Gedling Borough Council

2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June, 2021

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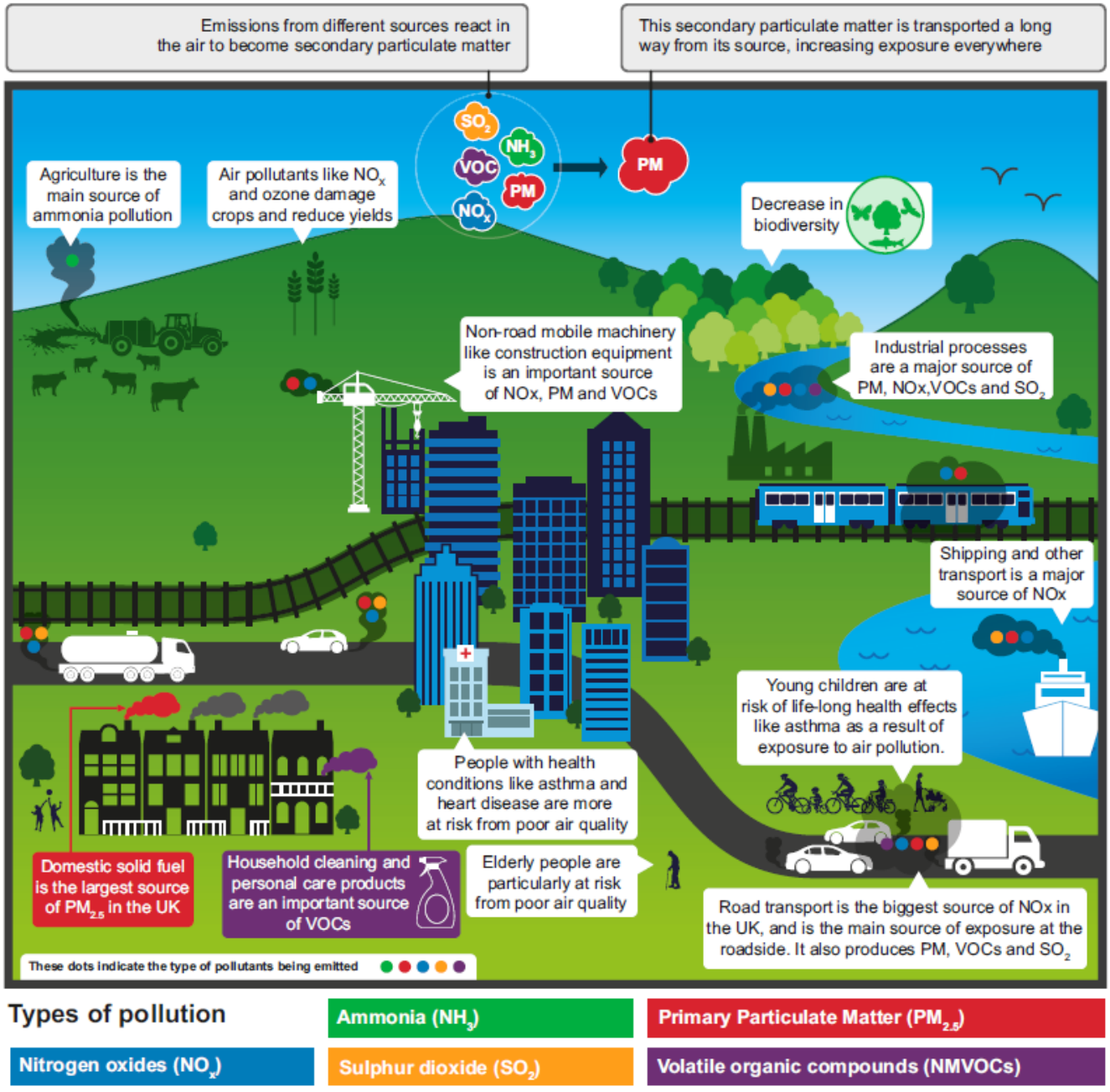
Executive Summary: Air Quality in Our Area

What is Air Pollution?

Air pollution is defined as a mixture of gases and particles that have been emitted into the atmosphere by man-made processes. The combustion of fuels such as: Coal, Oil, Gas, Petrol or Diesel and Wood Burning; are the most significant sources of the key pollutants of concern to Local Authorities.



Source – Defra 2017

What are Particles?

Particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

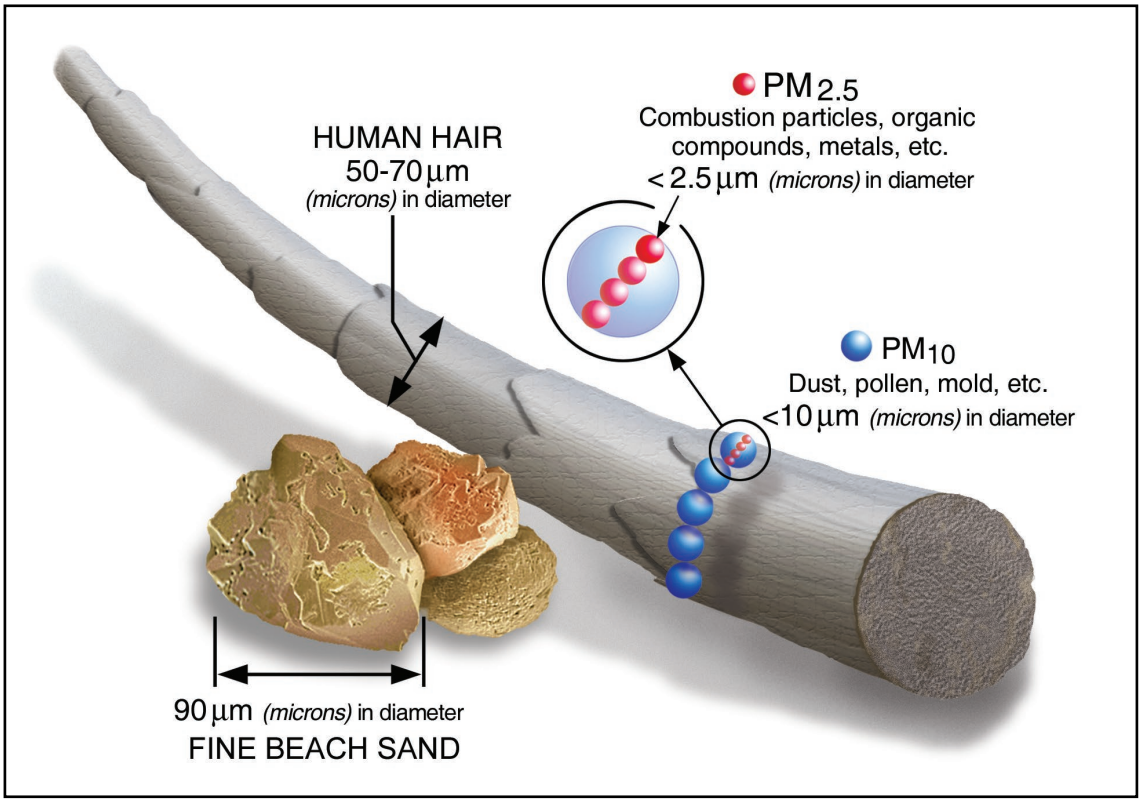
Particulate matter is made of lots of different sorts of things including: vehicle exhausts; poorly combusted fuel; particles of metal from engine chambers; bits worn from brake pads; bitumen asphalt or concrete dust work from the road; biological and other waste ground up on the road; and it's formed by reactions between other pollution in the air too.

How big is Particle Pollution?

Particle pollution includes "inhalable coarse particles," with diameters larger than 2.5 micron (µm) and smaller than 10µm and "fine particles," with diameters that are 2.5µm and smaller.

How small is 2.5µm? Think about a single hair from your head. The average human hair is about 70µm in diameter; making it 30 times larger than the largest fine particle.

(See diagram below)



Source: US EPA Particle Matter Basics

These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some particles, known as ***primary particles*** are emitted directly from vehicles and road surfaces, chimney stacks, dust from storage areas, spoil heaps, emissions from buildings (ventilation, boilers and solid fuel combustion), materials handling and construction sites.

Particles may form when substances react in the atmosphere. These are often from the oxidation of sulphur and nitrogen oxides, which form nitrates and ammonium salts. These are usually less than 10µm diameter, and originate from combustion and natural sources; these particles, known as ***secondary particles***.

What is Nitrogen Dioxide?

Nitrogen dioxide is a brown gas, with the chemical formula NO_2. It is chemically related to nitric oxide, a colourless gas with the chemical formula NO. These abbreviations are often used instead of writing the names of the chemicals in full.

Together, NO and NO_2 are known as Nitrogen Oxides or NOx. NOx is released into the atmosphere when fuels are burned (for example, petrol or diesel in a car engine or natural gas in a domestic central heating boiler).

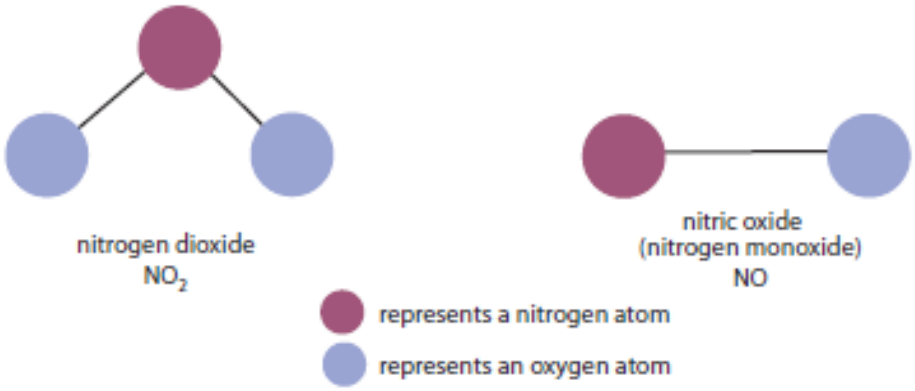


Diagram of the structures of NO_2 and NO

NOx emissions from burning fossil fuels are mainly as NO, but some sources can release a lot of NOx as NO2. These **primary** NO2 emissions are particularly important from diesel vehicles (especially when moving slowly), and can make up as much as 25% of the total NOx emissions from this source.

One reason for this is as a side-effect of measures that have been developed to reduce emissions of particulate matter (PM) from diesel vehicles by treating the exhaust using diesel particulate filters.

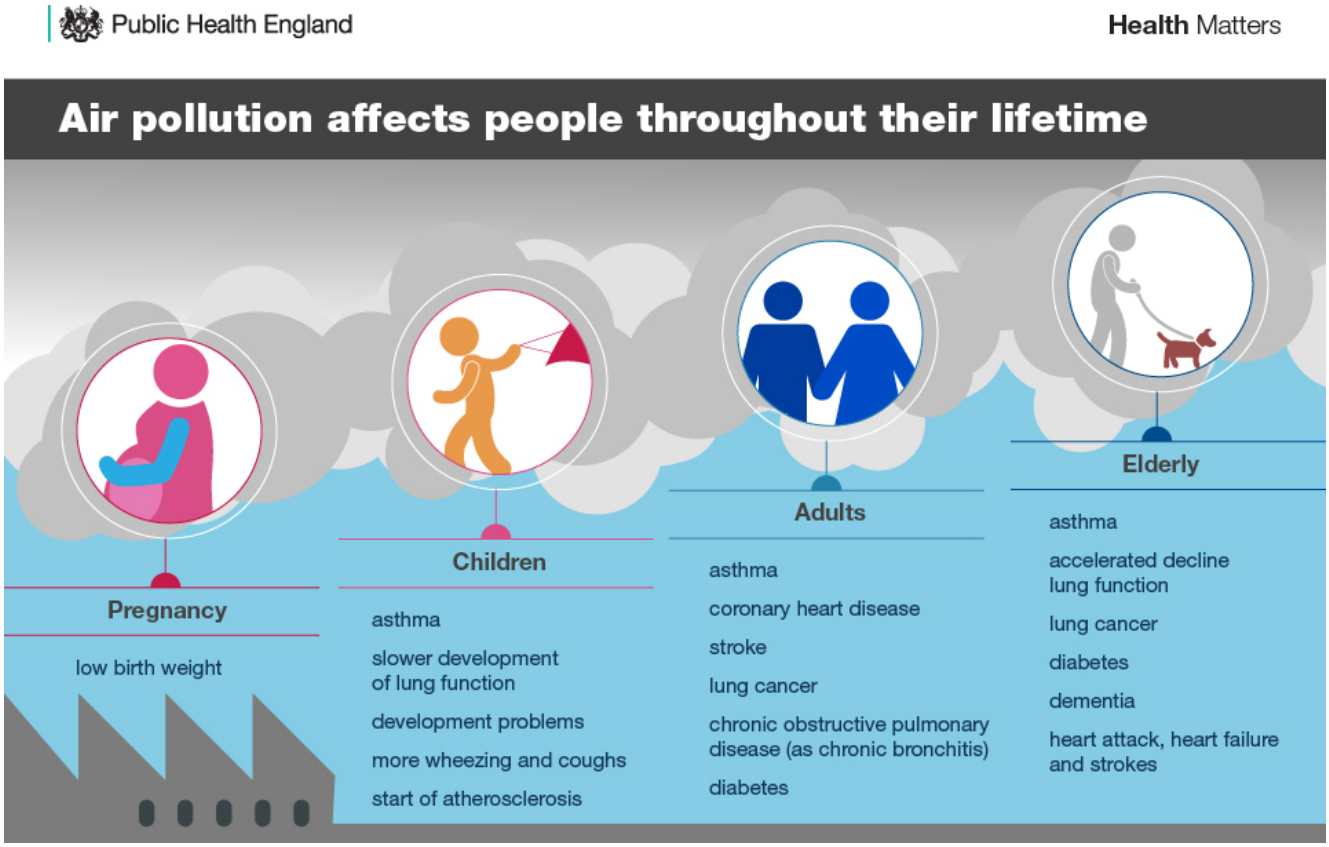
These primary NO2 emissions can lead to high concentrations of NO2 at the roadside, especially where there are many diesel vehicles.

NO2 is also formed in the atmosphere in a chemical reaction between NO and ozone (O3). Because this NO2 is not released straight into the atmosphere, but is formed there by a chemical reaction, it is known as **secondary** NO2.

Sometimes this reaction cannot take place because there is not enough O3 for the NO to react with. This is most common close to where NO is released, for example, nearby busy roads.

Why Should I Be Concerned?

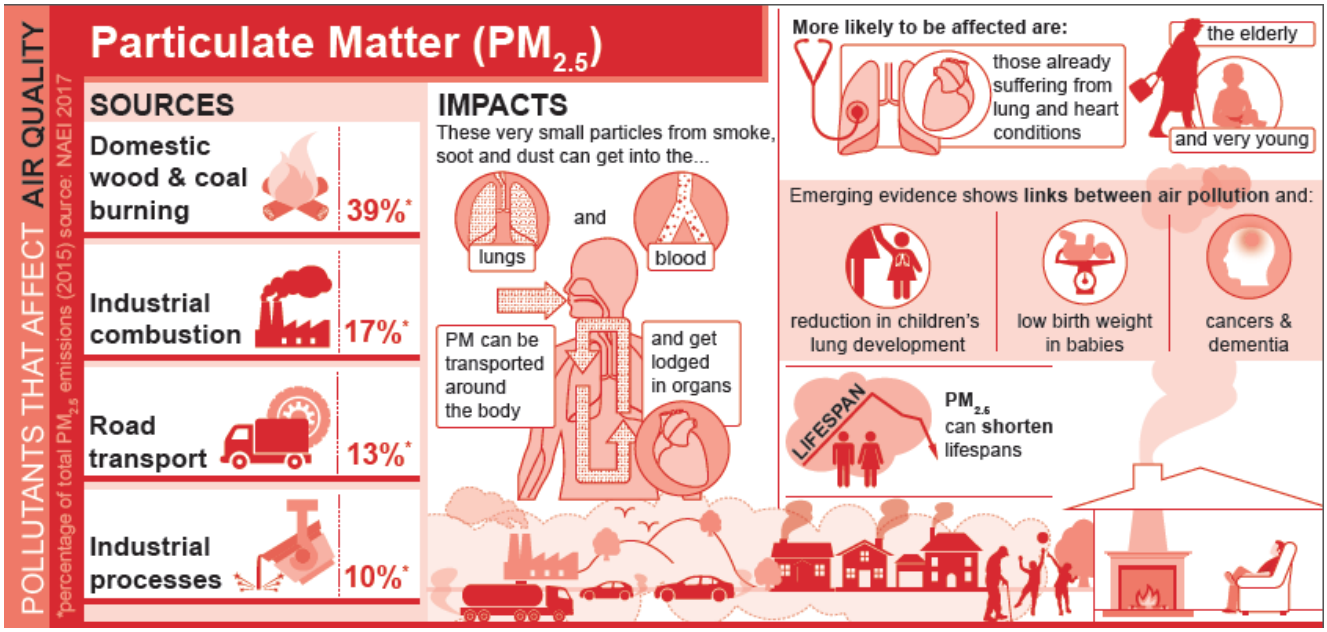
Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer.



Source – Public Health England 'Health Matters' 2018

Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

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



Source: DEFRA 2017

Fine ($PM_{2.5}$) and ultrafine ($PM_{0.1}$)[5] particulates can cause these problems because they are so small that they can be drawn into the lungs and can pass into the bloodstream. Once there it is transport around the body and can be deposited in body issues and interfere and affect the body's metabolic processes. As particulate matter is made up of a range of different chemical compounds and materials it can affect the body's processes in different ways.

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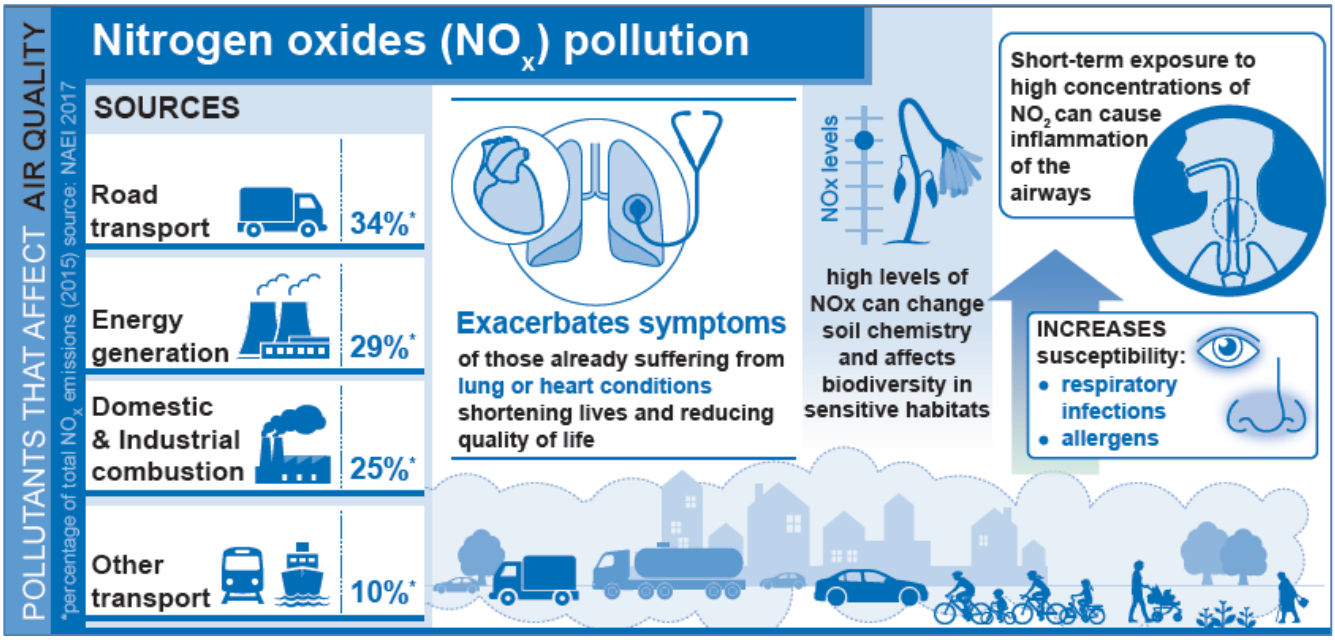
[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

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

[5] $PM_{0.1}$; particles that are less than 0.1 µm in diameter



Source: DEFRA 2017

Studies have shown associations of nitrogen dioxide (NO_2) in outdoor air with adverse effects on health, including reduced life expectancy. It has been unclear whether these effects are caused by NO_2 itself or by other pollutants emitted by the same sources (such as traffic). Evidence associating NO_2 with health effects has strengthened substantially in recent years and we now think that, on the balance of probability, NO_2 itself is responsible for some of the health impact found to be associated with it in epidemiological studies.[6]

Estimating the Impacts of Air Pollution to your Health

The UK Committee on the Medical Effects of Air Pollutants (COMEAP) examined existing papers compiled in a number of countries, including the UK, looking at the effect that long-term exposure to NO_2 may have on mortality.

However, after several years of analysis and deliberation over the available data, Committee members concluded that uncertainty in assessing the impact of NO_2 individually compared to other pollutants, such as $PM_{2.5}$, made it difficult to arrive at an individual figure wholly attributable to NO_2.

One reason for this is that both pollutants can often be emitted from a single source, for example from road transport, meaning that it can be difficult to differentiate between the individual effects of each pollutant.

[6] GOV.UK Webpage Statement on the evidence for the effects of nitrogen dioxide on health

The report[7] does include exploratory calculations based on both $PM_{2.5}$ and NO_2, using information from studies in which the overlap of effects associated with the two pollutants has been accounted for; although there was disagreement within the committee a majority view was published:

"the range of estimates of the annual mortality burden of human-made air pollution in the UK is estimated as an effect equivalent to 28,000 to 36,000 deaths."

These figures are thought to be the closest overall estimate to the mortality impact of air pollution in the UK – however as more research on the impacts of nitrogen dioxide is carried out, this could yet be further refined.

Public Health England (PHE) publishes an annual indicator in the Public Health Outcome Framework relating to air quality[8]. The indicator is a summary measure of the impact on death rates of long term exposure to man-made particulate air pollution.

PHE have also estimated the mortality burden are based on modelled annual average concentrations of fine particulate matter (PM2.5) in each local authority area originating from human activities, based on the attributable mortality in 2010.

Using this information and the COMEAP lower level of confidence figure for both particles and NO_2 (28,000 deaths) the local public heath team have calculated the following local estimates for particles and NO_2: **Table i**.

[7] Committee On The Medical Effects Of Air Pollutants: Associations of long-term average concentrations of nitrogen dioxide with mortality,

[8] Public Health Profiles, PHE Online

Table i: Estimated effects on annual mortality in 2019 of human-made $PM_{2.5}$ and NO_2 air pollution.

Area	Attributable Fraction	Attributable* deaths aged 25+	Associated Life-years Lost
EAST MIDLANDS	5.3	3,052	30,878
Nottingham City	5.7	171	2,004
Gedling Borough	**5.4**	**78**	**807**

Sources: local secondary analysis combining:

- PHE Public Health Outcomes Framework (Indicator 3.01) (last accessed May 2021)
- ONS Mortality 2019 (last accessed via NOMIS May 2021)
- COMEAP "Mortality Effects of Long-Term Exposures to Particulate Air Pollution in the United Kingdom" (2010)

* in reality, air pollution is likely to contribute a small amount to the deaths of a larger number of exposed individuals rather than being solely responsible for the number of deaths equivalent to the calculated figure of attributable deaths.

Air Quality in Gedling Borough

The main pollutants of concern in the Borough relate to the tail pipe emissions from motor vehicles. As such the main commuter routes into Nottingham, through the Borough, are the main areas of concern: the A60 Mansfield Road, A612 Colwick Loop Road and B684 Mapperley Plains/Woodborough Road. Ambient background levels are affected by emissions from domestic heating: NOx from domestic gas boilers and PM from wood/coal burners.

Nitrogen Dioxide is the primary pollutant of concern in the Borough; Gedling Borough has an Air Quality Management Area (AQMA) along the A60 Mansfield Road. Nitrogen Dioxide monitoring results for the last year (2020) show no exceedances within the AQMA, but continue to be of concern in the AQMA and along the Colwick Loop Road.

Background levels of $PM_{2.5}$ across the Borough are modelled to be under the World Health Organisation guideline level. These modelled levels do not take into account the impact of the Covid-19 lockdown(s).

Actions to Improve Air Quality

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

The 2019 Clean Air Strategy[9] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[10] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Due to the traffic related issues of our AQMA and more widely across the Borough the Council works with colleagues from the County Council Highway Department to implement actions to help:

- Ease congestion thereby maintaining a flow of traffic (reducing the stop/start)
- Promote Public Transport use.
- Promote cycling/walking as an alternative.

More generally the Public Protection Service works with colleagues in the Planning Service to ensure air quality issues are considered in the forward planning process and during consultation for new developments.

Below is a brief summary of core actions to target sources of pollution in Gedling over the past year.

[9] Defra. Clean Air Strategy, 2019

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

ECO Stars Fleet Recognition Scheme

The ECO Stars Fleet Recognition Scheme (http://ecostar.web10.indzine.net/) encourages and helps operators of HGVs, buses, coaches, vans and taxis to run fleets in the most efficient and green way.

The scheme provided recognition for best operational practices, and guidance for making improvements. The ultimate aim being to reduce fuel consumption which naturally leads to fewer vehicle emissions and has the added benefit of saving money.

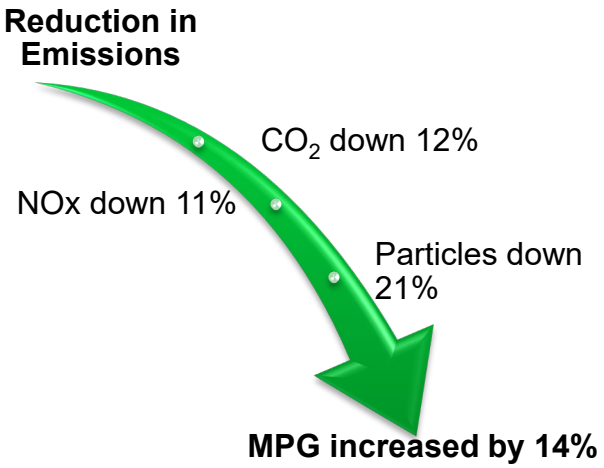
The Nottingham ECO Stars scheme began as a scheme in Gedling Borough in 2012 and then expanded the following year to cover the whole of the Nottingham conurbation.

Membership stood at 139 members operating over 8000 vehicles at project closure in 2020.

Is the scheme having any benefit?

The South Yorkshire ECO Stars group have developed a Scheme Assessment Toolkit, developed by the University of the West of England, whereby emissions output as well as fuel consumption have been modelled using data supplied by operators that have been active members of the scheme.

Gedling Borough Council's own fleet participated in an evaluation of their ECO Stars led improvement; results summarised below:



Additionally, eight ECO Stars members of the South Yorkshire Scheme have also been modelled: All of the companies showed an improvement in NOx emissions, 6 companies showed improvement in PM and CO2 emissions; for, example:

- **Company A** had a 46% reduction in PM, 8% reduction in NOx, and a 24% reduction in CO_2.
- **Company B** had a 73% reduction in PM, a 9% reduction in NOx, and a 15% reduction in CO_2.

Local Planning Document - Guidance on Air Quality Mitigation

Informal guidance on Air Quality has been prepared to set out the measures, which will be taken to help reduce vehicle emissions that occur as a result of development proposals. (Link to Guidance on Air Quality Mitigation) The guidance applies across the whole Borough in order to improve air quality and avoid other areas having to be designated as AQMAs. At the present time the guidance carries some weight as a material consideration in determining planning applications; the Council seeks agreement with developers to include many of the mitigation measures on a voluntary basis.

The Councils Local Planning Document was published and adopted in the summer of 2018. The Plan includes **Policy LPD11: Air Quality** which states:

> *Planning permission will not be granted for development proposals that have the potential to adversely impact on air quality, unless measures to mitigate or offset their emissions and impacts have been incorporated, in accordance with the Council's Air Quality and Emissions Mitigation guidance and other associated guidance documents.*

In areas where air quality is a matter of concern, development proposals will be required to deliver a positive impact on air quality.

Development proposals must not exacerbate air quality beyond acceptable levels, either through poor design or as a consequence of site selection.

This will bring the requirements of the guidance into the statutory development plan giving it more weight.

Marketing and promotion of sustainable transport alternatives

Both the County Council and Gedling Borough Council continue to develop and deliver programmes to encourage more sustainable travel. These include infrastructure improvements such as the County Council's integrated transport programme delivering improvements for pedestrians, cyclists and bus users; as well as marketing materials and campaigns developed in partnership with stakeholders such as passenger transport operators

Go-Ultra Low programme

The County Council, in partnership with Nottingham and Derby City councils, successfully secured £6.1m of funding to deliver the Go-Ultra Low programme between 2016 and 2020. The programme includes the development and delivery of an area-wide electric vehicle charging infrastructure network; and during 2017 the partnership procured a preferred delivery partner of the charging infrastructure. To date, 123 locations in the county have been investigated for the potential provision of electric vehicle (EV) charge points. This has resulted in the installation of EV charge points at 23 locations in 17 towns in Nottinghamshire (providing a total of 10 rapid and 57 fast chargers across these locations). Within Gedling borough 19 locations have been investigated but the provision of EV charge points is currently only feasible at four of those locations. This has resulted in the provision of two rapid and seven fast charge points within car parks in four towns within the borough (Arnold, Carlton, Mapperley and Netherfield). Funding for the programme ended in 2020

Retrofitting of buses

In February 2018 it was announced that the County Council (and Nottingham City Transport) had successfully secured funding from the Green Technology Fund to retrofit some of the most polluting buses in the county – including a number of buses that travel in the AQMA. Work is now underway to retrofit the identified vehicles (and is due to be completed in 2021).

Effective network management

The County Council continues to work with stakeholders to effectively manage its highway network. Along with the co-ordination of works, contingency planning, and effective event and incident planning, during 2019/20 the County Council purchased a third camera enforcement car to effectively enforce parking violations

Workplace Travel Plans

Gedling Borough Council and Nottinghamshire County Council have completed a council travel plan to help promote sustainable travel amongst staff as part of both their journeys to work and whilst undertaking Council business. Travel Plans are also developed with businesses through the development control process

Personal travel planning with residents

The DfT Access Fund funded personalised travel planning project targeted 4,976 households in Daybrook during 2019; with 1,188 households opting to take part in the project and receiving travel advice. Single occupancy car use for work trips fell by 6 percentage points amongst those that took part on the project

Environment Strategy

Development and adoption of Nottinghamshire County Council's Environment Strategy and action plan in 2020 focussing on reducing emissions from its own activities

School Travel Toolkit

Following a successful trial with four pilot schools in 2019/20, the Nottinghamshire School Travel Planning Toolkit was rolled out to all County schools during the 2020/21 academic year. The toolkit provides schools, parents/carers and children with information and advice on improving travel to and from schools, including the sustainable travel options available.

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Conclusions and Priorities

Conclusions from the following report include:

- The results of diffusion tube monitoring for 2020 (Table A3) show no exceedances inside the AQMA; all other monitoring results tend to indicate levels below the objective.
- Trends of monitoring carried out the Nitrogen Dioxide indicate a declining level of this pollutant.
- All monitoring results within existing AQMA were below the air quality objective; clearly 2020 was an exceptional year and as such there are no plans to revoke the AQMA based on this year's results. However, results in the AQMA appear to be following a declining trend and so it is hoped that this may be revisited in future years.

Gedling Borough's and Nottinghamshire County Councils priorities for the coming year continue to be

- Ongoing effective land use planning and securing of appropriate levels of developer contributions for mitigation (including travel planning) and sustainable transport improvements
- Measures to encourage the take-up of low emission vehicles, including charging infrastructure and promotion events; and through the Bus Quality Partnerships, including the purchase of new vehicles and the retrofitting of buses
- Ongoing management of on-street parking to help keep traffic moving
- Traffic control and information provision to minimise disruption and delay on County Council managed roads (including the A60) such as contingency planning, the effective co-ordination of works and the provision of real-time travel information
- Travel planning such as the development of new travel plans at businesses across the county through planning conditions
- The encouragement of smarter travel behaviour such as the marketing and promotion of passenger transport, walking and cycling, provision of cycling and walking route maps, cycle training programmes, and web-based journey planners
- Enhancements to the local cycling and walking networks
- The facilitation of smarter travel behaviour such as the provision of a car sharing scheme and integrated and concessionary passenger transport ticketing schemes
- Measures to reduce the need to travel at peak times such as the provision and encouragement of flexible working arrangements.

How to Get Involved

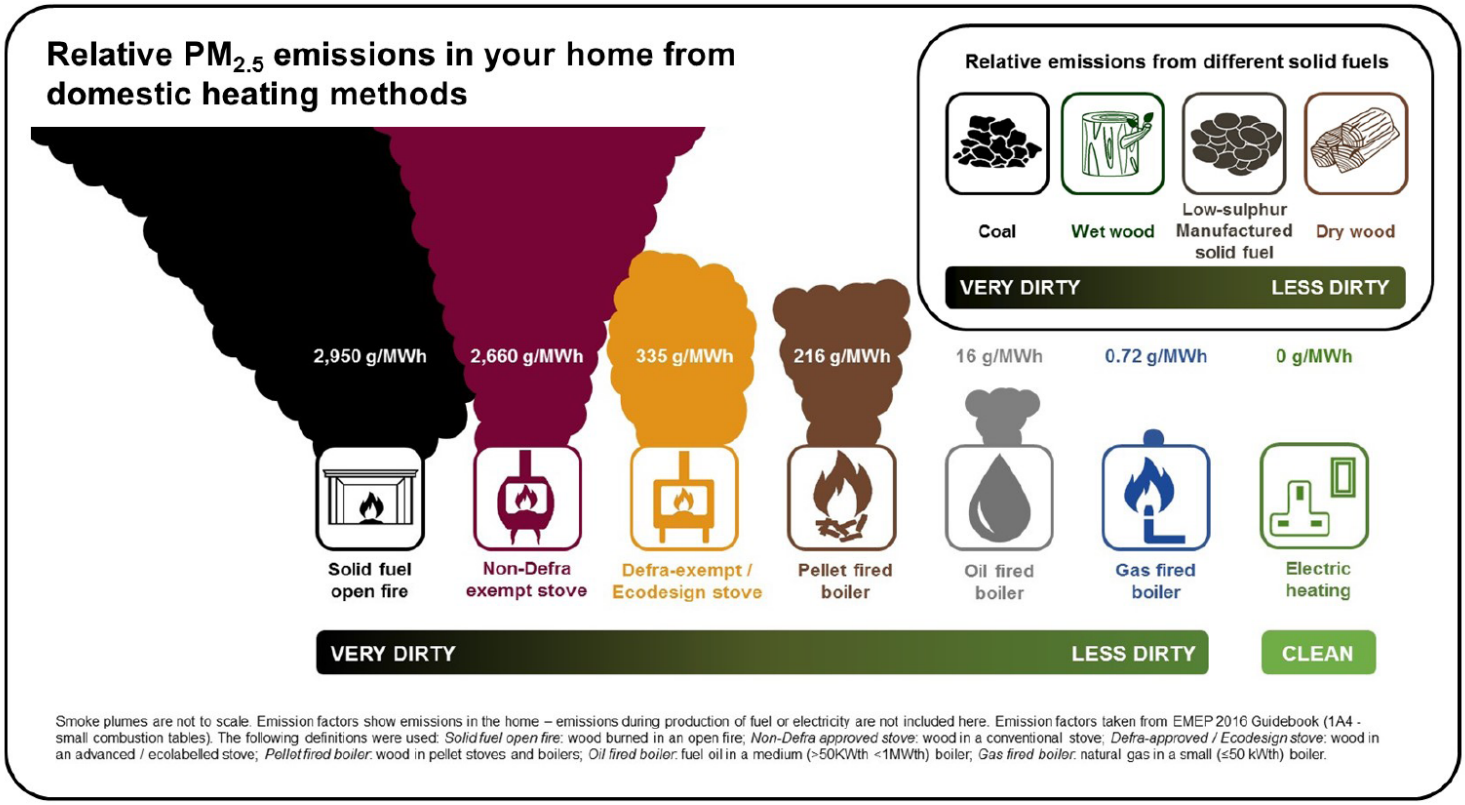
As a resident of Gedling Borough you can help to make a difference

Transport Choices

- trying alternatives to car travel or preferably taking the active option - bus, train, walking and cycling.
- when buying a new or used car consider the alternatives to diesel – electric/hybrid/petrol.

Heating your Home

- when buying a new boiler for your home consider the NOx emissions – go for a low NOx model.
- if you are thinking of installing a solid fuel burner make sure you are not in a smoke control area. If you are, make sure the appliance is certified for use in a smoke control area; buy a **SIA Ecodesign Ready** model, where available.



Defra, 2018

- keeping gas appliances and solid fuel burners in good repair and make sure any chimney/flue is cleaned regularly.

  See burnright

- If you are using wood burning appliance make sure the wood is woodsure READY TO BURN

Changing your behaviour can reduce your exposure to pollution

Pollution levels vary over very short distances: in general, the closer you are to the sources, the more you breathe in.

- If you're walking or cycling, you can easily avoid the worst pollution by travelling along quieter streets. Even walking on the side of the pavement furthest from the road can help.
- One of the worst places for pollution is inside vehicles on busy roads where levels inside the car are typically as high as just outside.
- The health benefits of physical activity (walking or cycling) outweigh the risks from air pollution. If you're in a vehicle, you just get the risks with none of the benefits.

Air pollution is a local problem. It comes from local sources, it has local health impacts, and it can be tackled by local action.

The collective effect of actions by individuals, together with action by local councils and governments, can make a significant difference to pollutant exposure.

Royal College of Physicians. Every breath we take: the lifelong impact of air pollution. Report of a working party. London: RCP, 2016

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Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Gedling Borough during 2020 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 Gedling Borough to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

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

- NO_2 annual mean

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA Gedling No.2	Declared 16/03/2011	NO2 Annual Mean	A60 Manfield Road (Oxclose Lane to Egerton Road)	NO	45µg/m^3	28.5µg/m^3	Air Quality Action Plan for Gedling Borough Council 2019	Action Plan 2019

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

☒ **Gedling Borough Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Gedling Borough

Defra's appraisal of last year's ASR concluded: *'On the basis of the evidence provided by the local authority the conclusions reached are **accepted** for all sources and pollutants, and the report is considered an example of good practice. The next step is for Gedling Borough Council to submit an Annual Status Report in 2021*.'

Gedling Borough has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 44 measures are included within Table 2.2, with the type of measure and the progress Gedling Borough have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in the Action Plan. Key completed measures are:

- Nottinghamshire Air Quality Strategy
- Marketing and promotion of sustainable transport alternatives
- Go-Ultra Low programme
- Retrofitting of buses
- Effective network management
- Workplace Travel Plans
- Personal travel planning with residents
- Environment Strategy
- School Travel Toolkit.
- ECOStars Fleet Recognition Scheme
- Successful bid under OZEV On-Street Residential Charging Scheme.

Gedling Borough working in partnership with Nottinghamshire County Council expects the following measures to be completed over the course of the next reporting year:

- Construction of improved cycle routes in Gedling – Funding has been secured to deliver further cycling improvements in the borough along the A612 corridor. Further feasibility work on the proposals is underway and it is hoped construction will start in 2020/21, subject to consultation and County Council Committee approvals
- Retrofitting of buses – This work (using existing funding sources) is expected to be completed during 2021/22
- Local Cycling & Walking Infrastructure Plan (LCWIP) – the County Council (in partnership with Derby City, Derbyshire County, and Nottingham City councils) are developing a D2N2 LCWIP. A list of future cycling and walking improvements priorities will be identified through technical analysis undertaken as part of the LCWIP development (any schemes identified will be subject to feasibility, consultation, and County Council Committee approval)

Gedling Borough's and Nottinghamshire County Councils priorities for the coming year continue to be

- Ongoing effective land use planning and securing of appropriate levels of developer contributions for mitigation (including travel planning) and sustainable transport improvements
- Measures to encourage the take-up of low emission vehicles, including charging infrastructure and promotion events; and through the Bus Quality Partnerships, including the purchase of new vehicles and the retrofitting of buses
- Ongoing management of on-street parking to help keep traffic moving
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- The facilitation of smarter travel behaviour such as the provision of a car sharing scheme and integrated and concessionary passenger transport ticketing schemes
- Measures to reduce the need to travel at peak times such as the provision and encouragement of flexible working arrangements

The principal challenges and barriers to implementation that Gedling Borough anticipates facing continue to be related to the Covid-19 pandemic. Lockdowns continued into 2021 and colleagues in Public Health continue to be focused, understandably, on Covid-19 work. Long term the social and economic impacts on the Borough, and how the Council balances the environmental and economic imperatives will be a challenge.

Progress on some measures has been slower than expected due to the impact of the Covid-19 pandemic**.** Please see Appendix F for more details.

Gedling Borough anticipates that the measures stated above and in Table 2.2 will achieve compliance in A60 Mansfield Rd AQMA.

Quantification of emissions and/or concentrations reduction can be difficult for most of the action plan measures. There are often various confounding factors that make it difficult to directly attribute concentration changes, as a result of intervention measure implementation. Quantification of the emissions reduction will often be easier to calculate than an estimate of the concentration reduction; which would otherwise require the application of detailed dispersion models to make suitable predictions.

Where direct quantification of emissions reduction cannot be achieved, LAs are asked to apply best judgement in a qualitative manner; such as a matrix based approach whereby each measure is assigned an indicative reduction of NO_2 with associated timescales.

Air Quality Impacts		Timescale	
Score	**Indicative Reduction in NO_2 Concentration**		**Years**
7	>5 μg/m^3	Short (S)	<2
6	2 - 5 μg/m^3	↓	↓
5	1 - 2 μg/m^3		
4	0.5 - 1 μg/m^3	Medium (M)	2.5
3	0.2 - 0.5 μg/m^3	↓	↓
2	0 - 0.2 μg/m^3		
1	0 μg/m^3	Long (L)	>5

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Traffic control and management - Consideration and installation of SCOOT/MOVA and other traffic signal efficiency improvements	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2010	2024	NCC/Via EM	integrated transport block funding	NO	Funded		Completed	5(L)	Restrain average journey times in the morning peak to a 1% increase per year	All signals within AQMA equipped with SCOOT and MOVA but require periodic review. Signal improvements at A60/Sir John Robinson Way delivered during 2019/20	
2	Traffic control and management - traffic control centre that monitors traffic movement and provides real time traffic control over many traffic signal installations	Traffic Management	UTC, Congestion management, traffic reduction	2019	2024	Nottinghamshire County Council (NCC)/Via EM Ltd/Nottingham City Council (NCiC)	NCC and NCiC revenue funding	NO	Funded	£100k - £500k	Implementation	4(S)	Restrain average journey times in the morning peak to a 1% increase per year	Traffic control centre monitors traffic movement on the local highway network (not the trunk road/motorways) and provides real time traffic control over many traffic signal installations, including on A60 Daybrook	The UTCC is a shared facility between Nottinghamshire County Council and the City Council. Estimated cost shown is the County Council's annual contribution.
3	Traffic control and management - co-ordination of street works to minimise traffic disruption and unnecessary congestion	Traffic Management	UTC, Congestion management, traffic reduction	2019	2024	NCC/Via EM/NCiC	NCC and NCiC revenue funding	NO	Funded	£100k - £500k	Implementation	3(S)	Restrain average journey times in the morning peak to a 1% increase per year	Regular coordination meetings held between all works promoters and regional partners in additional to regular meetings between HE and regional partners to create a framework programme of planned works affecting strategic and local routes. The County Council introduced a streetworks permit scheme on 1 April 2020 to help plan/coordinate roadworks on its managed highway network. Detailed journey time monitoring undertaken annually since 2005/06	
4	Traffic control and management - management of incidents to minimise traffic disruption and unnecessary congestion	Traffic Management	UTC, Congestion management, traffic reduction	2019	2024	NCC/Via EM/NCiC/Highways England (HE)	NCC, NCiC, HE revenue funding	NO	Funded	£100k - £500k	Implementation	2(S)	Restrain average journey times in the morning peak to a 1% increase per year	Traffic control centre that monitors traffic movement on the local highway network (not the trunk road/motorways) and provides real time traffic control over many traffic signal installations. See also item 5 below	Lack of future revenue funding

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5	Traffic control and management - Effective contingency planning to minimise traffic disruption and unnecessary congestion	Traffic Management	UTC, Congestion management, traffic reduction	2019	2024	NCC/Via EM Ltd	NCC revenue funding	NO	Funded	£100k - £500k	Completed	2(S)	Restrain average journey times in the morning peak to a 1% increase per year	The local operating agreement between NCC and HE has been comprehensively reviewed to identify the relevant parts of the network which have interaction on each authority and to put in place appropriate communication channels for management of incidents and dissemination of information Key locations on the local network have been identified and associated diversion routes investigated in line with the developing network hierarchy Incidents dealt with through agreed procedures and regular partnership meetings held. Working in close collaboration with the City and HE, tactical diversion routes have been developed for the emergency diversion of traffic from any part of the strategic road network, to reduce the delay in rerouting traffic to ease congestion at the time of incidents Detailed journey time monitoring undertaken annually since 2005/06.	Information conveyed by all forms of media (press, radio, website, social media etc.). Implementation ongoing
6	Parking management and control - Bus stop clearways	Traffic Management	UTC, Congestion management, traffic reduction	2019	2024	NCC/Via EM Ltd	NCC capital funding	NO	Funded		Completed	3(S)		Bus stop clearways introduced at bus stops within the AQMA where parked vehicles were identified as impeding traffic flows	Additional bus stop clearways will be considered in the future should vehicles parking in bus stops be identified as impeding traffic flows at additional locations
7	Parking management and control - Ensure that car parking in and around the AQMA is managed and reviewed	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2010	2024	NCC	NCC revenue funding	NO	Funded		Completed	2(S)	Manage parking to improve journey time reliability	Parking restrictions already in place along the A60. No additional side-road/off-line locations currently identified as requiring restrictions to aid traffic flow.	Improvements will only be considered should vehicles parking be identified as impeding traffic flows.No additional side-road/off-line locations currently identified as requiring restrictions to aid traffic flow.
8	Improving links with local transport strategy	Transport Planning and Infrastructure	Other	2019	2024	NCC/GBC	N/A	NO			Implementation	N/A(S)	N/A		Ensuring existing strategies complement and enable actions to improve air quality
9	Analyse journeys through AQMA	Other	Other			NCC/GBC	NONE	NO	Not Funded		Aborted	N/A(M)	survey	None	Project would require acquiring origin/destination journey data over a massive geographic area and therefore would be very expensive to deliver. GBC therefore need to determine and secure funding before such surveys could be undertaken

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10	Consider walking infrastructure and facility enhancements	Transport Planning and Infrastructure	Other policy	2010	2024	NCC/GBC	s38 and S106	NO			Implementation	3(S)	Increased walking trips	In 2020/21 integrated transport improvements to encourage more people to walk more often included a new pedestrian crossing on A6211 Thackeray's Lane, Woodthorpe and dropped kerb schemes on Thackeray's Lane, Front Street and Howbeck Road in Arnold.	Walking infrastructure improvements delivered as part of annual integrated transport programme. GBC secure s38, s106 and capital funding for improvements as part of new development. Funding status to be determine based on any improvements identified.
11	Consider cycling infrastructure and facility enhancements	Transport Planning and Infrastructure	Other policy	2010	2024	NCC/GBC	Various funding sources	NO	Partially Funded	> £10 million	Implementation	3(S)	Increased cycling trips	NCC secured LGF and NCC funding to deliver cycle network improvements in the Arnold area during 2018/19 and 2019/20 (2.7km of new off-road facilities and 14.5km of signed routes). Funding has also been secured to deliver further improvements along the A612 corridor (subject to consultation and member approval - construction programmes TBD)	Cycling infrastructure improvements delivered as part of annual integrated transport programme. GBC secure s38 and s106 funding for improvements as part of new development. The emerging D2N2 LCWIP will be used to help identify and prioritise future improvements should DfT funding be made available for their delivery
12	Improve links with local planning and Local Development Framework - Ensure sustainable development on vacant sites within and in the vicinity of the AQMA	Policy Guidance and Development Control	Other policy	2019	2024	GBC	N/A	NO			Implementation	3(S)	No. of AQ impact assessments related to AQMA	none in reporting year	
13	Improve links with local planning and Local Development Framework - Co-ordination of land-use planning and transport infrastructure	Policy Guidance and Development Control	Other policy	2019	2024	GBC/NCC	N/A	NO			Implementation	4(S)	N/A		
14	Improve links with local planning and Local Development Framework - Secure appropriate levels of developer contributions (Section 106 and/or CIL) for use on air quality improvement projects	Policy Guidance and Development Control	Other policy	2019	2024	GBC/NCC	N/A	NO			Implementation	4(S)	Sums collected for air quality projects	None in reporting year	

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15	Improve links with local planning and Local Development Framework - Use of planning conditions for mitigation; inc. travel plans etc. enforcement to ensure compliance	Policy Guidance and Development Control	Other policy	2019	2024	GBC	N/A	NO			Implementation	4(M)	N/A	AQ mitigation Conditions requested on 80 planning applications throughout the Borough	
16	Encourage the uptake of alternative fuels - wider network of charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2019	2024	GBC	GoUltra Low/ORCS	NO	Partially Funded	£1 million - £10 million	Planning	4(M)	N/A	Provision of EV charge points as part of Go Ultra Low project - 4 in Gedling; providing two rapid and seven fast charge points within car parks in four towns within the borough. Funding for the programme ended in 2020. **£130k funding secured (ORCS) for 2019-2020.**	ORCS funding secured installation in first half of 2021
17	Communication and education - awareness raising of local air quality issues - Tackling the school run – communication with school children and parents	Public Information	Via other mechanisms	2019	2024	GBC/NCC Public Health	GBC/NCC	NO			Planning	3(M)		Following the trial with four pilot schools in 2019/20, the Nottinghamshire School Travel Planning Toolkit was rolled out to all County schools during the 2020/21 academic year. This provides information and advice to school leaders, teachers, parents/carers and children, on ways in which travel to and from schools can be improved and sustainable modes of travel encouraged.	GBC and Public Health looking to KS2 education performance programme put on hold during Covid 19
18	Communication and education - awareness raising of local air quality issues - the link with poor health	Public Information	Via other mechanisms	2019	2024	GBC/NCC Public Health	N/A	NO			Implementation	1(M)	Publication of relevant promotional material		Air Quality Strategy for Nottingham and Nottinghamshire published linked to wider work carried out at County Level
19	Travel plans - Work with local businesses/ organisations to encourage the development and implementation of travel plans	Promoting Travel Alternatives	Workplace Travel Planning	2010	2024	GBC planning/NCC	Developer contributions	NO			Implementation	3(S)	Restrain average journey times in the morning peak to a 1% increase per year	Developed with businesses as part of planning conditions. Targeted travel planning (funded by the County Council) was held at workplaces within the AQMA during 2014/15	Funding status costs dependent on the businesses receiving travel planning support and GBC securing developer contirbutions.
20	Promoting travel choices - Undertake personalised travel planning in Commuter Areas	Promoting Travel Alternatives	Personalised Travel Planning	2010	2019	NCC	DfT Access Fund	NO	Funded	£50k - £100k	Completed	3(M)	Restrain average journey times in the morning peak to a 1% increase per year	The 2019 DfT Access Fund funded PTP project targeted 4,976 households in Daybrook; with 1,188 households opting to take part in the project and receiving travel advice.	Funding relates only to travel planning already complete and not what may be undertaken in the future

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21	Promotion of EV Charging Network	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2018	2020	NCC/NCiC	OZEV / GoUltra Low	NO	Partially Funded	£1 million - £10 million	Completed	4(M)		Go Ultra Low promotion of charging infrastructure and vehicle events. OZEV funding secured to promote take-up of ULEVs. Funding ended March 2020	Costs only relate to what has been deliver to date, not what will be required in the future
22	Promoting travel choices - Consideration of extending existing city-based car club into the county	Alternatives to private vehicle use	Car Clubs			NCC		NO	Not Funded			2(L)	Restrain average journey times in the morning peak to a 1% increase per year		Nottm City scheme introduced in 2014. Expansion of scheme into county dependent on demonstration of its success
23	Promoting travel choices - The promotion and facilitation of car sharing schemes.	Alternatives to private vehicle use	Car & lift sharing schemes	2010	2024	NCC	NCC	NO	Funded	< £10k	Implementation	2(S)	Restrain average journey times in the morning peak to a 1% increase per year	4592 members currently registered.	It is estimated that during the 2019 calendar year the Nottinghamshire car share scheme delivered reductions of 1.3m miles travelled, 298t of CO_2 emissions, and 1.35t of NOx emissions. Costs are for current financial year only.
24	Promoting travel choices - Residential Travel Packs, to be issued to all new built homes	Promoting Travel Alternatives	Other	2019	2024	GBC/NCC	N/A	NO			Implementation	2(M)	N/A		Planning conditions to ensure travel plans are required where appropriate
25	Public transport - Development of ITSO smartcard ticketing	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2010	2024	NCC/NCiC/PT operators	PT operators	NO			Implementation	2(S)	Increased passenger transport patronage	Implementation ongoing	Integrated ticketing strategy developed in 2014/15. New smartcard platform introduced in 2014. Robin Hood card scheme introduced in 2015. The emerging Enhanced Partnership required by the National Bus Strategy is seeking to deliver further improvements to integrated ticketing and these should be clarified by March 2022. The major bus operators have now all introduced contactless payments for their own ticketing products alongside the Robinhood card and this was completed in around March 2020
26	Public transport - Deliver the free countywide off-peak concessionary fare scheme for the over 60s and disabled.	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2019	2024	NCC/NCiC/PT operators	NCC	NO	Funded	> £10 million	Implementation	2(S)	Increase passenger transport patronage	Implementation ongoing	Estimated annual cost of measure is shown
27	Public transport - publicise web based journey planners	Public Information	Other	2019	2024	NCC	NCC	NO			Implementation	2(S)	Increased walking/cycling/ passenger transport trips	Implementation ongoing	Available at http://www.nottinghamshire.gov.uk/transport/public-transport/plan-journey

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28	Public transport - Consider bus provision on the A60 and surrounding area.	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2019	2024	NCC/PT operators		NO			Completed	2(S)	Increased bus patronage		Bus service provision is provided on a commercial basis with support from NCC where justified; and reviewed periodically
29	Public transport - Consider capacity increases on the GO2 services along the A60 corridor	Transport Planning and Infrastructure	Other	2019	2024	NCC		NO				2(S)	N/A		Capacity increases will be considered by operators should passenger information demonstrate that there is insufficient capacity on existing services
30	To encourage adoption of cycling and walking as alternatives to using private vehicles - Develop and undertake annual cycling promotional marketing	Promoting Travel Alternatives	Promotion of cycling	2019	2024	NCC	NCC	NO	Funded	£50k - £100k	Implementation	2(S)	Increased cycling trips	General promotion (e.g. website and literature) implementation ongoing. In addition to the above, PTP was offered to 4,976 households in Daybrook during 2019 following completion of cycle route improvements NCC's Travel Choice webpages provide information and advice to residents, jobseekers and businesses, on the different sustainable options for travelling around the county	Travel Choice website: https://travelchoice.nottinghamshire.gov.uk/
31	To encourage adoption cycling and walking as alternatives to using private vehicles - Deliver adult and child cycle training	Promoting Travel Alternatives	Promotion of cycling	2019	2024	NCC	DfT Funding	NO	Funded	£10k - 50k	Implementation	1(S)	Increased cycling trips	9,383 people received cycle training during 2019/20.	Annual costs
32	To encourage adoption cycling and walking as alternatives to using private vehicles - Develop and undertake annual walking promotional marketing	Promoting Travel Alternatives	Promotion of walking	2019	2024	NCC	NCC	NO	Funded		Implementation	1(S)	Increased cycling trips	Greater Nottingham cycling maps produced; to be reviewed as network enhanced	Funded within existing resources
33	Promotion of low emission vehicles through taxi licensing.	Promoting Low Emission Transport	Taxi emission incentives	2019	2024	GBC	DEFRA AQ Grant	YES	Funded	£10k - 50k	Completed	3(M)	Review of Taxi Licence criteria		ECOStars project closed with mixed results. Review of criteria ongoing due to covid impacts
34	Target reductions in emissions from buses - ECOStars Fleet Recognition Scheme.	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2019	2020	GBC	DEFRA AQ Grant	YES	Funded	£50k - £100k	Completed	4(S)	Scheme membership	7 bus/coach operators members. Operating ~740 vehicles	Project Closed

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35	Target reductions in emissions from buses - Ongoing delivery of Quality Bus Partnerships	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2019	2024	NCC/NCiC/PT operators; NCT (operator)	OZEV Funding	NO	Funded	£1 million - £10 million	Implementation	5(M)	Ongoing take-up of cleaner vehicles	Ongoing	SQBP in place affecting all buses travelling through AQMA. Operator NCT secured £4.4m OZEV funding and invested a further £12.4m to upgrade its facilities to enable running of a gas fleet, including two services which travel through the AQMA.
36	Encouragement of low-emission public transport fleets (new vehicles and retro-fitting)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2019	2022	NCC/PT operators	OZEV Funding	NO	Funded	£1 million - £10 million	Implementation	4(S)	On-going take-up of cleaner vehicles	NCT CBTF investment complete. Trentbarton the Calverton and 141 services will be retrofitted during 2021	Operator NCT secured £4.4m OZEV funding and invested a further £12.4m to upgrade its facilities to enable running of a gas fleet, including two services which travel through the AQMA. NCC secured £1.3m; from the Green Bus Technology Fund in Feb 2018 to retrofit older buses, including services 'Threes', 56, 57 and 59 which operate in the AQMA
37	Target reductions in emissions from buses - Encouraging the use of emissions standards when procuring school bus contracts and supported bus services.	Promoting Low Emission Transport	Other	2019	2024	NCC/PT operators		NO				4(S)	On-going take-up of cleaner vehicles		
38	Target reductions in emissions from heavy and light goods vehicles - ECOStars Fleet Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2019	2020	GBC	DEFRA AQ Grant	YES	Funded	£50k - £100k	Completed	4(S)	Scheme membership	132 HGV/LGV Members operating ~7600 vehicles	Project Closed
39	Target reductions in emissions from the council fleet and contract vehicles - Gedling Borough membership of ECOStars scheme.	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2019	2020	GBC	DEFRA AQ Grant	YES	Funded	£10k - 50k	Completed	3(S)	N/A		Project Closed
40	Target reductions in emissions from the council fleet and contract vehicles - Ensuring new vehicles procured are cleanest possible.	Vehicle Fleet Efficiency	Other	2019	2024	GBC		NO			Implementation	3(S)	N/A		GBC works in partnership with other LAs via the Transport Managers Group to procure fleet vehicles. The group continues to look at ways to adopt a joint approach to fleet reviews and options for alternative fuels.

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41	Target reductions in emissions from the council fleet and contract vehicles - GBC Green Procurement	Vehicle Fleet Efficiency	Other	2019	2024	GBC		NO			Implementation	2(M)	N/A		The Council continues to work towards delivering on pledges for Carbon Neutrality. Procurement will most likely be one strand.
42	Review of public transport infrastructure along A60 corridor, including the creation of a park and ride scheme at Leapool.	Alternatives to private vehicle use	Bus based Park & Ride, Re-prioritising road space away from cars, Bus priority, high vehicle occupancy lane	2016	2026	NCC/NCiC/GBC	Transforming Cities Fund	NO	Funded	£1 million - £10 million	Planning	4(L)	N/A	£6.0m has been secured to deliver a package of bus priority measures in Arnold and Bestwood (£2.33m) which will improve connectivity between and into the two district centres and the new Park & Ride site (£2.4m). The bus priority measures will also improve the reliability and punctuality of existing bus services	The delivery timetable for these measures is dependent on the Park & Ride construction; and any proposals are still subject to feasibility, business case, planning, consultation, funding availability and political and public acceptability. It is currently anticipated construction will start in 2022 with an anticipated completion date of 2023.
43	New Trent crossing	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	N/A	TBD	NCC/NCiC/GBC	Transforming Cities Fund	NO	Not Funded	> £10 million		2(L)	N/A	Funding for a new cycle/pedestrian bridge between West Bridgford and the City as part of the Nottingham Transforming Cities Fund Bid. Feasibility work is underway. Construction schedules TBD and is still subject to feasibility, business case, planning, consultation, funding availability and political and public acceptability.	A new road bridge was not prioirtised for inclusion in a higwhay programnme following feasibility studies undertaken in 2016. Such a scheme may be reviewed alongside future Local Plan growth strategies (post 2032) but will be subject to political and public approval, feasibility, business case for any proposals, identifying appropriate site, prior to consultation and securing funding. The proposed foot/cycle bridge scheme is still subject to feasibility, business case, planning, consultation, funding availability and political and public acceptability.

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Gedling Borough is taking the following measures to address $PM_{2.5}$:

- Construction Emission Management Plans are routinely requested during the planning application stage of any development. To help control dust and other emissions during development.
- Education and enforcement of Clean Air Act and Smoke Control Areas.

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

This section sets out the monitoring undertaken within 2020 by Gedling Borough and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Gedling Borough undertook automatic (continuous) monitoring at one site during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The Nottingham Air Quality page presents automatic monitoring results for Gedling Borough, with automatic monitoring results also available through the UK-Air website .

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

3.1.2 Non-Automatic Monitoring Sites

Gedling Borough undertook non- automatic (i.e. passive) monitoring of NO_2 at 31 sites during 2020. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 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, only where relevant.

Results of automatic monitoring

Table A.1 indicates the results for automatic monitoring for 2020 show no exceedances of the air quality objective for NO_2. The graph below shows a decrease in NO_2 levels over a ten-year period (2011-2020).

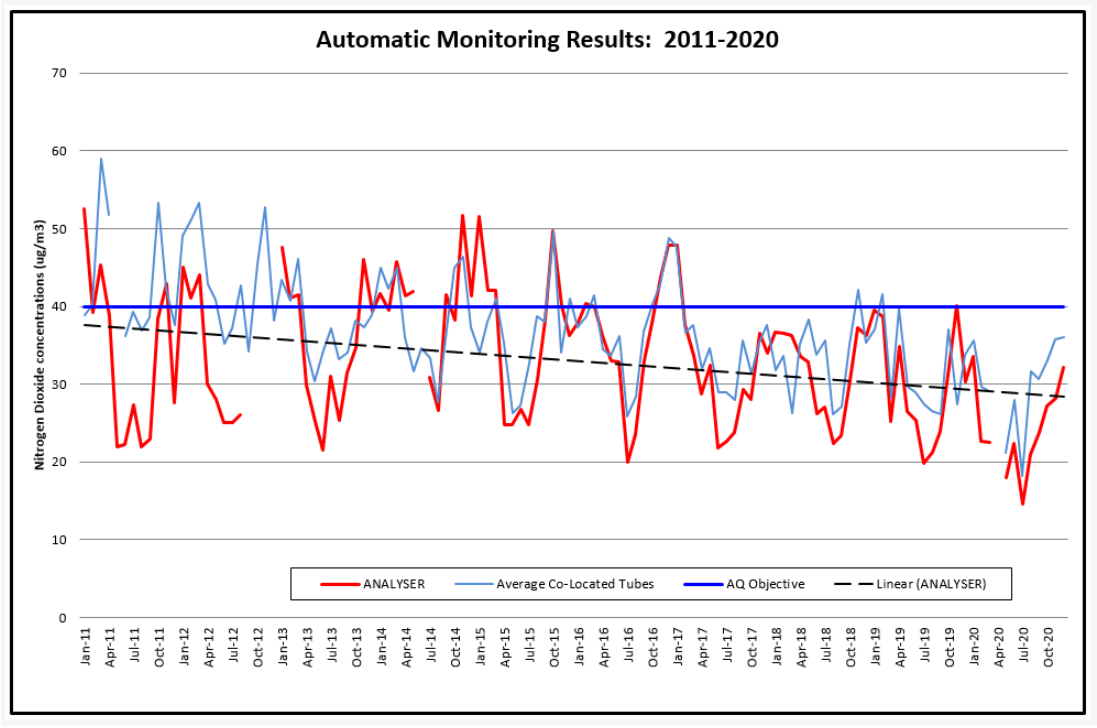


Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There were no exceedances of this objective in 2020.

Results of non-automatic (passive) monitoring

The results of diffusion tube monitoring for 2020 (Table A3) show no exceedances inside the AQMA; all other monitoring results tend to indicate levels below the objective.

Appendix A includes a series of graphs plotting diffusion tube results over a 5 year period (2016 – 2020). These graphs all indicate a **declining** trend in NO_2 levels over this period. Full diffusion tube monitoring dataset, including details of bias and location adjustments are available in Appendix B and C.

For discussion relating to the impact of the Covid-19 lockdown(s) on air quality in Gedling Borough please refer to Appendix F.

3.2.2 Particulate Matter (PM_{10})

Gedling Borough does not monitor for Particulate Matter (PM_{10}).

3.2.3 Particulate Matter ($PM_{2.5}$)

Gedling Borough does not monitor for Particulate Matter ($PM_{2.5}$).

3.2.4 Sulphur Dioxide (SO_2)

Gedling Borough does not monitor for Sulphur Dioxide

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
GBC1	Daybrook Square	Roadside	457944	344596	NO2	Y	Chemiluminescent	75	5	2

Notes:

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
82492	Grove PH Daybrook Sq	Roadside	457947	344651	NO2	YES	0.0	3.5	No	3.0
82494	Hastings Street	Urban Background	460391	341413	NO2	NO	n/a	n/a	No	3.0
82495	Marion Murdock Court	Urban Background	461294	342826	NO2	NO	n/a	n/a	No	3.0
82937	47 Plains Road, Mapperley	Roadside	459209	343513	NO2	NO	0.0	7.0	No	3.0
87398	Morley Mills Building	Roadside	457969	344780	NO2	YES	0.0	3.0	No	3.0
87399	Mansfield Road, Redhill	Roadside	457866	345578	NO2	YES	25.0	10.0	No	3.0
87400	Daybrook Dental Surgery	Roadside	457867	345388	NO2	YES	30.0	2.3	No	3.0
87401	19 Victoria Road	Roadside	461995	341175	NO2	NO	0.5	4.0	No	3.0
87402	36 Victoria Road	Roadside	462002	341097	NO2	NO	4.0	1.6	No	3.0
87403, 87404, 87405	Daybrook Analyser	Roadside	457944	344597	NO2	YES	75.0	5.0	Yes	2.0
87406	Burton Rd/Shearing Hill	Roadside	462422	341972	NO2	NO	1.0	16.0	No	3.0
87407	The Vale PH Thackerays Lane	Roadside	457918	344358	NO2	YES	15.0	3.4	No	3.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
87408	Rickets Lane	Rural	456621	355935	NO2	NO	n/a	n/a	No	3.0
88005	Mansfield Road, Redhill North	Roadside	458325	346630	NO2	NO	4.9	2.5	No	3.0
87410	Civic Centre, Arnold	Urban Background	458259	344723	NO2	NO	n/a	n/a	No	3.0
87411	Colwick Park Close	Roadside	461103	340086	NO2	NO	1.0	10.0	No	3.0
87412	Daybrook Fish Bar	Roadside	457947	344713	NO2	YES	0.0	3.0	No	3.0
87413	T&S Heating	Roadside	457950	344748	NO2	YES	0.0	3.0	No	3.0
87414	Frank Keys	Roadside	457969	344827	NO2	YES	25.0	3.0	No	3.0
87415	856 Plains Road, Mapperley	Roadside	458898	343139	NO2	NO	0.0	8.0	No	3.0
87460	Rectory Rd/Vale Rd	Roadside	461161	340122	NO2	NO	19.0	6.5	No	3.0
87461	Mile End Road	Roadside	461196	340108	NO2	NO	0.5	3.0	No	3.0
87821	189 Plains Road	Roadside	459611	343935	NO2	NO	4.9	1.7	No	3.0
87822	Memorial Hall, Gedling	Roadside	461879	342480	NO2	NO	9.5	3.3	No	3.0
87824	Arnold Lane/High Hazels	Roadside	461197	343196	NO2	NO	2.3	1.8	No	3.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
87823	Howieson Court	Roadside	459974	344159	NO2	NO	4.5	1.9	No	3.0
87999	New Works Cottages	Roadside	463150	341842	NO2	NO	14.0	2.0	No	3.0
88000	Colwick Loop Rd /Nether Pasture	Roadside	462615	340837	NO2	NO	3.8	2.4	No	3.0
88001	Nottingham Road, Burton Joyce	Roadside	463226	342668	NO2	NO	13.0	21.5	No	3.0

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
GBC1	457944	344596	Roadside	97.2	97.2	35.5	31.4	31.6	29.8	24.2

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

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

Notes:

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

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2020 (%) [2]	2016	2017	2018	2019	2020
82492	457947	344651	Roadside	100	99.7	35.0	34.0	29.0	30.0	24.1
82494	460391	341413	Urban Background	83	81.9	22.0	22.0	19.0	20.0	16.6
82495	461294	342826	Urban Background	100	99.7	18.0	16.0	16.0	16.0	11.8
82937	459209	343513	Roadside	100	99.7	29.0	28.0	25.0	24.0	19.0
87398	457969	344780	Roadside	100	99.7	34.0	31.0	30.0	31.0	22.9
87399	457866	345578	Roadside	100	99.7	26.0	23.0	23.0	24.0	17.9
87400	457867	345388	Roadside	100	99.7	33.0	31.0	30.0	28.0	22.9
87401	461995	341175	Roadside	100	99.7	29.0	26.0	23.0	24.0	21.1
87402	462002	341097	Roadside	100	99.7	30.0	31.0	28.0	28.0	22.7
87403, 87404, 87405	457944	344597	Roadside	100	99.7	34.0	31.0	31.0	31.0	23.6
87406	462422	341972	Roadside	84	84.1	26.0	24.0	23.0	24.0	18.2
87407	457918	344358	Roadside	100	99.7	29.0	35.0	33.0	28.0	25.1
87408	456621	355935	Rural	100	99.7	14.0	15.0	15.0	13.0	10.7
88005	458325	346630	Roadside	100	99.7				34.0	28.9
87410	458259	344723	Urban Background	100	99.7	18.0	18.0	16.0	16.0	12.0
87411	461103	340086	Roadside	100	99.7	25.0	23.0	23.0	21.0	15.8
87412	457947	344713	Roadside	92	92.0	**44.0**	**43.0**	39.0	39.0	28.5
87413	457950	344748	Roadside	92	92.0	**42.0**	**41.0**	37.0	36.0	27.0
87414	457969	344827	Roadside	100	99.7	37.0	33.0	31.0	30.0	24.3
87415	458898	343139	Roadside	100	99.7	28.0	26.0	23.0	24.0	17.8

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
87460	461161	340122	Roadside	100	99.7	28.0	27.0	25.0	24.0	18.6
87461	461196	340108	Roadside	92	88.5	38.0	33.0	31.0	31.0	24.7
87821	459611	343935	Roadside	100	99.7			25.0	21.0	17.1
87822	461879	342480	Roadside	100	99.7			36.0	34.0	28.9
87824	461197	343196	Roadside	83	84.3			20.0	22.0	15.8
87823	459974	344159	Roadside	100	99.7			32.0	31.0	24.7
87999	463150	341842	Roadside	100	99.7				22.0	19.6
88000	462615	340837	Roadside	100	99.7				29.0	22.9
88001	463226	342668	Roadside	100	99.7				20.0	15.4

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

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

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

Notes:

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

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

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

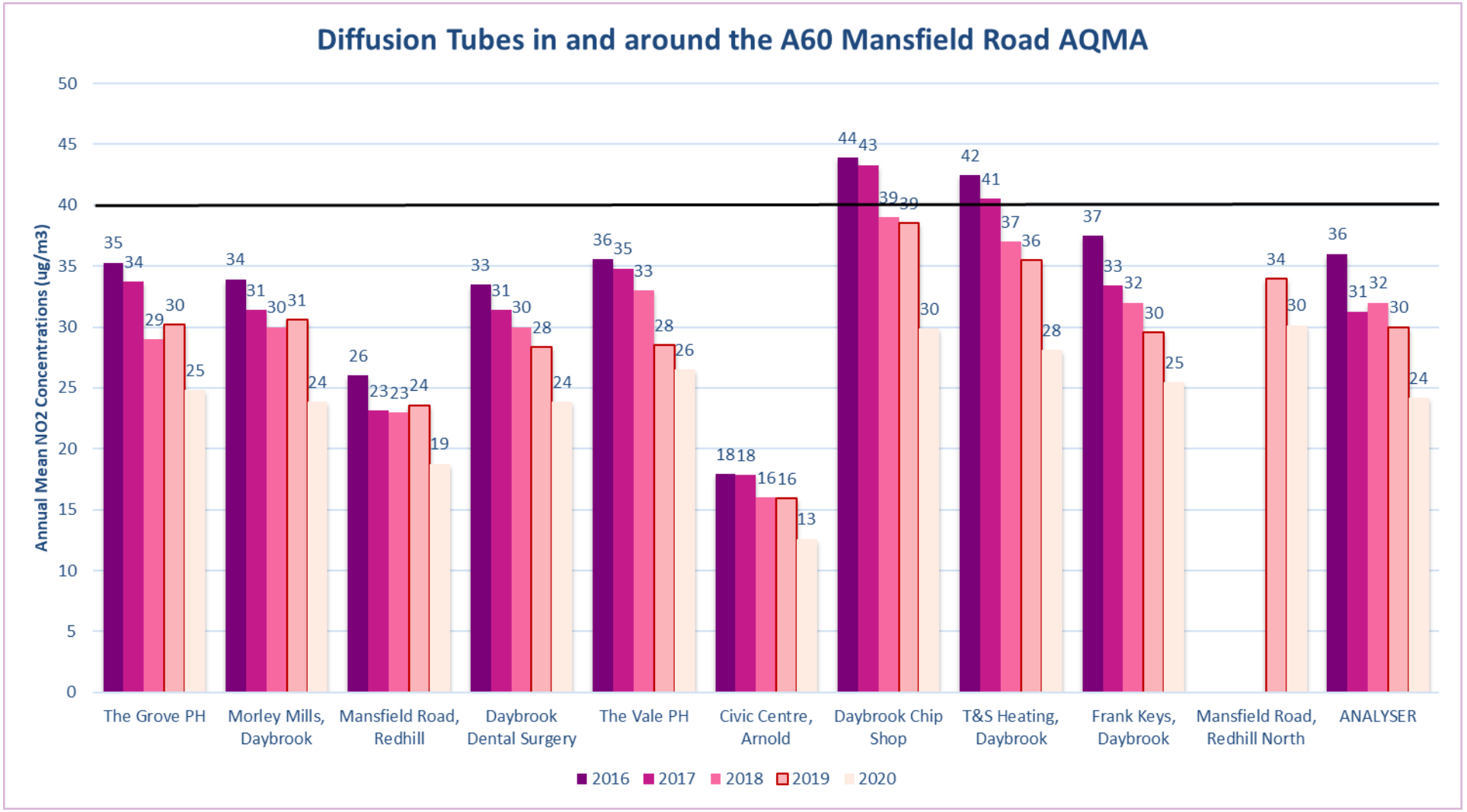
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

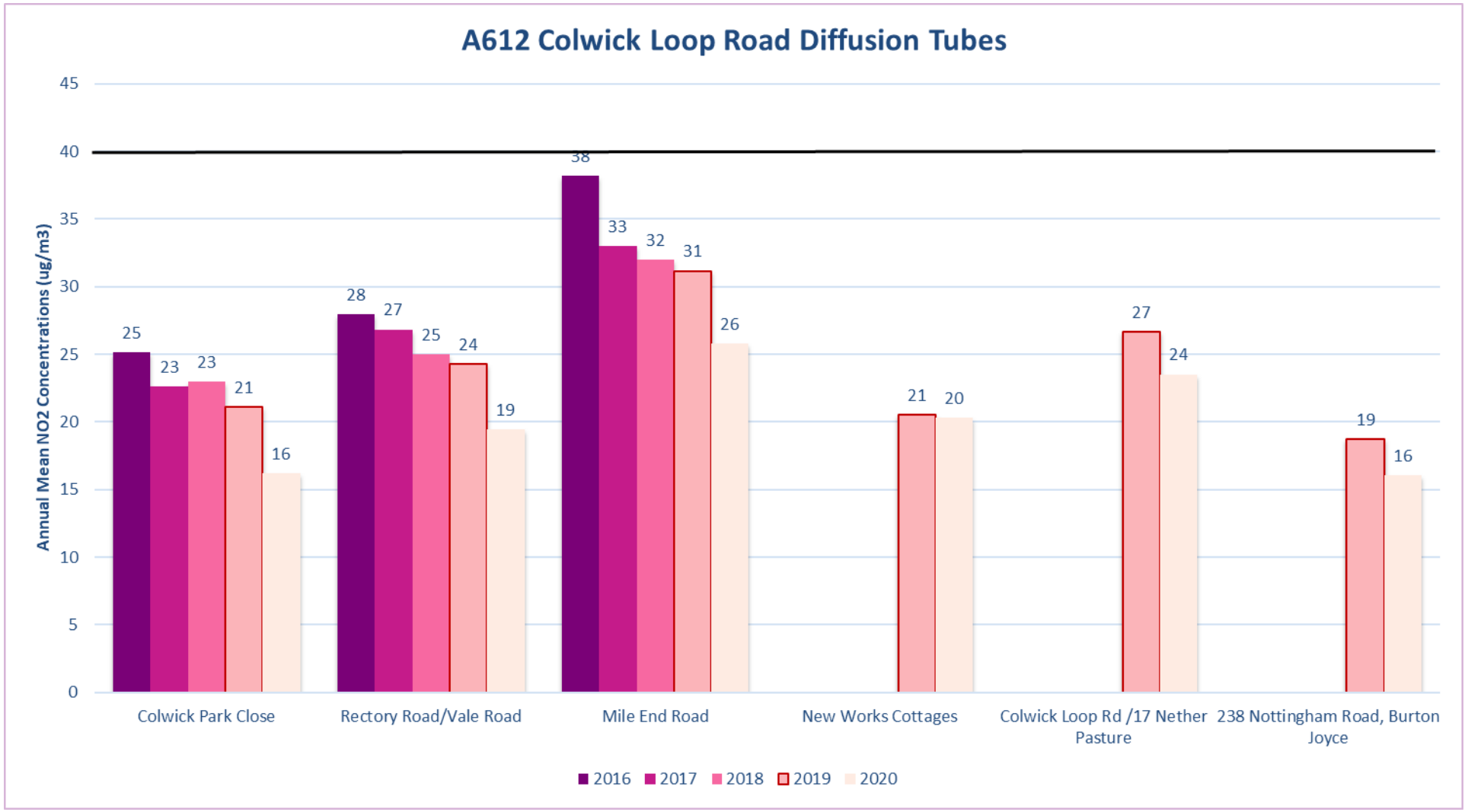
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

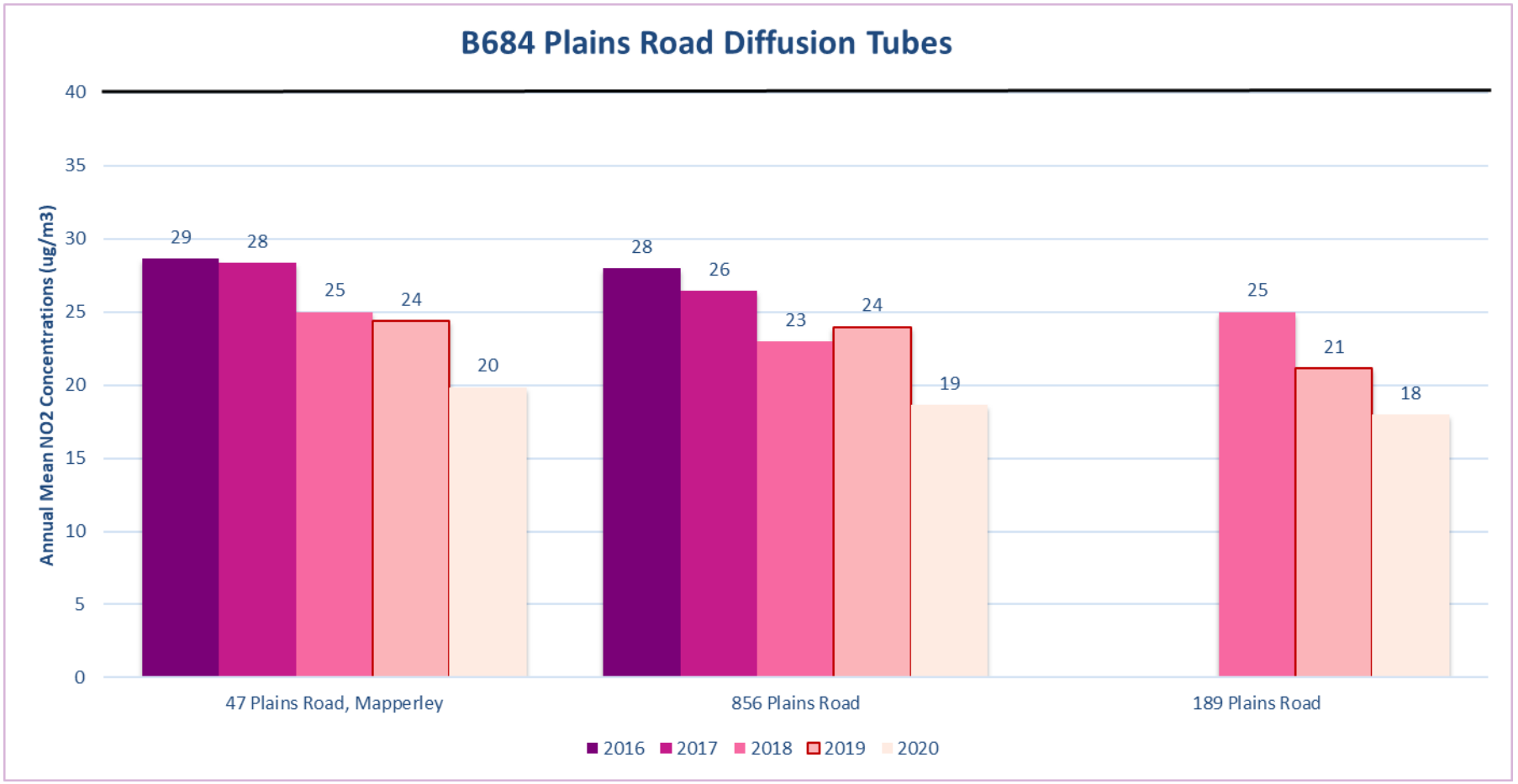
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

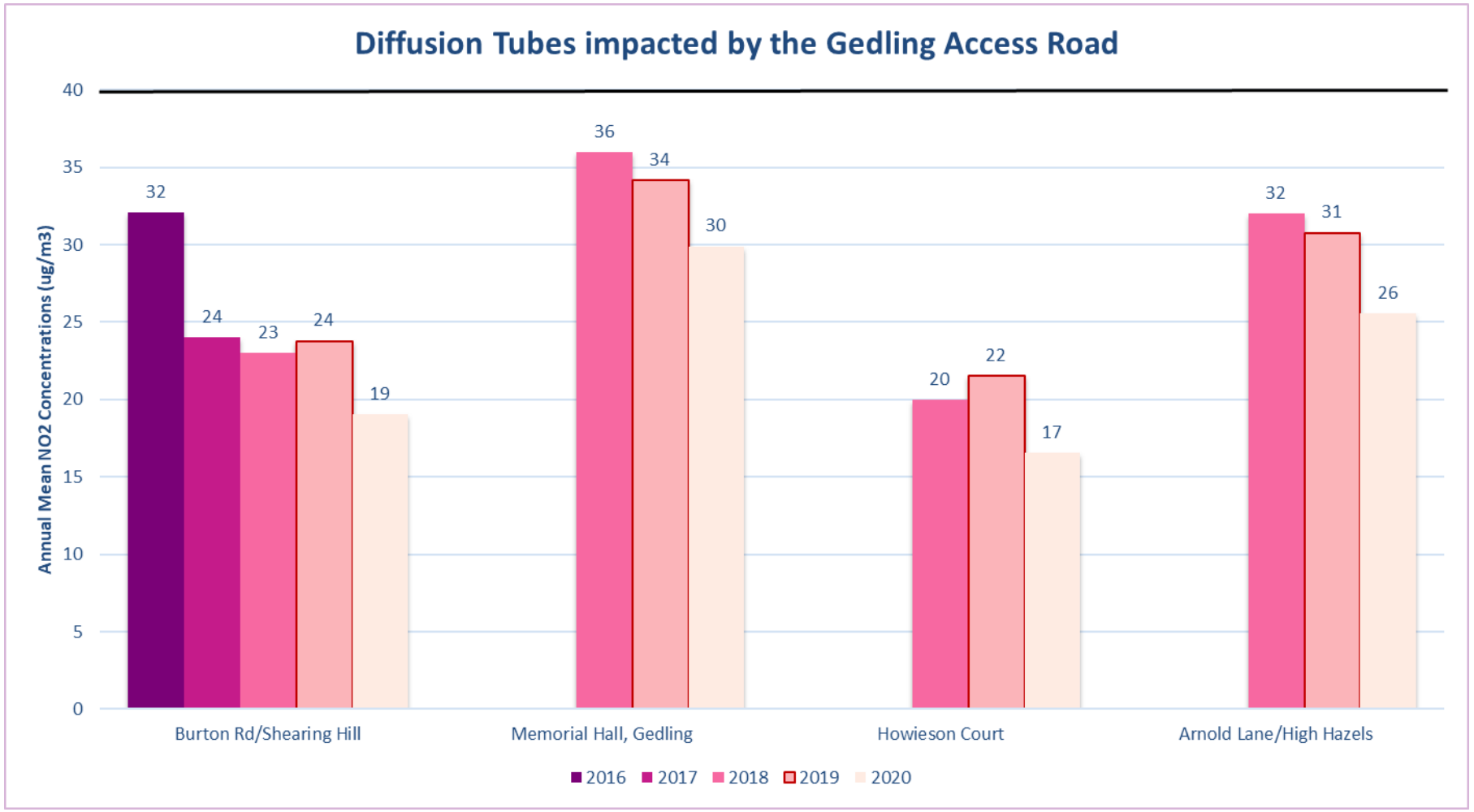
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations




A612 Colwick Loop Road Diffusion Tubes
Annual Mean NO2 Concentrations (ug/m3)
45
40
35
30
25
20
15
10
5
0
25
23
23
21
16
28
27
25
24
19
38
33
32
31
26
21
20
27
24
19
16
Colwick Park Close
Rectory Road/Vale Road
Mile End Road
New Works Cottages
Colwick Loop Rd /17 Nether Pasture
238 Nottingham Road, Burton Joyce
2016
2017
2018
2019
2020


B684 Plains Road Diffusion Tubes
Annual Mean NO2 Concentrations (ug/m3)
40
35
30
25
20
15
10
5
0
29
28
25
24
20
28
26
23
24
19
25
21
18
47 Plains Road, Mapperley
856 Plains Road
189 Plains Road
2016
2017
2018
2019
2020


Diffusion Tubes impacted by the Gedling Access Road
Annual Mean NO2 Concentrations (ug/m3)
40
35
30
25
20
15
10
5
0
32
24
23
24
19
36
34
30
20
22
17
32
31
26
Burton Rd/Shearing Hill
Memorial Hall, Gedling
Howieson Court
Arnold Lane/High Hazels
2016
2017
2018
2019
2020

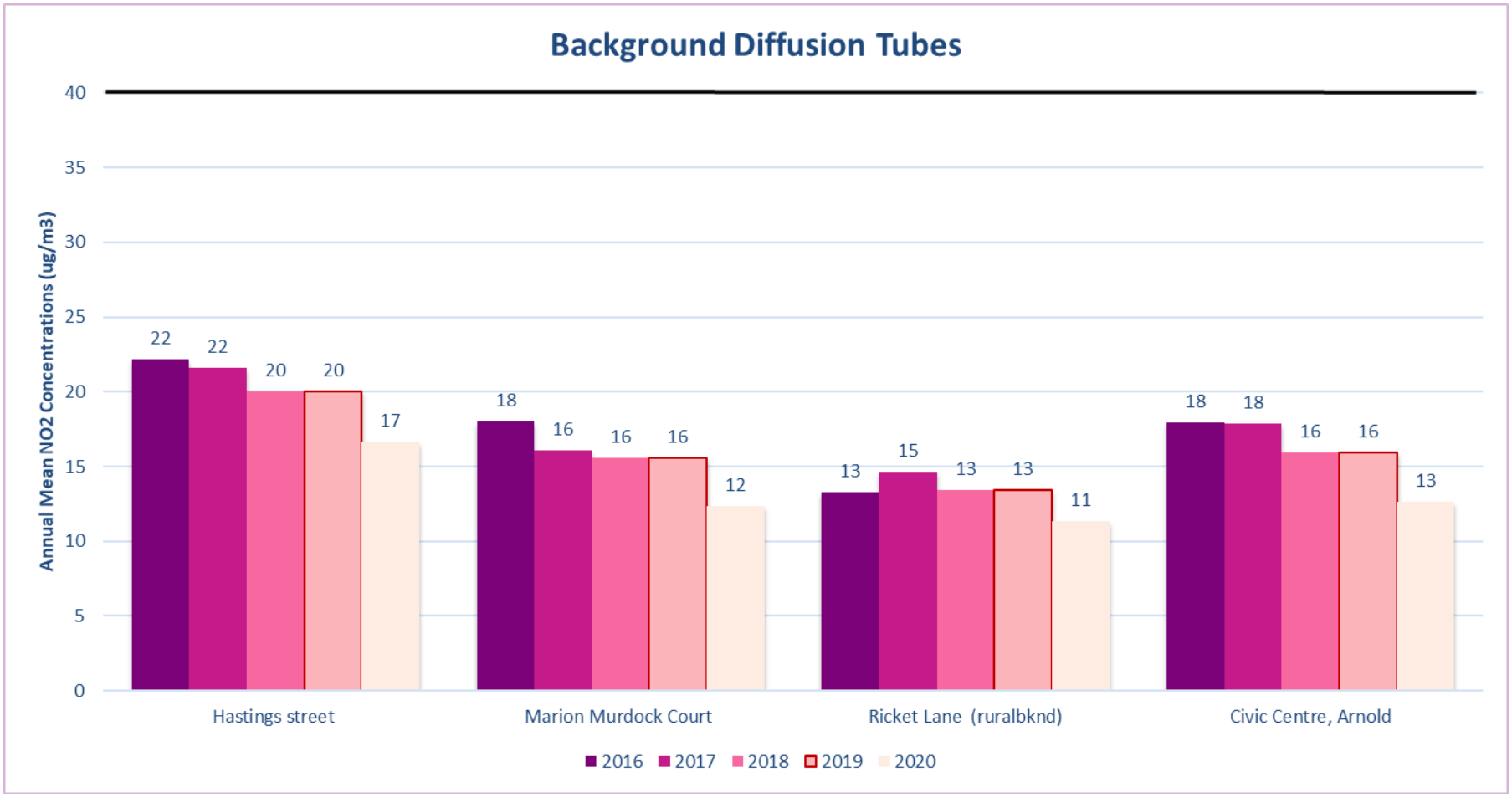

Background Diffusion Tubes
Annual Mean NO2 Concentrations (ug/m3)
40
35
30
25
20
15
10
5
0
22
22
20
20
17
18
16
16
16
12
13
15
13
13
11
18
18
16
16
13
Hastings street
Marion Murdock Court
Ricket Lane (ruralbknd)
Civic Centre, Arnold
2016
2017
2018
2019
2020

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
GBC1	457944	344596	Roadside	97.2	97.2	0	0	0	0	0

Notes:

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

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
82492	457947	344651	40.9	34.5	26.5	19.6		22.8	23.4	24.9	30.9	41.1	37.6	34.8	29.8	24.1	-	
82494	460391	341413	31.5	25.0	18.0			11.0	12.0	12.5	17.6	23.2	28.2	26.2	20.5	16.6	-	
82495	461294	342826	26.5	16.5	12.5	8.6		9.2	8.8	9.7	14.7	18.6	22.4	20.3	14.6	11.8	-	
82937	459209	343513	34.5	29.4	21.7	13.9		17.2	19.8	21.0	23.5	27.3	31.7	29.7	23.5	19.0	-	
87398	457969	344780	42.4	33.9	26.5	17.1		22.0	18.8	25.1	29.4	32.9	39.9	36.1	28.2	22.9	-	
87399	457866	345578	32.4	27.7	23.5	13.2		18.6	12.3	19.8	21.1	25.7	32.3	28.4	22.1	17.9	-	
87400	457867	345388	45.4	33.9	26.6	16.5		19.9	22.7	24.4	30.8	32.3	36.5	35.5	28.2	22.9	-	
87401	461995	341175	34.4	25.5	25.1	19.1		23.8	22.5	23.9	26.2	26.0	39.5	32.0	26.1	21.1	-	
87402	462002	341097	39.7	35.2	28.4	19.6		24.8	16.8	25.7	31.3	31.0	29.7	34.3	28.0	22.7	-	
87403	457944	344597	37.7	29.1	29.8	21.9		28.7	18.2	32.6	31.3	34.4	36.8	36.4	-	-	-	Triplicate Site with 87403, 87404 and 87405 - Annual data provided for 87405 only
87404	457944	344597	36.8	30.5	28.4	20.4		26.8	18.2	30.8	29.6	32.7	36.7	37.6	-	-	-	Triplicate Site with 87403, 87404 and 87405 - Annual data provided for 87405 only
87405	457944	344597	32.4	29.5	29.0	21.2		28.5	18.4	31.4	31.2	32.2	33.6	34.3	29.2	23.6	-	Triplicate Site with 87403, 87404 and 87405 - Annual data provided for 87405 only
87406	462422	341972	33.4	24.7	21.2	14.4		17.4		18.2		25.3	26.8	29.9	22.5	18.2	-	
87407	457918	344358	47.4	39.5	30.2	16.6		23.2	24.9	27.1	32.0	35.7	43.7	39.3	31.0	25.1	-	
87408	456621	355935	23.8	18.3	11.3	6.4		9.4	8.1	9.8	11.5	16.1	20.3	19.1	13.2	10.7	-	
88005	458325	346630	52.8	41.8	34.4	20.2		30.6	30.8	37.1	41.5	39.9	39.0	41.6	35.7	28.9	-	
87410	458259	344723	24.4	19.6	12.0	8.5		8.9	10.8	10.2	15.6	17.4	21.6	22.0	14.9	12.0	-	
87411	461103	340086	25.3	19.2	20.6	14.2		17.1	14.4	17.0	20.4	23.5	23.4	25.1	19.5	15.8	-	
87412	457947	344713	53.4		32.3	20.9		29.7	28.9	34.5	38.3	42.5	49.5	39.0	35.2	28.5	-	
87413	457950	344748	48.3		31.3	20.1		23.8	27.3	32.2	37.5	39.0	43.8	44.0	33.3	27.0	-	
87414	457969	344827	47.3	36.7	27.6	15.9		22.7	21.4	26.4	30.6	35.0	39.0	43.3	30.0	24.3	-	
87415	458898	343139	34.3	25.7	21.7	12.9		18.4	13.0	21.1	25.9	25.4	29.6	25.4	22.0	17.8	-	
87460	461161	340122	36.1	27.6	23.6	13.9		17.9	16.4	20.8	23.8	25.2	29.7	29.0	23.0	18.6	-	
87461	461196	340108	43.1	36.1	28.7	20.6		26.2	28.7	29.1	35.0		37.4	33.2	30.5	24.7	-	
87821	459611	343935	31.6	27.0	20.3	11.1		14.3	14.6	19.0	22.8	24.4	30.6	28.6	21.1	17.1	-	
87822	461879	342480	49.5	42.9	35.3	25.1		29.7	35.1	33.5	37.6	36.0	40.2	41.2	35.7	28.9	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
87824	461197	343196	29.5	21.3	16.4	12.8				9.7	11.6	25.1	28.6	28.6	19.5	15.8	-	
87823	459974	344159	36.7	31.9	27.6	19.6		26.0	29.2	30.9	33.6	37.2	38.7	36.1	30.5	24.7	-	
87999	463150	341842	36.4	26.4	22.4	15.2		20.1	17.5	21.2	27.8	29.2	31.4	28.6	24.2	19.6	-	
88000	462615	340837	35.7	30.8	29.7	21.2		29.0	20.6	29.8	28.9	31.0	30.9	31.5	28.3	22.9	-	
88001	463226	342668	27.6	22.4	19.0	11.0		14.2	11.1	15.2	17.9	24.3	28.4	26.8	19.0	15.4	-	

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

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **Gedling Borough Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Gedling Borough During 2020

One development has come through planning in 2020 which was considered to require an air quality assessment due to its proximity to the AQMA. Land to the West of A60 Mansfield Road – 2021/0072, a development of 157 dwellings accessing the A60 north of the AQMA. We await the air quality assessment, which may be conditioned should planning permission be granted.

Additional Air Quality Works Undertaken by Gedling Borough During 2020

Gedling Borough has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

Diffusion tubes are small clear plastic tubes open at one end with a pollutant-absorbing chemical matrix or gel at the closed end. The tubes are prepared and sealed before being transported to the monitoring site. At site, the tube is exposed, by removal of the end cap, for a period of one month. After the month the tube is resealed and sent to an analytical laboratory.

The laboratory analysis measures the quantity of pollutant absorbed and then calculates an average ambient pollutant concentration over the exposure period.

Diffusion tube results are for NO_2, concentrations measured in parts per billion (ppb) and micrograms per cubic metre (μgm^3).

Tubes are exposed on a monthly basis, following the timetable prescribed by the Diffusion Tube Network in which tubes are replaced generally on the first Wednesday of the month.

In 2020 there were two periods which did not follow the prescribed calendar: the planned exchange of tubes on 31st March 2020 was delayed due to the first Covid-19 lockdown, which shut the Gradko laboratory. The tubes were exchanged on site but were then placed in a refrigerator until such time as the lab was able to re-open in early June. Following consultation with Gradko it was established that the tubes stored in the refrigerator would still be valid, as they were within the prescribed shelf life.

The results for March 2020 were reviewed (as they had been held in the refrigerator) they appear to have not been affected and so are included. Results displayed as April 2020 are in fact the results for April and May (two month exposure); again these results were reviewed and considered acceptable based on the impact of the first Covid lockdown.

Second deviation from the calendar was in November 2020 when the exchange took place slightly outside the prescribed window.

From April 2008 GBC entered into a countywide contract with Gradko Ltd. for the supply and analysis of NO_2 diffusion tubes. At the same time it was agreed to use the same preparation method (20% solution of TEA in water). This harmonisation of laboratory and method for the county will allow easier comparisons of results across LA boundaries.

QA/QC Procedures

Gradko

The European Union Daughter Directive for NO_2 sets out data quality objectives for overall accuracy. Annual average NO_2 concentration results must comply with the objective of ±25% of the reference concentration therefore; average diffusion tube measurements should comply with this objective. The precision of analytical measurements is also an important consideration, as it is possible to arrive at an average bias of less than ±25% with very imprecise measurements. Following previous intercomparisons of laboratory results an arbitrary guideline figure of 3ppb for acceptable precision has been adopted.

Gradko's NO_2 diffusion tube procedures follow the Defra guideline document[11] related to the preparation, extraction, analysis and calculation procedures for NO_2 passive diffusion tubes. Their internal analysis procedures are assessed by U.K.A.S. on an annual basis for compliance to ISO17025. Results from the Ongoing Workplace Analysis Scheme for Proficiency (WASP) programme for Gradko generally show a "Satisfactory" performance classification.

Gedling Borough Council

Tubes are stored in a refrigerator until the day of exposure. On site, when the tubes are collected the date, site and time are recorded, referenced to the tube numbers assigned by the laboratory. The tubes are then forwarded to Gradko for analysis on the day of collection, along with a 'blank' trip diffusion tube.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Gedling Borough recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

[11] Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Gedling Borough have applied a national bias adjustment factor of 0.81 to the 2020 monitoring data. A summary of bias adjustment factors used by Gedling Borough over the past five years is presented in Table C.1.

The national bias adjustment factor (version 3/21) is based on 18 studies. Based on guidance Box 7.13 in LAQM TG(16) [April 21] Gedling Borough has used this factor to adjust the diffusion tube results.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.81
2019	National	03/20	0.93
2018	National	03/19	0.93
2017	National	03/18	0.89
2016	National	03/17	0.94

NO_2 Fall-off with Distance from the Road

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

No diffusion tube NO_2 monitoring locations within Gedling Borough required distance correction during 2020.

QA/QC of Automatic Monitoring

The automatic monitoring system used (Monitor Labs ML®9841B) uses gas-phase chemiluminescence detection to perform continuous analysis of nitric oxide (NO), total oxides of nitrogen (NOx), and nitrogen dioxide (NO_2).

The instrument consists of a pneumatic system, an NO_2-to-NO converter (molycon), a reaction cell, photomultiplier tube (PMT) detector, and processing electronics.
During 2001-2007 the analyser was housed in the basement of the Daybrook Baptist Chapel. In January of 2008 the analyser was moved to a Casella ROMON enclosure on the opposite side of the A60 Mansfield Road. The analyser has been operational since August 2000; data capture levels are: -

96% 2001	93% 2006	92% 2011	99% 2016
95% 2002	83% 2007	54% 2012*	99% 2017
97% 2003	81% 2008	91% 2013	99% 2018
98% 2004	95% 2009	80% 2014**	99% 2019
96% 2005	95% 2010	81% 2015*	97% 2020

*data logger failure

** air conditioning unit failure in mid-May

The ML®9841B analyser has a quoted detection of ± 0.5ppb and a precision of ± 0.5ppb or 1% of reading, whichever is largest. Accuracy of the analyser is dependent on the calibration and the calibration gases used.

QA/QC Procedures

The analyser is subject to a fortnightly two point manual calibration, by a suitably trained site operative from Gedling Borough, which is conducted in accordance with the manufacturer's quality control procedures. Filters at the sample head are changed concurrently with calibration. The equipment is serviced twice a year by the manufacturer's accredited engineers.

Calibration gases (Air and NO) used during the fortnightly calibration are supplied by BOC, who have demonstrated compliance with relevant quality control procedures in the preparation of gas mixtures. Gas cylinders are replaced before use by dates or when the gas levels fall below 50 bar.

Data Validation and Ratification

Gedling Borough Council employ the services of Air Quality Data Management (AQDM) to collect, ratify and calibrate the data from the Daybrook Station. Officers from Gedling Borough attend site on a fortnightly basis to carry out the manual calibration of the analyser, forwarding the results onto AQDM.

Automatic Monitoring Annualisation

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

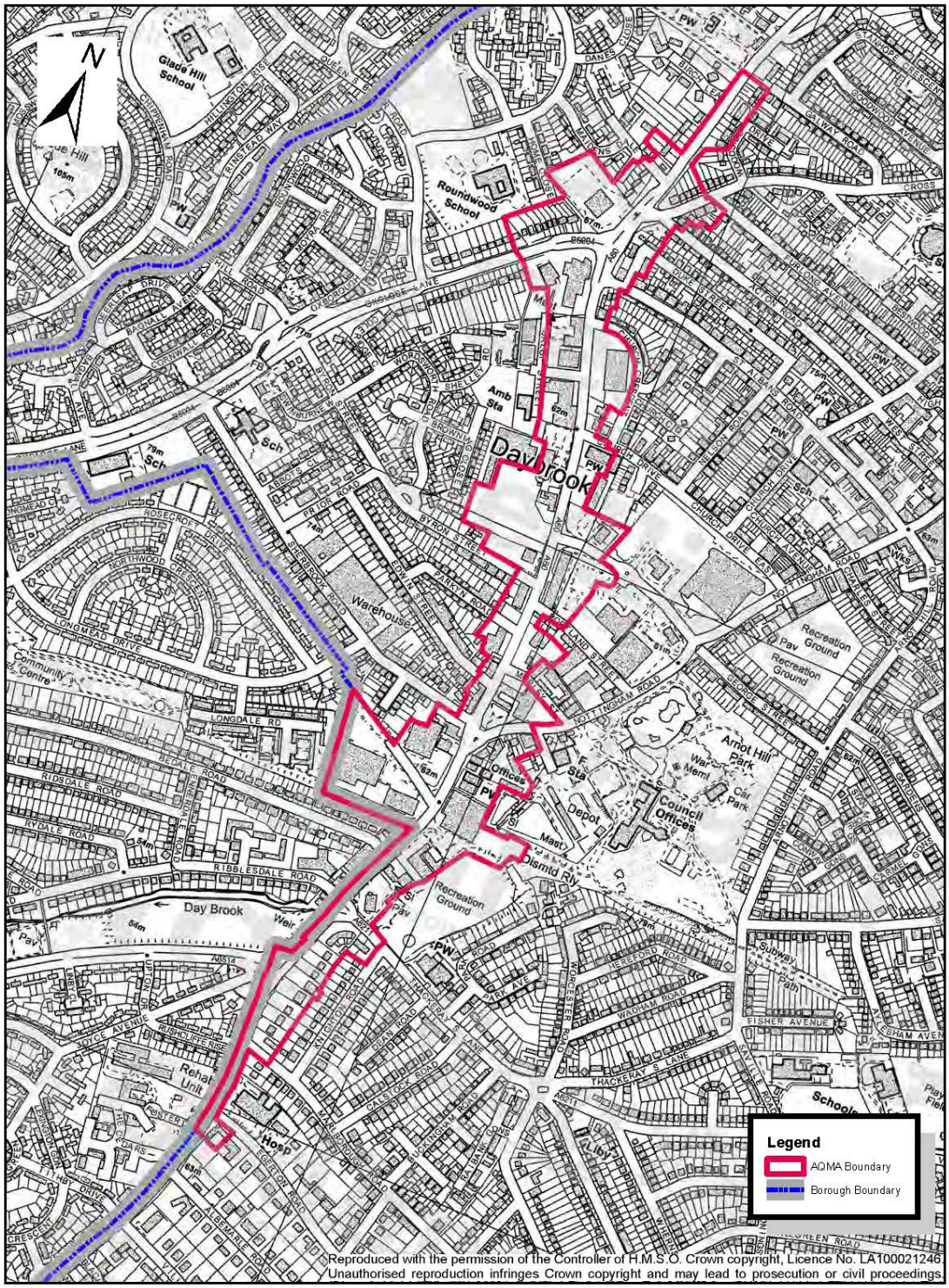
NO_2 Fall-off with Distance from the Road

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

No automatic NO_2 monitoring locations within Gedling Borough required distance correction during 2020.

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

Figure D.1 – Map of Air Quality Management Area



Gedling Borough Council

Map referred to in the
Gedling No: 2 Air Quality Management Order 2011
(Nitrogen Dioxide)

Scale 1:7,500

Date April 2011

Figure D.2 - Map of Overall Sheet Locations

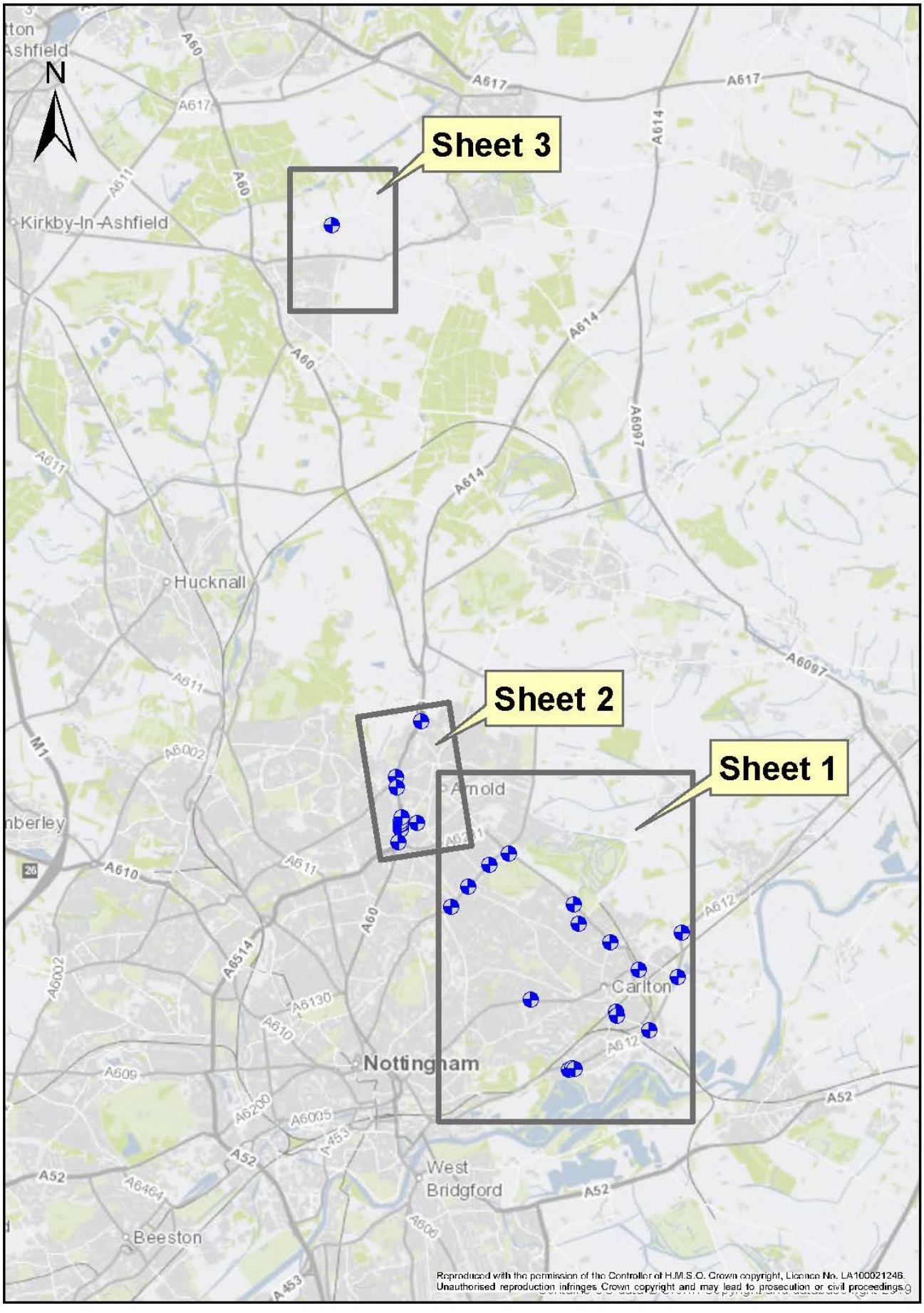


Figure D.3 – Sheet 1 - Map of Central and Southern Diffusion Tubes

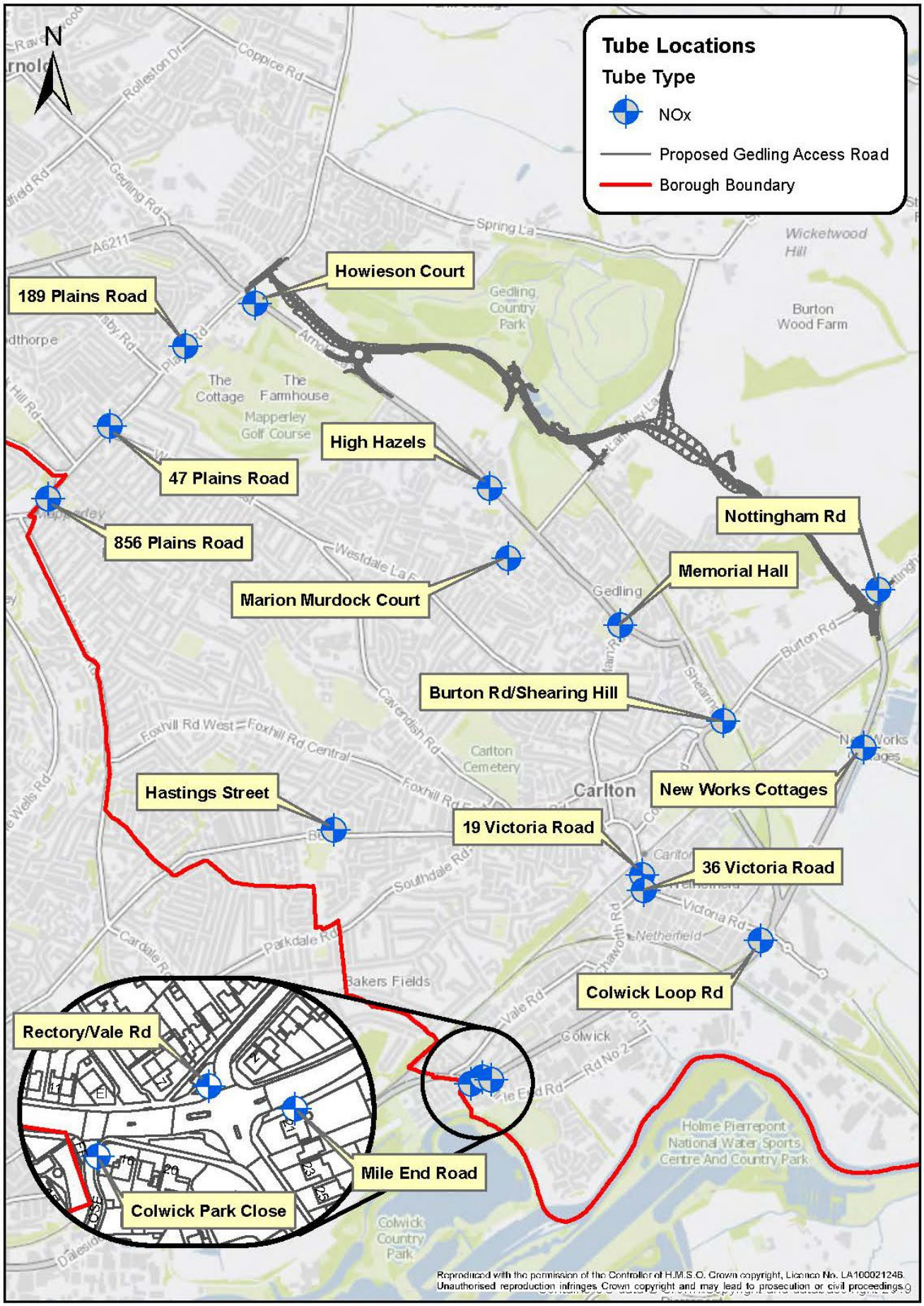


Figure D.4 – Sheet 2 - Map of Air Quality Management Area Diffusion Tubes

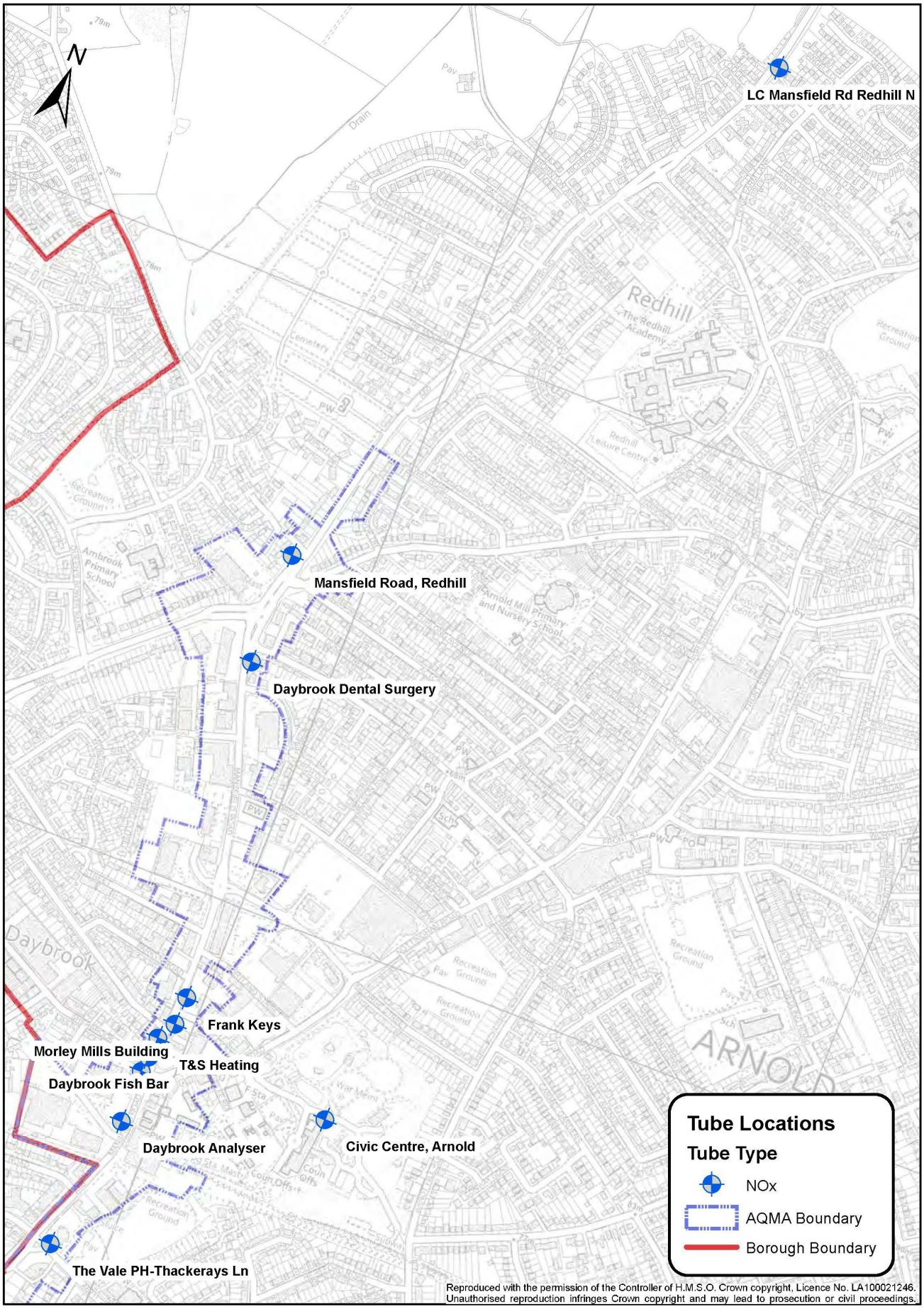
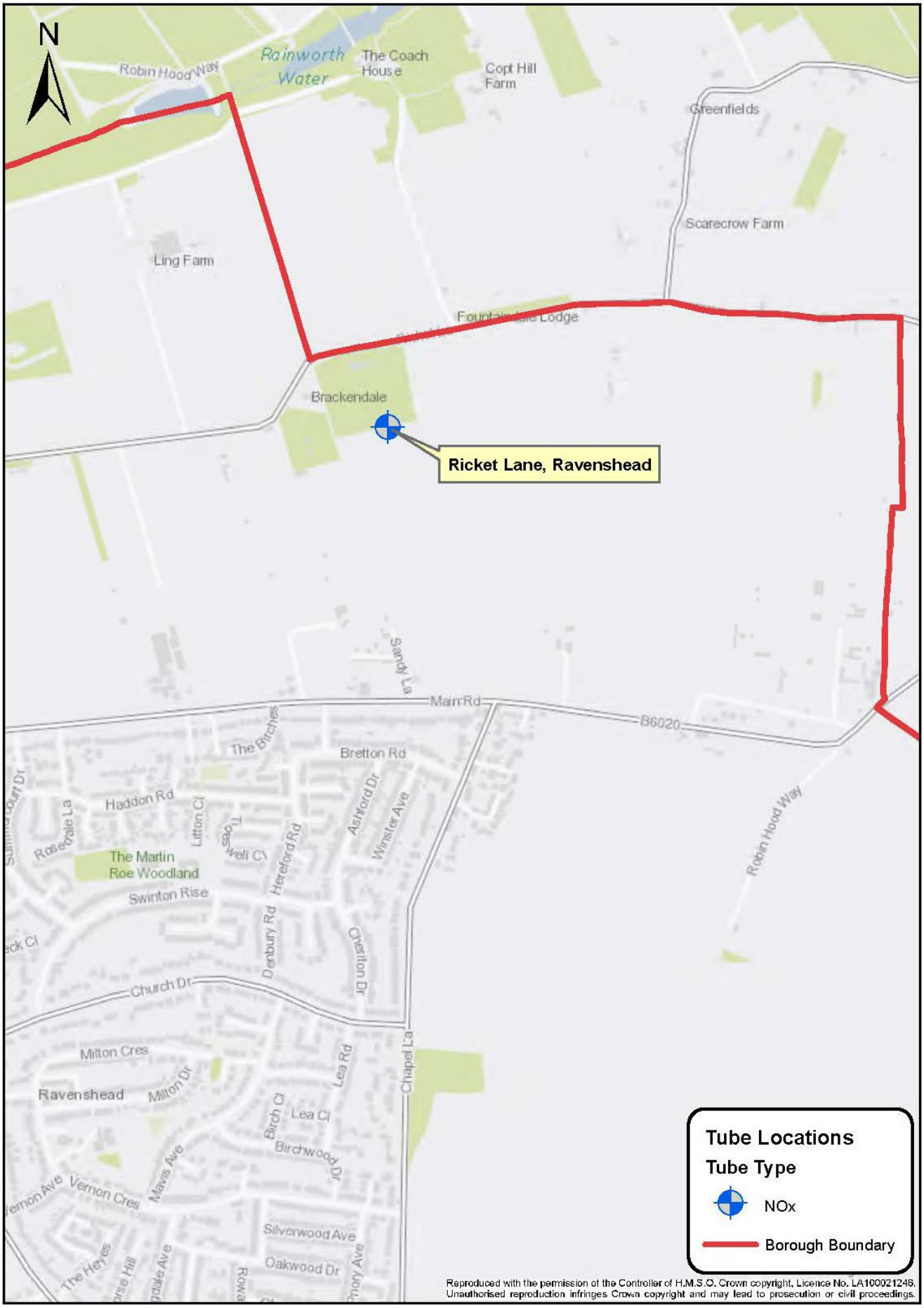


Figure D.5 – Sheet 3 - Map of Rural Background Diffusion Tubes



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[12]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[13] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[14] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[13] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[14] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

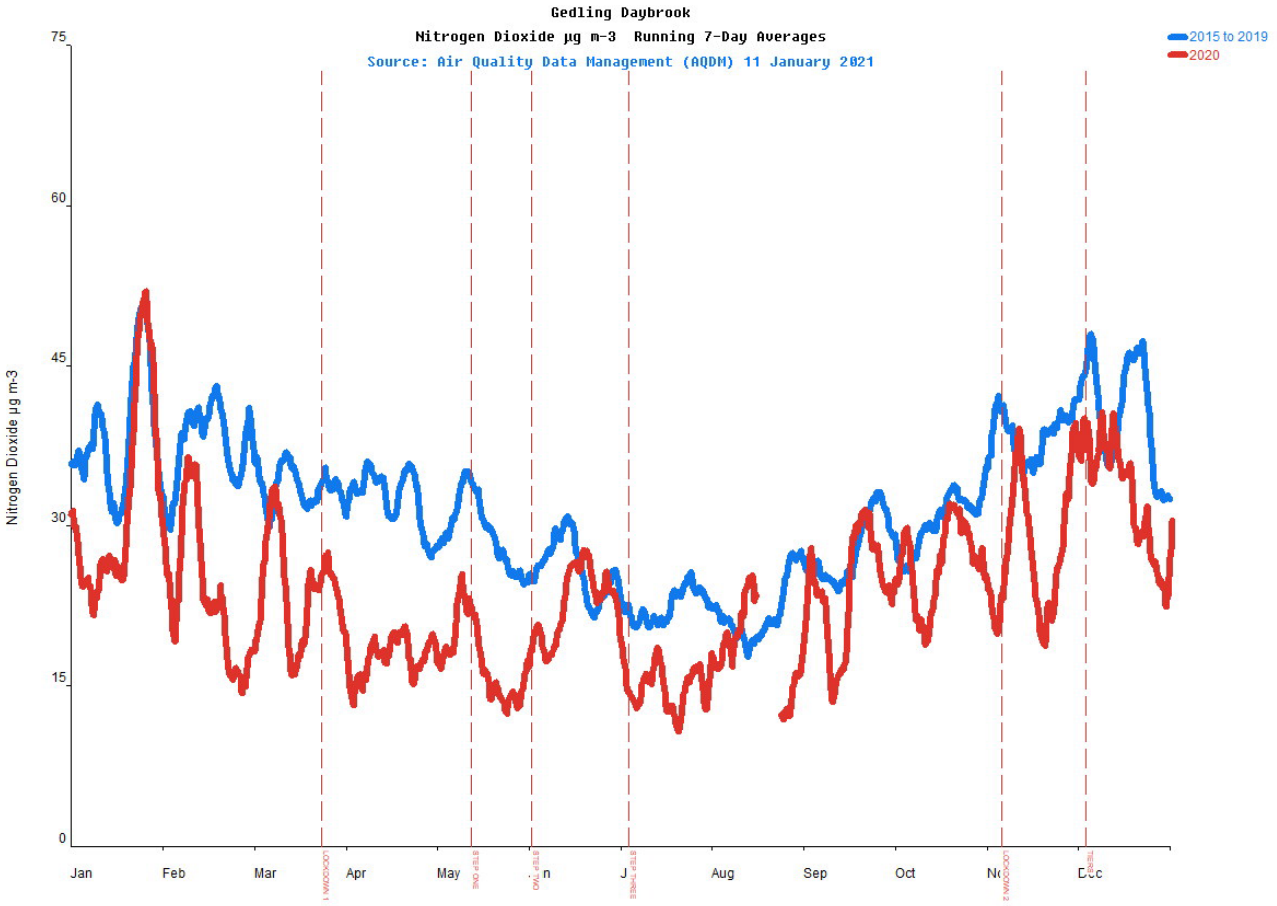
Impacts of COVID-19 on Air Quality within Gedling Borough

Comparing the average weekday traffic volumes between April and December 2020, with pre Covid-19 pandemic levels (March 2020) there was around a 25% reduction in traffic across Nottinghamshire, with the same level of reduction in Gedling specifically. Along the A60 Woodthorpe, south of the Daybrook AQMA, there was around a 27% decrease in traffic volumes. However, recent traffic data indicates that traffic volumes along the A60 are now 93% of what they were pre pandemic, and at around 95% across the borough.

Cycle counters installed across the county show cycling levels on an average day in April to May 2020 (during the Covid-19 pandemic) were up 53% on the previous year (2019). In Gedling, there was an average increase of 34%. These increased cycling levels continued, with September to November 2020 cycling levels greater than 2019 level – 41% increase in the county and a 67% increase in Gedling.

Air Quality Impacts

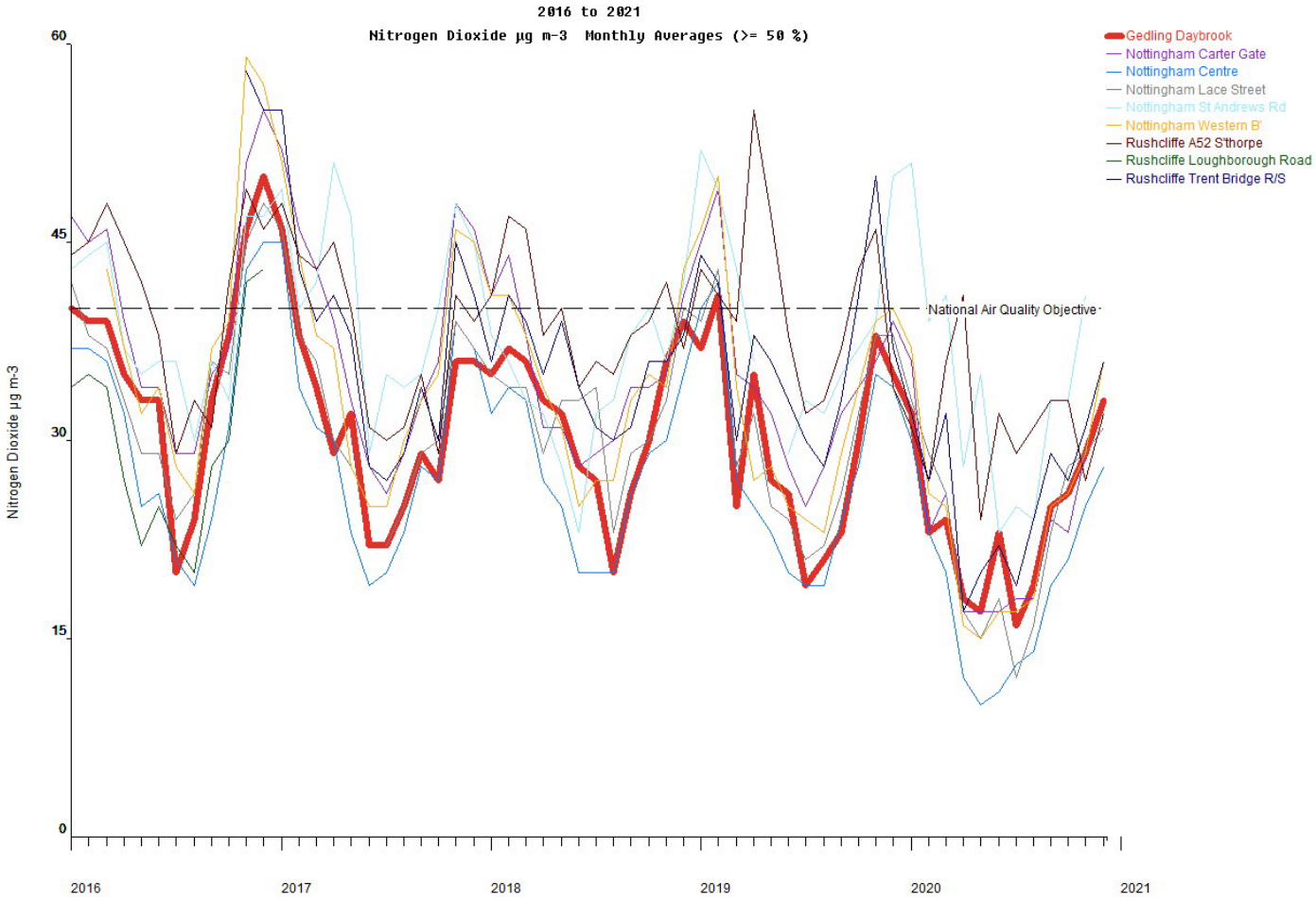
The plot below compares the running 7-day NO_2 concentration during 2020 (red line) with the same statistic averaged over 2015 to 2019 (blue line). The effect of the lockdowns and the easing of restrictions is apparent by comparing 2020 with the 2015 2019 average.



The first lockdown began on 23rd March 2020 and was most effective during April 2020. The comparison between April 2020 and the average for the April periods during 2015-2019 therefore shows the lockdown effect at the most extreme.

- April 2015 to 2019 average 32.8µg/m^3
- April 2020 17.8µg/m^3
- Reduction 15.1µg/m^3 or 45.9%

However, it is clear from the January to March 2020 results that 2020 was a low year anyway due to the continual reduction of NO_2 concentrations. This is demonstrated by the second plot showing the monthly means for 2016 to 2020.



An additional factor to comparing results is the influence of the weather. The spring of 2020 was particularly fine, where high pressure systems dominated the weather patterns; somewhat abnormal. Isolating the lockdown effect from the meteorology and the long-term downward trend is beyond the simple analysis carried out above.

Opportunities Presented by COVID-19 upon LAQM within Gedling Borough Council

No LAQM related opportunities have arisen as a consequence of COVID-19 within Gedling Borough Council.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Gedling Borough Council

The following are the measures which are considered to have been affected by the Covid-19 pandemic and lockdowns:

- Action Plan Measure 17, Promotion of AQ in schools – Work with Public Health colleagues at the County Council delayed due to Covid-19. **Medium/High Impact**
- The implementation of action plan measure 36: Work to retrofit buses was impacted by COVID-19 and there has therefore been a delay in the completion of this. However, it is estimated that the works will be completed in 2021. **Small Impact**
- Action Plan Measures 34, 38 and 39, ECOStars Fleet Recognition Scheme – Continuation of the scheme was hampered by the lockdowns. Project was extended to October 2020 to try and make up for the periods of inactivity. **Small Impact**
- Action Plan Measure 33, ECOStars Taxi Scheme – The taxi scheme was a year pilot which was impacted in the mid-late stages dues to the lockdown(s). The project was extended into October 2020 to try and make up for the missing months; however the impacts of the Covid-19 lockdowns were still being felt in the industry. **Small Impact**

The impacts as presented above are aligned with the criteria as defined in Table F 1, with professional judgement considered as part of their application.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

Glossary of Terms

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

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