

2024 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: December 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Nottingham City Council's administrative area

Air quality is the term used to describe how polluted the air we breathe is.

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year[1].

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution[2].

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO_2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

In Nottingham the main sources of urban nitrogen dioxide (NO_2) are natural gas fired heating/hot water systems and boilers (industrial, commercial and domestic sources) and motor vehicles.

The largest local contributors to ambient concentrations of particulate matter (PM_{10}, $PM_{2.5}$, $PM_{0.1}$) are road transport; diesel engine vehicles, tyre, brake, and road surface wear, and the burning of solid fuels such as coal-based 'smokeless fuels' and wood.

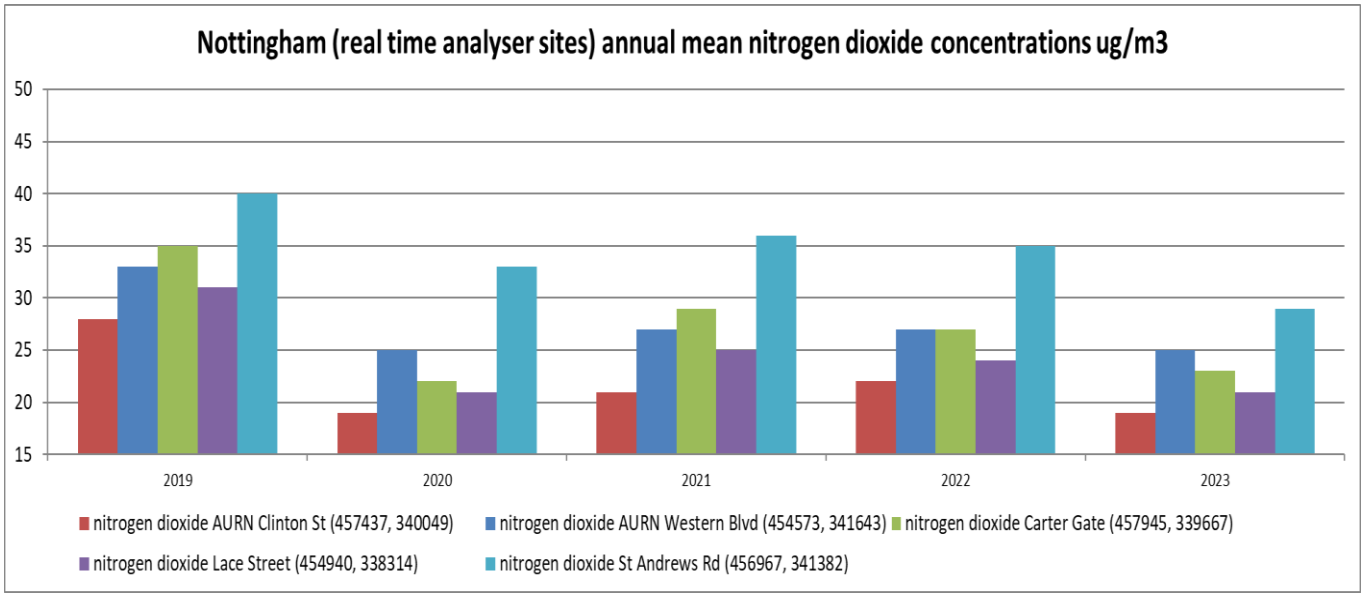
Air quality modelling (DEFRA 2017) indicates that the majority of Nottingham's fine particulate air pollution ($PM_{2.5}$ and smaller) comes from sources outside the City, and contains a proportion of secondary particles formed by chemical reactions between air pollutants such as ammonia, sulphur dioxide and nitrogen dioxide.

Air Quality Monitoring data 2023

Nottingham has an AQMA for NO_2 and is required to carry out NO_2 monitoring. It uses real time analysers and nitrogen dioxide diffusion tubes to do this.

DEFRA operates two AURN stations (for the Nottingham 'Agglomeration'), monitoring a range of pollutants of concern. Monitoring data from Nottingham City Council's 3 RTAs and the Clinton Street East and Western Boulevard AURN stations show NO_2 concentrations were below the annual mean air quality objective of 40 ug/m3

Figure 1.



During 2020 and part of 2021 action to prevent/minimise transmission of Covid-19 (including 'lockdowns') reduced emissions from road transport and other commercial

activity, particularly the office, retail, leisure and hospitality sector, a significant proportion of the commercial activity in Nottingham's city centre.

In 2023 Nottingham City Council's network of 50 diffusion tubes (38 individual locations), although only indicative of NO_2 concentrations, recorded annual mean (bias adjusted and annualised) concentrations of over 40 ug/m^3 at just 1 site, compared to 8 (after distance adjustment) in 2022 and 6 sites in 2021.

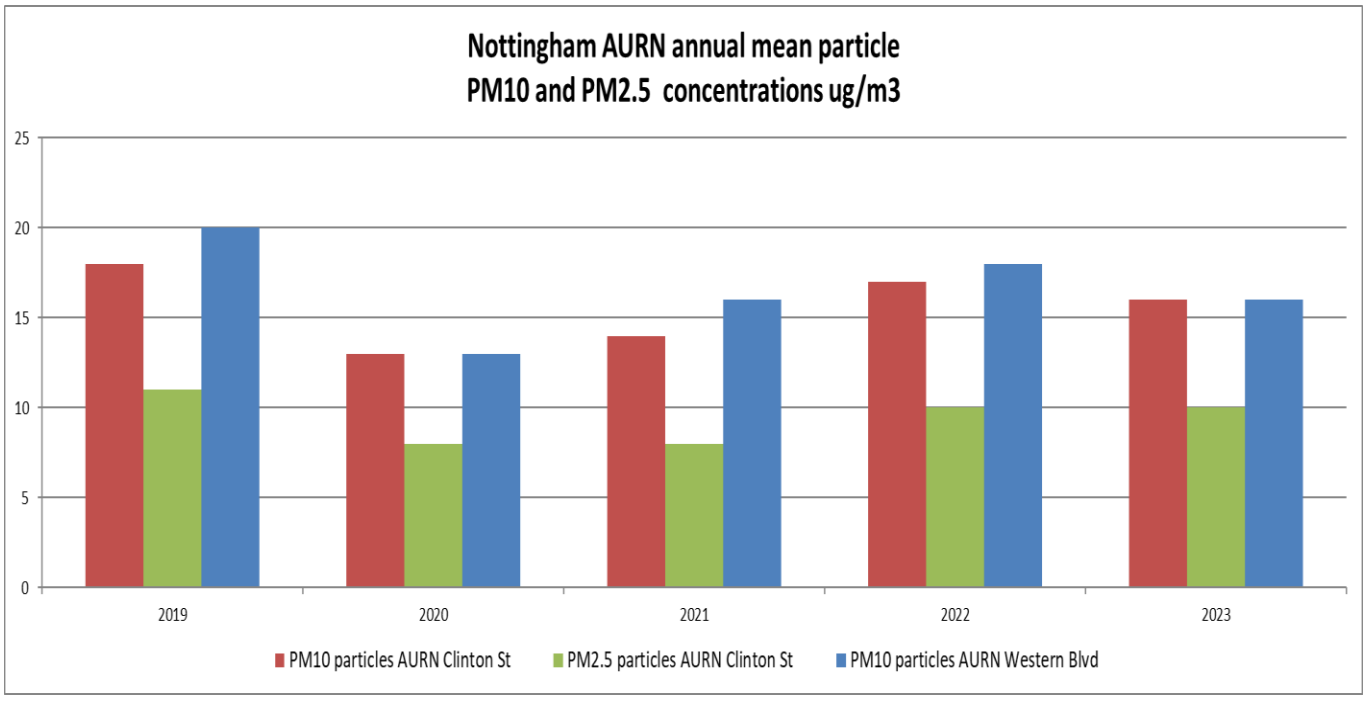
Particle monitoring data

DEFRA operates two AURN stations (for the Nottingham 'Agglomeration'), monitoring a range of pollutants of concern, including PM10 and PM2.5. The Clinton Street East and Western Boulevard AURN stations show PM10 concentrations were below the annual mean air quality objective of 40 ug/m^3 (Figure 2.).

$PM_{2.5}$ does not have any aqos. However, the Environmental Targets (fine particulate matter) (England) Regulations 2023 set two PM2.5 targets for England, to be met by 2040. https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update_20230403.pdf

$PM_{2.5}$ did not exceed the 2040 PM $_{2.5}$ Annual Mean Concentration Target of 10 ug/m^3.

Figure 2.



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[3] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter ($PM_{2.5}$), the pollutant of most harmful to human health. The Air Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero[5] details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel and the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Local actions to improve Air Quality

In 2015, to raise the profile of air quality issues and its impact on health, a Joint Strategic Needs Assessment was undertaken resulting in the Air Quality and Health chapter of the JSNA. The chapter identified the key health issues, links to the Public Health Outcome Framework indicators (originally 3.01, now D01) and opportunities and synergies from links to a range of activities with improved health outcomes that reduce emissions of air pollution. The chapter was updated in 2019.

https://nottinghaminsight.org.uk/search?q=JSNA%20air%20quality

Nottingham City Council pledge to reduce air pollution (2018-2023)

Nottingham City Council committed to improving air quality by cutting Nitrogen Dioxide and particulate pollution by 20% by 2023 when compared to 2018 page 17:

https://www.nottinghamcity.gov.uk/media/3372996/full-strategic-council-plan-2021-23.pdf

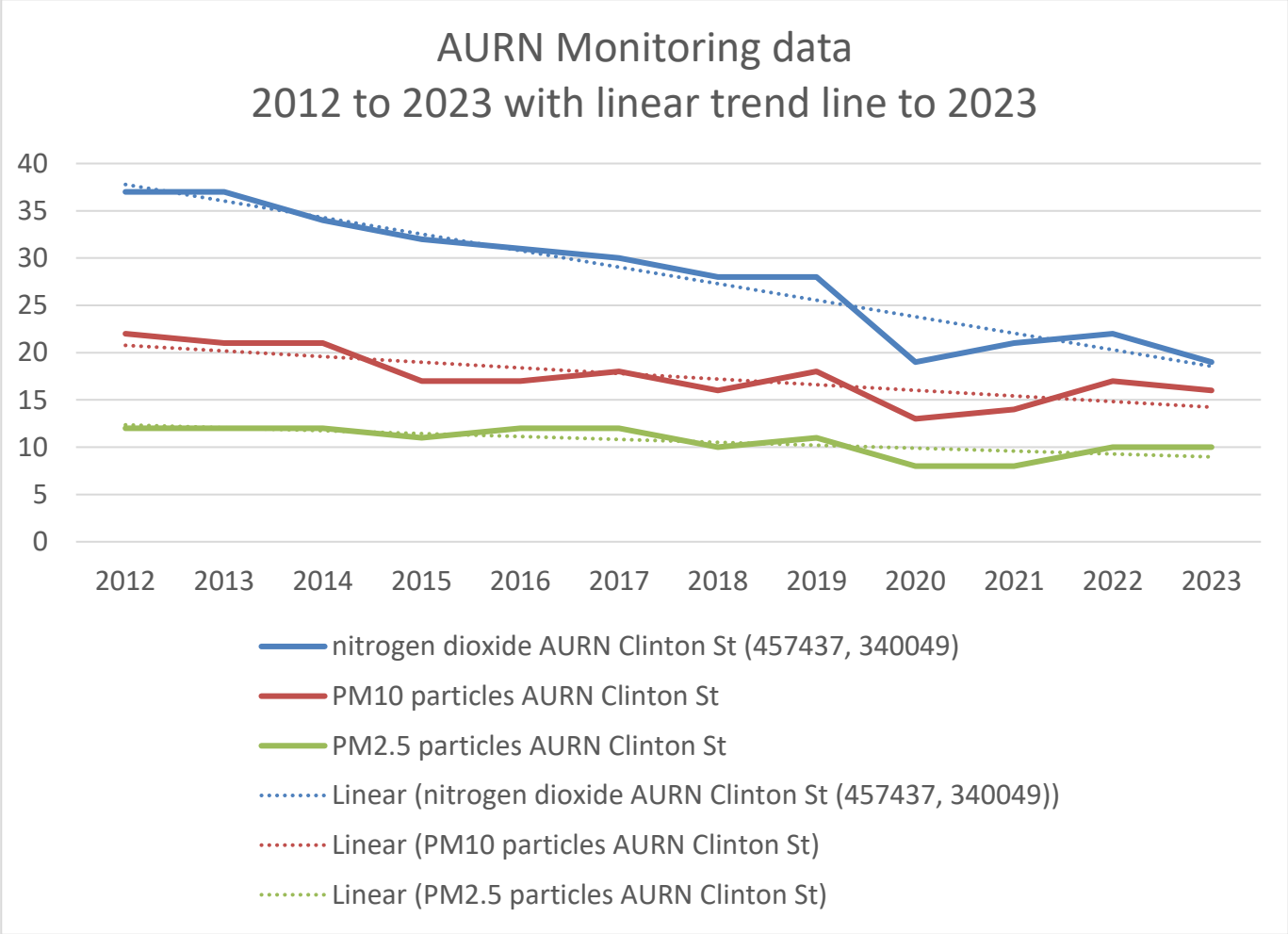
[3] Defra. Environmental Improvement Plan 2023, January 2023

[4] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

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

Although levels dropped sharply in 2020, and only slightly increased in 2021 (due to covid-19 measures and its impact on the economy), when compared to 2018 2023 NO_2 levels were 29% lower, however PM_{10} levels and $PM_{2.5}$ levels, although falling in 2019-2020 are now the same as in 2018 (Figure 3).

Figure 3



The combustion of carbon containing fuels (e.g. natural gas, petrol, diesel, liquified petroleum gas 'lpg', wood) in air produces water vapour, carbon dioxide, the oxides of nitrogen (NO_X); nitrogen oxide (NO) and nitrogen dioxide (NO_2), and particles (PM). Thus, strategies and action to reduce local CO_2 emissions will also reduce emissions of NO_X and, in the case of solid and liquid hydrocarbon-based fuels, particles.

In October 2023 Nottingham City Council published its refreshed Strategic Council Plan 2023-27.

https://www.nottinghamcity.gov.uk/media/3377077/enc-1-for-strategic-council-plan-2023-2027.pdf

Carbon Neutral Action Plan

This plan builds on Nottingham 2028 Carbon Neutral Charter by setting out high-level objectives in order to achieve a resilient and carbon neutral Nottingham by 2028.

Nottingham's approach to sustainable carbon neutrality will integrate carbon reduction with sustainability and an ambition to identify and realise multiple benefits, termed co-benefits.

Co-benefits are deliberate or incidental positive outcomes across a range of other areas in addition to the central aim of an intervention. An example of a co-benefit is moving towards more active travel to tackle air-quality also has benefits for health from exercise and mental wellbeing and reducing carbon emissions.

The approach encompasses all current and foreseeable emission sources and will reduce or negate entirely the combustion of carbon-based fuels and, in turn, will reduce or negate emissions of NOx/NO_2 and particles and other combustion by-products.

https://www.nottinghamcity.gov.uk/cn2028

Carbon Neutral Supplementary Planning Document (draft)

In accordance with the Council's agreed Action Plan to achieve Carbon Neutrality by 2028, Planning Policy is currently preparing a supplementary planning document to provide detailed guidance on the range of measures possible to reduce Carbon in new residential and commercial development proposals. It will supplement existing Planning Policies as contained in the Nottingham City Aligned Core Strategy (2014) and the Local Plan Part 2 and highlight the Councils agreed targets.

Taking into consideration the policy context and best practice examples, it is anticipated that this SPD will firstly; provide guidance in relation to energy efficiency, renewable energy and sustainable design and construction and secondly; present a Carbon Neutrality checklist for applicants to demonstrate compliance with the policy approach.

Nottingham Local Plan Part 1 and 2

Nottingham City Council has been working to improve air quality by reducing emissions of CO2, NOx/NO2 and particles (PM10, PM2.5) by increasing energy efficiency across Nottingham City Council and Nottingham City Homes building stock and investing in alternative energy generation.

Nottingham City Council's Land and Planning Policies Development Plan Document (Local Plan Part 2) was adopted in January 2020.

It supports the wider Broxtowe Borough, Gedling Borough and Nottingham City Aligned Core Strategy. The Core Strategy details policies and objectives) of which the majority directly address or contribute towards improving air quality e.g.

i) Environmentally responsible development addressing climate change

ii) High quality new housing

v) Regeneration

viii) Health and wellbeing

x) Excellent transport systems and reducing the need to travel

xi) Protecting and improving natural assets

xii) Timely and viable infrastructure

https://www.nottinghamcity.gov.uk/information-for-business/planning-and-building-control/planning-policy/the-local-plan-and-planning-policy/the-adopted-local-plan/

Local Plan to Improve Air Quality in Nottingham (Action plan to reduce NO2 concentrations in locations at risk of infraction of EU limit values).

The main element of this air quality action plan, which was the retrofit of approximately 185 Euro V emission standard Nottingham City Transport buses with NO2 abatement technology to bring them up to Euro VI emission standard and the accelerated introduction of lower NO2 emissions Bio-gas buses, was substantially completed by February 2020.

https://www.nottinghaminsight.org.uk/d/aBFPtBx

A significant proportion of the buses operating on the roads where infraction of the EU limit NO2 annual mean was predicted were upgraded by August 2019. The reduction in NOx/NO2 emissions and ambient NO2 concentrations were calculated, submitted to and, provisionally accepted by, DEFRA in August 2019.

The second element of the plan, Nottingham City Council's revised Hackney Carriage and Private Hire Vehicle Strategy 2017-2020 designed to transition the fleet to Euro VI compliant taxi's from January 2020, and for a minimum of 40% of the HC and 25% of the Private Hire fleet to be Ultra Low Emission Vehicles has been implemented.

The process for reviewing compliance with the ministerial direction started in 2023.

Nottinghamshire Air Quality Strategy

In November 2019 Nottingham and Nottinghamshire completed the review of their joint Air Quality Strategy and each Council's respective Health and Wellbeing Boards subsequently approved them in 2020. The two versions of the Strategy, an interactive webpage and the more detailed strategy document, are available to download from each Council's website (search on-line for Nottingham and Nottinghamshire Air Quality Strategy).

The strategy draws together work by local authorities, police, fire and rescue services, NHS trusts, Environment Agency and National Highways (formerly Highways England) to develop, promote and support activity within their own organisations and complement each other to reduce harmful emissions from their activity, estate, staff and customers/service users.

https://www.nottinghaminsight.org.uk/f/5ab131c6-d61b-4cea-b407-de704be9ac17

and search for 'Air Quality Strategy for Nottingham and Nottinghamshire 2020-2030'

Air Quality and Emissions Mitigation – Guidance for Developers 2019 (draft)

Nottingham City Council is working to transpose the draft supplementary planning document, developed in partnership with East Midlands Air Quality Network, into an easy to follow guide and menu for developers in Nottingham to use. The guidance will enable developers to develop sites whilst minimising air pollution and carbon emissions from the development over its lifetime.

Paste the link https://www.nottinghaminsight.org.uk/d/aavR2kmH into a web browser to download the document.

Clear Zone

Nottingham's Clear Zone encompasses the roads immediately surrounding the Old market Square and linking it to Upper Parliament Street, Maid Marian Way, Victoria Street and Pelham Street.

It limits access to the zone to certain vehicles and for limited times.

Benefits include an improved the pedestrian environment encouraging more people to come to the city centre for shopping and leisure.

Go Ultra Low Nottingham programme

Through our Go Ultra Low Nottingham project we are helping to support uptake for electric cars and other low emission vehicles across the city. Our vision is for Nottingham to become an exemplar for low emission vehicles, spanning private cars, vans, buses, taxis and commercial fleets as a core part of our sustainable transport system.

Nottingham has been named one of the UK's first Go Ultra Low Cities. £6.1m funding awarded by the Office for Low Emission Vehicles has introduced a range of innovative projects to support the uptake in Ultra Low Emission Vehicles (ULEVs).

Electric Vehicle Projects - Nottingham's way of improving electric car usage (transportnottingham.com)

Nottingham - Derby Access Fund

A comprehensive package of sustainable travel behaviour change measures to support capital infrastructure investment in Nottingham and Derby building on local good practice.

Objectives:

Improve air quality to support the introduction of Clean Air Zones or similar restricted vehicular access areas.

Embed sustainable and active travel cultures in our businesses and communities

Improve access to work and jobs

https://www.nottinghamshire.gov.uk/media/117257/nottinghamderbyaccessfundbid.pdf

https://www.nottinghaminsight.org.uk/search?q=Nottingham+Derby+Access+fund

Conclusions and Priorities

2023's monitoring shows a decrease in NO_2 concentrations and PM_{10} at all automatic real-time monitoring locations and all 'pollutants of concern' monitored by real time analysers remained below the relevant air quality objective for their relevant pollutant.

Priorities to improve air quality

The local (and conurbation wide) priority to improve air quality continues to be how to reduce levels of nitrogen dioxide and identify and implement practicable measures to reduce particle emissions and concentrations in the City area.

The local priorities and challenges to improve air quality in Nottingham and reduce emissions are:

i. Raising local awareness of air pollution and its health impacts, and build and sustain commitment to reduce emissions and exposure,

ii. Maintain activity to deliver Nottingham City Council's ambition to be Carbon Neutral by 2028, thereby reducing emission of NO_2 and particles,

iii. Continue to roll-out/improve energy efficiency in Nottingham City Council's housing stock, as and when funding permits,

iv. Promote energy efficiency and the transition to/installation of alternative technologies that significantly reduce/negate NO_2/NO_x emissions in the commercial/industrial sector,

v. Go Ultra Low Nottingham – continues to secure funding to promote and support a range of initiatives and projects to facilitate the take-up of Ultra Low Emission Vehicles (ULEV) in Nottingham,

vi. Encourage all bus operators to implement a retrofit or replacement programme for older polluting buses,

vii. Continue work with Nottingham's taxi companies to introduce low and zero emission vehicles.

viii. Integrate East Midlands Air Quality Network Air Quality and Emission Mitigation guidance as Supplementary Planning Guidance in the Local Plan.

ix. Further develop plans and secure funding for extension of Nottingham's Tram network (lines 4 and 5),

x. Continue to work with major private and public sector employers to review vehicle use to reduce emissions,

xi. Identify opportunities and secure further funding to transition Nottingham City Council commercial vehicle fleet to ULEV,

xii. Identify and implement practicable local solutions to reduce particle emissions and concentrations.

Local Engagement and How to get Involved

What is the Council doing to reduce emissions?

Nottingham City Council is concerned about air pollution, climate change, and air quality and recognises that these issues are complex and interlinked.

The Council's strategies and action on climate change and public transport have reduced CO_2 emissions and air pollution in the City, but the Council recognises it is necessary to go much further to reduce emissions from the range of sources that generate particles and nitrogen dioxide and impact on health.

Health and Wellbeing Board

This group comprises Nottingham City Council and a large number of organisations, including Primary Health Care commissioners and providers, Registered Social Landlords, and third sector organisations.

http://www.healthynottingham.co.uk/

In September 2020 the Board approved the revised Nottingham and Nottinghamshire Air Quality Strategy. https://www.nottinghamshireinsight.org.uk/d/aaJK0SBf

(copy and paste into web browser to download)

Nottingham Green Partnership

Nottingham Green Partnership is a wide range of organisations in the public, private and voluntary sectors that are working together to reduce the city's environmental impact. It recognises the environmental issues that affect Nottingham and its citizens and aims to deliver actions that will reduce our reliance on fossil fuels, increase resilience and improve quality of life.

What can I do to improve air quality?

When burned in air, carbon containing fuels e.g. wood and fossil fuels, emit carbon dioxide, nitrogen oxides (NOx) – nitrogen oxide (NO) and nitrogen dioxide (NO_2), and particles (including PM_{10} and $PM_{2.5}$). Although it does not affect local air quality, carbon dioxide is a greenhouse gas and contributes to climate change. Nitrogen dioxide and particles adversely affect local air quality therefore reducing emissions of these pollutants will improve air quality.

Measures that reduce emissions of air pollution and thereby improve air quality:

Travel choices: walking, cycling, public transport, and journey/travel planning

Walking and cycling, also known as 'active travel', have mental and physical health benefits in addition to reducing air pollution. Follow the links below for more information:

Walking in Nottingham: https://www.nottinghamcity.gov.uk/leisure-and-culture/events-markets-parks-and-museums/parks-and-open-spaces/a-walk-in-the-park/

Rights of Way - Nottingham City Council

Highways register - Nottingham City Council

Cycling in Nottingham: http://www.transportnottingham.com/cycling/

TravelWell Active Travel Social Prescribing project Travel Well – Transport Nottingham

LCWIP Local Cycling Walking and Infrastructure Plan – Transport Nottingham

Nottingham has a high-quality public transport network located within the City, including the NET tram network as well as an established bus network.

Nottingham NET: http://www.thetram.net/

Nottingham City Transport: https://www.nctx.co.uk/

Trent Barton: https://www.trentbarton.co.uk/

Stagecoach: https://stagecoachbus.com

Zero Emission Bus Regional Areas project Multi-Million Pound Investment in 78 New Electric Buses for Nottingham City Transport - Nottingham City Transport (nctx.co.uk)

Transforming Cities – Transport Nottingham

Low Emission Vehicle Initiative fund Turning The Council's Fleet Green – Transport Nottingham.

Nottingham Car club: https://www.transportnottingham.com/driving/car-club/

A car club is a membership scheme that offers pay-as-you-go basis car rental, At the end of the journey you return your car to its dedicated on-street car club parking space. Nottingham currently has a network for 14 car club vehicles in 11 locations.

Energy efficiency:

We use energy in the form of electricity or natural gas to heat our homes, cook and power electrical equipment. Insulating our homes and using energy efficient appliances reduces energy consumption and emissions, both at power stations and locally from domestic gas boilers and gas cookers.

Visit http://www.energysavingtrust.org.uk/ for ideas on home to save energy and money.

Clean Air Day

On the 20th June 2023 Nottingham, together with other Cities and organisations across the UK, promoted the eighth (National) Clean Air Day. The aim of the day was to raise awareness about air pollution, what people can do, and publicise via social media what people did, to reduce emissions and their exposure to air pollution.

Please visit https://www.cleanairday.org.uk/ for more information.

Although promoted as a single 'Clean Air Day', the event is to highlight the year round issue of air pollution and its effects on health, enable Citizens identify what they can do on Clean Air Day and in the future to reduce personal exposure to air pollution, reduce emissions, and improve air quality.

World Car Free Day

Nottingham City Council continues to promote this world-wide annual event. This year WCFD is on Sunday 22rd September 2024 and, if resources allow, Nottingham City Council intends to promote the day.

https://www.livingstreets.org.uk/get-involved/world-car-free-day/

https://www.twinkl.co.uk/event/world-carfree-day-2024#:~:text=Taking%20place%20on%20the%2022nd,of%20cars%20on%20the%20environment.

For more information, comment, or raise your concerns about air pollution and air quality please visit

https://www.nottinghamcity.gov.uk/information-for-business/environmental-health-and-safer-housing/environmental-health-and-safer-places/

Local Responsibilities and Commitment

This ASR was prepared by the Communities, Environment and Residents Services Directorate, Environmental Health and Public Protection service of Nottingham City Council with the support and agreement of the following officers and departments:

Chris Carter (Head of Transport Strategy, Growth and City Development)

Chris Common (Carbon Neutral Policy Manager)

This ASR has not been signed off by Nottingham City Council's Director of Public Health.

If you have any comments on this ASR please address them to Richard Taylor at:

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1 Local Air Quality Management

This report provides an overview of air quality in Nottingham City Council's administrative area during 2023. 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 Nottingham City Council 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.

A summary of AQMAs declared by Nottingham City Council for NO_2 can be found in **Error! R eference source not found.**. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=188

Further information detailing declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/maps/

The air quality objectives pertinent to the current AQMA designation are as follows:

- NO_2 annual mean; 40 *u*g/m^3

Figure 4 – Nottingham City Council AQMA (‘No. 2’)

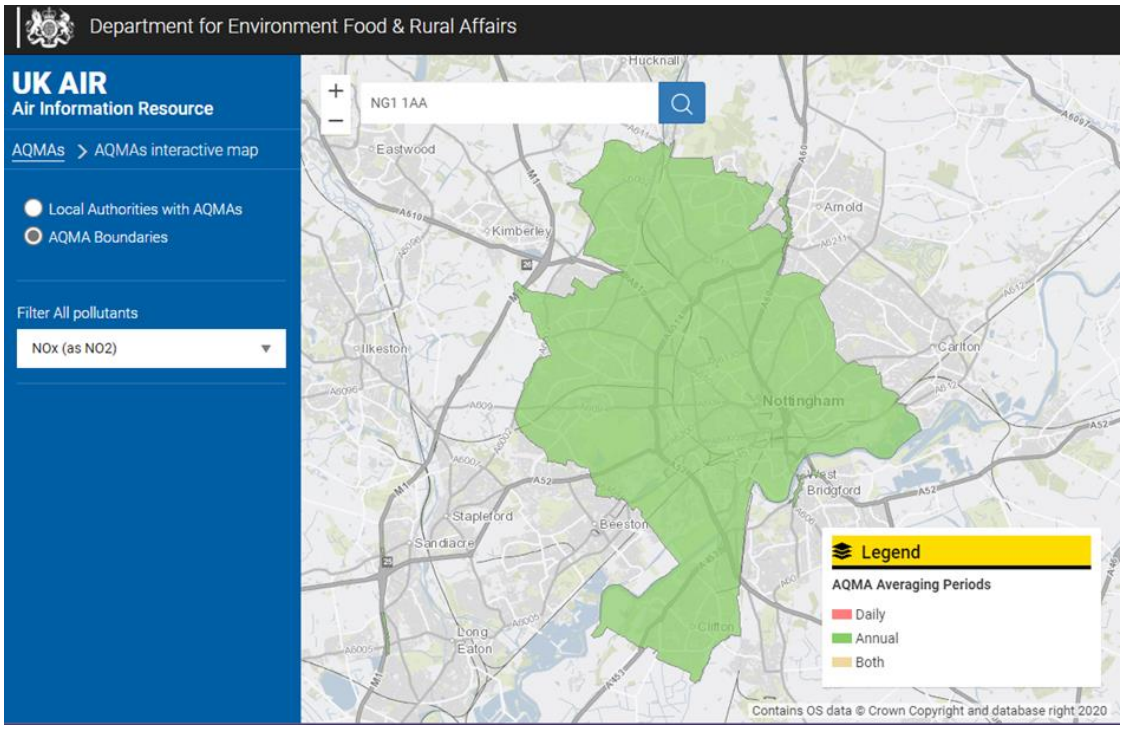


Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 'No.2'	Declared 2002, amended 2019.	NO_2 Annual Mean (40 ug/m^3)	**Encompassing the entire administrative area of Nottingham City Council.**	NO	42 *u*g/m^3 (at AQMS RTA site Dunkirk – no longer operated) 47 *u*g/m^3 (Queens Road)	46 *u*g/m^3 (at Queens Road diffusion tube)	Not compliant (based on DT indicative monitoring Queens Road DT46	LTP Implementation Plan 2010 2015-18, 2016-19, 2017-20, 2018-21 and 2019-22	https://nottinghamshireinsight.org.uk/search?q=air+quality+action+plan https://nottinghamshireinsight.org.uk/search?q=local+transport+plans

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

☒ **Nottingham City Council confirm that all current AQAPs have been submitted to Defra.**

NOTE . This table has been significantly amended (compared to previous ASRs) to reflect ASR24-2261 appraisal report.

2.2 Progress and Impact of Measures to address Air Quality in the City of Nottingham

Defra's appraisal of last year's ASR (2023) may be downloaded by pasting the link below into a web browser

https://nottinghaminsight.org.uk/d/acj0GCuX

In summary it concluded 'On the basis of the evidence provided by the local authority the conclusions reached are accepted for all sources and pollutants. Following the completion of this report, Nottingham City Council should submit an Annual Status Report in 2024.'

The following comments were made:

1. The council should add an amendment to the exceedances stating that when distance correcting for relevant exposure, two sites becomes compliant with the objective.

NCC – amendment not made to the original ASR 2023 report as the appraisal highlights the issue.

2. The AQAP is due to expire as of 2023 as such the council should revise the current AQAP and amend it as needed to ensure it is still relevant to future ASRs.

NCC – not progressed due to resourcing issues.

3. Please could the Council where possible provide estimates of costs for air quality measures in Table 2.2, and remove missing/incomplete entries from the table unless they can be filled in entirely, in order to ensure full transparency to the public regarding the actions taken to tackle air quality.

NCC – Estimates of costs are provided when available. Incomplete entries will remain as these still show measures being implemented or complete.

4. The ASR has not been signed off by the relevant Public Health Body. This is an example of good practice and is expected to increase support for measures to improve air quality, as such it should be included in future ASRs.

NCC - Noted.

5. Comments from last year's ASR have been mentioned and addressed for the most part. Including use of online maps with the addition of automatic monitoring stations.

6. Clear justification was added for use of the local bias adjustment factor for the non-automatic monitoring QA/QC process.

7. An additional section was added to the appendix about Nottingham's Ministerial Direction which helps to contextualise the council's priorities.

8. The council have included reference to the Public Health Outcomes Framework D01 – Fraction of mortality attributable to particulate air pollution, this is considered an example of good practice and should be included in future ASRs.

9. Nottingham City Council provides a lot of detail in the Executive Summary, in particular the Actions to Improve Air Quality, Conclusions and Priorities, and Local Engagement and How to get Involved sections.

Nottingham City Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Over 50 measures are included within Table 2.2, with the type of measure and the progress Nottingham City Council have made during the reporting year of 2022 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective plans within nottinghaminsight.org.uk :-

https://www.nottinghaminsight.org.uk/search?q=transport

https://www.nottinghaminsight.org.uk/f/aAXNRad

The Nottingham Local Transport Plan now encompasses 2011 to 2026:

https://www.nottinghaminsight.org.uk/d/aapQXtBh

Local Transport Plan Implementation Plan 2019-2022

https://www.nottinghaminsight.org.uk/d/aYivUAT

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Nottingham City Council anticipates that further additional measures not yet identified or prescribed will be required in subsequent years to achieve compliance and enable the revocation of Nottingham City AQMA No. 2.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
NCC017	Nottingham City park and Ride sites	Alternatives to private vehicle use	Bus based Park & Ride	2019	2019	Nottingham City Council	Developers & highway infrastructure funding				Completed	Reduced vehicle emissions		Implemented and operational	
NCC018	Nottingham City Council staff car share	Alternatives to private vehicle use	Car & lift sharing schemes	-	2021	Nottingham City Council	N/A				Completed	Reduced vehicle emissions		Implemented and operational	
NCC019	Nottingham City Council Car Club	Alternatives to private vehicle use	Car Clubs	2014	2030	Nottingham City Council, Enterprise Car Hire	N/A				Completed	Reduced vehicle emissions		Implemented and operational	New concession awarded to Enterprise , with expansion and replacement of existing diesel Euro 6 vehicles with Evs and Hybrids
NCC020	Nottingham City Park and Ride sites	Alternatives to private vehicle use	Rail based Park & Ride			Network Rail, Nottingham Express transit					Completed	Reduced vehicle emissions		Implemented and operational	
NCC021a	Nottingham City Electric Scooter rental trial	Alternatives to private vehicle use	Other	2020	2030	Nottingham City Council, Superpedestrian scooters					Planning			Trials ongoing	Misuse, pavement clutter affecting sight impaired. Superpedestrian withdrew their operation in 12/23. New concession starting 06/24.
		Environmental Permits	Introduction/increase of environment charges through permit systems and economic instruments	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Introduction/increase of environmental funding through permit systems and economic instruments	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Large Combustion Plant Permits and National Plans going beyond BAT	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Measures to reduce pollution through IPPC Permits going beyond BAT	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments:

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															DEFRA and Treasury
		Environmental Permits	Other measure through permit systems and economic instruments	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Tradable permit system through permit systems and economic instruments	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Other	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
-	-	Freight and Delivery Management	Delivery and Service plans	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Freight Consolidation Centre	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Freight Partnerships for city centre deliveries	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Quiet & out of hours delivery	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Other	-	-	-	-	-	-	-	-	-	-	-	-
NCC 022	Air Quality Strategy for Nottingham and Nottinghamshire 2020-2030	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2020	2030	Nottingham City Council, Nottinghamshire County, Borough and District Councils. NCity and County Health and Wellbeing Board members					Completed				Collaborative working being reestablished between partners.
		Policy Guidance and Development Control	Low Emissions Strategy												

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
		Policy Guidance and Development Control	Other policy												
NCC023	Draft East Midlands Air Quality Network Air Quality and Emissions Mitigation Guidance for Developers	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2019		East Midlands Air Quality Network (East Midlands LAs - Env H, Planning & Transport, Public H, PHE	LA base budgets				Planning				
-	-	Policy Guidance and Development Control	Sustainable Procurement Guidance	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Emission control equipment for small and medium sized stationary combustion sources / replacement of combustion sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Low Emission Fuels for stationary and mobile sources in Public Procurement	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Other measure for low emission fuels for stationary and mobile sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Public Procurement of stationary combustion sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Regulations for fuel quality for low emission fuels for stationary and mobile sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Shift to installations using low emission fuels for stationary and mobile sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Other Policy	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	-	-	-	-	-	-	-	-	-	-	-	-
NCC024	Nottingham City Centre Clear Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)			Nottingham City Council								Feasibility studies being conducted	Funding to implement, enforcement

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
NCC028	Broadmarsh Car park dedicated EV charging spaces/floor	Promoting Low Emission Transport	Priority parking for LEVs	2020	2021	Nottingham City Council	DfT							Facility installed	
NCC002	Go Ultra Low Nottingham Programme	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2015	2030	Led by Nottingham City Council. OLEV grant funding (Go Ultra Low Programme) , now part of the Low Emission Vehicle Investment programme	DfT						Project specific outputs	Project complete	Project complete but many initiatives being continued through FTZ and TCF (see below) and LEVI scheme.
NCC025	Fleet Strategy	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2018		Led by Nottingham City Council	NCC, DEFRA				https://www.nottinghamevservices.co.uk/fleet/			Ongoing	
NCC011	CAZ additional measures	Promoting Low Emission Transport	Taxi emission incentives	2019	2021	Led by Nottingham City Council. Joint Air Quality Unit /	DEFRA						% Euro 6 and % ULEV private hire vehicles operating to strategy	Project complete	
NCC011a	City of Nottingham Age and specification Policies Relating to Hackney Carriage and Private Hire Vehicles	Promoting Low Emission Transport	Taxi Licensing conditions	2018	2021	Led by Nottingham City Council. Joint Air Quality Unit /							Policy specific outputs	Project complete	
NCC016a	Electric Van Experience	Promoting Low Emission Transport	Other	2020	2024	Nottingham City Council, local businesses	National Highways				Completed		Increase in uptake of Evs attributable to the intervention	Project underway	Vehicles taken into NCC fleet to replace diesels. 60%+ of businesses involved in the trial said that they would invest in electric vehicles in future.
	Workplace Travel Service	Promoting Travel Alternatives	Increase the number of businesses using Electric vehicles	2018	2027	Local businesses	DfT								Original scheme completed with successful completion of grant scheme. New WTS to continue to fund EV charging at business premises and alternative transport use.
NCC001	DEFRA Air Quality funding	Promoting Low Emission Transport	Other		2020/2021	Led by Nottingham City	DEFRA						Project specific outputs	Initial works underway	-

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
						Council. Joint Air Quality Unit /									
NCC00N	Covid-19 response Future Hybrid working project	Promoting Travel Alternatives	Encourage / Facilitate home-working		2021/2022	Nottingham City Council	NCC							Implemented as part of Covid-19 response.	Likely to achieve 40-60% reduction in office space requirements. Will reduce commuting using all modes.
NCC024	NCC Active travel Fund Measures	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure				DEFRA DfT				https://www.transportnottingham.com/projects/emergency-active-travel-fund-covid-19-measures/		Up lift in number journeys by bike and on foot attributable to the intervention	ongoing	
NCC09a	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	Personalised Travel Planning	2021	2022	Nottingham City Council. DfT grant funding (Capability Fund)									
NCC030	Nottingham Station Hub	Promoting Travel Alternatives	Promote use of rail and inland waterways	2018		Nottingham City Council, Network Rail					Operational			Completed	Continuing with support from Midlands Connect and East Midlands Councils
	HUB														
NCC030a	Transport Interchange and Integration	Promoting Travel Alternatives	Promote use of rail and inland waterways	2018			Midlands Connect,								
	BUS2						Developer contributions/								
							partnership working,								
							Local Growth Fund,								
							Transforming Cities								
							Fund/Other								
NCC09b	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	Promotion of cycling	2021	2030	Nottingham City Council. DfT grant funding (Capability Fund)									Continuing
NCC09c	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	Promotion of walking	2021	2030	Nottingham City Council. DfT grant funding (Capability Fund)									Continuing

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
NCC09d	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	School Travel Plans	2021	2030	Nottingham City Council. DfT grant funding (Capability Fund)									Continuing
NCC09e	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	Workplace Travel Planning	2021	2030	Nottingham City Council. DfT grant funding (Capability Fund)									Continuing
NCC013	DfT Active Travel Measures	Promoting Travel Alternatives	Other	2020	2021	NCC, DfT	DfT				Increase in Active travel			Project underway	
			Monitoring Cameras, Cycle Lanes, School Street Closures and Pop up Cycle Parking												
		Public Information	Via leaflets												
		Public Information	Via other mechanisms												
		Public Information	Via radio												
		Public Information	Via television												
NCC031	Aq data sharing	Public Information	Via the Internet	2018		NCC, AQMS	None				AQ information available on websites				
NCC032	Air Quality news	Public Information	Other	2018		NCC	None				Regular AQ updates and alerts on EH Twitter feed.				
NCC033	Anti-idling signs and campaigns	Traffic Management	Anti-idling enforcement	2019		NCC	None				Signage to discourage idling in identified problem areas				
		Traffic Management	Emission based parking or permit charges												
NCC024	NCC Active Travel Fund Measures	Traffic Management	Reduction of speed limits, 20mph zones		2023	NCC	DfT				Service user survey completed				
											https://www.transportnottingham.com/projects/emergency-active-travel-fund-covid-19-measures/				
		Traffic Management	Road User Charging (RUC)/ Congestion charging												
NCC007	Southside Transport Strategy (Broadmarsh)	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority,	2014/15 - 2015/16	2016 - 2023		Nottingham City Council. Funding from Local Growth Fund, LTP and prudential borrowing							Works to demolish car park finished in 2018. Further road space works planned to take place in future years	Large-scale regeneration project. High number of dependencies for the works

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
			high vehicle occupancy lane												
		Traffic Management	Testing Vehicle Emissions												
NCC0nn	Real Time camera enabled UTC	Traffic Management	UTC, Congestion management, traffic reduction			Nottingham City Council					Operational				
NCC003	Nottingham Workplace Parking Levy (WPL)	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2011	2012 – ONWARDS to 2037	Nottingham City Council	WPL liable businesses				operational		Congestion Constraint and mode shift to more sustainable modes of transport due toWPL Package		
		Traffic Management	Other												
		Transport Planning and Infrastructure	Bus route improvements												
NCC010	Nottingham Enterprise Zone Sustainable Transport Package	Transport Planning and Infrastructure	Cycle network	2016-17	2018-21	Nottingham City Council. Funding from Local Growth Fund and developer contributions.					Operational		Mode shift to more sustainable modes of transport due to intervention	Completed	Delay to original scheme due to Network design refinements
NCC026	Nottingham Citycard cycles	Transport Planning and Infrastructure	Public cycle hire scheme	2015	2018	Nottingham City Council	WPL, DfT				Operational			Operational	
											https://www.transportnottingham.com/cycling/hire-a-bike/				
NCC004	Midland Mainline Enhancements	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	2016-17	2016-2023	Network Rail								Awaiting introduction of new rolling stock	Electrification now progressing, but with uncertainties relating to enhancements on Midland Mainline. New rolling stock will contribute to improving air quality.
NCC012	CAZ additional measures	Transport Planning and Infrastructure	Other	2018	Oct-21	Nottingham City Transport	DEFRA					1-6 ug/m3 City wide effect. Most pronounced in City Centre due to concentration of routes.		NCT Retrofit Project now complete, council now working other operators	NCT Retrofit now complete, Council now working with other operators to ensure their fleets meet the highest emission standards. Measure has not necessarily worked as well as expected according to DfT

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															research. NCT now replacing vehicles with new electric fleet, but ZEBRA2 bid rejected. Minority operators did receive some ZEBRA2 funding. Trent Barton replacing vehicles with new Euro6 diesels.
			Bus retrofit project												
NCC014	Future Transport Zone - e-mobillity hubs	Transport and Planning Infrastructure	Mobility hubs better use of data and electric vehicles	2020	2024		DfT			£1 million - £10 million	Implementation	Reduced vehice emissions	Mode shift to more sustainable modes of transport due to intervention	Project underway	
NCC014	Future Transport Zone - Mobility as a service	Transport Planning and Infrastructure	Mobility as a service	2020	2030	Bus, tram and train operetors	DfT			£1 million - £10 million	Implementation	Reduced vehice emissions	Mode shift to more sustainable modes of transport due to intervention	Project underway	MAAS operator being tendered and award awaited.
NCC014	Future Transport Zone - Data Platform	Transport Planning and Infrastructure	Mobility hubs better use of data and electric vehicles	2020	2024	Nottingham County Council	DfT			£1 million - £10 million	Implementation	Reduced vehice emissions	Mode shift to more sustainable modes of transport due to intervention	Project underway	The link between the KPI and the intervention is in most cases indirect as better data informs other interventions however better information wil also enable better transport choices directly
NCC015	Transforming Cities Fund	Transport and Planning Infrastructure	Other	2020	2023		DfT						Mode shift to more sustainable modes of transpor and improved accessibillity to jobs and services due to intervention	Project underway	Increase active travel and public transport use
			Active Travel and Bus Priority Measures												
-	ECOstars	Vehicle Fleet Efficiency	Driver training and ECO driving aids	-	-	Gedling Borough Council on behalf of Nottinghamshire	-	-	-	-	https://www.ecostars-uk.com/about-eco-stars/eco-stars-for-buses-vans-freight/public-sector/	Reduction in emission from improved driver	-	Operational	Ecostars

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
						Local Authorities-						behaviour in conurbation			
-	ECoStars	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	-		Gedling Borough Council on behalf of Nottinghamshire Local Authorities-					https://www.ecostars-uk.com/about-eco-stars/eco-stars-for-buses-vans-freight/public-sector/	Reduction in emission from improved driver behaviour in conurbation		Operational	Ecostars
NCC026	NCC CAZ additional measures	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport												
NCC027		Vehicle Fleet Efficiency	Testing Vehicle Emissions												
		Vehicle Fleet Efficiency	Vehicle Retrofitting programmes												
		Vehicle Fleet Efficiency	Other												
NCC021b	Leveling up fund	Alternatives to private vehicle use	Other	2022	2024	NCC	DfT	NO	Funded	> £10 million	Implementation		evidenc eof mode swict away from ICE powered vehicles and improved accessibillity attributable to the interventions	Ongoing	Streets for People / LED lighting upgrade / School Streets / Community Electric Vehicle Charging Poitnts
NCC021c	Active Travel Fund	Alternatives to private vehicle use	Other	2022	2025	NCC	Active Travel England	NO	Funded	£1 million - £10 million	Implementation		Up lift in number journeys by bike and on foot attributable to the intervention	Ongoing	St.Ann's Well Road, Beechdale Road and Porchester Road Cycle and Walking Schemes / Active Travel Social Prescribing
NCC016b	Bus Service Improvement Plan	Promoting Low Emission Transport	Other	2022	2025	NCC	DfT	NO	Funded	£1 million - £10 million	Implementation			Ongoing	Bus Priority Schemes / Traffic Light Priority for Buses / Pinch Point relief / Fares package
NCC016c	Zero Emission Bus Regional Area	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2022	2027	NCC	DfT	NO	Funded	> £10 million	Implementation			Ongoing	68 Electric buses for Nottingham City Transport
NCC016d	Low Emission Vehicle Infrastructure	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2022	2027	NCC	DfT	NO	Funded		Implementation			Ongoing	Expansion of public EV charging network

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[6], local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter ($PM_{2.5}$)). There is clear evidence that $PM_{2.5}$ (particulate matter smaller 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Nottingham City Council is implementing and considering the following measures to address PM2.5:

Existing measures are focused on: -

i. reducing emissions from transport by constraining traffic growth and encouraging and facilitating walking, cycling and the use of public transport and

ii. on-going regulatory activity re Permitted Processes, ensuring compliance with the City's existing Smoke Control Orders, discouraging bonfires and uncontrolled burning, and ensuring construction and demolition activity implement dust minimisation measures.

Additional measures being considered include: -

i. Reducing emissions from non-vehicle fixed and mobile sources.

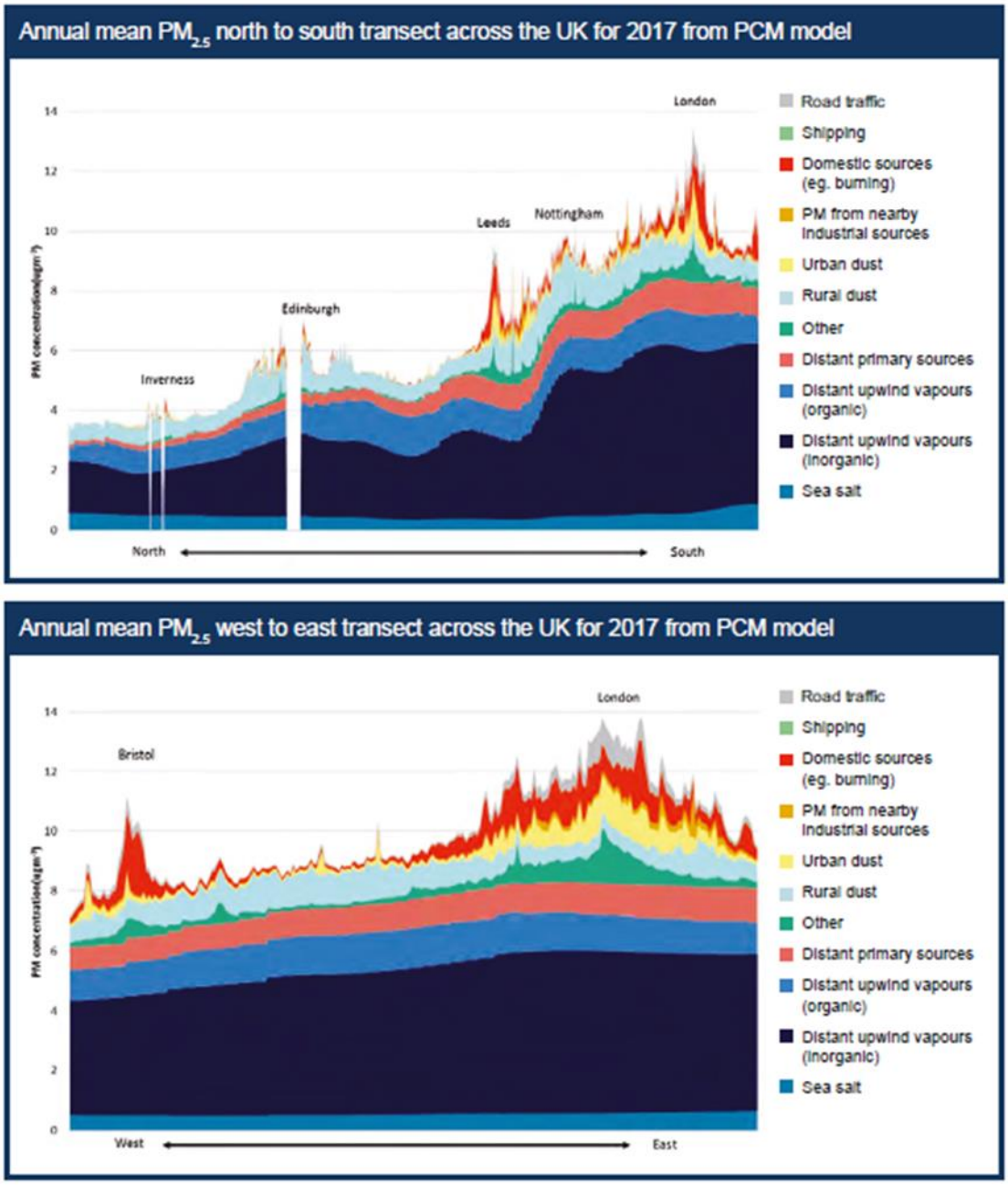
It should be noted that the UK Governments Air Quality Strategy (May 2019) details PM2.5 source contribution to annual mean concentrations across the UK, highlighting a number of cities that fall on the chosen transect line, including Nottingham. (Figure 5).

The PCM model indicates that as much as 80% of Nottingham's PM2.5 levels come from distant primary sources and distant upwind vapours e.g. industrial, commercial and agricultural sources outside the City's boundary and therefore any action by Nottingham City Council will only have a small impact on PM2.5 levels.

[6] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

Figure 5

These images show how particulate matter from across the country can build up in the atmosphere as 'background pollution' and the role that this can play in combination with local sources in areas with a pollution challenge.





29

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

This section sets out the monitoring undertaken within 2023 by Nottingham City Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Nottingham City Council undertook automatic (continuous) monitoring at three sites during 2023.

Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at https://uk-air.defra.gov.uk/data/data_selector

The https://nottinghamaqm.net/ page presents automatic monitoring results for Nottingham City Council, with automatic monitoring results also available through the UK-Air website https://uk-air.defra.gov.uk/interactive-map?network=nondefraaqmon

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

Nottingham City Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 38 sites during 2023. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2023 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.

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

2023's monitoring shows only 1 diffusion tube monitoring site (Queens Road) exceeding the annual mean air quality objective (when applying the local bias adjustment factor), down from 8 (adjusted) in 2022 , and a decrease in monitored NO_2 concentrations at the 3 real time analyser sites. **With RTA sites remained below the NO_2 annual mean air quality objective of 40 ug/m3.**

Diffusion tube monitoring was discontinued at site 14 (Ilkeston Road/Lenton Boulevard junction) following a review of monitoring site guidance.

Note; During April 2024 18 of 20 electro-chemical cell NO2 units were deployed and co-located with a number of diffusion tubes. Monitoring results from these sensors will be reported in 2025's ASR (2024 data).

The Local Plan to Improve Air Quality in Nottingham

In December 2015 the Department for Environment Food and Rural Affairs (DEFRA) released draft plans to improve air quality in the UK "Tackling Nitrogen Dioxide in our towns and cities". The document also contained the results of DEFRA's analysis, which concluded that concentrations of Nitrogen Dioxide (NO_2) in six UK cities, including Nottingham, were above the legal levels set by the EU First Daughter Directive on air quality (99/30/EC) and the UK Air Quality Strategy 2000. The document concluded that modelled levels of NO_2 (in Nottingham) along the Ring Road and around Crown Island would exceed the legal limit of 40µg/m^3 until (and including) 2023 without additional action being taken.

The document identified road traffic as a major source of NO_2 and, as a result, DEFRA required Nottingham City Council to prepare a plan aimed at reducing the level of Nitrogen Dioxide in the city. The plan was expected to consider the implementation of a Clean Air Zone, which would charge a fee for the most polluting vehicles to enter the zone. The aim of this approach was to reduce concentrations of Nitrogen Dioxide such that they would be brought into compliance with the Air Quality Directive in the shortest possible time and by the year 2020 at the latest.

A Clean Air Zone (CAZ) defines the area where targeted action is taken to improve air quality to improve health benefits while supporting economic growth. A key objective of a mandated Clean Air Zone scheme is to reduce the levels of Nitrogen Dioxide concentrations to levels of 40µg/m3 compliant with EU directive 2008/50/EC.

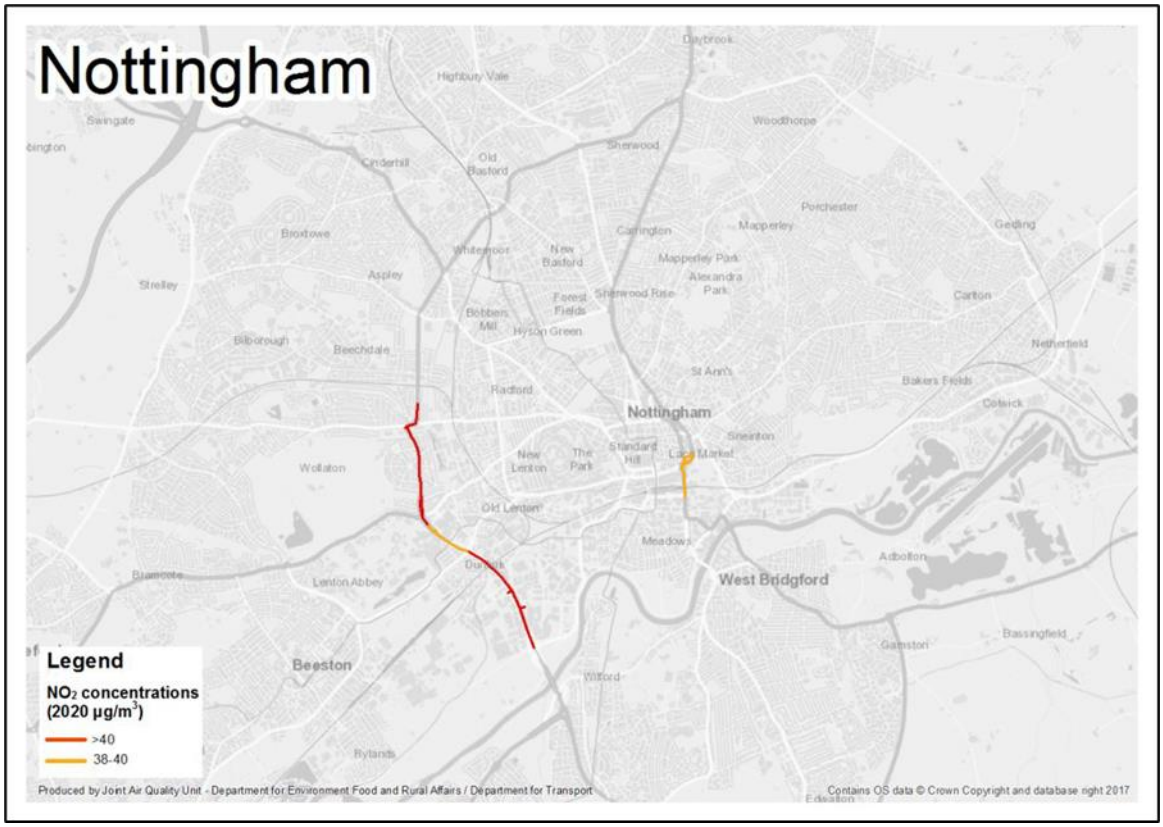
The national 2015 plan was challenged in the High Court by Client Earth and in October 2016, and the high court ruled that the plan was not sufficient to meet the aims of the Air Quality Directive. The High Court then quashed the plan and ordered that DEFRA produce a revised plan. Subsequently, in May 2017, Government released its Clean Air Zone Framework. This outlined four classes of Clean Air Zone, each of which charge non-compliant vehicles of different types for entry into each classified Zone. Vehicles would be compliant, and therefore not charged to enter the Zone, depending on their emission standard (i.e. Euro 6 or higher for Diesel, or Euro 4 or higher for petrol).

- Class A – Buses and Taxis (inc private hire)
- Class B – Buses, Taxis & HGV's
- Class C – Buses, Taxis, HGV's and light vans

- Class D – Buses, Taxis, HGV's, light vans and private motor cars

In July 2017 DEFRA and the Department for Transport (DfT) jointly released the "UK Plan for Tackling Roadside Nitrogen Dioxide Emissions". This plan again named Nottingham and a number of other Local Authorities areas as having persistently high levels of Nitrogen Dioxide.

The July 2017 plan showed that, according to the government's national analysis, the areas within Nottingham with highest concentration of Nitrogen Dioxide are on the Ring Road and at Crown Island.



The City Council carries out its own monitoring of Nitrogen Dioxide levels as part of the Local Air Quality Monitoring (LAQM) process. Results from this monitoring show that the areas of highest Concentration of Nitrogen Dioxide are located in the City Centre. Levels of NO_2 are particularly high around Canning Circus, Maid Marian Way and London Road.

Shortly after the release of the plan, the Secretary of State for Environment directed that Nottingham City Council produce a local plan, to be submitted by 15th September 2018.

Government strongly advised that, when preparing, their plans Local Authorities should consider all measures aimed at achieving compliance with the directive, with charging for access into Clean Air Zones considered necessary only if other measures failed to achieve compliance.

Part of the work to determine the scope and extent of any measures Nottingham City Council engaged Ricardo AEA. RAEA carried out detailed air quality modelling and modelled a range of future scenarios based on Class A-D CAZ.

Nottingham City Council's Local Plan to Improve Air Quality (and supporting business case) was submitted to government in September 2018.

https://nottinghaminsight.org.uk/Document-Library/Document-Library/aBFyzqe

The plan was accepted and a Ministerial Direction (dated 20th November 2018) received to implement the plan (Appendix F).

The main element of this air quality action plan, which was the retrofit of approximately 185 Euro V emission standard Nottingham City Transport buses with NO2 abatement technology to bring them up to Euro VI emission standard and the accelerated introduction of lower NO2 emissions Bio-gas buses, was substantially completed by February 2020.

https://www.nottinghaminsight.org.uk/d/aBFPtBx

A significant proportion of the buses operating on the roads where infraction of the EU limit NO2 annual mean was predicted were upgraded by August 2019. The reduction in NOx/NO2 emissions and ambient NO2 concentrations were calculated, submitted to and, provisionally accepted by, DEFRA in August 2019.

The second element of the plan, Nottingham City Council's revised Hackney Carriage and Private Hire Vehicle Strategy 2017-2020 designed to transition the fleet to Euro VI compliant taxi's from January 2020, and for a minimum of 40% of the HC and 25% of the Private Hire fleet to be Ultra Low Emission Vehicles has been implemented.

To assess compliance with Local Plans DEFRA set up a new diffusion tube monitoring network: the United Kingdom Urban Nitrogen Dioxide Monitoring Network 'UUNN'.

https://uk-air.defra.gov.uk/networks/network-info?view=UUNN

In September 2021 Nottingham City Council was informed that diffusion tube monitoring on the A6008 Upper Parliament Street (part of the UUNN) recorded an Annual Average NO2 concentration of 44 *u*g/m^3.

In 2022 Nottingham City Council received grant funding to acquire, and at time of writing had deployed 18 of 20 electrochemical cell real time analysers (ECRTA) at locations across the City where diffusion tubes indicated exceedances of the AQO in 2022 (including the A6008 Upper Parliament Street).

The ECRTA units are able to provide data with very high temporal resolution (e.g. concentrations are recorded every minute, rather than calculated as a monthly average in the case of diffusion tubes) and with higher confidence in the accuracy and precision than that achievable with diffusion tubes.

The process for reviewing compliance with the ministerial direction started in 2024.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

2023 monitoring data from the AURN Clinton Street East and the AURN Western Boulevard stations show both the annual mean and 24-hour air quality objectives continue to be met.

Note: In January 2024 the DEFRA funded AURN station was relocated from Clinton Street East to Kenmore Gardens, St Anns, a site more representative of an 'urban background' and exposure.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

At the time of writing (June 2024) activity is still in progress to install a second DEFRA funded AURN PM $_{2.5}$ monitoring site, representative of an 'urban background' and exposure. The site is likely to be operational towards thee end of 2024.

Note: Computer dispersion modelling undertaken for DEFRA apportions approximately 80% of PM2.5 pollution to sources outside Nottingham City.

Public Health Outcomes Framework

The Public Health Outcomes Framework sets out a vision for public health, that is to

'**Improve and protect the nation's health, and improve the health of the poorest fastest'**

For details of the policy behind the framework, see our further information.

The framework focuses on two high level outcomes to be achieved across the public health system and beyond:

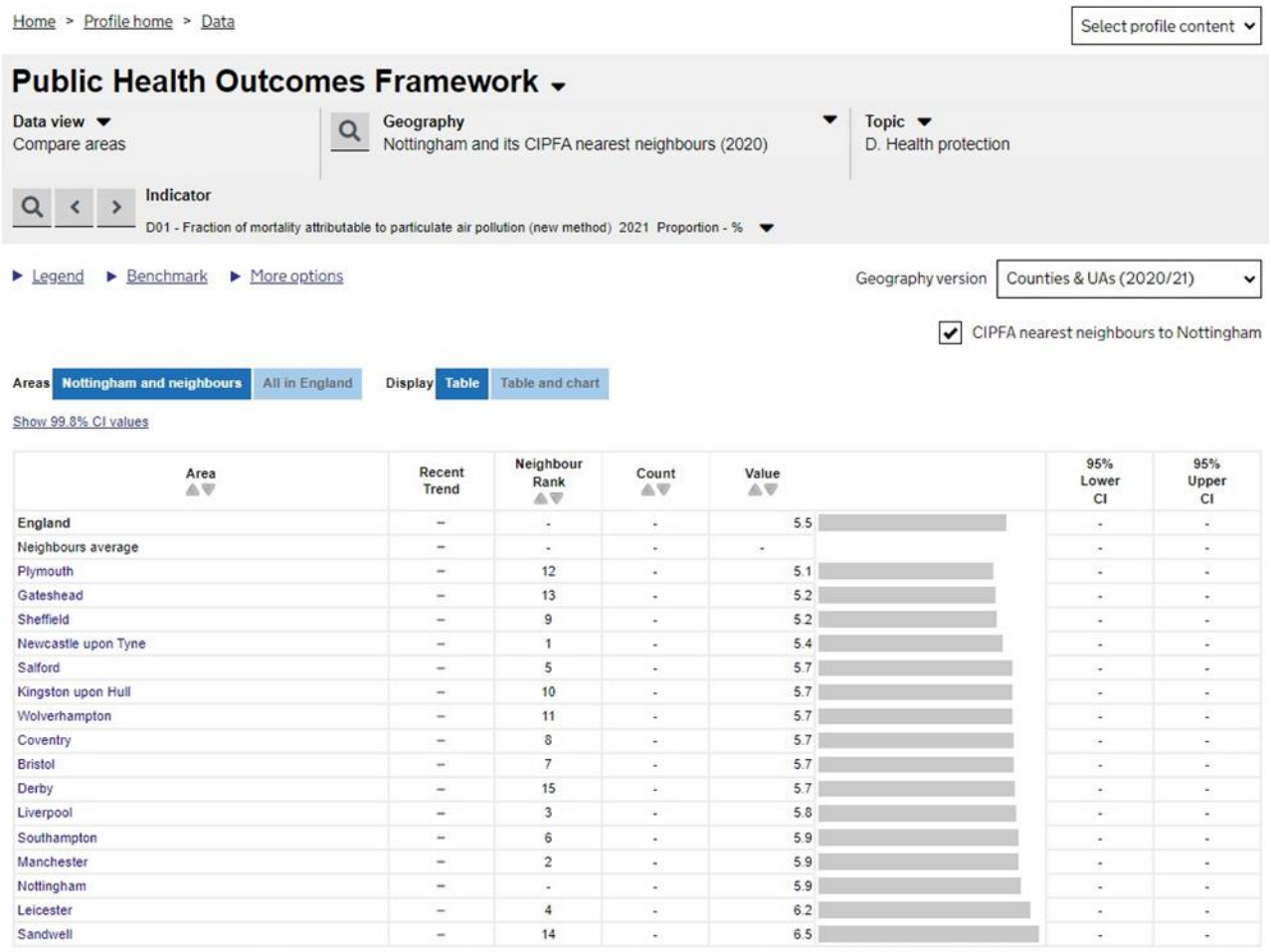
1. **Increased healthy life expectancy**

2. Reduced differences in life expectancy and healthy life expectancy between communities

The nature of public health is such that marked improvements in these outcomes will take years, sometimes even decades.

With respect to the overarching indicator ‘Health Protection’ there is an indicator for PM2.5: **Indicator D01 – Fraction of mortality attributable to particulate air pollution**

https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#gid/1000043



Home > Profile home > Data

Select profile content

Public Health Outcomes Framework

Data view: Compare areas | Geography: Nottingham and its CIPFA nearest neighbours (2020) | Topic: D. Health protection

Indicator: D01 - Fraction of mortality attributable to particulate air pollution (new method) 2021 Proportion - %

Legend | Benchmark | More options

Geography version: Counties & UAs (2020/21)

CIPFA nearest neighbours to Nottingham

Areas: Nottingham and neighbours | All in England — Display: Table | Table and chart

Show 99.8% CI values

Area	Recent Trend	Neighbour Rank	Count	Value	95% Lower CI	95% Upper CI
England	–	-	-	5.5	-	-
Neighbours average	–	-	-	-	-	-
Plymouth	–	12	-	5.1	-	-
Gateshead	–	13	-	5.2	-	-
Sheffield	–	9	-	5.2	-	-
Newcastle upon Tyne	–	1	-	5.4	-	-
Salford	–	5	-	5.7	-	-
Kingston upon Hull	–	10	-	5.7	-	-
Wolverhampton	–	11	-	5.7	-	-
Coventry	–	8	-	5.7	-	-
Bristol	–	7	-	5.7	-	-
Derby	–	15	-	5.7	-	-
Liverpool	–	3	-	5.8	-	-
Southampton	–	6	-	5.9	-	-
Manchester	–	2	-	5.9	-	-
Nottingham	–	-	-	5.9	-	-
Leicester	–	4	-	6.2	-	-
Sandwell	–	14	-	6.5	-	-

Source: Background annual average $PM_{2.5}$ concentrations for the year of interest are modelled on a 1km x 1km grid using an air dispersion model, and calibrated using measured concentrations taken from background sites in Defra's Automatic Urban and Rural Network (https://uk-air.defra.gov.uk/interactive-map). By approximating LA boundaries to the 1km by 1km grid, and using census population data, population weighted background $PM_{2.5}$ concentrations for each lower tier LA are calculated. This work is completed under contract to Defra, as a small extension of its obligations under the Ambient Air Quality Directive (2008/50/EC). Concentrations of total $PM_{2.5}$ are used for estimating the mortality burden attributable to particulate air pollution (COMEAP, 2022).

3.2.4 Sulphur Dioxide (SO_2)

Table A.9 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2023 with the air quality objectives for SO_2.

There were no exceedances of any of the three air quality objectives.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CG NOx	Carter Gate	Roadside	457945	339667	NO2 NO NOx	Y	Chemiluminescent	12	4	2.5
LS NOx	Lace Street	Roadside	454940	338314	NO2 NO NOx	Y	Chemiluminescent	3	9	1.5
SA NOx	St. Andrews Road	Roadside	456967	341382	NO2 NO NOx	Y	Chemiluminescent	12	13	1.5
CC AURN	Clinton St East.	Urban background	457437	340049	PM2.5,PM10 NO2, NO, NOx O3 SO2	N	FDMS, FDMS Chemiluminescent Ultra Violet Absorption (UVA) Ultra Violet Fluorescence (UVF)	N/A	35	3
WB AURN	Western Boulevard	Kerbside	454573	341643	PM10 NO2	NO	FDMS Chemiluminescent	15	1	2.5

Notes:

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
2	564 Derby Road	Roadside	454522	338938	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	23.0	No	2.5
4	121 Beeston Rd	Roadside	454782	338146	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	10.0	No	2.5
5	87 Abbey Street	Roadside	455153	338510	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	5.0	No	2.5
6	4 Western Blvd	Roadside	454466	340111	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	17.0	No	2.5
12	Bentinck Rd - Sch	Roadside	455808	340799	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	6.0	No	2.5
13	238 Ilkeston Road	Roadside	455439	340131	NO2	Nottingham No.2 Air Quality	0.0	3.0	No	2.5

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)
						Management Area 2019				
16	1-6 Castle Gardens	Roadside	455870	339133	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
17	215 Castle Boulevard	Roadside	455861	339133	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	5.0	No	2.5
19	87 Castle Blvd	Roadside	456852	339303	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	4.0	No	2.5
21	Salutation Inn Maid Marian Way	Roadside	457092	339641	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
24, 25, 26	St Andrew's Rd T	Roadside	456967	341382	NO2	Nottingham No.2 Air Quality Management Area 2019	12.0	16.0	Yes	1.5
27	21 Cartergate	Roadside	457959	339681	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	8.0	No	2.5

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)
28	Riverbank PH Trent Bridge	Roadside	458051	338328	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	2.0	No	2.5
30	LP 53890 Manvers Street	Roadside	458081	339896	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
31	134 Middleton Boulevard	Roadside	454371	339945	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	17.0	No	2.5
33	Lace Street NOx RTA	Roadside	454941	338315	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	9.0	Yes	1.5
35	Lampost 70 Wollaton Road	Roadside	454587	340087	NO2	Nottingham No.2 Air Quality Management Area 2019	10.0	3.0	No	2.5
40	Lampost Middleton Boulevard/Crown Island	Roadside	454321	339928	NO2	Nottingham No.2 Air Quality Management Area 2019	15.0	5.0	No	2.5
43	Outside 328 Derby Road	Roadside	455453	339602	NO2	Nottingham No.2 Air	6.0	3.0	No	2.5

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)
						Quality Management Area 2019				
44	Parking Post Cliff Road	Roadside	457775	339530	NO2	Nottingham No.2 Air Quality Management Area 2019	4.0	17.0	No	2.5
46	Hicking Building Queens Road	Roadside	457729	339122	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
47	Carrington Road/Railway Station (Sheriffs Way)	Roadside	457402	339145	NO2	Nottingham No.2 Air Quality Management Area 2019	23.0	1.0	No	2.5
49	2 Castle Boulevard	Roadside	457150	339384	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	4.0	No	2.5
50	A52 Clifton Boulevard	Roadside	455714	337837	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
51	Trent Street	Roadside	457530	339339	NO2	Nottingham No.2 Air Quality	0.0	2.0	No	2.5

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)
						Management Area 2019				
52	Lamppost Crown Public House	Roadside	454386	340087	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
53	3 Bayard Court	Roadside	454243	340057	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
55	40 Horwood Drive	Roadside	456441	336131	NO2	Nottingham No.2 Air Quality Management Area 2019	4.0	2.0	No	2.5
56	Mansfield Road Lampost 119M38 (roadside)	Kerbside	457064	342128	NO2	Nottingham No.2 Air Quality Management Area 2019	10.0	1.0	No	2.5
57	Stepping Stones Retirement Park	Roadside	456265	336412	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	35.0	No	2.5
10, 58, 59	565 Valley Road	Roadside	455533	342826	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	7.0	No	2.5

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)
20, 60, 61	13 Canning Terrace	Roadside	456399	340191	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	5.0	No	2.5
22, 62, 63	Alfreton Road LP 80A01 in front of Beyts Takeaway	Roadside	456160	340389	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
29, 64, 65	346 Meadow Lane	Roadside	458464	339010	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
54, 66, 67	Trafford gardens play area	Roadside	454493	341505	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	3.0	No	2.5
68	Clifton Lane KL409	Roadside	455538	335731	NO2	Nottingham No.2 Air Quality Management Area 2019	0.0	4.0	No	2.5
69	Sturgeon Avenue 14S309	Roadside	455529	335701	NO2	Nottingham No.2 Air Quality Management Area 2019	5.0	10.0	No	2.5
70	Ilkeston Road	Roadside	455552	340138	NO2	Nottingham No.2 Air	0.0	3.0	No	2.5

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)
						Quality Management Area 2019				

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CG NOx	457945	339667	Roadside		100	35	23	29	27	23
LS NOx	454940	338314	Roadside		92	31	23	25	24	21
SA NOx	456967	341382	Roadside		99	**40**	34	36	35	29
AURN CC	457437	340049	Urban Background		90	28	19	21	22	19
AURN WB	454573	341643	Roadside		99	33	25	27	27	25

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

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

☒ **Where exceedances of the NO_2 annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023.**

Notes:

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

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

All means have been "annualised" as per LAQM.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%).

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
2	454522	338938	Roadside		90.4	29.5	27.2	25.9	27.1	21.0
4	454782	338146	Roadside		90.4	35.0	28.2	29.6	27.6	24.2
5	455153	338510	Roadside		90.4	31.5	32.9	33.2	33.3	27.1
6	454466	340111	Roadside		92.3	33.1	30.3	29.8	31.0	26.4
12	455808	340799	Roadside		100.0	34.9	37.9	31.9	37.2	28.6
13	455439	340131	Roadside		90.4	35.4	35.7	37.1	35.0	28.1
16	455870	339133	Roadside		100.0	**40.3**	34.9	33.7	32.4	27.0
17	455861	339133	Roadside		92.3	38.5	37.2	32.9	35.5	27.4
19	456852	339303	Roadside		100.0	33.2	28.2	25.4	25.0	20.5
21	457092	339641	Roadside		100.0	**43.5**	29.6	38.5	36.6	30.4
24, 25, 26	456967	341382	Roadside		100.0	38.0	35.2	35.5	35.5	28.4
27	457959	339681	Roadside		100.0	**42.3**	36.8	35.5	35.1	30.0

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 2023 (%) [2]	2019	2020	2021	2022	2023
28	458051	338328	Roadside		73.1	35.8	31.8	32.2	32.2	27.9
30	458081	339896	Roadside		92.3	**42.3**	**40.7**	**41.4**	**41.0**	35.6
31	454371	339945	Roadside		92.3	29.5	27.2	27.7	28.0	24.5
33	454941	338315	Roadside		82.7	36.3	32.3	31.6	31.0	25.6
35	454587	340087	Roadside		100.0	39.8	35.2	36.3	34.7	30.1
40	454321	339928	Roadside		100.0	35.8	29.3	32.1	32.2	26.7
43	455453	339602	Roadside		90.4	28.9	27.1	30.4	30.8	24.5
44	457775	339530	Roadside		100.0	39.5	32.6	30.2	32.1	26.9
46	457729	339122	Roadside		100.0	**52.9**	**47.8**	**58.5**	**57.1**	**46.9**
47	457402	339145	Roadside		100.0	**48.9**	39.3	**42.6**	**44.7**	39.1
49	457150	339384	Roadside		100.0	38.0	37.7	39.2	**45.4**	34.9
50	455714	337837	Roadside		63.5	**54.9**	**42.1**	**46.8**	**45.9**	34.1
51	457530	339339	Roadside		100.0	37.0	30.9	29.3	31.3	25.3
52	454386	340087	Roadside		92.3	**40.8**	34.5	37.7	**40.5**	33.8

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
53	454243	340057	Roadside		100.0	34.3	27.2	26.1	27.7	22.6
55	456441	336131	Roadside		67.3	31.3	22.6	27.8	26.3	22.9
56	457064	342128	Kerbside		84.6	**52.3**	**41.4**	**45.1**	**42.8**	31.4
57	456265	336412	Roadside		82.7	27.5	22.7	24.6	23.9	20.3
10, 58, 59	455533	342826	Roadside		100.0	**40.1**	38.2	**41.8**	39.6	34.1
20, 60, 61	456399	340191	Roadside		100.0	**49.0**	39.6	**43.1**	**42.4**	35.4
22, 62, 63	456160	340389	Roadside		100.0	**40.5**	31.3	33.5	34.2	26.7
29, 64, 65	458464	339010	Roadside		100.0	**45.2**	**41.9**	**46.4**	**43.4**	37.4
54, 66, 67	454493	341505	Roadside		100.0	**42.7**	36.1	37.1	38.5	31.5
68	455538	335731	Roadside		80.8		33.7	35.8	34.9	29.0
69	455529	335701	Roadside		90.4		29.4	31.0	30.4	25.5
70	455552	340138	Roadside		84.6					32.9

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

☒ **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

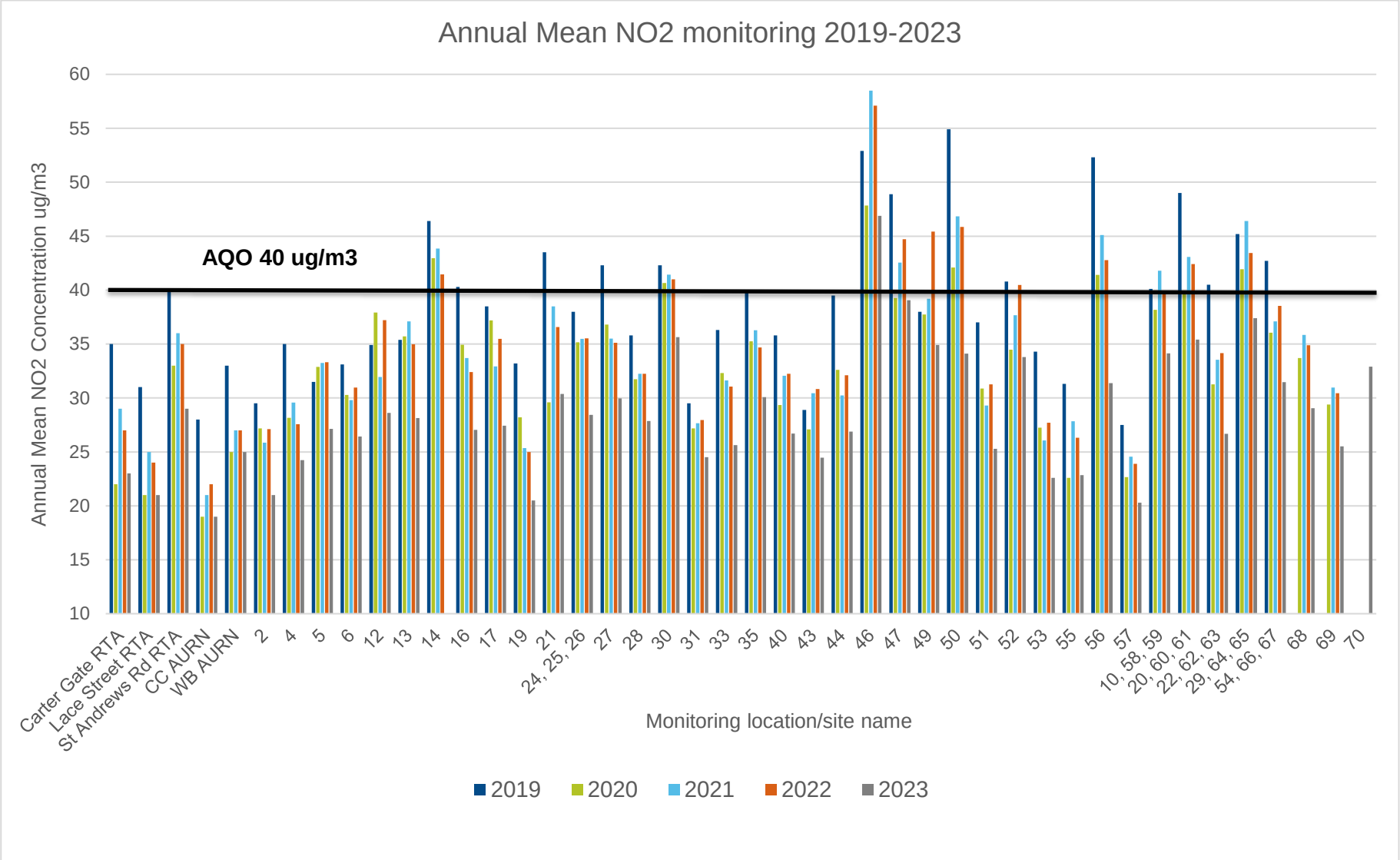


Figure A.1.2 – Trends in Annual Mean No2 Concentrations at real time analyser sites 2015-2023

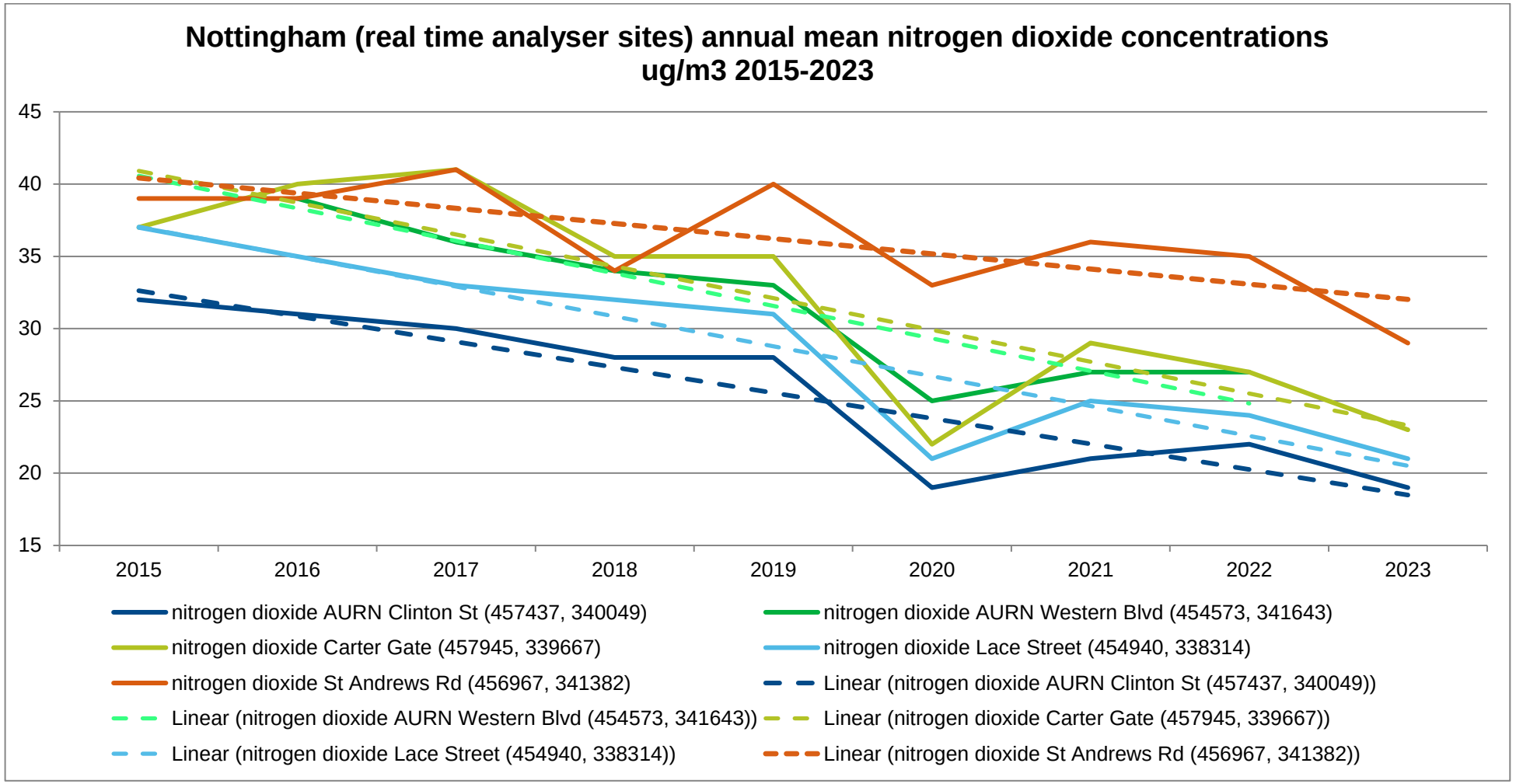


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CG NOx	457945	339667	Roadside		99	0	0	0	0	0
LS NOx	454940	338314	Roadside		92	0	0	0	0	0
SA NOx	456967	341382	Roadside		99	0	0	0	0	0
AURN CC	457437	340049	Urban Background		90	0	0	0	0	0
AURN WB	454573	341643	Roadside		99	0	0	0	0	0

Notes:

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

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

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

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

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

Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CC AURN	457437	340049	Urban Background		100	18	15	14	17	16
WB AURN	454573	341643	Roadside		94	20	16	16	18	16

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

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ are shown in **bold**.

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.

(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.2 – Trends in Annual Mean PM_{10} Concentrations

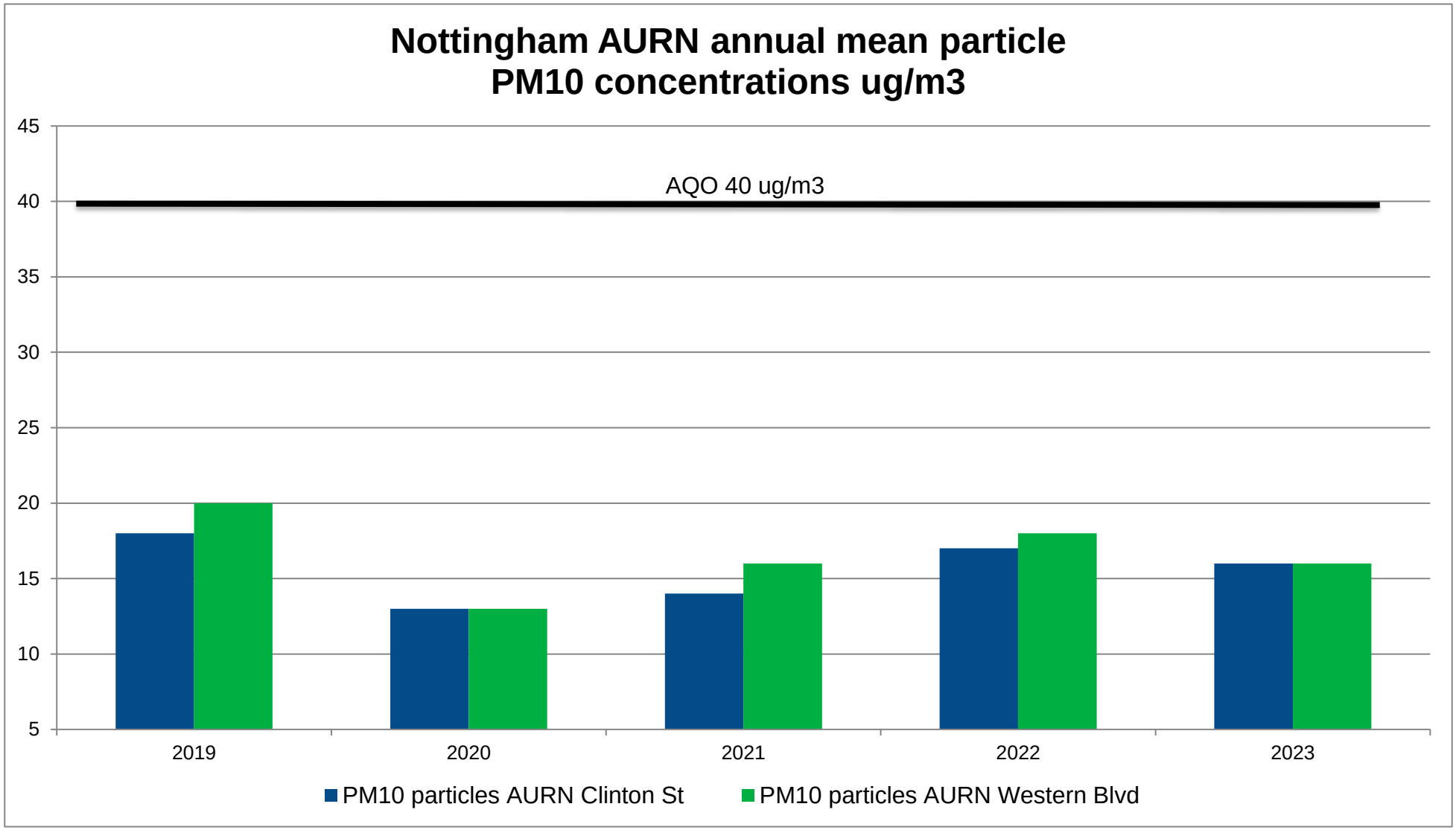


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CC AURN	457437	340049	Urban Background		100	9	0	1	6	0
WB AURN	454573	341643	Roadside		94	12	3	1	5	0

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CC AURN	457437	340049	Urban Background		100	11	9	8	10	10

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

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

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.

(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.3 – Trends in Annual Mean $PM_{2.5}$ Concentrations

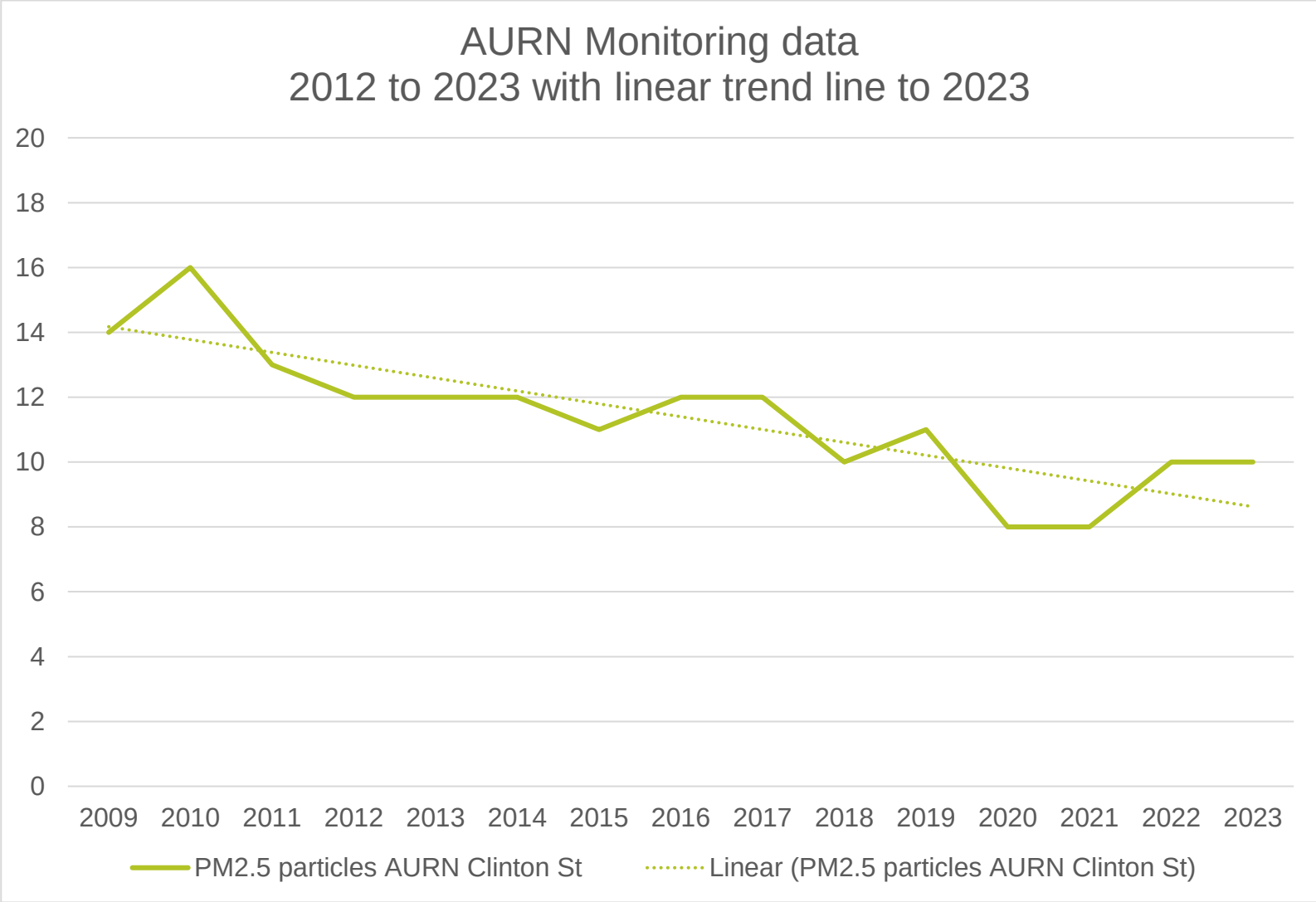


Table A.9 – SO_2 2023 Monitoring Results, Number of Relevant Instances

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	Number of 15-minute Means > 266µg/m³	Number of 1-hour Means > 350µg/m³	Number of 24-hour Means > 125µg/m³
CC AURN	457437	340049	Urban Background		94	0	0	0

Notes:

Results are presented as the number of instances where monitored concentrations are greater than the objective concentration.

Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year).

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO_2 2023 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
2	454522	338938	31.4	26.4	22.9	21.1	16.5	14.7	18.7	18.7	22.8	25.8		21.5	21.9	21.0	-	
4	454782	338146	37.8	34.2	30.7	22.9	20.2	19.3	18.4	20.9	22.6	27.6		23.1	25.2	24.2	-	
5	455153	338510	41.2	36.4	31.1	27.2	23.8	18.8	21.9	23.0	27.9	32.6		27.0	28.3	27.1	-	
6	454466	340111	35.7	33.0	25.8		21.9	19.1	23.7	24.2	28.8	29.5	32.5	28.8	27.5	26.4	-	
10	455533	342826	41.9	40.9	36.2	37.7	38.4	36.1	27.9	31.1	37.5	35.9	39.4	27.7	-	-	-	Triplicate Site with 10, 58 and 59 - Annual data provided for 59 only
12	455808	340799	35.6	34.4	28.9	29.5	28.6	27.2	23.7	26.5	31.1	34.5	32.7	24.7	29.8	28.6	-	
13	455439	340131	32.7	33.2		30.7	32.1	29.4	19.8	23.4	31.5	32.5	35.6	21.4	29.3	28.1	-	
16	455870	339133	35.6	34.6	28.9	28.4	24.5	21.2	20.5	22.1	28.2	31.4	36.5	26.2	28.2	27.0	-	
17	455861	339133	35.1	33.7	27.7	27.2	24.9	21.4	24.1	25.5	31.4	30.6	32.6		28.6	27.4	-	
19	456852	339303	29.0	26.4	21.9	20.9	17.7	15.5	14.6	15.4	22.2	24.8	27.2	20.4	21.3	20.5	-	
20	456399	340191	41.6	44.0	36.4	36.7	40.3	36.1	26.1	31.2	39.8	40.2	38.2	26.8	-	-	-	Triplicate Site with 20, 60 and 61 - Annual data provided for 61 only
21	457092	339641	37.6	35.4	31.5	31.9	34.9	27.0	23.7	26.4	34.3	35.5	36.9	24.4	31.6	30.4	-	
22	456160	340389	32.0	33.7	22.0	32.5	31.8	28.0	19.6	23.5	32.4	29.5	32.8	15.1	-	-	-	Triplicate Site with 22, 62 and 63 - Annual data provided for 63 only
24	456967	341382	41.0	35.4	31.7	25.6	24.4	19.7	26.0	27.0	31.1	29.5	35.5	30.4	-	-	-	Triplicate Site with 24, 25 and 26 - Annual data provided for 26 only
25	456967	341382	42.8	35.5	30.7	26.2	24.7	19.6	28.1	27.8	31.0	28.7	34.5	27.5	-	-	-	Triplicate Site with 24, 25 and 26 - Annual data provided for 26 only
26	456967	341382	42.8	34.9	31.2		26.6	19.2	27.4	23.6	30.8	30.7	31.9	26.6	29.6	28.4	-	Triplicate Site with 24, 25 and 26 - Annual data provided for 26 only
27	457959	339681	40.5	38.2	31.7	29.9	27.1	27.4	26.8	26.8	32.9	34.5	31.0	27.7	31.2	30.0	-	
28	458051	338328	37.0	32.7	26.1	24.1	24.6				28.3	32.2	33.7	22.6	29.0	27.9	-	
29	458464	339010	42.7	42.4	38.7	40.1	40.3				38.9	42.9	39.7	28.5	-	-	-	Triplicate Site with 29, 64 and 65 - Annual data provided for 65 only
30	458081	339896	45.3	41.5	36.0		36.4	38.6	30.6	32.4	39.0	38.7	39.5	30.5	37.1	35.6	-	
31	454371	339945	29.4	29.8	25.9		38.4	17.5	19.7	19.6	25.5	24.5	28.5	22.0	25.5	24.5	-	

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
33	454941	338315	36.4	34.2	30.8	25.4	23.7	22.2	20.6	23.1	28.1			22.4	26.7	25.6	-	
35	454587	340087	41.0	37.8	29.5	29.4	28.0	26.5	25.8	27.5	33.6	32.9	36.5	27.4	31.3	30.1	-	
40	454321	339928	32.5	32.0	28.5	32.7	30.2	30.4	17.5	21.7	28.2	27.6	30.0	22.7	27.8	26.7	-	
43	455453	339602	34.8	29.1	28.7	24.3	23.3	21.8	17.6	21.4	26.3	31.1		21.9	25.5	24.5	-	
44	457775	339530	35.9	31.9	29.7	27.9	24.1	22.2	19.5	22.7	30.4	31.5	34.5	25.8	28.0	26.9	-	
46	457729	339122	58.5	55.7	46.0	54.2	49.4	44.5	40.5	44.9	52.9	49.4	51.2	38.9	48.8	**46.9**	-	
47	457402	339145	49.5	45.5	38.7	43.9	42.4	41.9	29.8	34.8	42.7	44.4	42.4	32.2	40.7	39.1	26.2	
49	457150	339384	44.8	44.4	34.5	35.6	35.8	28.7	28.6	30.3	39.0	39.7	43.5	31.6	36.4	34.9	-	
50	455714	337837	54.8	47.8		36.8	30.8				35.8	43.7	46.5	15.5	38.9	34.1	-	
51	457530	339339	34.5	31.8	25.9	25.4	20.6	16.5	23.5	21.4	28.3	30.3	32.4	25.7	26.4	25.3	-	
52	454386	340087	38.8	34.7	35.8	35.2		29.8	27.2	30.8	36.8	52.0	36.5	29.7	35.2	33.8	-	
53	454243	340057	31.1	27.7	24.1	24.8	19.0	18.1	18.2	19.0	25.4	24.1	28.6	22.4	23.5	22.6	-	
54	454493	341505	45.4	39.2	32.1	26.9	24.9						38.8	27.5	-	-	-	Triplicate Site with 54, 66 and 67 - Annual data provided for 67 only
55	456441	336131	36.5	31.1	22.8			15.5			23.8	24.9	30.7	22.5	26.0	22.9	-	
56	457064	342128		39.2	35.4	30.3	28.3	26.3	29.2	31.0	37.2		38.3	31.7	32.7	31.4	-	
57	456265	336412	27.3	25.2	21.9	18.6	20.6			17.3	19.4	21.6	20.4	19.2	21.1	20.3	-	
58	455533	342826	40.4	40.2	34.4	35.8	36.6	35.9	26.8	31.4	35.6	36.2	34.3	29.1	-	-	-	Triplicate Site with 10, 58 and 59 - Annual data provided for 59 only
59	455533	342826	43.0	36.9	36.9	37.9	39.9	37.4	27.7	31.6	38.8	35.3	40.2	27.2	35.6	34.1	-	Triplicate Site with 10, 58 and 59 - Annual data provided for 59 only
60	456399	340191	42.1	42.3	34.8	38.5	40.3	37.3	28.2	31.9	40.7	40.0	40.2	26.5	-	-	-	Triplicate Site with 20, 60 and 61 - Annual data provided for 61 only
61	456399	340191	41.9	41.4	35.8	38.0	43.0	36.9	27.3	33.5	38.5	41.4	42.2	28.1	36.9	35.4	-	Triplicate Site with 20, 60 and 61 - Annual data provided for 61 only
62	456160	340389	33.0	33.8	29.9	32.8	33.7	29.3	18.4	24.7	31.0	33.3	27.2	22.2	-	-	-	Triplicate Site with 22, 62 and 63 - Annual data provided for 63 only
63	456160	340389	33.4	34.1	31.6	31.6	33.3	29.7	13.5	25.8	32.8	21.1	19.8	11.3	27.8	26.7	-	Triplicate Site with 22, 62 and 63 - Annual data provided for 63 only
64	458464	339010	49.0	43.8	37.9	38.6	41.8	39.8	29.6	36.3	39.3	43.6	43.8	30.2	-	-	-	Triplicate Site with 29, 64 and 65 - Annual data provided for 65 only
65	458464	339010	48.2	42.9	40.5	37.3	42.0	41.0	29.3		37.6	41.1	41.8	30.6	39.0	37.4	-	Triplicate Site with 29, 64 and 65 - Annual data provided for 65 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
66	454493	341505	47.9		30.2		26.5	27.1		29.7	35.1	32.4	41.6	32.1	-	-	-	Triplicate Site with 54, 66 and 67 - Annual data provided for 67 only
67	454493	341505	45.0	39.0		29.7			29.5	29.7	33.1	33.3	40.5	28.9	32.8	31.5	-	Triplicate Site with 54, 66 and 67 - Annual data provided for 67 only
68	455538	335731	47.3	42.9	30.7	23.8	20.8		24.9		31.8	28.5	39.5	12.6	30.3	29.0	-	
69	455529	335701	41.4	37.0	28.1	25.2	23.8	20.2	19.6		26.7	26.3	32.7	11.6	26.6	25.5	-	
70	455552	340138			35.9	34.7	34.3	31.4	28.8	30.8	36.3	38.4	40.5	31.9	34.3	32.9	-	

☒ **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.**

☒ **Nottingham City Council confirm that all 2023 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 Nottingham City Council During 2023

Nottingham City Council has not identified any new major or significant sources likely to significantly impact on air quality within the reporting year of 2023.

Additional Air Quality Works Undertaken by Nottingham City Council During 2023

Changes continue to be made the City Centre road layout and prioritisation under the Southside Transport (Broadmarsh) project (Table 2.2 NCC07).

QA/QC of Diffusion Tube Monitoring

Gradko International supply and analyse Nottingham City Council's diffusion tubes. The tubes use 20% TEA in water. The organisation is UKAS accredited and is assessed annually for compliance to ISO 17025 and participates in other proficiency schemes.

Gradko have confirmed that their procedures follow the guidance issued on behalf of Defra (AEA Energy & Environment, Feb 2008) relating to the preparation, extraction, analysis and calculation procedures for passive NO_2 diffusion tubes

Gradko participate in a number of QA/QC monitoring systems to demonstrate satisfactory performance including the Workplace Analysis Scheme for Proficiency (WASP) programme to ensure uniformity in data throughout the year.

Precision vs Accuracy (Bias)

A further aspect of QA/QC for a laboratory is the reproducibility of results i.e. precision. Precision should not be confused with accuracy. Diffusion tube precision can be described as the ability of a measurement to be consistently reproduced, i.e. how similar the results of duplicate or triplicate tubes are to each other.

Accuracy represents the ability of the measurement to represent the 'true' value, which for the monitoring results, is defined as the results from the automatic analysers. When averaged over a number of sets of results bias can be evident. This represents the overall

tendency of the diffusion tubes to depart from the 'true' value, i.e. to systematically over-or under-read when compared against the reference method.

Once identified, bias can be adjusted for to improve the accuracy of diffusion tube results. This is done using bias adjustment factors which have been found to be specific to a laboratory and tube preparation method. See Appendix A subsection A-1 above.

Unlike bias, poor precision cannot be adjusted for. It can only be improved by careful handling of the tubes in both the laboratory and the field.

The LAQM website provides a link to the summary of precision results for individual laboratories https://laqm.defra.gov.uk/air-quality/air-quality-assessment/precision-and-accuracy/

The 2023 precision rating for Gradko supplied/analyzed diffusion tubes was 'good'. This precision reflects the laboratory's performance/consistency in preparing and analyzing the tubes, as well as the subsequent handling of the tubes in the field.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Nottingham City Council's administrative area recorded data capture of more than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

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.

Nottingham City Council have applied a local bias adjustment factor of 0.96 to the 2023 monitoring data. A summary of bias adjustment factors used by Nottingham City Council over the past five years is presented in **Error! Not a valid bookmark self-reference.**.

The results of diffusion tubes 24,25,26 and co-located with the St Andrew's Road real time analyser were used to derive the bias adjustment.

The local bias adjustment was used in preference to the national bias adjustment because use of the NBA (0.81) would reduce the average of the three diffusion tube values from 29.6 (0.6 ug/m3 more than the average reported by the RTA) to 23.9 (6 ug/m3 less). Whereas the use of the local bias factor corrects for the 'over reading' of the three tubes. Bringing the average of the three diffusion tubes back to the annual mean of 29 ug/m3, calculated from the real time analysers monitoring record.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Nottingham City Council's administrative area recorded data capture of more than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2024 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.

Nottingham City Council have applied a local bias adjustment factor of 0.96 to the 2023 monitoring data. A summary of bias adjustment factors used by Nottingham City Council over the past five years is presented in **Error! Not a valid bookmark self-reference.**.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Local	-	0.96
2022	Local	-	1.12
2021	Local	-	1.11
2020	Local	-	1.10
2019	Local	-	1.08

Table C.2 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2
Periods used to calculate bias	**12**	
Bias Factor A	**0.96 (0.9 - 1.03)**	
Bias Factor B	**4% (-3% - 11%)**	
Diffusion Tube Mean (µg/m^3)	**29.9**	
Mean CV (Precision)	**4.1%**	
Automatic Mean (µg/m^3)	**28.7**	
Data Capture	**98%**	
Adjusted Tube Mean (µg/m^3)	**29 (27 – 31)**	

Notes:

A single local bias adjustment factor has been used to bias adjust the 2023 diffusion tube results.

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.

Table C.3 – Non-Automatic NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
47	1.0	24.0	39.1	19.0	26.2	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*

QA/QC of Automatic Monitoring

AURN Sites

The analysers at the AURN sites are subject to a four weekly calibration regime. The calibrations are undertaken by an Environment Agency trained local site operator (LSO) and conducted in accordance with the Local Site Operators' Manual.

CG NOx, LS NOx and SA NOx Sites

At Nottingham City Council's CG NOx, LS NOx and SA NOx sites calibrations are carried out fortnightly. The calibrations, using zero air and span gases, are undertaken by the LSOs that prior to 2016 were also the LSOs for the City Centre AURN site. Calibrations are conducted using the same principles and procedures as given in the AURN LSO Manual.

The equipment is fully serviced every six months by Matts Monitors Ltd, Stroud. http://www.mattsmonitors.co.uk/servicing-and-calibration.html

Calibration Gas Traceability

AURN Site

Please visit the DEFRA site https://uk-air.defra.gov.uk/networks/ for more information.

CG NOx, LS NOx and SA NOx Sites

Calibration gases used in the CG NOx, LS NOx and SA NOx monitoring sites are supplied by Matts Monitors Ltd. The gases are supplied with a certificate of analysis.

Data Collection and Processing

AURN Site

Please visit https://uk-air.defra.gov.uk/data/ for more information.

CG NOx, LS NOx and SA NOx Sites

During 2022 data collection, validation and ratification was carried out by Air Quality Data Management Ltd http://www.aqdm.co.uk/

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

Nottingham City Council does not operate its own PM10 or PM2.5 particulate monitoring equipment.

Monitoring data from two DEFRA operated sites are reported.

Automatic Monitoring Annualisation

Nottingham City Council does not operate its own PM10 or PM2.5 particulate monitoring equipment.

Monitoring data from two DEFRA operated sites are reported (both greater than 75% recorded data capture therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

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

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

From https://maps.nottinghamcity.gov.uk/insightmapping/#

To view Nottingham City Council's monitoring site locations:-

1. Using Google Chrome or Microsoft Edge web browser navigate to: - https://maps.nottinghamcity.gov.uk/insightmapping/#
2. On the left-hand menu column select 'Layers',
3. Select the '+' of the 'Environment' folder
4. Select Air Quality Monitoring Stations (Live)
5. Use the + button the map to zoom in (- to zoom out) if sites cannot be distinguished

Figure D.1 Map of Nottingham City Non-Automatic (pink circle) and Automatic (purple square) Monitoring Sites

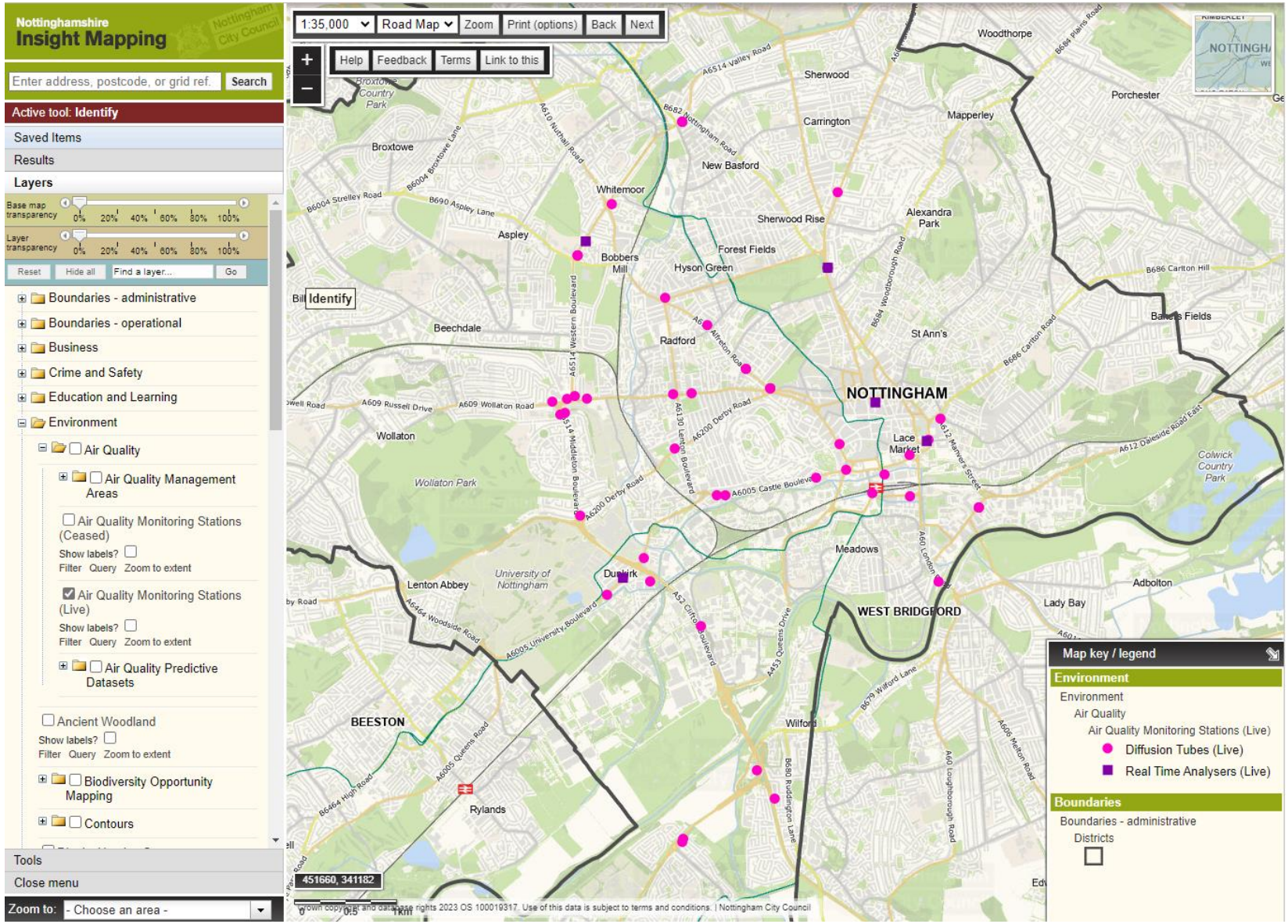
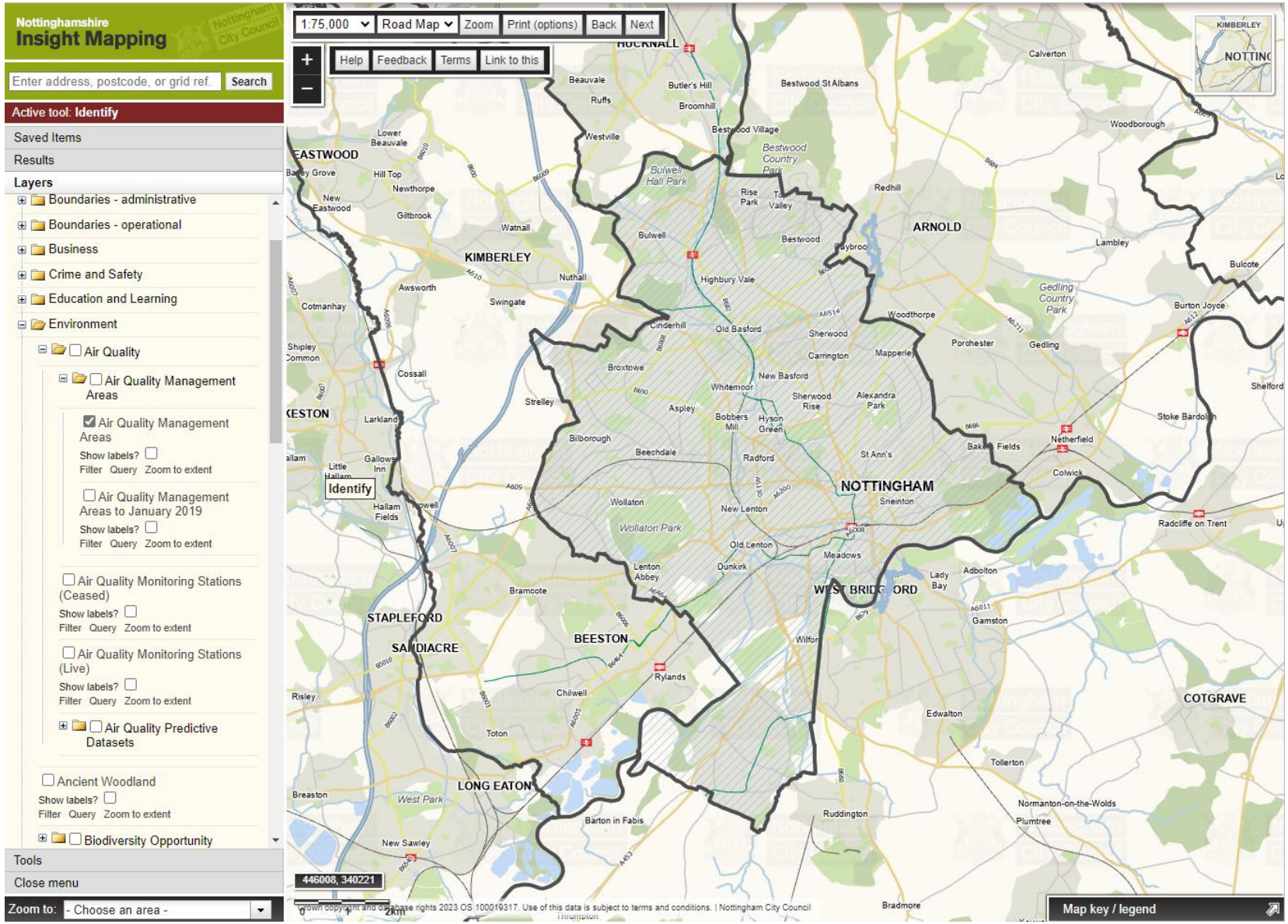


Figure D.2 Map of Nottingham No.2 Air Quality Management Area for nitrogen dioxide (city-wide)



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).

Appendix F: Ministerial Direction

MINISTERIAL DIRECTION

ENVIRONMENT ACT 1995

Environment Act 1995 (Nottingham City Council) Air Quality Direction 2018

The Secretary of State, in exercise of the power conferred by section 85(5) of the Environment Act 1995(1), gives the following direction.

In accordance with section 85(6) a copy of this direction will be published in the London Gazette.

The Secretary of State makes this direction having determined that it is necessary in order to meet obligations placed upon the UK under the EU Ambient Air Quality Directive(2).

Citation, commencement and application

1.—(1) This direction may be cited as the Environment Act 1995 (Nottingham City Council) Air Quality Direction 2018 and comes into force on 21 November 2018.

(2) This direction applies to Nottingham City Council.

Interpretation

2. In this direction—

"local plan for NO_2 compliance" means the detailed scheme (excluding any associated mitigation measures) which Nottingham City Council identified as part of the AQP to deliver compliance with the legal limit value for nitrogen dioxide in the shortest possible time that was approved by the Secretary of State on 20 November 2018 and is summarised in Schedule 1;

"the authority" means Nottingham City Council;

"AQP" means the UK plan for tackling roadside nitrogen dioxide concentrations 2017, drawn up by the Secretary of State in accordance with regulation 26(1) of the Air Quality Standards Regulations 2010(3);

Duty to implement the approved local plan for NO_2 compliance

3.—(1) The authority must take steps to implement the local plan for NO_2 compliance for the area for which it is responsible.

(2) The authority must ensure that the local plan for NO_2 compliance is implemented so that—

(a) compliance with the legal limit value for nitrogen dioxide is achieved in the shortest possible time, and by 2019 at the latest;

(b) exposure to levels above the legal limit for nitrogen dioxide are reduced as quickly as possible.

(1) 1995 c25.
(2) 2008/50/EC OJ No. L 152, 11.06.08, p.1.
(3) S.I. 2010/1001. A copy of the plan is available at: https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017.

Variation, revocation or suspension

4. The authority must not vary, revoke or suspend its implementation of the local plan for NO_2 compliance pursuant to paragraph 3, without the prior written consent of the Secretary of State.

Guidance

5. The authority, in taking steps under this direction, must have regard to relevant guidance issued by the Secretary of State.

Thérèse Coffey MP
Parliamentary Under Secretary of State for the Environment
Department for the Environment Food & Rural Affairs

20 November 2018

SCHEDULE 1

Paragraph 2

Summary of local plan for NO_2 compliance measures

Measures description	*Deadlines*
Clean Bus Technology Fund bus retrofit programme	To be implemented as soon as possible and at least in time to bring forward compliance to 2019
Updating the taxi licensing policy (as set out in the Age and Emissions Policy)	To be implemented as soon as possible and at least in time to bring forward compliance to 2019

EXPLANATORY NOTE

(This note is not part of the direction)

This direction directs Nottingham City Council to implement its local plan for NO2 compliance, in connection with duties in respect of air quality under Part 4 of the Environment Act 1995 and as part of the UK plan for tackling roadside nitrogen dioxide concentrations 2017. The local plan for NO_2 compliance was approved by the Secretary of State on 20 November 2018, and it must now be implementation to ensure compliance with the legal limit value for nitrogen dioxide is achieved in Nottingham in the shortest possible time. Under section 85(7) of the Environment Act it is the duty of a local authority to comply with a direction given to it. A copy of this direction is available at for inspection at Seacole Building, 2 Marsham Street, London, SW1P 4DF.

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.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.
- Estimating background concentrations of PM2.5 for urban air quality modelling in a data poor environment. E Draper et al. Atmospheric Environment Volume 314. December 2023. https://doi.org/10.1016/j.atmosenv.2023.120107

- AEA Energy & Environment (Feb 2008) **Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users Issue 1a**
- AEA Technology (2005) **Local Site Operators' Manual**
- **Air Quality (England) Regulations 2000 (SI 2000 No. 928),**
- **Air Quality Standards Regulations 2010 (SI 2010 No. 1001)**
- Department for the Environment, Food and Rural Affairs **Clean Air Strategy 2019**
- Department for the Environment, Food and Rural Affairs (2007) **The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007**
- **The Air Quality (England) (Amendment) Regulations 2002 (SI 3043)**
- **The Pollution Prevention and Control Act 1999**
- **Nottingham City Council (2000 - 2019) LAQM Review and Assessment Reports:**

http://www.nottinghaminsight.org.uk/f/63682/Library/Environment/Air-Quality/

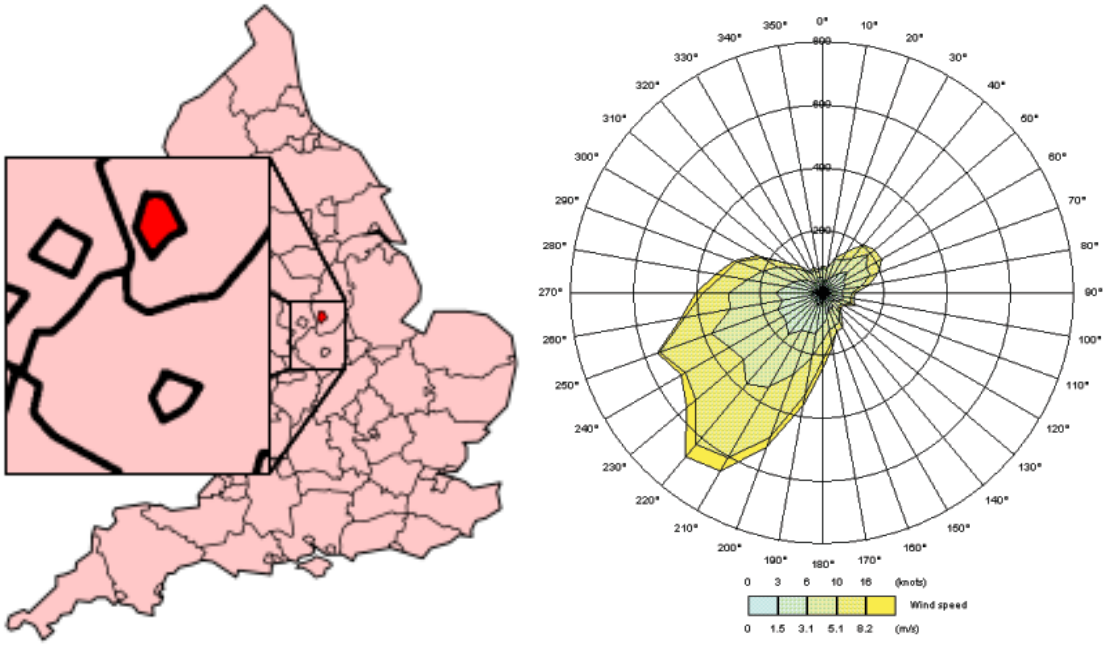
- **Nottingham City Council: Health and Wellbeing Joint Strategic Needs Assessment: - Air Quality and Health 2019**
  https://www.nottinghaminsight.org.uk/d/aXx6DuH

Nottingham's geography and weather.

A location's air quality is affected by both local and distant emissions, from a wide range of sources, seasonal and day-to-day weather conditions, and the prevailing wind direction.

Nottingham's location in England means it does not experience daily coastal sea-breeze effects and is therefore subject to the wind direction of the air masses moving across the UK. The wind rose (Figure 9) is typical of data measured at Watnall meteorological station on the western edge of the Nottingham conurbation) shows the wind direction with the greatest frequency as the large lobe at 220^0. This 'prevailing wind' direction is roughly from the southwest. Thus, Nottingham's air quality is significantly influenced by sources ranged in an arc from the west-south-west to the south-south-west.

Figure 6: Nottingham City Council's geographic location in England and example Windrose (Watnall)



Nottingham is surrounded by agricultural land, the M1 motorway bounds Nottingham to the west, and the very large urban industrial conurbation of the West Midlands is approximately 40 miles to its southwest (Figure 10). Emissions from agricultural activity outside the conurbation as well as those from closer and more distant domestic, commercial, industrial and transport sources outside Nottingham contribute to the levels of NO2 and particles measured in Nottingham.

Figure 7: Nottingham City Council's geographic location (detailed)

