2018 Air Quality Annual Status Report (ASR)

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

June 2018

Local Authority Officer	Brendan Cox
Department	Public Protection Service
Address	Civic Centre, Arnot Hill Park, Arnold, Nottinghamshire, NG5 6LU
Telephone	0115 9013901
E-mail	environmental.health@gedling.gov.uk
Report Reference number	GBC/ASR-2018
Date	30/06/2018

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.

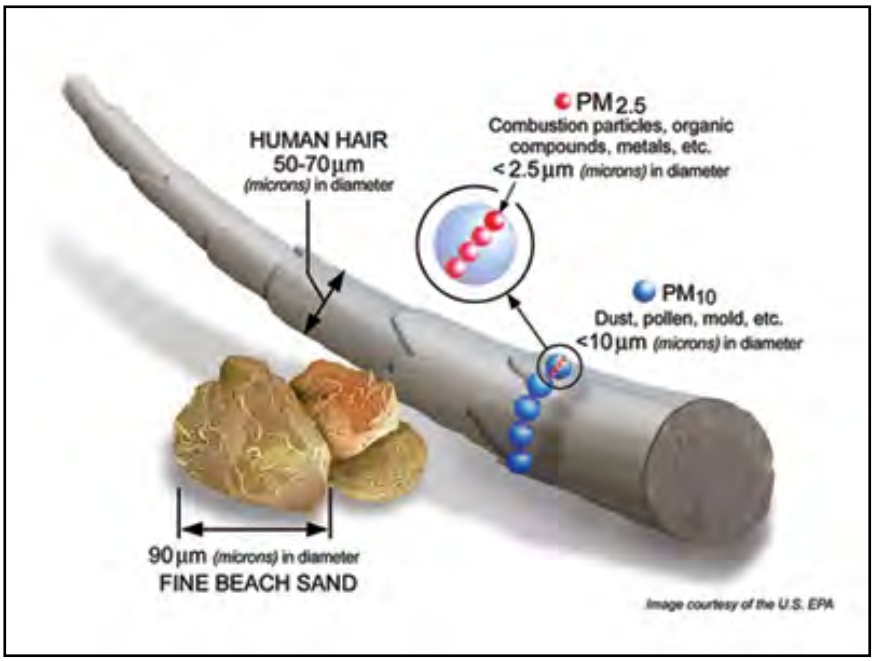
Particulate matter is made of lots of different sorts of things including: vehicle exhausts; poorly combusted fuel; particles of metal from engine chambers; bits worn from brake pads; bitumen asphalt or concrete dust work from the road; biological and other waste ground up on the road; and it's formed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

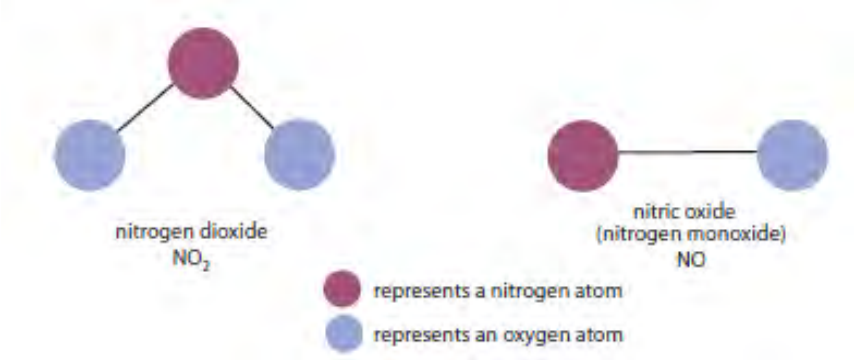


Diagram of the structures of NO_2 and NO

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.

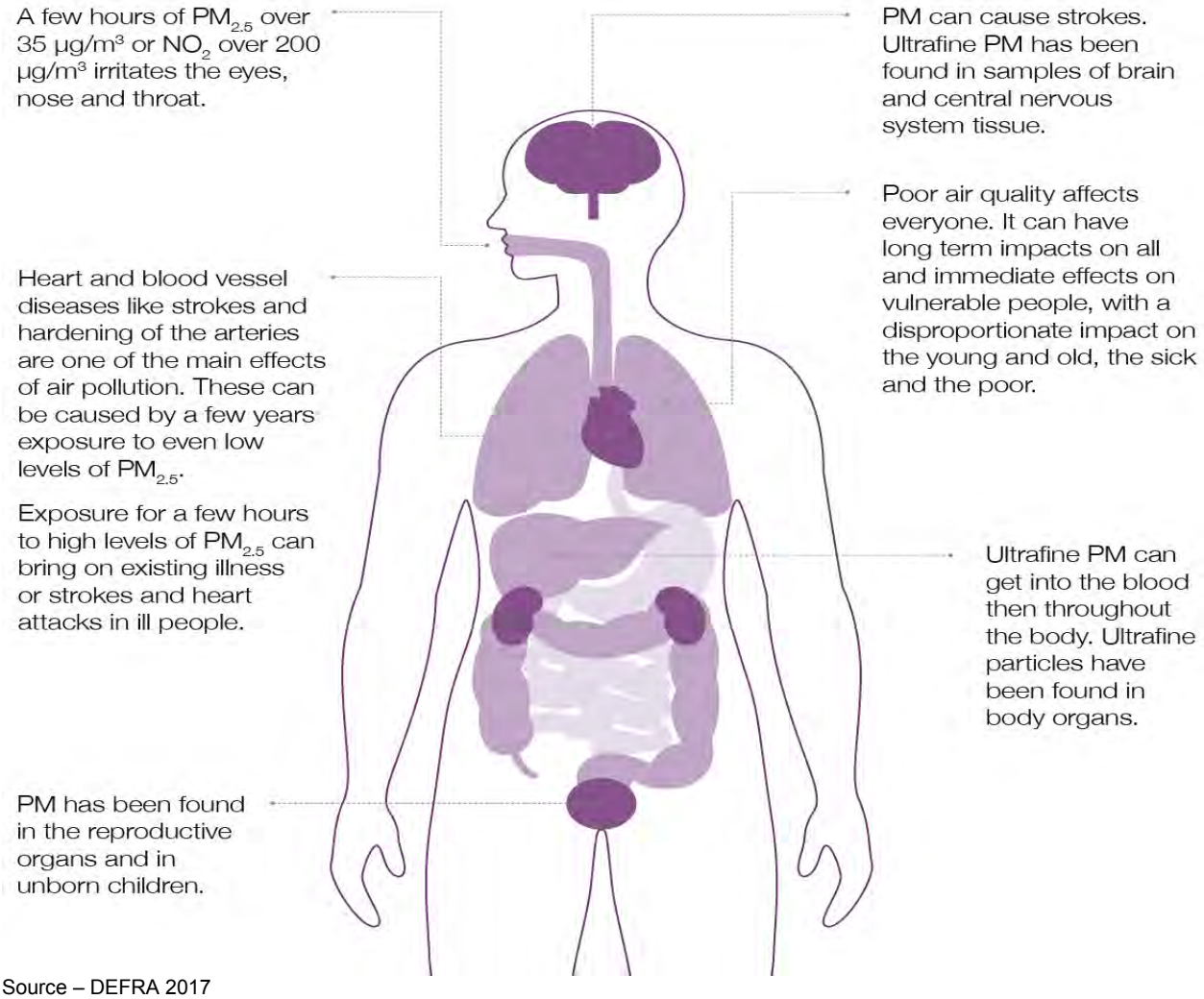
These primary NO_2 emissions can lead to high concentrations of NO_2 at the roadside, especially where there are many diesel vehicles.

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.

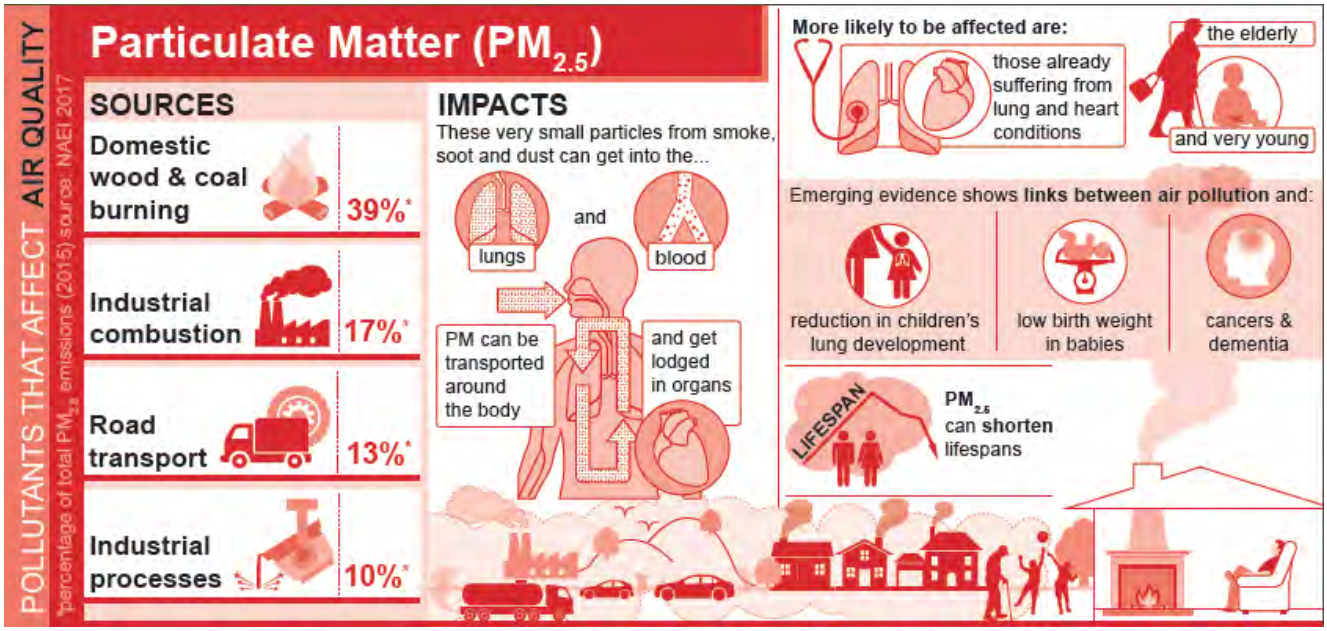


Source – DEFRA 2017

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.

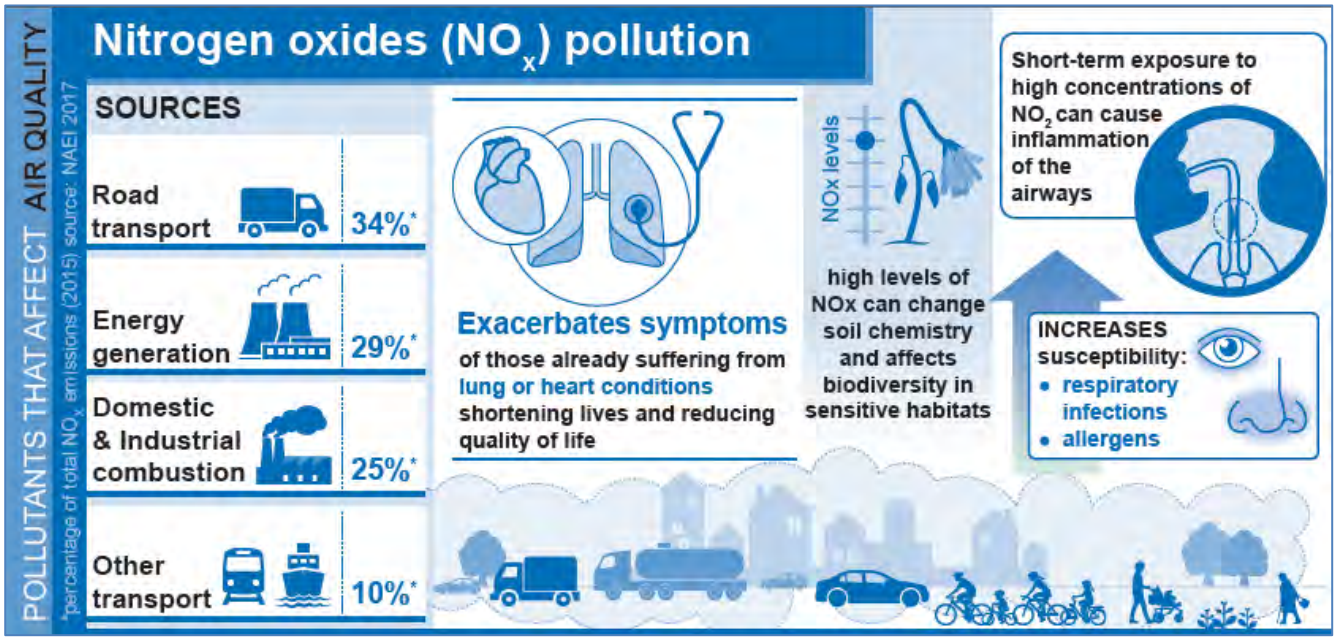
Table ii*: Comparison of deaths attributable to human-made air pollution, smoking and deaths related to alcohol consumption, Nottinghamshire County and Nottingham City.*

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 (2017) show exceedances within the AQMA, and continue to be of concern 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 Highways 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.

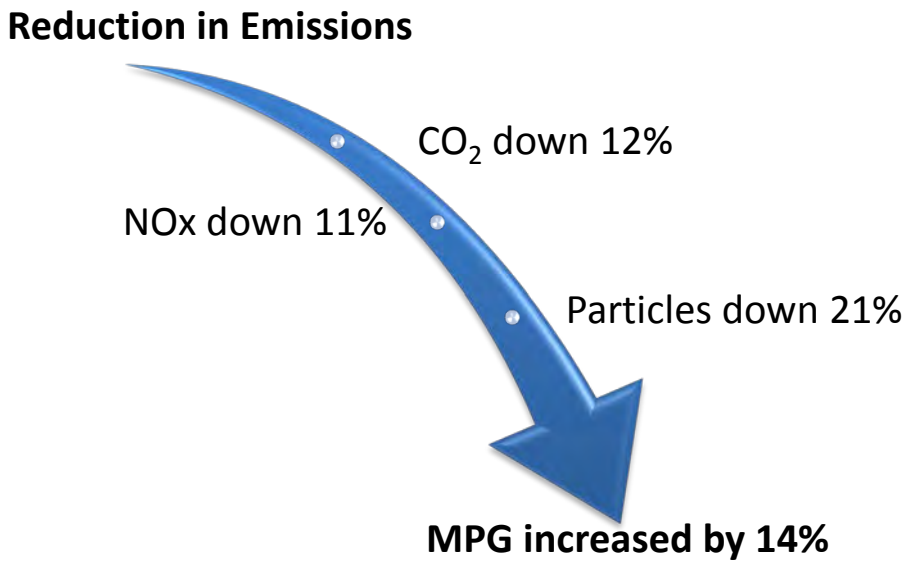
The Nottingham ECO Stars scheme began as a scheme in Gedling Borough in 2012 and then expanded the following year to cover the whole of the Nottingham conurbation.

Membership stands at 112 members operating over 7000 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.

Emerging 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 Council is currently coming to the end of the production of the new Local Planning Document. Currently under review by the Inspector it is hoped that the new Local Plan will be adopted in 2018.

Within the current draft Policy LPD11: Air Quality 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.

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.

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.

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 in 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. With the assistance of Public Health England and local Public Health officers the NEPWG are in the process of engaging with stakeholders, in particular Transport and Land-use Planners to re-draft a new strategy.

3) The suburban areas of the Borough fall within the Nottingham Urban Area Agglomeration; which is one of the agglomerations DEFRA has mandated to introduce a Clean Air Zone (CAZ) by 2020 due to breaches of EU limit values. The Borough Council will continue to liaise with Nottingham City Council over the CAZ development; and the development of a 'Greater Nottingham Air Quality Strategy.'

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

5) The Air Quality Action Plan has been in place for over 6 years and many of the actions have been completed and/or on going for some time. Additionally, it is understood that the assumptions made, at the time of writing the Action Plan, (about the main contributing sources of pollution, which parts of the vehicle fleet contribute the most to the pollution problem) may need revising.

The Action Plan is based on old emissions information, which has been updated to better reflect the effect diesel passenger vehicles may have.

This update of the Action Plan will inevitably raise some difficulties:

a) Have we done the easy things…what's left is the difficult?

b) Dealing with commuters in diesel passenger vehicles.

The revision of the document has been delayed for two reasons:

i.) The emerging development of the Clean Air Zone (CAZ) in Nottingham – work is ongoing to establish the various options for the geographical extent of the proposed CAZ. This could have a fundamental impact on the air quality of the AQMA and therefore the requirements of the new Action Plan.

ii.) The traffic data used to carry out the source apportionment assessment – traffic data around the AQMA has not been surveyed since the first Action Plan therefore the data is out of date (even when applying growth factors). Nottinghamshire County Council has carried out new traffic assessments and this has been feed into a new source apportionment assessment.

Work has started on the updating of the Action Plan; initial options have been determined via stakeholder workshop (held in May 2018) and a draft Action Plan is due to be locally consulted on during the summer; before submission to statutory stakeholders for comments.

6) 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 to install mitigation as standard (for example electric vehicle charging points), but ultimately there is no formal trigger for them to do so.

7) 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:

- 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
- Parking enforcement on County Council managed roads to ensure that the traffic keeps moving
- Travel planning such as the development of new travel plans at businesses across the county through planning conditions
- Measures to reduce the need to travel at peak times such as the provision and encouragement of flexible working arrangements
- The facilitation of smarter travel behaviour such as the provision of a car sharing scheme and integrated and concessionary ticketing schemes
- 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.
- The encouragement of the uptake of low-emission vehicles through the delivery of the Nottingham Go Ultra Low City bid funding to provide public electric vehicle charging network points in the Borough.
- Enhancements to the local cycling and walking networks.

How to Get Involved

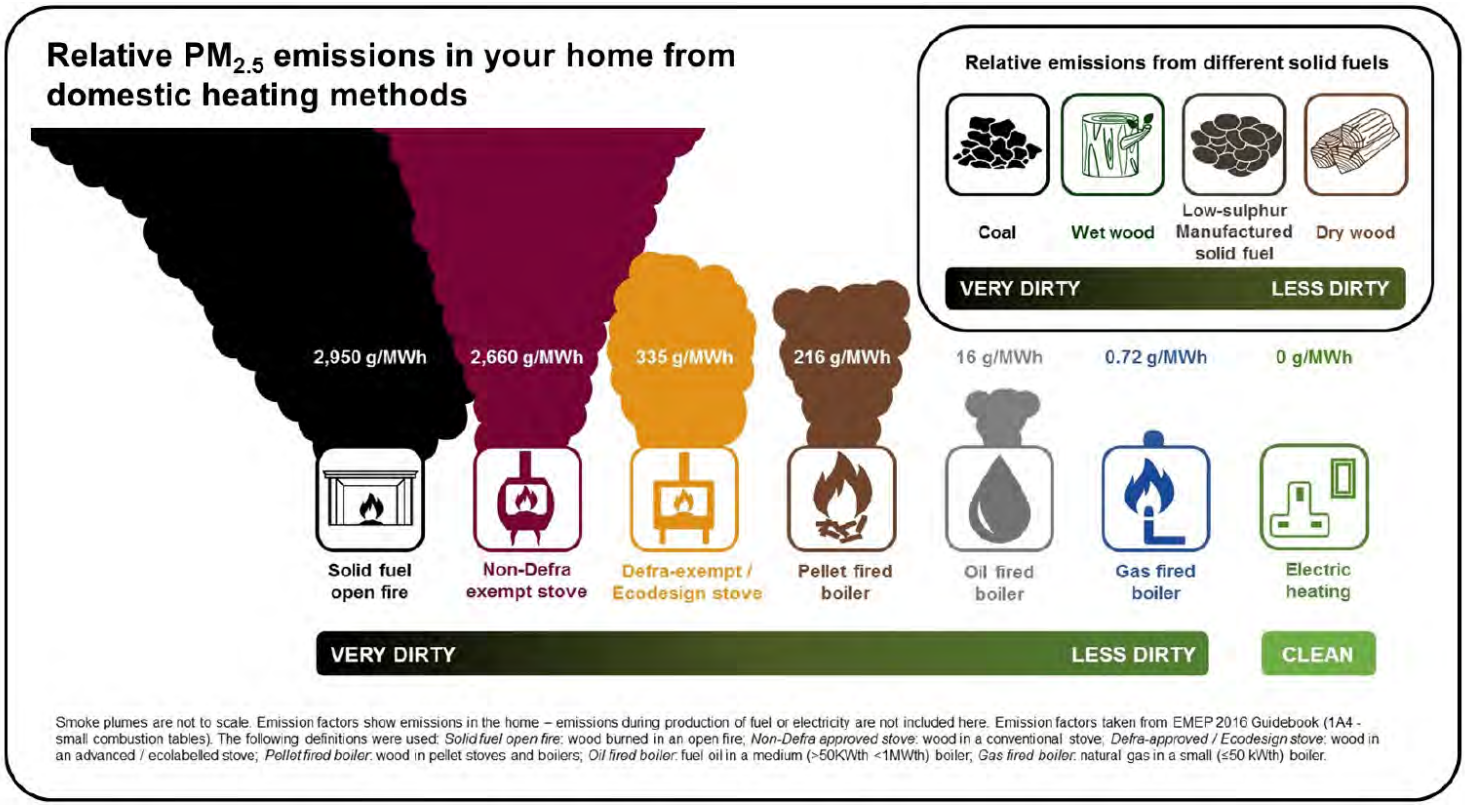
As a resident of Gedling Borough you can help to make a difference

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

- If you are using wood burning appliance make sure the wood is

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 2017. 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	43 µg/m^3	Action Plan Nov 2012

☒ **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:

> *The AQMA surrounding the A60 is clearly a main through traffic route in and out of Nottingham and will be subject to future traffic management measures within Nottingham. It is likely to be appropriate to consider developing measures to address emissions reductions in this area in conjunction with Nottingham City Council, and develop a partnership approach with all the local and regional transport authorities as a way forward.*

Gedling Borough has taken forward a number of measures in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the Action Plan. Key completed measures are:

1. Continuation of the ECO Stars Fleet Recognition Scheme in the Nottingham Urban Area. Membership stands at 112 members operating over 7000 vehicles.
2. Awareness and training undertaken by the County Council amongst staff and works promoters to ensure that powers are used effectively and to make works promoters aware of their requirement to reduce traffic disruption and encourage alternative working methods that reduce peak period working/disruption on County Council managed roads
3. Upgrade and optimisation of traffic signals within the AQMA
4. Personalised travel planning undertaken with residents in areas adjoining the AQMA which resulted in a 14% reduction of journeys to work by car amongst participants
5. Personalised travel planning travel clinics undertaken at major workplaces within the AQMA, including at the County Council
6. School travel plans developed by the County Council at schools in the borough
7. Eco-driver training amongst County Council employees
8. The introduction of advisory 20mph speed limits outside all schools in the borough to encourage more people to walk and/or cycle to school.

Progress on the following measures has 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.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Gedling Borough and Nottinghamshire County Council's anticipate that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of the A60 AQMA.

2.2.1 Target Pollution Reduction(s) in the AQMA

The reduction in NO_2 emissions required, based on 2010 worse case adjusted diffusion tubes results, expressed as a concentration, would be a 5µg/m^3 reduction in NO_2 from 45 to 40µg/m^3.

The reduction in road NOx emissions required to meet the 40µg/m^3 objective has been calculated as 16µg/m^3 which represents a 24% reduction in roadside NOx.

The Council has not set individual pollution reduction targets for each of the measures in the Action Plan. This is largely due to the challenges in trying to establish the effect any particular measure is having on emissions and concentrations within the AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	The creation of a park and ride scheme.	Alternatives to private vehicle use	Bus based Park & Ride	NCC	2016-2026	2015(review)	Review	N/A	2015(review)	N/K	Scheme dependent on business case for any proposals, identifying appropriate site and securing funding.
2a	Re-routing of freight operators - Restriction of vehicle types using the road at certain times	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	NCC	2013	2014	Review/Feasibility Assessment	N/A	Study Undertaken during 2013/14 considered a number of alternative routes for HGVs that normally travel along A60. Each of the routes was, however found to be unsuitable.	Complete	Not feasible to introduce
2b	Re-routing of freight operators - Restricting the road as appears on route finders and Satellite Navigation Systems	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	NCC	2013	2014	Review/Feasibility Assessment	N/A	As 2a	Complete	Not feasible to introduce
2c	Re-routing of freight operators - Consider diverting HGVs	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	NCC	2013	2014	Review/Feasibility Assessment	N/A	As 2a	Complete	Not feasible to introduce
3a	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	Ongoing	Ongoing	Restrain average journey times in the morning peak to a 1% increase per year	N/A	Signals within AQMA re-phased. SCOOT and MOVA equipped signals are relayed back to the Traffic Control Centre so that they can be altered in real time as required	Ongoing	Potential barrier: Lack of future funding

3b	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	Restrain average journey times in the morning peak to a 1% increase per year	N/A	Implementation ongoing	Ongoing	Potential barrier: Lack of future revenue funding
3c	Traffic control and management - Consideration of bus priority measures at traffic signal junctions	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	2012/13	Restrain average journey times in the morning peak to a 1% increase per year	N/A	SCOOT/MOVA installed at nine sets of signals within AQMA	2012/13	
3d	Traffic control and management - Review of 24hr bus lane restrictions	Traffic Management	UTC, Congestion management, traffic reduction	NCC	2012	2013-14	Review	N/A	Complete	Complete	
3e	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	Restrain average journey times in the morning peak to a 1% increase per year	N/A	Implementation ongoing	Ongoing	
3f	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	Restrain average journey times in the morning peak to a 1% increase per year	N/A	Implementation ongoing	Ongoing	

3g	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	Ongoing	Ongoing	Restrain average journey times in the morning peak to a 1% increase per year	N/A	Information conveyed by all forms of media (press, radio, website, social media etc.). Implementation ongoing	Ongoing	Potential barrier: Lack of future revenue funding
4	Gedling waste collection - Ensure that collections around the AQMA occur outside of peak time.	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	GBC	2012	Ongoing	N/A	N/A	Ongoing	Ongoing	none
5a	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	Pre-2008	Ongoing	Manage parking to improve journey time reliability	N/A	CPE introduced in 2008. CCTV enforcement car introduced in 2016, with second vehicle purchased in 2018. Implementation ongoing	Ongoing	
5b	Parking management and control - Continual review of car parking charging	Traffic Management	Other	GBC	2012	N/A	N/A	N/A	Ongoing	Ongoing	none
6	Low emission zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)	NCC	2013	2014	Review	N/A	Nottingham City Council undertaken modelling to help inform extents of proposed scheme. Consultation on proposals will take place during 2018/19 to identify preferred scheme. Ongoing	Complete - Dependant on feasibility and extent studies.	Nottingham City Council are currently investigating the introduction of a Clean Air Zone (CAZ) to help meet its 2020 air quality targets. Scheme extents still to be determined and consultation still to be undertaken.
7a	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	2012	Ongoing	No. of AQ impact assessments related to AQMA	N/A	no assessments submitted	Ongoing	none

7b	Improve links with local planning and Local Development Framework - Ensure AQAP and AQMA are considered in future planning policy frameworks (Local Plans).	Policy Guidance and Development Control	Other policy	GBC/NCC	2012	2012-13	"Ongoing consultation with Core Strategy/ Local Plan development"	N/A	LPD11 Air Quality in proposed Draft LP	Ongoing	Local Plan due for adoption in 2018
7c	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	2012	Ongoing	N/A	N/A	Ongoing	Ongoing	none
7d	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	2012	Ongoing	Sums collected for air quality projects	N/A	Ongoing	Ongoing	none
7e	Improve links with local planning and Local Development Framework - Development of an Air Quality Supplementary Planning Document	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	GBC	2013	2013-15	Development of SPD	N/A	Complete	Complete	

7f	Improve links with local planning and Local Development Framework - Use of planning conditions for delivery times, travel plans etc.; including enforcement to ensure compliance	Policy Guidance and Development Control	Other policy	GBC	2012	Ongoing	N/A	N/A	Ongoing	Ongoing	
8	Improving links with local transport strategy	Transport Planning and Infrastructure	Other	NCC/GBC	2012	Ongoing	N/A	N/A	Ongoing	Ongoing	Ongoing working between Borough and County LAs
9a	Target reductions in emissions from buses - ECOStars Fleet Recognition Scheme.	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	GBC	2012	2012-2015	Scheme membership	N/A	Scheme included 112 Members operating 7000 vehicles	2018	Last year of funding from GBC. Scheme will close if alternative funding cannot be found
9b	Target reductions in emissions from buses - Promotion of the benefits of Eco-driving training	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	GBC	2012	2012-15	N/A	N/A	Complete	Complete	SAFED training no longer available
9c	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) and OLEV funding	Ongoing	Ongoing	Ongoing take-up of cleaner vehicles	N/A	SQBP in place affecting all buses travelling through AQMA.	Ongoing	

9d	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/NCiC/PT operators; NCT (operator) and OLEV funding	Ongoing	Ongoing	On-going take-up of cleaner vehicles	N/A	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	Ongoing	
10a	Target reductions in emissions from heavy and light goods vehicles - ECOStars Fleet Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	GBC	2012	2012-2015	Scheme membership	N/A	Scheme included 112 Members operating 7000 vehicles	2018	Last year of funding from GBC. Scheme will close if alternative funding cannot be found
10b	Target reductions in emissions from heavy and light goods vehicles - Promotion of the benefits of Eco-driving training	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	GBC	2012	2012-15	N/A	N/A	Complete	Complete	SAFED training no longer available
11	Promotion of low emission vehicles through taxi licensing.	Promoting Low Emission Transport	Taxi emission incentives	GBC	2013	none	Review of Taxi Licence criteria	N/A	none	not known	CAZ my be driver for improvement in future
12a	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	2012	Ongoing	N/A	N/A	4 star member	Ongoing	

12b	Target reductions in emissions from the council fleet and contract vehicles - Ensuring new vehicles procured are cleanest possible.	Vehicle Fleet Efficiency	Other	GBC	2012	Ongoing	N/A	N/A	Electric van purchased	Ongoing	
12c	Target reductions in emissions from the council fleet and contract vehicles - Run Eco-driving training course	Vehicle Fleet Efficiency	Driver training and ECO driving aids	GBC	2012	2012-13	N/A	N/A	none	Complete	
12d	Target reductions in emissions from the council fleet and contract vehicles - Consider alternative fuelled 'pool vehicles'	Vehicle Fleet Efficiency	Other	GBC	2012	2012-	N/A	N/A	See 12b, bicycles available for staff use	Ongoing	
12e	Target reductions in emissions from the council fleet and contract vehicles - GBC Green Procurement	Vehicle Fleet Efficiency	Other	GBC	2012	none	N/A	N/A	none	not known	
13a	Encourage the uptake of alternative fuels - GBC consider installing electric charging points for visitors and staff.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	GBC	2012	2013	N/A	N/A	One charging point part of Plugged in Midlands.	Complete	

13b	Encourage the uptake of alternative fuels - Consider a wider network of charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	GBC	2012	2014-15	N/A	N/A	One charging point at a GBC car park in Arnold. Part of Plugged in Midlands. £6.1m funding secured (GoUltra Low) for 2016-2021. Preferred delivery partner procured. Site investigation underway. Implementation ongoing.	Ongoing	Site investigation to determine feasibility of sites underway as part of GoUltra Low project
14a	Communication and education - awareness raising of local air quality issues - Design and erect AQMA signs	Public Information	Other	GBC	2013	none	N/A	N/A	none	not known	
14b	Communication and education - awareness raising of local air quality issues - Roadside Vehicle Emissions Testing (RVET)	Vehicle Fleet Efficiency	Testing Vehicle Emissions	GBC	2012	none	N/A	N/A	none	not known	funding not available
14c	Communication and education - awareness raising of local air quality issues - Tackling the school run – communication with schools and parents	Public Information	Via other mechanisms	GBC/NCC	2012	2012-	school travel plans	N/A	School travel plans have been developed with 43 of the 45 schools in Gedling Borough; with one of the schools without a travel plan falling within the AQMA	Ongoing	
14d	Communication and education - awareness raising of local air quality issues - Undertake a publicity campaign to raise awareness of the A60 AQMA.	Public Information	Via other mechanisms	GBC	2013	Ongoing	Publication of relevant promotional material	N/A	Articles in Contacts magazine regarding Action Plan and ECOStars	Ongoing	

15a	Travel plans - Review/refresh Gedling Borough Council Travel Plan;	Promoting Travel Alternatives	Workplace Travel Planning	GBC	2013	2013-14	N/A	N/A	Complete	Complete	
15b	Travel plans - Nottinghamshire County Council to review travel plan for its sites	Promoting Travel Alternatives	Workplace Travel Planning	NCC; integrated transport block funding	N/A	Ongoing	Restrain average journey times in the morning peak to a 1% increase per year	N/A	PTP travel clinics held at NCC buildings within the AQMA during 2014/15	Ongoing - operational for nearly 20 years	
15c	Travel plans - Continue to support the implementation of school travel plans	Promoting Travel Alternatives	School Travel Plans	NCC: DfT funding		2000-2011	Restrain average journey times in the morning peak to a 1% increase per year	N/A	STPs developed with 43 of the 45 schools in the Borough	Mar-11	Central Govt grant funding to deliver STPs no longer available
15d	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; integrated transport block funding	N/A	Ongoing	Restrain average journey times in the morning peak to a 1% increase per year	N/A	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	Ongoing	
16a	Promoting travel choices - Undertake personalised travel planning within Gedling borough	Promoting Travel Alternatives	Personalised Travel Planning	NCC/AECOM; integrated transport block/Access Fund funding	2015/16	2015/16 and 2019/20	Restrain average journey times in the morning peak to a 1% increase per year	N/A	PTP undertaken in Daybrook during 2014/15. Access Fund secured to undertake PTP in Daybrook during 2019/20	Mar-20	
16b	Promoting travel choices - Establishment of a City Car Club and consideration of extending this into the county	Alternatives to private vehicle use	Car Clubs	NCC/NCiC	2014-2017	Dependent on success of Nottingham city scheme	Restrain average journey times in the morning peak to a 1% increase per year	N/A	Nottm city scheme introduced in 2014. Expansion of scheme into county dependent on its success	N/K	Funding for implementation to be determined

16c	Promoting travel choices - The promotion and facilitation of car sharing schemes.	Alternatives to private vehicle use	Car & lift sharing schemes	NCC	Pre-2006	Ongoing	Restrain average journey times in the morning peak to a 1% increase per year	42.15kg NOx reduction during 2017 through the car share activities	3,141 members registered. Implementation ongoing	Ongoing	
16d	Promoting travel choices - Residential Travel Packs, to be issued to all new built homes	Promoting Travel Alternatives	Other	NCC	2012	Ongoing	N/A	N/A	none	Ongoing	Not progressed due to available funding and potential ongoing costs of producing the materials.
17a	Public transport - Development of ITSO smartcard ticketing	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	NCC/NCiC/PT operators	Ongoing	Ongoing	Increased passenger transport patronage	N/A	Integrated ticketing strategy developed in 2014/15. New smartcard platform introduced in 2014. Robin Hood card scheme introduced in 2015	Ongoing	
17b	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	Ongoing	Ongoing	Increase passenger transport patronage	N/A	Implementation ongoing	Ongoing	
17c	Public transport - Investigate and publicise web based journey planners	Public Information	Other	NCC	Ongoing	Ongoing	Increased walking/cycling/ passenger transport trips	N/A	Implementation ongoing	Ongoing	
17d	Public transport - Review, install/ replace flagpoles/ timetable cases along key AQMA corridors	Transport Planning and Infrastructure	Bus route improvements	NCC	2012	2012-	N/A	N/A	Flagpoles and timetable cases have been installed at all bus stops along the A60 AQMA corridor.	Complete	

17e	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	Ongoing	Ongoing	Increased bus patronage	N/A	Implementation ongoing	Ongoing	
17f	Public transport - Install 'real time' bus information along key AQMA corridors	Transport Planning and Infrastructure	Bus route improvements	NCC	2012	2014-15	Complete	N/A	Complete	Complete	
17g	Public transport - Consider capacity increases on the GO2 services along the A60 corridor	Transport Planning and Infrastructure	Other	NCC	2012	2012-	N/A	N/A	Capacity increases will be considered should passenger information demonstrate that there is insufficient capacity on existing services	Ongoing	
18a	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	Ongoing	Ongoing	Increased cycling trips	N/A	Implementation ongoing. PTP to be delivered during 2019/20 following completion of planned cycle route improvements	Ongoing	

18b	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	Ongoing	Ongoing	Increased cycling trips	N/A	7,518 people received cycle training in 2017/18. Implementation ongoing	Ongoing	
18c	To encourage adoption cycling and walking as alternatives to using private vehicles - Consider the use of advance cycle stop lines at feasible junctions within the AQMA	Promoting Travel Alternatives	Promotion of cycling	NCC	2012	2012-15	Complete	N/A	Complete	Complete	
18d	To encourage adoption cycling and walking as alternatives to using private vehicles - Gedling Borough Council to hold 'Car Free Days' to encourage staff to cycle or walk to work.	Promoting Travel Alternatives	Other	GBC	2013	2012-	No. of 'car free days'	N/A	Ongoing	Ongoing	
EXTRA 1	Nottingham city workplace parking levy (WPL)	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	NCiC	Pre-2012	2012 and ongoing	Restrain average journey times in the morning peak to a 1% increase per year		NCiC introduced WPL within the city in 2012 and have used funding to make passenger transport improvements in the city	Introduced 2012 and ongoing	
EXTRA 2	20mph speed limits outside schools	Traffic Management	Reduction of speed limits, 20mph zones	NCC; integrated transport block funding	2012/13	2013-2016	Increased walking/cycling trips		Advisory 20mph speed limits installed outside all feasible schools	2016/17	

EXTRA 3	Nottingham Go-Ultra Low City bid	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	NCiC/NCC; OLEV funding	2015/16	2016-2021	Ongoing take-up of cleaner vehicles		£6.1m funding secured for 2016-2021. Preferred delivery partner procured. Site investigation underway. Grants are also available to businesses to install EV charging infrastructure. Implementation ongoing	2021	
EXTRA 4	Nottingham city Clean Air Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)	NCiC; DfT funding	2016-2019	2019/20			NCiC undertaken modelling to help inform extents of proposed scheme. Consultation on proposals will take place during 2018/19 to identify preferred scheme	2020	Scheme extents still to be determined following consultation which is still to be undertaken
EXTRA 5	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/Rushcliffe BC					Feasibility studies undertaken in 2016 determined no compelling case for inclusion in any programme. To be reviewed to complement future Local Plan growth strategies (post 2032)	Future scheme dependent on business case for any proposals, identifying appropriate site and securing funding	Future scheme dependent on business case for any proposals, identifying appropriate site and securing funding
EXTRA 6	Nottinghamshire Air Quality Strategy	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	NCC/NCiC/district councils	2017/18	2018/19	Reduced emissions		A review of the Nottinghamshire Air Quality Strategy is underway	2018/19	

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 2017 is reported as 11.6µg/m^3
2. Modelled background levels	Downloaded from Defra webpages the background map for 2017 in Gedling is presented in Appendix D. Levels are predicted to be generally between 8.5 – 11µg/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 $PM_{2.5}$:

- Dust Management 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 2017 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 24 sites during 2017. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) 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 2017 dataset of monthly mean values is provided in Appendix B.

Results of automatic monitoring

Table A.1 indicates the results for automatic monitoring for 2017 show no exceedances of the air quality objective for NO_2.

The graph below shows a slight decrease in NO_2 levels over a ten-year period (2008-2017).

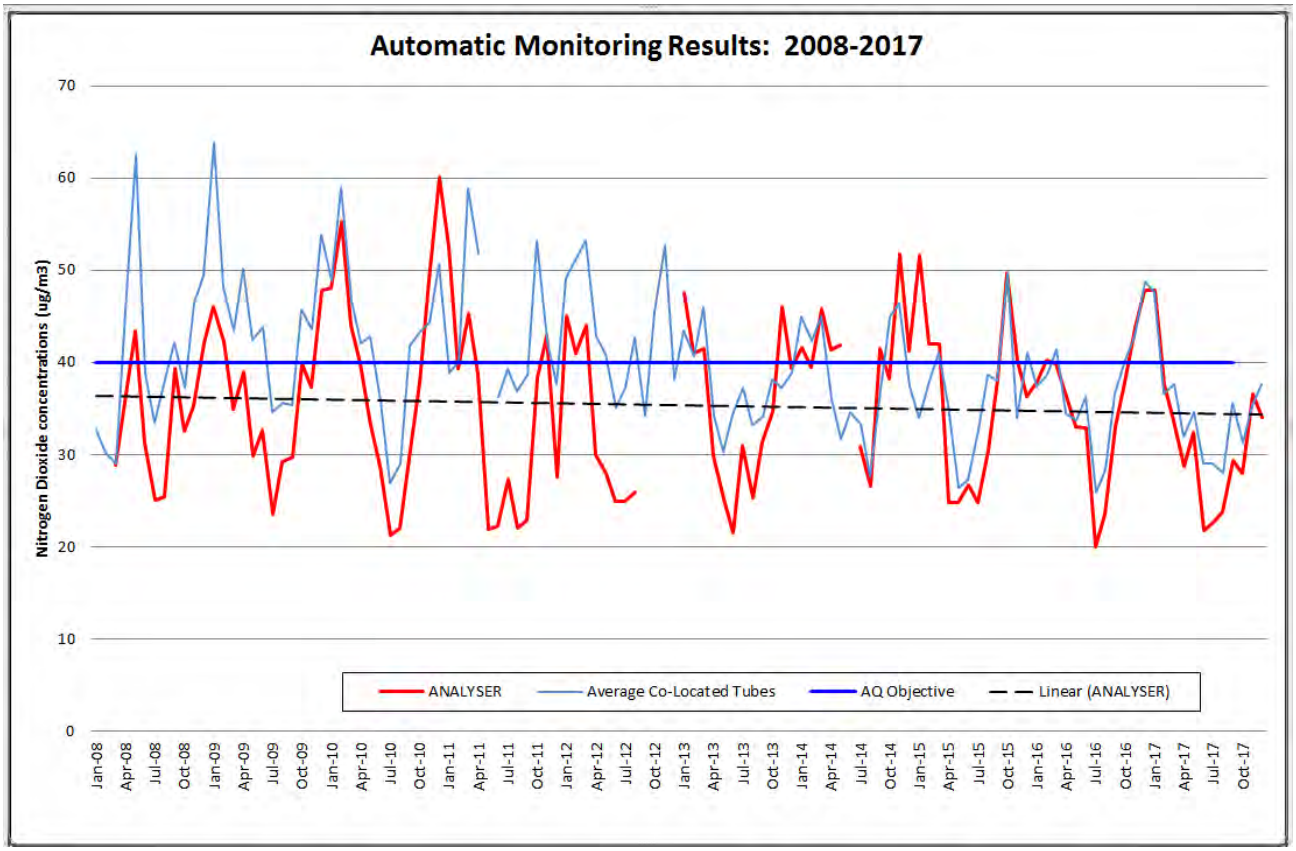


Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There were no exceedances of this objective in 2017.

Results of non-automatic (passive) monitoring

The results of diffusion tube monitoring for 2017 (Table A3) show 2 receptor exceedances of the air quality objectives (Daybrook Fish Bar, T&S Heating), both 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 (2008 – 2017). 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

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)
87398	Morley Mills Building	Receptor	457969	344780	NO_2	Y	0m	3m	N	3m
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	4.5m	1.5m	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	14m	3.5m	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

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)
87411	Colwick Park Close	Receptor	461103	340086	NO_2	N	1m	10m	N	3m
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

(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 2017 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
					2013	2014	2015	2016	2017
GBC1	Roadside	Automatic	99	99	35	37	36	36	31
82492	Receptor	Diffusion Tube	100	100	35	36	33	35	34
82494	Urban background	Diffusion Tube	100	100	23	22	21	22	22
82495	Urban background	Diffusion Tube	92	92	19	18	17	18	16
82937	Receptor	Diffusion Tube	92	92	29	30	27	29	28
87398	Receptor	Diffusion Tube	100	100	36	35	32	34	31
87399	Receptor	Diffusion Tube	100	100	27	27	25	26	23
87400	Receptor	Diffusion Tube	100	100	33	33	32	33	31
87401	Receptor	Diffusion Tube	100	100	29	29	26	29	26
87402	Receptor	Diffusion Tube	100	100	32	29	33	30	31
87403	Co-located tubes	Diffusion Tube	100	100	36	36	33	34	31
87404	Co-located tubes	Diffusion Tube	100	100	38	34	33	35	31
87405	Co-located tubes	Diffusion Tube	100	100	37	35	33	35	30
87406	Receptor	Diffusion Tube	25	25	27	24	24	26	24
87407	Receptor	Diffusion Tube	100	100	31	30	36	29	35
87408	Rural Background	Diffusion Tube	58	58	16	14	11	14	15
87409	Receptor	Diffusion Tube	100	100	33	31	30	32	30

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2017 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2013	2014	2015	2016	2017
87410	Urban background	Diffusion Tube	100	100	20	19	18	18	18
87411	Receptor	Diffusion Tube	100	100	28	25	23	25	23
87412	Receptor	Diffusion Tube	92	92	**44**	39	37	**44**	**43**
87413	Receptor	Diffusion Tube	92	92	**44**	**41**	38	**42**	**41**
87414	Receptor	Diffusion Tube	100	100	39	37	35	37	33
87415	Receptor	Diffusion Tube	92	92	28	27	25	28	26
87460	Receptor	Diffusion Tube	100	100	32	30	29	28	27
87461	Receptor	Diffusion Tube	58	58	**46**	39	36	38	33

☒ **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)				
					2013	2014	2015	2016	2017
GBC1	Roadside	Automatic	99.7	99.7	0	0 (167)	22(218)	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.**

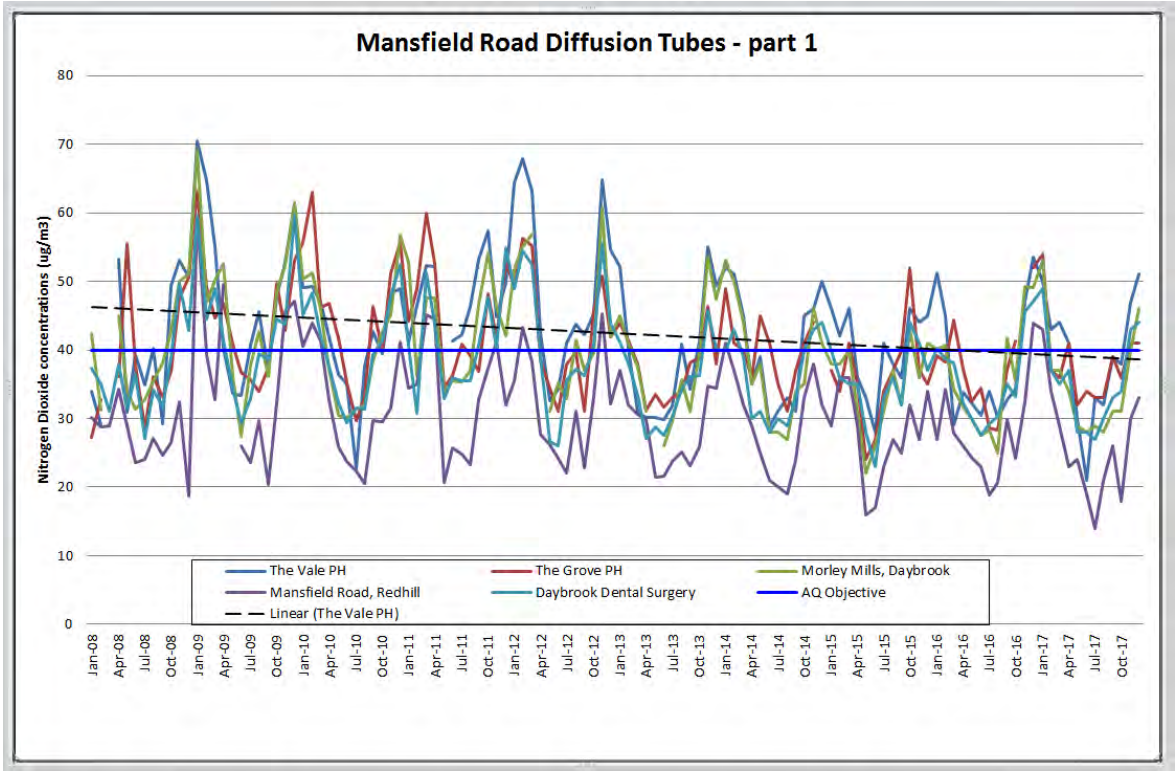
(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

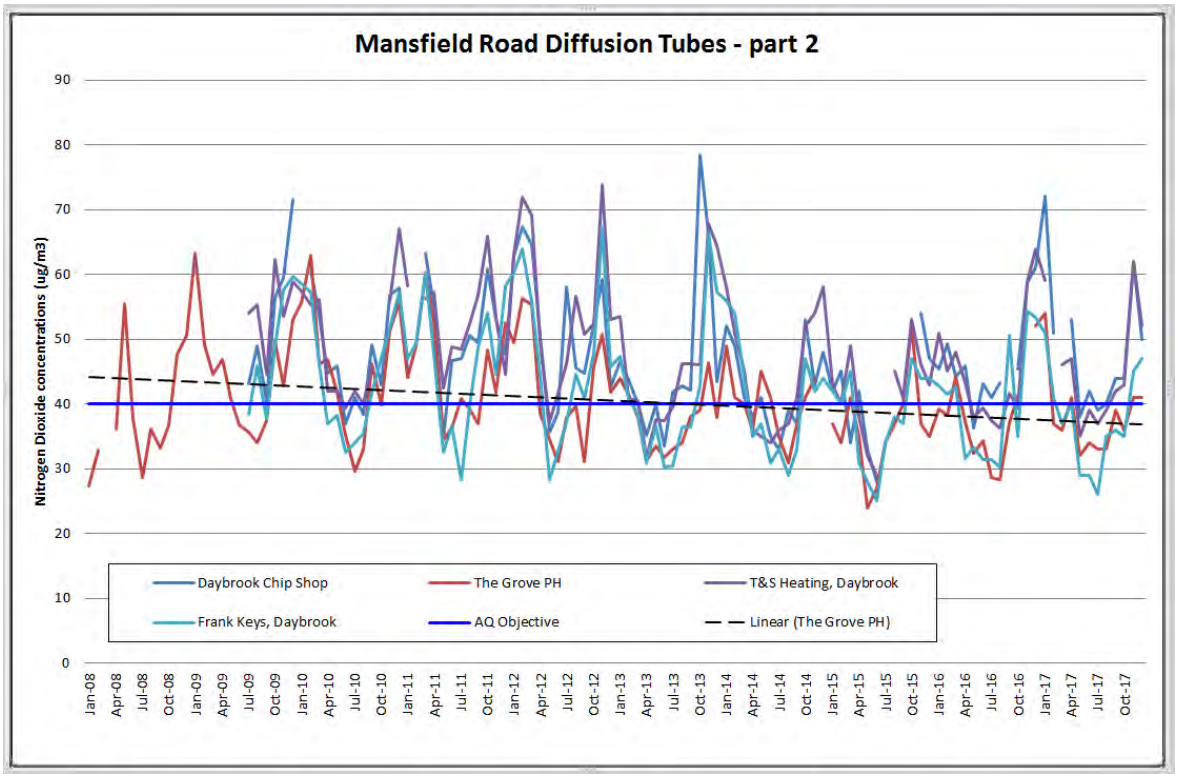
(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

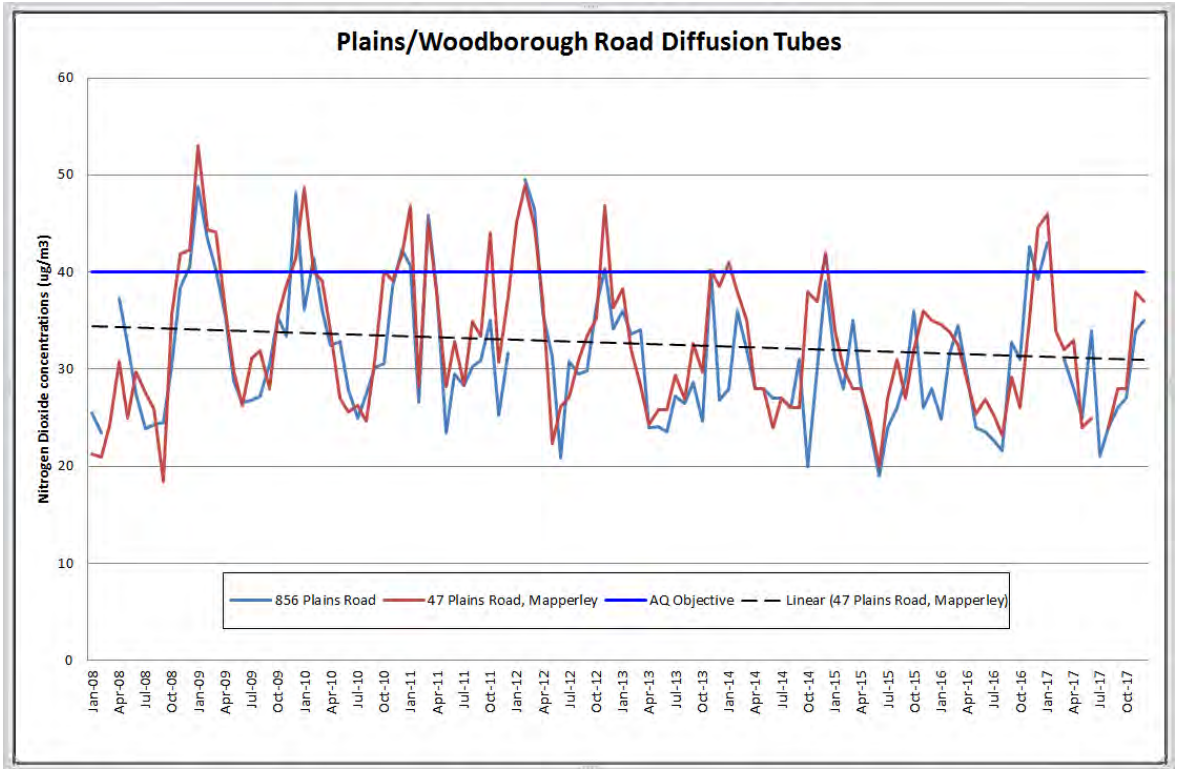
(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

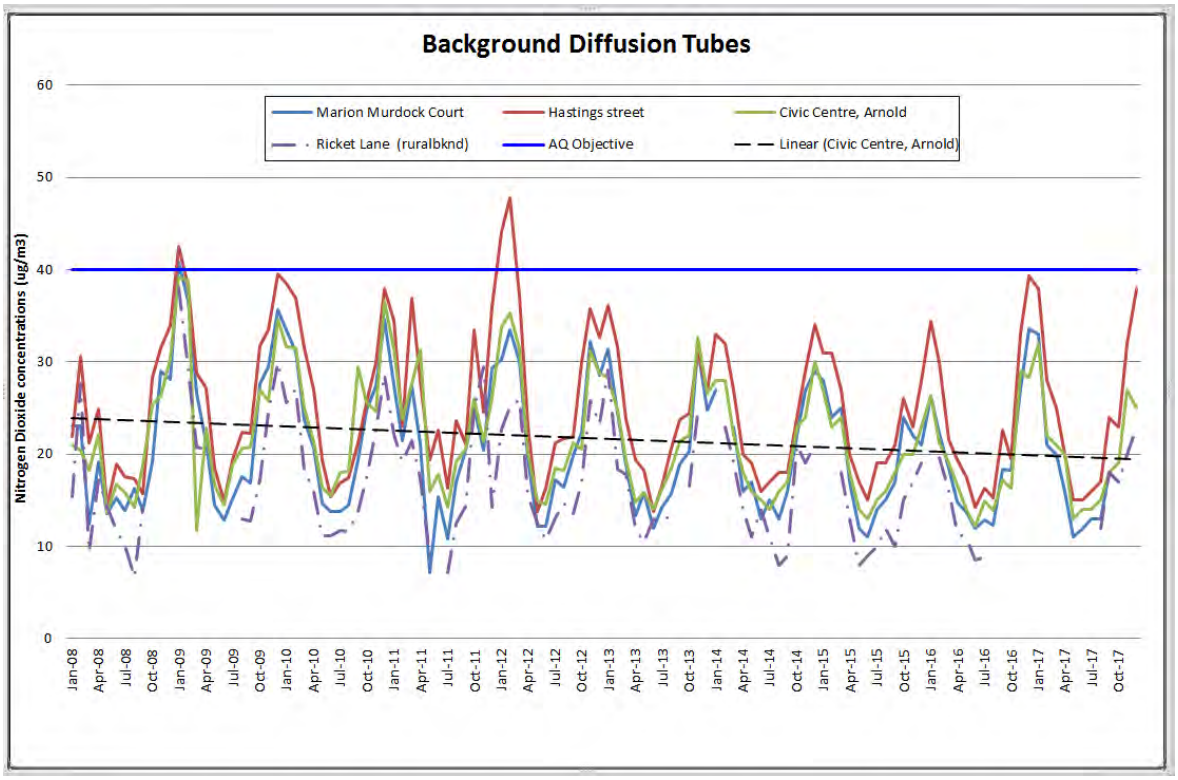
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

Nitrogen Dioxide Diffusion Tube Results 2008 – 2017






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


Background Diffusion Tubes
Nitrogen Dioxide concentrations (ug/m3)
Marion Murdock Court
Hastings street
Civic Centre, Arnold
Ricket Lane (ruralbknd)
AQ Objective
Linear (Civic Centre, Arnold)

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results – 2017

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 (0.89) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
82492	54.0	37.0	36.0	41.0	32.0	34.0	33.0	33.0	39.0	36.0	41.0	41.0	38.0	33.7	
82494	38.0	28.0	25.0	20.0	15.0	15.0	16.0	17.0	24.0	23.0	32.0	38.0	24.0	21.6	
82495	33.0	21.0	20.0	16.0	11.0	12.0	13.0	13.0	18.0	17.0	-	25.0	18.0	16.1	
82937	46.0	34.0	32.0	33.0	24.0	25.0	-	24.0	28.0	28.0	38.0	37.0	32.0	28.3	
87398	53.0	37.0	37.0	34.0	29.0	28.0	29.0	28.0	31.0	31.0	40.0	46.0	35.0	31.4	
87399	43.0	34.0	29.0	23.0	24.0	19.0	14.0	21.0	26.0	18.0	30.0	33.0	26.0	23.2	
87400	49.0	37.0	35.0	37.0	28.0	28.0	27.0	30.0	33.0	34.0	43.0	44.0	35.0	31.4	
87401	41.0	33.0	31.0	28.0	27.0	24.0	24.0	21.0	26.0	25.0	34.0	35.0	29.0	25.9	
87402	49.0	37.0	37.0	38.0	28.0	30.0	25.0	28.0	34.0	33.0	40.0	43.0	35.0	31.2	26.6
87403	48.0	39.0	39.0	31.0	36.0	29.0	31.0	27.0	34.0	32.0	37.0	37.0	35.0	31.1	
87404	50.0	37.0	37.0	33.0	35.0	29.0	30.0	29.0	38.0	32.0	35.0	37.0	35.0	31.2	
87405	45.0	34.0	37.0	32.0	33.0	29.0	26.0	28.0	35.0	30.0	34.0	39.0	34.0	29.9	
87406	40.0	-	27.0	-	-	-	-	-	-	-	-	35.0	34.0	23.8	

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 (0.89) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
87407	50.0	43.0	44.0	41.0	30.0	21.0	33.0	32.0	39.0	38.0	47.0	51.0	39.0	34.8	28.0
87408	-	16.0	-	9.0	-	-	-	12.0	18.0	17.0	20.0	23.0	16.0	14.7	
87409	50.0	36.0	31.0	32.0	23.0	25.0	26.0	26.0	34.0	31.0	41.0	45.0	33.0	29.7	
87410	32.0	22.0	21.0	20.0	13.0	14.0	14.0	15.0	18.0	19.0	27.0	25.0	20.0	17.9	
87411	38.0	30.0	27.0	23.0	22.0	16.0	18.0	17.0	22.0	27.0	30.0	34.0	25.0	22.6	
87412	72.0	51.0	-	53.0	38.0	42.0	39.0	40.0	44.0	44.0	62.0	50.0	49.0	**43.3**	
87413	59.0	-	46.0	47.0	35.0	39.0	37.0	39.0	42.0	43.0	62.0	52.0	46.0	**40.5**	
87414	51.0	41.0	37.0	40.0	29.0	29.0	26.0	35.0	36.0	35.0	45.0	47.0	38.0	33.4	
87415	43.0	-	31.0	28.0	25.0	34.0	21.0	24.0	26.0	27.0	34.0	35.0	30.0	26.4	
87460	42.0	35.0	33.0	30.0	22.0	24.0	21.0	25.0	28.0	26.0	37.0	38.0	30.0	26.8	
87461	46.0	38.0	44.0	42.0	32.0	-	-	35.0	-	-	-	42.0	40.0	33.2	

☐ **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 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.**

(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	
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 2017 for 20% TEA in water is given as **0.89** 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 **0.91**.

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

Two of the diffusion tube locations are not representative of the receptors concerned:

1. 36 Victoria Road
2. The Vale PH

Due to site constraints the tubes are located as close as possible to the receptors. The two results have 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 Vale PH uses the "Civic Centre" UB tube (17.9µg/m^3) and 36 Victoria Rd uses the average of Marion Murdock Court and Hastings Street UB tubes. (16.1µg/m^3). Screen shots of these spreadsheets are attached to this appendix.

Short-term to Long-term Data adjustment

As mentioned tube data from Burton Rd/Shearing, Ricket Lane and Mile End Road were incomplete for 2017. 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

Burton Rd/Shearing Hill Tube (ref.87406)

Long term site	Annual Mean 2017 (Am)	Period Mean 2017 (Pm)	Ratio
Chesterfield Roadside	18.0	24.17	0.74
Nottingham Centre	30.0	37.39	0.80
Market Harborough	10.0	13.67	0.73
GBC Analyser	31.0	38.50	0.81
GBC co-located tubes	35.0	41	0.85
		Average ratio	**0.79**

Ricket Lane Tube (ref.87408)

Long term site	Annual Mean 2017 (Am)	Period Mean 2017 (Pm)	Ratio
Chesterfield Roadside	18.0	17.98	1.00
Nottingham Centre	30.0	31.18	0.96
Market Harborough	10.0	10.13	0.99
GBC Analyser	31.0	31.14	1.00
GBC co-located tubes	35.0	33.81	1.04
		Average ratio	**1.00**

Mile End Road Tube (ref.87461)

Long term site	Annual Mean 2017 (Am)	Period Mean 2017 (Pm)	Ratio
Chesterfield Roadside	18.0	19.84	0.91
Nottingham Centre	30.0	31.72	0.95
Market Harborough	10.0	10.53	0.95
GBC Analyser	31.0	34.00	0.91
GBC co-located tubes	35.0	36.33	0.96
		Average ratio	**0.94**

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	04/01/2017	01/02/2017	47.9	49.7	45.2	48	2.3	5	5.6	47.8	99	Good	Good
2	01/02/2017	01/03/2017	39.0	37.1	33.6	37	2.7	7	6.7	37.6	93.6	Good	Good
3	01/03/2017	29/03/2017	38.8	37.1	37.3	38	0.9	3	2.4	33.7	99.7	Good	Good
4	29/03/2017	27/04/2017	30.9	33.3	32.5	32	1.2	4	3.1	28.7	99.9	Good	Good
5	27/04/2017	01/06/2017	35.5	35.0	33.1	35	1.2	4	3.1	32	99.9	Good	Good
6	01/06/2017	28/06/2017	28.5	29.0	29.3	29	0.4	1	1.0	22	99.4	Good	Good
7	28/06/2017	02/08/2017	30.9	29.5	26.4	29	2.3	8	5.7	23	99.8	Good	Good
8	02/08/2017	30/08/2017	26.8	28.6	27.6	28	0.9	3	2.2	24	99.9	Good	Good
9	30/08/2017	27/09/2017	34.3	37.7	34.6	36	1.9	5	4.7	29	99.9	Good	Good
10	27/09/2017	01/11/2017	32.4	31.5	30.5	31	1.0	3	2.4	28	99.4	Good	Good
11	01/11/2017	06/12/2017	36.7	35.4	34.4	36	1.1	3	2.8	36.6	99.9	Good	Good
12	06/12/2017	03/01/2018	37.4	37.1	38.9	38	1.0	3	2.4	34	95.8	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

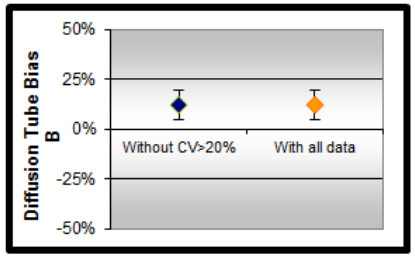
(Check average CV & DC from Accuracy calculations)

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	0.91 (0.85 - 0.97)
Bias B	10% (3% - 17%)
Diffusion Tubes Mean:	35 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	31 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	31 (29 - 34) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.91 (0.85 - 0.97)
Bias B	10% (3% - 17%)
Diffusion Tubes Mean:	35 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	31 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	31 (29 - 34) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Co-Location Spreadsheet 2017 Gradko Analysed

Adjustment of SINGLE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tube Measurements																
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 0.91 (0.85 - 0.97) Bias B 10% (3% - 17%) Tube Precision: 4 Automatic DC: 99%
The Grove PH - Daybrook Sq	53.8	37.0	35.8	40.9	31.6	33.6	32.7	32.5	39.0	35.9	41.0	40.8		37.9	12	Adjusted with 95% CI 34 (32 - 37)
Hastings Street	38.0	28.0	25.4	20.5	14.7	15.0	16.2	16.9	24.0	22.9	32.0	37.6		24.3	12	Adjusted with 95% CI 22 (21 - 24)
Marion Murdock Court	33.4	21.0	19.5	16.1	11.1	11.7	12.9	13.4	18.0	17.0	-	25.1		18.1	11	Adjusted with 95% CI 16 (15 - 18)
47 Plains Road	46.1	34.0	32.3	32.9	23.6	25.0	-	24.4	28.0	28.4	38.0	37.3		31.8	11	Adjusted with 95% CI 29 (27 - 31)
Morley Mills, Daybrook	52.6	37.0	36.9	33.7	29.1	27.9	28.7	28.1	31.0	31.5	40.0	46.4		35.2	12	Adjusted with 95% CI 32 (30 - 34)
Mansfield Road, Redhill	42.9	34.0	29.0	23.3	23.9	19.1	13.8	20.7	26.0	17.7	30.0	33.0		26.1	12	Adjusted with 95% CI 24 (22 - 25)
Daybrook Dental Surgery	49.5	37.0	35.0	36.9	27.5	28.3	26.8	29.9	33.0	33.8	43.0	43.6		35.4	12	Adjusted with 95% CI 32 (30 - 34)
Victoria Road, Netherfield	40.6	33.0	30.6	27.6	27.3	24.0	23.8	21.3	26.0	24.6	34.0	35.3		29.0	12	Adjusted with 95% CI 26 (25 - 28)
Victoria Road, Netherfield	48.6	37.0	36.9	38.3	27.6	30.2	25.0	27.5	34.0	32.7	40.0	42.9		35.1	12	Adjusted with 95% CI 32 (30 - 34)
Burton Rd/Shearing Hill	39.8	-	26.6	-	-	-	-	-	-	-	-	35.2		33.9	3	Adjusted with 95% CI 31 (29 - 33)
The Vale PH - Thackerays Lane	50.1	43.0	44.4	41.4	30.0	20.8	32.7	32.4	39.0	37.7	47.0	50.8		39.1	12	Adjusted with 95% CI 36 (33 - 38)
Ricket Lane (ruralbknd)	-	16.0	-	9.3	-	-	-	12.3	18.0	17.2	20.0	22.6		16.5	7	Adjusted with 95% CI 15 (14 - 16)
Wickes Store, Daybrook	49.7	36.0	31.4	32.2	23.2	25.1	26.0	26.2	34.0	30.8	41.0	44.8		33.4	12	Adjusted with 95% CI 30 (28 - 32)
Civic Centre, Arnold	31.8	22.0	20.5	19.6	13.4	14.1	14.5	15.1	18.0	19.3	27.0	24.8		20.0	12	Adjusted with 95% CI 18 (17 - 19)
Colwick Park Close	38.3	30.0	27.3	23.3	21.5	15.9	18.3	17.3	22.0	27.4	30.0	33.5		25.4	12	Adjusted with 95% CI 23 (22 - 25)
Daybrook Chip Shop	72.0	51.0	-	53.2	38.3	41.7	38.8	40.0	44.0	44.1	62.0	49.7		48.6	11	Adjusted with 95% CI 44 (41 - 47)
T&S Heating, Daybrook	59.2	-	45.9	47.4	34.6	38.8	36.5	39.3	42.0	43.5	62.0	51.7		45.5	11	Adjusted with 95% CI 41 (39 - 44)
Frank Keys, Daybrook	50.8	41.0	37.0	40.2	29.2	28.8	25.9	34.7	36.0	35.2	45.0	46.5		37.5	12	Adjusted with 95% CI 34 (32 - 36)
856 Plains Road	43.3	-	31.2	27.5	25.2	33.7	20.8	23.7	26.0	26.8	34.0	34.6		29.7	11	Adjusted with 95% CI 27 (25 - 29)
Rectory Road/Vale Road	41.9	35.0	32.8	30.2	22.5	23.9	21.1	24.9	28.0	26.3	37.0	38.2		30.1	12	Adjusted with 95% CI 27 (26 - 29)
Mile End Road	46.4	38.0	43.8	41.9	31.6	-	-	34.6	-	-	-	41.8		39.7	7	Adjusted with 95% CI 36 (34 - 39)

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

2017 Diffusion Gradko Analysed Tube Results

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/18

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 2018

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]

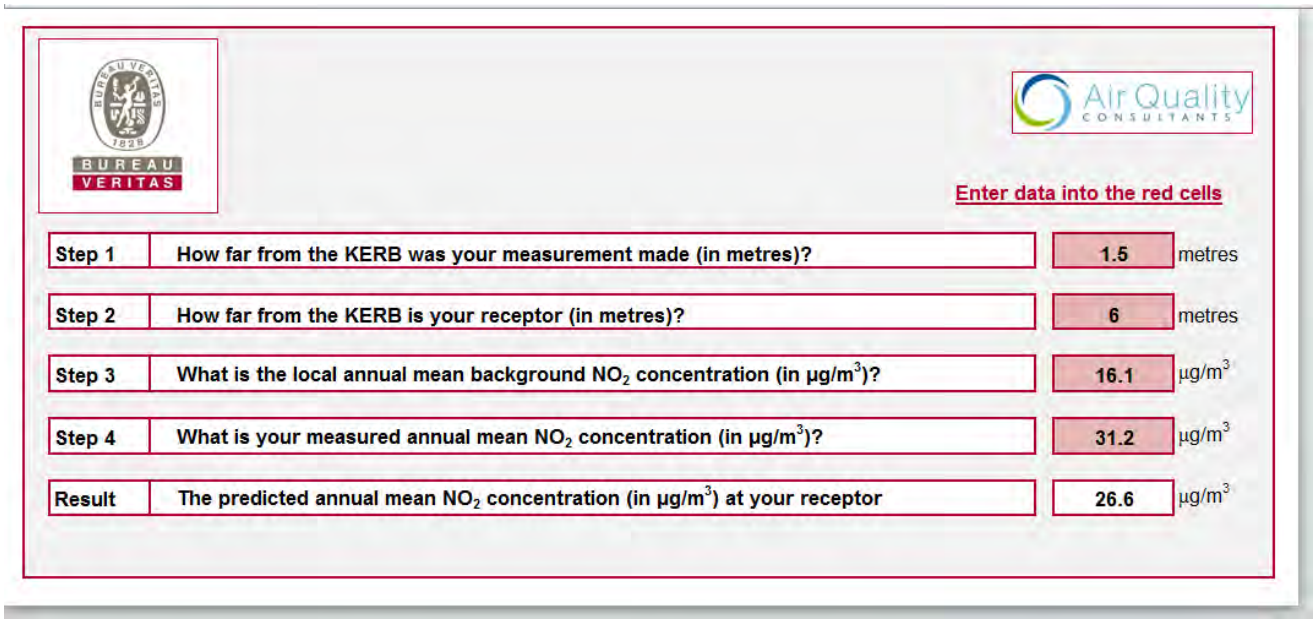
Step 4:

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	2017	R	Gedling Borough Council	12	35	31	10.1%	G	**0.91**
Gradko	20% TEA in water	2017	R	Gateshead Council	12	36	37	-2.7%	G	**1.03**
Gradko	20% TEA in water	2017	R	Gateshead Council	12	29	25	17.5%	G	**0.85**
Gradko	20% TEA in water	2017	R	Gateshead Council	12	34	35	-5.3%	G	**1.06**
Gradko	20% TEA in water	2017	R	LB Hounslow	12	65	54	22.2%	G	**0.82**
Gradko	20% TEA in water	2017	R	LB Hounslow	12	59	53	10.6%	G	**0.90**
Gradko	20% TEA in water	2017	B	LB Hounslow	11	28	30	-6.0%	G	**1.06**
Gradko	20% TEA in water	2017	R	LB Hounslow	11	43	34	28.8%	G	**0.78**
Gradko	20% TEA in water	2017	B	LB Hounslow	9	38	33	14.9%	G	**0.87**
Gradko	20% TEA in water	2017	R	LB Hounslow	11	52	42	24.4%	G	**0.80**
Gradko	20% TEA in water	2017	UB	Liverpool	11	20	17	15.2%	G	**0.87**
Gradko	20% TEA in water	2017	R	North Ayrshire Council	12	26	21	23.2%	G	**0.81**
Gradko	20% TEA in water	2017	R	South Gloucestershire Council	12	25	23	10.3%	G	**0.91**
Gradko	20% TEA in water	2017	KS	Marylebone Road Intercomparison	12	101	79	28.6%	G	**0.78**
Gradko	20% TEA in water	2017		**Overall Factor[3] (34 studies)**				**Use**		**0.89**

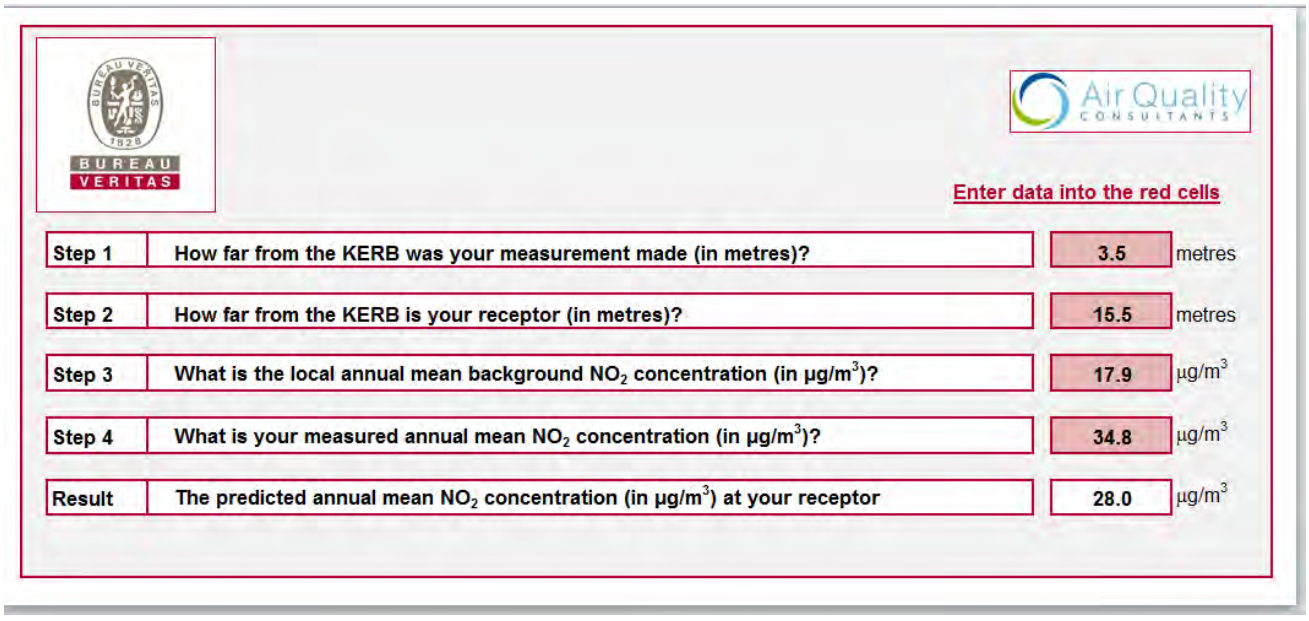
Gradko 20%TEA in Water Co-location Studies 2017



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	1.5	metres
Step 2	How far from the KERB is your receptor (in metres)?	6	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	16.1	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	31.2	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	26.6	$\mu g/m^3$

36 Victoria Road Calculation for Distance to Receptor

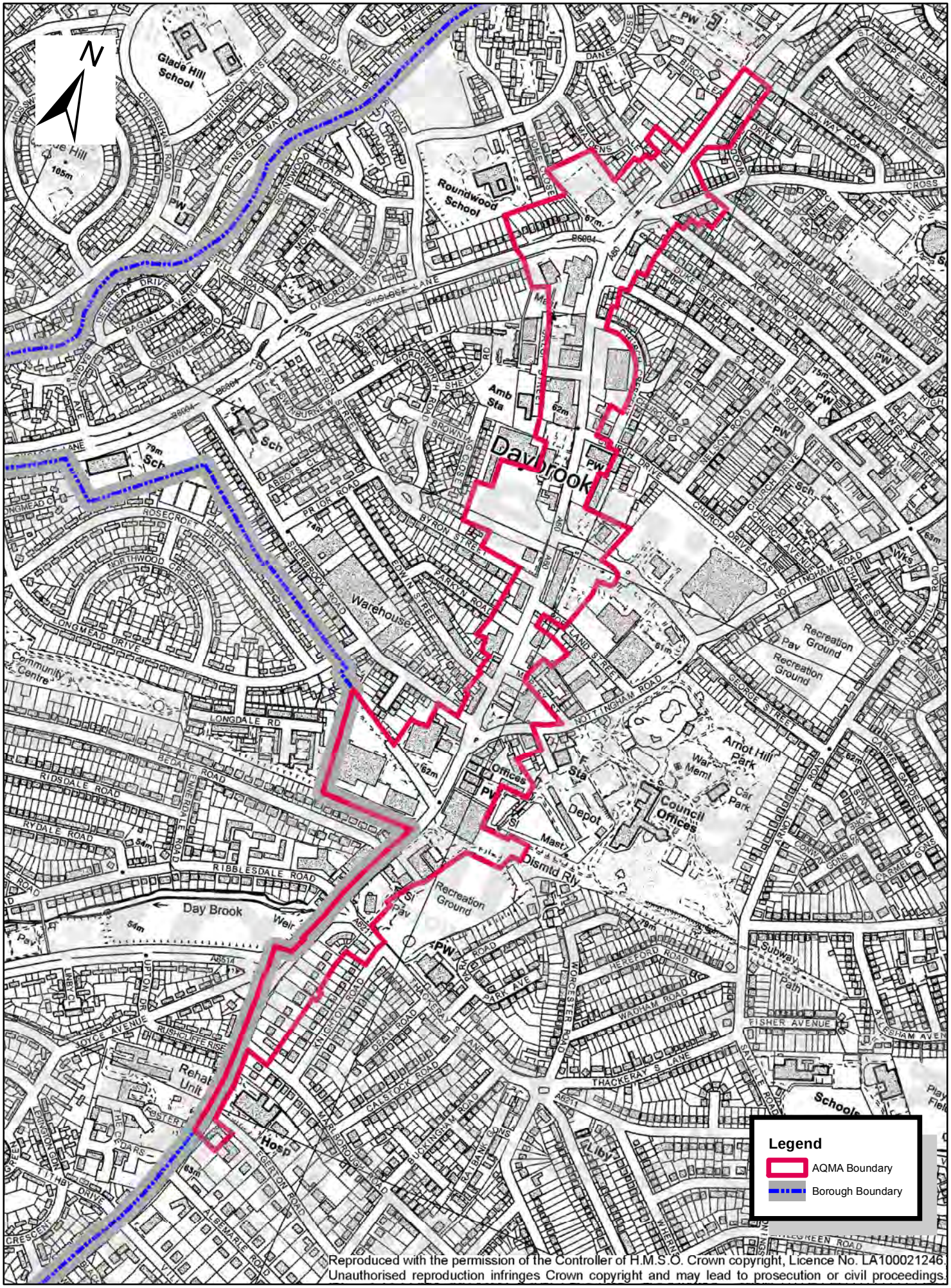


Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	3.5	metres
Step 2	How far from the KERB is your receptor (in metres)?	15.5	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	17.9	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	34.8	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	28.0	$\mu g/m^3$

Vale PH Calculation for Distance to Receptor

Appendix D: Maps

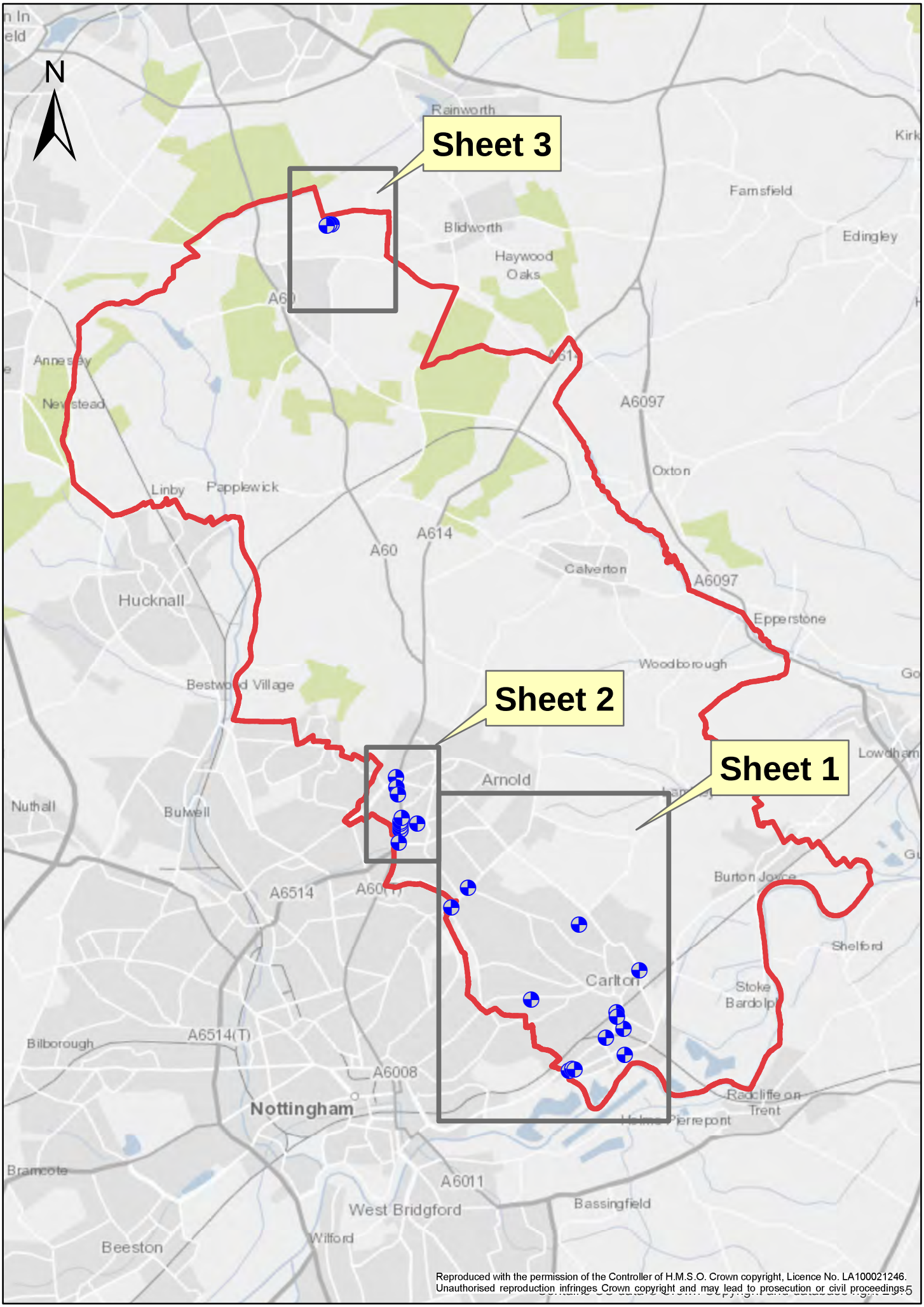


Gedling Borough Council

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

Scale 1:7,500

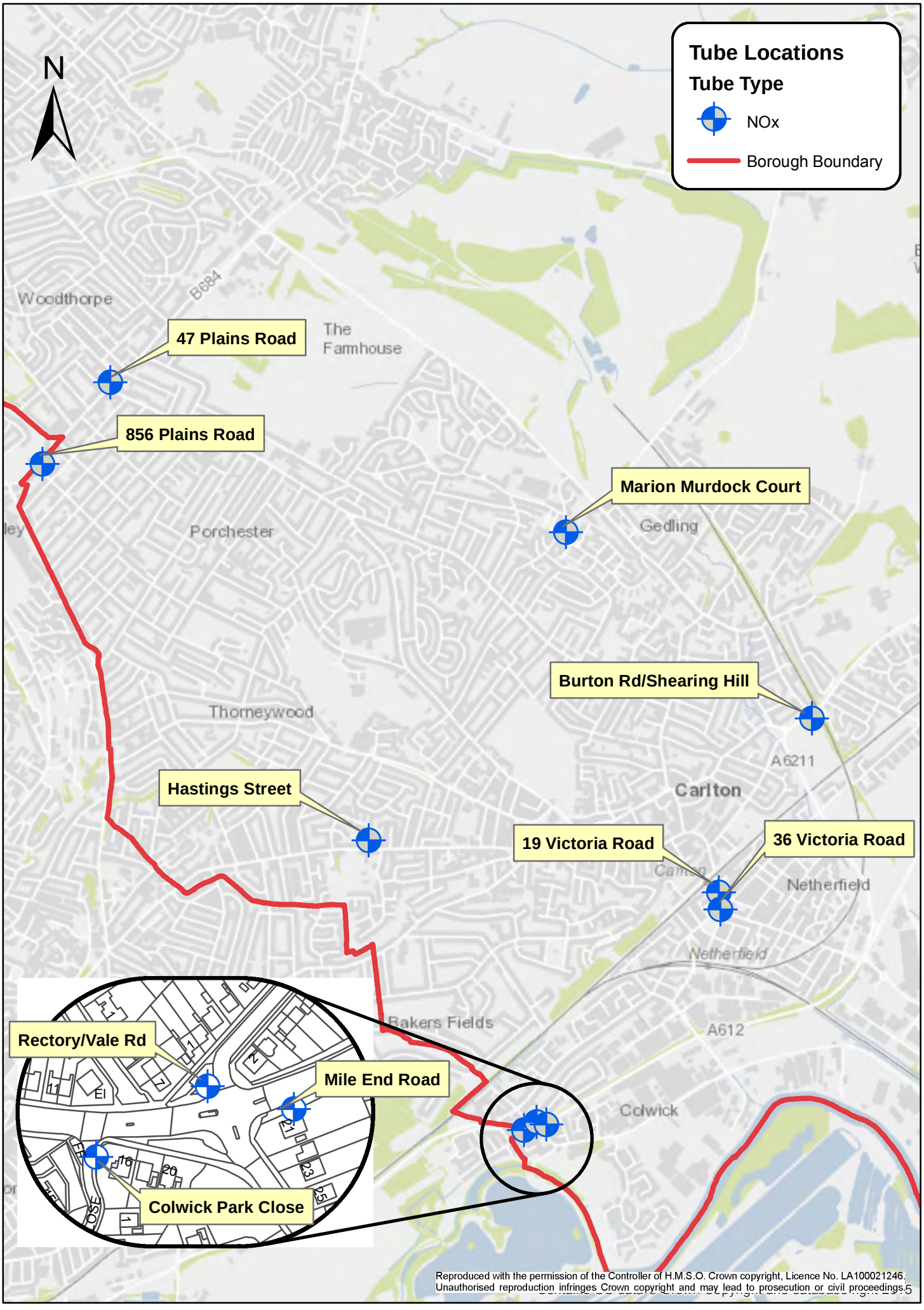
Date April 2011



Gedling Borough Council

Sheet Locations

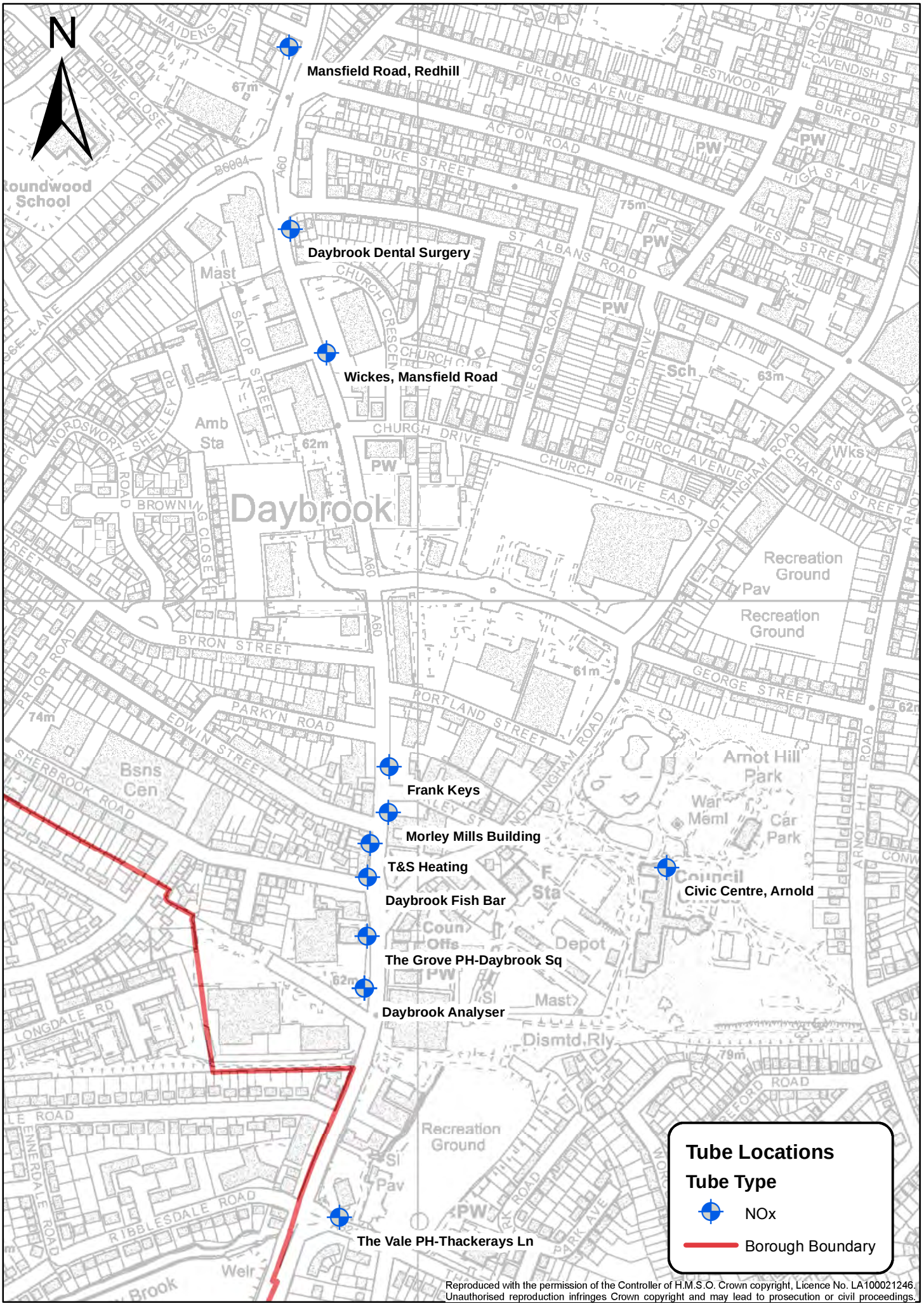
Scale: nts



Gedling Borough Council

DiffusionTube Locations - Sheet 1

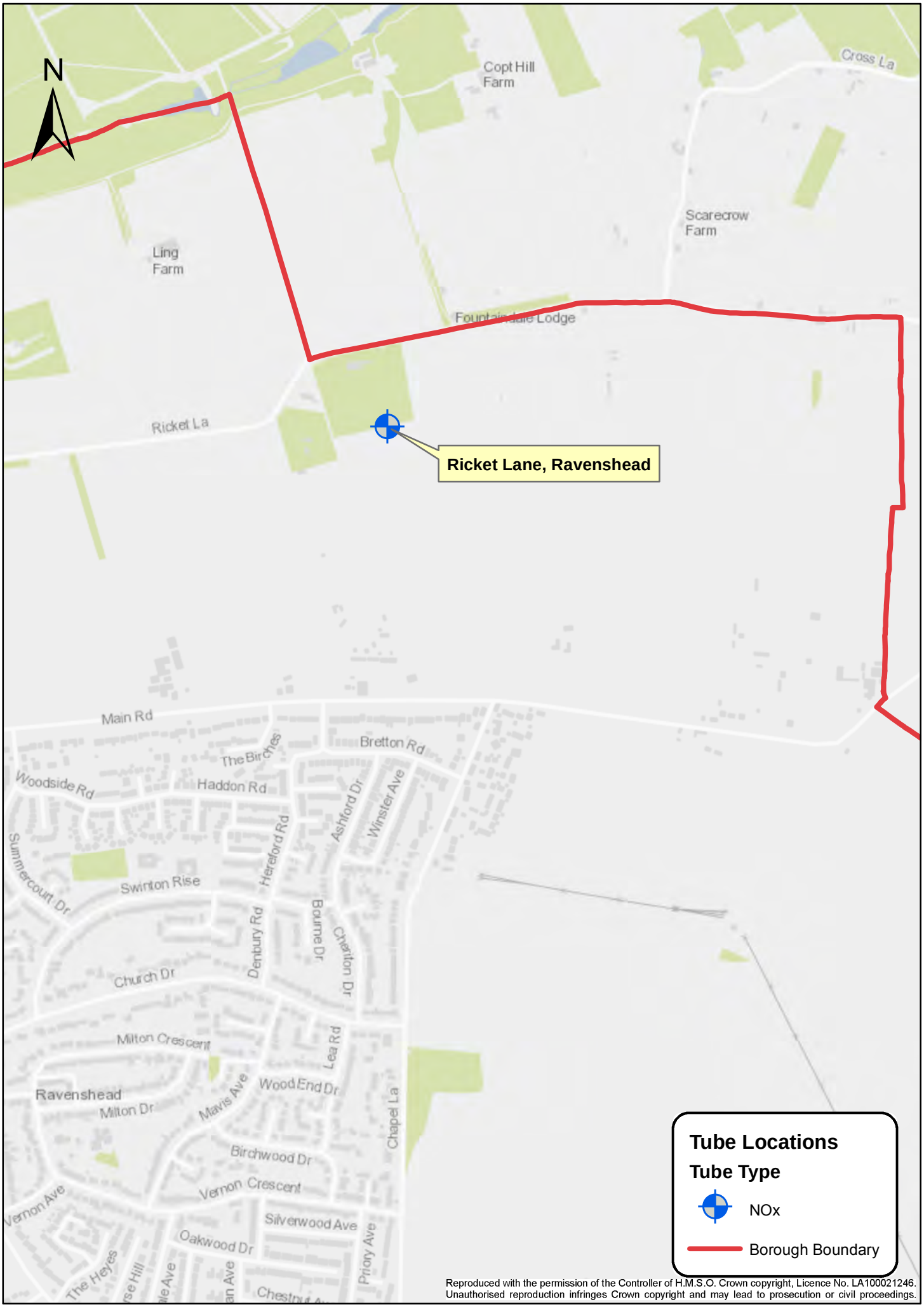
Scale: nts



Gedling Borough Council

DiffusionTube Locations - Sheet 2

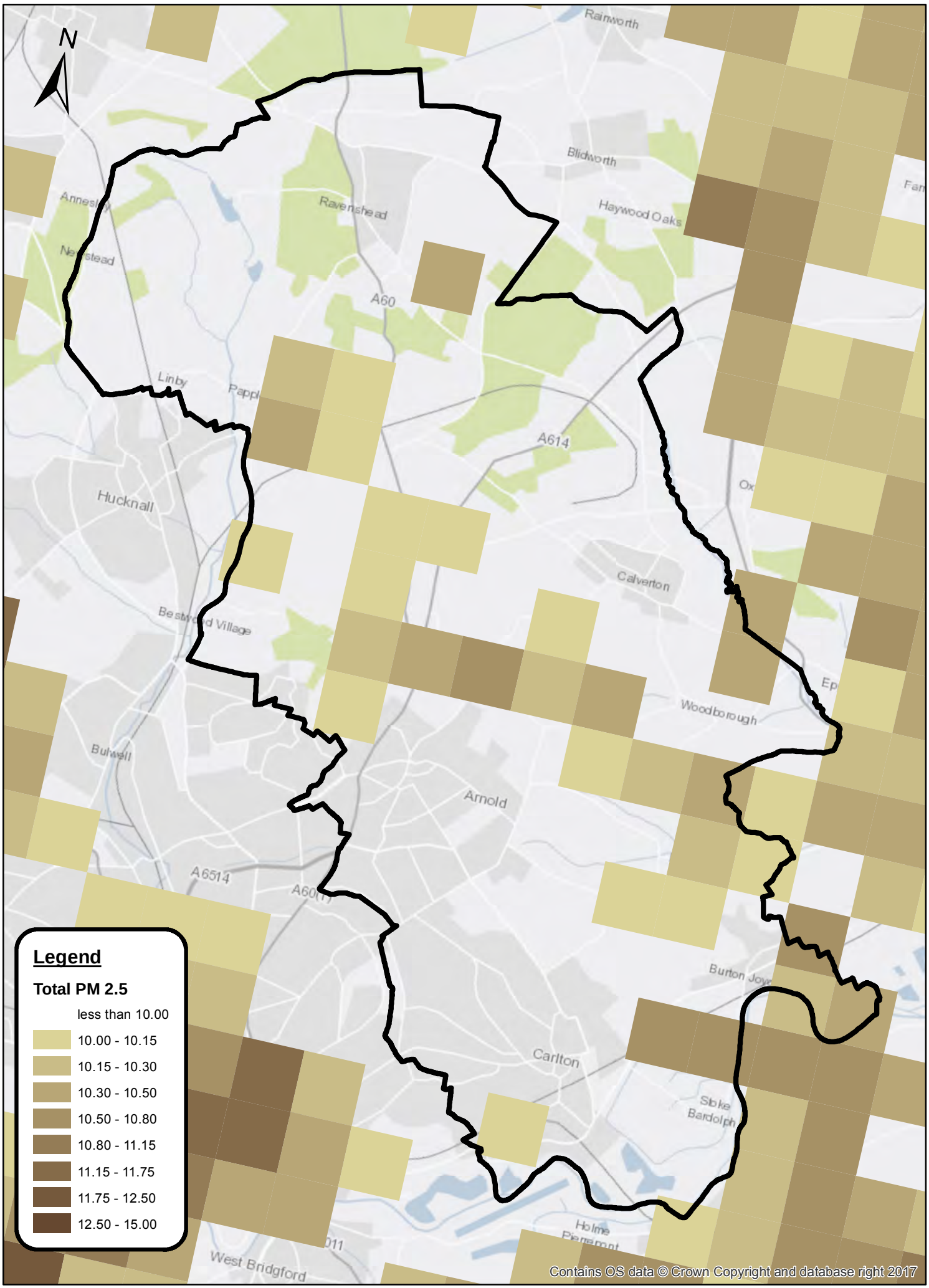
Scale: nts



Gedling Borough Council

DiffusionTube Locations - Sheet 3

Scale: nts



Gedling Borough Council

2017 PM2.5 Modelled Background Concentrations above WHO limit value (scaled from 10ugm3 to 15ugm3)

Scale 1:75,000

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

References

Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users, 2008. AEA Energy & Environment.

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

Joint strategic needs assessment: Air Quality (2015), Health Protection Strategy Group; http://jsna.nottinghamcity.gov.uk/insight/Strategic-Framework/Nottinghamshire-JSNA/Cross-cutting-themes/Air-Quality.aspx ; Accessed May 2015.

LTP3, 3rd Local Transport Plan for Nottingham, 2011-2026; Nottinghamshire County Council; 2011.

Part IV of the Environment Act 1995 - Local Air Quality Management: Policy Guidance; LAQM.PG(16); Department for Environment and Food and Rural Affairs; 2016.

Part IV of the Environment Act 1995 - Local Air Quality Management; Technical Guidance; LAQM.TG(16); Department for Environment and Food and Rural Affairs; 2016.

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007. Department for Environment and Food and Rural Affairs.

ML®9841B Nitrogen Oxides Analyser Operational and Service Manuals; Monitor Labs; Rev H; October 1998.

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

Air Quality – A Briefing for Directors of Public Health; Department for Environment and Food and Rural Affairs, Public Health England and Local Government Association; 2017.