2023 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, as amended by the Environment Act 2021

Date: April 2023

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Executive Summary: Air Quality in Our Area

Air Quality in Newark & Sherwood

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

The mortality burden of air pollution within the UK is equivalent to 29,000 to 343,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

In Newark & Sherwood, the Office for Health Improvement & Disparities have calculated that 5.3% of mortality is attributable to particulate air pollution, which is lower than the East Midlands (5.6%) and lower than the England (5.5%) percentage figures (2021 period).

In our district the key sources of air pollution are from vehicle emissions, industrial processes and agriculture. The main pollutants of concern are nitrogen dioxide and particulate matter which are both found in vehicle exhaust emissions. Ambient background levels are also affected by emissions from domestic heating: NO_x from domestic gas boilers and PM from wood, coal and oil fired burners and boilers.

NO_2 levels in 2022 were very similar to those observed in 2021 and reported in last year's ASR. Most sites recorded slightly lower annual average, however some (FADS 1N, Newark Castle 12N and Big Fish 18N) increased marginally although the difference was minimal as with all monitoring locations when compared to those from 2021. It would seem that there was a significant reduction in NO_2 levels when the COVID 19 pandemic

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

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

[3] Defra. Air quality appraisal: damage cost guidance, January 2023

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

restrictions were in place in 2020 and since then things have increased slightly from these low levels but have not returned to pre pandemic levels as people have found different ways of working some commuter travel has reduced. 2021 and 2022 levels were very similar which indicates that things may have settled and should remain around this level going forward.

The three sites where results were most elevated were Brunel Drive/Lincoln Road, FADS Cartergate and Bowbridge Road. The Brunel Drive and Lincoln Road junction is a hotspot where traffic builds up particularly when private and business vehicles are exiting the nearby industrial estate to access the nearby A1 or A46. Bias adjusted annual mean for 2022 was 26.06 ug/m^3.

The FADS Cartergate site is at the busy Beaumond Cross junction in Newark where there is regularly queuing traffic which is controlled by traffic lights and where Lombard Street, London Road and Portland Street meet. There is a busy Asda supermarket, large doctors' surgery and multiple shops and restaurants. This area is regularly bustling with vehicles and pedestrians. Bias adjusted annual mean for 2022 here was 25.44 ug/m^3.

Bowbridge Road is a predominantly residential street, but one end shares a junction with the busy London Road and the other end has a significant amount of development occurring with the Lord Hawke Way residential development and the much larger Middlebeck development site, which continues to grow and is much larger than when reported last year, and also Hawton Lane industrial sites. Bowbridge Road regularly has queuing traffic due to traffic lights at each end to control the volumes of vehicles. Bias adjusted annual mean for 2022 was 25.17 ug/m^3.

The Big Fish roundabout site (25.06 ug/m^3) and the Lodge (22.55 ug/m^3) were the next two highest results. Both are very close to busy A roads and junctions and have been discussed in previous reports.

We regularly review tube locations and consider these the current worst-case scenarios and representative of relevant exposure.

These areas have historically shown some of the most elevated monitored levels of nitrogen dioxide in the district, although the levels are significantly below Air Quality

Objectives for England (Table E1) and below that required for declaring a new Air Quality Management Areas (AQMA) and any associated action plan or strategy.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Our core actions to target sources of air pollution are based on recommendations made in the Nottinghamshire Air Quality Strategy (2020) and include:

- To review and assess air quality in the district against national health-based standards and produce annual reports of our assessment and monitoring.
- We work with colleagues from Nottinghamshire County Council Highways to implement actions to ease congestion and maintain a flow of traffic (reducing the stop/start) and promote alternatives such as public transport and cycling/walking.
- We work with colleagues in the Planning Unit to ensure air quality is a material consideration in the forward planning process and during consultation for new developments. We may consult with neighbours on proposed development with significant impacts on air quality across our boundaries and can require modelling or monitoring to establish impact of developments on air quality.

[5] Defra. Environmental Improvement Plan 2023, January 2023

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

- We work with the UK Health Security Agency and other health professionals to raise awareness and promote measures to improve air quality whilst reducing emissions to air from our own activities.
- We rigorously enforce legislation to control industrial emissions and carry out risk-based enforcement and charging. We can also assist and advise businesses where required.
- We enforce legislation to control emissions from chimneys and bonfires and assess biomass burners for air quality using the DEFRA biomass screening tool.
- We promote clean air and good practise through our website and publish DEFRA guidance on Open Fires and Wood Burning Stoves and the Woodsure Ready to Burn initiative. We have produced a webpage aimed at educating wood burner owners to improve practices to increase efficiency and reduce particulate emissions. This has been promoted through our corporate social media accounts.

We try to encourage consumers to buy Eco Design stoves. This is a European-wide initiative designed to lower emissions from Stoves. In 2015 DEFRA stated Eco Design as the method it will use to improve efficiency and reduce emissions from solid fuel stoves.

In addition to the above, HETAS has introduced the Cleaner Choice Product Approval Scheme. Stoves approved by the scheme are independently proven to meet the most stringent emissions criteria, going further than any other industry scheme and exceeding Eco Design and Defra Exemption requirements. We would recommend that consumers consider these schemes when looking to purchase a new stove.

- We advise householders to encourage reduction and recycling of household waste.
- We promote anti-vehicle idling in our district as part of our ‘days of action’ which targets various improvements at locations throughout the district. We have carried out some of these this year and have focussed on school pick up times when engines may be left running. We have handed out leaflets during pick up time on several occasions at Holy Trinity School, Boundary Road Newark, Barnby Road School Newark and Lowes Wong School in Southwell. We are also meeting with colleagues at Nottinghamshire County Council to discuss how we can continue and improve this driver anti idling education program.
- We promote and welcome the use of electric vehicle charging points across the district.

Conclusions and Priorities

Newark & Sherwood District Council has never had to declare an AQMA and in recent years and Nitrogen Dioxide levels seem to be generally reducing. Our priorities are therefore to ensure that the levels of air pollution continue to reduce or at least stay the same and don't increase. Levels observed in 2022 were very similar to those of 2021 with small reductions across most sites but marginal increases at three locations. Since the significant reduction of levels during the 2020 COVID 19 pandemic restrictions, things seem to have increased slightly as lockdown restrictions were removed but now levelled out during the last two years monitoring. The general post pandemic level is significantly below pre pandemic monitored levels despite no restrictions. This is likely to be due to more home and smart working and less commuting.

There were no exceedances of air quality objectives at any location across the district. There are some large residential developments proposed and ongoing across the district however we ensure that air quality is considered as part of the planning application and require air quality assessments and construction management plans where appropriate. Below is a brief summary of our priorities in addressing air quality for the coming year:

- We will continue to monitor for Nitrogen Dioxide in the areas of concern. We review monitoring locations on a regular basis to ensure that worst case relevant exposure is represented.

- We are a member of the Nottinghamshire Environmental Protection Working Group (NEPWG), which is establishing links 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 in 2015 (JSNA Air Quality). We will continue to promote air quality issues via the NEPWG with health colleagues to promote air quality issues in emerging work.

- The Nottinghamshire Air Quality Strategy has been reviewed and updated by the NEPWG and Nottinghamshire County Council. We shall have regard for recommendations made within it across the district going forward.

Local Engagement and How to get Involved

As a resident of Newark and Sherwood District you can help to make a difference:

- Why not try cycling to work instead of driving if it is a viable option for you and work is not too far away for you to do this. Even if for only for one day a week, you will be having a beneficial effect on air quality by reducing vehicle emissions and also improving your own health by exercising. If cycling to work is not possible, could you use public transport instead?

- When you look to buy a new car do some research and look for one that has low emissions such as modern petrol, hybrid or electric.

- If you are thinking of installing a biomass burner (i.e. a wood or pellet or briquette burner) either for domestic or industrial use, make sure that it is an exempt appliance (i.e. exempt from certain parts of the Clean Air Act 1993) or use an authorised fuel if you are going to use it in a smoke control zone. Also make sure that it is correctly installed (with HETAS or Building Regulation approval for domestic) and correctly maintained including regular services and the chimney swept at least twice per year. The fuel used should be appropriate for the burner; this should be provided in the manufacturer's instructions. Guidance on wood burners and the Woodsure scheme is available from the Smoke Control Area section of our website.

- During the COVID 19 pandemic you may have had to work at home for some of the time. Evidence in this report and elsewhere nationally has shown that there was a large reduction in emissions during the pandemic and working at home more often was one of the factors which contributed to this reduction. Is working at home something that you could try and continue to do in the future if your employer allows? Even if you can only manage one day every few weeks you will be reducing your commuter emissions and collectively this can have a huge impact as the COVID 19 pandemic has shown. Do you really need to travel to that meeting, can it be attended virtually instead?

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.

- Try to turn your vehicle engine off if you are stationary for a significant amount of time or enable stop/start if your vehicle has it fitted. An idling engine can produce up to twice as much exhaust emissions as an engine from a vehicle in motion.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Newark & Sherwood District Council with the support and agreement of the following officers and departments:

Planning at Newark & Sherwood District Council

Nottinghamshire County Council

UK Health Security Agency

Office for Health Improvement and Disparities

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

If you have any comments on this ASR, please send them to Jim Hemstock at:

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Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Newark & Sherwood during 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Newark & Sherwood to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

Newark & Sherwood currently does not have and never has had to declare any AQMAs within the District. Levels seem to be reducing year on year so it would seem unlikely at this stage that any AQMA will be declared anytime soon.

The Nottinghamshire Air Quality Strategy is in place to prevent and reduce polluting activities. We shall have regard for recommendations made within it across the district going forward.

Members of the Nottinghamshire Environmental Protection Working Group have produced a section on air quality which is included in the Nottinghamshire Joint Strategic Needs Assessment. The JSNA will be considered by the Health and Wellbeing Board and will be used to develop a Health and Wellbeing Strategy; this then sets out the priorities and funding for health, care and commissioning plans.

For reference, a map of Newark & Sherwood District Council's monitoring locations is available in Appendix D.

2.2 Progress and Impact of Measures to address Air Quality in Newark & Sherwood

Defra's appraisal of last year's ASR concluded that the 2022 ASR was accepted for all sources and pollutants with no particular adverse comments, the main commentary points are presented below.

1. Some of the policy text, for example around the Environment Act, which was amended in 2021, is now outdated and so could be updated.
2. The Council provide a good discussion of NO_2 trends within the district as well as the impacts of the easing of COVID-19 restrictions has had on air quality.
3. The Council should continue to review the monitoring programme on a regular basis, to ensure that monitoring takes place at any sites of potential exceedance with relevant exposure.
4. The Council could provide clearer maps showing the locations of monitoring sites.
5. Within the text there was some irregularity in the units cited, such as mg/m^3 used instead of $\mu g/m^3$. This should be amended to ensure consistency across the report.
6. The Council have provided a thorough account of actions they have implemented and plan to implement within the district to maintain good air quality, which given the already low concentrations monitored shows good practice and an aspiration for continual improvement.

Newark and Sherwood has never had to declare an AQMA and given current levels, it seems unlikely that an AQMA is going to be declared in the near future. This rural authority has less significant issues than the neighbouring Nottingham conurbation.

This can give the perception that there isn't an air quality problem in the district; however it is important to continue with the measures to ensure this situation doesn't deteriorate.

Our core actions to target sources of air pollution are those measures described in the county wide Air Quality Strategy (2020) and include:

- To review and assess air quality in the district against national health based standards and produce annual reports of our assessment and monitoring.

- We work with colleagues from Nottinghamshire County Council Highways to implement actions to ease congestion and maintain a flow of traffic (reducing the stop/start) and promote alternatives such as public transport and cycling/walking.
- We work with colleagues in the Planning Unit to ensure air quality is a material consideration in the forward planning process and during consultation for new developments. We may consult with neighbours on proposed development with significant impacts on air quality across our boundaries and can require modelling or monitoring to establish impact of developments on air quality.
- We work with UK Health Security Agency and other health professionals to raise awareness and promote measures to improve air quality whilst reducing emissions to air from our own activities.
- We review our energy usage and put in place initiatives to improve energy efficiency. In September 2017, the council moved to new purpose-built offices which has greatly improve our performance in this field.
- We rigorously enforce legislation to control industrial emissions and carry out risk-based enforcement and charging. We can also assist and advise businesses where required.
- We promote clean air and good practise through our website and publish DEFRA guidance on Open Fires and Wood Burning Stoves and the Woodsure Ready to Burn initiative. We have produced a webpage aimed at educating wood burner owners to improve practices to increase efficiency and reduce particulate emissions. This has been promoted through our corporate social media accounts.

We try to encourage consumers to buy Eco Design stoves (full web-link available in references section of report). This is a European-wide initiative designed to lower emissions from Stoves. In 2015 DEFRA stated Eco Design as the method it will use to improve efficiency and reduce emissions from solid fuel stoves.

In addition to the above, HETAS has introduced the Cleaner Choice Product Approval Scheme (full web-link available in references section of report). Stoves approved by the scheme are independently proven to meet the most stringent emissions criteria, going further than any other industry scheme and exceeding Eco Design and Defra Exemption requirements. We would recommend that consumers consider these schemes when looking to purchase a new stove.

- We enforce legislation to control emissions from chimneys and bonfires and advise householders to encourage reduction and recycling of household waste.
- We promote anti-vehicle idling in our district as part of our ‘days of action’ which targets various improvements at locations throughout the district. We have carried out some of these this year and have focussed on school pick up times when engines may be left running. We have carried out this exercise at Holy Trinity School, Boundary Road Newark but have other locations and dates booked in for the coming year.
- We promote and welcome the use of electric vehicle charging points across the district.

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), 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.

In Newark & Sherwood, the Office for Health Improvement & Disparities have calculated that 5.3% of mortality is attributable to particulate air pollution, which is lower than the East Midlands (5.6%) and lower than England (5.5%) percentage figures (2021 period).

This authority does not monitor for $PM_{2.5}$ and so to consider the probable levels across the district, reference can be made to the following information sources:

Nottingham Centre AURN site – the monitored annual mean concentration for 2022 was 10.4 µm3.

DEFRA Background Levels – Background maps are available from the DEFRA webpages, 2022 levels for Newark Sherwood are predicted as an average of 8.18 µm3.

The authority is working towards reducing emissions and concentrations of $PM_{2.5}$; the World Health Organisation guideline value for annual average is now 5µm^3 which has been halved from pre 2021. The UK objective brought about by Environment Act 2021 and The Environmental Targets (Fine Particulate Matter) (England) Regulations 2022 is for the annual mean level in ambient air to be equal or less than 10µm^3 by 31st December 2040 (this was however out for consultation at the time of writing). Given this proposed future UK target limit, the modelled average level shows that Newark and Sherwood is already compliant.

In order to maintain compliance with $PM_{2.5}$ limits, Environmental Health requests Construction Management Plans and Dust Management Plans to accompany planning applications of large-scale development and also educates and enforces the relevant provisions of the Clean Air Act such as Smoke Control Areas and Chimney Heights.

More recently DEFRA and the National Clean Air Strategy has seen focus placed on wood burning stoves as a significant source of $PM_{2.5}$ emissions. Newark & Sherwood District

Council has taken this on board and has produced a web page to promote the correct use of stoves and initiatives such as Woodsure and Burnrite in order to try to tackle this source of $PM_{2.5.}$ This has been published throughout corporate social media accounts.

We regulate 53 permitted sites under the Environmental Permitting Regulations 2016 (as amended) and carry out risk-based enforcement and charging.

Environmental Health has been out promoting anti-vehicle idling at school pick up locations. Currently this is just being done as an education program for drivers and is not being formally enforced. This continued throughout 2022 and has been incorporated into in our 'days of action' along with other Council initiatives at several locations across the district. We are in discussions with Nottinghamshire County Council regarding anti idling initiatives and best practice going forward.

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

This section sets out the monitoring undertaken within 2022 by Newark & Sherwood District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2018 and 2022 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Newark & Sherwood District Council no longer carries out any automatic monitoring.

3.1.2 Non-Automatic Monitoring Sites

Newark & Sherwood District Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 13 sites during 2022. Table A.1 in Appendix A presents the details of the non-automatic sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Table A.2 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2022 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

There were no exceedances of the annual mean NO_2 objective throughout the 2022 monitoring period and over the last few years generally the trend has been reduction in levels. NO_2 levels in 2022 were very similar to those observed in 2021 and reported in last year's ASR. Most sites recorded slightly lower annual average, however some (FADS 1N, Newark Castle 12N and Big Fish 18N) increased marginally although the difference was minimal as with all monitoring locations when compared to those from 2021. There was a significant reduction in NO_2 levels when the COVID 19 pandemic restrictions were in place in 2020 and since then things have increased slightly from these low levels but have not returned to pre pandemic levels as people have found different ways of working some commuter travel has reduced. With 2021 and 2022 levels being very similar, it would seem to indicate that things have settled post COVID restriction removal. We would expect this to continue going forward.

The three sites where results were most elevated were Brunel Drive/Lincoln Road, FADS Cartergate and Bowbridge Road. The Brunel Drive and Lincoln Road junction is a hotspot where traffic builds up particularly when private and business vehicles are exiting the nearby industrial estate to access the nearby A1 or A46. Bias adjusted annual mean for 2022 was 26.06 ug/m^3.

The FADS Cartergate site is at the busy Beaumond Cross junction in Newark where there is regularly queuing traffic which is controlled by traffic lights and where Lombard Street, London Road and Portland Street meet. There is a busy Asda, large doctors' surgery and multiple shops and restaurants. This area is always bustling with vehicles and pedestrians. Bias adjusted annual mean for 2022 here was 25.44 ug/m^3.

Bowbridge Road is a predominantly residential street but one end shares a junction with the busy London Road and the other end has a significant amount of development occurring with the Lord Hawke Way residential development and the much larger Middlebeck development site, which continues to grow and is much larger than when reported last year, and also Hawton Lane industrial sites. Bowbridge Road regularly has queuing traffic due to traffic lights at each end to control the volumes of vehicles. Bias adjusted annual mean for 2022 was 25.17 ug/m^3.

The Big Fish roundabout site (25.06 ug/m^3) and the Lodge (22.55 ug/m^3) were the next two highest results. Both are very close to busy A roads and junctions and have been discussed in previous reports.

The laboratory bias adjustment factor for 2022 for the method and laboratory used was 0.83 which was calculated using the National Diffusion Tube Bias Factor Adjustment Spreadsheet (03/23, see appendix C). The laboratory used was Gradko and the method was 20% TEA in water.

The NO2 tubes monitoring sites are regularly reviewed and are located where the public could be regularly present for a considerable period of time and are therefore considered to be representative of relevant public exposure.

These areas have historically shown some of the most elevated monitored levels of nitrogen dioxide in the district, although the levels are significantly below Air Quality Objectives for England (Table E1) and below that required for declaring a new Air Quality Management Areas (AQMA) and any associated action plan or strategy.

3.2.2 Particulate Matter (PM_{10})

No PM10 monitoring has been carried out during 2020 by Newark & Sherwood District Council.

3.2.3 Particulate Matter ($PM_{2.5}$)

No PM2.5 monitoring has been carried out during 2020 by Newark & Sherwood District Council.

3.2.4 Sulphur Dioxide (SO_2)

No SO2 monitoring has been carried out during 2020 by Newark & Sherwood District Council.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
3N_a, 3N_b	Balderton 3N	Suburban	481681	351500	NO_2	No	5.0	1.0	No	2.0
5N_a, 5N_b	Northern Rd 5N	Roadside	480400	355000	NO_2	No	5.0	1.0	No	2.0
7N_a, 7N_b	Bowbridge Rd 7N	Kerbside	480153	353320	NO_2	No	5.0	1.0	No	2.0
1N_a, 1N_b	FADS Cartergate 1N	Roadside	479851	353692	NO_2	No	1.0	2.0	No	2.0
4N_a, 4N_b	Farndon 4N	Suburban	477200	351900	NO_2	No	5.0	2.0	No	2.0
6N_a, 6N_b	War Memorial Appleton Gate 6N	Urban Centre	480006	353892	NO_2	No	1.0	2.0	No	2.0
9N_a, 9N_b	Albert St 9N	Roadside	479778	353621	NO_2	No	1.0	1.0	No	2.0
10N_a, 10N_b	Handley Court 10N	Urban Background	479859	354223	NO_2	No	1.0	1.0	No	2.0
11N_a, 11N_b	The Lodge 11N	Urban Background	481460	355900	NO_2	No	2.0	N/A	No	2.0
12N_a, 12N_b	Newark Castle 12N	Urban Centre	479676	354016	NO_2	No	3.0	5.0	No	2.0
16N_a, 16N_b	Brunel Dr/Lincoln Rd 16N	Roadside	481152	355589	NO_2	No	3.0	2.0	No	2.0
18N_a, 18N_b	Big Fish 18N	Kerbside	465090	367595	NO_2	No	3.0	1.0	No	2.0
21N_a, 21N_b	Friary Road 21N	Roadside	480276	354029	NO_2	No	5.0	1.0	No	2.0

Notes:

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
3N_a, 3N_b	481681	351500	Suburban	91.8	91.8	17.6	16.4	12.3	12.9	12.8
5N_a, 5N_b	480400	355000	Roadside	100	100.0	29.9	29.0	21.0	22.9	22.2
7N_a, 7N_b	480153	353320	Kerbside	92	92.0	30.3	28.5	21.8	25.9	25.1
1N_a, 1N_b	479851	353692	Roadside	100	100.0	31.4	31.2	24.3	24.5	25.4
4N_a, 4N_b	477200	351900	Suburban	100	100.0	14.8	14.4	10.8	10.8	10.4
6N_a, 6N_b	480006	353892	Urban Centre	92.3	92.3	21.6	21.2	16.0	16.9	16.5
9N_a, 9N_b	479778	353621	Roadside	100	100.0	28.6	27.9	19.7	22.7	21.9
10N_a, 10N_b	479859	354223	Urban Background	100	100.0	21.2	20.6	14.7	16.6	16.0
11N_a, 11N_b	481460	355900	Urban Background	100	100.0	32.5	30.3	21.0	24.3	22.5
12N_a, 12N_b	479676	354016	Urban Centre	100	100.0	18.6	18.5	12.0	13.0	13.9
16N_a, 16N_b	481152	355589	Roadside	93.1	93.1	35.3	35.4	23.3	27.9	26.6
18N_a, 18N_b	465090	367595	Kerbside	100	100.0	33.9	32.1	22.8	24.6	25.1
21N_a, 21N_b	480276	354029	Roadside	100	100.0	26.8	25.1	18.7	21.1	21.3

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

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

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

Notes:

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

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

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

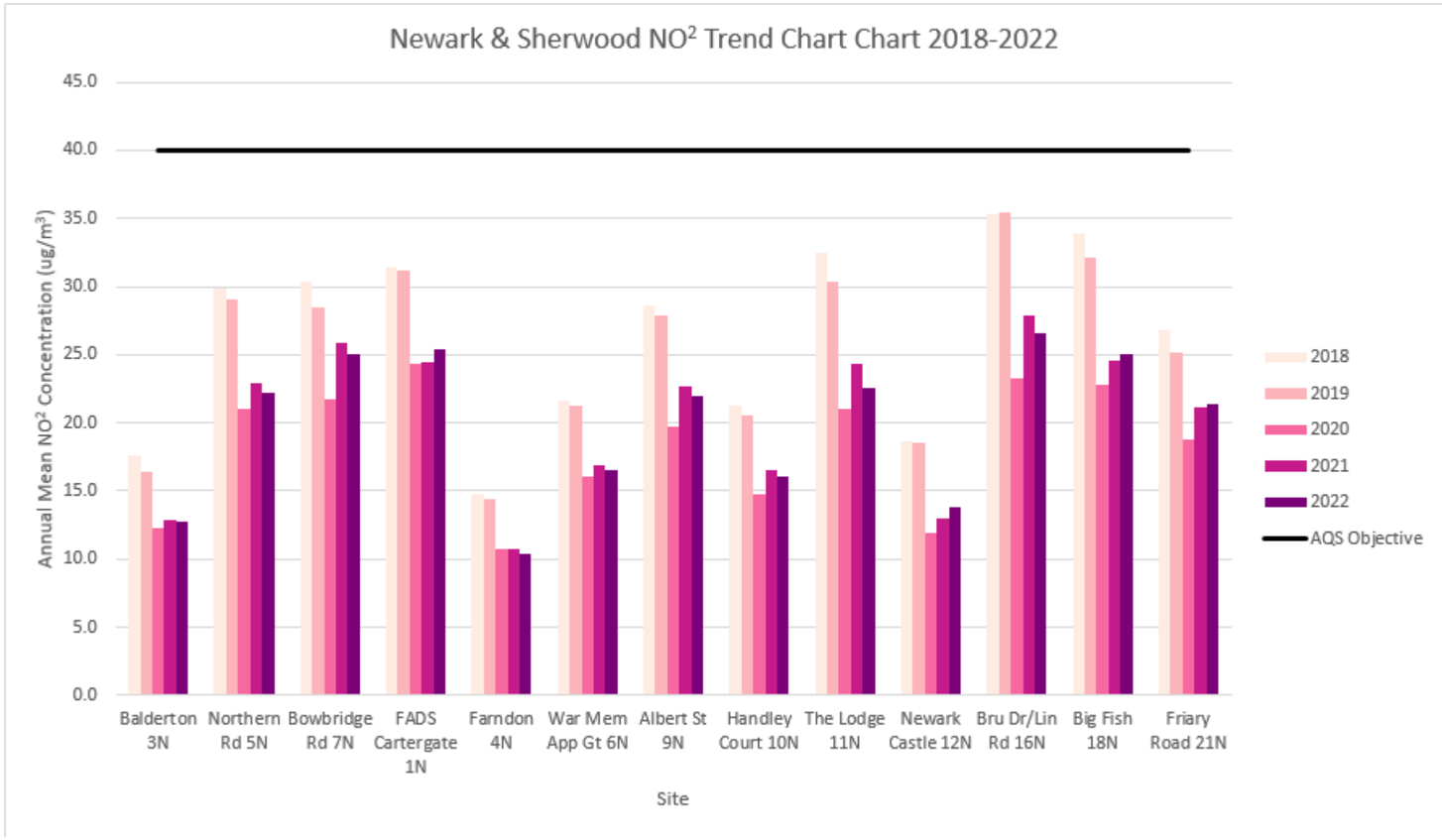
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
3N_a	481681	351500	26.0	14.6	21.4	12.1	8.9	10.3	10.1	12.2		15.6	16.5	20.9	-	-	-	Duplicate Site with 3N_a and 3N_b - Annual data provided for 3N_b only
3N_b	481681	351500	26.2	14.6	21.2	12.0	10.1	10.2	10.7	12.2		15.4	17.2		15.4	12.8	-	Duplicate Site with 3N_a and 3N_b - Annual data provided for 3N_b only
5N_a	480400	355000	39.8	28.2	30.5	23.9	20.9	22.8	21.4	26.2	26.0	28.0	30.3	32.7	-	-	-	Duplicate Site with 5N_a and 5N_b - Annual data provided for 5N_b only
5N_b	480400	355000	37.4	23.2	31.5	22.5	20.7	21.6	20.9	25.0	25.7	24.1	28.1	31.2	26.8	22.2	-	Duplicate Site with 5N_a and 5N_b - Annual data provided for 5N_b only
7N_a	480153	353320	44.2	30.0		28.4	23.2	23.3	24.1	28.4	31.9	29.4	33.4	34.8	-	-	-	Duplicate Site with 7N_a and 7N_b - Annual data provided for 7N_b only
7N_b	480153	353320	46.0	29.7		25.6	22.2	23.3	25.9		29.4	28.9	35.6	38.8	30.2	25.1	-	Duplicate Site with 7N_a and 7N_b - Annual data provided for 7N_b only
1N_a	479851	353692	44.6	31.7	28.6	21.6	24.5	26.4	26.3	25.9	29.6	31.4	35.5	35.3	-	-	-	Duplicate Site with 1N_a and 1N_b - Annual data provided for 1N_b only
1N_b	479851	353692	49.2	33.9	32.5	22.1	25.3	27.3	27.3	26.3	29.1	31.0	34.7	35.8	30.7	25.4	-	Duplicate Site with 1N_a and 1N_b - Annual data provided for 1N_b only
4N_a	477200	351900	25.0	12.0	17.4	9.0	7.9	7.8	7.4	9.8	10.5	13.2	15.6	18.3	-	-	-	Duplicate Site with 4N_a and 4N_b - Annual data provided for 4N_b only
4N_b	477200	351900	24.0	11.3	14.4	9.5	7.6	7.7	8.3	9.4	9.0	13.0	16.1	17.7	12.6	10.4	-	Duplicate Site with 4N_a and 4N_b - Annual data provided for 4N_b only
6N_a	480006	353892	32.2	19.6	23.1	17.5	12.5	15.1	14.9		18.3	21.0	19.1	24.6	-	-	-	Duplicate Site with 6N_a and 6N_b - Annual data provided for 6N_b only
6N_b	480006	353892	32.7	20.4	24.4	14.3	14.0	14.1	13.7		16.9	20.2	21.6	27.9	19.9	16.5	-	Duplicate Site with 6N_a and 6N_b - Annual data provided for 6N_b only
9N_a	479778	353621	35.0	25..82	31.9	23.4	22.5	23.2	22.9	26.1	26.4	26.9	27.4	32.4	-	-	-	Duplicate Site with 9N_a and 9N_b - Annual data provided for 9N_b only
9N_b	479778	353621	33.6	23.9	31.4	22.9	21.2	23.6	22.5	24.2	24.8	26.6	28.6	29.5	26.4	21.9	-	Duplicate Site with 9N_a and 9N_b - Annual data provided for 9N_b only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
10N_a	479859	354223	29.9	17.2	25.8	17.1	13.4	13.5	13.7	17.7	18.6	19.3	22.1	24.5	-	-	-	Duplicate Site with 10N_a and 10N_b - Annual data provided for 10N_b only
10N_b	479859	354223	29.5	16.9	25.1	17.4	12.7	13.2	14.5	17.1	16.0	19.7	23.3	24.5	19.3	16.0	-	Duplicate Site with 10N_a and 10N_b - Annual data provided for 10N_b only
11N_a	481460	355900	37.2	28.3	25.4	26.4	24.4	24.1	22.8	27.3	25.4	25.6	25.8	28.9	-	-	-	Duplicate Site with 11N_a and 11N_b - Annual data provided for 11N_b only
11N_b	481460	355900	37.8	28.7	28.4	27.1	23.9	24.1	24.1	28.3	27.7	25.4	27.4	27.5	27.2	22.5	-	Duplicate Site with 11N_a and 11N_b - Annual data provided for 11N_b only
12N_a	479676	354016	28.7	16.0	22.3	13.8	18.9	11.1	11.6	13.9	15.6	17.1	20.5	21.6	-	-	-	Duplicate Site with 12N_a and 12N_b - Annual data provided for 12N_b only
12N_b	479676	354016	24.2	14.4	21.5	12.8	10.6	11.1	11.3	13.8	14.1	16.9	18.2	20.9	16.7	13.9	-	Duplicate Site with 12N_a and 12N_b - Annual data provided for 12N_b only
16N_a	481152	355589	41.2	23.3	45.2	35.3	27.6	24.6	29.0	35.8	33.5	26.0		32.5	-	-	-	Duplicate Site with 16N_a and 16N_b - Annual data provided for 16N_b only
16N_b	481152	355589	39.5	25.0	41.6	33.4	24.3	23.7	30.2	36.8	34.0	27.9		34.8	32.0	26.6	-	Duplicate Site with 16N_a and 16N_b - Annual data provided for 16N_b only
18N_a	465090	367595	40.5	26.3	27.8	24.6	25.5	30.0	29.8	32.0	27.5	31.5	36.8	33.5	-	-	-	Duplicate Site with 18N_a and 18N_b - Annual data provided for 18N_b only
18N_b	465090	367595	40.7	26.7	30.4	24.6	24.7	28.9	27.7	33.8	26.6	30.0	34.8	30.4	30.2	25.1	-	Duplicate Site with 18N_a and 18N_b - Annual data provided for 18N_b only
21N_a	480276	354029	36.6	23.5	34.4	22.3	18.1	17.9	20.1	23.1	23.5	25.2	29.5	32.2	-	-	-	Duplicate Site with 21N_a and 21N_b - Annual data provided for 21N_b only
21N_b	480276	354029	37.6	23.6	34.6	22.8	17.4	18.5	21.3	23.7	24.5	25.3	29.7	31.7	25.7	21.3	-	Duplicate Site with 21N_a and 21N_b - Annual data provided for 21N_b only

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

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **Newark & Sherwood District Council confirm that all 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Newark & Sherwood During 2022

Newark & Sherwood District Council has not identified any new or changed sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by Newark & Sherwood During 2022

Newark & Sherwood District Council has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

Diffusion tube data for Newark and Sherwood District Council is supplied and analysed by Gradko International Ltd, the tubes were prepared using the 20% TEA in water preparation method. The exposure period corresponded with the exposure calendar where possible. On occasion the 'changeover day' was moved to fit in with workload and staff availability. There was no requirement to distance correct as levels were not high enough to warrant it. Precision summary data for Gradko is presented below.

Precision Summary Table

Diffusion Tube Preparation Method	2020 Good	2020 Bad	2021 Good	2021 Bad	2022 Good	2022 Bad
Gradko, 20% TEA in Water	27	0	34	0	27	0

Participation in Laboratory Proficiency Testing Scheme

Gradko International Ltd take part in the AIR PT scheme which is operated by LGC Standards and supported by the Health and Safety Executive (HSE). The scheme provides a means for assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management

(LAQM). An edited summary of the AIR PT results showing only Gradko results is provided below:

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of ≤ ± 2 as defined above.

AIR PT Round	AIR PT AR037	AIR PT AR039	AIR PT AR040	AIR PT AR042	AIR PT AR043	AIR PT AR045	AIR PT AR046	AIR PT AR049	AIR PT AR050
Round conducted in the period	May – June 2020	July – August 2020	September – October 2020	January – February 2021	May – June 2021	July – August 2021	September – October 2021	January – February 2022	May – June 2022
Gradko International	NR [4]	NR [4]	75 %	25 %	100 %	100 %	100 %	100 %	100 % [1]

[1] Participant subscribed to two sets of test results (2 x 4 test samples) in each AIR PT round.
[2] NR, No results reported.
[3] Cardiff Scientific Services, Exova (formerly Clyde Analytical), Kent Scientific Services, Kirklees MBC, Northampton Borough Council and West Yorkshire Analytical Services; no longer carry out NO2 diffusion tube monitoring and therefore did not submit results.
[4] Round was cancelled due to pandemic.

NO2 PT Summary – AIR PT Rounds AR037, 39, 40, 42, 43, 45, 46, 49 and 50

Diffusion Tube Annualisation

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

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Newark and Sherwood District Council have applied a national bias adjustment factor of 0.83 to the 2022 monitoring data using spreadsheet version 3/23. A summary of bias adjustment factors used by Newark and Sherwood District Council over the past five years is presented in

Table C.1.

Table C.1 – Bias Adjustment Factor

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/23

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 2023
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:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	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 a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2022		Overall Factor[3] (27 studies)				Use		0.83

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	03/23	0.83
2021	National	03/22	0.84
2020	National	03/21	0.81
2019	National	03/20	0.93
2018	National	03/19	0.93

NO_2 Fall-off with Distance from the Road

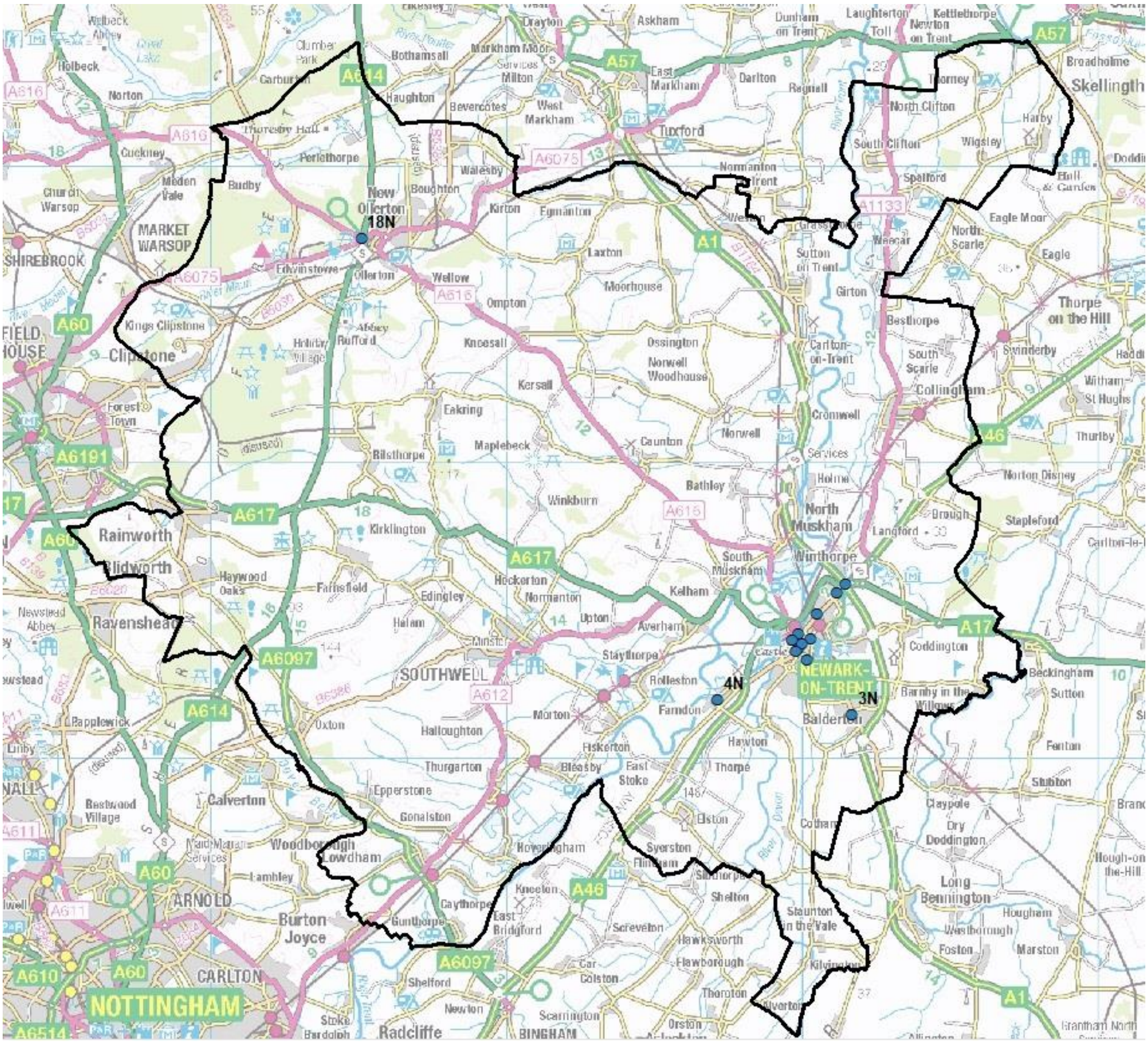
Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM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

No diffusion tube NO_2 monitoring locations within Newark and Sherwood required distance correction during 2022.

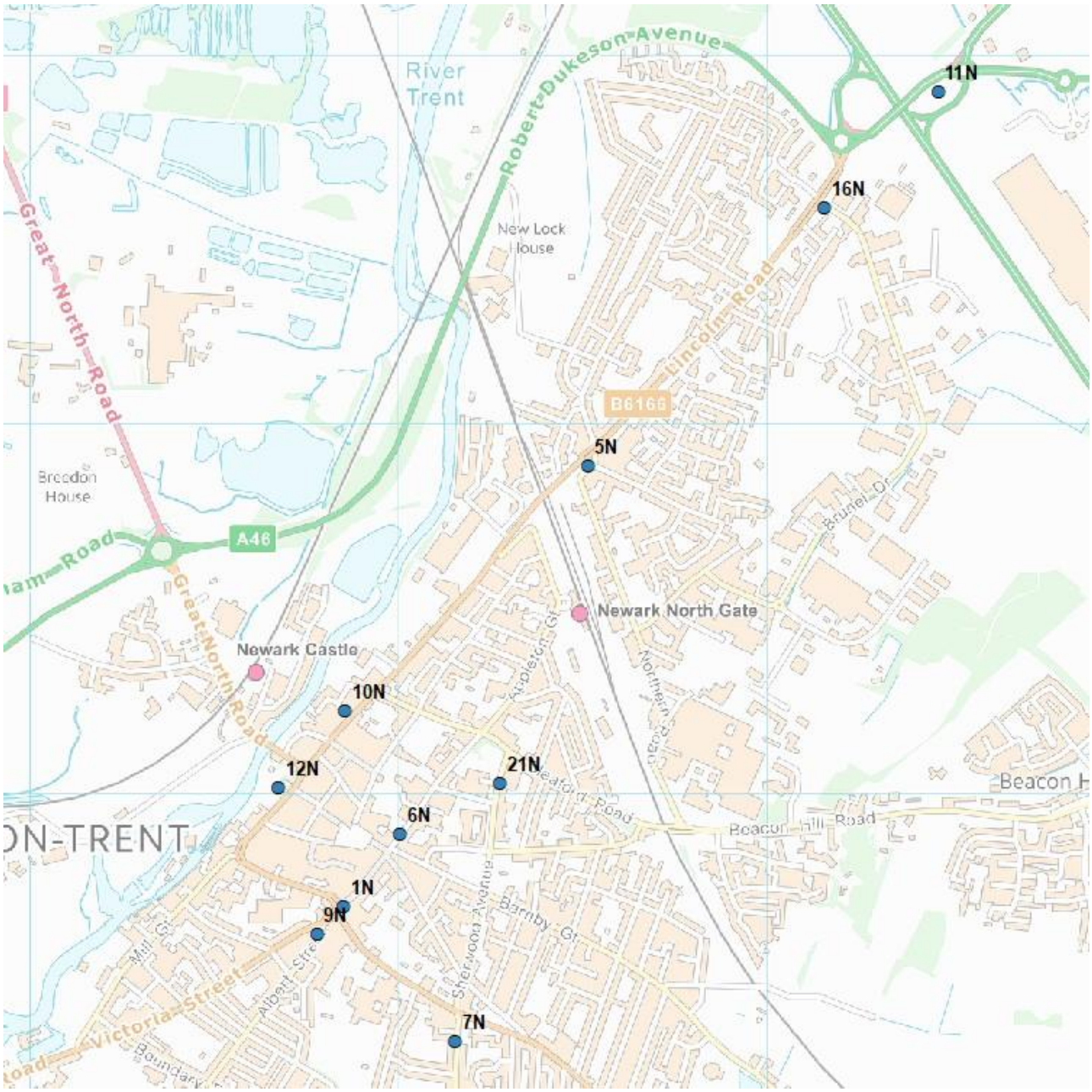
Appendix D: Map(s) of Monitoring Locations and AQMAs

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

NSDC NO_2 Diffusion Tube Locations Full Map



NSDC NO_2 Diffusion Tube Locations Newark Detail Map



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

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

[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	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- National Clean Air Strategy 2019 https://www.gov.uk/government/publications/clean-air-strategy-2019
- Nottinghamshire Joint Strategic Needs Assessment (JSNA) Chapter on Air Quality http://jsna.nottinghamcity.gov.uk/insight/Strategic-Framework/Nottinghamshire-JSNA/Cross-cutting-themes/Air-Quality.aspx
- Office for Health Improvement & Disparities Public Health Outcomes Framework https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/1/gid/1000043/pat/6/par/E12000004/ati/401/are/E07000175/yrr/3/cid/4/tbm/1
- The Nottinghamshire Air Quality Strategy 2020 https://storymaps.arcgis.com/collections/c9c0690392ea4601bd85e9ff533d898d
- Newark & Sherwood District Council Guidance on Wood Burning Stoves https://www.newark-sherwooddc.gov.uk/smokecontrol/
- HETAS Cleaner Choice Product Approval https://www.hetas.co.uk/trade/scheme/product-approval-scheme/#:~:text=HETAS%20is%20introducing%20the%20new,on%20air%20quality%20and%20the
- Eco Design https://www.hetas.co.uk/consumer/advice-hub/advice-articles/ecodesign-explained/
- WHO Air Quality Guidelines report 2021 https://www.who.int/publications/i/item/9789240034228
- Woodsure Ready to Burn https://www.readytoburn.org/
- Defra practical guidance on open fires and wood burning stoves

https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1901291307_Ready_to_Burn_Web.pdf