2019 Air Quality Annual Status Report (ASR)

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

June 2019

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Executive Summary: Air Pollution 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
- 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.

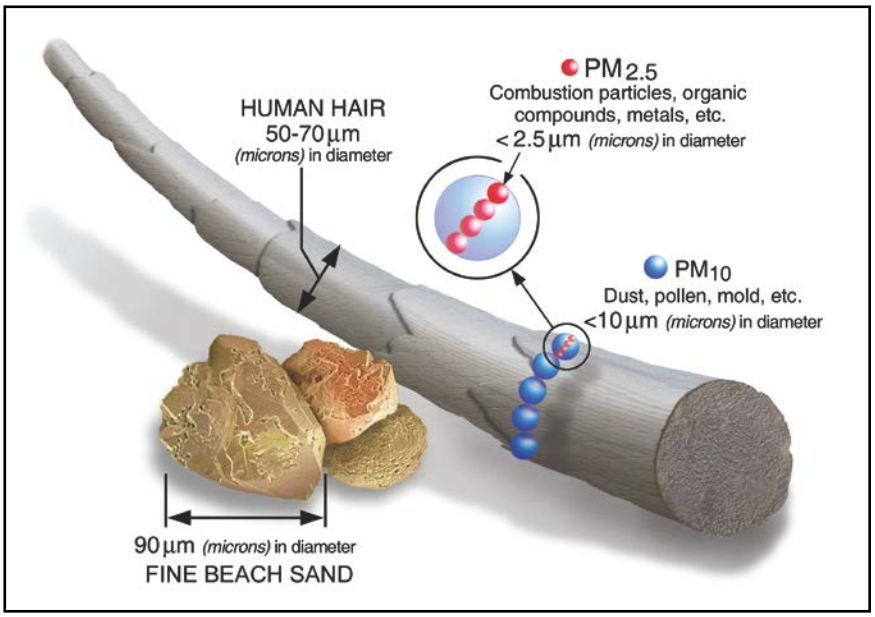
Particulate matter is made of lots of different sorts of things including: vehicle exhausts; poorly combusted fuel; particles of metal from engine chambers; bits worn from brake pads; bitumen asphalt or concrete dust work from the road; biological and other waste ground up on the road; and it's formed 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: USEPA - https://www3.epa.gov/pm/basic.html

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).

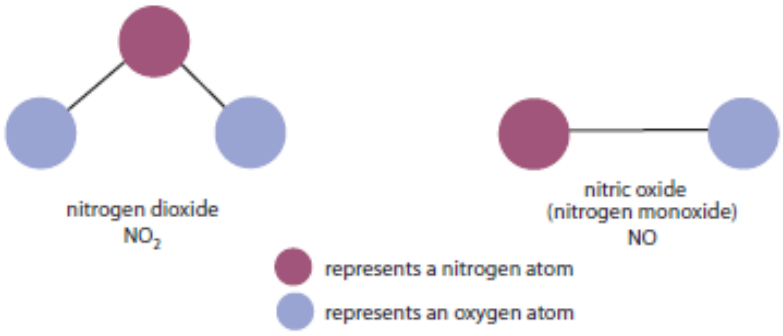


Diagram of the structures of NO_2 and NO

NOx emissions from burning fossil fuels are mainly as NO, but some sources can release a lot of NOx as NO_2. These **primary** NO_2 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.

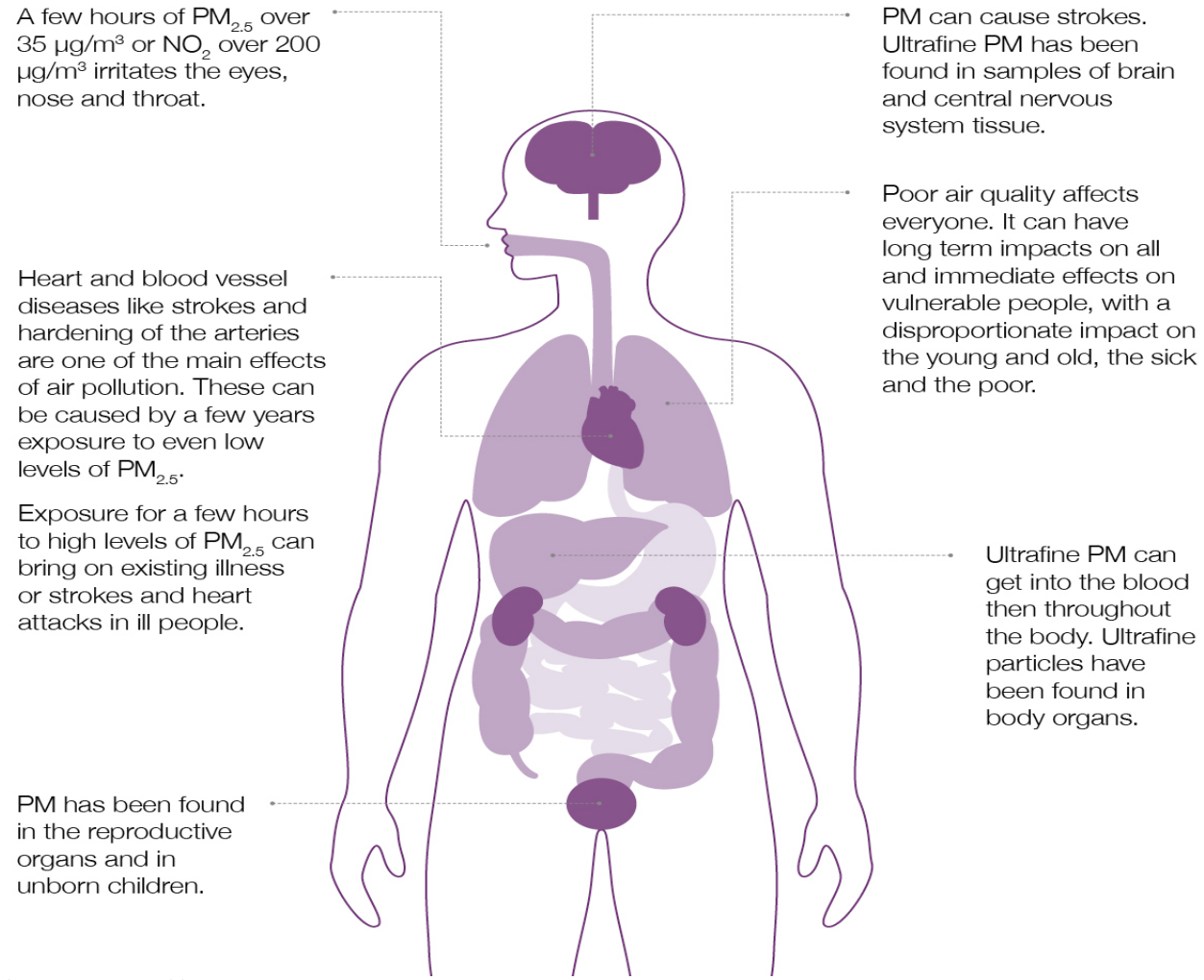
These primary NO_2 emissions can lead to high concentrations of NO_2 at the roadside, especially where there are many diesel vehicles.

NO_2 is also formed in the atmosphere in a chemical reaction between NO and ozone (O_3). Because this NO_2 is not released straight into the atmosphere, but is formed there by a chemical reaction, it is known as **secondary** NO_2.

Sometimes this reaction cannot take place because there is not enough O_3 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.

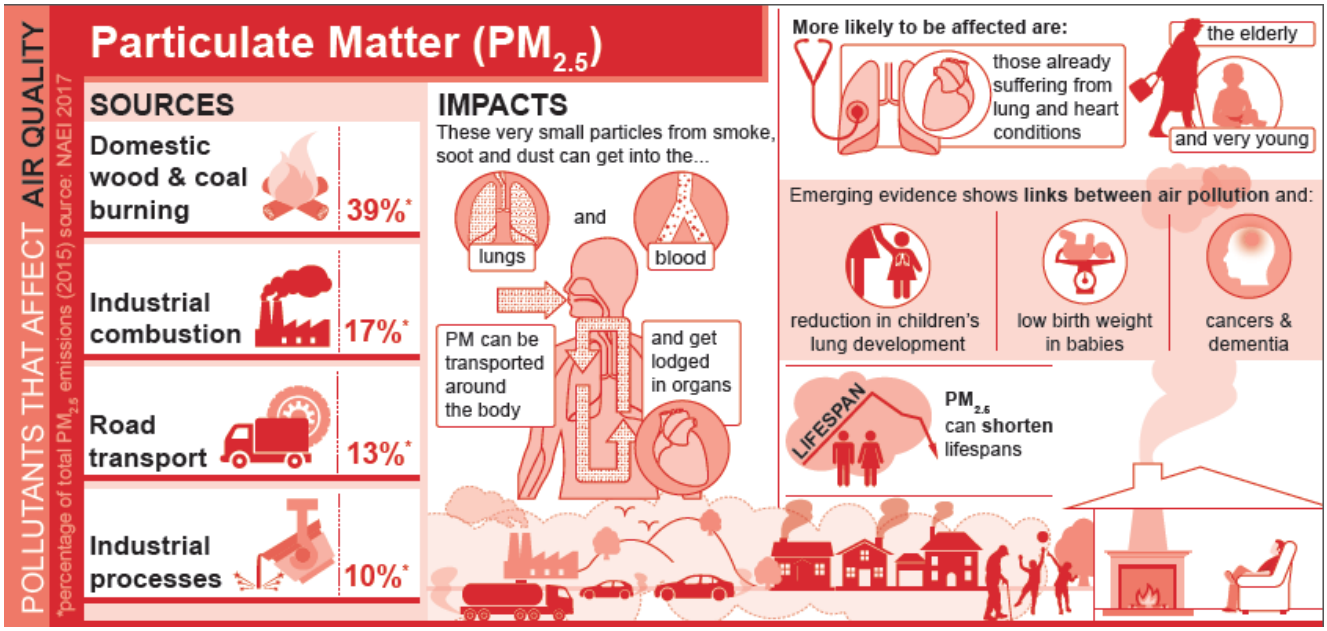


Source – DEFRA 2017

Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2]. The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

1 Environmental equity, air quality, socioeconomic status and respiratory health, 2010
2 Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
3 Defra. Abatement cost guidance for valuing changes in air quality, May 2013

Health effects of Particles



Source: DEFRA 2017

One of the best characterized and most important health impacts of air pollution is the increase in mortality risk associated with long-term exposure to particulate air pollution.[4] Public Health England (PHE) has produced estimates of this risk for all local authorities in the United Kingdom. These estimates are based on the research evidence of mortality risk, combined with modelled levels of the background air pollution to which populations are exposed at local authority level. Local estimates are given in **Table i**.

Table i: Estimated effects on annual mortality in 2015 of human-made $PM_{2.5}$ air pollution.

Area	Attributable Fraction	Attributable* deaths aged 25+	Associated Life-years Lost
EAST MIDLANDS	5.1	2,266	27,189
Nottingham City	5.3	127	1,525
Nottinghamshire CC	5.0	410	4,914
Gedling Borough	**5.0**	**61**	**735**

Sources: local secondary analysis combining:

- PHE Public Health Outcomes Framework (Indicator 3.01) (last accessed February 2017)
- ONS Mortality 2015 (last accessed via NOMIS February 2017)
- 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.

4 Gowers, A.M. et al. Estimating Local Mortality Burdens associated with Particulate Air Pollution, Public Health England, 2014

To place these figures in context, **Table ii** presents a comparison of deaths attributable to some other key risk factors in Nottinghamshire County and Nottingham City.

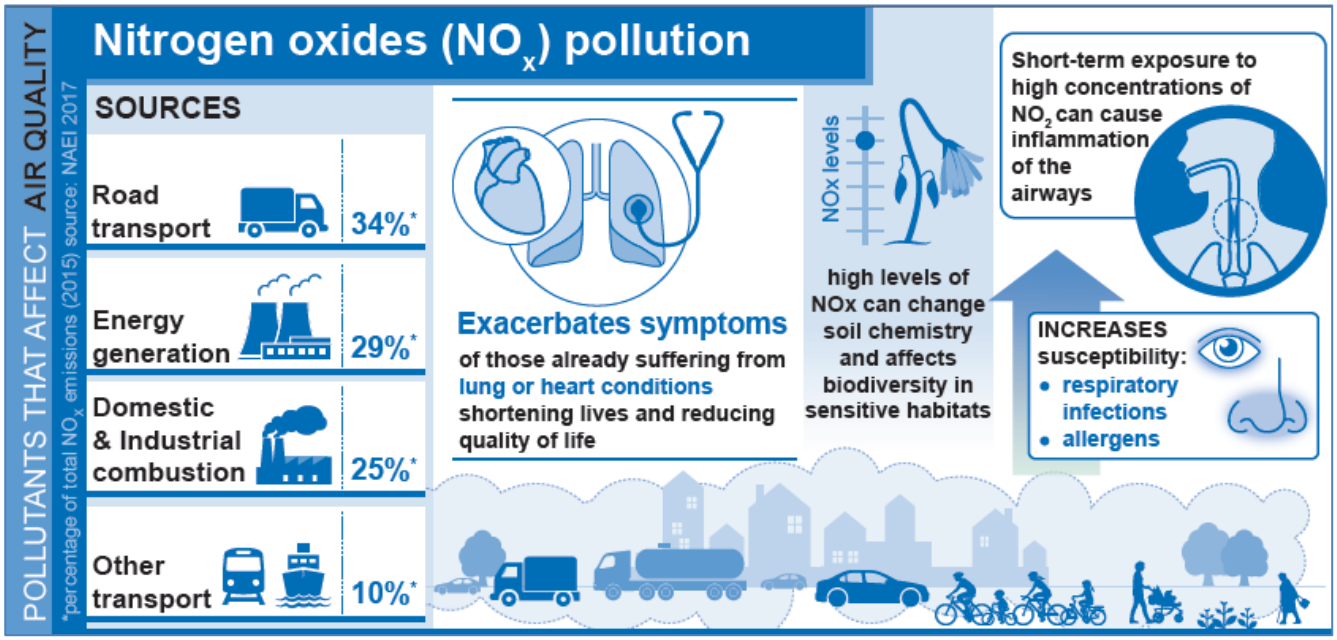
Table ii*: Comparison of deaths attributable to human-made air pollution, smoking and deaths related to alcohol consumption, Nottinghamshire County and Nottingham City.*

Area	Deaths attributable to human-made air pollution	Deaths attributable to smoking	Deaths related to alcohol consumption
Nottinghamshire County	430	1,293*	386¥
Nottingham City	150	414	146

*Estimate based on 1/3 of deaths attributable for 2012-2014, Tobacco Control Profiles, PHE, http://www.tobaccoprofiles.info/profile/tobacco-control

¥ Estimates for 2015, Local Alcohol Profiles for England. 4.01 Alcohol-related mortality (persons) http://fingertips.phe.org.uk/profile/local-alcohol-profile

Health effects of Nitrogen Dioxide



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.[5] It is hoped that PHE will produce similar estimates of increase in mortality risk associated with long-term exposure to nitrogen dioxide air pollution in the near future.

Air Quality Issues 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 (2018) 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 some areas of the Borough are modelled to be over the World Health Organisation guideline level.

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.

[5] Statement on the evidence for the effects of nitrogen dioxide on health - https://www.gov.uk/government/publications/nitrogen-dioxide-health-effects-of-exposure

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.

Actions to Improve Air Quality

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

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

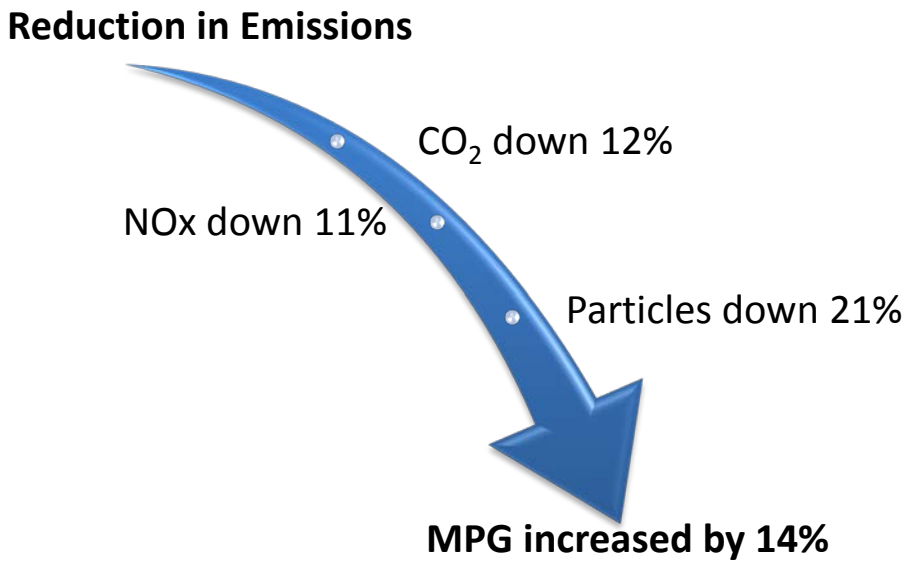
The Nottingham ECO Stars scheme began as a scheme in Gedling Borough in 2012 and then expanded the following year to cover the whole of the Nottingham conurbation.

Membership stands at 118 members operating over 7475 vehicles.

Is the scheme having any benefit?

The South Yorkshire ECO Stars group have recently 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) 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 new 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 2021. 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. Work is now underway to identify a feasible network across the Derbyshire/Nottinghamshire area. To date 14 publicly available charge points have been installed across the Borough (in two locations). Grants also available to help businesses install charging infrastructure.

Nottinghamshire Air Quality Strategy

The County, City and Borough/District councils have worked in partnership to review and update the Nottinghamshire Air Quality Strategy, which has been approved at the Nottinghamshire Health and Wellbeing Board.

Retrofitting of buses

In February 2018 it was announced that the County Council (and Nottingham City Council) 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 will continue in to 2019/20).

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, the County Council has purchased an additional 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 determine which modes of transport are suitable. Travel Plans are also developed with businesses through the development control process.

Cycle network improvements

Work commenced on the delivery of enhancements to a number of cycle routes in the Arnold area utilising Local Growth Fund, developer contributions and integrated transport block funding.

Local Priorities and Challenges

Below is a brief summary of the priorities for the local authority in addressing air quality for the coming year:

1) The Borough Council is, as a member of the Nottinghamshire Environmental Protection Working Group (NEPWG), through which links have been established with colleagues in Public Health. Engagement with Health and Well Being Boards (Nottingham City and Nottinghamshire County) has led to Air Quality being included within the Joint Strategic Needs Assessment (JSNA) for the County and City since 2015 (JSNA Air Quality). The Council will continue to promote air quality issues via the NEPWG with health colleagues to promote air quality issues in emerging work.

2) Linked to the above the NEPWG are in the process of re-writing of the Nottinghamshire Air Quality Strategy 2008. A new draft strategy document has recently been approved by the County Health and Wellbeing Board ready for a final version to be published.

3) Continue to monitor for Nitrogen Dioxide in the areas of concern.

4) The revised Air Quality Action Plan has recently been published in final draft, following public consultation. It is expected to be formally adopted by the Council this summer.

5) Promotion of Air Quality Planning Guidance Document – with regard to the planning guidance document mentioned above, at the current time the document is informal. Therefore, the Council are encouraging developers, via planning consultations, to install mitigation as standard (for example electric vehicle charging points) proportionate to development size.

6) Our priorities in partnership with Nottinghamshire County Council are predominately measures to make the best use of the transport networks and through smarter travel measures that will encourage people to travel more sustainably. Measures will include:

- On-going 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 through the Nottingham Go-Ultra Low programme, including charging infrastructure and promotion events; and through the Bus Quality Partnerships, including the purchase of new vehicles and the retrofitting of buses
- On-going 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
- Upgrade of traffic signals at A60/Sir John Robinson Way junction (installation of MOVA and pedestrian detection) to enhance the existing SCOOT system
- Development of an online school travel toolkit
- Travel planning such as the development of new travel plans at businesses across the county through planning conditions
- Undertaking targeted personal travel planning with residents
- 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

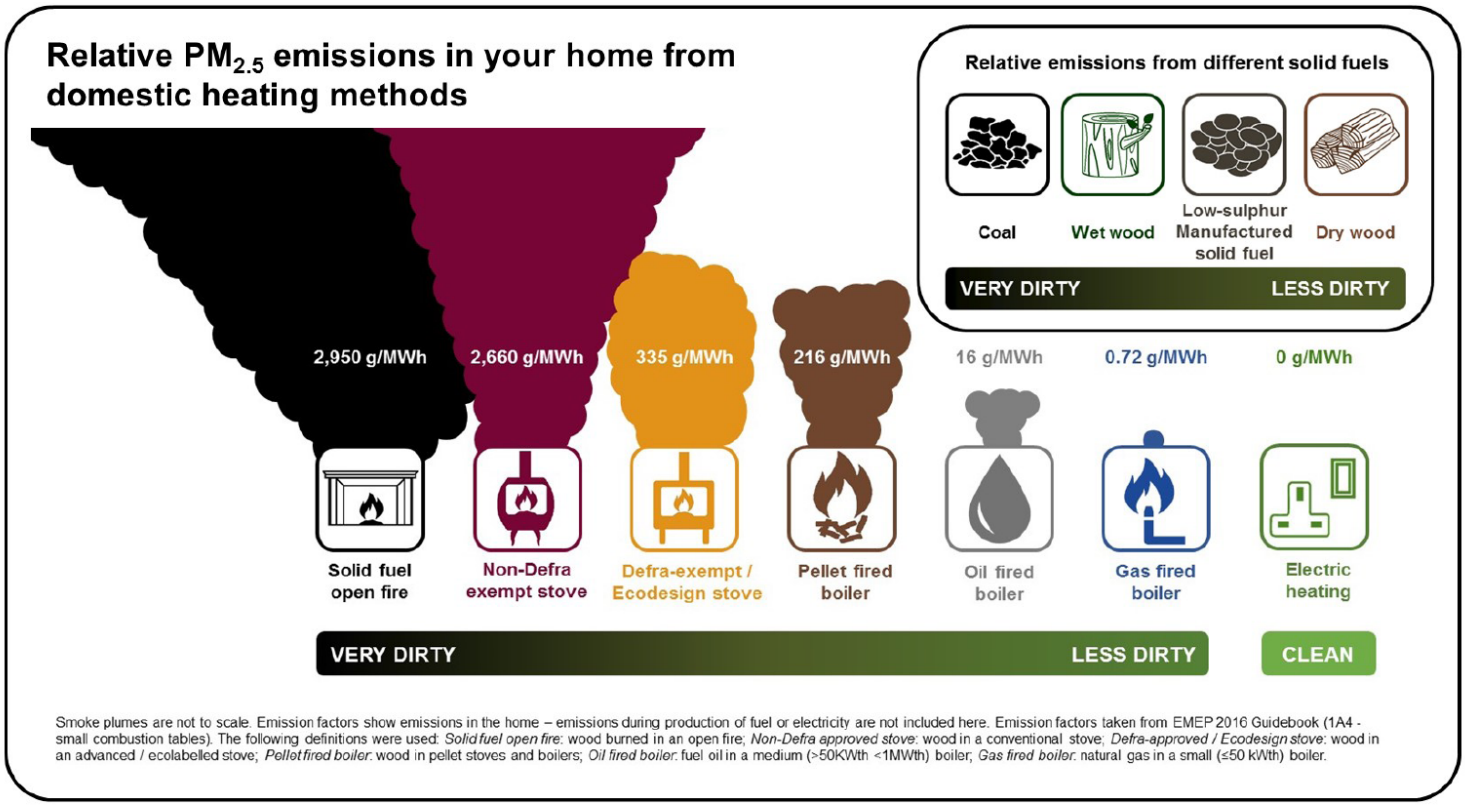
As a resident of Gedling Borough you can help to make a difference

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

Table of Contents

List of Tables

1 Local Air Quality Management

This report provides an overview of air quality in Gedling Borough during 2018. 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 can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Gedling Borough can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at the Councils Air Quality webpages.

Alternatively, see Appendix D: Maps of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan (inc. date of publication)
						At Declaration	Now	
Gedling No:2	16/03/2011	NO2 annual mean	Gedling	A60 Manfield Road (Oxclose Lane to Egerton Road)	NO	45 µg/m^3	39 µg/m^3	**Action Plan 2019**

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

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 acceptable for all sources and pollutants

Gedling Borough has taken forward a number of measures in pursuit of improving local air quality, found in the revised Air Quality Action Plan. Details of all measures found in the new Action Plan are set out in Table 2.2.

This is the first year of reporting on the new Action Plan therefore, no measures have been completed. However some measures have carried over from the previous Action Plan and are therefore on-going.

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

- Park and ride sites due to the lack of revenue funding available for undertaking the feasibility studies for such measures (and revenue running costs to support their implementation); as well as the lack of major scheme funding available for the delivery of such measures
- Introduction of a car club in the county as this will only be introduced once the club in the City proves consistently successful/self-sufficient over a period of time (the Nottingham City car club was only introduced in April 2014)
- Expansion of the cycle hire scheme due to the lack of revenue funding available for such schemes. The County Council is currently working with Nottingham City Council to investigate potential methods of delivering a self-sufficient scheme, which would not require revenue support by the authorities.

2.2.1 Target Pollution Reduction(s) in the AQMA

The reduction in NO2 emissions required, based on 2017 worse case adjusted diffusion tubes results this would equate to a **3µg/m^3 reduction in NO_2 from 43 to 40µg/m^3.**

The reduction in road NOx emissions required to meet the 40µg/m^3 objective has been calculated as **7.15µg/m^3 which represents a 14% reduction in roadside NOx**.

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

No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
Priority 1 - Work with the Highway Authority to manage traffic volume and improve flows.											
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	NCC/Via EM; integrated transport block funding	N/A	2019/20	Restrain average journey times in the morning peak to a 1% increase per year	5(L)	SCOOT and MOVA equipped signals within AQMA rephrased but require periodic review.		Further signal improvements planned at A60/Sir John Robinson Way. Following this a review of signal operation along AQMA corridor to be undertaken
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	Nottinghamshire County Council (NCC)/Via EM Ltd/Nottingham City Council (NCiC): NCC and NCiC revenue funding	N/A	Ongoing 2019-2024	Restrain average journey times in the morning peak to a 1% increase per year	4(S)		Ongoing	
3	Traffic control and management - co-ordination of street works to minimise traffic disruption and unnecessary congestion	Traffic Management	UTC, Congestion management, traffic reduction	NCC/Via EM/NCiC: NCC and NCiC revenue funding	N/A	Ongoing 2019-2024	Restrain average journey times in the morning peak to a 1% increase per year	3(S)		Ongoing	
4	Traffic control and management - management of incidents to minimise traffic disruption and unnecessary congestion	Traffic Management	UTC, Congestion management, traffic reduction	NCC/Via EM/NCiC/Highways England (HE): NCC, NCiC, HE revenue funding	N/A	Ongoing 2019-2024	Restrain average journey times in the morning peak to a 1% increase per year	2(S)		Ongoing	
5	Traffic control and management - Effective contingency planning to minimise traffic disruption and unnecessary congestion	Traffic Management	UTC, Congestion management, traffic reduction	NCC/Via EM Ltd: NCC revenue funding	N/A	Ongoing 2019-2024	Restrain average journey times in the morning peak to a 1% increase per year	2(S)		Ongoing	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	NCC/Via EM Ltd: NCC revenue funding	Ongoing	N/A		3(S)	Bus stop clearways introduced at bus stops within the AQMA where parked vehicles were identified as impeding traffic flows	Ongoing	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

No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
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	NCC; NCC revenue funding	N/A	Introduction of junction protection and targeted roadside parking restrictions along feeder corridors into the AQMA.	Manage parking to improve journey time reliability	2(S)	Introduction of junction protection and targeted roadside parking restrictions (including bus stop clearways) along feeder corridors into the AQMA to help traffic flows/journey times. CPE introduced in 2008. CCTV enforcement car introduced in 2016, with second vehicle purchased in 2018. Implementation ongoing	Ongoing	Parking restrictions already in place along A60, no additional side-road/off-line locations currently identified as requiring restrictions to aid trraffic flow
8	Improving links with local transport strategy	Transport Planning and Infrastructure	Other	NCC/GBC	N/A	Ongoing 2019-2024	N/A	N/A(S)		Ongoing	Ensuring existing strategies complement and enable actions to improve air quality
9	Analyse journeys through AQMA	Other	Other	NCC/GBC	Dependent on GBC securing funding	Dependent on GBC securing funding	survey	N/A(M)			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
10	Consider walking infrastructure and facility enhancements	Transport Planning and Infrastructure	Other policy	NCC/GBC	N/A	Ongoing	Increased walking trips	3(S)	Walking infrastructure improvements delivered as part of annual integrated transport programme. GBC secure s38 and s106 funding for improvements as part of new development	Ongoing	
11	Consider cycling infrastructure and facility enhancements	Transport Planning and Infrastructure	Other policy	NCC/GBC	N/A	Ongoing	Increased cycling trips	3(S)	Cycling infrastructure improvements delivered as part of annual integrated transport programme. GBC secure s38 and s106 funding for improvements as part of new development. NCC secured LGF and NCC funding tro deliver cycle network improvements delivered during 2018/19 improvements in Arnold	Ongoing	Arnold/Woodthorpe/Carlton strategic cycling network developed. NCC secured funding from LEP and NCC to be delivered during 2018/19

No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
Priority 2 - Ensure that future development is designed to reduce exposure and improve air quality.											
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	GBC	N/A	Ongoing	No. of AQ impact assessments related to AQMA	3(S)		Ongoing	
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	GBC/NCC	N/A	Ongoing 2019-2024	N/A	4(S)		Ongoing	
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	GBC/NCC	N/A	Ongoing 2019-2024	Sums collected for air quality projects	4(S)		Ongoing	
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	GBC	N/A	Ongoing 2019-2024	N/A	4(M)	AQ mitigation Conditions requested on 80 planning applications throughout the Borough	Ongoing	
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	GBC	2018	2019-2020	N/A	4(M)		14 charge points	Site investigation to determine feasibility and installation of infrastructure underway. To date 14 publicly-available charge points have been installed across the Borough (in two locations). Grants also available to help businesses install charging infrastructure

No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
Priority 3 - Promotion and education											
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	GBC/NCC Public Health	2019	Ongoing 2019-2024		3(M)	Commissioned toolkit for school communities to use	2020	
18	Communication and education - awareness raising of local air quality issues - the link with poor health	Public Information	Via other mechanisms	GBC/NCC Public Health	2018-19	Ongoing 2019-2024	Publication of relevant promotional material	1(M)		Ongoing	Nottinghamshire Clean Air Strategy currently being reviewed 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	GBC planning/NCC	N/A	Ongoing 2019-2024	Restrain average journey times in the morning peak to a 1% increase per year	3(S)	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
20	Promoting travel choices - Undertake personalised travel planning in Commuter Areas	Promoting Travel Alternatives	Personalised Travel Planning	NCC	2018	2019	Restrain average journey times in the morning peak to a 1% increase per year	3(M)	Funding DfT Access Fund funding secured by NCC to deliver PTP during 2019	2019	
21	Promotion of EV Charging Network	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	NCC/NCiC	N/A	2018-2020		4(M)	Go Ultra Low promotion of chraging infrastructure and vehicle events	2020	OLEV funding secured to promote take-up of ULEVs. Identification of potential sites underway. Promotion of GoUltra Low network
22	Promoting travel choices - Consideration of extending existing city-based car club into the county	Alternatives to private vehicle use	Car Clubs	NCC		Dependent on demonstration of success of existing Car Club	Restrain average journey times in the morning peak to a 1% increase per year	2(L)	Nottm city scheme introduced in 2014. Provider reviewed in 2018. Expansion of scheme into county dependent on its success which is still unclear		Funding for implementation to be determined
23	Promoting travel choices - The promotion and facilitation of car sharing schemes.	Alternatives to private vehicle use	Car & lift sharing schemes	NCC	N/A	Ongoing 2019-2024	Restrain average journey times in the morning peak to a 1% increase per year	2(S)	3,351 current members	Ongoing	
24	Promoting travel choices - Residential Travel Packs, to be issued to all new built homes	Promoting Travel Alternatives	Other	GBC/NCC	N/A	Ongoing 2019-2024	N/A	2(M)		Ongoing	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	NCC/NCiC/PT operators	N/A	Ongoing 2019-2024	Increased passenger transport patronage	2(S)	Implementation ongoing	Ongoing	Integrated ticketing strategy developed in 2014/15. New smartcard platform introduced in 2014. Robin Hood card scheme introduced in 2015
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	NCC/NCiC/PT operators	N/A	Ongoing 2019-2024	Increase passenger transport patronage	2(S)	Implementation ongoing	Ongoing	

No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
27	Public transport - publicise web based journey planners	Public Information	Other	NCC	N/A	Ongoing 2019-2024	Increased walking/cycling/ passenger transport trips	2(S)	Implementation ongoing	Ongoing	Available at http://www.nottinghamshire.gov.uk/transport/public-transport/plan-journey
28	Public transport - Consider bus provision on the A60 and surrounding area.	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	NCC/PT operators	N/A		Increased bus patronage	2(S)		Ongoing	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	NCC	N/A		N/A	2(S)		Ongoing	Capacity increases will be considered 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	NCC	N/A	2019-2020	Increased cycling trips	2(S)	Implementation ongoing. Cycling maps reviewed. PTP to be delivered during 2019/20 following completion of planned cycle route improvements	2020	Implementation ongoing. PTP to be delivered during 2019/20 following completion of planned cycle route improvements
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	NCC; DfT funding	N/A	Ongoing 2019-2024	Increased cycling trips	1(S)		Ongoing	7,518 people received cycle training in 2017/18. Implementation ongoing
Priority 4 - Reduce emissions from buses and taxis.											
33	Promotion of low emission vehicles through taxi licensing.	Promoting Low Emission Transport	Taxi emission incentives	GBC	2019	Ongoing 2019-2024	Review of Taxi Licence criteria	3(M)	ECO Stars Taxi Scheme to be implemented 2019/20		DEFRA Grant funding secured for 19/20
34	Target reductions in emissions from buses - ECOStars Fleet Recognition Scheme.	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	GBC	N/A	2018-19	Scheme membership	4(S)	7 bus/coach operators members. Operating ~740 vehicles		DEFRA Grant funding secured for 19/20
35	Target reductions in emissions from buses - Ongoing delivery of Quality Bus Partnerships	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	NCC/NCiC/PT operators; NCT (operator)	N/A	Ongoing 2019-2024	Ongoing take-up of cleaner vehicles	5(M)	SQBP in place affecting all buses travelling through AQMA	Ongoing	SQBP in place affecting all buses travelling through AQMA. Operator NCT secured £4.4m OLEV 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
36	Encouragement of low-emission public transport fleets (new vehicles and retro-fitting)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	NCC/PT operators	N/A	Ongoing 2019-2024	On-going take-up of cleaner vehicles	4(S)	Operator NCT secured £4.4m OLEV 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	Ongoing	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

No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
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	NCC/PT operators	N/A	Ongoing 2019-2024	On-going take-up of cleaner vehicles	4(S)		Ongoing	
Priority 5 - Reduce emissions from HGVs and LGVs.											
38	Target reductions in emissions from heavy and light goods vehicles - ECOStars Fleet Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	GBC	N/A	2018-19	Scheme membership	4(S)	106 HGV/LGV Members operating ~7000 vehicles		DEFRA Grant funding secured for 19/20
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	GBC	N/A	2018-19	N/A	3(S)		Continuation dependant of funding	Gedling Fleet a 4 star member
40	Target reductions in emissions from the council fleet and contract vehicles - Ensuring new vehicles procured are cleanest possible.	Vehicle Fleet Efficiency	Other	GBC	N/A	Ongoing 2019-2024	N/A	3(S)		Ongoing	
41	Target reductions in emissions from the council fleet and contract vehicles - GBC Green Procurement	Vehicle Fleet Efficiency	Other	GBC	N/A	Ongoing 2019-2024	N/A	2(M)		Ongoing	
Long Term Measures/Projects influencing AQMA											
42	The creation of a park and ride scheme.	Alternatives to private vehicle use	Bus based Park & Ride	NCC	2016-2026	Dependent on feasibility and funding availability		4(L)			This proposal is retained as a potential safeguarded scheme by NCC but is subject to feasibility, business case, planning, consultation, funding availability and political and public acceptability
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	NCC/NCiC/GBC				2(L)			Feasibility studies undertaken in 2016 determined no compelling case for inclusion in any programme. To be reviewed to be considered alongside future Local Plan growth strategies (post 2032). Future scheme dependent on feasibility, business case for any proposals, identifying appropriate site, prior to consultation and securing funding
44	Review of public transport infrastructure along A60 corridor	Transport Planning and Infrastructure	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	NCC/NCiC/GBC				4(L)			This proposal is 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/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.

The Borough Council does not monitor for $PM_{2.5}$ and so to understand the likely levels across the borough two points of reference have been taken.

1. The nearest relevant AURN site in Nottingham	Monitored annual mean concentration for 2018 is reported as 10µg/m^3
2. Modelled background levels	Downloaded from Defra webpages the background map for 2018 in Gedling is presented in Appendix D. Levels are predicted to be generally between 8.2 – 10.4µg/m^3.

The Council has a new role in working towards reducing emissions and concentrations of $PM_{2.5}$; no Air Quality Objective has been set but the World Health Organisation guideline value is 10µg/m^3.

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

- Construction Emission Strategies are routinely requested during the planning application stage of any development.
- Promotion of cleaner vehicle fleets via the ECO Stars Fleet Recognition scheme.
- 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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Gedling Borough undertook automatic (continuous) monitoring at one site during 2018 Table A.1 in Appendix A shows the details of the sites. National monitoring results are available HERE.

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 (passive) monitoring of NO_2 at 28 sites during 2018. Table A.2 in Appendix A shows the details of the sites. The monitoring programme is constantly reviewed to ensure that locations are still relevant and new sites are not required.

The Council has received two Planning contributions (Section 106) for:

- 4 additional tube locations (for 5 years) around a large housing development (former Gedling Colliery) which is currently under construction. This housing development will ultimately be served by a new highway (Gedling Access Road (GAR)) which is due to start construction in 2020.
- 3 additional tubes (for 5 years) on Trent Valley Way/Colwick Loop Road to assess the impact of a large development (Land off Teal Close). **These tubes will be reported from the Annual Status Report 2020 onward.**

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

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for “annualisation” and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Results of automatic monitoring

Table A.1 indicates the results for automatic monitoring for 2018 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 (2009 - 2018).

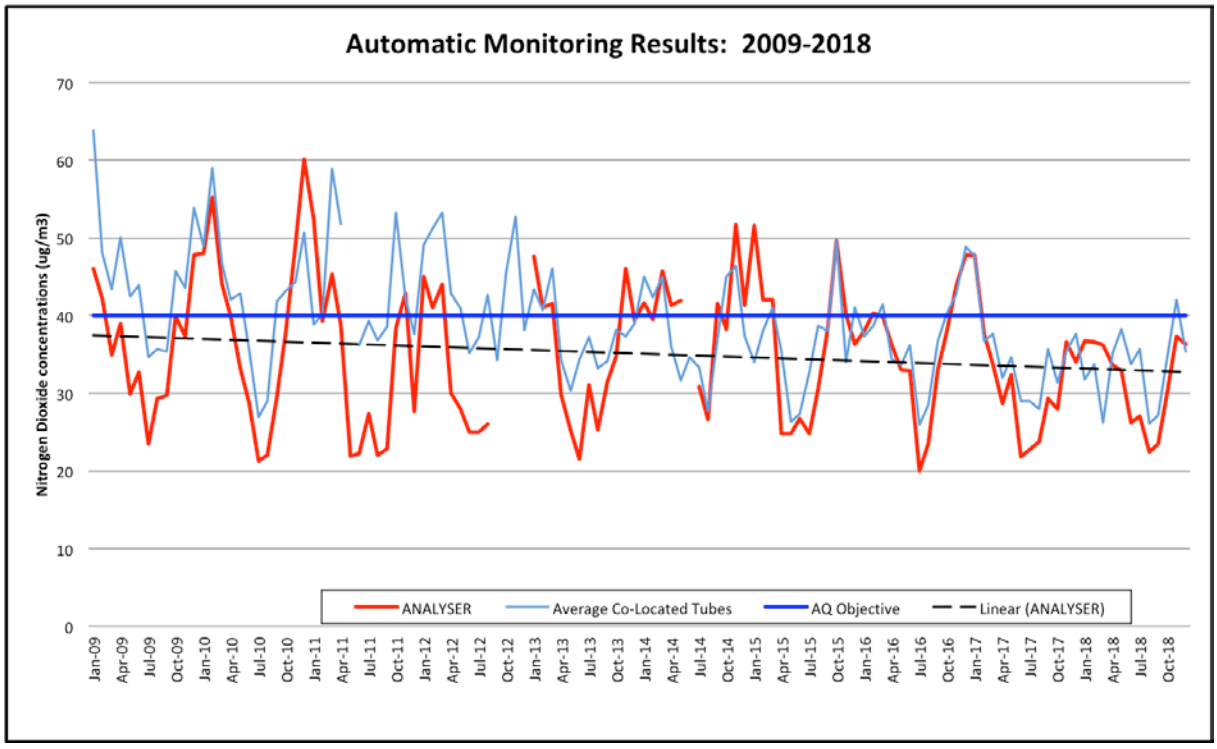


Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There were no exceedances of this objective in 2018.

Results of non-automatic (passive) monitoring

The results of diffusion tube monitoring for 2018 (Table A3) show no excedances 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 10-year period (2009 – 2018). 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.

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	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m)	Distance to kerb of nearest road (m)	Inlet Height (m)
GBC1	Daybrook Square	Roadside	457944	344596	NO_2	Y	Chemiluminescent	75	5	2

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
82492	Grove PH Daybrook Sq	Receptor	457947	344651	NO_2	Y	0m	3.5m	N	3m
82494	Hastings street	Urban background	460391	341413	NO_2	N	N/A	N/A	N	3m
82495	Marion Murdock Court	Urban background	461294	342826	NO_2	N	N/A	N/A	N	3m
82937	47 Plains Road, Mapperley	Receptor	459209	343513	NO_2	N	0m	7m	N	3m
87398	Morley Mills Building	Receptor	457969	344780	NO_2	Y	0m	3m	N	3m

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
87399	Mansfield Road, Redhill	Receptor	457866	345578	NO_2	Y	25m	10m	N	3m
87400	Daybrook Dental Surgery	Receptor	457867	345388	NO_2	Y	30m	2.3m	N	3m
87401	19 Victoria Road	Receptor	461995	341175	NO_2	N	0.5m	4m	N	3m
87402	36 Victoria Road	Receptor	462002	341097	NO_2	N	4m	1.6m	N	3m
87403, 87404, 87405	Daybrook Analyser	Co-located tubes	457944	344597	NO_2	Y	75m	5m	Y	2m
87406	Burton Rd/Shearing Hill	Receptor	462422	341972	NO_2	N	1m	16m	N	3m
87407	The Vale PH-Thackerays Ln	Receptor	457918	344358	NO_2	Y	15m	3.4m	N	3m
87408	Rickets Lane	Rural Background	456621	355935	NO_2	N	N/A	N/A	N	3m
87409	Wickes, Mansfield Road	Receptor	457904	345259	NO_2	Y	50m	3m	N	2m
87410	Civic Centre, Arnold	Urban background	458259	344723	NO_2	N	N/A	N/A	N	3m
87411	Colwick Park Close	Receptor	461103	340086	NO_2	N	1m	10m	N	3m

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
87412	Daybrook Fish Bar	Receptor	457947	344713	NO_2	Y	0m	3m	N	3m
87413	T&S Heating	Receptor	457950	344748	NO_2	Y	0m	3m	N	3m
87414	Frank Keys	Receptor	457969	344827	NO_2	Y	25m	3m	N	3m
87415	856 Plains Road	Receptor	458898	343139	NO_2	N	0m	8m	N	3m
87460	Rectory Road/Vale Road	Receptor	461161	340122	NO_2	N	19m	6.5m	N	3m
87461	Mile End Road	Receptor	461196	340108	NO_2	N	0.5m	3m	N	3m
87821	189 Plains Road	Roadside	343935	459611	NO_2	N	4.9m	1.7m	N	3m
87822	Memorial Hall, Gedling	Roadside	342480	461879	NO_2	N	9.5m	3.3m	N	3m
87824	Arnold Lane/High Hazels	Roadside	343196	461197	NO_2	N	2.3m	1.8m	N	3m
87823	Howieson Court	Roadside	344159	459974	NO_2	N	4.5m	1.9m	N	3m

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
					2014	2015	2016	2017	2018
GBC1	Roadside	Automatic	99.5	99.5	37	36	36	31	32
82492	Receptor	Diffusion Tube	100	100	36	33	35	34	29
82494	Urban background	Diffusion Tube	100	100	22	21	22	22	19
82495	Urban background	Diffusion Tube	100	100	18	17	18	16	16
82937	Receptor	Diffusion Tube	100	100	30	27	29	28	25
87398	Receptor	Diffusion Tube	100	100	35	32	34	31	30
87399	Receptor	Diffusion Tube	100	100	27	25	26	23	23
87400	Receptor	Diffusion Tube	100	100	33	32	33	31	30
87401	Receptor	Diffusion Tube	100	100	29	26	29	26	23
87402	Receptor	Diffusion Tube	100	100	29	33	30	31	28
87403	Co-located tubes	Diffusion Tube	100	100	36	33	34	31	31
87404	Co-located tubes	Diffusion Tube	100	100	34	33	35	31	31
87405	Co-located tubes	Diffusion Tube	100	100	35	33	35	30	31
87406	Receptor	Diffusion Tube	100	100	24	24	26	24	23
87407	Receptor	Diffusion Tube	100	100	30	36	29	35	33
87408	Rural Background	Diffusion Tube	92	92	14	11	14	15	15
87409	Receptor	Diffusion Tube	100	100	31	30	32	30	28
87410	Urban background	Diffusion Tube	100	100	19	18	18	18	16

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2014	2015	2016	2017	2018
87411	Receptor	Diffusion Tube	100	100	25	23	25	23	23
87412	Receptor	Diffusion Tube	100	100	39	37	**44**	**43**	39
87413	Receptor	Diffusion Tube	100	100	**41**	38	**42**	**41**	37
87414	Receptor	Diffusion Tube	75	75	37	35	37	33	31
87415	Receptor	Diffusion Tube	92	92	27	25	28	26	23
87460	Receptor	Diffusion Tube	100	100	30	29	28	27	25
87461	Receptor	Diffusion Tube	58	58	39	36	38	33	31
87821	Roadside	Diffusion Tube	100	100					25
87822	Roadside	Diffusion Tube	100	100					36
87824	Roadside	Diffusion Tube	83	83					20
87823	Roadside	Diffusion Tube	100	100					32

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

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

☒ **If applicable, all data has been distance corrected for relevant exposure**

Notes:

Exceedances of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

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

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

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

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

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
GBC1	Roadside	Automatic	99.7	99.7	0 (167)	22(218)	0	0	0

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

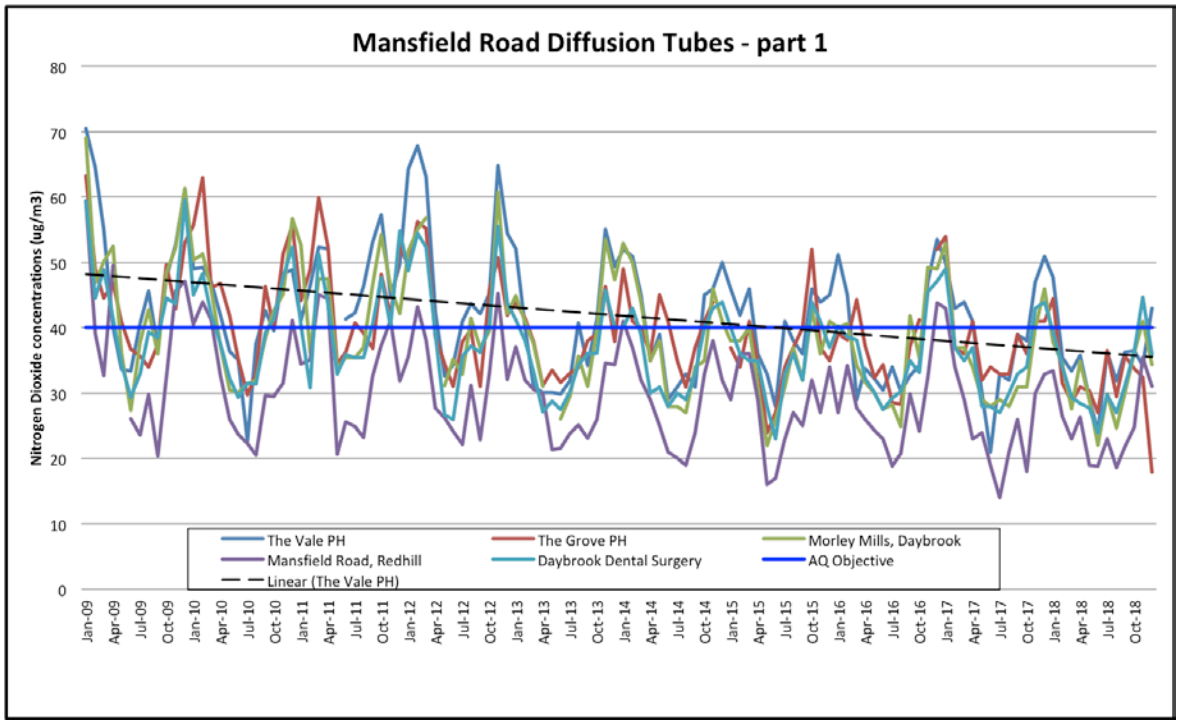
(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

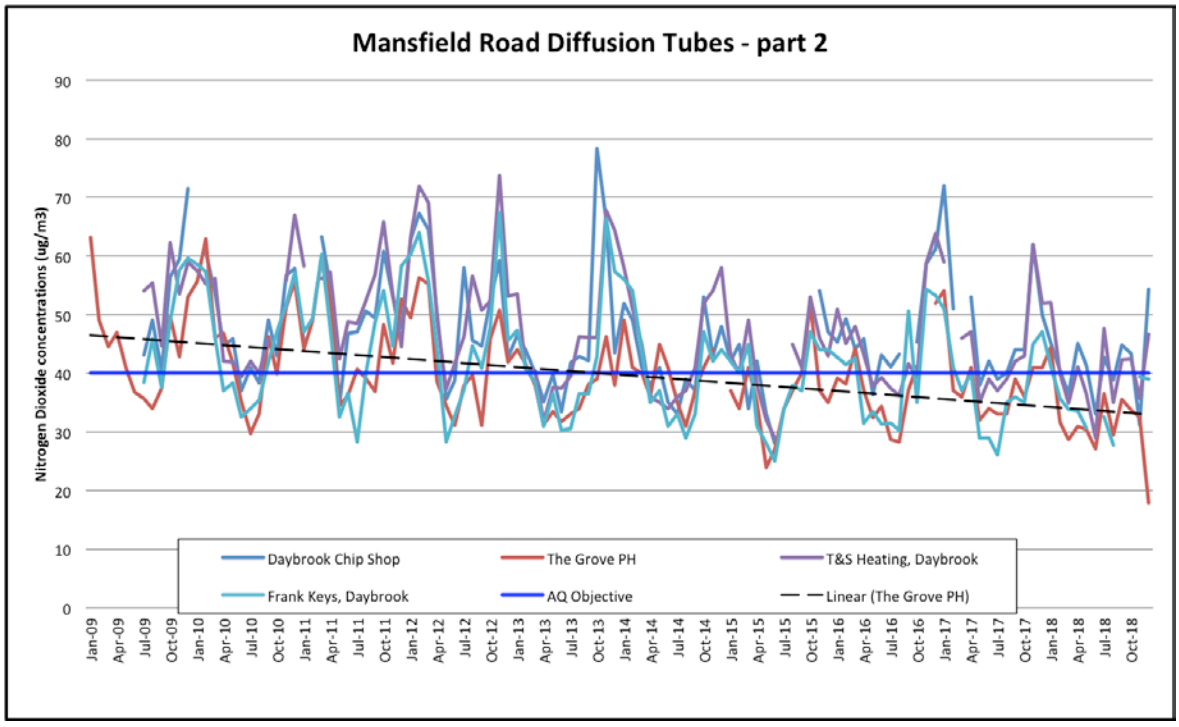
(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

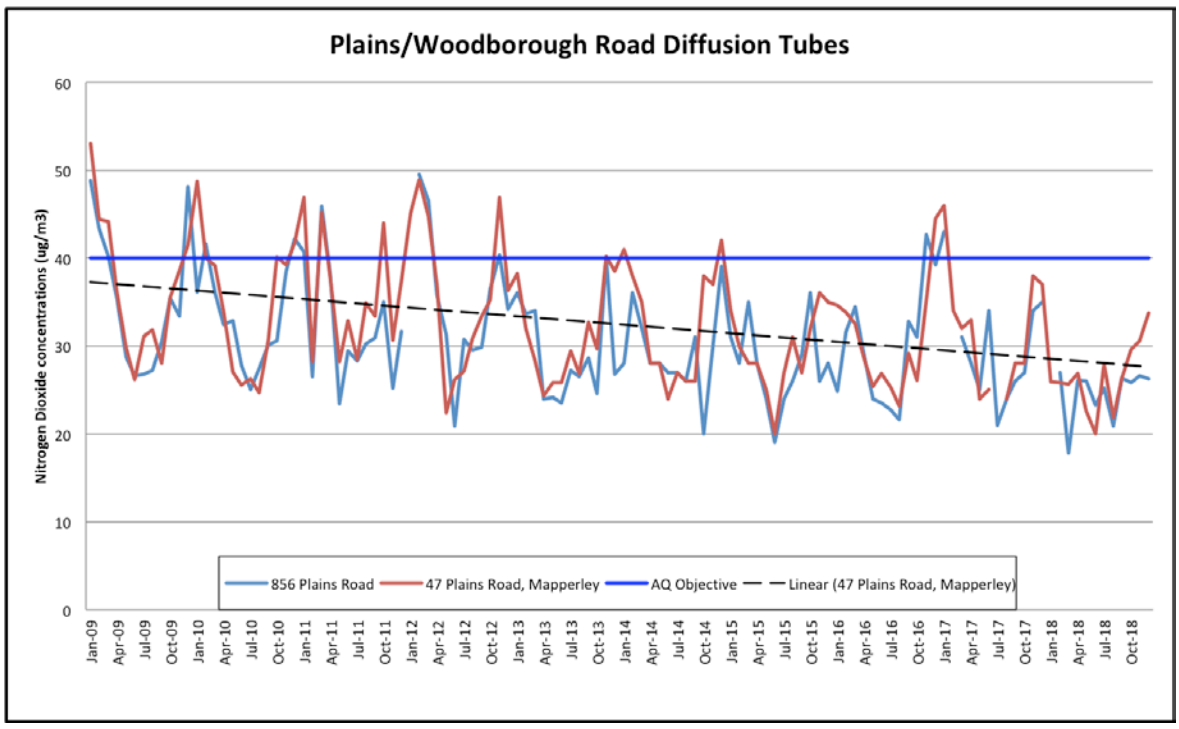
(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

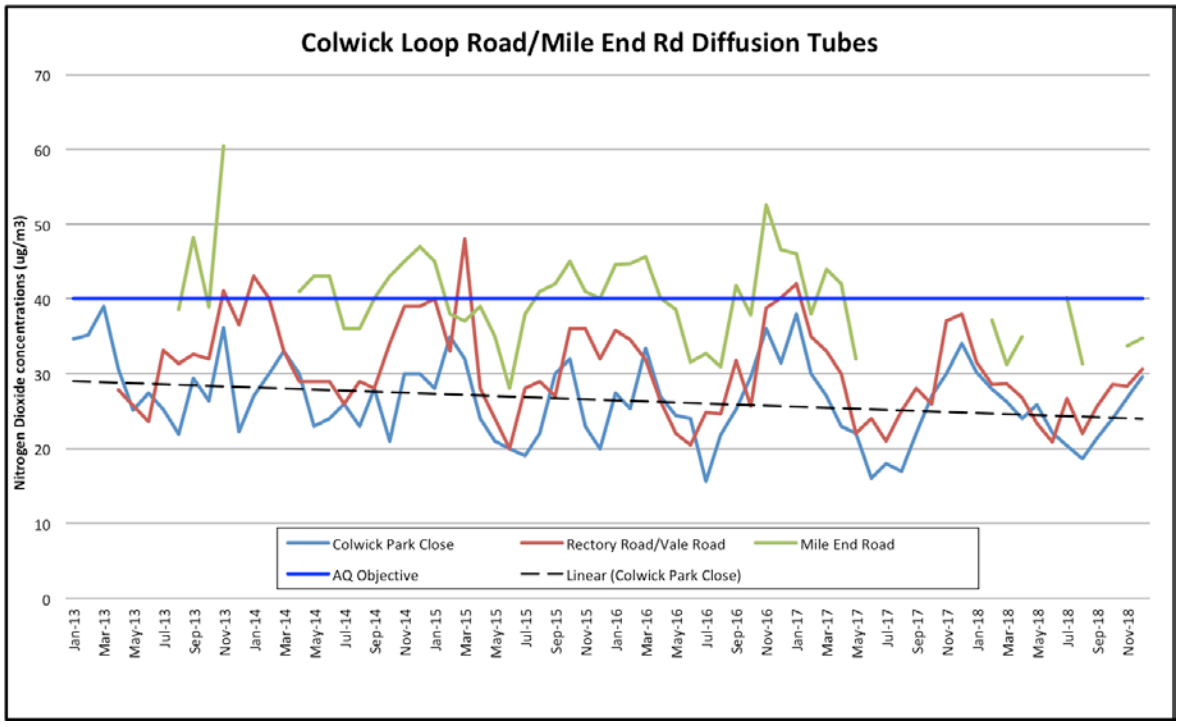
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

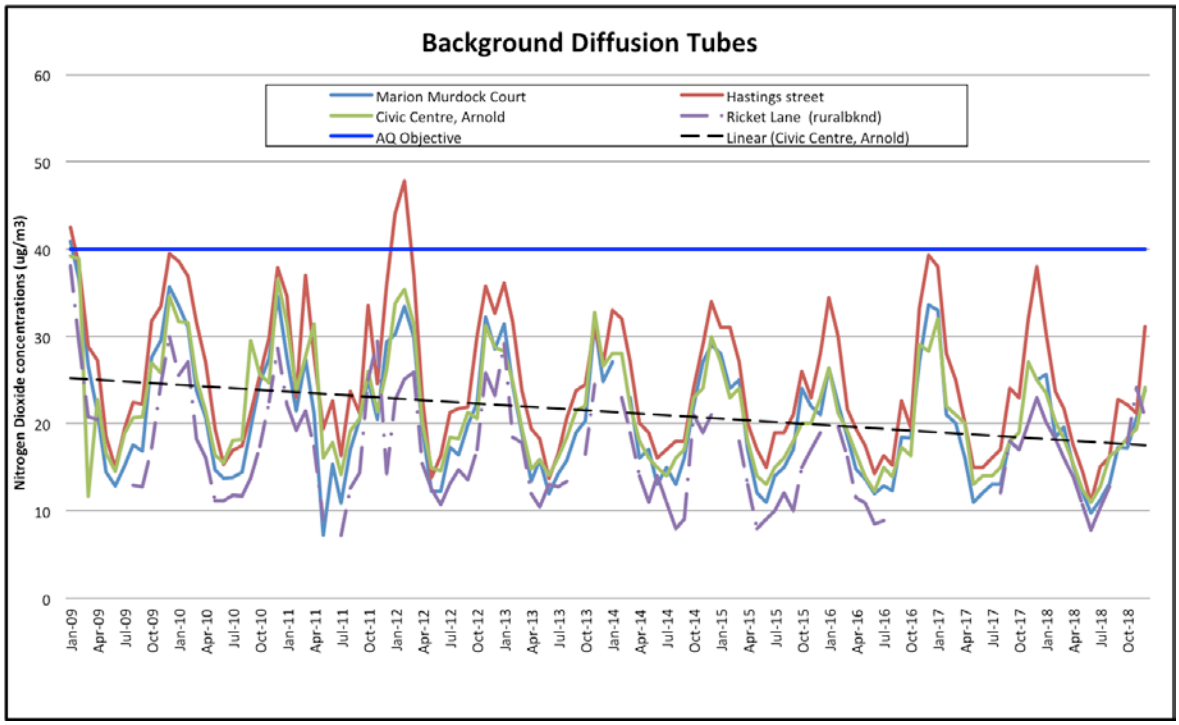
Nitrogen Dioxide Diffusion Tube Results 2009 – 2018






Plains/Woodborough Road Diffusion Tubes
Nitrogen Dioxide concentrations (ug/m3)
856 Plains Road
47 Plains Road, Mapperley
AQ Objective
Linear (47 Plains Road, Mapperley)


Colwick Loop Road/Mile End Rd Diffusion Tubes
Nitrogen Dioxide concentrations (ug/m3)
Colwick Park Close
Rectory Road/Vale Road
Mile End Road
AQ Objective
Linear (Colwick Park Close)


Background Diffusion Tubes
Marion Murdock Court
Hastings street
Civic Centre, Arnold
Ricket Lane (ruralbknd)
AQ Objective
Linear (Civic Centre, Arnold)
Nitrogen Dioxide concentrations (ug/m3)
60
50
40
30
20
10
0
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results – 2018

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.93) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
82492	44	32	29	31	30	27	37	29	36	34	32	18	32.0	29.0	
82494	30	24	22	18	15	11	15	16	23	22	21	31	21.0	19.0	
82495	26	18	20	15	12	10	11	13	17	17	21	24	17.0	16.0	
82937	26	26	26	27	23	20	28	22	26	30	31	34	26.0	25.0	
87398	38	35	28	35	29	22	30	25	30	36	41	34	32.0	30.0	
87399	33	27	23	26	19	19	23	19	22	25	35	31	25.0	23.0	
87400	40	34	29	28	28	24	30	27	31	36	45	36	32.0	30.0	
87401	32	29	0	28	26	22	27	20	24	28	27	31	24.0	23.0	
87402	36	32	30	29	24	23	32	27	33	31	32	36	30.0	28.0	
87403	35	33	26	33	38	32	34	26	26	33	40	37	33.0	31.0	
87404	28	32	30	35	38	33	36	28	28	36	44	33	34.0	31.0	
87405	33	35	22	37	39	35	37	25	27	36	41	36	34.0	31.0	
87406	28	25	22	23	26	22	25	20	25	30	23	31	25.0	23.0	
87407	48	35	33	36	29	24	36	32	36	36	34	43	35.0	33.0	

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.93) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
87408	20	18	16	14	11	8	10	13	-	18	24	21	16.0	15.0	
87409	41	33	29	29	24	19	25	25	30	33	35	39	30.0	28.0	
87410	24	20	18	15	12	11	13	16	17	18	19	24	17.0	16.0	
87411	30	28	26	24	26	22	20	19	21	24	27	30	25.0	23.0	
87412	45	41	37	45	41	33	43	39	45	43	31	54	41.0	39.0	
87413	52	40	35	41	36	29	48	35	42	42	36	47	40.0	37.0	
87414	41	36	34	34	31	-	33	28	-	-	39	39	35.0	31.0	
87415	-	27	18	26	26	23	25	21	26	26	27	26	25.0	23.0	
87460	32	29	29	27	23	21	27	22	26	29	28	31	27.0	25.0	
87461	-	37	31	35	-	-	40	31	-	-	34	35	35.0	31.0	
87821	34	27	27	25	22	43	23	21	21	27	29	30	27.0	25.0	
87822	40	38	40	38	35	32	44	37	40	41	37	48	39.0	36.0	29.8
87824	-	25	25	23	20	17	11	17	19	-	27	30	21.0	20.0	
87823	36	35	35	36	35	28	30	28	34	20	31	66	35.0	32.0	

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

Notes:

Exceedances of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

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

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

(2) Distance corrected to nearest relevant public exposure.

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

Nitrogen Dioxide Diffusion Tubes

Overview

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.

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[6] 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.

Chemiluminescent Monitor Data

Overview

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.

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

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	99.7% 2016
95% 2002	83% 2007	54% 2012*	99% 2017
97% 2003	81% 2008	91% 2013	99% 2018
98% 2004	95% 2009	80% 2014**	
96% 2005	95% 2010	81% 2015*	

*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, 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.

Diffusion Tube Bias Adjustment Factors

National Bias Adjustment Factors (BAF) have been obtaining using the co-location studies spreadsheet available at http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

The Gradko national BAF 2018 for 20% TEA in water is given as **0.93** from 34 studies of various types. (See screen shot in this appendix)

Factor from Local Co-location Studies

A co-location study was carried out with the GBC NOx analyser.
Attached to this appendix the AEA spreadsheet for calculating bias, precision and accuracy of triplicate tubes. The bias factor calculated is also **0.95**.

Discussion of Choice of Factor to Use

Based on guidance Box7.11 in LAQM TG(16) GBC has used the **national** bias adjustment factor when adjusting diffusion tube results.

Adjustment for Receptor Distance

One of the diffusion tube locations is not representative of the receptor concerned and its annual average was within 10% of the air quality objective.

1. Memorial Hall, Gedling

Due to site constraints the tube is located as close as possible to receptors. The result has therefore been adjusted using the 'NO_2 with distance from roads' spreadsheet; available at http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

Background concentrations have been taken from the nearest urban background diffusion tube; the average of Marion Murdock Court and Hastings Street UB tubes. (18.85µg/m^3). Screen shots of these spreadsheets are attached to this appendix.

Short-term to Long-term Data adjustment

Diffusion tube data from two locations: Frank Keys, Daybook and Mile End Road, were incomplete for 2018. As such the annual average has been "annualised" as in Box 7.10 of LAQM TG16. Table A1 below shows details of the data used and factors produced to adjust the tube results.

Table A.1 Short-Term to Long-Term Monitoring Data Adjustment

Frank Keys, Daybrook Tube (ref.87414)

Long term site	Annual Mean 2018 (Am)	Period Mean 2018 (Pm)	Ratio
Nottingham Urban Centre	28.0	28.33	0.99
Leicester University	23.0	23.67	0.97
Northampton Spring Park	13.0	13.89	0.94
		Average ratio	**0.97**

Mile End Road Tube (ref.87461)

Long term site	Annual Mean 2018 (Am)	Period Mean 2018 (Pm)	Ratio
Nottingham Urban Centre	28.0	28.29	0.99
Leicester University	23.0	23.14	0.99
Northampton Spring Park	13.0	14.29	0.91
		Average ratio	**0.96**

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	03/01/2018	31/01/2018	34.6	27.9	32.8	32	3.5	11	8.6	36.7	96.6	Good	Good
2	31/01/2018	01/03/2018	33.2	32.4	35.5	34	1.6	5	3.9	36.6	99.9	Good	Good
3	01/03/2018	28/03/2018	26.2	30.3	22.2	26	4.1	16	10.1	36.2	99.7	Good	Good
4	28/03/2018	01/05/2018	32.8	35.3	37.2	35	2.2	6	5.5	33.6	99.9	Good	Good
5	01/05/2018	06/06/2018	38.3	38.0	38.5	38	0.3	1	0.6	32.9	99.8	Good	Good
6	06/06/2018	04/07/2018	32.5	33.5	35.3	34	1.4	4	3.5	26.2	99.1	Good	Good
7	04/07/2018	01/08/2018	34.0	35.6	37.4	36	1.7	5	4.3	27	99.9	Good	Good
8	01/08/2018	06/09/2018	25.9	27.8	24.7	26	1.6	6	3.9	22.4	99.9	Good	Good
9	06/09/2018	03/10/2018	26.4	28.2	26.8	27	0.9	3	2.3	23.4	99.8	Good	Good
10	03/01/2018	31/10/2018	33.0	35.9	36.1	35	1.7	5	4.2	30.4	99.6	Good	Good
11	31/10/2018	06/12/2018	40.3	44.4	41.5	42	2.1	5	5.3	37.3	99.9	Good	Good
12	06/12/2018	09/01/2019	36.5	32.8	36.4	35	2.1	6	5.3	36.3	99.9	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

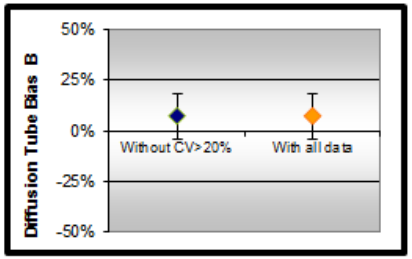
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Daybrook Square

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

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.95 (0.86 - 1.06)
Bias B	6% (-6% - 17%)
Diffusion Tubes Mean:	33 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	32 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	32 (29 - 35) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.95 (0.86 - 1.06)
Bias B	6% (-6% - 17%)
Diffusion Tubes Mean:	33 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	32 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	32 (29 - 35) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Co-Location Spreadsheet 2018 Gradko Analysed

Adjustment of SINGLE Tubes

AEA Energy & Environment
From the AEA group

Site Name/ID	Periods													Raw Mean	Valid periods	Adjusted measurement (95% confidence interval) with all the data 12 periods used in this calcuations
	1	2	3	4	5	6	7	8	9	10	11	12	13			Bias Factor A 0.95 (0.86 - 1.06) Bias B 6% (-6% - 17%) Tube Precision: 6 Automatic DC: 100%
The Grove PH - Daybrook Sq	44.5	31.6	29.0	30.9	30.4	27.0	36.5	29.5	36.0	34.0	32.5	18.0		31.6	12	Adjusted with 95% CI 30 (27 - 34)
Hastings Street	30.4	23.7	22.0	17.6	14.6	11.0	15.1	16.2	23.0	22.0	21.2	31.0		20.6	12	Adjusted with 95% CI 20 (18 - 22)
Marion Murdock Court	25.7	18.5	20.0	15.2	12.1	10.0	11.2	13.2	17.0	17.0	20.7	24.0		17.0	12	Adjusted with 95% CI 16 (15 - 18)
47 Plains Road	25.9	25.8	26.0	26.9	22.6	20.0	28.0	21.9	26.0	30.0	30.6	34.0		26.5	12	Adjusted with 95% CI 25 (23 - 28)
Morley Mills, Daybrook	37.9	34.6	28.0	34.8	29.0	22.0	29.8	24.7	30.0	36.0	41.0	34.0		31.8	12	Adjusted with 95% CI 30 (27 - 34)
Mansfield Road, Redhill	33.4	26.5	23.0	26.4	19.0	19.0	23.0	18.6	22.0	25.0	35.4	31.0		25.2	12	Adjusted with 95% CI 24 (22 - 27)
Daybrook Dental Surgery	39.5	34.0	29.0	28.4	27.8	24.0	29.7	27.0	31.0	36.0	44.6	36.0		32.3	12	Adjusted with 95% CI 31 (28 - 34)
Victoria Road, Netherfield	31.6	28.9	0.0	27.7	25.8	22.0	26.6	20.5	24.0	28.0	26.8	31.0		24.4	12	Adjusted with 95% CI 23 (21 - 26)
Victoria Road, Netherfield	36.5	32.4	30.0	29.3	23.6	23.0	31.6	26.7	33.0	31.0	31.6	36.0		30.4	12	Adjusted with 95% CI 29 (26 - 32)
Burton Rd/Shearing Hill	28.4	25.4	22.0	23.2	26.3	22.0	25.2	19.6	25.0	30.0	22.7	31.0		25.1	12	Adjusted with 95% CI 24 (22 - 27)
The Vale PH - Thackerays Lane	47.8	35.5	33.0	35.7	29.2	24.0	36.2	31.8	36.0	36.0	34.2	43.0		35.2	12	Adjusted with 95% CI 33 (30 - 37)
Ricket Lane (ruralbknd)	20.1	18.2	16.0	13.9	10.7	8.0	10.4	12.8	-	18.0	24.1	21.0		15.7	11	Adjusted with 95% CI 15 (14 - 17)
Wickes Store, Daybrook	40.7	32.7	29.0	29.2	24.5	19.0	24.7	25.0	30.0	33.0	35.2	39.0		30.1	12	Adjusted with 95% CI 29 (26 - 32)
Civic Centre, Arnold	23.5	20.2	18.0	15.4	12.4	11.0	12.7	16.2	17.0	18.0	19.4	24.0		17.3	12	Adjusted with 95% CI 16 (15 - 18)
Colwick Park Close	30.2	28.0	26.0	24.0	25.8	22.0	20.4	18.6	21.0	24.0	26.8	30.0		24.7	12	Adjusted with 95% CI 23 (21 - 26)
Daybrook Chip Shop	45.2	40.5	37.0	45.1	41.4	33.0	42.7	38.9	45.0	43.0	31.2	54.0		41.4	12	Adjusted with 95% CI 39 (36 - 44)
T&S Heating, Daybrook	52.1	39.9	35.0	41.2	36.5	29.0	47.6	35.0	42.0	42.0	35.8	47.0		40.2	12	Adjusted with 95% CI 38 (35 - 43)
Frank Keys, Daybrook	41.3	35.8	34.0	33.6	30.7	-	32.6	27.8	-	-	39.4	39.0		34.9	9	Adjusted with 95% CI 33 (30 - 37)
856 Plains Road	-	27.0	18.0	26.1	26.0	23.0	25.2	20.9	26.0	26.0	26.6	26.0		24.6	11	Adjusted with 95% CI 23 (21 - 26)
Rectory Road/Vale Road	31.6	28.6	29.0	26.8	23.3	21.0	26.7	22.0	26.0	29.0	28.4	31.0		26.9	12	Adjusted with 95% CI 26 (23 - 29)
Mile End Road	-	37.1	31.0	35.0	-	-	40.1	31.4	-	-	33.7	35.0		34.7	7	Adjusted with 95% CI 33 (30 - 37)
189 Plains Road	34.0	26.6	27.0	25.1	21.8	43.0	22.9	21.1	21.0	27.0	28.7	30.0		27.3	12	Adjusted with 95% CI 26 (24 - 29)
Memorial Hall, Gedling	40.0	38.2	40.0	38.3	35.3	32.0	43.5	36.8	40.0	41.0	37.3	48.0		39.2	12	Adjusted with 95% CI 37 (34 - 42)
Arnold Lane/High Hazels	-	25.4	25.0	22.5	20.2	17.0	10.6	17.5	19.0	-	27.5	30.0		21.5	10	Adjusted with 95% CI 20 (18 - 23)
Howieson Court	36.5	34.9	35.0	35.8	35.2	28.0	29.7	28.0	34.0	20.0	31.2	66.0		34.5	12	Adjusted with 95% CI 33 (30 - 37)

The bias adjustment factor used in these calculations include all the data and no screening of data due to poor precision has been applied.

2018 Diffusion Gradko Analysed Tube Results

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/19

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

This spreadsheet will be updated at the end of June 2019

LAQM Helpdesk Website

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

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

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

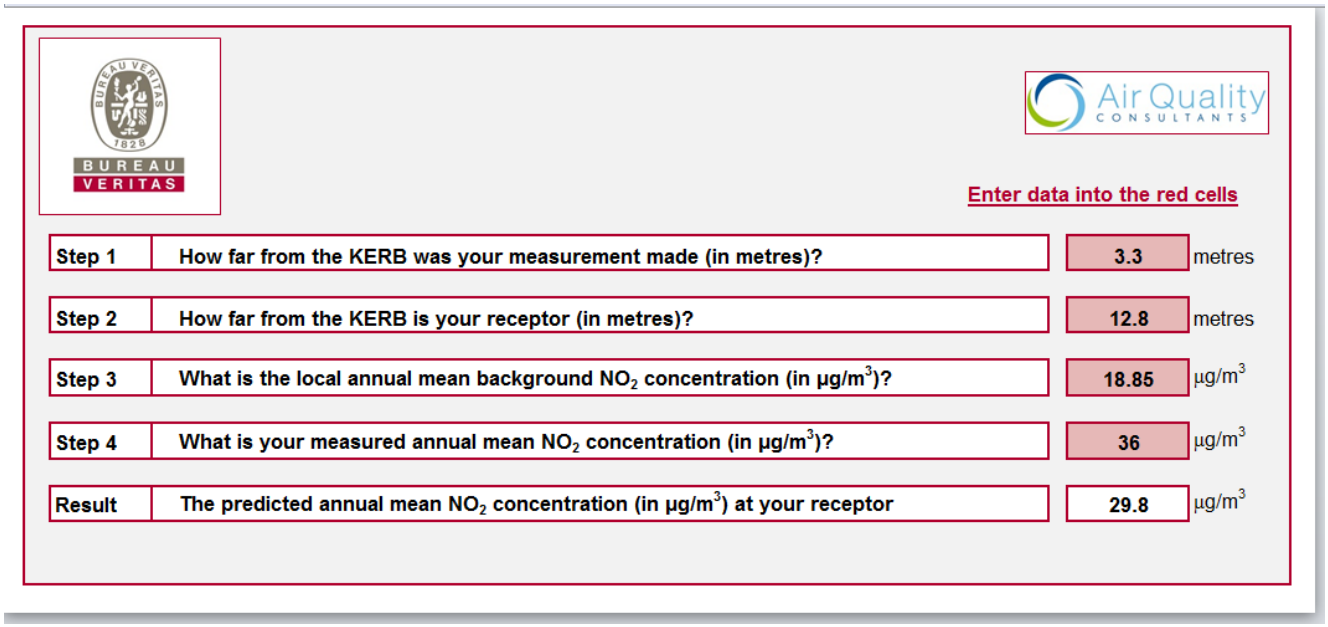
Step 4:

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

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

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2018	R	Eastleigh Borough Council	11	28	32	-12.0%	G	**1.14**
Gradko	20% TEA in water	2018	R	Eastleigh Borough Council	12	42	38	10.2%	G	**0.91**
Gradko	20% TEA in water	2018	UB	Eastleigh Borough Council	12	27	28	-4.4%	G	**1.05**
Gradko	20% TEA in water	2018	R	Gateshead Council	12	29	25	13.9%	G	**0.88**
Gradko	20% TEA in water	2018	R	Gateshead Council	12	32	29	10.8%	G	**0.90**
Gradko	20% TEA in water	2018	R	Gateshead Council	9	40	41	-1.8%	G	**1.02**
Gradko	20% TEA in water	2018	R	Wokingham Borough Council	12	38	33	13.2%	G	**0.88**
Gradko	20% TEA in water	2018	R	Bath & North East Somerset	12	40	39	4.0%	G	**0.96**
Gradko	20% TEA in water	2018	R	Bedford Borough Council	10	30	27	8.8%	G	**0.92**
Gradko	20% TEA in water	2018	KS	Marylebone Road Intercomparison	11	93	85	9.3%	G	**0.91**
Gradko	20% TEA in water	2018	R	South Gloucestershire Council	12	21	20	6.3%	G	**0.94**
Gradko	20% TEA in water	2018	R	Thurrock Borough Council	12	53	52	2.3%	S	**0.98**
Gradko	20% TEA in water	2018	R	Thurrock Borough Council	12	34	30	15.1%	G	**0.87**
Gradko	20% TEA in water	2018	R	Thurrock Borough Council	12	31	24	28.8%	G	**0.78**
Gradko	20% TEA in water	2018	UB	Thurrock Borough Council	12	27	25	9.2%	S	**0.92**
Gradko	20% TEA in water	2018		**Overall Factor[3] (30 studies)**				**Use**		**0.93**

Gradko 20%TEA in Water Co-location Studies 2018

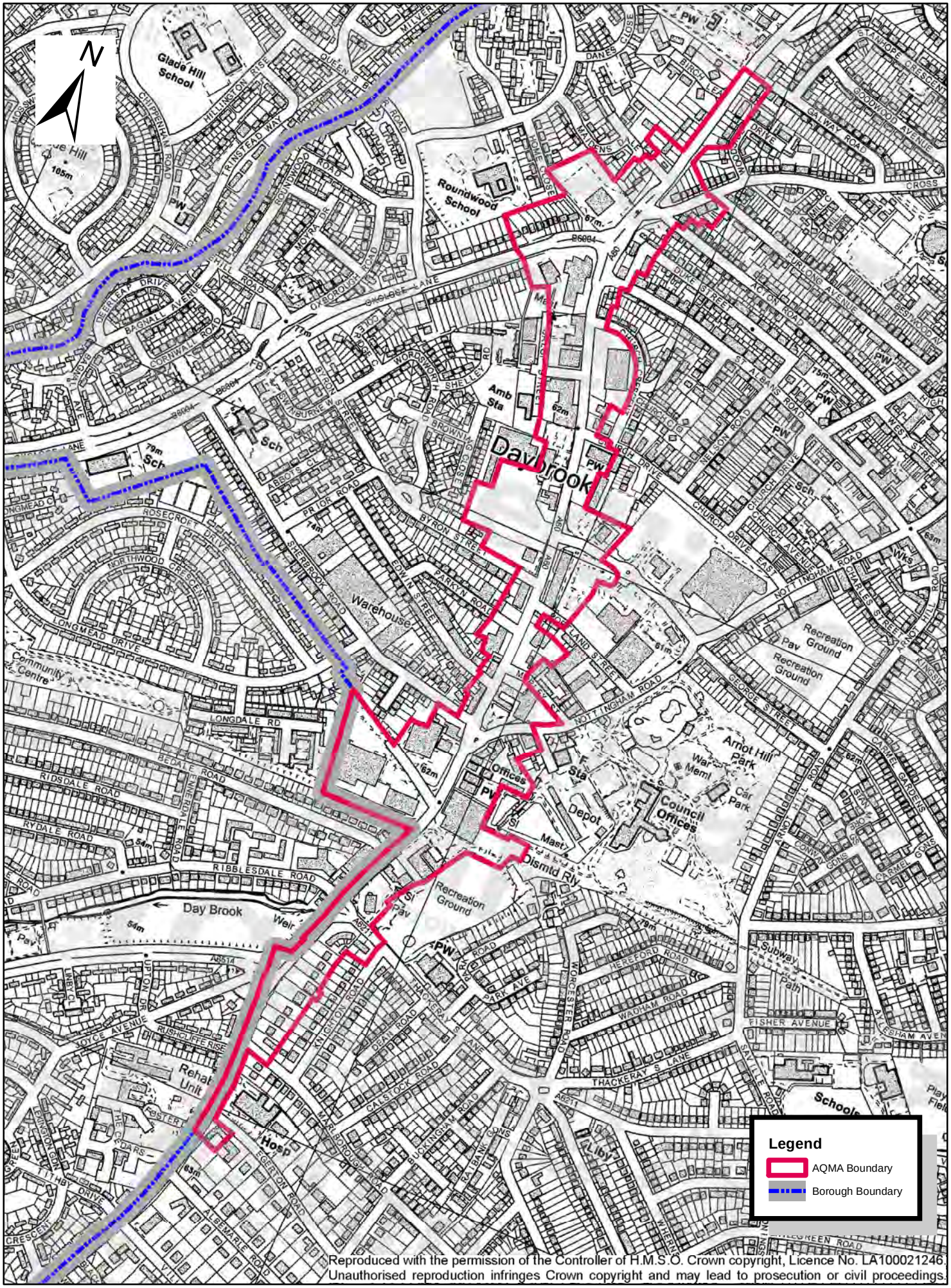


Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	3.3	metres
Step 2	How far from the KERB is your receptor (in metres)?	12.8	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	18.85	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	36	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	29.8	$\mu g/m^3$

Memorial Hall, Gedling Calculation for Distance to Receptor

Appendix D: Maps

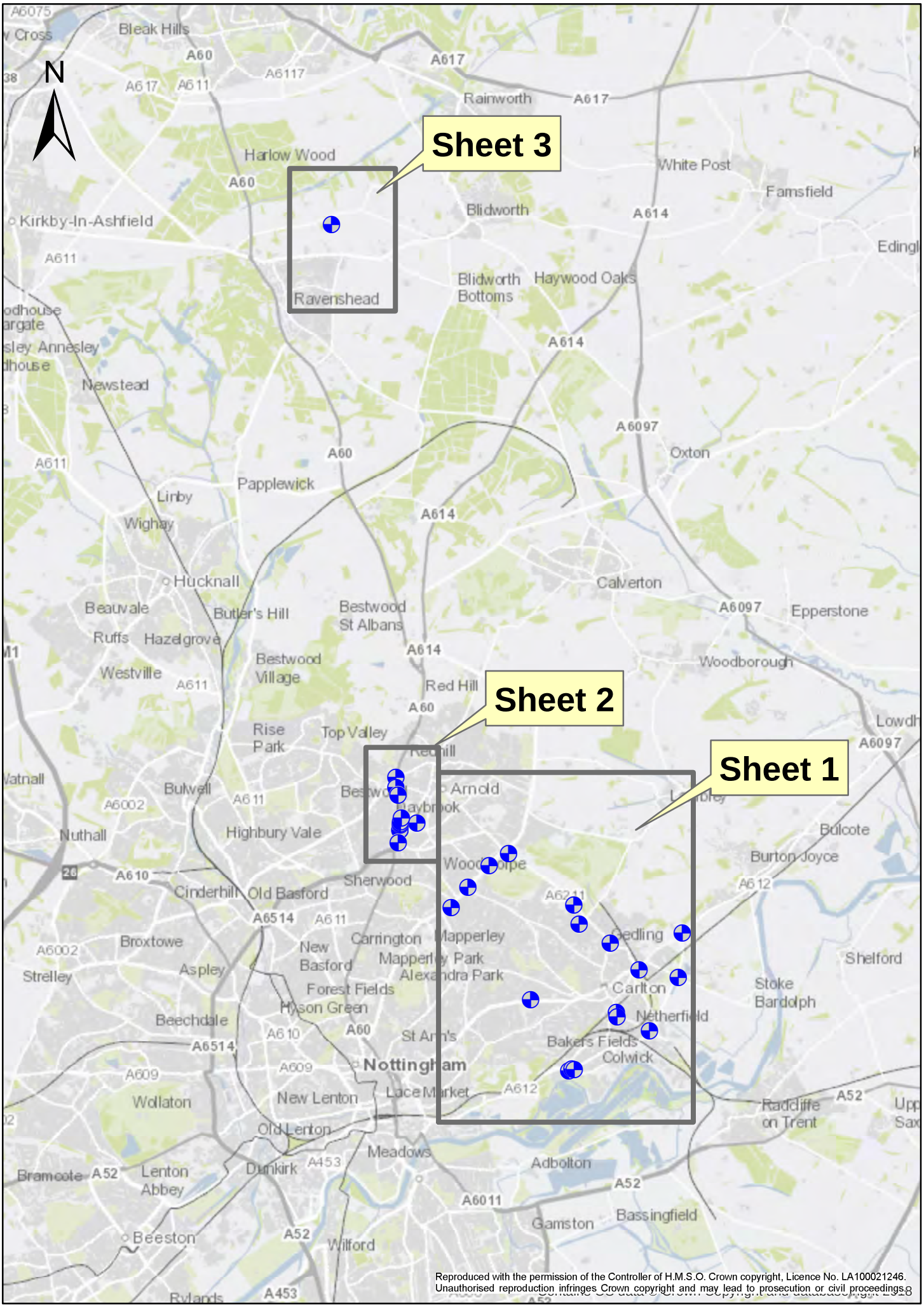


Gedling Borough Council

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

Scale 1:7,500

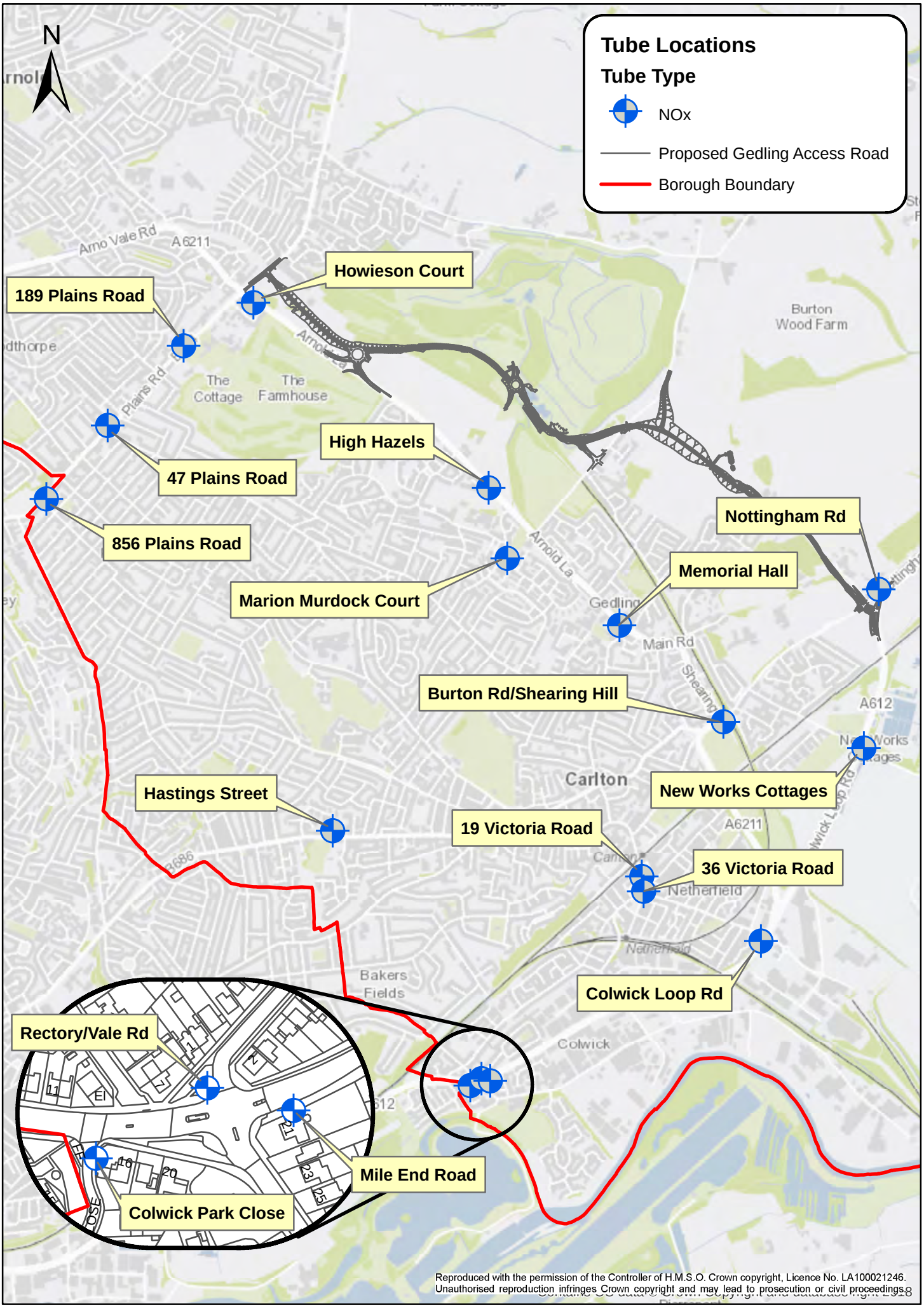
Date April 2011



Gedling Borough Council

Sheet Locations

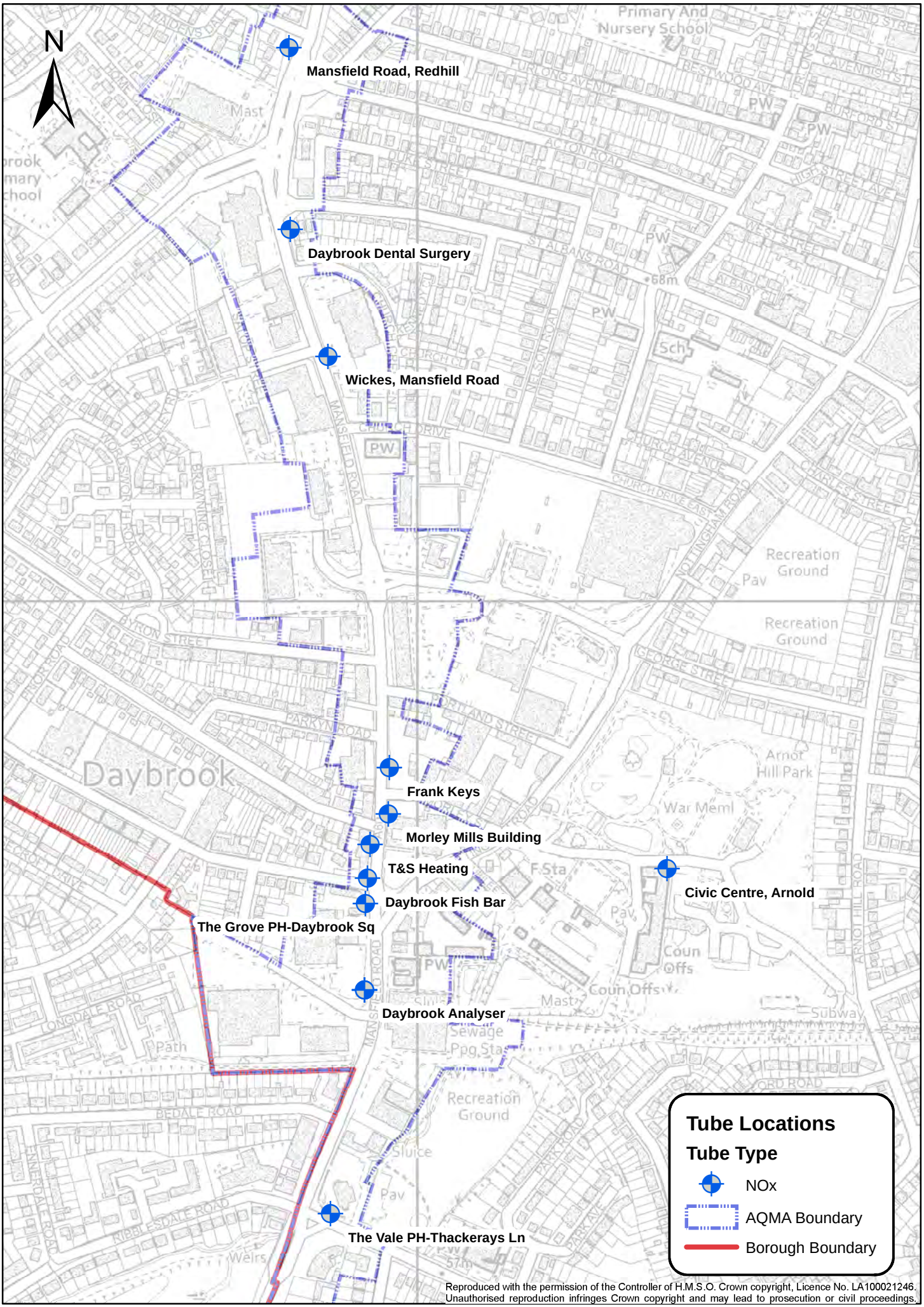
Scale: nts



Gedling Borough Council

DiffusionTube Locations - Sheet 1

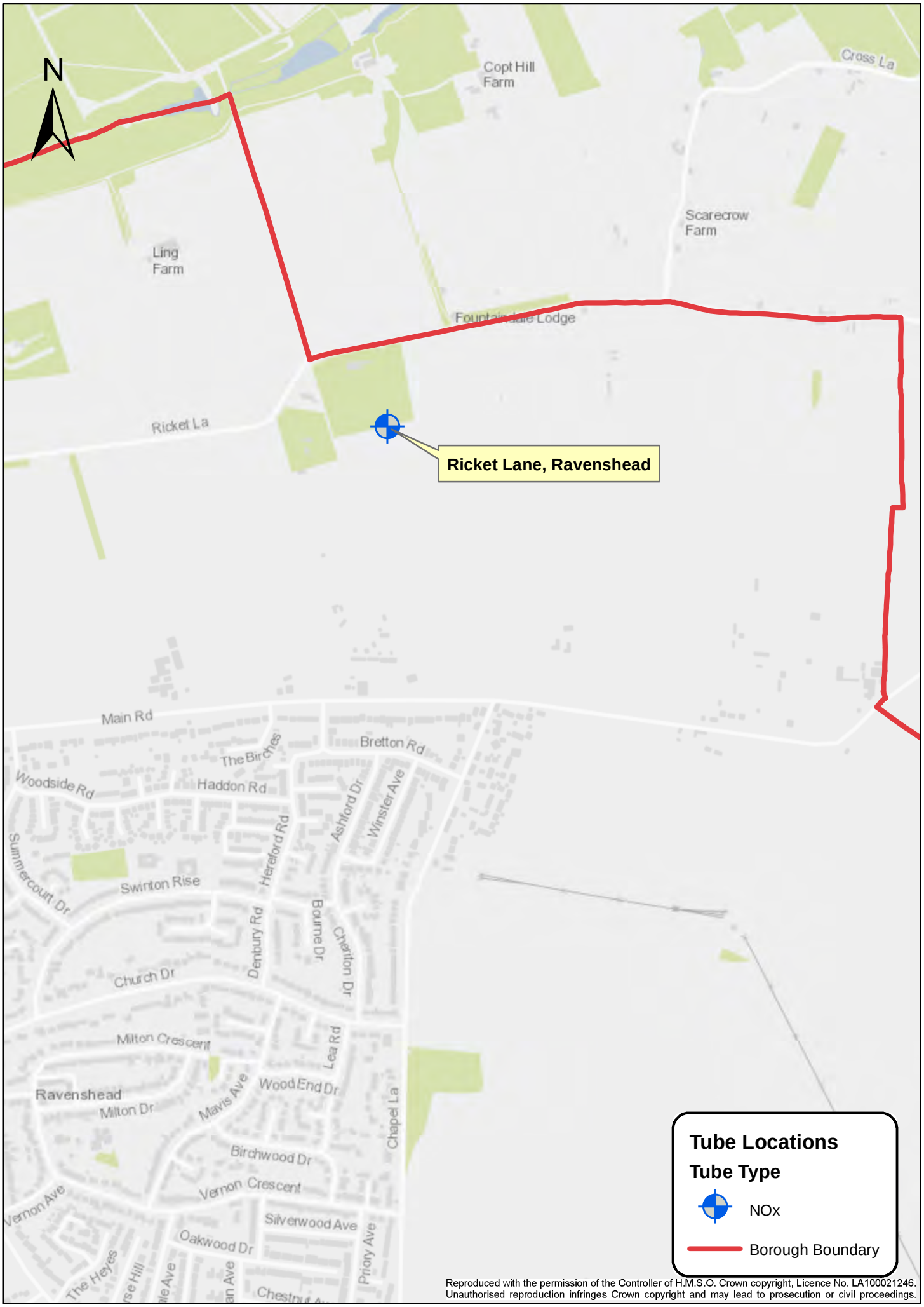
Scale: nts



Gedling Borough Council

DiffusionTube Locations - Sheet 2

Scale: nts



Gedling Borough Council

DiffusionTube Locations - Sheet 3

Scale: nts

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[7]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
GBC	Gedling Borough Council
HGV	Heavy Goods Vehicle
JSNA	Joint Strategic Needs Assessment
LA	Local Authority
LAQM	Local Air Quality Management
NEPWG	Nottinghamshire Environmental Protection Working Group
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NCC	Nottinghamshire County Council
PHE	Public Health England
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
WHO	World Health Organisation
WASP	Workplace Analysis Scheme for Proficiency

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