national benchmarks since 2014 and the council could pursue revoking these AQMAs.* This report recommends revocation of AQMA 1 and AQMA 5, subject to Defra appraisal of this report (see monitoring section).
- *The Council have presented NO_2 trends however have provided a limited discussion on these trends. It would be beneficial for the Council to discuss NO_2 trends within the borough and provide an insight to what may have caused these trends.* Discussions have been held with Highways England air quality officers on possible reasons for recent NO_2 trend concentrations within the Langsett AQMA in particular (see monitoring section).

Barnsley Council has taken forward several direct measures during the current reporting year of 2019 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.

More detail on these measures can be found in our air quality action plan (https://www.barnsley.gov.uk/media/5738/barnsley-mbc-air-quality-action-plan-2017.pdf), which includes important links to other local and regional strategies which have contributed to the Plan. Key completed measures for this ASR are:

- Care4Air campaign (https://www.care4air.org/), due to current lack of funding to continue this campaign

- Priority Parking for low emission vehicles. The Barnsley MBC Car Parking Strategy has highlighted the importance of providing priority for the low emission vehicles, in order to further encourage their uptake locally.
- ECO Stars taxis. We intend however to keep this within the Action Plan, should funding to continue become available in future years

We 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 MBC's priorities for the coming year are:

1. Where appropriate we will bid for funding for actions within our Air Quality Action Plan, as and when this funding become available.
2. Following a successful Defra joint air quality grant bid with our partners Doncaster MBC and Sheffield City Region, we will be implementing a scheme involving temporary road closures around local schools, along with active travel initiatives in order to highlight the benefits of cycling and walking. Due to the Covid-19 crisis, a start date for this project has yet to be determined. Furthermore, our Defra air quality grant funded eco-driver training programme (again with our partners Doncaster MBC) for public and private sector car "grey" fleets within the Borough has been temporarily curtailed due to the crisis, but we intend to resume as soon as circumstances allow.
3. 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.
4. To ensure that air quality as an issue is embedded within the latest update of the Sheffield City Region Transport Strategy 2018 to 2040 and subsequent plans to implement this strategy, including development of a City Region Air Quality Action Plan.
5. To continue to work with Highways England to improve air quality in Langsett.
6. Continue monitoring both inside and outside of AQMAs to gauge progress with actions and ensure continued compliance outside of our AQMAs.

7. 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.
8. 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.
9. To continually review the Action Plan, in order that our efforts are targeted towards those actions most effective in reducing emissions and improving air quality.

The principal challenges and barriers to implementation that we 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."

Monitoring data obtained within all our AQMAs are discussed in detail within the monitoring section of this report

We 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 which has been subsequently "distance corrected" to represent relevant exposure at building façade.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Barnsley MBC anticipates that further additional measures not yet prescribed may be required in subsequent years to achieve compliance and enable revocation of AQMAs 4 and 6. Again, we stress that we are happy to consider any advice or guidance Defra may wish to provide for these two AQMAs.

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. The advice given by the Helpdesk is contained within appendix C.

To summarise this correspondence, the Helpdesk proposed the use of the below matrix in order quantify air quality impacts:

Figure 1 – 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/m^3	Short (S)	< 2
6	100-500k	6	2-5 µg/m^3		
5	500k-1million	5	1-2 µg/m^3		
4	1-10 million	4	0.5 - 1 µg/m^3		
3	10-50 million	3	0.2 – 0.5 µg/m^3	Medium (M)	2-5
2	50-100 million	2	0 - 0.2 µg/m^3		
1	>100million	1	0 µg/m^3	Long (L)	>5

We therefore applied the criteria contained within this matrix to each of our actions within our Action Plan within our 2018 and 2019 ASRs and have continued using this matrix in our 2020 ASR. 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. We have also “colour-coded” the actions within table 2.2 (RAG), based on effectiveness of action, along with progress. 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	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Carriageway Improvements	Traffic Management	UTC, Congestion management, traffic reduction	2018	LA Highways and Major Projects departments	Funding from Sheffield City Region Infrastructure Fund	Completion of schemes	4, but scheme specific	Design of scheme to alleviate congestion within AQMA 2A	2021, but ongoing for future schemes	AQ assessment indicates reduction in NO_2 concentrations at certain receptors, whilst increase at others. Where increase in concentrations occur, the annual mean NO_2 objective is not predicted to be exceeded, with impact described as negligible to slight adverse. Planning permission for the AQMA 2A scheme has been granted with scheme now being implemented
2	Barnsley Bus Agreement	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2016	LA Transport Dept.	Voluntary agreement with fleet renewal provided by the bus operator	Uptake in Euro VI buses, target 2022 49% or better. 2016/17 - 14%. 2017/18 18%. 2018/19 17%, end of 2019 21%	3 (estimated)	Voluntary agreement signed January 2017	2022	Voluntary agreement signed with commitment to fleet renewal including Euro VI.
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	LA Housing & Energy Dept.	Joint funding from Office of Low Emissions grant award and BMBC funding	Installation of EV charge points	2 (estimated)	Successful award of funding and developing the project	2020-21 or future years	BMBC received OLEV funding to deliver 43 dual 7 kW EVCPs (on-street charging infrastructure), with match funding also from BMBC. It was hoped to complete this project in 2020, but delays due to current Covid-19 crisis
4	Specific scheme for AQMA 6	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2016 and previous years	LA, Highways England	Highways England Air Quality Fund to assess feasibility of proposed mitigation	Reduction in concentrations	4 (estimated)	Completion of further assessment work by HE in 2019, concluded that it would not be proportional to pursue such an intervention.	Completed	Further discussion within the text of this document. BMBC and HE will continue to seek further actions within this AQMA, however this particular action will not now be proceeding, so this action will be removed from the Plan. This has now been shaded red due to the action not proceeding
5	Planning applications - air quality mitigation and assessment	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2014-2015	LA Environmental Health and Planning Departments	BMBC	17 planning applications in 2016, where AQ actions have been agreed / conditioned / recommended,35 in 2017, 40 in 2018, 43 in 2019	2 (estimated)	in 2019 there were 43 planning applications where AQ mitigations were agreed / conditioned / recommended. These mitigations include provision of EVCPs, Travel Plans and fleet mitigations etc.	Ongoing	Successful implementation. Unable to quantify impact as number of planning applications will vary from year to year, along with mitigations required for each new development.
6	Control over emissions from Part B and A2 processes, and act as consultees for Part A1 processes	Other	Other	Ongoing	LA Environmental Health Department	BMBC	Unable to determine	2 (estimated)	Ongoing	Ongoing	Successful implementation

7	Enforcement of Clean Air Act with regards to industrial smoke	Other	Other	Ongoing	LA Environmental Health Department	BMBC	Unable to determine	2 (estimated)	Ongoing	Ongoing	Successful implementation
8	Enforcement of Clean Air Act with regards to domestic smoke	Other	Other	Ongoing	LA Environmental Health Department	BMBC	Unable to determine	2 (estimated)	Ongoing	Ongoing	Successful implementation
9	Investigation of nuisance complaints, including appropriate action to resolve the complaint	Other	Other	Ongoing	LA Environmental Health Department	BMBC	Unable to determine	2 (estimated)	Ongoing	Ongoing	Successful implementation
10	BMBC Fleet improvements	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2016, preparation for future funding bids	LA Fleet Operations Department	BMBC	Number of BMBC LEVs purchased or existing vehicles procured	2 (estimated)	The development of a comprehensive vehicle replacement strategy	Ongoing	The Council now has a vehicle replacement programme up until 2025, with the minimum specification being Euro 6. A minimum of 30 EVs to replace diesel vehicles will also be procured, an increase in 19 vehicles compared to last year
11	Priority parking for LEVs	Promoting Low Emission Transport	Priority parking for LEV's	2017-18	LA Highways Department	BMBC	Completed	2 (estimated)	BMBC car parking strategy will place charge points associated with new development in priority locations in order to encourage uptake	Completed	The Strategy will be reviewed periodically. This action is now complete and will be removed from the Action Plan
12	ECO Stars HDV Fleet Recognition scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Completed	LA Transportation Department	Defra AQ grant fund award	No of operators and vehicles signed up to the scheme. In 2018-19 These have been submitted to Defra in the AQCG final report.	2 (estimated)	2018-19 ECO Stars business targets met by Aug 19. ECO Stars NRMM feasibility study being undertaken, along with Future Business Model	2019, but intend to continue after this date, subject to securing of funding. Alternative funding mechanisms for the scheme are being explored	Continuation of ECO Stars scheme subject to identification of future funding.
13	ECO Stars Taxi Fleet Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Completed	LA Transportation Department	Defra AQ grant fund award	These have been submitted to Defra in the AQCG final report.	2 (estimated)	Successful Defra AQ grant award scheme currently ongoing	Aug-19	Continuation of ECO Stars taxi scheme subject to identification of future funding.
14	Eco Driver Training Scheme	Vehicle Fleet Efficiency	Driver training and ECO driving aids	2019	LA Public Health and Environmental Health Departments	Defra AQ grant fund award	No of operators and vehicles signed up to the scheme	2 (estimated)	Successful Defra AQ grant award, with intention to award contract in Summer 2019	Jul-20, now dependent on the scheme completing post Covid-19	Scheme was progressing satisfactorily until Covid-19
15	Barnsley Intelligent Transport Systems	Traffic Management	UTC, Congestion management, traffic reduction	Completed	LA Highways Department	BMBC	Installation of intelligent systems (SCOOT / MOVA) within AQMAs. Several of our AQMAs now have SCOOT / MOVA installed, with performance reviewed	2 (estimated)	Installation of MOVA / SCOOT	Completed, but ongoing review of performance	Successful implementation
16	Encourage cycling and walking (developing infrastructure and campaigns)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2022-2023 onwards	LA Highways Department	Transforming Cities Funding bid developed in 2019 and awarded in 2020, significant investment element for cycling and walking	Completion of Transforming Cities funded schemes	2 (estimated)	Successful award of Transforming Cities funding award to Sheffield City Region in March 2020	Access funding secured until 2020	Successful implementation of Access funded schemes. Development of active

						infrastructure contained within the bid					
17	Care4Air	Public Information	Via the Internet	Completed	LA Environmental Health Department	None currently available	Unable to determine	Unable to determine but considered beneficial.	Ongoing	Ongoing	Previously successful implementation - requires further funding. Due to lack of funding it is proposed to remove this from the Action Plan
18	Assessment of air quality impact of major traffic schemes	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Completed	Completed LA Environmental Health Department	BMBC	Unable to determine	Unable to determine but considered beneficial.	Assessment of proposed major road scheme within AQMA 2A (see action 1 above). Also, assessment of other potential road schemes	Ongoing	Successful implementation, but dependent on future promotion of schemes
19	Promoting Travel Alternatives (Workplace travel planning; encourage/facilitate home-working; personalised travel planning; school travel plans)	Promoting Travel Alternatives	Workplace Travel Planning	2017-18	LA Transportation Department	BMBC and developer contributions	Unable to determine	2 (estimated)	Ongoing	In 2019, The Council's Active Travel Supplementary Planning Document (SPD) has been formally adopted and is now being used in the appraisal planning applications for new development	The SPD includes a minimum requirement for the installation of electric vehicle charge points at both new residential and commercial development
20	Anti-idling policy feasibility study	Traffic Management	Anti-idling enforcement	2017-18	LA Public Health and Environmental Health Departments	BMBC	Number of participating organisations	2 (estimated)	Review of other local authority anti-idling procedures and policies. Developing local procedures to raise awareness of anti-idling	Expected to be ongoing	This action will now be renamed anti-idling raising awareness. The Council proceeded with a campaign involving the Borough's primary schools in 2019 and 2020, which has had to be temporarily curtailed due to Covid-19

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

Barnsley MBC is taking the following measures to address $PM_{2.5}$.

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.

Barnsley MBC does not monitor $PM_{2.5}$. In order to obtain an indication of $PM_{2.5}$ concentrations within the Borough, we have therefore applied the procedure within paragraph 7.109 and Box 7.7 of LAQM.TG (16). This procedure uses a national PM_{10} to $PM_{2.5}$ annual mean conversion factor (0.7). This conversion has subsequently been applied to the last five years PM_{10} annual means recorded at our roadside Barnsley Kendray monitoring station. The below table details this conversion.

Year	**2015**	**2016**	**2017**	**2018**	**2019**
PM_{10} annual mean (µg/m^3)	22	22	17	18	20
$PM_{2.5}$ annual mean (µg/m^3)	15.4	15.4	11.9	12.6	14

Whilst these indicative $PM_{2.5}$ concentrations have been obtained from a roadside monitoring site; we note that concentrations have been greater than the World Health Organisation (WHO) annual mean guideline concentration of 10 µg/m^3.

Public Health England have created outcome framework indicators, one of these relates to fraction of mortality attributable to particulate air pollution[5]. The 2015 percentage for the Barnsley Borough was 3.99%, whilst the 2017 Public Health Outcome Framework relates to modelled $PM_{2.5}$ concentrations[6]. These data show a modelled annual mean $PM_{2.5}$ concentration for Barnsley of 6.7 µg/m^3, compared to 7.3 µg/m^3 for the Yorkshire and the Humber region and 8.9 µg/m^3 for England as a whole.

Barnsley MBC is taking the following measures to address $PM_{2.5}$ emissions and concentrations:

Barnsley MBC has addressed the reducing emissions of $PM_{2.5}$ within our Air Quality Action Plan (AQAP) revised in 2017. Appendix G of our 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 (016), Action Plan Toolbox.

Applying Table A.1 therefore, all of the actions within the Plan will assist in reducing $PM_{2.5}$ concentrations, including those actions in the Plan which deal with industrial and domestic emissions, particularly actions six to nine 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 borough is covered by smoke control orders.

In addition, Barnsley has an issue with domestic smoke nuisance. For the period 1st November 2018 to 31st October 2019, the Council received 299 complaints relating to smoke from bonfires, and 48 complaints related to smoke from chimneys. In 2019, the Council subsequently bid for Defra air quality grant funding to undertake an awareness raising campaign regarding domestic emissions of particulate matter, taking into account that 38% of harmful primary particulate emissions in the UK come from burning

[5] https://data.england.nhs.uk/dataset/phe-indicator-30101
[6] https://fingertips.phe.org.uk/search/particulate%20matter/page-options/ovw-do-0#page/4/gid/1/pat/6/par/E12000003/ati/202/are/E08000016/iid/92924/age/-1/sex/-1/cid/4/tbm/1/page-options/ovw-do-0

wood and coal in domestic open fires. Unfortunately, the bid was unsuccessful, however, should opportunity to bid for funding be available again in the future, the Council may consider a further bid.

The entire Barnsley Borough is covered by smoke control orders.

The Clean Air Strategy, published this year, demonstrated further commitment to reducing $PM_{2.5}$ concentrations, particularly domestic emissions. We therefore await for the forthcoming Environment Bill and subsequent clarification of the future role of local authorities and any additional duties in reduing emissions, particularly from domestic sources.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Barnsley MBC undertook automatic (continuous) monitoring at three sites during 2019. **Error! Reference source not found.** in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are available from the Air Quality England website (https://www.airqualityengland.co.uk/local-authority/?la_id=19). Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

National monitoring results are available at https://uk-air.defra.gov.uk/ for the Government's Barnsley Gawber monitoring station, whilst http://www.airqualityengland.co.uk/ presents data from our A628 Roadside and A635 Roadside monitoring stations.

3.1.2 Non-Automatic Monitoring Sites

Barnsley MBC undertook non- automatic (passive) monitoring of NO_2 at 64 sites during 2020. Table A.2 in Appendix A shows the details of the sites.

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

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[7], "annualisation" (where the data capture falls below 75%), and distance correction[8]. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. Note that the concentration data presented in Table A.3 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 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, and only where relevant.

Therefore, please note that in Table A.3, diffusion tube data have **not** been distance corrected, whilst diffusion tubes DT15, DT16 and DT17 are co-located with our A628 Roadside automatic analyser in order to generate our local bias adjustment factor.

Due to satisfactory data capture in 2019, no diffusion tube data have been required to be annualised in accordance with Box 7.10 of LAQM.TG (16) (Annualising NO_2 Diffusion Tube Monitoring Data).

In order to provide a comparison with the UK air quality objectives, the distance corrected data (as detailed in table B1, and paragraphs 7.77 to 7.79 of LAQM.TG (16)) have been used to represent relevant exposure for LAQM purposes. Therefore, the below discussion is based upon data obtained from roadside / kerbside diffusion tubes which have been distance corrected to represent

[7] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[8] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

relevant exposure at receptor façade. There is a detailed discussion within Appendix C regarding the distance correction process we have adopted, including a discussion reagrding the background component of the distance correction calculation (local monitored urban background NO_2 concentration or 1 km^2 grid background concentration).

Consequently, in 2019, there has been a" levelling off" in nitrogen dioxide (NO_2) roadside concentrations within the Borough, including within our AQMAs, when compared to previous years. Below, we report on concentrations within each AQMA in turn, followed by monitoring outside our AQMAs.

The annual mean has been met in **AQMA 1** in 2019 for the nine years running (diffusion tube numbers 10, 28, 29 and 30).

Maps showing the location of these diffusion tubes are found in Appendix D and considered to be representative of exposure throughout the AQMA, whilst figure A.1 below charts a five-year trend in concentrations.

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 No. 1 AQMA in the Borough. Within our previous ASRs we stated that we are awaiting further information about this proposed scheme before we proceed with any revocation.

Subsequently, in 2020 the Department of Transport published its Route Investment Strategy, 2020-2025 (RIS2)[9]. RIS2 identifies the M1 motorway between junctions 35a and 39 as being in the "RIS3 pipeline" post 2025 for a scheme designed to introduce "extra capacity". AQMA 1 follows the M1 in the Barnsley borough, 100 metres either side of the central reservation from just south of junction of 35a to just north of junction 38.

[9] Department for Transport, March 2020, https://www.gov.uk/government/publications/road-investment-strategy-2-ris2-2020-to-2025

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 the AQMA continue to be well below the annual average objective for NO_2, we are now 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. Before revocation we will draft a detailed assessment to provide the evidence and justification for such a decision.

However, prior to this, and subject to appraisal of this report by Defra, we ask the question is this a reasonable course of action, taking into account there has been no assessment undertaken of the impact on local air quality of any increase due to any future "extra-capacity scheme"? Such a scheme may involve moving emissions closer to receptors by the addition of an all lane running scheme utilising the hard shoulder of the motorway, but any detailed assessment would also have to consider future change in emissions due to future changes in vehicle fleet post 2025, particularly on a motorway "drive cycle".

All diffusion tubes within **AQMA 2A** recorded concentrations below 40µg/m^3 (distance corrected for exposure) in 2019, the second successive year of compliance within this AQMA. Roadside and Kerbside concentrations were in excess of 40µg/m^3 at some locations in 2019 within this AQMA.

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

AQMA 2A along the A628 Dodworth Road can be split into two main links, these being the section between junction 37 of the M1 motorway and Pogmoor Crossroads, and the section from Pogmoor Crossroads to Town End Roundabout in Barnsley town centre. Both these sections recorded general reduction in concentrations in the period 2015 to 2018, with an increase or levelling off in concentrations in 2019.

Further monitoring is required before revocation can be considered for this AQMA.

There is continued exceedance in **AQMA 4** (tube numbers 41, 43 as distance corrected for exposure), however concentrations were below 40µg/m^3 for diffusion tube 44 for the second year in succession since declaration of this AQMA. There has been a levelling off in annual mean NO_2 concentration reductions in 2019, compared to previous years.

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

As discussed earlier (and in previous ASRs), NO_2 concentrations within AQMA 4 (Harborough Hill Road) are significantly affected by increased emissions due to an uphill gradient, and we would welcome any further guidance on how this issue may be addressed.

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 seven years, (as distance corrected for exposure in accordance TG (16) guidance).

In 2017, this Service produced a Detailed Assessment recommending revocation of AQMA 5[10]. This was subsequently disputed by Defra following appraisal of the detailed assessment[11]. Defra's comments are below:

1. The report has been produced in house by Barnsley Metropolitan Borough Council, based upon a review of the monitoring, and considering future trends in emissions and traffic levels in the AQMA concerned.

2. The review is based around the results of a single diffusion tube, that has registered a concentration of 38ug/m3 for 2016 following the application of appropriate correction factors.

3. We cannot concur with the report's recommendation that AQMA 5 is recommended for revocation on the basis of this assessment alone.

[10] Barnsley MBC, June 2017, Detailed Assessment proposing revocation of Barnsley No. 5 Air Quality Management Area
[11] Defra, DA 2017 Aug 5915_5822_1_Barnsley_DA7_002 Appraisal Report

4. It is well known that diffusion tube results are not the most accurate form of monitoring, and this assessment has only considered the results of monitoring from the current diffusion tube, and considerations of future trends in traffic and emissions levels.

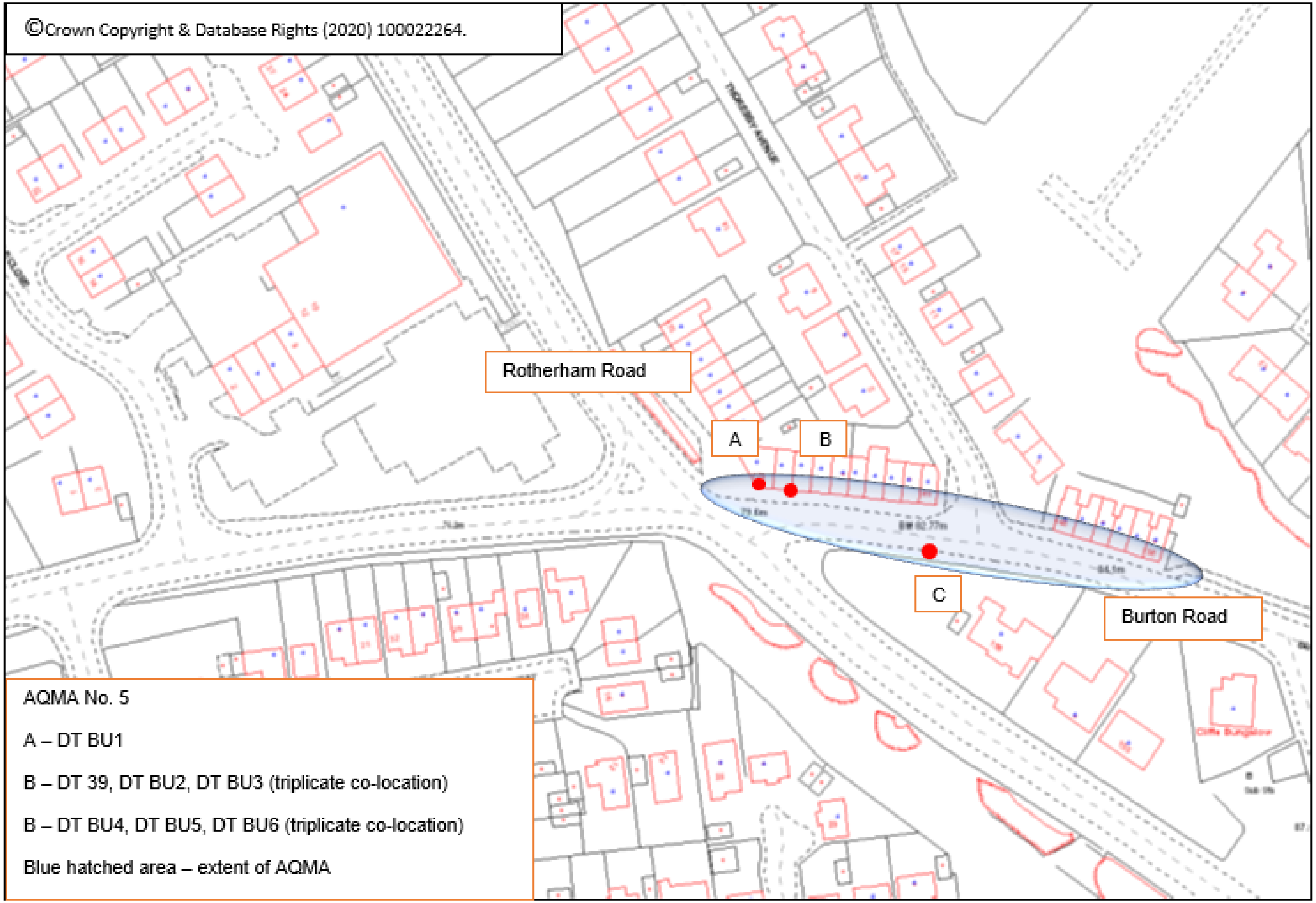
5. We agree that the conclusions drawn from the trends in traffic and emissions do suggest emissions are expected to fall, but it is also well known that the dispersion of emissions at a busy junction is difficult to predict, and can be subject to significant variations, related to traffic and weather patterns.

6. Therefore in these circumstances we recommend that some additional monitoring should be carried out to provide assurance that pollution levels remain significantly below objective levels. For this purpose, we consider that a minimum of two triplicate diffusion tube sites should be located close to the sites of relevant exposure, and if possible a triplicate site co-located with a continuous monitor, for a six month period.

7. The DA may then be completed with reference to the additional monitoring results.

In response, this service has undertaken monitoring in order to meet the above requirements. Unfortunately, it has not proved feasible to locate a continuous monitor within or adjacent to the AQMA, therefore, this Service has undertaken additional NO_2 diffusion tube monitoring within the AQMA.

This additional monitoring commenced in October 2017, and consisted of six additional diffusion tubes located within this AQMA, as detailed in the table and map below (the additional diffusion tube monitoring locations have the prefix “BU”:


©Crown Copyright & Database Rights (2020) 100022264.
Rotherham Road
A
B
C
Burton Road
AQMA No. 5
A – DT BU1
B – DT 39, DT BU2, DT BU3 (triplicate co-location)
B – DT BU4, DT BU5, DT BU6 (triplicate co-location)
Blue hatched area – extent of AQMA

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT39	Burton Road – app Rotherham Rd junc.	Kerbside	436072	407320	NO_2	Yes (5)	2.5	0.5	No	2.7
BU1	Burton Road, 30 mph sign	Roadside	436069	407321	NO_2	Yes (5)	1	1.8	No	2.5
BU2	Burton Road, co-located DT 39	Kerbside	436072	407320	NO_2	Yes (5)	2.5	0.5	No	2.7
BU3	Burton Road, co-located DT 39	Kerbside	436072	407320	NO_2	Yes (5)	2.5	0.5	No	2.7
BU4	Burton Road, LC 33 - Downhill	Kerbside	436107	407307	NO_2	Yes (5)	12	0.1	No	2.7
BU5	Burton Road, LC 33 - Downhill	Kerbside	436107	407307	NO_2	Yes (5)	12	0.1	No	2.7
BU6	Burton Road, LC 33 - Downhill	Kerbside	436107	407307	NO_2	Yes (5)	12	0.1	No	2.7

The last five years roadside / kerbside data (annual mean, µg/m^3) are detailed within the below table:

Year	DT39	BU1	BU2	BU3	BU4	BU5	BU6
2015	44.8						
2016	46.4						
2017	45	30.3*	33.9*	35.2*	39.4*	36.8*	40.3*
2018	44.4	33.9	38.8	40.3	33.9	34.7	37.2
2019	41.9	36.3	44.1	44.4	41.6	38.7	39.8

*annualised data, based on three-month data, Oct-Dec 2017 inclusive, details of the annualisation calculation are found in Appendix C.

This Service has reviewed our 2017 detailed assessment and recall that the assessment was primarily based on the results of one diffusion tube within this AQMA (DT39). As this diffusion tube is not located at receptor façade, annual mean data were accordingly subject to distance correction. As an AURN urban background site (Barnsley Gawber) is located within the Borough, the detailed assessment reported the distance correction calculation with the both relevant grid square data, and also reported the Barnsley Gawber concentrations as the background component of the calculation.

Data were reported for the period 2011 to 2016. The 2011 and 2012 1 km^2 background data (grid square 435500 406500) were extracted from the 2011 background map database, whilst the data for 2013 to 2016 were extracted from the 2013 update background map database.

For this ASR, we have replicated this process and have also incorporated the data from the 2017 assessment in the table below:

Year	NO2 annual average µg/m³ Gawber	% Data Capture	Background for grid square 435500 406500	DT39 distance corrected Gawber background µg/m³	DT39 distance corrected grid square background µg/m³	BU1, Distance corrected Gawber background µg/m³	BU1, Distance corrected grid square background µg/m³	BU2, Distance corrected Gawber background µg/m³	BU2, Distance corrected grid square background µg/m³	BU3, Distance corrected Gawber background µg/m³	BU3, Distance corrected grid square background µg/m³
2011	20	94	23.13*	37.9	38.9						
2012	21	94	22.59*	37.4	37.9						
2013	21	98	23.49**	37.1	37.6						
2014	21	99	22.79**	38.4	39.6						
2015	19	97	22.09**	36.6	37.6						
2015	19	97	18.9***	36.6	36.6						
2016	19	99	21.26**	37.7	38.4						
2016	19	99	18.3***	37.7	37.5						
2017	16	98	14.4****	35.8	35.3	(28.9)	(28.7)	(28.2)	(27.7)	(29.1)	(28.6)
2018	16	99	13.7****	35.4	34.7	32.1	31.9	31.6	30.8	32.6	31.9
2019	17	96	13.1****	34	32.8	34.4	34	35.5	34.3	35.7	34.5

() – annualised data, based upon three-month monitoring exercise

Data were extracted from the 2011 background map database *

Data were extracted from the 2013 background map database **

Data were extracted from the 2015 background map database ***

Data were extracted from the 2017 background map database ****

We have subsequently discussed the significance of these data with the LAQM Helpdesk[12]. LAQM Helpdesk advised that for diffusion tube data, should the last three years NO_2 annual means be 36 µg/m^3 or below (i.e. greater than 10% below the objective) at receptor façade, this may constitute sufficient grounds for subsequent revocation.

Distance corrected data from the above table demonstrate that concentrations from diffusion tube monitoring locations within the AQMA (DT39, BU1, BU2, BU3) have been below 36 µg/m^3 for the last three years, when both the grid square and Barnsley Gawber background NO_2 component are applied separately to the distance correction calculation. Further details of this calculation are found within Appendix C.

We note however that there appears not to be a consistent decline in roadside NO_2 concentrations within this AQMA, and consequently the reduction in receptor façade concentrations following application of the distance correction seems mainly to be in response in generally declining background concentrations as measured at the Barnsley Gawber AURN site, or due to refinement of the Defra 1 km^2 grid square background concentration database due to updates in 2013, 2015 and 2017.

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

Diffusion tubes BU4, BU5 and BU6 are also located within AQMA, with the nearest receptor to these tubes (tubes located on the westbound, downhill carriageway of Burton Road) located outside the AQMA and at a sufficient distance away to result in receptor façade concentrations being sufficiently below the objective to warrant these data not be considered further. The distance corrected data for 2017 to 2019 for these tubes are presented in the below table (annual mean, µg/m^3):

[12] LAQM Helpdesk, personal communication March 2020

Year	**BU4**	**BU5**	**BU6**
2017	(24)	(23.1)	(24.3)
2018	22.1	22.4	23.2
2019	25.4	24.4	24.7

() – annualised data, based upon three-month monitoring exercise

These data confirm no exceedance of the annual mean objective for receptors located nearest to the downhill carriageway.

We therefore request if the above explanation of monitoring undertaken in AQMA 5 is now sufficient to now proceed with revocation.

There is continued exceedance in **AQMA 6** in 2019 (tube numbers, 3, 8, Langsett) of the annual mean objective. This AQMA has been previously declared for both exceedances of the annual mean and 1-hour mean NO_2 objectives. LAQM.TG (16) states that concentrations over 60 µg/m^3 are at risk of exceeding the 1-hour NO_2 mean subject to exposure. In 2019, roadside concentrations were below 60µg/m^3 for the second year in succession, so we can assume that concentrations in areas of relevant exposure (gardens etc. where members of the public may be exposed for one hour or more) would have met the 1-hour objective in this AQMA.

In our 2019 ASR we reported that Highways England had undertaken detailed traffic surveys (origin-destination etc.) in 2018, along with additional monitoring to assess 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 the monitoring 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.

In 2019 Highways England undertook additional air quality monitoring in November 2019 to attempt to further understand the impact of right turning traffic into Gilbert Hill on NO_2 concentrations in Langsett.

The below text is taken directly from the subsequent report[13].

"Table 10 presents the potential impact on measured diffusion tube concentrations in the western half of the AQMA if the right turn onto Gilbert Hill were to be removed.

Table 10: Potential reduction in NO_2 concentrations at diffusion tubes"

	Diffusion tube DT3	***Diffusion tube DT4***	***Diffusion tube DT8***
Annual mean NO_2 (2018)	***49.5 µg/m³***	***48.2 µg/m³***	***55.7 µg/m³***
1.2% reduction	*48.9 µg/m³*	*47.6 µg/m³*	*55.0 µg/m³*
1.4% reduction	48.8 µg/m³	47.5 µg/m³	54.9 µg/m³
1.7% reduction	48.7 µg/m³	47.4 µg/m³	54.8 µg/m³
1.9% reduction	48.6 µg/m³	47.3 µg/m³	54.6 µg/m³
2.2% reduction	48.4 µg/m³	47.1 µg/m³	54.5 µg/m³

Consequently, it has been concluded that the results of the air quality monitoring data indicate 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.

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

[13] Technical Note Highways England 6th February 2020, A616 Langsett: November 2019 Smogmobile Surveys

Concentrations adjacent to the downhill carriageway continue to meet the objective (now three years in succession), whilst concentrations adjacent to the uphill carriageway continue to exceed the objective. Whilst there has been a welcome reduction in concentrations in previous years, this appears to have now levelled off in 2019. This reduction in concentrations is thought to be due to declining road traffic emissions as a consequence of the increase in newer Euro VI heavy goods vehicles which have lower emissions than previous euro standards replacing older more polluting ones. The numbers of new Euro VI replacing older HGVs are starting to level off and this may be reflected in the levelling off the reductions in 2019 NO_2 measurements[14]. There is a high percentage of HGVs using this trans-Pennine route (2018 data; AADT 14218, LGV 3087, HGV 1810[15]).

Further ongoing roadside NO_2 monitoring data are required to assess future trends. However, the 2020 data will not provide a true reflection of long-term trends due to the impact of the lockdown on traffic flows. We intend to continue roadside monitoring at Langsett in 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 we 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 (http://assets.highwaysengland.co.uk/Corporate+documents/FINAL+-+HE+Research+Projects+to+Improve+Air+Quality.pdf), 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.

We would welcome any suggestions Defra may wish to make to progress this issue, as part of the statutory appraisal of this ASR.

[14] Highways England air quality team, personal communication
[15] https://roadtraffic.dft.gov.uk/manualcountpoints/7354

In 2018, for the first time since declaration of **AQMA 7** in 2012, the tube located within this AQMA at the junction of Sheffield Road and Cemetery Road near Barnsley town centre was below 40 µg/m^3 when concentrations were distanced corrected back to nearest residential building facade. In 2019 however, concentrations exceeded the annual mean objective within this AQMA. Maps showing the location of these diffusion tubes are found in Appendix D, whilst figure A.1 below details charts a five-year trend in concentrations.

The Council monitors diffusion tube NO_2 concentrations **outside our AQMAs** and discussion of new monitoring undertaken in 2019 is found below, along with discussion of any diffusion showing consistently high concentrations but below the annual mean objective.

The appraisal of our 2019 ASR stated the following:

"DT26 is exceeding air quality objectives but when distance corrected is below threshold. Recommend discussion on this as exceeding consistently for the past few years."

DT 26 is located near to the junction of the A61 Sheffield Road and the Birdwell and junction 36 M1 motorway roundabouts. Maps in Appendix D shows the location of the tube in relation to nearby residential receptors and the roundabouts. The A61 is a busy arterial road, allowing traffic from the southern portion of the Barnsley urban area to access the M1 motorway at junction 36. 2018 Department for Transport traffic counts[16] indicate an annualised daily traffic flow (AADT) of 18868 on Sheffield Road at Birdwell, with an AADT midway between the Birdwell and junction 36 roundabouts of 38132.

Annual mean roadside and distance corrected concentrations for DT26 and neighbouring diffusion tubes DT25 and DT27 are presented in the below table (µg/m^3):

[16] https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints

DT	2015	2016	2017	2018	2019
DT25 roadside	45	42.9	40.2	34.3	38.6
DT25 distance corrected	38.7	37.1	34.4	28.7	32
DT26 roadside	44.3	44.8	43.2	40.1	40.3
DT26 distance corrected	38.2	38.6	36.7	32.8	33.2
DT27 roadside*	43.3	39.5	38.6	39.1	39.8

Receptor near to DT27 is not residential etc., the building being classed as a place of worship. As can be seen from the map in Appendix D, DT27 is located on the outbound carriageway from the junction 36 roundabouts, whilst DT25 and DT26 are located on the inbound carriageway.

The nearby Birdwell Roundabout was constructed recently (completed in Summer 2017), with the purpose of alleviating congestion on junction 36 and the arterial roads leading to this junction, including Sheffield Road. The 2018 and 2019 data for DT25 and DT26 indicate some reduction in concentrations following completion of Birdwell roundabout and alleviation of concentrations. This area of the Borough is subject to possible future development, so it is our intention to continue monitoring in future years.

Additional diffusion tube monitoring was undertaken in 2019, in response to local concerns issues. Specifically, the new locations were:

Diffusion Tube	**Roadside / Kerbside annual mean 2019 (µg/m³)**	**Distance corrected annual mean 2019 (µg/m³)**
DT40 (relocated)	42.2	32.2
DT50	37.4	28.7
DT51	31.0	31.0
DT52	35.4	30.0
DT53	59.0	48.4
DT54	44.6	33.1
DT55	42.6	35.5
DT56	26.2	23.7
DT57	38.9	33.6
DT58	37.4	34.0

With the exception of DTs 54 and 56 monitoring has continued at these locations. Of particular interest are the data from DT53, 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). Clearly, an exceedance of the annual mean NO_2 objective is evident at this location, subject to suitable exposure. We therefore propose to undertake a detailed assessment subsequent to submission of this ASR with a view to declare an additional AQMA.

We have had an initial discussion with the LAQM Helpdesk regarding the data from this diffusion tube and the circumstances of the monitoring location the data are considered to be representative. This communication is reproduced below[17]:

Barnsley MBC Question to Helpdesk

We have a recently located a NO_2 diffusion tube giving an annual mean 2019 concentration of 48.4 µg/m^3 at building façade, representing exposure at a row of buildings close to a busy arterial road. The diffusion tube is at a height of 2.8 metres above ground level. The buildings at ground level are a row of commercial properties (no relevant exposure), with flats at first floor level (and in some cases second floor level). Does the annual mean concentration at 2.8 metres represent exceedance of the annual mean objective at first and second floor and therefore should I consider declaration due to exceedance of the annual mean objective? Alternatively, is there another method of determining concentration at first floor and second floor level using the NO_2 annual mean concentration derived at 2.8 metres?

LAQM Helpdesk Response

In order to effectively determine concentrations at differing heights, it is recommended to carry out dispersion modelling of the area where receptors can be placed at specific levels representative of the sensitive receptors. It is a local authority's prerogative to declare an air quality management area, a process which may be based on either monitoring trends or a detailed study, and TG.16 recommends that monitoring must be undertaken in order to identify the requirement for such a study (para 7.508). It may be useful

[17] LAQM Helpdesk, personal communication March 2020

therefore to increase monitoring in the area to determine any further pollution hot spots and also assisting in the validity of your model, should it be decided to undertake one in support of your management area declaration.

We will take into account the above comments when undertaking the subsequent detailed assessment.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

With regard to the 1-mean objective AQMA 6 (Langsett) was amended in 2016 to include exceedance of this mean. Concentrations at roadside have now dropped below 60µg/m^3 for the second year in succession, so we conclude that the 1-hour mean objective was not exceeded in 2018 or 2019 (we considered relevant exposure to be in the gardens of properties adjacent to the road within this AQMA). Further years data are however required before amendment of this AQMA to remove exceedance of the 1-hour mean objective can be considered.

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. There have been no exceedances of the annual and 24-hour mean objectives for PM_{10} for the past nine years, taking into account that the 24-hour mean objective should not be exceeded more than 35 times per year.

3.2.3 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ monitoring is not undertaken by Barnsley MBC, however we have reported in earlier this ASR (section 2.3) of the procedure within paragraph 7.109 and Box 7.7 of LAQM.TG (16) for converting our roadside PM_{10} data to indicative $PM_{2.5}$ data.

3.2.4 Sulphur Dioxide (SO_2)

Table A.77 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2019 with the air quality objectives for SO_2. There have been no measured exceedances of the SO_2 objectives for the past nine years.

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?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Barnsley A635 Roadside	Roadside	436298	405691	PM10	N	Beta Attenuation	N/A	5	1.45
CM2	Barnsley A628 Roadside	Roadside	432680	406174	NO2	Y, AQMA 2A	Chemiluminescent	N/A	3.5	1.7
CM3	Barnsley Gawber	Urban background	432525	407475	NO2, SO2, O3	N	Chemiluminescent, UV Fluorescence UV Absorption	n/a	n/a	4 (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

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT1	Midhopestones Eastbound	Roadside	423621	399817	NO2	No	3	2.5	No	2.85
DT2	Langsett Stanley Cottages	Roadside	421102	400496	NO2	Yes (6)	0	1.5	No	2.95
DT3	Footpath Sign, School House, Langsett	Roadside	421143	400481	NO2	Yes (6)	0	3.5	No	1.9
DT4	Langsett School House	Roadside	421126	400485	NO2	Yes (6)	n/a	2	No	2.75
DT5	Langsett Café	Roadside	421291	400482	NO2	Yes (6)	0	2	No	2.9
DT6	Langsett Wagon and Horses	Roadside	421282	400471	NO2	Yes (6)	n/a	3	No	2.6
DT7	Gilbert Hill – Langsett	Roadside	421117	400501	NO2	No	7.5	2.5	No	2.6
DT8	Langsett - Footpath Sign	Roadside	421215	400475	NO2	Yes (6)	2	2	No	2.1
DT9	Claycliffe Rd / Barugh Lane	Kerbside	431468	408579	NO2	No	0	1.5	No	2.8
DT10	Lansdowne Crescent, Darton	Urban Background	430820	409453	NO2	Yes (1)	0	n/a	No	2
DT11	Dodworth Road	Roadside	434000	406292	NO2	Yes (2A)	0	n/a	No	2.7
DT12	Dodworth Road	Roadside	433910	406290	NO2	Yes (2A)	0	n/a	No	2.75
DT13	Traffic Lights Dodworth Rd	Roadside	433820	406278	NO2	Yes (2A)	2.5	2.5	No	2.9
DT14	Dodworth Road	Roadside	432702	406160	NO2	Yes (2A)	13	3	No	2.65

DT15	Pogmoor Crossroads	Roadside	432680	406174	NO2	Yes (2A)	n/a	n/a	Yes	1.7
DT16	Pogmoor Crossroads	Roadside	432680	406174	NO2	Yes (2A)	n/a	n/a	Yes	1.7
DT17	Pogmoor Crossroads	Roadside	432680	406174	NO2	Yes (2A)	n/a	n/a	Yes	1.7
DT18	Traffic Lights Pogmoor Road	Roadside	432645	406198	NO2	No	5.5	5.25	No	2.8
DT19	Crown Hill Rd	Roadside	432481	406068	NO2	Yes (2A)	0	n/a	No	2.75
DT20	Dodworth Road – Pogmoor	Roadside	432535	406071	NO2	Yes	7.5	1.5	No	2.95
DT21	Dodworth Rd, Pogmoor	Roadside	432402	406013	NO2	Yes (2A)	8	3	No	2.9
DT22	Dodworth Rd, Pogmoor	Kerbside	432351	405985	NO2	Yes (2A)	11.5	2.5	No	2.9
DT23	Dodworth Rd, Pogmoor	Roadside	432281	405951	NO2	Yes (2A)	8	2	No	3
DT24	A6135 Hoyland	Kerbside	435274	400384	NO2	No	6.5	1	No	2.8
DT25	A61 Sheffield Road Birdwell	Roadside	434832	400405	NO2	No	3	1.5	No	2.9
DT26	A61 Sheffield Road, Birdwell	Roadside	434820	400421	NO2	No	3	1.5	No	2.8
DT27	A61 Sheffield Road, Birdwell	Roadside	434823	400398	NO2	No	n/a	n/a	No	2.9
DT28	Tankersley School	Roadside	434652	400231	NO2	Yes (1)	0	n/a	No	2.8
DT29	Moor Lane, Birdwell	Urban Background	434721	400352	NO2	Yes (1)	0	n/a	No	2.7
DT30	The Walk, Birdwell	Roadside	434309	401032	NO2	Yes (1)	0	n/a	No	2.6
DT31	Sheffield Rd – Birdwell	Roadside	434595	401107	NO2	No	3.5	2.5	No	3
DT32	Sheffield Rd – Chapel Street, Birdwell	Roadside	434559	401274	NO2	No	0	n/a	No	2.75

DT33	Westway	Roadside	434251	406199	NO2	No	0	n/a	No	2.85
DT34	Wakefield Road / Carlton Road	Roadside	435011	408281	NO2	No	7	2	No	3.5
DT35	Wakefield Road / Carlton Road	Roadside	435027	408190	NO2	No	n/a	n/a	No	2.8
DT36	Wakefield Road / Smithies Lane (North)	Roadside	435027	408104	NO2	No	6.5	2	No	2.7
DT37	Wakefield Road – Burton Road junction	Roadside	435174	407499	NO2	No	5.8	1.7	No	2.8
DT38	Old Mill Lane / Honeywell Street	Kerbside	434757	406995	NO2	No	3	0.3	No	2.8
DT39	Burton Road – app Rotherham Rd junc.	Kerbside	436072	407320	NO2	Yes (5)	2.5	0.5	No	2.7
DT40	Grange Lane, near to Cundy Cross junc.	Roadside	437122	406557	NO2	No	6	1.4	No	2.8
DT41	Harborough Hill Road	Roadside	434933	406695	NO2	Yes (4)	8	2	No	2.7
DT42	Mottram Street / Eldon Street	Roadside	434727	406753	NO2	No	0	n/a	No	2.75
DT43	Harborough Hill Road	Roadside	434955	406769	NO2	Yes (4)	5	2	No	2.9
DT44	Harborough Hill Road, adj. gyratory	Roadside	435047	407033	NO2	Yes (4)	0	n/a	No	2.9
DT45	Mexborough Road, Bolton-u-Dearne	Urban Background	445699	402140	NO2	No	0	n/a	No	3.2
DT46	Near to supermarket site, Wombwell Lane	Kerbside	437554	405291	NO2	No	4	0.65	No	3.2
DT47	Sheffield Road / Park Road Xrds	Roadside	434958	405672	NO2	No	0	n/a	No	2.8

DT48	Sheffield Road / Cemetery Road Xrds	Roadside	434964	405709	NO2	Yes (7)	1.5	2	No	2.7
DT49	Doncaster Road, Ardsley	Kerbside	437528	405675	NO2	No	3.9	0.5	No	2.8
DT50	Carlton Road (W'fd Road junction) uphill	Roadside	435062	408244	NO2	No	5.5	1.5	No	2.75
DT51	Carlton Road (W'fd Road junction) downhill	Roadside	435049	408229	NO2	No	0	1.3	No	2.4
DT52	Wakefield Road / Bar Lane junction	Roadside	434112	409625	NO2	No	2.8	1.6	No	2.7
DT53	Sheffield Road, town centre	Roadside	434809	406023	NO2	No	2.5	0.25	No	2.8
DT54	Alhambra R/bt	Roadside	434763	406038	NO2	No	12	3	No	2.6
DT55	Wombwell Lane, adj. Keel Inn	Roadside	437369	405456	NO2	No	2.4	1.6	No	2.7
DT56	Junction Church Street / Regent Street	Roadside	434430	406529	NO2	No	4.2	1.8	No	2.8
DT57	Grange Lane, Stairfoot, northbound	Roadside	437242	405772	NO2	No	1.5	1.5	No	2.75
DT58	Grange Lane, Stairfoot, southbound	Roadside	437250	405813	NO2	No	2.3	2.3	No	2.9
BU1	Burton Road, 30 mph sign	Roadside	436069	407321	NO2	Yes (5)	1	1.8	No	2.5
BU2	Burton Road, co-located DT 39	Kerbside	436072	407320	NO2	Yes (5)	2.5	0.5	No	2.7
BU3	Burton Road, co-located DT 39	Kerbside	436072	407320	NO2	Yes (5)	2.5	0.5	No	2.7
BU4	Burton Road, LC 33 - Downhill	Kerbside	436107	407307	NO2	Yes (5)	12	0.1	No	2.7

BU5	Burton Road, LC 33 - Downhill	Kerbside	436107	407307	NO2	Yes (5)	12	0.1	No	2.7
BU6	Burton Road, LC 33 - Downhill	Kerbside	436107	407307	NO2	Yes (5)	12	0.1	No	2.7

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
CM2	432680	406174	Roadside	Automatic	96.4	96.4	39	36	35	32	32
CM3	432525	407475	Urban Background	Automatic	86	86	19	19	16	16	17
DT1	423621	399817	Roadside	Diffusion Tube	83	83	38.6	37.1	35.9	29.5	29.3
DT2	421102	400496	Roadside	Diffusion Tube	100	100	**45.7**	**41.5**	37.4	34.5	33.8
DT3	421143	400481	Roadside	Diffusion Tube	100	100	**72.2**	**62.3**	**60.9**	**49.5**	**49.0**
DT4	421126	400485	Roadside	Diffusion Tube	100	100	**75.4**	**63.9**	**57**	**48.2**	**48.8**
DT5	421291	400482	Roadside	Diffusion Tube	100	100	**43.4**	39	39.5	31.8	31.9
DT6	421282	400471	Roadside	Diffusion Tube	100	100	**49.5**	**47.6**	**45.1**	39.3	38.8
DT7	421117	400501	Roadside	Diffusion Tube	100	100	37.2	33.1	32.7	28.5	28.3
DT8	421215	400475	Roadside	Diffusion Tube	100	100	**79.8**	**68.7**	**65.4**	**55.7**	**55.6**
DT9	431468	408579	Kerbside	Diffusion Tube	92	92	38	32.8	31.9	27.7	31.7
DT10	430820	409453	Urban Background	Diffusion Tube	100	100	29.6	29.1	26.9	22.2	24.4
DT11	434000	406292	Roadside	Diffusion Tube	92	92	**43.9**	**43.2**	38.5	35.0	39.1
DT12	433910	406290	Roadside	Diffusion Tube	100	100	**48.5**	**45.5**	**41.8**	38.9	38.9
DT13	433820	406278	Roadside	Diffusion Tube	92	92	**48.1**	**45.1**	**43.9**	39.0	**43.3**
DT14	432702	406160	Roadside	Diffusion Tube	100	100	**49.8**	**49.2**	**44.4**	39.4	**40.5**
DT15	432680	406174	Roadside	Diffusion Tube	100	100	**41.2**	38.3	34.5	34.5	31.5
DT16	432680	406174	Roadside	Diffusion Tube	100	100	38.6	36.3	34.3	32.8	32.7
DT17	432680	406174	Roadside	Diffusion Tube	100	100	**40.8**	37.8	32.6	33.6	31.9
DT18	432645	406198	Roadside	Diffusion Tube	92	92	**44.4**	36.9	34.1	27.6	30.3

DT19	432481	406068	Roadside	Diffusion Tube	100	100	30.9	28.1	28.7	25.7	27.2
DT20	432535	406071	Roadside	Diffusion Tube	100	100	**44.7**	**43.4**	**40.9**	37.0	39.6
DT21	432402	406013	Roadside	Diffusion Tube	100	100	**58.1**	**51.1**	**49.1**	**45.8**	**46.2**
DT22	432351	405985	Kerbside	Diffusion Tube	100	100	**53.2**	**52.7**	**50**	**44.2**	**48.1**
DT23	432281	405951	Roadside	Diffusion Tube	100	100	**49.8**	**50**	**52**	**43.4**	**47.0**
DT24	435274	400384	Kerbside	Diffusion Tube	92	92	35.4	32.5	**40**	30.2	30.3
DT25	434832	400405	Roadside	Diffusion Tube	100	100	**45**	**42.9**	**40.2**	34.3	38.6
DT26	434820	400421	Roadside	Diffusion Tube	100	100	**44.3**	**44.8**	**43.2**	**40.1**	**40.3**
DT27	434823	400398	Roadside	Diffusion Tube	100	100	**43.3**	39.5	38.6	39.1	39.8
DT28	434652	400231	Roadside	Diffusion Tube	100	100	22.5	25.5	22.6	23.9	23.6
DT29	434721	400352	Urban Background	Diffusion Tube	100	100	32.7	31.3	32.1	27.6	28.3
DT30	434309	401032	Roadside	Diffusion Tube	92	92	34.7	32.6	36.2	29.5	33.4
DT31	434595	401107	Roadside	Diffusion Tube	92	92	33.2	33.2	31.8	29.7	29.7
DT32	434559	401274	Roadside	Diffusion Tube	100	100	38.1	37.9	38.5	32.8	35.5
DT33	434251	406199	Roadside	Diffusion Tube	92	92	30.8	31.8	30.9	29.0	31.2
DT34	435011	408281	Roadside	Diffusion Tube	100	100	34.4	34.9	35.2	33.1	32.2
DT35	435027	408190	Roadside	Diffusion Tube	100	100	**42.2**	**40.7**	38.7	37.4	35.9
DT36	435027	408104	Roadside	Diffusion Tube	100	100	**42**	**42.9**	**43.4**	**40.1**	**40.3**
DT37	435174	407499	Roadside	Diffusion Tube	100	100	32.8	34.3	33.4	30.2	32.3
DT38	434757	406995	Kerbside	Diffusion Tube	92	92	**41.5**	**41.9**	**43.4**	**40.4**	37.8
DT39	436072	407320	Kerbside	Diffusion Tube	100	100	**44.8**	**46.4**	**45**	**44.4**	**41.9**
DT40	437122	406557	Roadside	Diffusion Tube	83	83					**42.2**
DT41	434933	406695	Roadside	Diffusion Tube	100	100	**67.4**	**69.1**	**68.7**	**59.3**	**60.3**
DT42	434727	406753	Roadside	Diffusion Tube	92	92	33.4	34	33.6	31.4	28.1
DT43	434955	406769	Roadside	Diffusion Tube	100	100	**65**	**66.5**	**65.8**	**59.7**	**58.9**
DT44	435047	407033	Roadside	Diffusion Tube	100	100	**43**	**41.1**	**42.6**	37.2	39.1

DT45	445699	402140	Urban Background	Diffusion Tube	100	100	23.7	24.1	24.8	21.7	22.6
DT46	437554	405291	Kerbside	Diffusion Tube	100	100	**47.6**	**46.7**	**48.1**	38.4	**42.2**
DT47	434958	405672	Roadside	Diffusion Tube	100	100	37.2	39	38.6	30.3	33.5
DT48	434964	405709	Roadside	Diffusion Tube	100	100	**51.4**	**54.7**	**48.4**	**43.4**	**47.4**
DT49	437528	405675	Kerbside	Diffusion Tube	100	100	**49.3**	**48.7**	**46.4**	39.0	**41.9**
DT50	435062	408244	Roadside	Diffusion Tube	92	92					37.4
DT51	435049	408229	Roadside	Diffusion Tube	83	83					31.0
DT52	434112	409625	Roadside	Diffusion Tube	100	100					35.4
DT53	434809	406023	Roadside	Diffusion Tube	100	100					**59.0**
DT54	434763	406038	Roadside	Diffusion Tube	75	75					**44.6**
DT55	437369	405456	Roadside	Diffusion Tube	100	100					**42.6**
DT56	434430	406529	Roadside	Diffusion Tube	75	75					26.2
DT57	437242	405772	Roadside	Diffusion Tube	92	92					38.9
DT58	437250	405813	Roadside	Diffusion Tube	100	100					37.4
BU1	436069	407321	Roadside	Diffusion Tube	100	100			30.3	33.9	36.3
BU2	436072	407320	Kerbside	Diffusion Tube	100	100			33.9	38.8	**44.1**
BU3	436072	407320	Kerbside	Diffusion Tube	100	100			35.2	**40.3**	**44.4**
BU4	436107	407307	Kerbside	Diffusion Tube	83	83			39.4	33.9	**41.6**
BU5	436107	407307	Kerbside	Diffusion Tube	83	83			36.8	34.7	38.7
BU6	436107	407307	Kerbside	Diffusion Tube	83	83			**40.3**	37.2	39.8

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

☒ **Annualisation has been conducted where data capture is <75%**

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

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 **<u>bold and underlined.</u>**

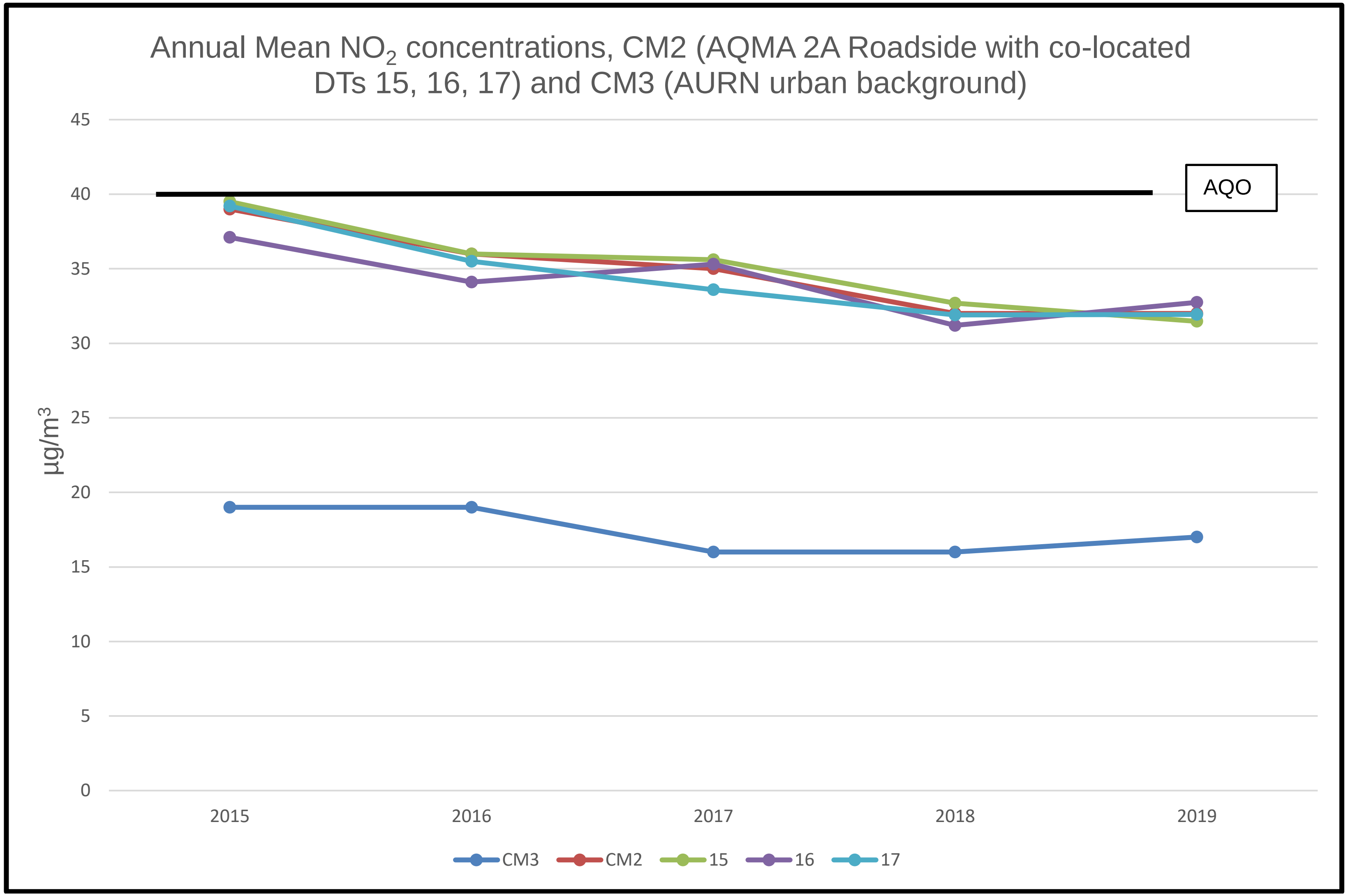
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

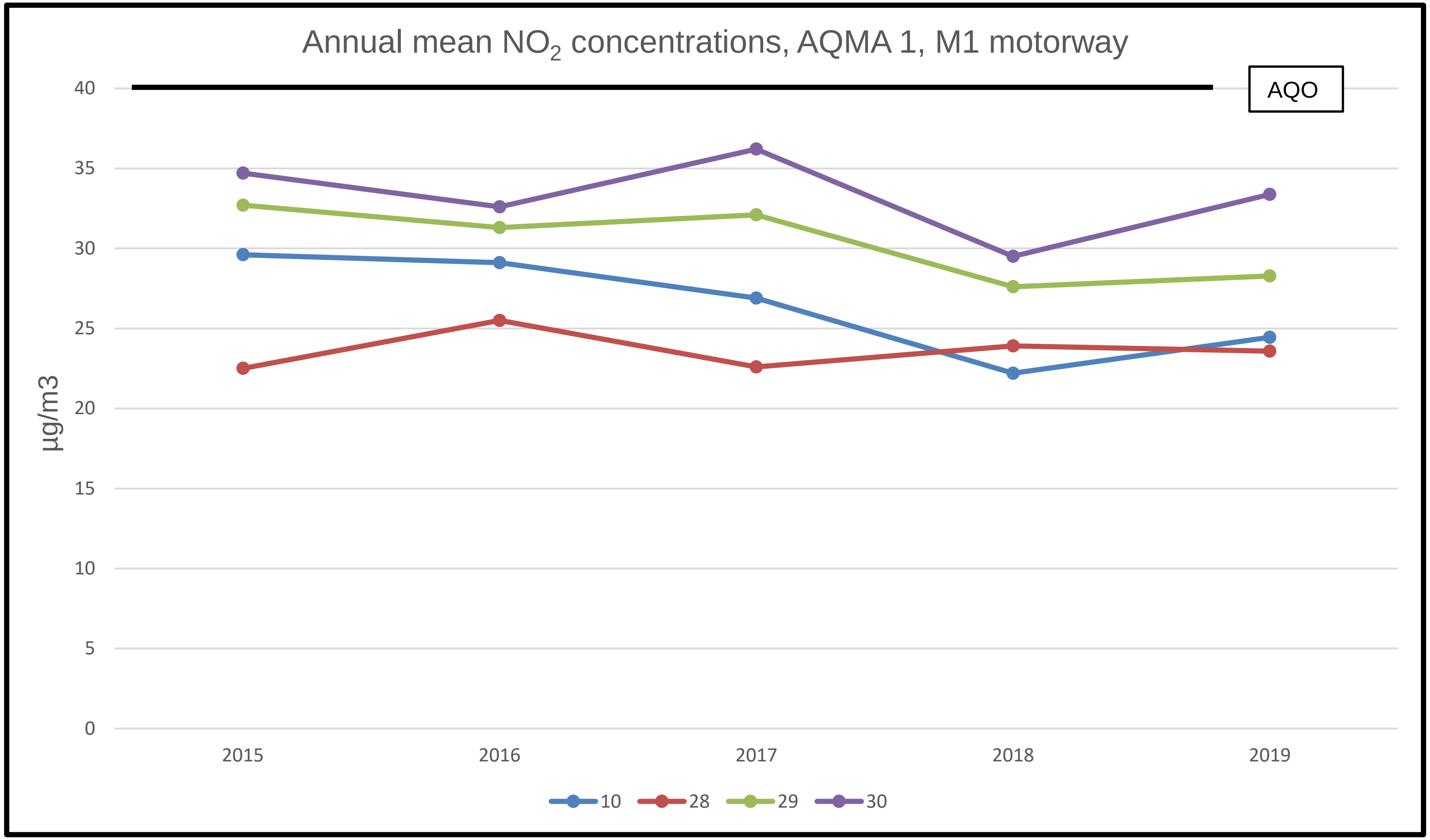
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

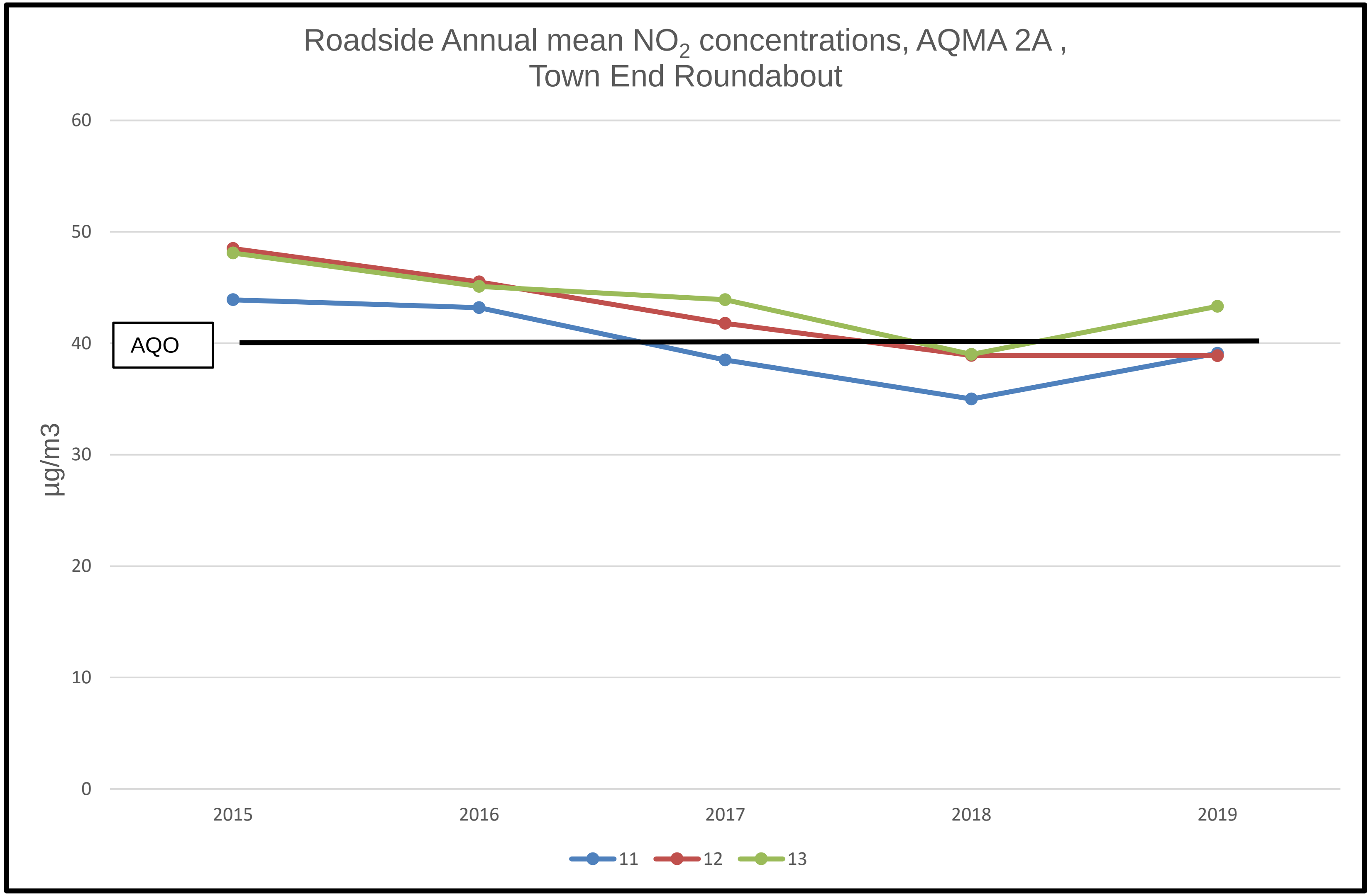
(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

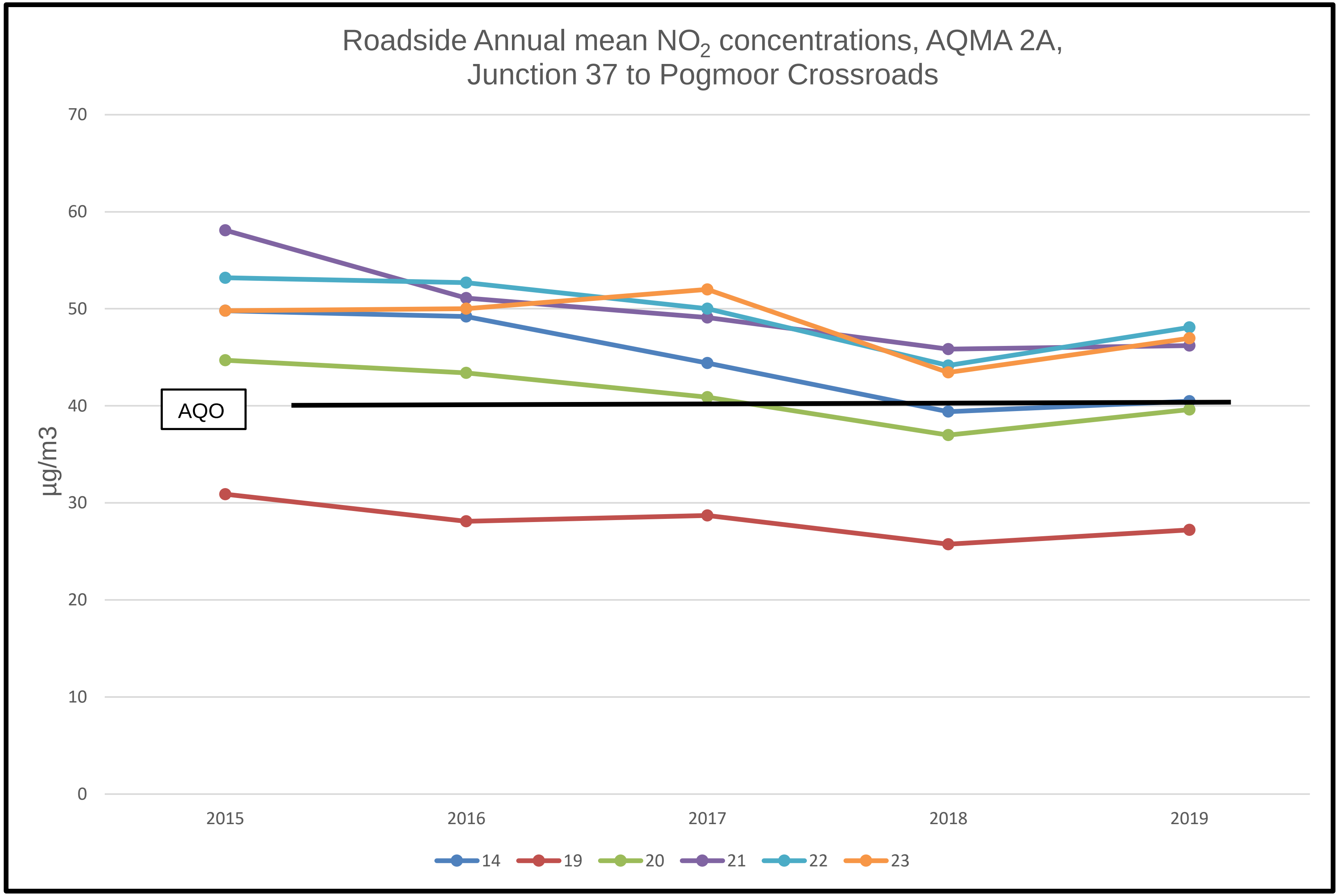
(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

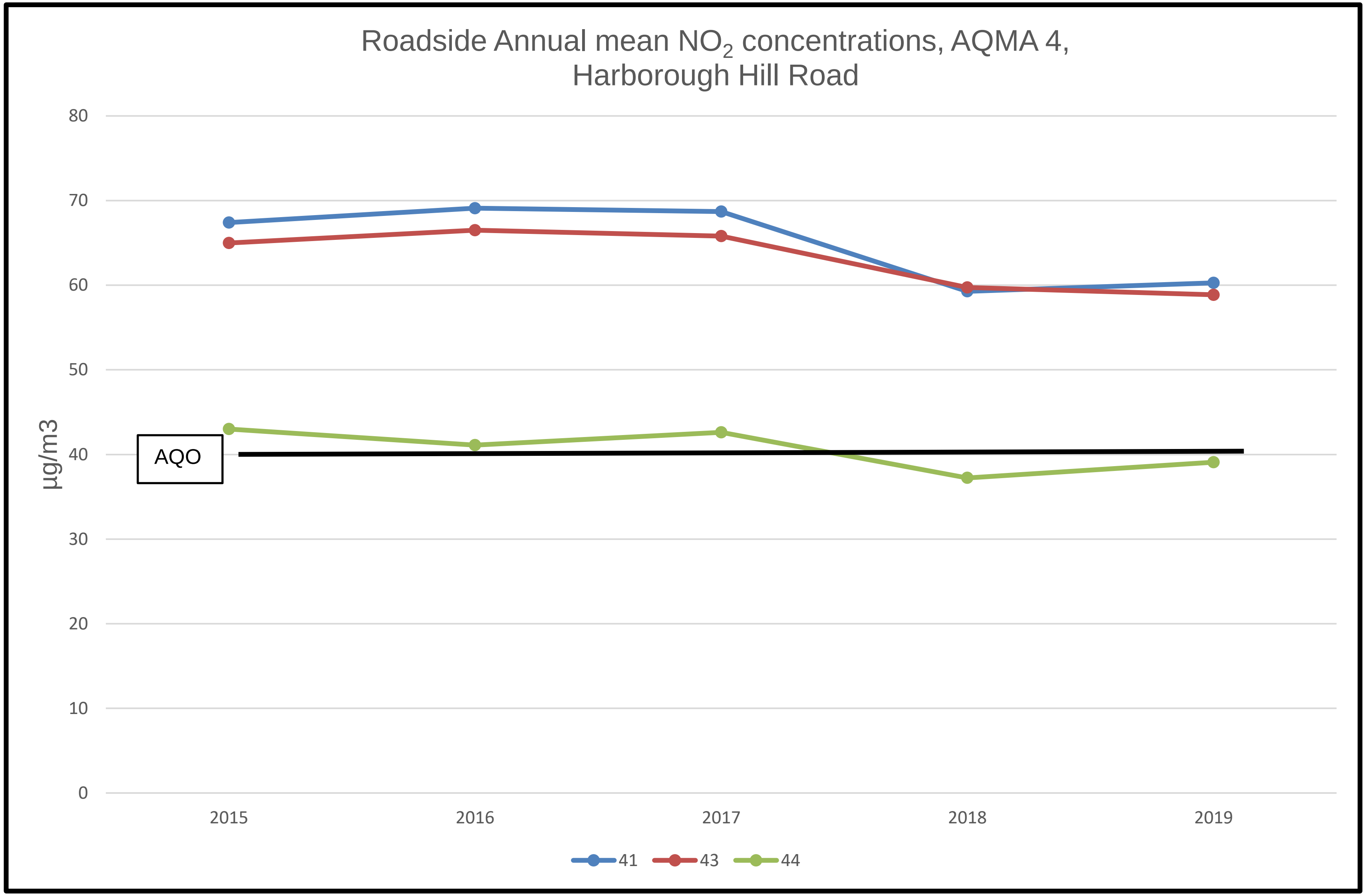
Figure A.1 – Trends in Annual Mean NO_2 Concentrations



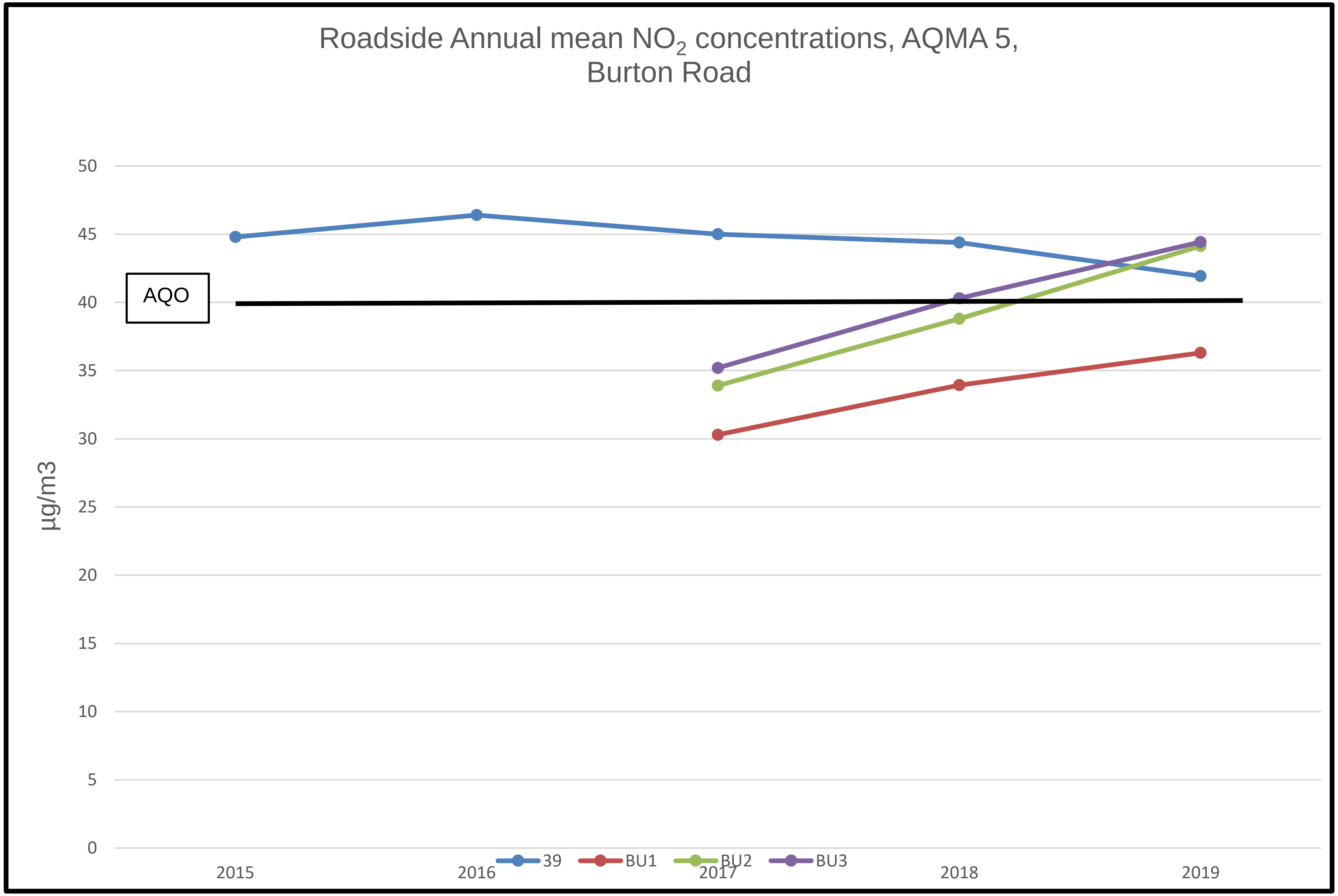

Annual mean NO_2 concentrations, AQMA 1, M1 motorway
AQO
40
35
30
25
20
15
10
5
0
µg/m3
2015
2016
2017
2018
2019
10
28
29
30

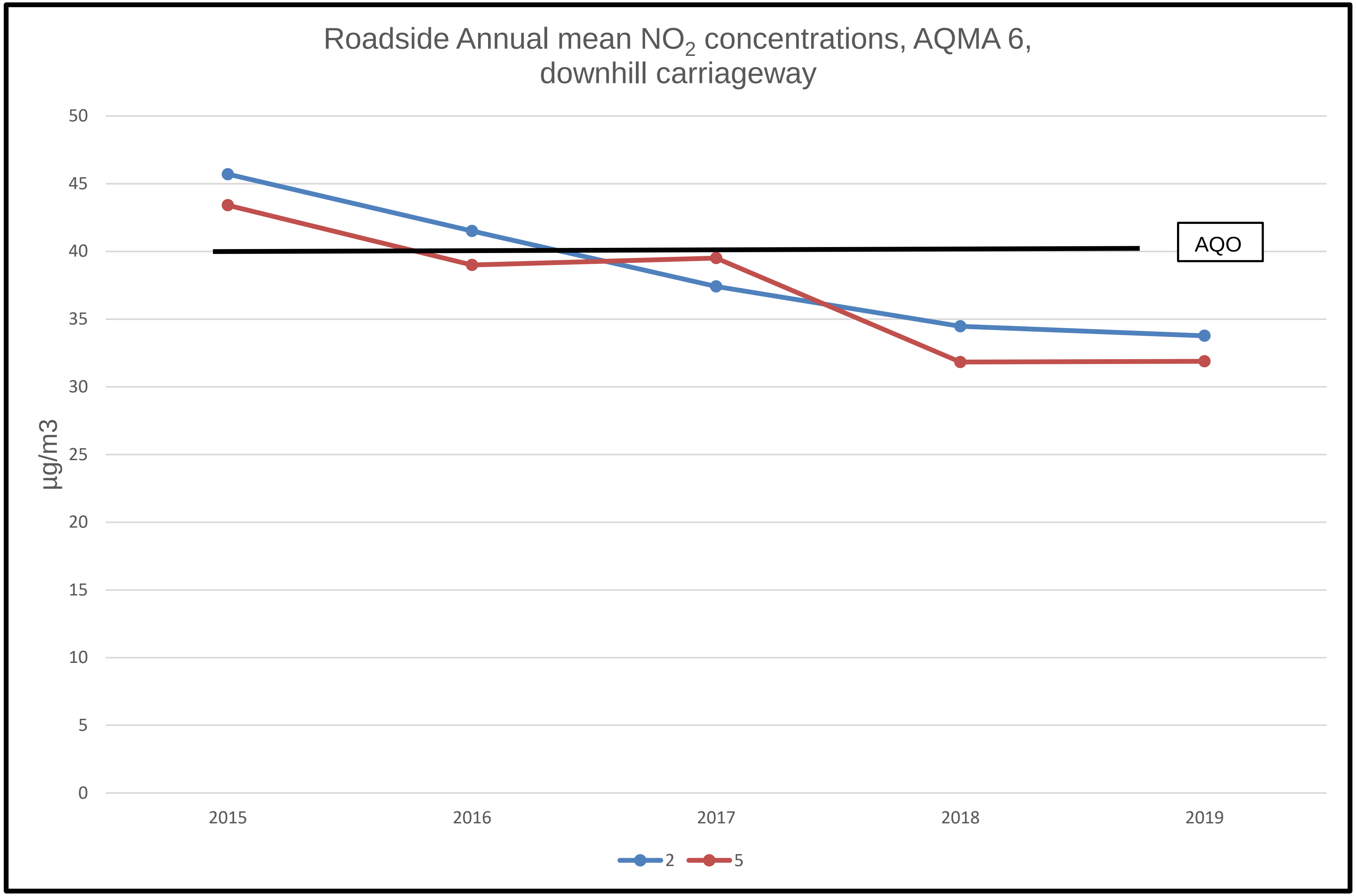

Roadside Annual mean NO_2 concentrations, AQMA 2A ,
Town End Roundabout
60
50
40
30
20
10
0
µg/m3
AQO
2015
2016
2017
2018
2019
11
12
13

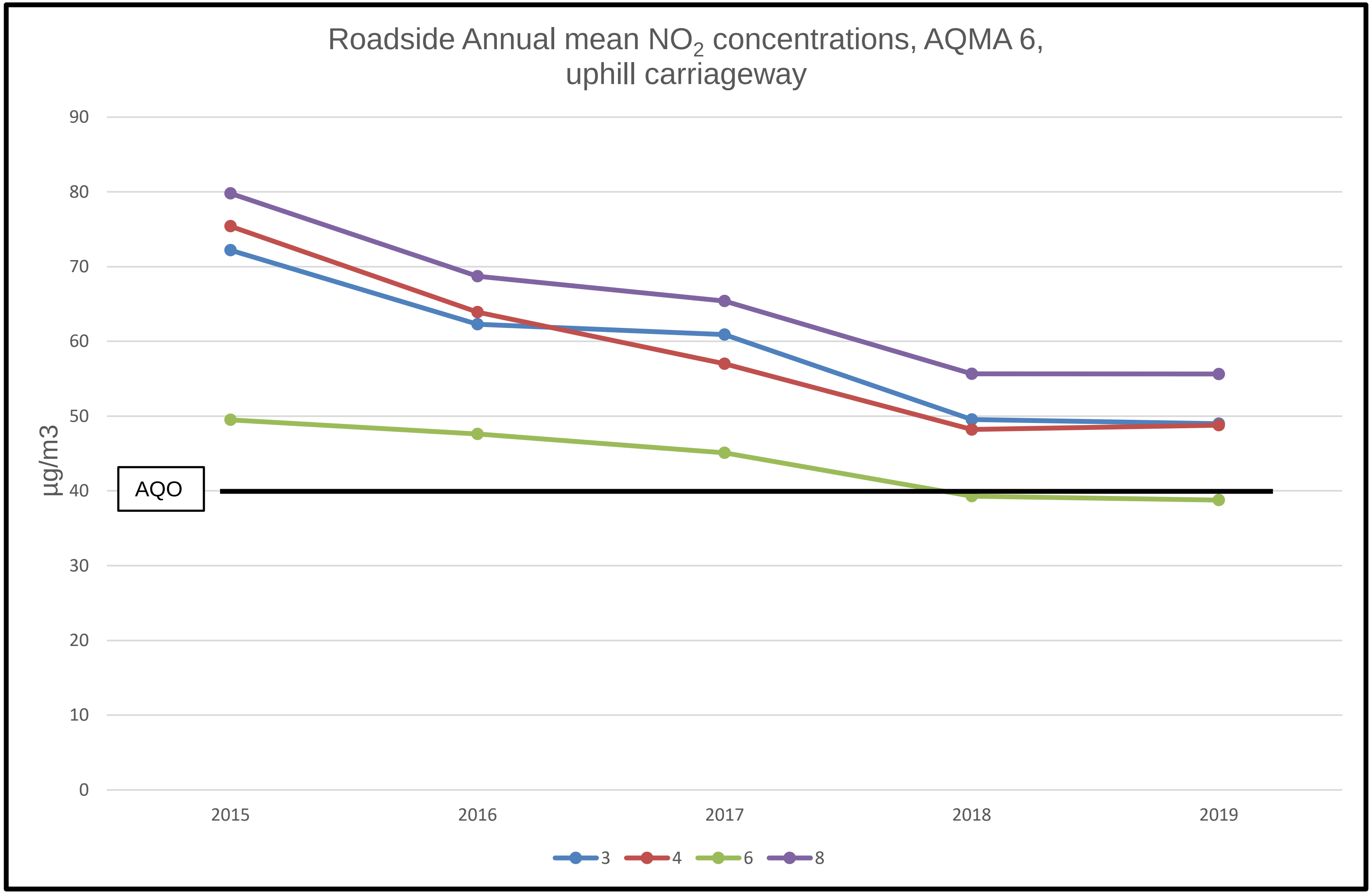

Roadside Annual mean NO_2 concentrations, AQMA 2A,
Junction 37 to Pogmoor Crossroads
70
60
50
40
30
20
10
0
µg/m3
AQO
2015
2016
2017
2018
2019
14
19
20
21
22
23



Roadside Annual mean NO2 concentrations, AQMA 4, Harborough Hill Road
µg/m3
80
70
60
50
40
30
20
10
0
AQO
2015
2016
2017
2018
2019
41
43
44


Roadside Annual mean NO_2 concentrations, AQMA 5, Burton Road
µg/m3
50
45
40
35
30
25
20
15
10
5
0
AQO
2015
2016
2017
2018
2019
39
BU1
BU2
BU3


Roadside Annual mean NO2 concentrations, AQMA 6, downhill carriageway
50
45
40
35
30
25
20
15
10
5
0
µg/m3
2015
2016
2017
2018
2019
AQO
2
5


Roadside Annual mean NO_2 concentrations, AQMA 6, uphill carriageway
µg/m3
0
10
20
30
40
50
60
70
80
90
AQO
2015
2016
2017
2018
2019
3
4
6
8

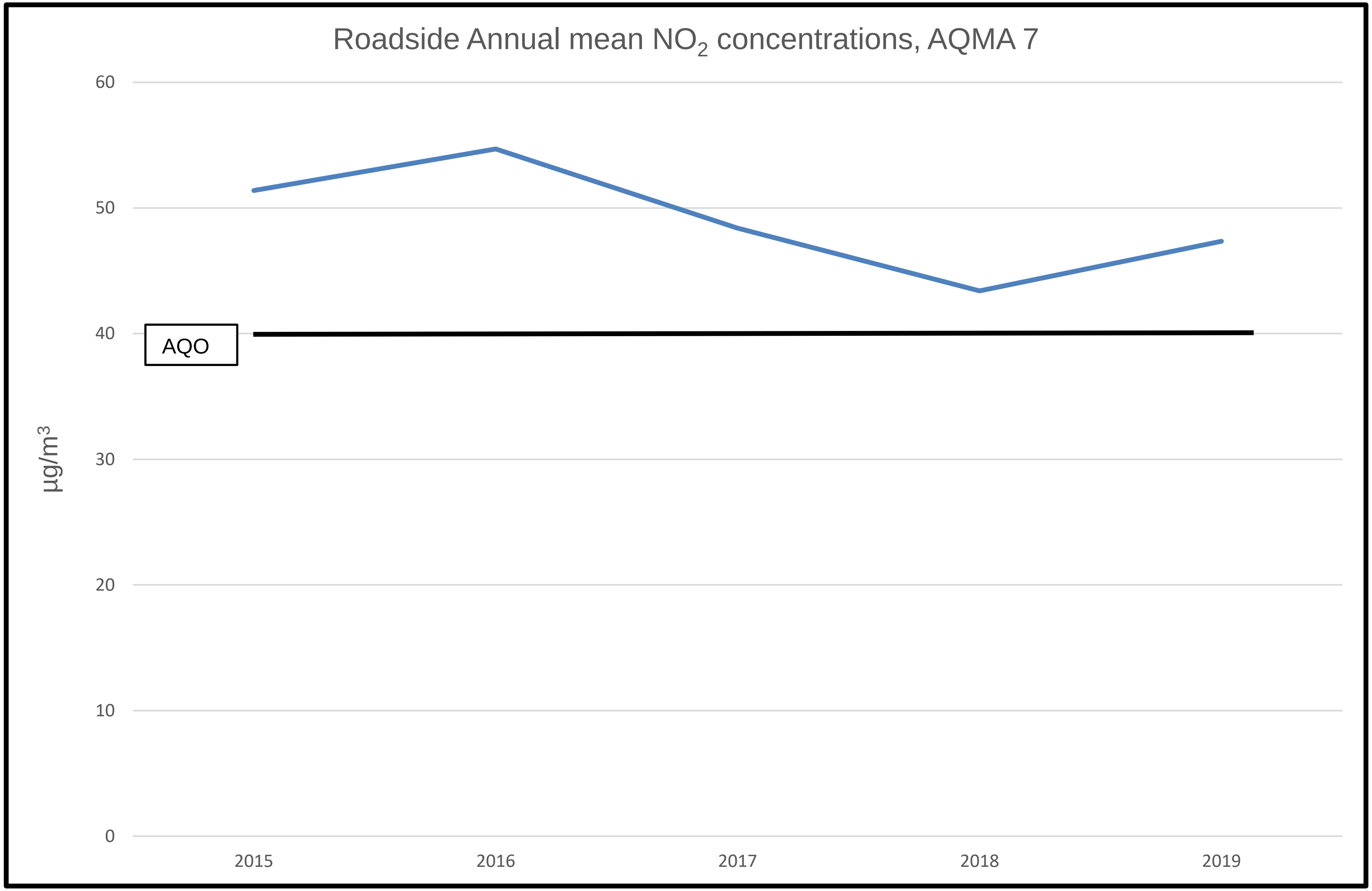

Roadside Annual mean NO_2 concentrations, AQMA 7
µg/m³
60
50
40
30
20
10
0
AQO
2015
2016
2017
2018
2019

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
							2015	2016	2017	2018	2019
CM2	432680	406174	Roadside	Automatic	96.4	96.4	2	2	4	0	0
CM3	432525	407475	Urban Background	Automatic	86	86	0	0	0	0	0

Notes:

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.**

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

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

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

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

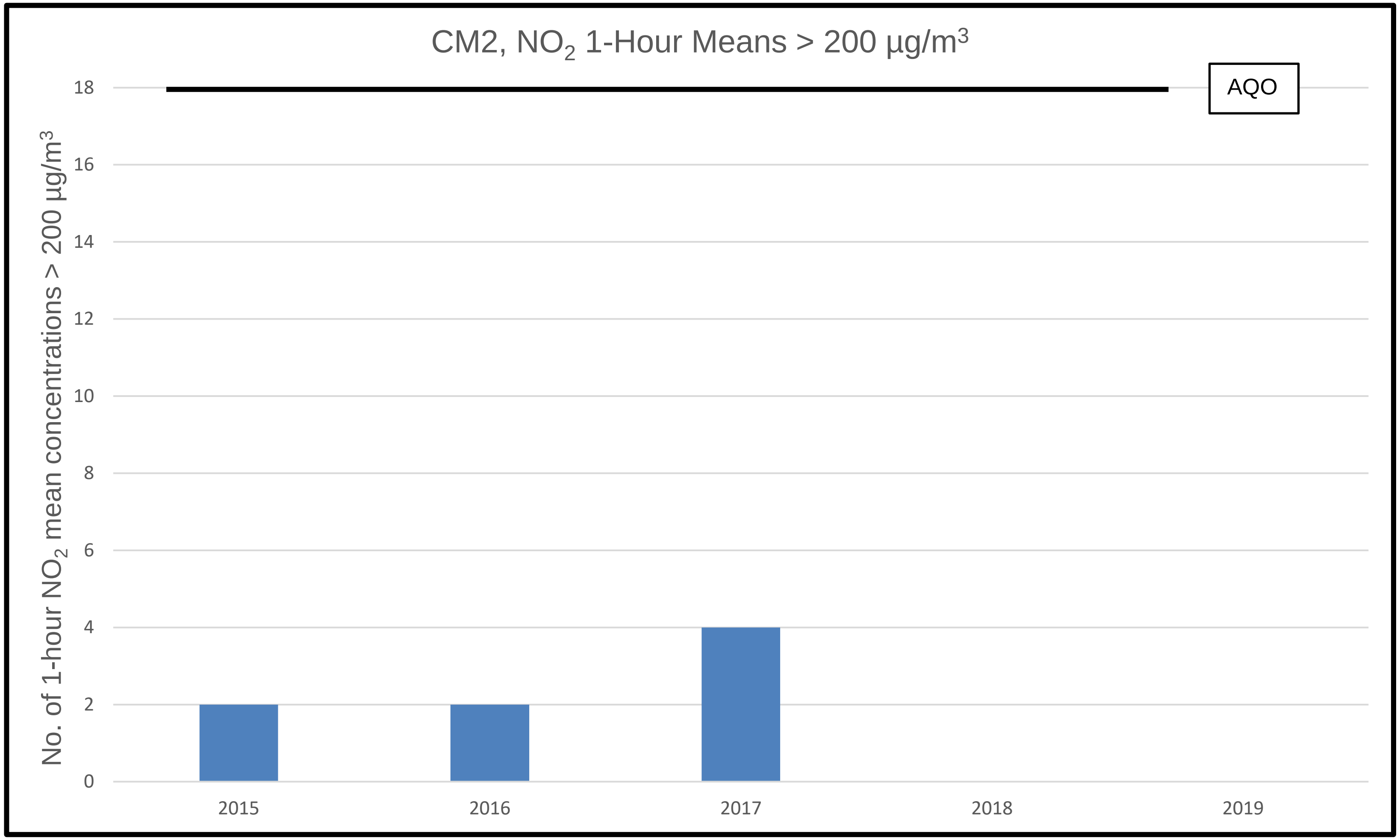


Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} Annual Mean Concentration (µg/m³) (3)				
						2015	2016	2017	2018	2019
CM1	436298	405691	Roadside	78.73	78.73	22	22	17	18	20

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

Exceedances of the PM_{10} annual mean objective of 40µg/m³ are shown in **bold.**

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

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

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

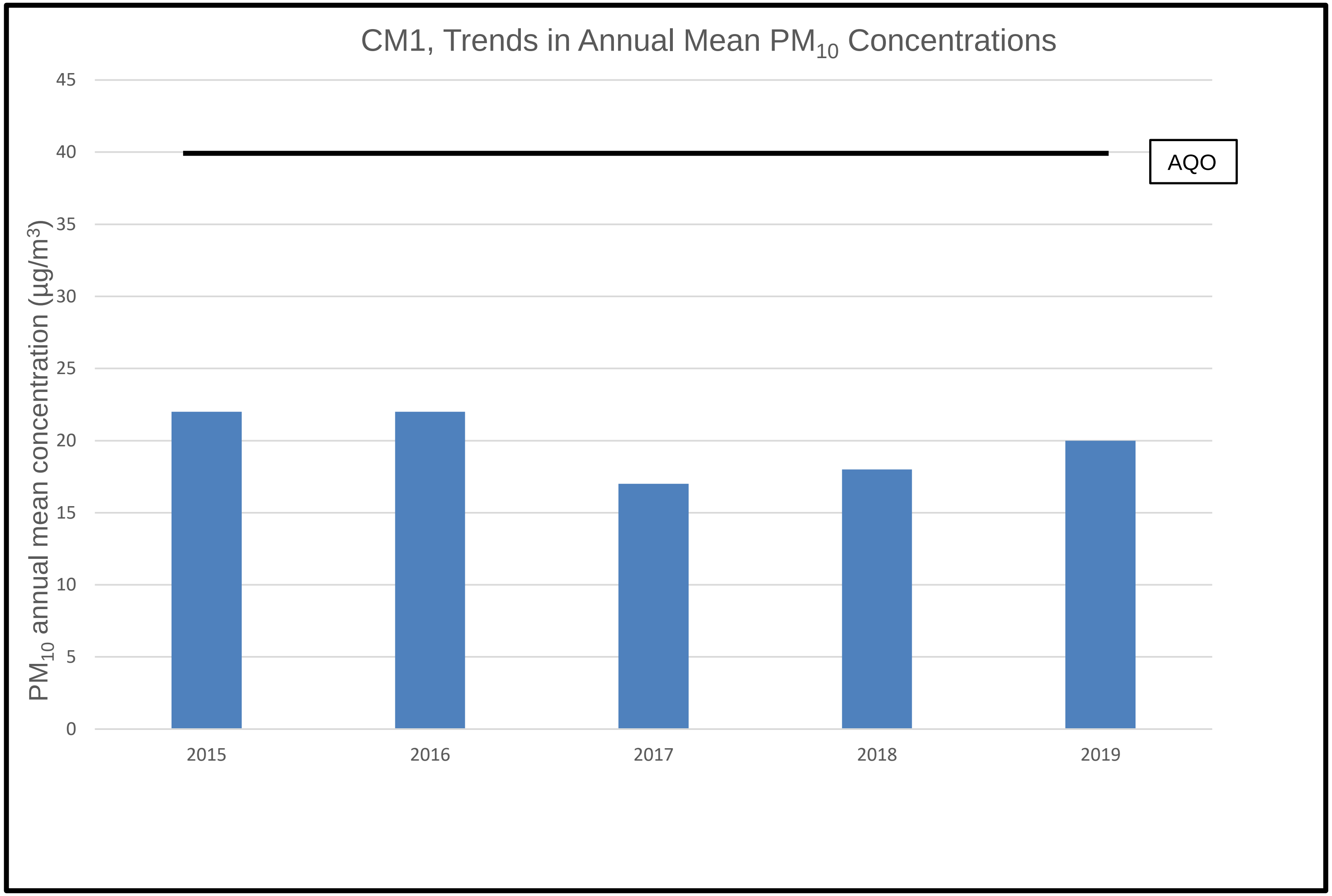


Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
						2015	2016	2017	2018	2019
CM1	436298	405691	Roadside	78.73	78.73	9	11	5	5	11

Notes:

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.**

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

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

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

Figure A.4 – Trends in Number of 24-Hour Mean PM_{10} Results >50µg/m³

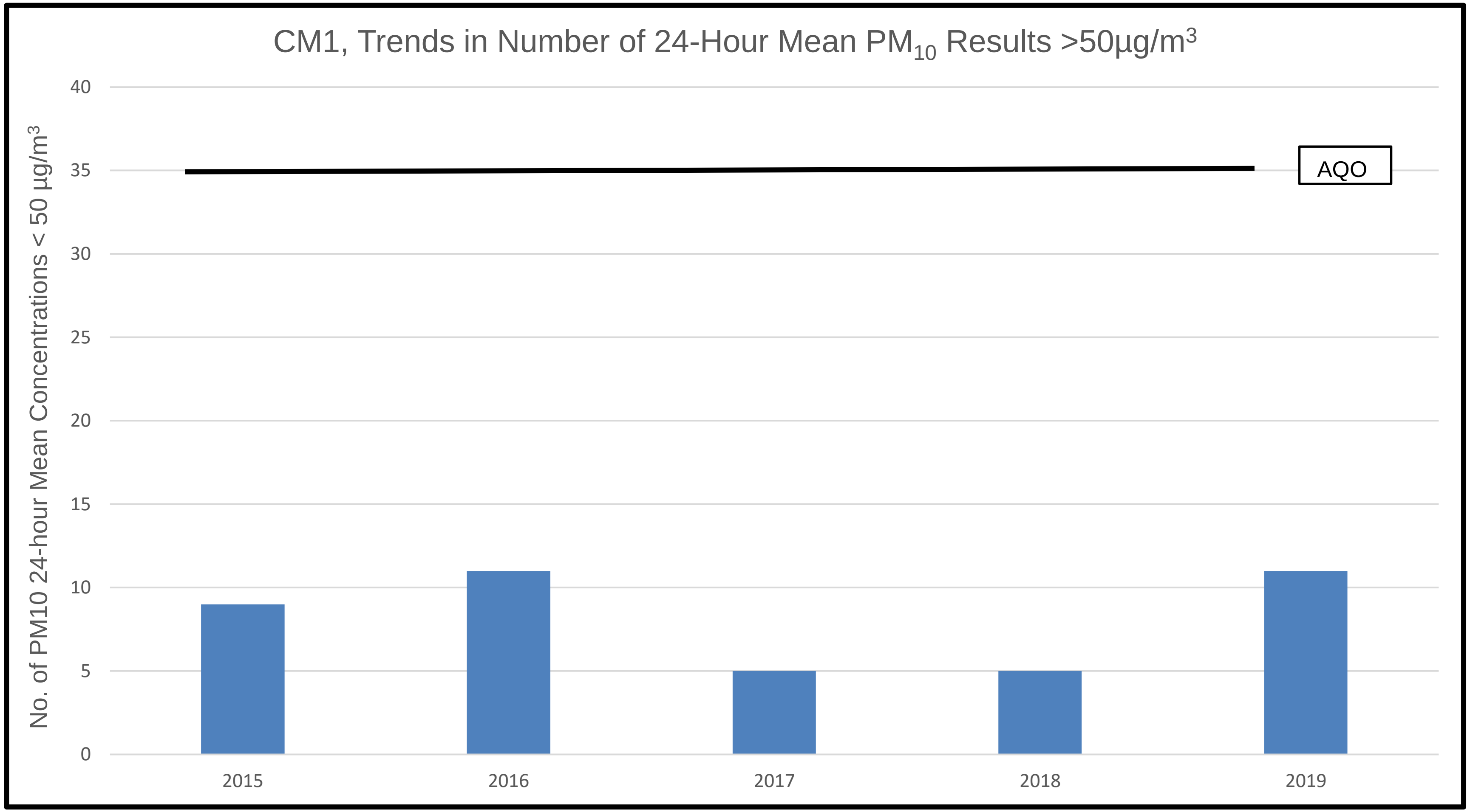


Table A.77 – SO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	Number of Exceedances 2019 (percentile in bracket) (3)		
						15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
CM3	432525	407475	Urban Background	87	87	0	0	0

Notes:

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)

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations ($\mu g/m^3$)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.98) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DT1	423621	399817	37	33	23	NR	NR	27	23	22	33	36	38	27	29.9	29.3	25.8
DT2	421102	400496	36	43	24	39	32	32	28	29	35	42	41	32	34.5	33.8	33.8
DT3	421143	400481	56	49	57	52	42	54	43	44	49	52	56	46	50.0	49.0	**49.0**
DT4	421126	400485	57	52	53	53	44	48	37	49	58	54	49	42	49.8	48.8	n/a
DT5	421291	400482	43	34	30	31	28	28	28	26	38	36	40	28	32.5	31.9	31.9
DT6	421282	400471	51	38	39	57	33	33	30	31	40	45	48	30	39.6	38.8	n/a
DT7	421117	400501	39	35	30	24	26	26	21	28	25	31	31	30	28.8	28.3	23.8
DT8	421215	400475	71	60	68	60	48	43	46	47	60	64	61	51	56.8	55.6	**45.7**
DT9	431468	408579	40	38	33	NR	22	27	21	23	32	36	44	39	32.3	31.7	31.7
DT10	430820	409453	36	32	24	18	17	21	18	23	24	27	33	25	24.9	24.4	24.4
DT11	434000	406292	45	42	NR	41	34	38	33	30	42	42	55	37	39.9	39.1	39.1
DT12	433910	406290	51	43	39	44	33	38	25	28	44	44	48	40	39.7	38.9	38.9
DT13	433820	406278	53	50	41	50	NR	38	34	35	42	48	50	44	44.2	43.3	36.2
DT14	432702	406160	49	34	45	39	42	33	34	37	45	45	49	44	41.3	40.5	30.3
DT15	432680	406174	40	43	33	30	21	24	23	27	32	35	41	35	32.1	31.5	n/a

DT16	432680	406174	43	48	34	31	24	24	25	27	31	34	41	39	33.4	32.7	n/a
DT17	432680	406174	43	47	33	29	23	24	24	27	30	34	38	40	32.6	31.9	n/a
DT18	432645	406198	32	NR	24	42	24	31	20	23	32	39	44	30	30.9	30.3	27.4
DT19	432481	406068	36	36	27	29	18	20	17	19	27	35	38	31	27.8	27.2	27.2
DT20	432535	406071	46	46	38	46	38	33	26	31	43	46	54	39	40.4	39.6	30.0
DT21	432402	406013	60	62	47	48	44	35	38	42	44	51	54	43	47.2	46.2	34.6
DT22	432351	405985	50	62	44	49	39	42	46	45	52	58	54	46	49.1	48.1	33.6
DT23	432281	405951	60	59	45	43	35	40	40	44	65	51	49	45	47.9	47.0	34.4
DT24	435274	400384	44	NR	28	27	22	25	24	28	31	36	43	32	30.9	30.3	24.6
DT25	434832	400405	48	50	32	40	30	28	31	27	43	46	58	39	39.4	38.6	32.0
DT26	434820	400421	52	54	34	44	32	32	31	27	44	48	56	38	41.1	40.3	33.2
DT27	434823	400398	51	49	41	48	31	36	30	30	38	46	53	35	40.6	39.8	n/a
DT28	434652	400231	28	31	16	31	18	21	16	13	21	27	42	24	24.1	23.6	n/a
DT29	434721	400352	38	45	27	27	19	21	21	26	27	30	35	31	28.8	28.3	28.3
DT30	434309	401032	44	47	34	30	24	24	NR	31	31	36	38	34	34.0	33.4	33.4
DT31	434595	401107	39	40	26	32	22	25	21	24	30	41	NR	32	30.3	29.7	25.8
DT32	434559	401274	41	59	30	29	25	26	27	34	34	45	45	39	36.2	35.5	35.5
DT33	434251	406199	40	40	29	33	NR	24	21	23	30	36	43	32	31.8	31.2	31.2
DT34	435011	408281	41	44	37	35	24	23	24	26	30	40	42	30	32.9	32.2	26.1
DT35	435027	408190	49	46	36	36	27	27	30	27	38	39	44	40	36.7	35.9	n/a
DT36	435027	408104	55	45	45	40	34	34	34	33	40	45	53	37	41.2	40.3	31.3
DT37	435174	407499	46	44	30	31	23	27	20	21	30	40	47	36	32.9	32.3	26.5
DT38	434757	406995	49	47	42	38	28	34	28	33	37	43	NR	44	38.6	37.8	29.4
DT39	436072	407320	48	48	38	52	37	39	34	35	41	50	50	41	42.8	41.9	33.3
DT40	437122	406557	56	46	41	58	39	43	35	32	44	NR	NR	38	43.1	42.2	32.2
DT41	434933	406695	71	70	48	62	60	63	52	62	55	66	71	57	61.5	60.3	**42.1**

DT42	434727	406753	35	32	27	34	23	25	13	24	30	32	41	NR	28.7	28.1	28.1
DT43	434955	406769	66	67	55	66	53	62	45	56	69	57	59	68	60.1	58.9	**44.1**
DT44	435047	407033	46	50	39	43	32	36	30	31	40	46	39	47	39.9	39.1	39.1
DT45	445699	402140	33	32	21	18	17	18	16	17	22	27	30	26	23.1	22.6	22.6
DT46	437554	405291	56	53	41	41	31	35	33	39	46	47	55	41	43.1	42.2	33.0
DT47	434958	405672	45	46	28	36	27	32	21	26	32	41	38	36	34.2	33.5	33.5
DT48	434964	405709	51	55	43	63	42	53	31	32	48	47	72	43	48.3	47.4	**40.2**
DT49	437528	405675	41	58	38	54	32	36	35	37	44	41	55	41	42.7	41.9	31.8
DT50	435062	408244	NR	49	37	43	26	33	34	36	35	41	47	40	38.2	37.4	28.7
DT51	435049	408229	NR	41	30	35	20	28	24	NR	31	34	43	31	31.6	31.0	31.0
DT52	434112	409625	42	44	34	48	28	31	28	25	35	36	47	37	36.2	35.4	30.0
DT53	434809	406023	60	67	54	82	51	59	55	43	60	67	74	51	60.2	59.0	**48.4**
DT54	434763	406038	55	53	43	47	38	42	41	44	47	NR	NR	NR	45.5	44.6	33.1
DT55	437369	405456	54	51	41	47	37	42	38	36	41	47	52	36	43.5	42.6	35.5
DT56	434430	406529	33	42	23	32	19	23	21	21	27	NR	NR	NR	26.7	26.2	23.7
DT57	437242	405772	51	60	35	38	28	32	26	25	37	NR	51	52	39.6	38.9	33.6
DT58	437250	405813	44	44	33	47	28	36	27	27	37	44	53	39	38.2	37.4	34.0
BU1	436069	407321	40	46	27	52	32	31	31	26	34	41	48	35	37.0	36.3	32.3
BU2	436072	407320	48	47	38	55	39	45	37	33	46	50	60	44	45.0	44.1	35.5
BU3	436072	407320	46	56	41	57	36	42	31	34	44	54	59	43	45.3	44.4	35.7
BU4	436107	407307	54	NR	NR	44	36	38	35	33	38	48	54	44	42.5	41.6	25.4
BU5	436107	407307	NR	NR	33	46	37	33	31	41	37	40	54	44	39.5	38.7	24.4
BU6	436107	407307	50	NR	NR	44	35	35	31	33	38	44	53	44	40.6	39.8	24.7

☒ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

☒ **Annualisation has been conducted where data capture is <75%**

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

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 **<u>bold and underlined.</u>**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

Factor from Local Co-location Studies

Nitrogen dioxide diffusion tubes for 2019 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.

Diffusion Tube Bias Adjustment Factors

Barnsley MBC has taken account of the requirements of Box 7.11 of Technical Guidance LAQM.TG16 when calculating our bias adjustment factor. Previous data taken from the bias adjustment spreadsheet (version 03 /16) for our Barnsley A628 Roadside site gives the following:

Year	Length of survey (months)	Tube mean µg/m³	Monitor mean µg/m³	Bias (%)	Tube Precision	BAF
2014	12				Good	0.9
2015	12	40	38	4.6	Good	0.96
2016	12	38	36	6.2	Good	0.94
2017	11	34	35	-3.9	Good	1.03
2018	9	34	32	5	Good	0.95

Barnsley MBC have therefore previously used a local bias adjustment factor (BAF) for diffusion tube data contained within previous reports, based upon triplicate diffusion tubes co-located at our Barnsley A628 Roadside nitrogen dioxide analyser (QA/QC associated with this analyser is discussed later in this appendix). This procedure has been adopted for the 2019 factor. The local diffusion tube bias adjustment factor therefore is 0.98.

The precision and accuracy data for our 2019 factor in accordance with Defra's precision and accuracy spreadsheet are detailed in the below table.

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Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
	Diffusion Tubes Measurements									Automatic Method		Data Quality Check	
1	11/01/2019	07/02/2019	40	43	43	42	1.7	4	4.3	38.97	99.75	Good	Good
2	07/02/2019	07/03/2019	43	48	47	46	2.6	6	6.6	43.94	99.65	Good	Good
3	07/03/2019	04/04/2019	33	34	33	33	0.6	2	1.4	34.86	99.10	Good	Good
4	04/04/2019	01/05/2019	30	31	29	30	1.0	3	2.5	31.95	99.35	Good	Good
5	01/05/2019	06/06/2019	21	24	23	23	1.5	7	3.8	25.41	99.70	Good	Good
6	06/06/2019	05/07/2019	24	24	24	24	0.0	0	0.0	22.94	99.86	Good	Good
7	05/07/2019	07/08/2019	23	25	24	24	1.0	4	2.5	19.98	66.53	Good	or Data Capture
8	07/08/2019	06/09/2019	27	27	27	27	0.0	0	0.0	27.12	95.28	Good	Good
9	06/09/2019	02/10/2019	32	31	30	31	1.0	3	2.5	34.61	99.84	Good	Good
10	02/10/2019	08/11/2019	35	34	34	34	0.6	2	1.4	35.99	99.55	Good	Good
11	08/11/2019	04/12/2019	41	41	38	40	1.7	4	4.3	35.59	99.64	Good	Good
12	04/12/2019	08/01/2020	35	39	40	38	2.6	7	6.6	30.79	99.68	Good	Good
13													

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> Good precision | Good Overall DC

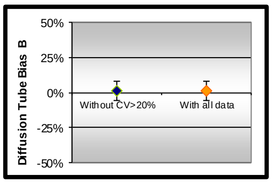
Site Name/ ID:

Precision 12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.98 (0.92 - 1.06)
Bias B	2% (-5% - 9%)
Diffusion Tubes Mean:	33 μgm^{-3}
Mean CV (Precision):	3
Automatic Mean:	33 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	33 (31 - 35) μgm^{-3}

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.98 (0.92 - 1.06)
Bias B	2% (-5% - 9%)
Diffusion Tubes Mean:	33 μgm^{-3}
Mean CV (Precision):	3
Automatic Mean:	33 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	33 (31 - 35) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

PM Monitoring Adjustment

Data obtained from our Kendray Beta Attenuation Monitor (BAM) in 2019 was subject to a correction factor, as determined by Ricardo-AEA under our existing calibration club and data ratification under contract **DN325160**, with concentrations reported at ambient temperature and pressure.

QA/QC of Diffusion Tube Monitoring

South Yorkshire Air Quality Samplers (SYAQS) participates in the WASP / AIR PT scheme for nitrogen dioxide and has previously participated within the survey's inter laboratory comparison scheme. Laboratory performance during 2019 was based on rounds AR030 to AR034 of the AARIR PT annual performance criteria for NO_2 diffusion tubes used in Local Air Quality Management. For AIR PT rounds AR030 to AR034, the results of the measurements based up a satisfactory z-score of < +/- 2 are detailed in the below table:

AR030 Jan – Feb 2019	AR031 Apr – May 2019	AR033 July – Aug 2019	AR034 Sep-Nov 2019
100%	100%	100%	75%

It is noted in round AR034 there was a decline in accuracy of the laboratory to 75%, however no further action with regard to the data has been taken at this stage, although these results have been brought to the attention of the laboratory.

We liaise closely with our colleagues elsewhere in South Yorkshire with regard to generation of bias adjustment factors, as we all use the same laboratory (SYAQS).

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

- Tube exposure time (in our case 1 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

As we use diffusion tubes as part of our Review and Assessment, we are advised to report both the adjustment factor from our local monitoring, and the bias adjustment factor from the national database.

As stated earlier, the 2019 bias adjustment factor for Barnsley has been calculated as 0.98, which compares well with the other South Yorkshire local authorities:

- Rotherham 0.95
- Doncaster 0.97
- Sheffield 0.97

This gives further confidence and justification for use of a local bias adjustment factor.

Annualisation of NO_2 Diffusion Tube Data

Due to adequate data capture for all our diffusion tubes during 2019 (all 75% data capture or above), there has been no requirement to annualise these data. However, we present annualised 2017 diffusion tube data (tubes BU1 to BU6) within the section dealing with the Burton Road AQMA 5. The workings behind this calculation are presented in the below table, which is based upon the procedure contained within Box 7.10 of LAQ.TG (16) (Annualising NO2 diffusion tube monitoring data). It should be noted that only three months diffusion tube data were obtained for diffusion tubes BU1 to BU6 (October to December inclusive) for 2017. The background continuous monitor NO_2 concentrations were obtained from the Barnsley Gawber monitoring station.

Diffusion tube monitoring period	**Barnsley Gawber period averages $\mu g/m^3$**
27.09.17 to 02.11.17	14.7
02.11.17 to 06.12.17	17.7
06.12.17 to 05.01.18	18.7
Average	17

The annual mean NO_2 concentrations for 2017 (98% data capture) was 16 $\mu g/m^3$.

The ratio **R** of the annual mean to the period mean (**Am/Pm**) is 16/17 = 0.94. The 2017 three-month period means for BU1 to BU6 have all therefore been multiplied by a factor of 0.94, in accordance with Box 7.10

Application of Diffusion Tube Distance Correction Factor

The vast majority of Barnsley MBC's NO_2 diffusion tubes are located at either kerbside or roadside. As the annual average objective for NO_2 applies at receptor façade (see Box 1.1 of LAQM.TG(16)), Barnsley MBC has used the distance correction methodology as outlined within paragraphs 7.77 to 7.79 (Fall-off in NO_2 Concentrations with Distance from the Road) of LAQM.TG (16), to account for relevant exposure in accordance with the annual average objective.

We have therefore used the Defra calculator from the LAQM website (http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html). This methodology requires local NO_2 background concentrations to calculate the falloff (along with kerbside / roadside concentrations, distance from kerb and distance from receptor). The Barnsley Gawber AURN monitoring station provides urban background NO_2 concentrations. For previous ASRs, we have therefore used this annual average to calculate the distance corrected annual NO_2 concentrations, rather than the concentrations taken from the 1 km^2 grid squares (Defra background maps https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html) for 2019. For this ASR however, we report in the table below both the distance corrected data using the 2019 Barnsley Gawber data and the relevant 1 km^2 grid concentrations.

An example calculation from the calculator (DT46 using a Barnsley Gawber 2019 background of 17 µg/m^3) is shown below.

BUREAU VERITAS

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	0.65	metres
Step 2	How far from the KERB is your receptor (in metres)?	4.65	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	17	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	42.2	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	33.0	µg/m^3

Interestingly, the 2019 Gawber annual mean of 17 µg/m^3 corresponds to the highest 1 km^2 grid concentration within the Barnsley borough, which is also 17 µg/m^3. This grid square is located within Barnsley town centre, and previous versions of the background map had a concentration of 31.6 µg/m^3 for this particular grid square (grid square 434500 406500, 2015 version[18]). This service considered this concentration to be anomalously high for a background concentration (albeit for a town centre location), hence our previous reticence at using the 1 km^2 grid concentrations for previous years 1 km^2 grid data for our distance correction calculations.

The below table provides a comparison of the distance correction calculation for our diffusion tubes (where relevant) using the Barnsley Gawber and 1 km^2 grid (2017 spreadsheet version) background concentrations.

[18] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015

DT No.	2019 Final AM	Grid Reference of 1 km^2 grid where diffusion tube is located		Gawber background 2019 μg/m^3	1 km^2 background 2019 μg/m^3	Distance corrected (Y/N)	Annual mean distance corrected (Gawber) μg/m^3	Annual mean distance corrected (1 km^2) μg/m^3
1	29.3	423500	399500	17	7.1	Y	25.8	22.9
2	33.8	420500	399500	17	5.7	Y	33.8	33.8
3	49.0	420500	399500	17	5.7	Y	49	49
4	48.8	420500	399500	17	5.7	N	n/a	n/a
5	31.9	420500	399500	17	5.7	Y	31.9	31.9
6	38.8	420500	399500	17	5.7	N	n/a	n/a
7	28.3	420500	400500	17	6.6	Y	23.8	19.6
8	55.6	420500	399500	17	5.7	Y	45.7	42.8
9	31.7	430500	408500	17	12.8	Y	31.7	31.7
10	24.4	430500	408500	17	12.8	Y	24.4	24.4
11	39.1	433500	405500	17	11.8	Y	39.1	39.1
12	38.9	433500	405500	17	11.8	Y	38.9	38.9
13	43.3	433500	405500	17	11.8	Y	36.2	34.7
14	40.5	432500	405500	17	14.8	Y	30.3	29.3
15	31.5	432500	405500	17	14.8	n/a	n/a	n/a
16	32.7	432500	405500	17	14.8	n/a	n/a	n/a
17	31.9	432500	405500	17	14.8	n/a	n/a	n/a
18	30.3	432500	405500	17	14.8	Y	27.4	27
19	27.2	431500	405500	17	11.2	Y	27.2	27.2
20	39.6	432500	405500	17	14.8	Y	30	29
21	46.2	431500	405500	17	11.2	Y	34.6	32.2
22	48.1	431500	405500	17	11.2	Y	33.6	30.9
23	47.0	431500	405500	17	11.2	Y	34.4	31.9
24	30.3	434500	399500	17	11.7	Y	24.6	22.3
25	38.6	434500	399500	17	11.7	Y	32	30.4
26	40.3	434500	399500	17	11.7	Y	33.2	31.6
27	39.8	434500	399500	17	11.7	N	n/a	n/a
28	23.6	434500	399500	17	11.7	N	n/a	n/a
29	28.3	434500	399500	17	11.7	Y	28.3	28.3
30	33.4	433500	400500	17	9.7	Y	33.4	33.4
31	29.7	434500	400500	17	16.6	Y	25.8	25.7
32	35.5	434500	400500	17	16.6	Y	35.5	35.5
33	31.2	433500	405500	17	11.8	Y	31.2	31.2
34	32.2	434500	407500	17	12.4	Y	26.1	24.3
35	35.9	434500	407500	17	12.4	N	n/a	n/a
36	40.3	434500	407500	17	12.4	Y	31.3	29.5
37	32.3	434500	406500	17	17.0	Y	26.5	26.5
38	37.8	434500	406500	17	17.0	Y	29.4	29.4
39	41.9	435500	406500	17	13.1	Y	34	32.8

40	42.2	436500	406500	17	12.5	Y	32.2	30.4
41	60.3	434500	406500	17	17.0	Y	42.1	42.1
42	28.1	434500	406500	17	17.0	Y	28.1	28.1
43	58.9	434500	406500	17	17.0	Y	44.1	44.1
44	39.1	434500	406500	17	17.0	Y	39.1	39.1
45	22.6	445500	401500	17	14.5	Y	22.6	22.6
46	42.2	437500	404500	17	10.4	Y	33	30.6
47	33.5	434500	405500	17	12.5	Y	33.5	33.5
48	47.4	434500	405500	17	12.5	Y	40.2	39.1
49	41.9	437500	405500	17	12.4	Y	31.8	30
50	37.4	434500	407500	17	12.4	Y	28.7	26.7
51	31.0	434500	407500	17	12.4	Y	31	31
52	35.4	433500	409500	17	10.3	Y	30	28
53	59.0	434500	405500	17	12.5	Y	42.6	40.8
54	44.6	434500	405500	17	12.5	Y	33.1	31.2
55	42.6	436500	404500	17	11.0	Y	35.5	33.8
56	26.2	433500	406500	17	13.7	Y	23.7	22.8
57	38.9	436500	405500	17	12.7	Y	33.6	32.5
58	37.4	436500	405500	17	12.7	Y	34	33.3
BU1	36.3	435500	406500	17	13.1	Y	34.4	34
BU2	44.1	435500	406500	17	13.1	Y	35.5	34.3
BU3	44.4	435500	406500	17	13.1	Y	35.7	34.5
BU4	41.6	435500	406500	17	13.1	Y	25.4	22.8
BU5	38.7	435500	406500	17	13.1	Y	24.4	21.8
BU6	39.8	435500	406500	17	13.1	Y	24.7	22.2

(N.B. Where the distance corrected data are the same when both the Barnsley Gawber and 1 km^2 grid data are used, this is due to the tube being located at building façade, and consequently no distance calculation has been undertaken).

As can be seen from the above table, the use of the Barnsley Gawber 2019 concentration produces a generally conservative estimate of receptor façade concentrations, when compared to use of the 1 km^2 grid data. For information, the 2019 1 km^2 grid concentration for the Barnsley Gawber urban background site is 13 $\mu g/m^3$.

We note that for rural locations in particular, such as those diffusion tubes located with our AQMA No. 6 at Langsett, there is a significant difference in the 1 km^2 grid concentration of 6 $\mu g/m^3$, compared to the Gawber background of 17 $\mu g/m^3$, which has been applied universally to our diffusion tubes, including those located at Langsett. Taking into account this discrepancy therefore, we are happy to be advised by Defra on the most appropriate background concentration to be used by ourselves for future ASRs, and look forward to this issue being addressed at the appraisal of this ASR

QA/QC of Automatic Monitoring

Oxides of Nitrogen

Barnsley A628 Roadside

This station provides the automatic data, which is used to derive the locally derived bias adjustment factor discussed above.

Site	Status	Address	Grid Ref
A628 Roadside	Roadside	Pogmoor Crossroads, A628 Dodworth Road	432680 406174

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

Station	A628 Roadside
Analyser Model	Thermo Scientific 42i Oxides of Nitrogen analyser
Logging System	Internal to Thermo Scientific 42i
Calibration gas	NO in N_2
Routine Calibration	Calibrations undertaken by Barnsley MBC personnel as Local Site Operator
Daily zero and span check	Yes
Air Conditioning	Yes
Service contract	2019, 2 x 6 monthly service, + repair call out (Matts Monitors, under contract (DN325308))
Third party Audit and data ratification	Ricardo-AEA Air Monitoring Calibration Club. 2 x 6 monthly audits of the analyser, calibration gas mixture and site infrastructure, along with full data ratification and reporting of the dataset under contract **DN325160**

Barnsley Gawber AURN

Site	Status	Address	Grid Ref
Barnsley Gawber	Urban Background, AURN	Wood View, Gawber, Barnsley	432524 407478

Further details on the location criteria of the Barnsley Gawber site can be found on the Bureau Veritas website. Details of the monitoring QA/QC are contained in the table below:

Station	Barnsley Gawber
Analyser Model	Thermo Scientific Model 42i
Logging System	Internal to Model 42i
Calibration gas	NO in N_2 , NO_2 in air
Routine Calibration	Calibrations undertaken by Barnsley MBC personnel as Local Site Operator
Daily zero and span check	Scrubbed zero air. Permeation tube
Air Conditioning	Yes

Service contract	2 x 6 monthly service, + repair call out (Enviro Technology Services plc)
Third party Audit and data ratification	Ricardo-AEA, as part of AURN

Sulphur Dioxide

Barnsley Gawber AURN

Site	Status	Address	Grid Ref
Barnsley Gawber	Urban Background, AURN affiliated	Wood View, Gawber, Barnsley	432524, 407478

Further details on the location criteria of the Gawber sites can be found on the Stanger Science and Environment webpage. The analysers at all locations are AURN type approved, with basic details of the monitoring given in the table below:

Station	Barnsley Gawber
Analyser Model	Thermo Scientific Model 42i
Logging System	Internal to Model 42i
Calibration gas	SO_2 in air
Routine Calibration	Calibrations undertaken by Barnsley MBC personnel as Local Site Operator
Daily zero and span check	Scrubbed zero air. Permeation tube
Air Conditioning	Yes
Service contract	2 x 6 monthly service, + repairs (Enviro Technology Services plc)
Third party audit and data ratification	Ricardo-AEA, as part of AURN

Ozone

Automatic monitoring of ozone using a dual cell UV photometric analyser is undertaken at the Barnsley Gawber site. QA/QC for this station is discussed below:

Barnsley Gawber AURN

Site	Status	Address	Grid Ref
Barnsley Gawber	Urban Background, AURN affiliated	Wood View, Gawber, Barnsley	432524, 407478

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

Station	Barnsley Gawber
Analyser Model	Thermo Scientific Model 49i
Logging System	Internal to Model 42i
Calibration gas	Calibration under on quarterly basis by AURN representatives
Routine Calibration	Not undertaken by LSO, undertaken on quarterly basis by the Ricardo-AEA (AURN QA/QC unit)
Air Conditioning	Yes

Service contract	2 x 6 monthly service, + repair call out (Enviro Technology Services plc)
Third party Audit and data ratification	Ricardo-AEA, as part of AURN

Fine Particles (PM_{10})

Automatic PM_{10} monitoring

Automatic monitoring of PM_{10} using a beta attenuation monitor (BAM) are undertaken at the A635 Kendray Roadside site.   QA/QC for the Kendray site is discussed below:

Barnsley A635 Roadside, Doncaster Road, Kendray

Monitoring commenced at this location in 2014.

Site	Status	Address	Grid Ref
Doncaster Road, Kendray	Roadside	A635 Doncaster Road, Kendray	436299 405690

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

Station	Royston
Analyser Model	BAM 1020
Logging System	Internal to the BAM
Filter Change	Filter changes undertaken by Barnsley MBC personnel as Local Site Operator, in accordance with manufacturer's specification and AURN procedure.
Air Conditioning	Yes
Service contract	2019, 2 x 6 monthly service, + repair call out (Matts Monitors, under contract DN325308)
Third party Audit and data ratification	Ricardo-AEA Air Monitoring Calibration Club. 2 x 6 monthly audits of the analyser, calibration gas mixture and site infrastructure, along with full data ratification and reporting of the dataset under contract **DN325160**

LAQM Helpdesk Advice to Barnsley MBC – Quantification of Emissions

Quantification of emissions/concentrations reduction can be difficult for some measures and cannot be readily applied to all measures. There are also various confounding factors that make direct attribution of concentration changes as a function of intervention measure implementation difficult. As a consequence, literature available on this is limited, noting that it is an area of focus for Defra.

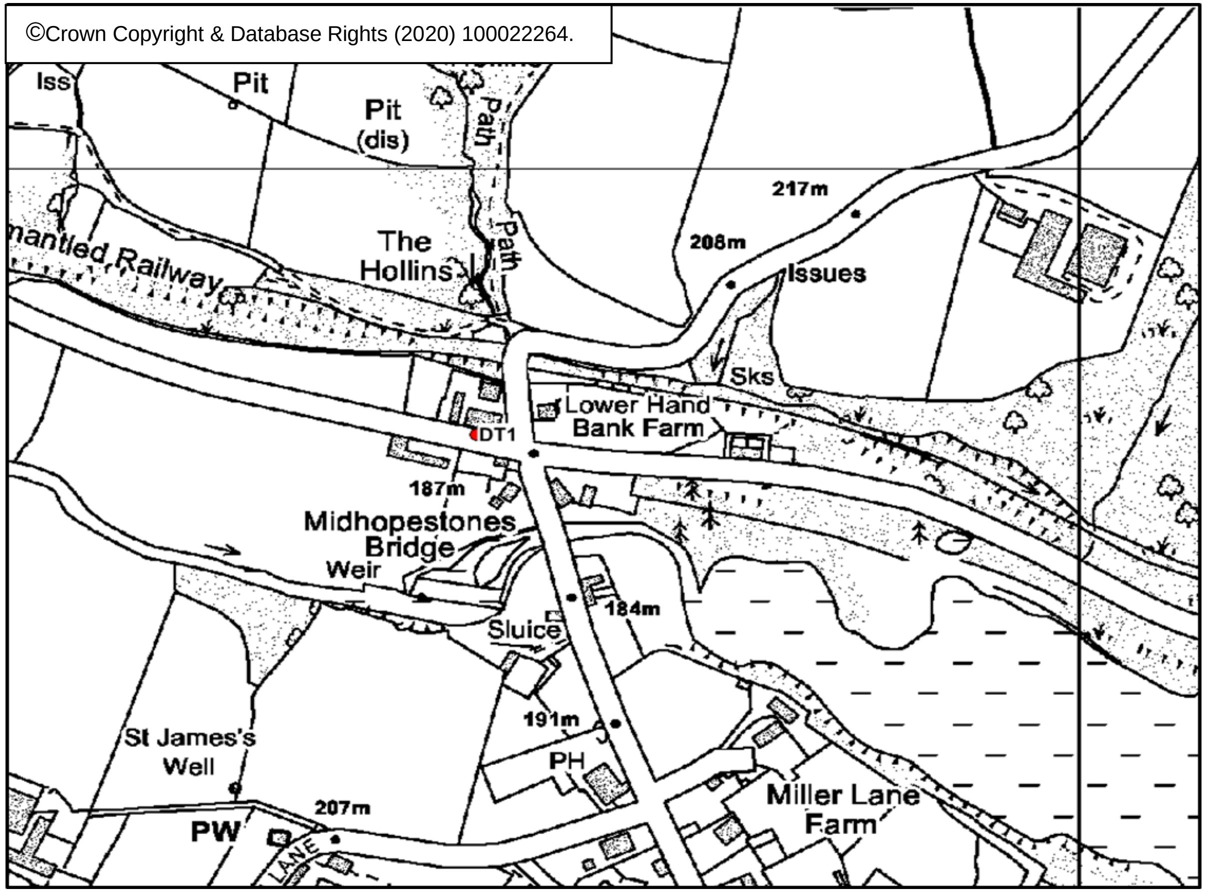
Quantification of the emissions reduction will often be easier (and cheaper) to achieve than an estimate of the concentration reduction, which would otherwise require the application of detailed dispersion models to make suitable predictions. We therefore suggest that where necessary you focus on estimates of emissions reduction.

Using the Emissions Factors Toolkit (EFT) is useful for estimating the emissions reduction that may be achieved through realisation of some road traffic intervention measures. For example, measures that will reduce congestion can be considered through application of the EFT, e.g. by varying the average speed on the queuing section of a road link as a proxy for the reduction in queuing traffic.

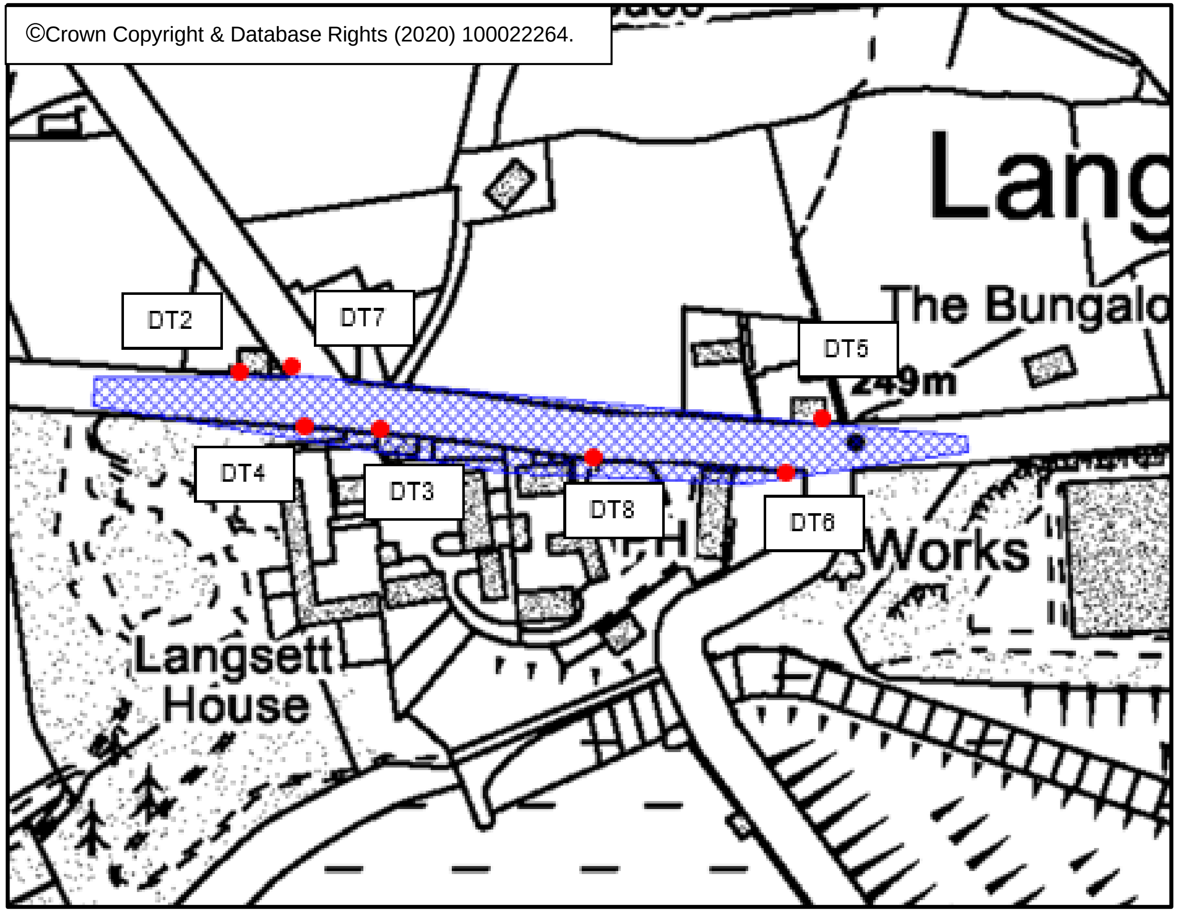
Where direct quantification of emissions reduction cannot be so readily achieved, one could apply best judgement in a qualitative manner. This could involve the application of a matrix-based approach whereby each measure is assigned an indicative reduction of NO_2 with associated timescales, example below, but do modify and update relative to your needs. This is comparable to, but does go slightly further than, the low / medium / high effect categories provided in the TG16 LAQM Toolbox.

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

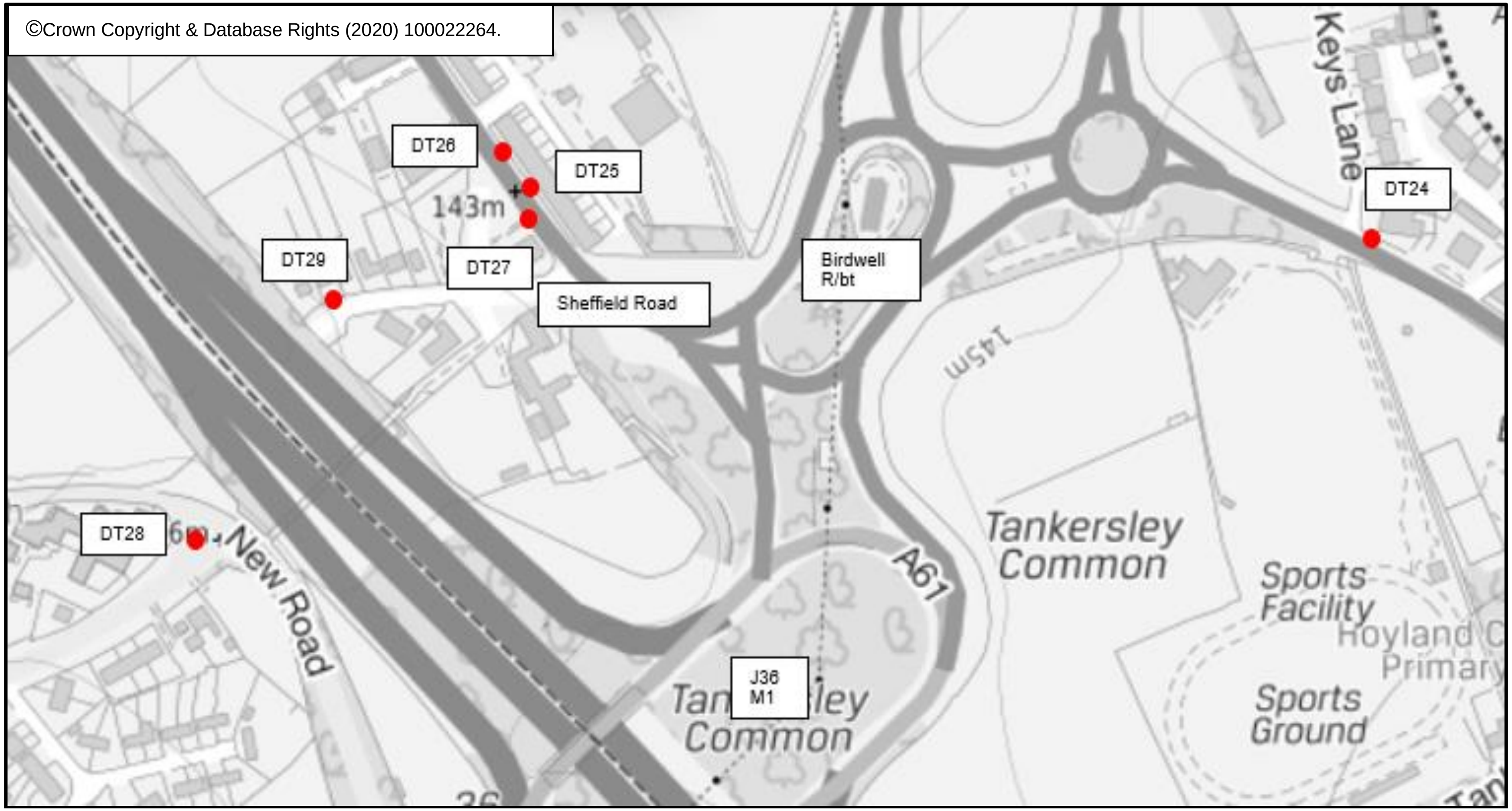
Appendix D: Maps of Monitoring Locations and AQMAs



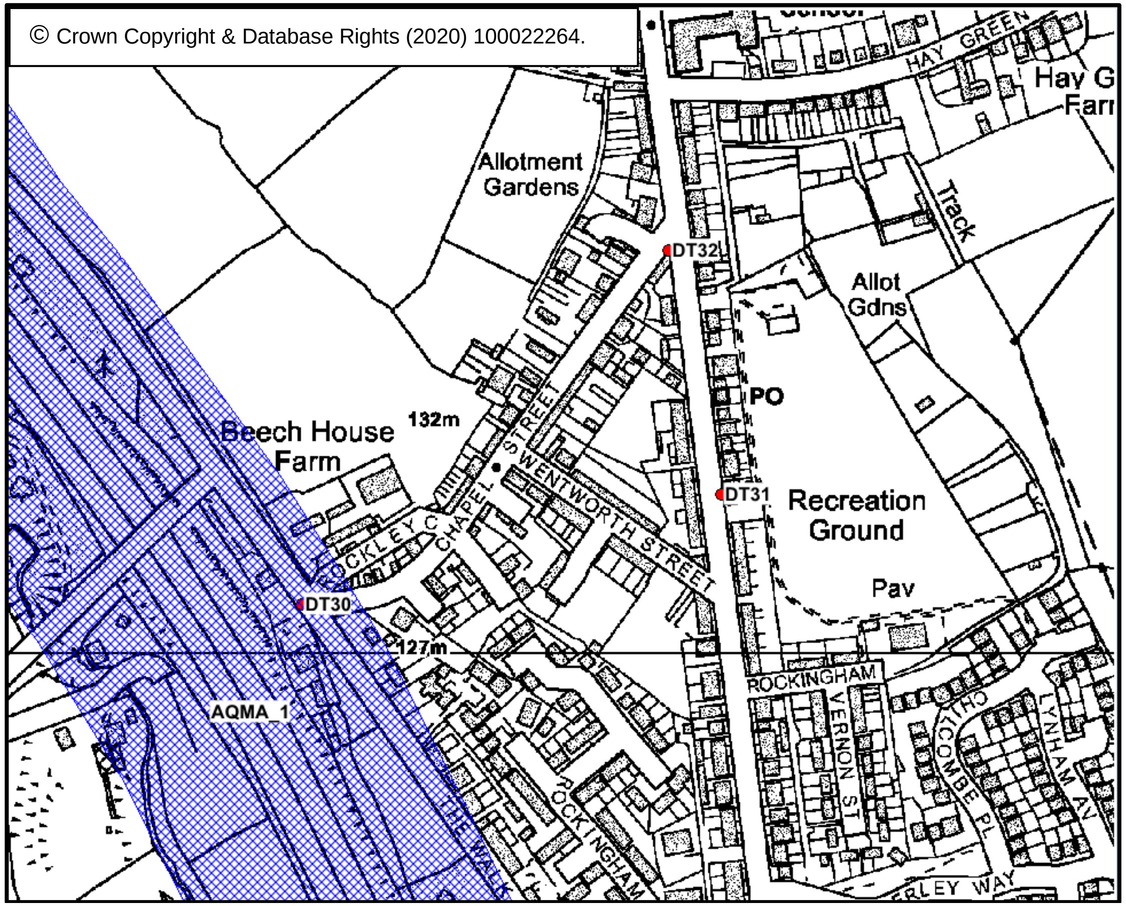
DT 1, GR 423621 399817, westbound carriageway, A616, Midhopestones



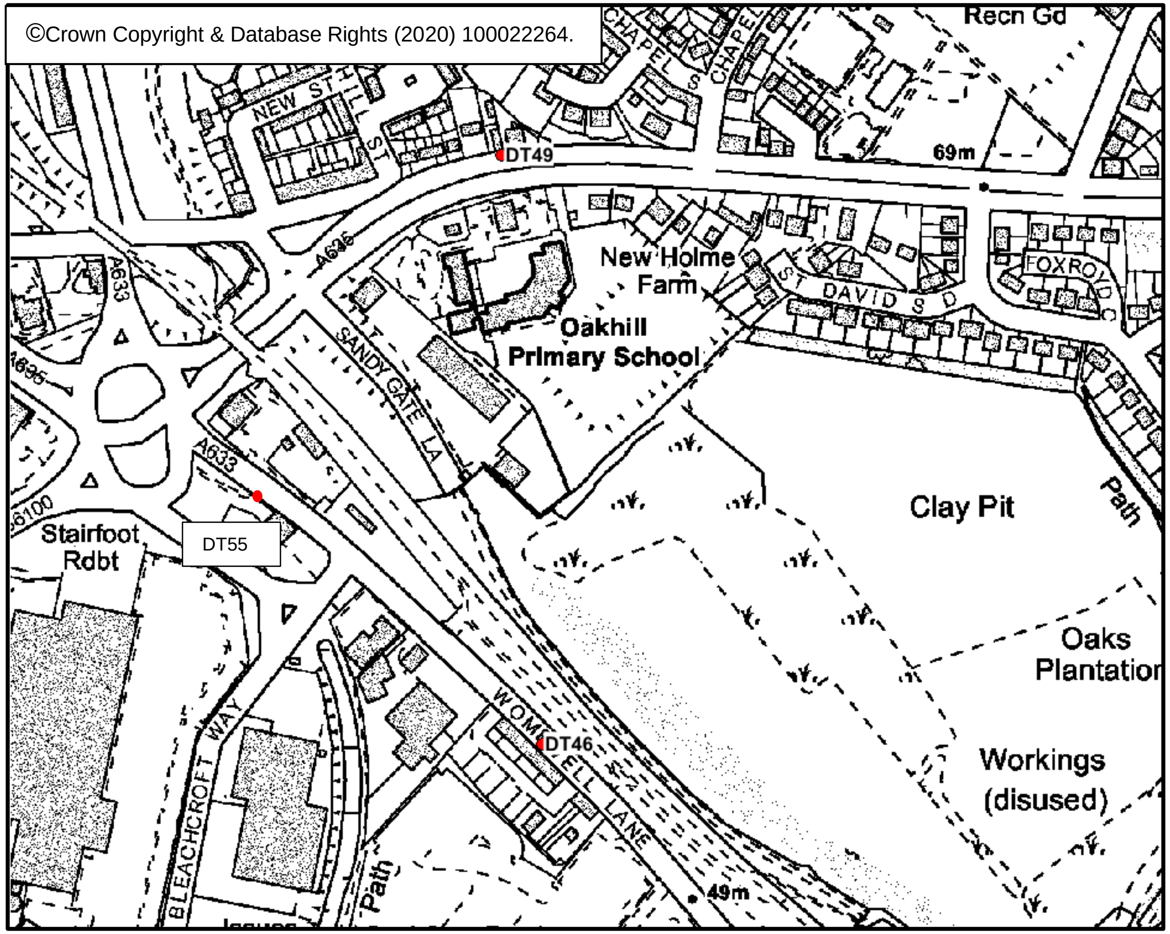
DT 2, GR 421102 400496, eastbound (downhill) carriageway, A616, Langsett
DT 3, GR 421143 400481, westbound (uphill) carriageway, A616, Langsett
DT 4, GR 421126 400485, westbound (uphill) carriageway, A616, Langsett
DT 5, GR 421291 400482, eastbound (downhill) carriageway, A616, Langsett
DT 6, GR 421282 400471, westbound (uphill) carriageway, A616, Langsett
DT 7, GR 421117 400501, Gilbert Hill, (uphill) carriageway, junction with A616, Langsett
DT 8, GR 421215 400475, westbound (uphill) carriageway, A616, Langsett
Blue hatched area is AQMA 6



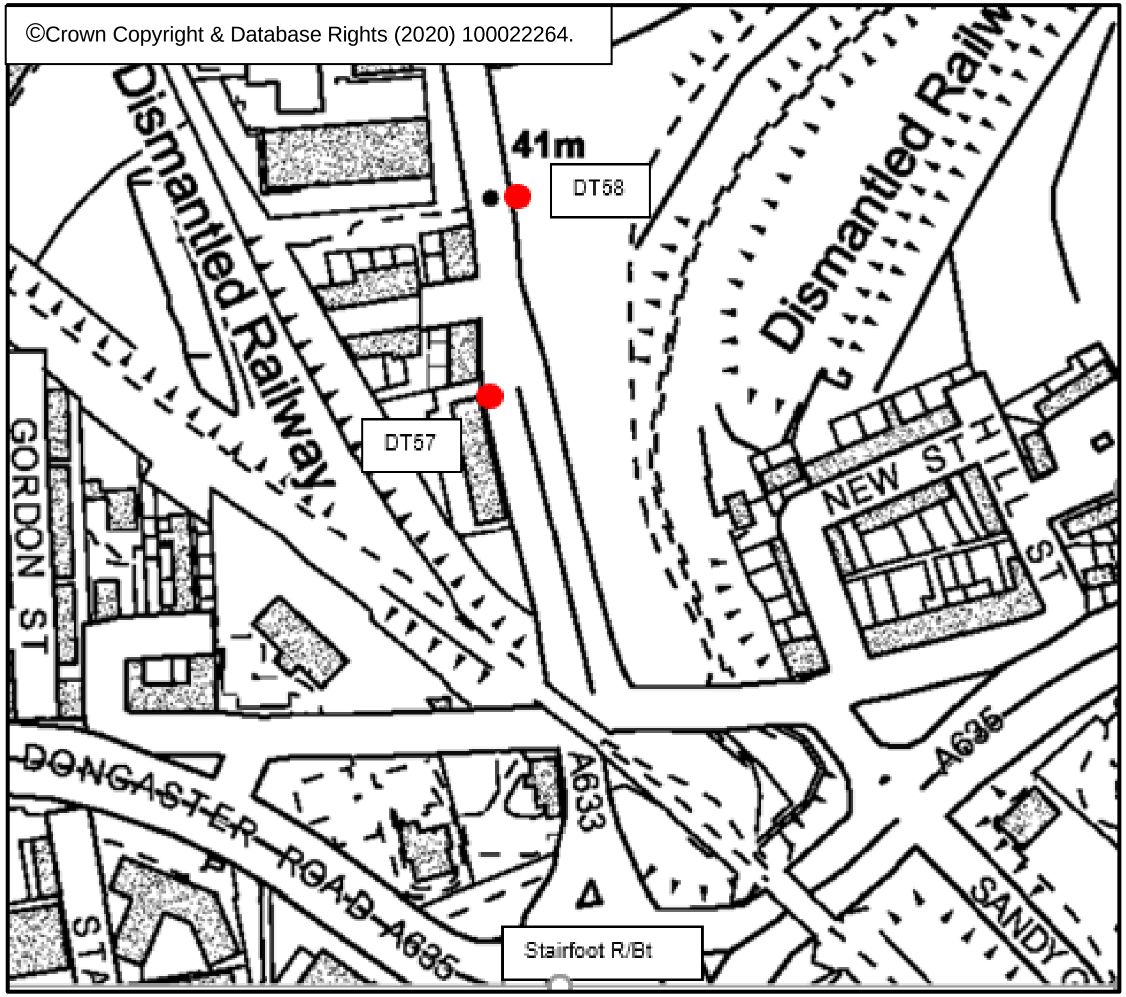
DT 24, GR 435274 400384, A6135, Hoyland
DT 25, GR 434832 400405, A61 Sheffield Road, Birdwell
DT 26, GR 434820 400421, A61 Sheffield Road, Birdwell
DT 27, GR 434823 400398, A61 Sheffield Road, Birdwell
DT 28, GR 434652 400231, adjacent school, Westwood New Road, Tankersley
DT 29, GR 434721 400352, Moor Lane, Birdwell



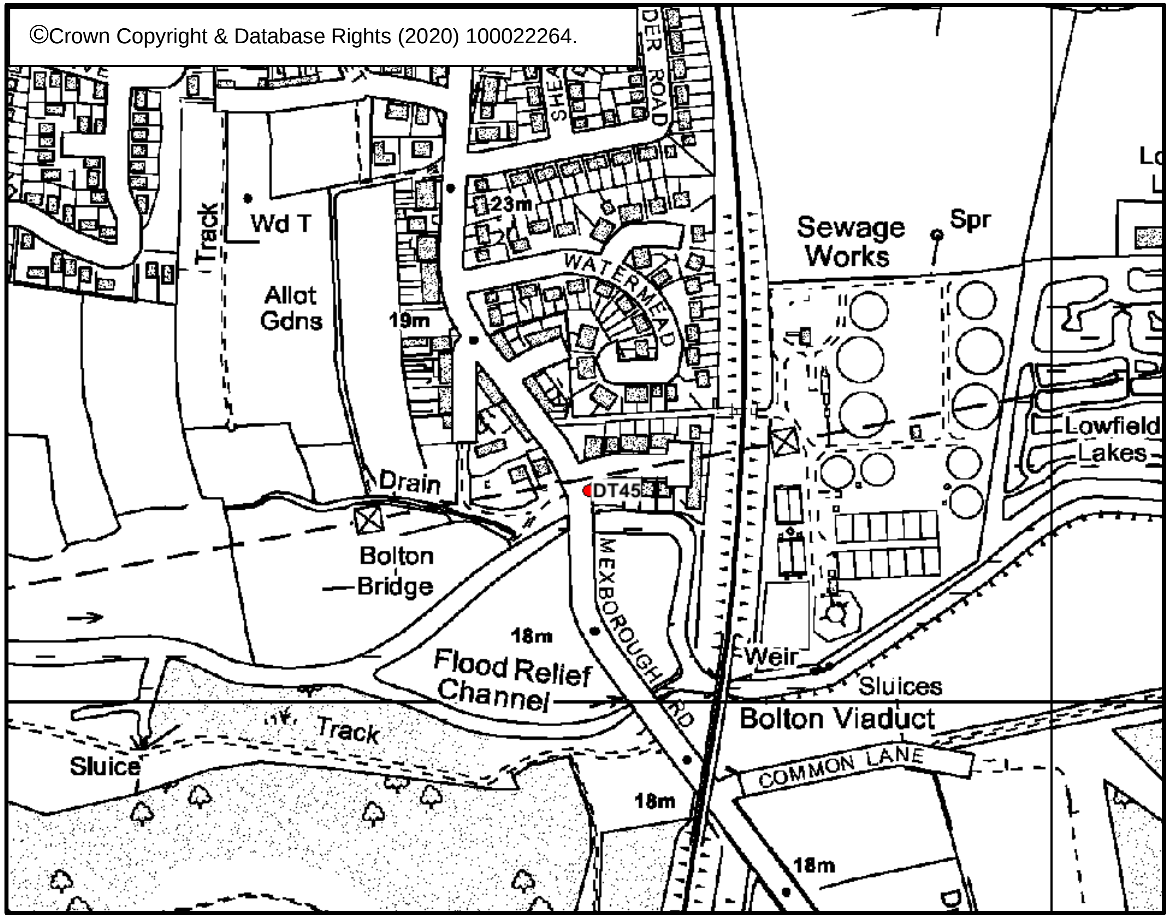
DT 30, GR 434309 401032, The Walk, Birdwell
DT 31, GR 434595 401107, southbound carriageway, A61 Sheffield Road, Birdwell
DT 32, GR 434559 401274, junction of northbound carriageway, A61 Sheffield Road, and Chapel Street, Birdwell
Blue hatched area is AQMA 1, 100 metres either side of the central reservation of the M1 motorway



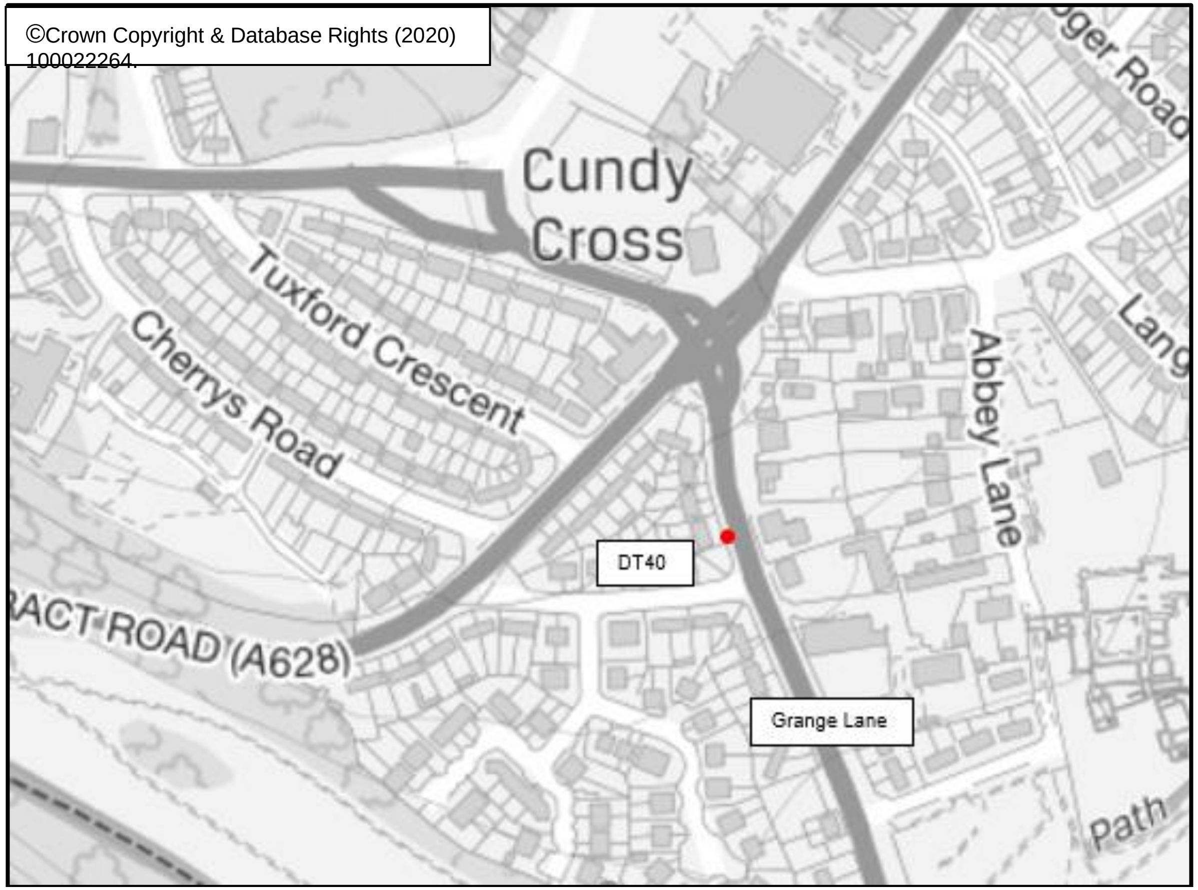
DT 46, GR 437554 405291, near to Supermarket site, A633 Wombwell Lane, Stairfoot
DT 49, GR 437528 405675, uphill gradient, A635 Doncaster Road, Ardsley
DT 55, GR 437369 405456, near to Stairfoot Roundabout, A633 Wombwell, Stairfoot



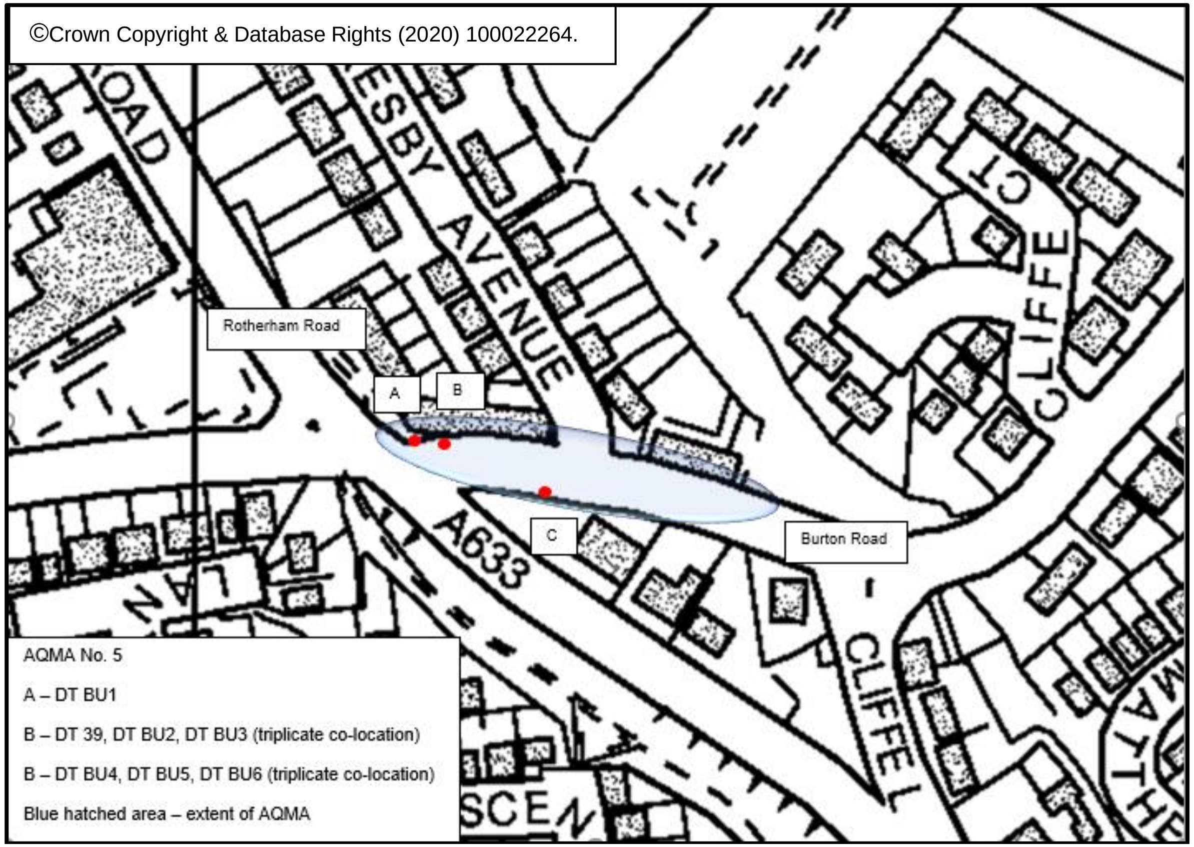
DT 57, GR 437242 405772, northbound carriageway, Grange Lane, Stairfoot,
DT 58, GR 437250 405813, southbound carriageway, Grange Lane, Stairfoot,



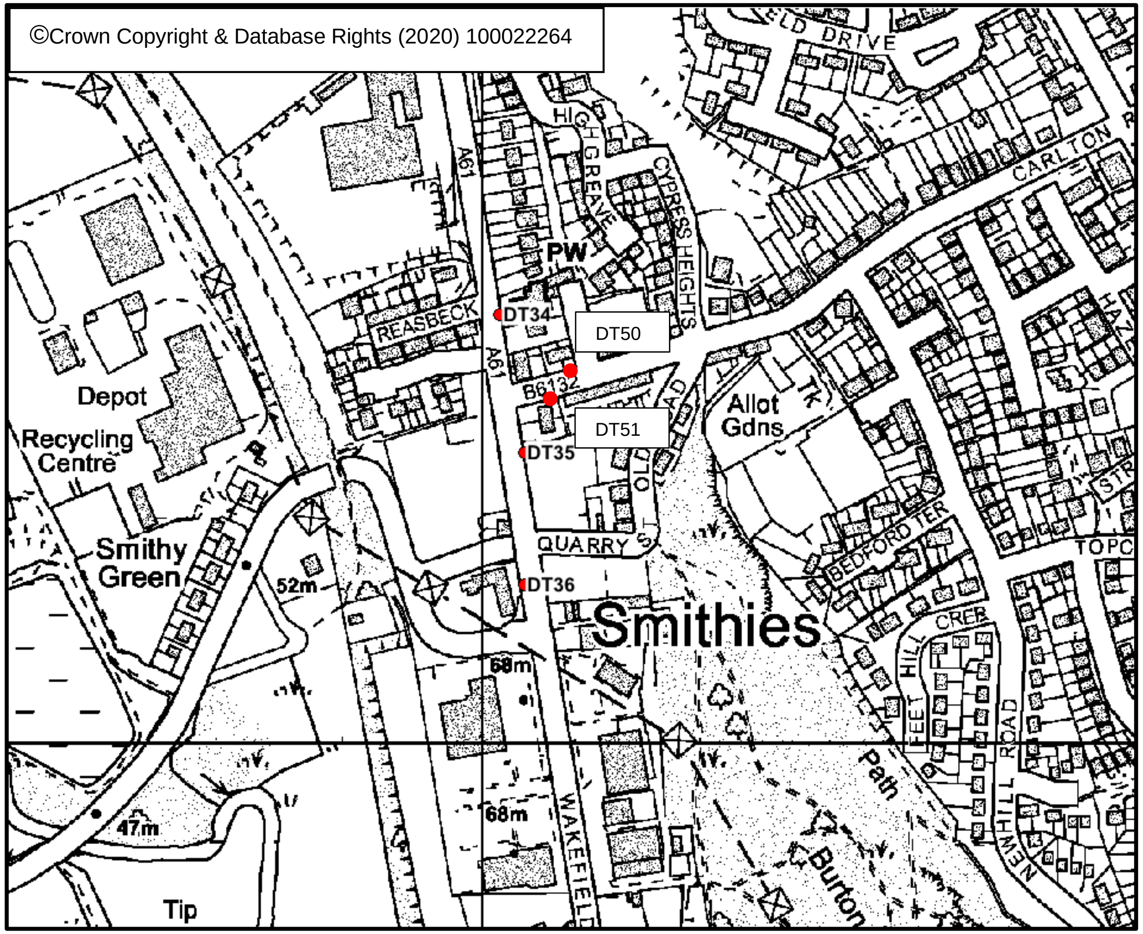
DT 45, GR 445699 402140, Mexborough Road, Bolton-upon-Dearne



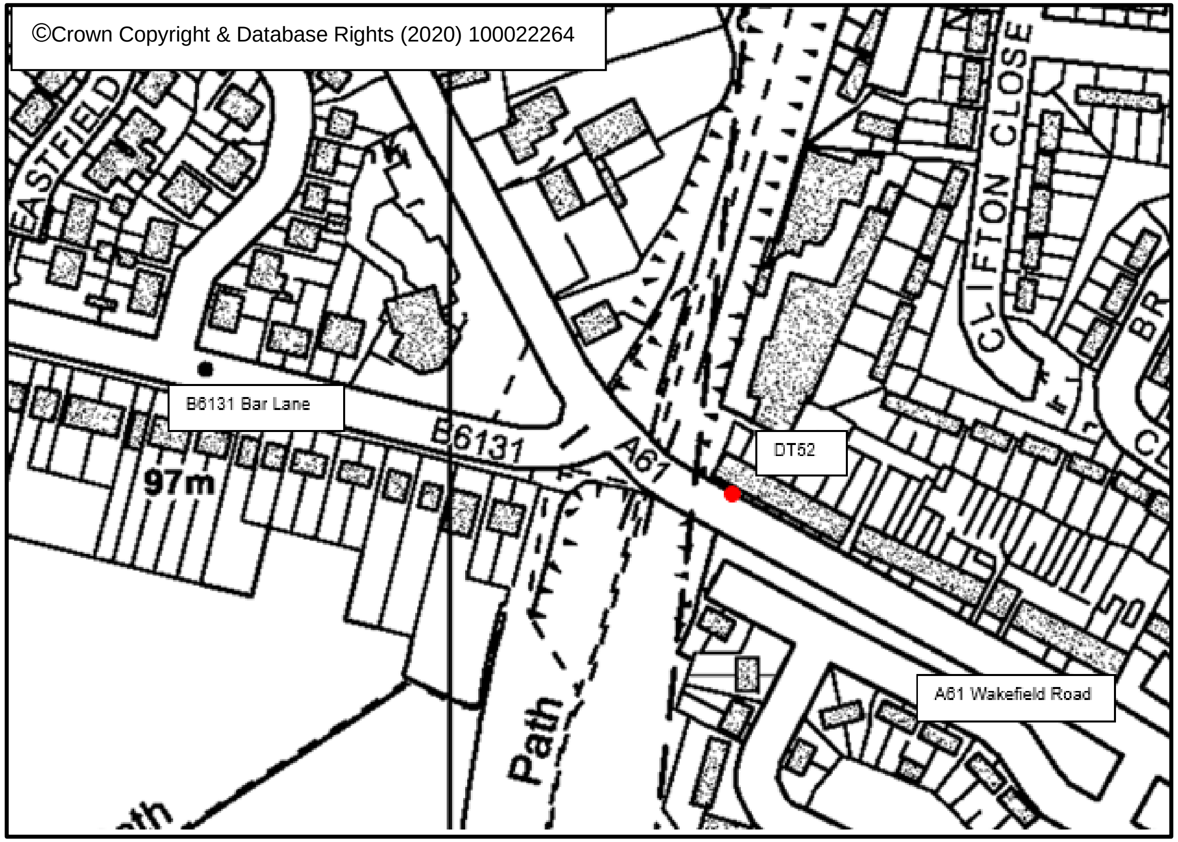
DT 40, GR 437122 406557, A633 Grange Lane, uphill carriageway near to Cundy Cross junction with Wakefield Road and Pontefract Road, Cundy Cross



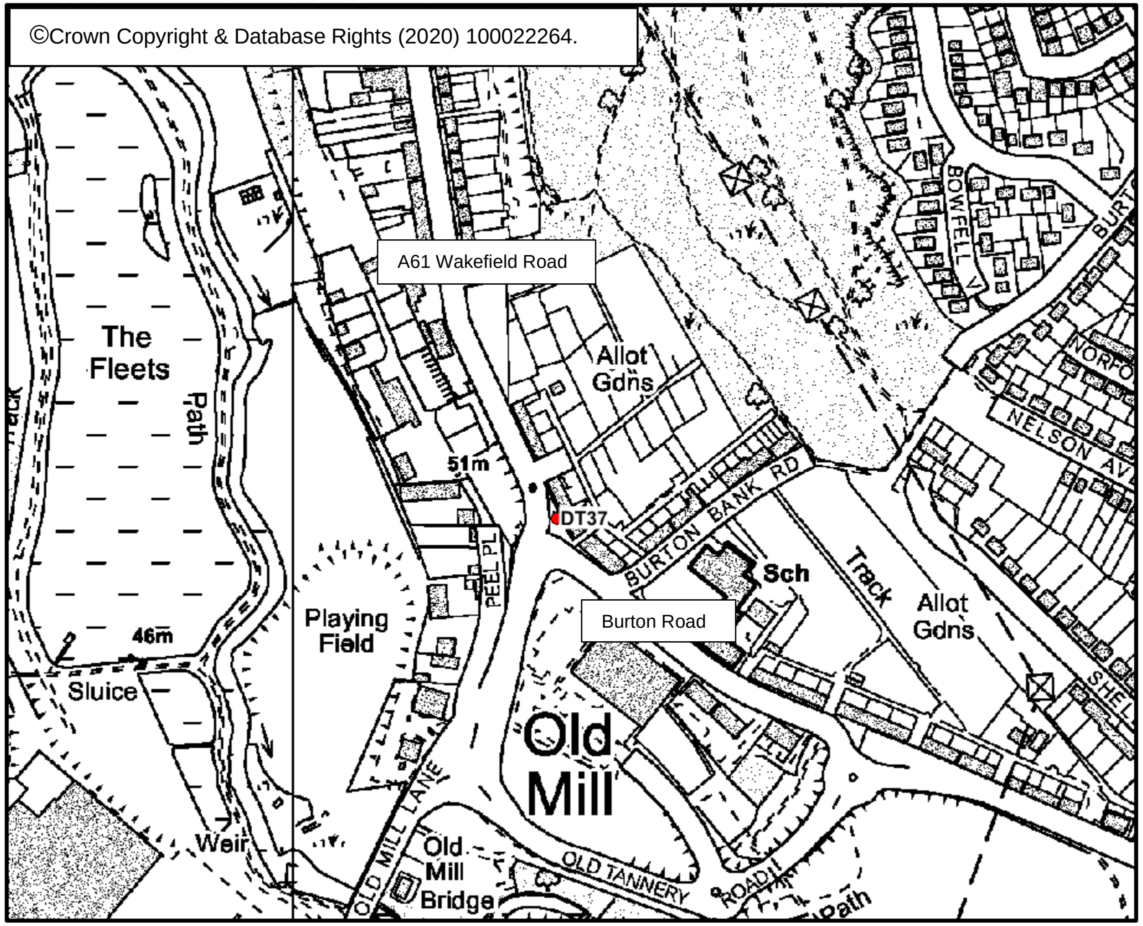
DT 39, GR 436072 407320, uphill carriageway, Burton Road, adjacent to A633 Rotherham junction
BU 1, GR 436069 407321, uphill carriageway, Burton Road, adjacent to A633 Rotherham junction
BU 2, GR 436072 407320, uphill carriageway, Burton Road, adjacent to A633 Rotherham junction
BU 3, GR 436072 407320, uphill carriageway, Burton Road, adjacent to A633 Rotherham junction
BU 4, GR 436107 407307, downhill carriageway, Burton Road, adjacent to A633 Rotherham junction
BU 5, GR 436107 407307, downhill carriageway, Burton Road, adjacent to A633 Rotherham junction
BU 6, GR 436107 407307, downhill carriageway, Burton Road, adjacent to A633 Rotherham junction
Blue hatched area is AQMA 5



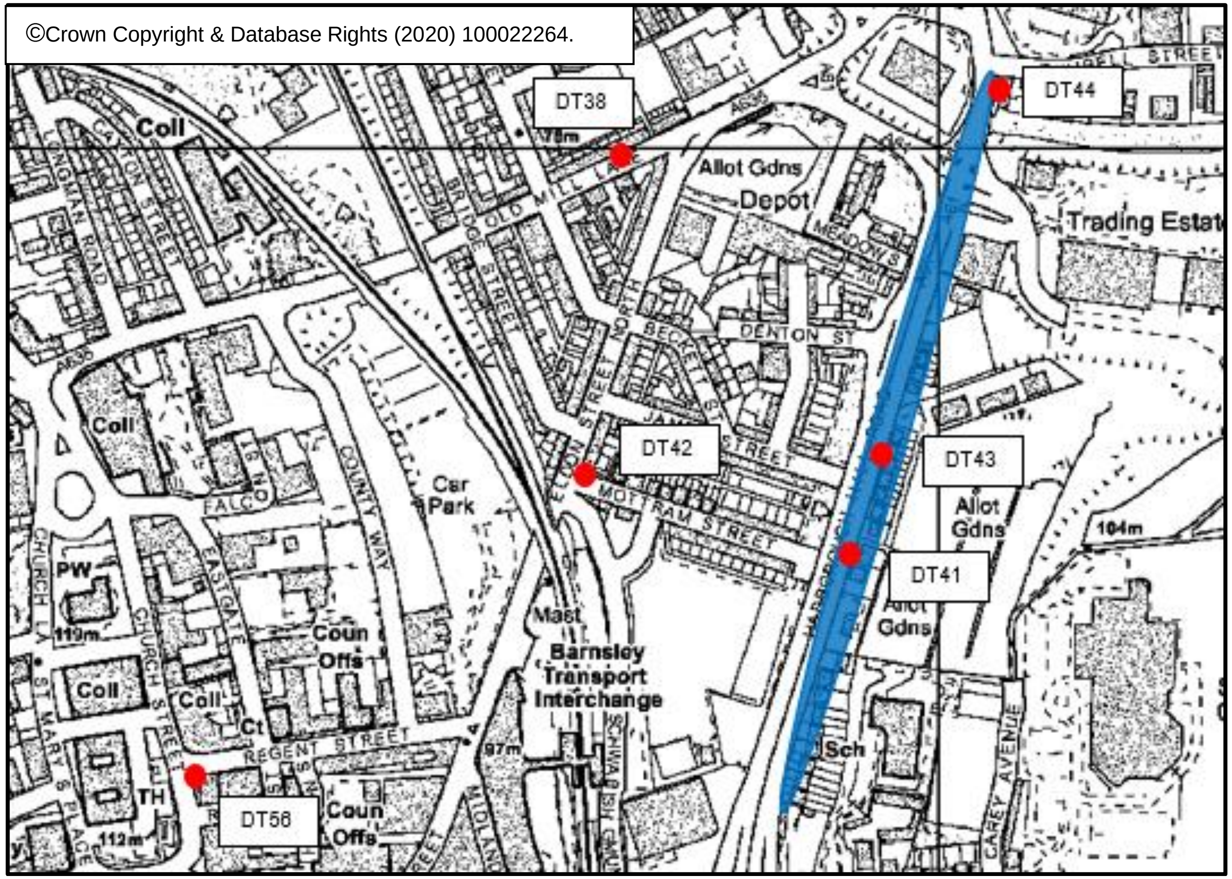
DT 34, GR 435011 408281, southbound carriageway, A61 Wakefield Road, Smithies
DT 35, GR 435027 408190, southbound carriageway, A61 Wakefield Road, Smithies
DT 36, GR 435027 408104, northbound carriageway, A61 Wakefield Road, Smithies
DT 50, GR 435062 408244, uphill carriageway, Carlton Road, junction with A61 Wakefield Road, Smithies
DT 51, GR 435049 408229, downhill carriageway, Carlton Road, junction with A61 Wakefield Road, Smithies



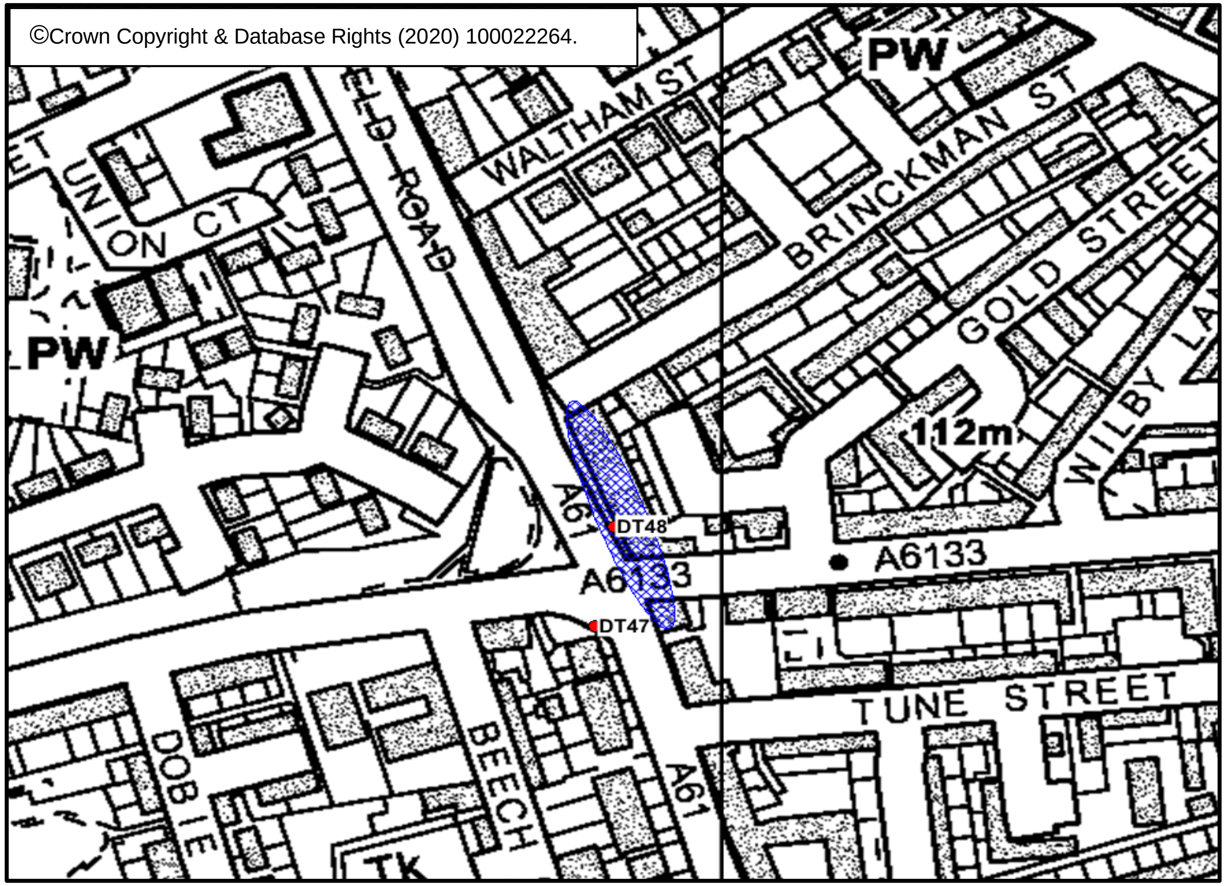
DT 52, GR 434112 409625, A61 Wakefield Road, junction with Bar Lane, Athersley North



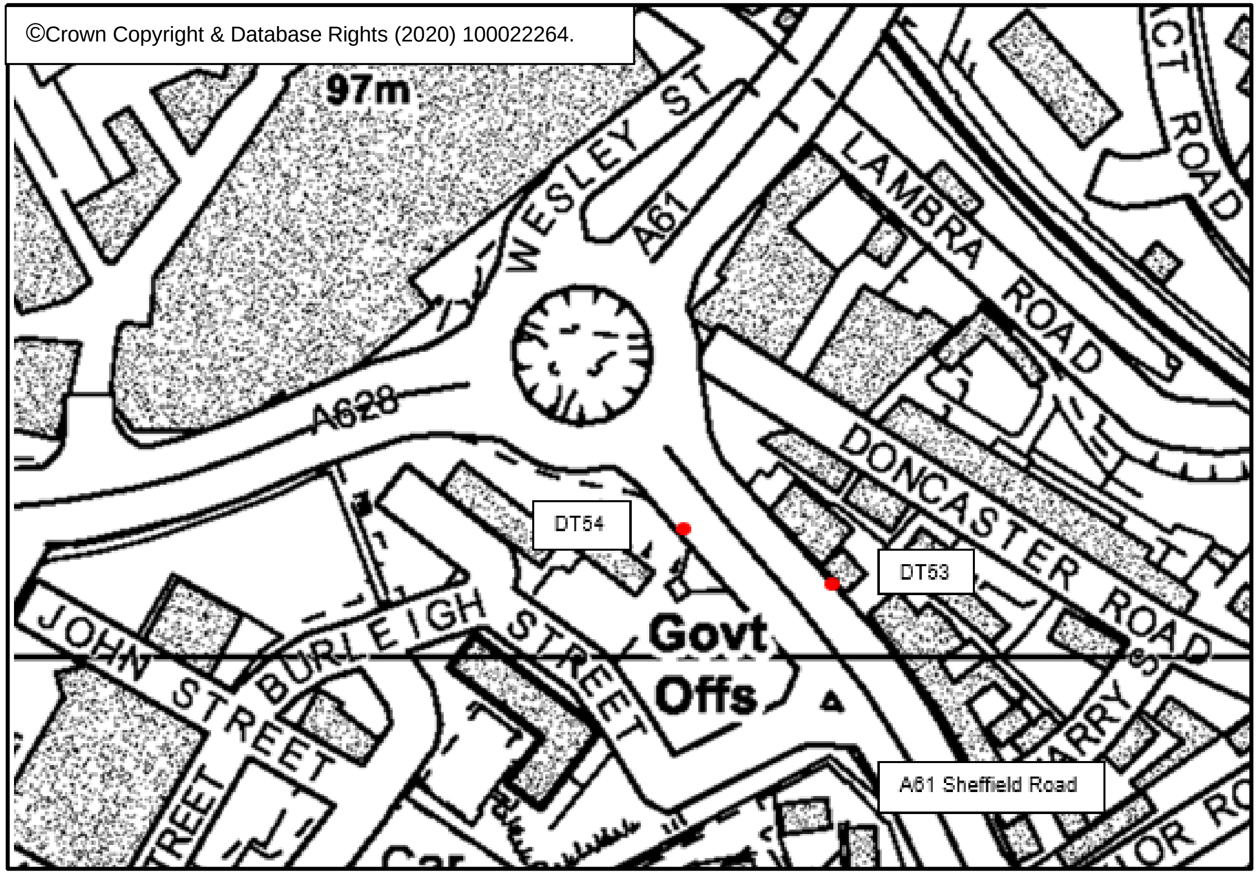
DT 37, GR 435174 407499, A61 Wakefield Road, Old Mill, junction with Burton Road and A61 Old Mill Lane



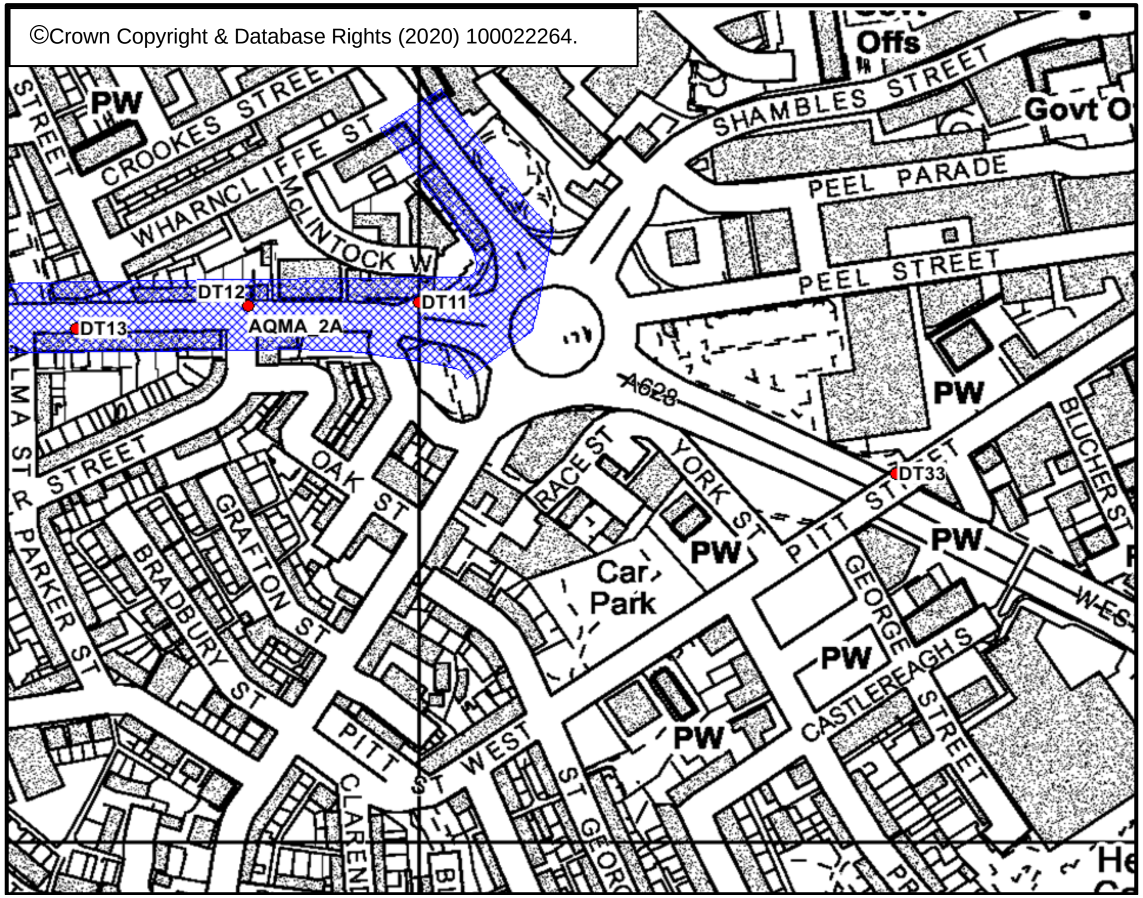
DT 38, GR 434757 406995, Old Mill Lane, near to Harborough Hill gyratory
DT 41, GR 434933 406695, A61 Harborough Hill Road, uphill gradient
DT 42, GR 434727 406753, Junction Mottram Street and Eldon Street, near to Barnsley town centre bus and rail interchange
DT 43, GR 434955 406769, A61 Harborough Hill Road, uphill gradient
DT 44, GR 435047 407033, A61 Harborough Hill Road, uphill gradient, near to gyratory
DT 56, GR 434430 406529, junction of Church Street and Regent Street, Barnsley town centre
Blue hatched area is AQMA 4



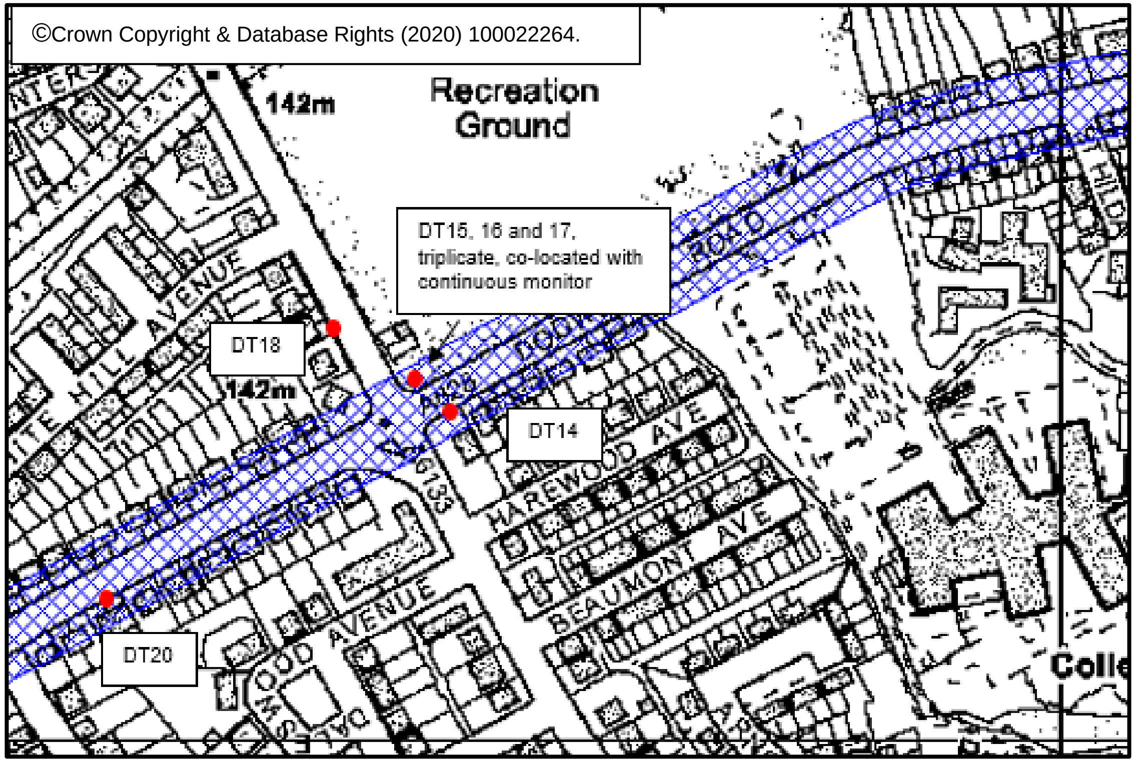
DT 47, GR 434958 405672, A61 Sheffield Road, junction with Park Road
DT 48, GR 434964 405709, A61 Sheffield Road, junction with A6133 Cemetery Road
Blue hatched area is AQMA7



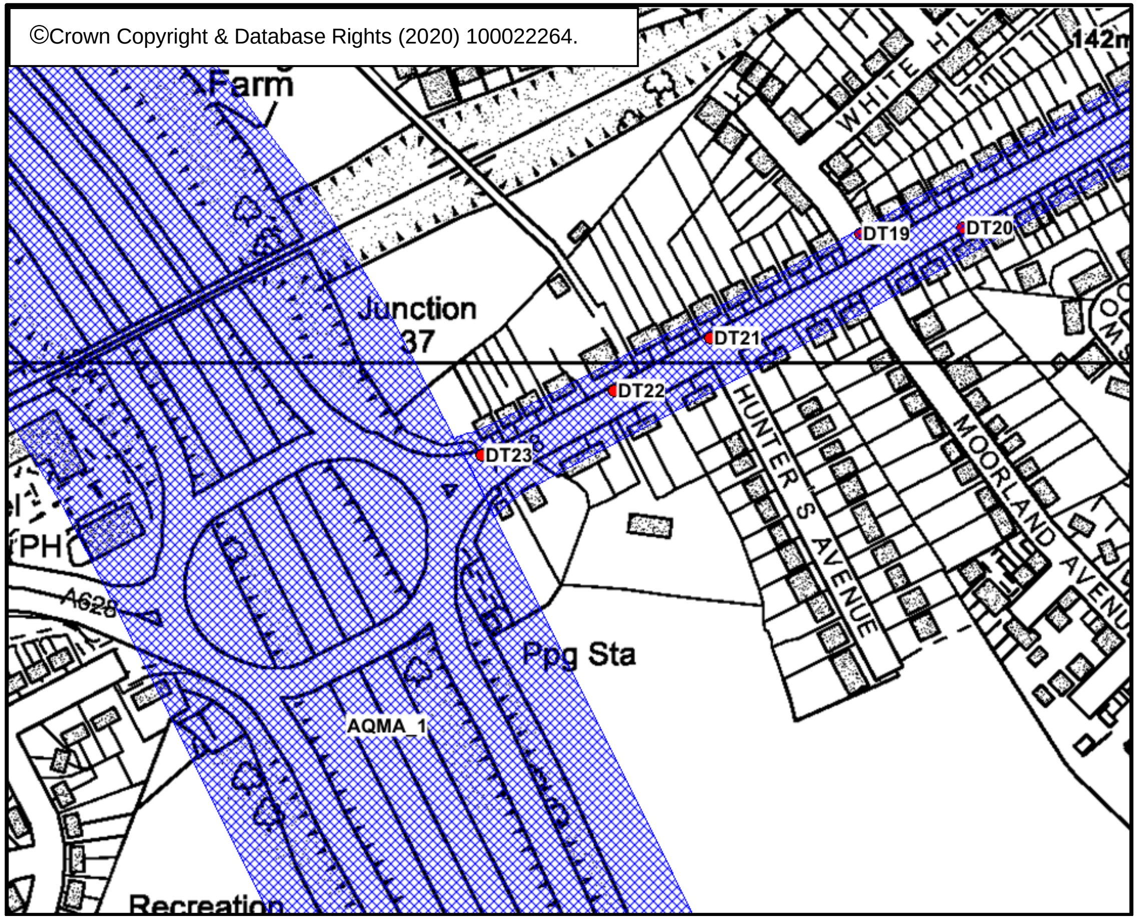
DT 53, GR 434809 406023, A61 Sheffield Road, outbound from Barnsley town centre
DT 54, GR 434763 406038, A61 Sheffield Road, inbound to Barnsley town centre



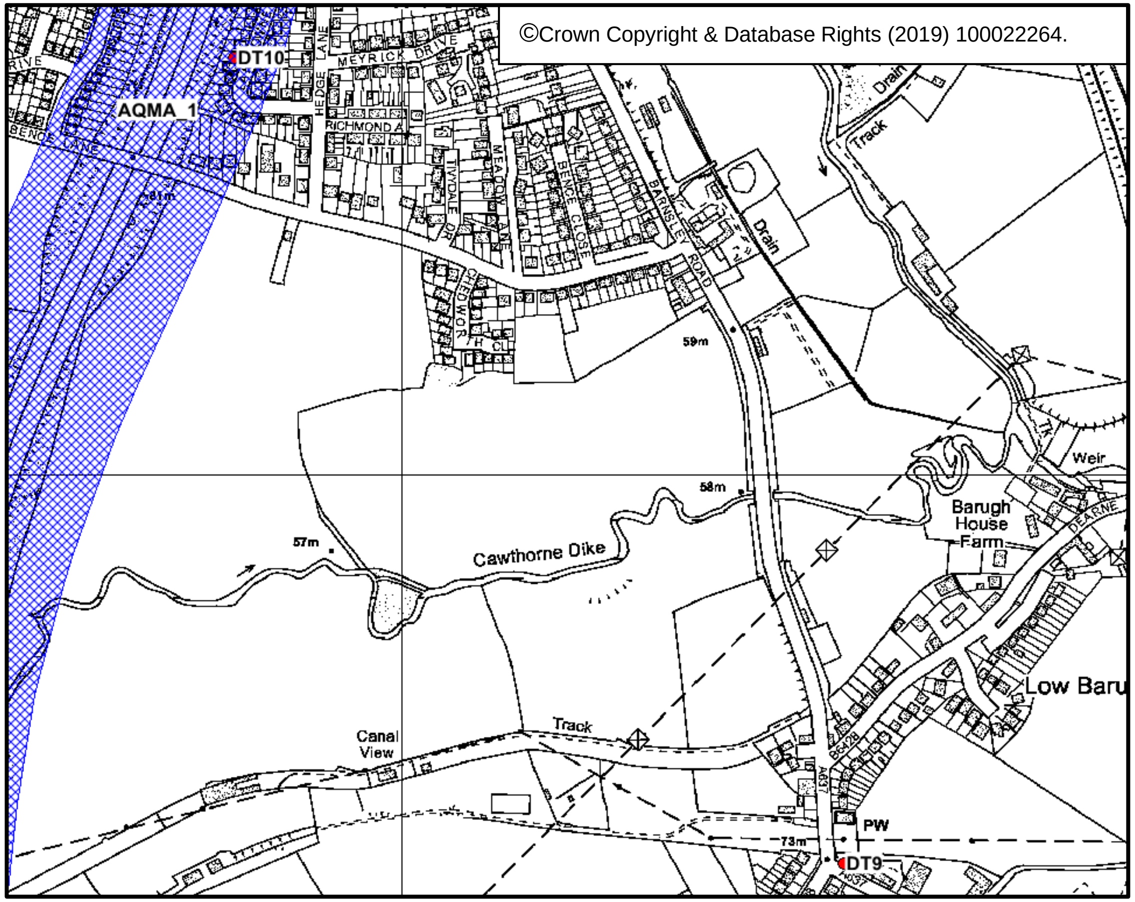
DT 11, GR 434000 406292, A628 Dodworth Road, near to Town End roundabout, eastbound carriageway
DT 12, GR 433910 406290, A628 Dodworth Road, near to Town End roundabout, eastbound carriageway
DT 13, GR 433820 406278, A628 Dodworth Road, near to Town End roundabout, westbound carriageway
DT 33, GR 434251 406199, Pitt Street, crossing A628 Westway
Blue hatched area is AQMA 2A



DT 14, GR 432702 406160, A628 Dodworth Road, near to Pogmoor Crossroads
DT 15, GR 432680 406174, A628 Dodworth Road, Pogmoor Crossroads, continuous monitor co-location site
DT 16, GR 432680 406174, A628 Dodworth Road, Pogmoor Crossroads, continuous monitor co-location site
DT 17, GR 432680 406174, A628 Dodworth Road, Pogmoor Crossroads, continuous monitor co-location site
DT 18, GR 432645 406198, Pogmoor Road, near to junction with A628 Dodworth Road, Pogmoor Crossroads
DT 20, GR 432535 406071, A628 Dodworth Road, outbound carriageway from Barnsley town centre
Blue hatched area is AQMA 2A



DT 19, GR 432481 406068, Crown Hill Road, A628 Dodworth Road
DT 20, GR 432535 406071, A628 Dodworth Road, outbound carriageway from Barnsley town centre
DT 21, GR 432402 406013, A628 Dodworth Road, inbound carriageway to Barnsley town centre, near to junction 37, M1 motorway
DT 22, GR 432351 405985, A628 Dodworth Road, inbound carriageway to Barnsley town centre, near to junction 37, M1 motorway
DT 23, GR 432281 405951, A628 Dodworth Road, inbound carriageway to Barnsley town centre, near to junction 37, M1 motorway
Blue hatched areas are AQMA 2A and AQMA 1



DT 9, GR 431468 408579, Roundabout, junction of A637 Claycliffe Road and Barugh Lane, Low Barugh
DT 10, GR 430820 409453, Lansdowne Crescent, Darton, adjacent to the M1 motorway.
Blue hatched area is AQMA 1

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[19]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[19] 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	Air quality Annual Status Report
BAM	Beta Attenuation Monitor (analyser for measuring PM_{10} concentrations)
Defra	Department for Environment, Food and Rural Affairs
ECO Stars	ECO (**E**fficient **C**leaner **O**peration) Fleet Recognition Scheme
EU	European Union
LAQM	Local Air Quality Management
MOVA	Microprocessor Optimised Vehicle Actuation - traffic control system, with the aim of maximising efficient traffic flow at a junction
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SCOOT	Split Cycle and Offset Optimisation Technique – a traffic control system, with the aim of maximising efficient traffic flow at a series of interdependent junctions
SO_2	Sulphur Dioxide

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