NORWICH
City Council

2026 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: 30th June 2026

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Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection Team of Norwich City Council with the support and agreement of the following officers and departments:

- Public Health – Norfolk County Council
- Environmental Strategy – Norwich City Council
- Sustainable Transport – Norfolk County Council

This ASR has been approved by:

- Cllr Toby Bolton - A sustainable city (climate and environment)
- Nicholas Austin – Executive Director of Climate and Environment
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Public Health has reviewed the report and approves the ASR.

If you have any comments on this ASR please send them to Sally Nicholson at:

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Executive Summary: Air Quality in Our Area

Air Quality in Norwich City Council

Breathing in polluted air affects our health and costs the National Health Service (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.

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Low-income communities are also disproportionately impacted by poor air quality, exacerbating health and social inequalities.

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.
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.

Norwich covers approximately 39 km² and has a population of around 147,000 people based on the latest mid-2024 estimates from the Office for National Statistics (ONS).

The Norwich Urban Area, as defined in the Greater Norwich Local Plan (GNLP, adopted March 2024), includes the built-up area of the city and surrounding fringe parishes that have a strong functional relationship with Norwich. This wider urban area has a population of approximately 280,000 people (2023 estimate).

The Greater Norwich area (covering Broadland, Norwich and South Norfolk local authority areas), which forms the strategic planning area for the GNLP, has a population of approximately 420,000–430,000 people based on recent monitoring and ONS-aligned estimates.

Norwich remains one of the most densely populated local authority districts in the East of England, with a density of around 3,700–3,800 people per km², reflecting continued population growth and urban concentration.

Norwich City Council permits 28 ‘Part B’ processes, which include a road stone coating plant, a sawmill and timber treatment facility, a cement batching installation, aircraft and vehicle respray operations, and a crematorium.

The Environment Agency regulates larger ‘Part A’ processes, of which Briar Chemicals—an agrochemical company—is the only one operating within the city.

However, neither Part A nor Part B processes are considered to contribute significantly to air pollution levels in Norwich.

The University of East Anglia (UEA) operates a gas-fired combined heat and power (CHP) plant and boiler system which supplies heat and electricity to the campus via a district energy network. The system has undergone upgrades in recent years and forms part of the University’s wider strategy to reduce carbon emissions and transition towards net zero.

Emissions from the CHP plant are released via appropriately designed stacks to ensure effective dispersion. As a result, and in line with previous assessments, this source is not considered to be a significant contributor to roadside nitrogen dioxide (NO_2) concentrations within Norwich, where road traffic remains the dominant source of emissions.

Road traffic is a major source of air pollution in Norwich. Completed source apportionment exercises have identified road traffic emissions to be the most significant source of NO_2. As a result, an Air Quality Management Area (AQMA) covering an area around the centre of Norwich was declared in 2012 due to exceedances of the NO_2 annual mean objective.

In 2025, the annual mean objective was not exceeded within the AQMA.

In order to address exceedances within the AQMA, Norwich City Council published an updated Air Quality Action Plan (AQAP) in 2021. The Council has since undertaken a further review of its actions, and consultation on a revised AQAP for 2026 has recently been completed. The updated AQAP is scheduled to be submitted to Defra by the end of June 2026.

Norwich City Council maintains and operates a comprehensive passive diffusion tube monitoring network to support the identification and targeting of pollution hotspots, where further action may be required. Diffusion tube locations are reviewed annually and are selected based on factors such as anticipated pollution hotspots, changes to traffic flow (including increased traffic on alternative routes), development impacts, and previously recorded elevated nitrogen dioxide (NO_2) concentrations.

In addition, monitoring locations may be introduced in response to specific developments; for example, in 2020, additional diffusion tubes were installed to establish baseline pollutant concentrations in advance of a proposed large-scale development at Anglia Square.

In 2025, the highest annual mean nitrogen dioxide (NO_2) concentration recorded within the AQMA was 33.7 µg/m³ at diffusion tube site DT11. This represents a reduction from 37.2 µg/m³ recorded at the same location in 2024.

This improvement is particularly notable when considered alongside longer-term trends, as DT11 recorded concentrations as high as 52 µg/m³ in 2012. Levels at this location were historically influenced by the 'street canyon' effect, which restricted pollutant dispersion.

The recent decline in concentrations is likely to reflect the cumulative impact of local interventions and wider trends, including the widescale introduction of electric buses in Norwich and a continued shift towards low-emission vehicles.

The highest nitrogen dioxide (NO_2) concentration recorded outside the AQMA in 2025 was at diffusion tube site DT65 on Bracondale, with a raw annual mean value of 40.1 µg/m³. This represents a slight exceedance of the national annual mean objective of 40 µg/m³, but also a reduction from 41.0 µg/m³ recorded at the same location in 2024.

In accordance with paragraph 7.84 of the Local Air Quality Management (LAQM) TG22 guidance, the result was distance-corrected to better reflect relevant public exposure. This adjustment, which accounts for uncertainty associated with diffusion tube monitoring and receptor location, reduced the concentration to 35.7 µg/m³—down from 36.5 µg/m³ in 2024— bringing it below the objective and marginally below the 10% threshold used for consideration under LAQM.TG22.

As DT65 was only established in 2024, the site will be subject to ongoing monitoring to determine whether the recorded concentrations are persistent. This will help inform whether the current AQMA boundary remains appropriate or if a future review and potential amendment may be required.

Between 2024 and 2025, nitrogen dioxide (NO_2) concentrations across the monitoring network remained broadly stable, with the majority of sites experiencing small increases of typically 1–2 µg/m³. A smaller number of sites, including those with historically higher concentrations, recorded reductions.

Importantly, the observed changes are relatively minor and consistent with normal year-to-year variability. When considered in the context of longer-term trends, most monitoring locations continue to show an overall decline in NO_2 concentrations since 2021, which is demonstrated in the Comparison of Diffusion tube results table. This suggests that, despite short-term fluctuations, the general trajectory of air quality in Norwich remains one of gradual improvement.

There were no exceedances of the national annual mean NO_2 objective within the AQMA in 2025, representing a very encouraging outcome. The highest recorded concentration was 33.7 µg/m³ at diffusion tube site DT11, a reduction from 37.2 µg/m³ at the same

location in 2024. As this is below 36 µg/m³ (i.e. within the 10% buffer below the 40 µg/m³ objective), 2025 represents the first year in which concentrations have been sufficiently below the objective to meet the criteria for sustained compliance.

However, in accordance with LAQM.TG22 guidance, an AQMA should not be considered for revocation until annual mean NO_2 concentrations have remained below 36 µg/m³ for three consecutive years. Subject to this threshold not being exceeded in the next two years, the Council may then consider revocation of the AQMA.

This 2026 Annual Status Report (ASR) refers to measures proposed in the 2021 Air Quality Action Plan.

Norwich City Council proposes to continue with both automatic continuous NO_2 monitoring in tandem with passive diffusion tube monitoring.

In response to concerns about increased traffic around Bethel Street and St Giles following the closure of Exchange Street to general traffic during the COVID-19 period, Norwich City Council, in partnership with Norfolk County Council, implemented additional air quality monitoring in the area. Five diffusion tubes (DT60–DT64) were installed in September 2023 at key locations. However, due to theft and data loss during 2023, there was insufficient data available for full reporting in that year. Complete datasets have since been obtained for 2024 and 2025, allowing for a more robust assessment of local air quality. Results indicate that nitrogen dioxide (NO_2) concentrations remain below the national annual mean objective at all sites, although slight increases were observed between 2024 and 2025. In particular, DT62 recorded the highest concentration within this group (25.6 µg/m³ in 2025), while other sites ranged between 14.0 and 18.8 µg/m³. These results suggest that, while concentrations have increased marginally year-on-year, levels remain well within the national air quality objective, and continued monitoring will help determine whether these changes reflect normal variability or emerging longer-term trends associated with traffic patterns in the area.

In 2024, a new triplicate diffusion tube location (DT67, DT68 and DT69) was installed at the new air quality monitoring station, Castle Meadow 2 (CM3), to replace the diffusion tubes previously co-located at the former Castle Meadow site (CM1).

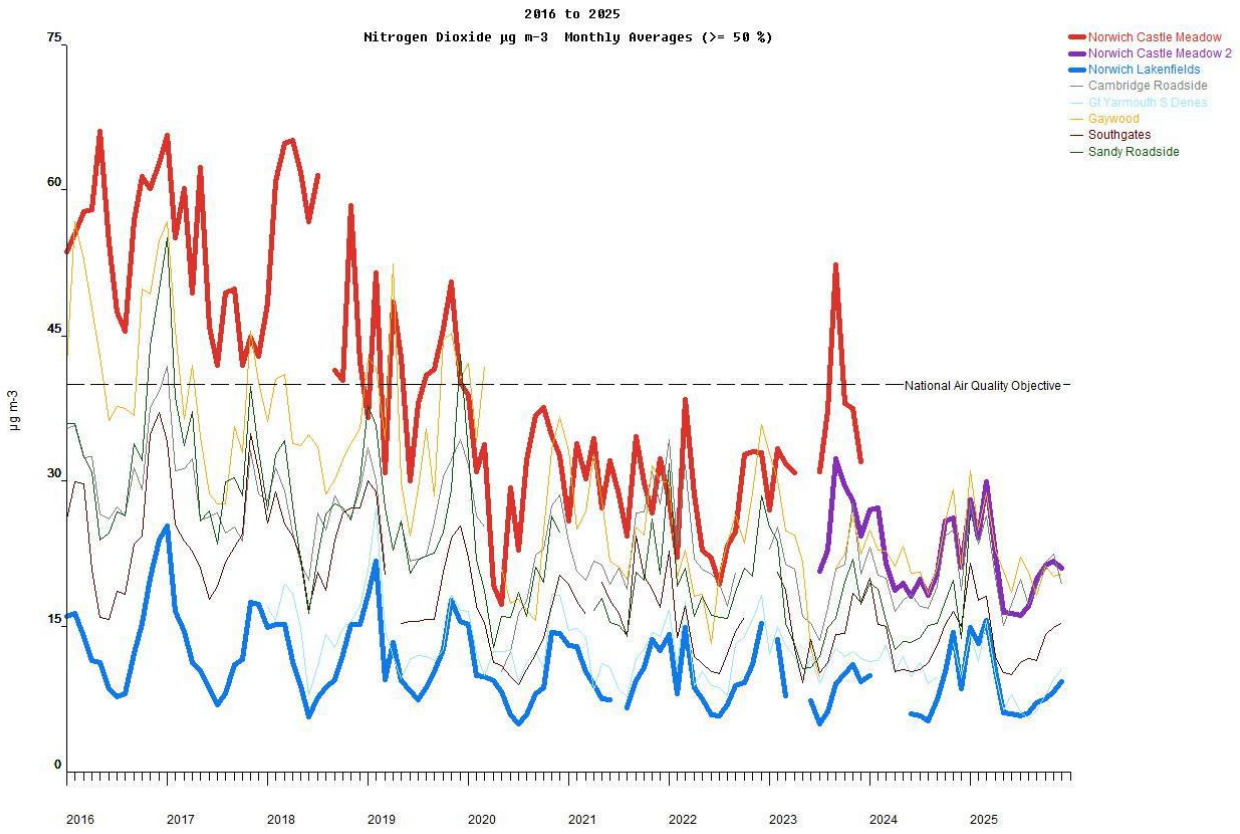
The new triplicate site has now produced a complete dataset for both 2024 and 2025, with recorded annual mean concentrations of 22.5 µg/m³ and 22.7 µg/m³ respectively.

These results indicate that nitrogen dioxide (NO_2) concentrations at this location are stable, with only a marginal increase between 2024 and 2025, and remain well below the national annual mean objective of 40 µg/m³.

No changes were made to the diffusion tube monitoring network in 2025, with a total of 46 diffusion tube locations maintained throughout the year.

NO_2 concentrations across the cityy have not returned to pre-lockdown levels, as illustrated by the plot of monthly mean concentrations below, although 2025 results appear to continue the longer-term downward trend. In addition to reduced travel during lockdown periods, longer-term changes in working patterns—including increased levels of home and

hybrid working—have continued to influence traffic flows and, consequently, air quality. As a result, current data may not fully reflect typical long-term conditions and should be regarded as indicative rather than definitive when assessed against the national annual mean objective for NO_2.



The requirement for a detailed assessment has not been identified for any pollutants, and the council will progress to the 2026 Annual Status Report (ASR).

There has been ongoing progress with the measures to improve Norwich's air quality that includes:

- Low and zero emission buses: Expansion of cleaner bus fleet, including additional zero emission buses funded through the Bus Service Improvement Plan (BSIP) and private investment by bus operators, and introduction of zero-emission buses on Park & Ride services. There has also been replacement of Euro 5 and lower buses with modern Euro 6 buses.

- Public transport improvements: New bus lanes and junction upgrades and traffic light priority for buses delivered in 2025 to improve reliability and reduce congestion, although some schemes remain on hold due to local objections.

Source: First Bus

- Highway and junction upgrades: Key schemes (e.g. Yarmouth Road/Pound Lane) completed, improving traffic flow and supporting walking, wheeling and cycling; active travel increased significantly.

- Micromobility growth: Continued expansion of the Beryl bike, e-bike and e-scooter scheme, with over 2.2 million rides and strong user uptake across a growing network of bays across the city.

Source: Beryl

- Transport hubs: Delivery of Bowthorpe interchange and ongoing development of further transport interchanges, including at the Norfolk & Norwich University Hospital.

- Active travel infrastructure: Ongoing investment in wayfinding and cycling infrastructure to encourage sustainable travel choices.

Full details of the improvements are listed in table 2.2.

Norwich City Council is working closely with Norfolk County Council Highways/Sustainable Transport and Public Health. We are also part of the County wide Air Quality Group established between all the local authorities, the Environment Agency, Natural England, The University of East Anglia and The Integrated Care Board.

We will continue to collaborate with key stakeholders in developing the updated AQAP, which was consulted on in 2026 and is due to be submitted to Defra in June 2026. This updated plan will set out new measures to support continued progress towards achieving compliance within the AQMA.

We shall not be reviewing our AQMA this year.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent years, 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[1] 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[2] 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[3] strategy sets out the UK Government's long-term approach to reducing exhaust emissions from road transport through a variety of measures, while ensuring these efforts are balanced with the needs of local communities. This is especially important given that cars remain the most widely used mode of personal travel, and that transport emissions are a major contributor to elevated nitrogen dioxide (NO_2) levels. In

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

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

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

fact, the majority of AQMAs have been designated due to NO_2 concentrations that exceed national objectives—levels that are heavily influenced by road traffic.

Our 2021 AQAP focuses on road infrastructure changes that are designed to divert traffic away from the congested city centre and re-allocate more road space for active forms of travel (i.e., walking/wheeling and cycling). The main focus is on removing congestion from the road network as factors such as vehicle emission standards are beyond the control of Norwich City Council. In addition, the plan promotes the use of public transport by prioritising bus routes, improving bus frequency on key routes and providing easy access to Park & Ride facilities. Cycle infrastructure is also a key focus for Norwich City Council by lengthening and linking up cycle routes as well as providing segregated and safer routes (i.e. at major junctions).

Norwich City Council's main priorities are to reduce emissions from transport and promote alternative modes of travel. To achieve this, Norwich City Council are working in conjunction with Norfolk County Council to examine the feasibility of implementing the following measures:

- Expansion of the Low Emission Zone (LEZ).
- Restricting the buses and taxis that are allowed to travel through the LEZ to a much tougher Euro emission standard (following discussions with transport operators).
- Extending engine switch off powers to accommodate the extended LEZ.
- Promote low and zero emission public transport through the use of external grant schemes and private investment through the BSIP.
- Reviewing traffic light junctions to reduce congestion and improve traffic flow, as well as supporting the provision of traffic light priority for buses at more junctions.
- Make road junctions safer and easier for those walking, wheeling and cycling to navigate.
- Expand the cycle networks and create safe, connected corridors for those walking, wheeling and cycling in accordance with the Norwich Local Cycling and Walking Infrastructure Plan (LCWIP).
- Review the support provided to schools in encouraging more active and sustainable travel to and from school, delivering initiatives such as School Streets, and encouraging schools to participate in air quality initiatives such as Clean Air Day.
- Engage the public and businesses through behaviour change programmes, including the use of social media to increase awareness of taking personal

responsibility for reducing air pollution, such as engine switch off, walking/cycling, car sharing and using domestic solid fuelled open fire or wood burners responsibly.

Norwich City Council considers that the implementation of these measures, alongside further actions to be included in the 2026 AQAP, will contribute to the continued reduction of NO_2 concentrations below the annual mean Air Quality Standard (AQS) objective, enabling the eventual revocation of the current AQMA designation.

Over the past decade, significant infrastructure improvements have been made across Norwich city centre. These include:

- The creation of pedestrian-only areas
- The removal of traffic lights and kerbside barriers at several junctions
- Restrictions on private motor vehicles on certain streets, allowing access only to buses, coaches, taxis, delivery vehicles, bicycles, and scooters

These changes aim to enhance the vitality of the city centre by reducing conflicts between vehicles, and those walking, wheeling and cycling.

Norfolk County Council and First Bus secured £14.7 million from the Department for Transport's Zero Emission Bus Regional Area (ZEBRA) fund. This has enabled:

- The introduction of 70 zero-emission battery electric buses starting in October 2023
- Full deployment across Norwich and surrounding areas by May 2024, replacing older diesel buses

This funding has enabled First Bus to electrify its most frequent cross-city routes, which account for around two-thirds of services operating through Castle Meadow. This significant investment not only enhances the passenger experience but also contributes to improved air quality across the city, particularly within the AQMA.

The Norwich Park & Ride service has faced challenges in regaining patronage following COVID-19; however, the Postwick site reopened on a trial basis in September 2023 and remains operational, and a new Park & Ride service contract was tendered in 2024 with operations commencing in Summer 2025. Due to continued lower usage levels, planned extensions to both the Postwick and Thickthorn sites are not currently being progressed.

A new Bus Passenger Charter was launched under the Norfolk BSIP in October 2021, committing to:

- Rebuilding passenger confidence

- Offering green, sustainable transport
- Providing simple and affordable fares
- Making buses the primary mode of transport

The goal is for 90% of buses in Norfolk to be Euro 5, Euro 6, or zero-emission by 2027. A new website, Travel Norfolk, offers live bus and rail times, journey planning, and bus stop locations, as well as the location and availability of electric vehicle (EV) charge points.

Norfolk County Council is looking at options to provide EV charging facilities at Park & Ride sites.

In terms of alternatives to private vehicle use, the cycle network across the Greater Norwich area has been significantly expanded in recent years. It now comprises five radial and two orbital pedal way routes, supported by a wider network of connecting cycle infrastructure.

In addition, the Beryl micromobility scheme, launched in 2020, continues to grow and includes approximately 60 standard bicycles, 200 electric bicycles and 585 electric scooters, the latter operating as part of the Government's e-scooter trial. Since its launch, the scheme has recorded over 2.4 million rides, more than 4.1 million miles travelled and in excess of 100,000 registered users. There are now around 200 bays located across Greater Norwich.

The continued expansion and uptake of micromobility and cycling infrastructure supports a shift towards sustainable transport, with further increases in usage expected as the network matures.

Norwich City Council continues to promote the uptake and use of electric vehicles (EVs). As of 1st April 2026, official electric vehicle public charging infrastructure statistics show that there are 282 publicly accessible EV charging ports within the Norwich city area across 184 charging devices[4] (i.e. more than one charging port available on most devices). It should be noted that this does not include privately owned chargers at people's homes and workplaces.

Mapping of publicly accessible electric vehicle charging devices can be found using websites including Zapmap (https://www.zap-map.com/live/) and Carwow https://www.carwow.co.uk/electric-cars/charging-points.

[4] Electric vehicle charging infrastructure statistics: data tables (EVCI) - GOV.UK

Norfolk County Council has been delivering an on-street charge point project[5], in Norwich, making EV ownership more accessible to households who don't have off-street parking where a private charger could be installed. To date this has included installation of 46 charging devices across 26 streets in Norwich.

Norwich City Council presently owns two EV charging points at UEA Enterprise Centre car park. In partnership with Norfolk County Council, additional public charging points are being planned at the council's Chantry/Theatre Street and Queens Road surface car parks, delivered under Local Electric Vehicle Infrastructure (LEVI) funding. Details of these chargers will be added to Zapmap as they become operational.

We are in discussions with Public Health on the Public Health Outcomes Framework (PHOF) on actions in relation to $PM_{2.5}$. We have had preliminary talks and shall be working with Public Health to identify sources of $PM_{2.5}$ and will add this in to our next action plan.

We hope to work again with the Environmental Science Department at the University of East Anglia (UEA), who we have previously collaborated with for various research projects.

Norwich City Council are currently reviewing their taxi policy using the Taxi and private hire vehicle licensing best practice guidance for licensing authorities in England[6]. This considers the local transport plans and strategy. Vehicle emission standards and the location and capacity of electric vehicle charging infrastructure shall be considered in the review to support taxis and private hire vehicles to contribute to air quality objectives.

Conclusions and Priorities

Monitoring data for 2025 indicates that no exceedances of the annual mean NO_2 objective were recorded within the AQMA, representing a significant milestone and continued improvement in air quality. The highest concentration within the AQMA was 33.7 µg/m³ (DT11), below the 36 µg/m³ threshold, marking the first year of sustained compliance in line with LAQM.TG22 guidance. However, a minimum of three consecutive years below this threshold is required before the AQMA can be considered for revocation.

[5] Norwich City on-street chargepoint project - Norfolk County Council

[6] Taxi and private hire vehicle licensing best practice guidance for licensing authorities in England - GOV.UK

Outside the AQMA, a slight exceedance was recorded at DT65 (40.1 µg/m³ raw); however, following distance correction this reduced to 35.7 µg/m³, below the objective and within the 10% threshold. This location will continue to be closely monitored to determine whether concentrations are persistent and whether any future AQMA amendment may be required.

Overall, NO_2 concentrations remain broadly stable, with minor year-to-year fluctuations but a clear long-term downward trend across the monitoring network since 2021. While concentrations have not fully returned to pre-pandemic conditions due to lasting changes in traffic patterns and travel behaviour, the general trajectory indicates ongoing improvement.

The key findings from Castle Meadow Air Quality Monitoring station were:

Nitrogen Dioxide (NO_2)

- No exceedances of the NO_2 Air Quality objectives
- Annual mean: 21.2 µg/m³ (Castle Meadow 2) — below the 40 µg/m³ objective
- Data capture: 98.6% (above 75% requirement)
- No annualisation required (sufficient data capture)
- 1-hour objective not exceeded (≤18 permitted exceedances per year)
- 99.8th percentile not required (data capture >85%)

Particulate Matter (PM_{10})

- No exceedances of PM_{10} Air Quality objectives
- Annual mean: 16.6 µg/m³ — below the 40 µg/m³ objective
- Data capture: 100%
- No annualisation required
- 24-hour objective exceeded on 3 days (within 35-day allowance)
- 90.4th percentile not required (data capture >85%)
- No short-term peaks recorded during Bonfire Night or New Year

Fine Particles ($PM_{2.5}$)

- No exceedances of $PM_{2.5}$ Air Quality Objectives
- Annual mean: 9.4 µg/m³ — below the 20 µg/m³ objective
- Data capture: 100%
- No annualisation required
- Air quality rated Moderate on 1 day
- No short-term peaks recorded during Bonfire Night or New Year

Overall Summary

- All monitored pollutants are within national objectives
- Data quality is high and fully compliant with guidance requirements
- No evidence of significant short-term pollution events
- Air quality at Castle Meadow 2 is good and stable

Significant progress has been made through transport-focused interventions, including the introduction of zero-emission buses, highway and junction improvements, expansion of cycling infrastructure, growth in micromobility, and increased provision of electric vehicle charging infrastructure. These measures have contributed to reducing emissions, particularly within the AQMA.

There are no new AQMAs required at this time, and the current AQMA boundary remains appropriate, subject to continued monitoring at locations such as DT65.

A revised Air Quality Action Plan (AQAP) has been consulted on in 2026 and will be submitted to Defra in June 2026. This updated plan will introduce new measures and priorities to support the continued reduction of emissions and maintenance of compliance.

Priorities for the coming year include:

- Continued reduction of transport emissions, particularly through low and zero-emission vehicles
- Delivery of further public transport and junction improvements to reduce congestion
- Expansion of active travel and micromobility infrastructure
- Ongoing monitoring of emerging hotspots, particularly outside the AQMA
- Development and implementation of the 2026 AQAP, including strengthened measures
- Increased focus on $PM_{2.5}$ and public health impacts, in collaboration with partners

Key challenges include:

- Public, stakeholder and political opposition to some traffic management measures
- Funding constraints and increased cost of scheme delivery due to energy, labour and transport cost increases
- Difficulty in influencing wider behavioural change and travel patterns
- Uncertainty around achieving sustained compliance required for AQMA revocation

How to get Involved

Norwich City Council are aware that air quality is a subject that has become an increasing area of interest and concern for more and more people year on year. As a result, information about air quality in general and actions that can be taken to improve air quality, can be found at the following:

- UK-AIR (the government's air information resource).
- Norwich City Council (air quality reporting website).
- Enterprise Car Club ('connecting Norfolk').
- Norfolk Liftshare (car journey sharing).
- Modeshift Stars (national schools award for schools promoting sustainable travel).
- Cycle City Ambition Programme (report for Department for Transport).
- Transforming Cities Overview (funding application to Department for Transport)
- https://www.beryl.cc/ (Beryl Bikes)

(Please note Norwich City Council does not have control over third party websites and, hence, may not necessarily endorse its content.)

Norwich City Council promote initiatives such as "Clean Air Day" and "Clean Air Night", which allow the public to raise any air quality issues or concerns and learn more about how to help themselves with improving the air which they breathe in (both indoors and outdoors). This is done with aid from the Norfolk Countywide Air Quality Group, who have promoted issues such as:

- Encouraging children to walk, wheel or cycle to school and find routes away from busy roads.
- Encouraging citizens to use an alternative mode of transport such as car share, public transport, cycle or walk for short journeys.
- Raising awareness of the safest way to use a wood-burner/open fire.
- Encouraging those walking to use quieter streets instead of the main road and encouraging drivers to switch off engines when idling.
- Norfolk County Council are working with schools to better understand current travel behaviour and support the delivery of school travel plans.

- Promoting ‘Clean Air Day’ with the main focus on the younger generation. Norwich City Council hope that initiatives such as ‘Clean Air Day’ would be a catalyst for behavioural changes that will continue beyond the day itself.
- Work in partnership with Beryl to exceed 100,000 users and more than 2 million cycle and e-scooter journeys in Norwich. https://www.beryl.cc/
- Working with bus operators to deliver additional zero emission buses in Norwich

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1 Local Air Quality Management

This report provides an overview of air quality in Norwich City Council during 2025. 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 Norwich 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 Norwich City Council can be found in Table 2.1. The table presents a description of the single AQMA that is currently designated within Norwich City Council. **Appendix D: Map(s) of Monitoring Locations and AQMAs** provides maps of the AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO_2 annual mean

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Highest Concentration: Declaration	Highest Concentration: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Central AQMA	November 2012	NO_2 Annual Mean	An area encompassing Norwich City Centre, broadly following the inner link road	NO	52 µg/ m^3 (at 52 St Augustine's Street)	33.7 µg/ m^3	1	AQAP June 2021	AQAP June 2021

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

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

2.2 Progress and Impact of Measures to address Air Quality in Norwich City Council

Defra's appraisal of last year's ASR concluded:

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports:

1. The Council have included detailed information regarding completed measures and priorities for the upcoming years, highlighting their pro-active approach to addressing air quality.
2. The Council works closely with partners. This multi-stakeholder collaboration enhances the credibility, reach and effectiveness of air quality interventions and aligns environmental planning with public health priorities.
3. The council maintains a robust and adaptive air quality monitoring system, including both automatic and diffusion tube stations. The Castle Meadow 2 monitoring station is fully operational, replacing the previous station, and the network continues to be reviewed and adjusted annually in response to changing conditions and development proposals.

Areas for Continued Improvement

1. It should be noted that the Diffusion Tube Bias Adjustment Factors Spreadsheet has been updated, with versions released in April 2025 and June 2025. While it is acknowledged NCC likely completed data processing prior to the release of subsequent versions, NCC are reminded to always use the most up-to-date information and tools available. Where possible, the use of the latest version should be applied in future reporting.

   This is noted and we shall endeavour to use the most up to date version.

2. The report highlights that DT65, a newly established monitoring site outside the current AQMA, initially exceeded the annual mean objective before distance correction. This suggests potential pollution pressure outside the AQMA. The Council should continue to closely monitor air quality trends in this area.

   We are continuing to monitor this area for air quality trends.

Norwich City Council has taken forward a number of direct measures during the current reporting year of 2025 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. There are 24 measures included within Table 2.2, with the type of measure and the progress Norwich City Council and partners have made during the reporting year of 2025 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in the 2021 Action Plan.

Key completed measures are:

- **Low NOx Buses** - A further 6 buses were added for Norwich Park & Ride and 14 more are being introduced in Norwich through Bus Service Improvement Plan (BSIP) funding.
- **Bus rapid transit** - Additional bus lanes have been provided on Dereham Road during 2025. Priority for bus movements was implemented at the Angel Road / Waterloo Road junction in 2025. Improvements to bus movements at the Yarmouth Road / Pound Lane junction were delivered Summer 2025. Reallocation of road space to public transport continues to divide opinion and some proposals remain on hold due to specific objections at some sites.
- **Ring Road Junction improvements** - Works completed at Yarmouth Road / Pound Lane junction in Summer 2025 to reduce delays and congestion for all highway users. Works at these key ring road junctions have provided an improved environment for walking, wheeling and cycling and have reduced congestion for all modes, including public transport. Levels of active travel using Beryl bikes and e-scooters have increased by 66% through the Heartsease junction improvement.
- **Installation of Beryl Bikes and E-Scooters across the Greater Norwich Area -** There has been over 2.4m total rides, 4.1million miles and over 100,000 users since the launch. There are nearly 200 bays across Greater Norwich.
- **Assess opportunity for a zero-emission bus fleet to operate the Norwich Park & Ride service when the contract is renewed in 2025 -** 6 buses on the new Park & Ride contract are zero emission. The other 3 are Euro 6. This is a significant improvement on the previous contract where all vehicles were Euro 5.
- **Transport hubs at key transport interchanges -** Bowthorpe interchange works were completed in 2025. Discussions are ongoing regarding an improved transport interchange at the Norfolk & Norwich University Hospital.

- **Wayfinding. Investment in new and transformative infrastructure to encourage more sustainable modes of transport for commuting and leisure journeys -** Roll out of improved wayfinding for cycle routes remains ongoing.

Norwich City Council's priorities for the coming year are:

- **Low NOx Buses** - Aim is to continue to work in partnership with bus operators on funding opportunities relating to low and zero NOx emission vehicles.
- **Ring Road Junction improvements -** Feasibility work is underway for the Bracondale / King Street junction.
- **Installation of Beryl Bikes and E-Scooters across the Greater Norwich Area -** Finding suitable space for bays to achieve optimal bay network density to drive up ridership is challenging but new bays are being added every month.
- **School Travel Plans -** A review is being undertaken to identify whether a comprehensive programme of support can be offered to schools to support more pupils travelling to school actively. Whilst it would be preferential for all vehicles on school contracts to be zero/low emission, a balance needs to be struck between this and affordability of the service. Options are being explored for all schools in Norfolk to provide information on mode travelled to school throughout the academic year to provide baseline data to measure progress against.
- **Education & information campaigns to encourage more responsible driving and the use of alternative modes:** Ongoing through delivery of engagement programmes at key employers and local communities in partnership with the Walk, Wheel Cycle Trust (formerly Sustrans).
- **Transport hubs at key transport interchanges** - Feasibility work underway for an improvement to the bus facilities on Castle Meadow and a new interchange at Mile Cross is being developed. A key focus of the Bus Service Improvement Plan is to improve transport interchanges across Norwich and Norfolk

Norwich City Council worked to implement these measures in partnership with the following stakeholders during 2025:

- Norfolk County Council Sustainable Transport
- Public Health Norfolk
- Norfolk Countywide Air Quality Group
- Environmental Strategy Team – Norwich City Council

The principal challenges and barriers to implementation that Norwich City Council anticipates facing are:

- **West to East traffic restriction in Norwich City Centre** - This scheme has been put on hold due to local concerns around negative impacts on general traffic and taxis.
- **Rationalising and simplifying of traffic on Prince of Wales Road** - This scheme has been put on hold due to local concerns around negative impacts on general traffic.
- **Extension to Thickthorn Park & Ride -** This scheme is not being taken forwards at the current time as there is sufficient capacity at the current site for growth of the service.
- **Education & information campaigns to encourage more responsible driving and the use of alternative modes** - Engagement with large employers is challenging in terms of accessing sites and engagement with staff.

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

- **Extension to Postwick Park & Ride site** – Although the new Park & Ride contract serves this site, patronage is significantly below pre covid levels, so the extension to this site is not currently being progressed.
- **Introduction of School Streets** - A School Streets trial was undertaken across Greater Norwich in 2022 involving 6 schools, but there are currently no schools in Norwich with School Street designation. In the meantime, support for schools to encourage more active travel to and from school is being reviewed.
- **Construction of final link of Northern Distributor Road (NDR) over River Wensum joining up with A47** - The planning application for the scheme has been withdrawn and discussions are underway with the Department for Transport on the way forward for the project. The County Council intends to carry out a public consultation on a shortlist of options and report the results of this during 2026.
- **Removal of private vehicle traffic from Tombland** – This is a longer-term goal. It will be considered as part of the development of the Transport for Norwich Implementation Plan.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Norwich City Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Central Air Quality Management Area.

Norwich City Council have produced a draft Air Quality Action Plan that shall be submitted to Defra by the end of June 2026 which has reviewed and amended the measures table.

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	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
Priority Air Quality Actions														
1.	Low NOx Buses	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	N/A	Ongoing	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Funded	£1 million - £10 million	Implementation	Every electric bus introduced will reduce emissions of NO_2	Reduction in NO_2 levels in the city and surrounds	24 buses retrofitted with exhaust gas treatment equipment by June 2018. 70 buses introduced through Zero Emission Bus Regional Area (ZEBRA) programme from March 2024, replacing diesel buses. A further 6 buses were added for Norwich Park & Ride and 14 more are being introduced in Norwich through BSIP funding.	Aim is to continue to work in partnership with bus operators on funding opportunities relating to low and zero NOx emission vehicles.
2.	Ring Road Junction improvements	Traffic Management	UTC, Congestion management, traffic reduction	2020	Ongoing	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Funded	£1 million - £10 million	Implementation	Specific value not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduced city centre congestion as well as wider network. Increase in numbers of people walking, wheeling and cycling	Grapes Hill roundabout was completed in November 2021. Foundry Bridge completed in July 2022 and initial evidence shows reduced congestion/smoother traffic flows. Work to the Heartsease Fiveways junction were completed in May 2024. Works completed at Yarmouth Road / Pound Lane junction in Summer 2025 to reduce delays and congestion for all highway users. Feasibility work is underway for the Bracondale / King Street junction.	Works at these key ring road junctions have provided an improved environment for walking, wheeling and cycling and have reduced congestion for all modes, including public transport. Levels of active travel using Beryl bikes and e-scooters have increased by 66% through the Heartsease junction.
3	Installation of Beryl Bikes and E-Scooters across the Greater Norwich Area	Promoting Travel Alternatives	Other	2020	2029	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Funded	£100k - £500k	Implementation	Studies are showing that 30% of all journeys taken by bike or scooter would otherwise have been taken by car	There has been over 2.2m total rides, 3.8million miles and over 100,000 users since the launch. There are nearly 200 bays across Greater Norwich.	The Beryl scheme was expanded in 2023/23 to include Wymondham and Drayton. Addition of more bays continues. There are now nearly 200 e-bikes and nearly 500 e-scooters in the scheme.	Finding suitable space for bays to achieve optimal bay network density to drive up ridership is challenging but new bays are being added every month.
4.	Castle Meadow Low Emission Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2006/09	Ongoing	Norfolk County Council	Norwich City Council	Funded	<£10k	Planning	Approx. 10-15 $\mu g/m^3$ NO_2	Reduction in NO_2 levels in Castle Meadow	Erratic decline in NO_2 but probably would have been worse without LEZ	Investment in zero emission vehicles, and Euro 6 buses, by bus operators is contributing to an improvement in air quality in Castle Meadow. A review is needed into the status of the LEZ and whether this needs amending as a result.
5	Review of traffic light times & synchronisation to optimise traffic flow for all new road layout schemes	Traffic Management	UTC, Congestion management, traffic reduction	2016	Ongoing	Norfolk County Council	Norfolk County Council	Funded	£10 - £50k	Completed	Specific value not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduced city centre congestion as well as wider network.	All new installations and replacement of traffic signals involves a review of junction performance to maximise benefits. Established junctions are also assessed if concerns are raised by stakeholders.	Maximising benefits for all users is not always possible. Where junctions are on a busy bus corridor, traffic light priority for buses is being rolled out, which reduces delay to bus users but can lead to minor delays to other road users on other junction arms.
6	Engine Switch Off Enforcement	Public Information	Other	Complete	Complete August 2018	Norwich City Council	Norwich City Council	Funded	<£10k	Ongoing on Castle Meadow & St Stephens. Reach extended if LEZ extended as proposed.	Complimentary to other measures; Castle Meadow LEZ.	Reduction in NO_2 levels in Castle Meadow	Engine switch off enforcement in place with issue of Fixed penalty Notices for drivers who fail to comply when requested. To date no non- compliance.	Use of powers to enforce engine switch-off via issue of fixed penalty notices. Specifically on Castle Meadow & St Stephens where bus & taxi only traffic. Any extension of the LEZ would mean extension of engine switch off enforcement area. No change to this. Though Norwich City Council are planning on writing to coach companies to remind them of the restrictions.
7	Signage informing engine switch- off enforcement. Electronic displays at traffic lights giving waiting times.	Public Information	Other	2017	Ongoing October 2018 for switch off on Castle Meadow	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Not Funded	£100k - £500k	Planning	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduction of NO_2 levels in AQMA	Ongoing - A review of technology available to display waiting times at traffic lights has been undertaken, which highlighted that this isn't currently an option to deliver in terms of available standards and legislation.	New signage associated with enforcement of engine switch off educates road users and reinforces AQMA. Review has highlighted that this is not an option at present – shall keep under review
8	Assess opportunity for a zero-emission bus fleet to operate the Norwich Park & Ride service when the contract is renewed in 2025	Promoting Travel Alternatives	Other	Complete	March 2025	Norfolk County Council	Norfolk County Council	Funded	£1 million - £10 million	Implementation	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduction in NO_2 levels in city centre and on busy feeder roads	6 buses on the new Park & Ride contract are zero emission. The other 3 are Euro 6. This is a significant improvement on the previous contract where all vehicles were Euro 5.	We will continue to explore options for all buses on this contract to be zero emission.
9	School Travel Plan	Promoting Travel Alternatives	School Travel Plans	Ongoing	Ongoing	Norfolk County Council	Norfolk County Council	Funded	£10 - £50k	Implementation	Specific value not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduction in NO_2 levels in city centre and surrounds.	A review is being undertaken to identify whether a comprehensive programme of support can be offered to schools to support more pupils travelling to school actively.	County Council already promotes Modeshift Stars software with schools so they can generate and manage their own travel plans. Whilst it would be preferential for all vehicles on school contracts to be zero/low emission, a balance needs to be struck between this and affordability of the service. Options being explored for all schools in Norfolk to provide information on

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														mode travelled to school throughout the academic year to provide baseline data to measure progress against
10	West to East traffic restriction in Norwich City Centre	Traffic Management	UTC, Congestion management, traffic reduction	2020	On hold	Norfolk County Council	Norfolk County Council (TFC Funding)	Funded	£1 million - £10 million	Planning	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduction in NO_2 levels in the city and surrounds	The scheme is currently on hold	This scheme has been put on hold due to local concerns around negative impacts on general traffic and taxis.
11	Revised layout in St Stephens Street/Red Lion Street	Traffic Management	UTC, Congestion management, traffic reduction	2020	2023	Norfolk County Council	Norfolk County Council (TFC Funding)	Funded	£1 million - £10 million	Completed	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre	Reduction in NO_2 levels in the city and surrounds	The scheme is now completed	Provides substantially improved conditions for pedestrians and reduces congestion with buses
12	Transport hubs at key transport interchanges	Transport Planning & Infrastructure	Public transport improvements - interchange stations and services	2020	2027	Norfolk County Council	Norfolk County Council (TFC Funding)	Funded	£1 million - £10 million	Implementation	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre	Reduction in NO_2 levels in the city and surrounds	Norwich Rail station works were completed July 2022. Norwich Bus Station works were completed 2024. Bowthorpe interchange works were completed 2025. Discussions ongoing regarding an improved transport interchange at the Norfolk & Norwich University Hospital. Feasibility work is underway for an improvement to the bus facilities on Castle Meadow and a new interchange at Mile Cross is being developed.	A key focus of the Bus Service Improvement Plan is to improve transport interchanges across Norwich and Norfolk.
13	Bus rapid transit	Transport Planning and Infrastructure	Bus route improvements	Ongoing	Ongoing	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Funded	>£10 million	Implementation	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduced city centre congestion as well as wider network.	Cromer Road and Aylsham Road bus lanes are complete. Additional bus lanes have been provided on Dereham Road during 2025. Priority for bus movements was implemented at the Angel Road / Waterloo Road junction in 2025. Improvements to bus movements at the Yarmouth Road / Pound Lane junction were delivered Summer 2025.	Reallocation of road space to public transport divide's opinion and some proposals remain on hold due to specific objections at some sites.
14	Rationalising and simplifying traffic on Prince of Wales Road	Traffic Management	UTC, Congestion management, traffic reduction	Long term		Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Funded	>£10 million	Planning	Specific value is not known but will contribute to overall reduction in NO_2 levels in city	Reduced city centre congestion	Proposals to restrict eastbound traffic movement on St Andrews Street have been put on hold due to political concerns	This scheme has been put on hold due to local concerns around negative impacts on general. traffic and taxis.
15	Extension to Thickthorn Park & Ride	Promoting Travel Alternatives	Other	2020	Ongoing	Norfolk County Council	Norfolk County Council (TFC Funding)	Funded	£1 million - £10 million	Planning	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre	Reduced city centre congestion as well as wider network.	This scheme is not being taken forward at the current time and funding has been reallocated to other projects in Norwich.	Opportunities to install EV charge points across Park & Ride sites are being examined.
16	Extension to Postwick Park & Ride site	Promoting Travel Alternatives	Other	TBC	TBC	Norfolk County Council	Norfolk County Council	Not Funded	£1 million - £10 million	Planning	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre	Reduced city centre congestion as well as wider network.	Services from the Postwick Park & Ride site are operating under the new Park & Ride contract from March 2025. Extension to this site is not currently being progressed.	Opportunities to install EV charge points across Park & Ride sites are being examined.
17	Introduction of School Streets	Transport Planning & Infrastructure	Other	2021	Ongoing	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Funded	£50k - £100k	Implementation	Specific value is not known but will encourage corridors to be utilised by students/pupils	Reduction in traffic levels, improved air quality and greater numbers of pupils walking.	One School Street is currently operational in Wymondham. We are using this scheme to fully understand the operational considerations and impacts of a School Street before looking to implement other School Streets across Norfolk.	Support for schools to encourage more active travel to and from school is being reviewed.
18	Wayfinding. Investment in new and transformative infrastructure to encourage more sustainable modes of transport for commuting and leisure journeys	Transport Planning & Infrastructure	Other	2020	Ongoing	Norfolk County Council	Norfolk County Council (TFC Funding)	Funded	£100k - £500k	Implementation	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduction in NO_2 levels in the city and surrounds	Roll out of pedestrian wayfinding across greater Norwich is complete.	Roll out of improved wayfinding for cycle routes remains ongoing.
19	Construction of final link of Northern Distributor Road (NDR) over River Wensum joining up with A47 West	Transport Planning & Infrastructure	Other	2023	Ongoing	Norfolk County Council	Norfolk County Council	Partially Funded	>£10 million	Planning	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduced city centre congestion as well as wider network.	The planning application for the scheme has been withdrawn, and discussions are underway with the Department for Transport on the way forward for the project.	Norfolk County Council previously submitted a planning application for the 3.9-mile dual carriageway road to be built between the A47 and Broadland Northway. However, this was withdrawn in January 2025 after the County Council were unable to resolve an objection from Natural England. Norfolk County Council is committed to working with the Department for Transport to try to improve travel and reduce traffic congestion on local roads and in communities to the west of Norwich. The County Council intends to carry out a public consultation on a shortlist of options and report the results of this during 2026.
20	Removal of private vehicle traffic from Tombland	Traffic Management	Strategic highway improvements, Re- prioritising Road space away from cars, including Access management Selective vehicle priority, bus priority, high vehicle occupancy lane	Long Term	TBC	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Not Funded	£1 million - £10 million	Planning	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduced city centre congestion	Not Started	Longer term goal. Will be considered as part of the development of the Transport for Norwich Implementation Plan.

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21	Education & information campaigns to encourage more responsible driving and the use of alternative modes	Promoting Travel Alternatives	Other	Ongoing	Ongoing	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council	Funded	£1 million - £10 million	Implementation	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduction of NO_2 levels in the city centre and surrounds	Ongoing through delivery of engagement programmes at key employers and local communities in partnership with the Walk, Wheel Cycle Trust (formerly Sustrans).	Engagement with large employers is challenging in terms of accessing sites and engagement with staff.
22	Installation of new Air Quality Monitoring Station	Other	Other	2021	2023	Norfolk County Council/Norwich City Council	Norfolk County Council	Funded	£10 - £50k	Completed	Replaced ageing AQS with more up to date technology. Implementation of measures more reliably quantified	Accurate Monitoring of Norwich Air Quality	Completed	The old station was switched off in January 2024 and removed.
23	Thorpe Road bus/cycle contraflow	Traffic Management	Strategic highway improvements, Re- prioritising Road space away from cars, including Access management Selective vehicle priority, bus priority, high vehicle occupancy lane	2020	2022	Norfolk County Council	Norfolk County Council (TFC Funding)	Funded	£1 million - £10 million	Completed	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre	Reduction of NO_2 levels in the city centre and surrounds	Completed	Provides a substantially improved and more direct route for buses and cyclists travelling into the city centre along a key radial route.
24	CCAG Programmes	Promoting Travel Alternatives	Promotion of Cycling	2014	2020	Norfolk County Council/Norwich City Council	Norfolk County Council/Norwich City Council/DfT	Funded	£1 million - £10 million	Completed	Specific value is not known but will contribute to overall reduction in NO_2 levels in city centre and surrounds.	Reduction in vehicle use in the city centre. Increased number of people cycling.	Completed	Cycle routes have been extended and more joined up. All 2 orbital and 5 radial pedal ways now complete

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[7], 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.

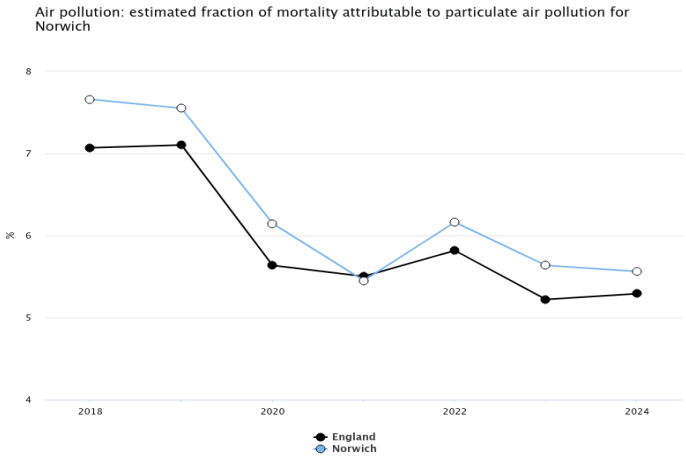
Long term exposure to anthropogenic particulate air pollution is estimated to have an effect on mortality risks equivalent to a number of attributable deaths. The Public Health Outcome Framework (PHOF) indicator D01[8] gives an estimate for this value, down to local authority area. In fact, air pollution is likely to contribute a small amount to the deaths of a larger number of exposed individuals rather than being solely responsible for the number of deaths equivalent to the calculated figure of attributable deaths. However, these attributable deaths give a measure of the importance of air pollution for a local authority. This relative risk forms the cause for action through all delivery partners to tackle air pollution in the area.

The fraction of mortality attributable to particulate air pollution for Norwich in 2024 was 5.6% which is the same as 2023 and has declined since 2022's figure of 6.2% which is pleasing to see. Though this is still slightly higher than the average for Norfolk and England.

The table and graph below are taken from Fingertips a website that provides public health data for the period 2018 to 2024. Note that this data has not been updated to reflect 2025 results.

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

[8] https://fingertips.phe.org.uk/search/particulate#page/4/gid/1/pat/502/par/E10000020/ati/501/are/E07000148/iid/93861/age/230/sex/4/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1



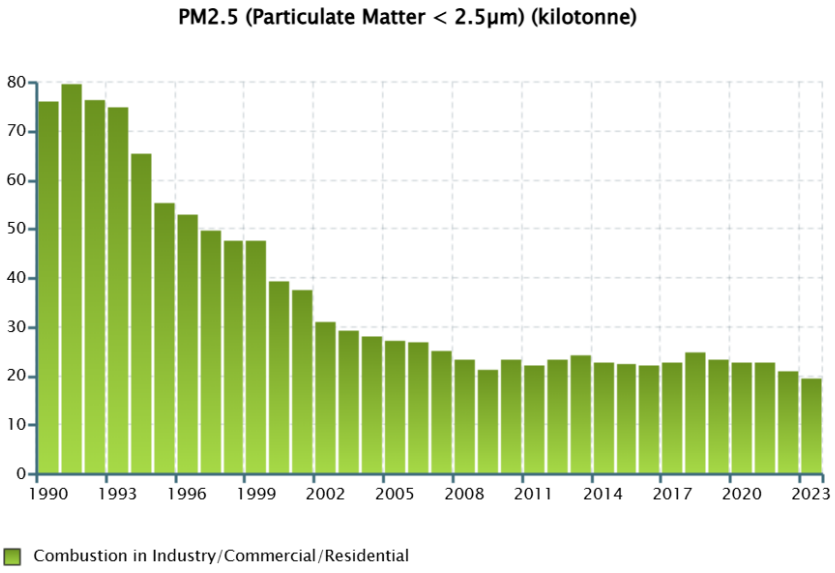
Period		Norwich Count	Value	95% Lower CI	95% Upper CI	Norfolk	England
2018	○	-	7.7%	-	-	7.2%	7.1%
2019	○	-	7.6%	-	-	7.2%	7.1%
2020	○	-	6.1%	-	-	5.7%	5.6%
2021	○	-	5.5%	-	-	4.9%	5.5%
2022	○	-	6.2%	-	-	5.4%	5.8%
2023	○	-	5.6%	-	-	5.3%	5.2%
2024	○	-	5.6%	-	-	5.2%	5.3%

Source: Department for Environment, Food and Rural Affairs

Primary $PM_{2.5}$ sources are from human activities like burning fuels, vehicles braking and various industrial processes as well as from natural sources and sea spray and dust.

UK emissions of $PM_{2.5}$ have declined by 75% since 1990 due mainly to a reduction in coal use, and the banning of crop residue burning in 1993. Emissions from coal-fired power stations have fallen by 100% since 1990. Residential sector emissions fell between 1990 (40kt) to 2005 (13kt), reflecting declining coal use. As other sources of emissions have declined, those from domestic combustion have become an increasingly important share of emissions, increasing from 15% in 1990 to 17% in 2023. Industrial use of biomass fuels is increasing and has, as a result, become a more significant contributor to UK emissions – 6% of UK emissions of $PM_{2.5}$ in 2023.[9]

[9] https://naei.energysecurity.gov.uk/air-pollutants/PM2.5



Domestic combustion contributed ~20% of total UK $PM_{2.5}$ emissions in 2024[10]

There are also often widespread PM episodes in the spring, which is believed to be from the fertilisers spread on the fields across the near continent. The UK gets a blast of PM (nitrate and sulphate particles) when the wind is blowing off the continent which is beyond Local Authorities control. These episodes can sometimes last for a few days and can affect the daily mean for a few days.

There are also occasional PM peaks on bonfire night and New Year's Eve, local episodes, but these are too short to exceed the daily limit.

Norwich City Council currently only monitors for $PM_{2.5}$ at the Castle Meadow 2 (CM3) Air Quality Station and it also uses results from the Lakenfields (CM2) AURN station. We do not currently have any particulate monitoring in other areas of the city, though this is something that is being reviewed.

Table A.8 and Figure A.5 show the $PM_{2.5}$ monitoring results for the automatic stations Lakenfields (CM2) and Castle Meadow (CM3). The $PM_{2.5}$ figures for 2025 have increased since 2024 at both CM2 and CM3. $PM_{2.5}$ annual mean concentrations increased during 2025 across all UK regions, reversing the long-term downward trend observed since around 2010. Data from the national Automatic Urban and Rural Network (AURN),

[10] https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25

including annual mean concentrations for the period 2010–2025 and daily mean concentrations for 2024–2025, show that this increase was driven by an unusually high number of pollution episodes during 2025.

Typically, the UK experiences one or two such episodes per year; however, during 2025 there were multiple extended periods of elevated $PM_{2.5}$ concentrations. This pattern was consistently observed not only within the national monitoring network but was also confirmed by independent local authority monitoring networks, comprising nearly 200 monitoring sites. Together, these datasets indicate that the increase in $PM_{2.5}$ annual means in 2025 reflects widespread regional influences rather than isolated local effects.

Norwich City Council is taking the following measures to address $PM_{2.5}$:

- **Real-Time Monitoring:** Automatic monitoring of $PM_{2.5}$ is carried out at the Automatic Urban and Rural Network (AURN) station (Norwich Lakenfields), which is an urban background site fitted with a FIDAS $PM_{2.5}$ analyser. Norwich City Council also has an automatic monitoring station which also has a FIDAS $PM_{2.5}$ analyser.
- **Air Quality Partnerships:** Norwich City Council are working with partners within the newly formed Norfolk Countywide Air Quality Group to ensure regular two-way engagement with representatives of Public Health Norfolk and Norfolk County Council Highways. This allows for an exchange of information and data, including that referenced in the Public Health Outcomes Framework.
- **Strategy Measures:** The measures listed within Table 2.2 ('Progress on Measures to Improve Air Quality') will have a positive contribution towards reducing $PM_{2.5}$ emissions and/or exposure, despite being primary orientated to NO_2. For example, reducing the volume of road traffic, increasing pedestrian only areas and promoting walk and cycle routes will also reduce vehicle brake and tyre wear – a contributor to $PM_{2.5}$ emissions. The switch to electrically powered buses will avoid the particulate matter produced from diesel engines. It is however understood that, at least in Norwich, $PM_{2.5}$ can be a transboundary pollutant.
- **Planning Applications:** The minimisation of airborne particulates will continue to be an important factor in all planning application considerations. Developers are encouraged to be part of the Considerate Contractors Scheme and have a fully adhered to onsite Environmental Policy which includes dust suppression. During 2025 Norwich City Council have also been requesting that any large developments consider the 2040 target of 10µg/m^3 in their planning.

- **Smoke Control Areas:** Norwich City Council has currently declared three smoke control areas in King Street, Norwich Airport and Bowthorpe. In these areas they are only allowed to burn in Defra exempt appliances using Defra authorised fuels which is enforced by Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020.

  The pollutants emissions from burning wood and coal are harmful to everyone (especially the young, elderly and most vulnerable) and we shall be doing further education to our residents and businesses on how to be compliant. We are also updating the enforcement procedure for these areas as introduced in the Environment Act 2021.

  We shall be implementing a communications strategy in 2026 which shall include social media, Norwich City Council's monthly magazine and educational days such as Clean Air Day and Clean Air Night to broadcast the message. We are also working with the Air Quality Group to progress joint education projects.

- **Trading Standards:** Norwich City Council are working with Trading Standards to ensure retailers of wood and coal are complying with the new Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020.

2.3.1 Open Fires and Wood Burning Stoves

The use of open fires and wood-burning stoves has risen in popularity, particularly over recent years, causing emissions from domestic chimneys to increase. As a result, there is the potential for indoor air pollution to also increase. This is significant as pollutants such as $PM_{2.5}$ which are associated with wood burners and open fires can cause breathing problems such as asthma attacks and contribute to other health conditions.

Norwich City Council have made it a priority to identify all houses in their housing stock which have open fires as their primary source of heating, and especially those pertaining to their own housing stock. On the last assessment there were 14 wood burners/solid fuel appliances in Council owned properties.

Norwich City Council still owns its housing stock and in 2022 it was decided that:

- We no longer grant permission for wood burners or other solid fuel appliances for safety and environmental reasons.
- If a property containing a solid fuel appliance becomes empty the appliance will be removed and the chimney opening sealed before a new tenant moves in.
- If an existing appliance or chimney is found to be dangerous it will be removed.

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

This section sets out the monitoring undertaken within 2025 by Norwich City Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2021 and 2025 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Norwich City Council undertook automatic (continuous) monitoring at 1 site during 2025. Table A.1 in Appendix A shows the details of the automatic monitoring sites.

The Envista – Air Resources Manager page presents automatic monitoring results for Norwich City Council, with automatic monitoring results also available through the UK-Air website.

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

3.1.2 Non-Automatic Monitoring Sites

Norwich City Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 35 sites during 2025. 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 2025 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.

During 2025, the maximum NO_2 annual mean concentration recorded at a diffusion tube site within the Central Norwich AQMA was 33.7 µg/m³ at DT11. Over the last five years, the NO_2 annual mean Air Quality Standard (AQS) objective of 40 µg/m³ has been exceeded at this location in 2021 and 2022. In 2023, concentrations fell below the objective to 38.4 µg/m³, with further reductions observed in 2024 (37.2 µg/m³) and reaching the lowest recorded level of 33.7 µg/m³ in 2025.

The sustained reduction below the objective since 2023 is encouraging. With the continued rollout of zero-emission buses, it is anticipated that air quality in this area will improve further. This is particularly important given that DT11 was historically the site of exceedance that led to the declaration of the Central Norwich AQMA in 2012, when a maximum annual mean concentration of 52 µg/m³ was recorded.

No diffusion tube sites within the AQMA recorded an NO_2 annual mean concentration within 10% of the Air Quality objective.

When compared with 2024, the 2025 diffusion tube results show that the majority of monitored locations experienced a small increase in NO_2 annual mean concentrations, with 27 of the 35 locations (77%) recording an increase. Decreases were observed at five

locations (14%), and three sites (9%) showed no change. This is represented in the table below:

Comparison of Diffusion tube results (annual mean NO_2 µg/m³)

Diffusion Tube ID	2021	2022	2023	2024	2025	Change (2024–2025)	Change (2021-2025)
DT1A, DT1B	25.7	27.1	26.6	23.7	26.6	▲	▲
DT4A, DT4B, DT4C	9.8	8.5	8.5	7.7	9.1	▲	▼
DT6	21.8	21.9	23.1	20.0	20.6	▲	▼
DT9	32.8	34.3	31.1	26.9	27.2	▲	▼
DT11	40.2	40.3	38.4	37.2	33.7	▼	▼
DT13	36.4	34.1	36.8	26.2	26.2	—	▼
DT16	28.6	28.8	28.5	27.1	25.8	▼	▼
DT19	23.7	25.9	25.6	24.2	25.6	▲	▲
DT22	21.6	20.9	22.4	20.6	20.6	—	▼
DT25	25.9	24.8	26.2	23.4	25.9	▲	—
DT26A, DT26B, DT26C	30.6	27.2	33.3	29.0	30.3	▲	▼
DT29A, DT29B, DT29C	29.4	27.7	28.6	20.2	20.7	▲	▼
DT31A, DT31B, DT31C	28.0	28.8	29.7	28.5	27.9	—	▼
DT34	26.4	23.9	30.2	24.0	24.9	▲	▼
DT37	22.6	23.4	23.9	19.6	21.1	▲	▼
DT39	22.6	23.4	19.1	17.7	20.4	▲	▼
DT40	21.3	19.8	21.8	18.9	19.0	▲	▼
DT41	29.4	28.2	28.3	24.9	22.9	▼	▼
DT42	27.4	26.7	25.6	23.1	24.7	▲	▼
DT44	21.3	20.7	35.5	17.2	17.7	▲	▼
DT45	22.7	22.5	21.8	19.9	20.7	▲	▼
DT46	23.9	24.0	22.9	21.3	20.3	▼	▼
DT47	22.1	20.7	20.5	17.9	19.5	▲	▼
DT48	26.8	23.0	27.3	25.4	27.1	▲	▲
DT49	24.7	26.7	29.2	27.3	29.0	▲	▲
DT50	24.2	25.5	26.8	23.5	23.7	▲	▼
DT52	–	16.0	16.9	14.3	15.2	▲	▼
DT60	–	–	–	14.4	15.8	▲	▲
DT61	–	–	18.2	13.3	14.0	▲	▼
DT62	–	–	–	24.2	25.6	▲	▲
DT63	–	–	–	13.8	16.2	▲	▲

DT64	–	–	21.6	17.4	18.8	▲	▼
DT65	–	–	–	41.0	40.1	▼	▼
DT66	–	–	–	30.7	31.7	▲	▲
DT67, DT68, DT69	–	–	–	22.5	22.7	▲	▲

Note: ▲ indicates an increase, ▼ a decrease, and ▬ no material change

The increases in NO_2 concentrations observed at some diffusion tube sites within the Central Norwich AQMA during 2025, compared with 2024, are considered to reflect short-term variability rather than a deterioration in air quality. Roadside NO_2 concentrations within the AQMA are particularly sensitive to meteorological conditions, and periods of cooler temperatures, lower wind speeds and more stable atmospheric conditions can reduce pollutant dispersion, leading to higher measured concentrations at locations characterised by confined street canyons and high buildings.

Changes in traffic activity within the city centre, including fluctuations in traffic volumes, congestion associated with roadworks, rerouted traffic, and increased post-pandemic commercial and visitor activity, are also likely to have influenced concentrations at some locations. Despite these short-term increases, the majority of long-running diffusion tube sites within the Central Norwich AQMA remain well below historic peak concentrations, including those recorded prior to the declaration of the AQMA in 2012.

Of the 26 diffusion tube sites with comparable data in both 2021 and 2025, NO_2 annual mean concentrations decreased at 20 locations, increased at five locations, and remained broadly unchanged at one location. This indicates a clear overall improvement in NO_2 concentrations across the network over the five-year period.

The continued reduction in NO_2 observed at key historically elevated sites, together with the ongoing rollout of zero-emission buses and wider bus fleet improvements, indicates that the underlying long-term trend across the AQMA remains one of overall improvement, notwithstanding year-to-year variability.

The 2026 Air Quality Action Plan (AQAP) will introduce new measures to support the continued maintenance of nitrogen dioxide (NO_2) concentrations below the air quality objective of 40 µg/m³. Monitoring undertaken in 2025 indicates that no diffusion tube sites within the AQMA recorded annual mean NO_2 concentrations within 10% of the objective, providing confidence that current and planned measures are helping to sustain compliance.

In 2025, four diffusion tube sites within the Central Norwich AQMA recorded a reduction in NO_2 concentrations. These were DT11 (St Augustine's Street), which recorded an annual mean concentration of 33.7 µg/m³; DT16 (Zipfel House) at 25.8 µg/m³; DT41 (Magdalen Street) at 22.9 µg/m³; and DT46 (Pitt Street) at 20.3 µg/m³. All four sites are located to the north of the city centre and are associated with major bus routes. The continued decline in NO_2 concentrations at these locations may therefore be partially attributable to improvements in bus fleet emissions and wider transport measures introduced in this area.

DT13 (Castle Meadow), DT22 and DT31A, B & C recorded no material change in NO_2 concentrations between 2024 and 2025. At DT13 (Castle Meadow), the annual mean concentration remained at 26.2 µg/m³ in both 2024 and 2025. Similarly, DT22 remained at 20.6 µg/m³, and DT31A–C remained at 28.5 µg/m³ over the same period.

The stabilisation of NO_2 concentrations at DT13 (Castle Meadow) is particularly encouraging, as this location is restricted to bus, coach and taxi movements only. The sustained reduction from historically higher concentrations, and the continued maintenance of relatively low levels, provides a strong indication that the introduction of zero-emission electric buses has had a positive impact on air quality in this area.

DT67, DT68 and DT69, which are co-located at the automatic air quality monitoring station and Castle Meadow, recorded a small increase in NO_2 concentrations between 2024 and 2025. Annual mean concentrations increased from 22.5 µg/m³ in 2024 to 22.7 µg/m³ in 2025, representing a change of +0.2 µg/m³.

These sites are influenced primarily by bus movements, and the very small change observed is considered minor and within the range of normal year-to-year variability. The continued maintenance of relatively low NO_2 concentrations at these locations is encouraging and provides further indication that the introduction and operation of zero-emission buses on Castle Meadow is contributing positively to air quality in this area.

DT29A, DT29B and DT29C, located at Chapelfield North, have recorded a substantial long-term reduction in NO_2 concentrations. Annual mean concentrations decreased from 29.4 µg/m³ in 2021 to 20.7 µg/m³ in 2025, representing an overall reduction of 8.7 µg/m³. Although a small increase was observed between 2024 and 2025 (from 20.2 µg/m³ to 20.7 µg/m³), concentrations at this location remain significantly lower than historic levels.

The reduction at Chapelfield North coincides with highway layout changes at the Grapes Hill junction, delivered through Transforming Cities Fund (TCF) investment. These works included the removal of some traffic signals and changes to traffic priorities, improving

vehicle flow and reducing queuing on Chapelfield North. In addition, Chapelfield North forms the primary outbound route for buses travelling west from the city centre, and the majority of buses using this corridor are now zero-emission vehicles. Collectively, these factors are considered to have contributed significantly to the sustained reduction in NO_2 concentrations at this site.

In 2023, it was noted that DT49 (Queens Road North) would be kept under review, as NO_2 concentrations had shown an increase since the site was installed in 2020. At that time, the absence of pre-COVID baseline data made it difficult to determine whether the increase reflected a longer-term trend or short-term variability.

Encouragingly, the 2024 results showed a reduction of 1.9 µg/m³ compared with 2023. However, concentrations remained above the 2020 baseline of 24.9 µg/m³, indicating that while some improvement had been observed, levels had not yet returned to earlier conditions. In 2025, the annual mean NO_2 concentration increased again to 29.0 µg/m³, remaining below the air quality objective but reinforcing the need for continued monitoring to determine whether fluctuations at this location represent an emerging trend or ongoing year-to-year variability.

For the seven diffusion tube sites located outside of the AQMA (DT4A–C, DT40, DT52, DT65 and DT66), the highest NO_2 annual mean concentration in 2025 was recorded at DT65 (40.1 µg/m³). This represents a slight decrease from 41.0 µg/m³ in 2024 although concentrations remain slightly above the air quality objective and the site will continue to be kept under close review. DT66 on the opposite side of the road showed a small increase, rising from 30.7 µg/m³ in 2024 to 31.7 µg/m³ in 2025, although below the objective, this site shall also be kept under review.

At other locations outside the AQMA, results indicate an overall improvement in air quality. DT40 (St Stephen’s Road) recorded an annual mean concentration of 19.0 µg/m³ in 2025, representing a reduction of 2.3 µg/m³ compared with 2021 (21.3 µg/m³). Similarly, DT4A–C recorded low concentrations of 9.1 µg/m³ in 2025, lower than the 2021 level of 9.8 µg/m³.

DT52, installed in 2022, recorded a reduction from 16.9 µg/m³ in 2023 to 15.2 µg/m³ in 2025.

Collectively, these results provide a positive indication that air quality outside the AQMA is generally improving, although continued monitoring remains important to ensure that concentrations are maintained below objective levels.

For diffusion tubes, the full 2025 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 which is for one location and that is DT65.

Paragraph 7.84 of LAQM TG22 states that "Where it is not possible to measure locations of relevant exposure, for the purposes of LAQM, distance correction can be applied to monitoring locations that record an annual mean concentration above the NO_2 annual objective of 40µg/m³. It is also recommended that this process be applied to monitoring locations that record an annual mean concentration that is within 10% of the NO_2 annual objective of 40µg/m^3 (i.e. above 36µg/m^3), to account for the inherent uncertainty in diffusion tube monitoring concentration data."

Therefore, DT65 has been distance corrected as the annual mean concentration was 40.1 µg/m^3 which is above the NO_2 annual objective and the distance corrected value for this location is 35.7 µg/m^3.

Notably one of the diffusion tubes at the triplicate site DT31A-C showed an elevated level of 54.62 µg/m^3 in September, where the other 2 tubes were 31.19 µg/m^3 and 29.58 µg/m^3. This appears to be an isolated and abnormal event as subsequent measures for the rest of the year do not show any elevations, and as the other two diffusion tubes were similar this is considered an anomaly. Defra have advised that anomalies in the data should be removed, so I have removed this from the reported data.

The annual mean NO_2 concentration recorded at the new Castle Meadow 2 Air Quality Station (CM3) was 21.0 µg/m^3 which is recorded in Table A.3. this is lower than that recorded in 2024 which was 22 µg/m^3. The reduction in NO_2 gives a clear indication that the electric buses are having a positive impact of the air quality on Castle Meadow. CM3 is sited on the southern end of castle meadow and is plotted on map in Appendix D. This site was chosen due to availability of space along Castle Meadow, and it is at a more central location.

At the Norwich Lakenfields urban background AURN monitoring site (CM2), the annual mean NO_2 concentration was 9 µg/ m^3 which had increased slightly from 2024, though is still below the 2021 level of 10 µg/ m^3 and can again be attributed to year-to-year variability.

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.

The Air Quality objective for the NO_2 hourly mean concentration was not exceeded at any of the two automatic monitoring stations during 2025. A maximum NO_2 hourly mean concentration of 79.2 µg/m^3 with 98.6% data capture was recorded at CM3. And at CM2 the NO_2 hourly mean concentration was 65 µg/m^3 with 99% data capture.

This is especially relevant for the Castle Meadow 2 (CM3) automatic monitoring analyser as this site is located in an area where pedestrians may stay for one hour or more.

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.

At the Castle Meadow 2 (CM3) automatic monitoring site, the 2025 annual mean PM_{10} concentration was 16.6 µg/m³, which has increased from 14.5 µg/m³ recorded in 2024. However, this remains well below the air quality objective.

At the AURN Norwich Lakenfields (CM2) site, the annual mean PM_{10} concentration was 12.1 µg/m³, which has increased from last year's 11.1 µg/m³.

The increase in PM_{10} reflects the rest of the UK due to an unusual series of high PM_{10} episodes in 2025, where we would only normally see one or two during a year.

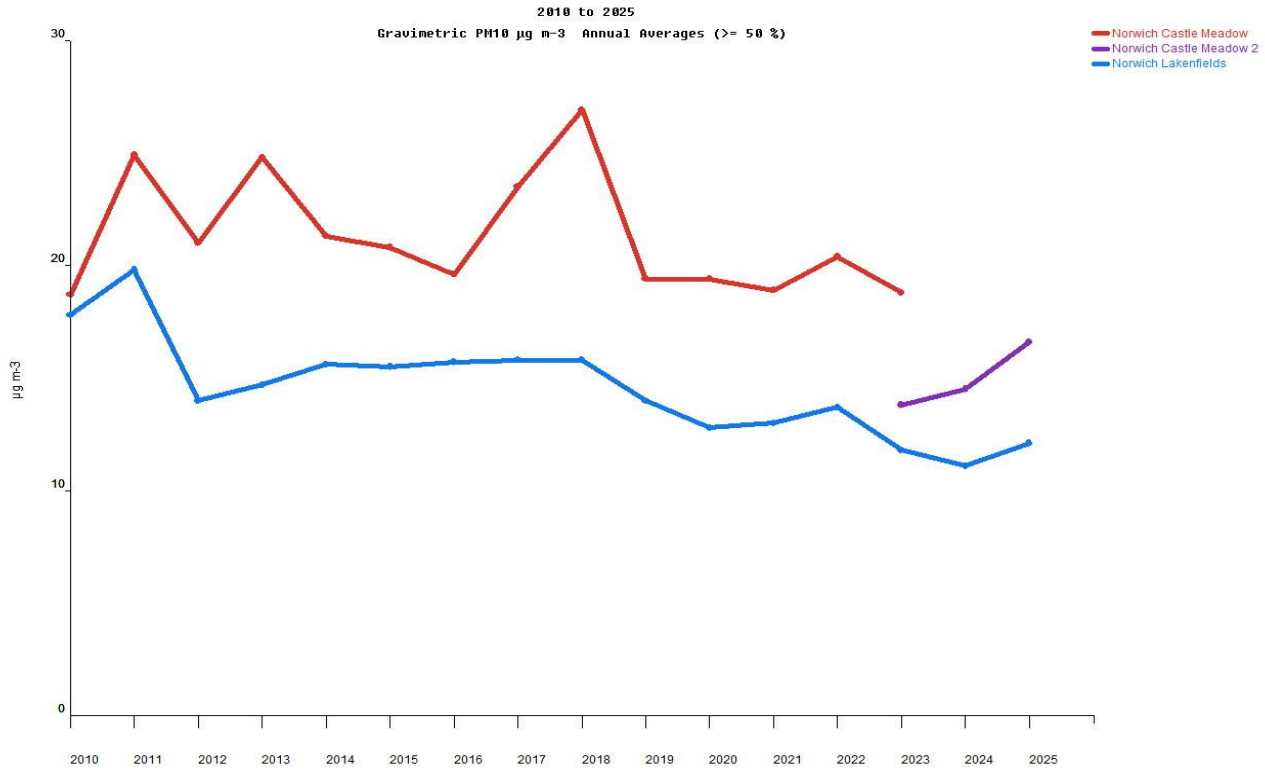
Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

At Castle Meadow 2 (CM3), there were 3 exceedances of the 24-hour mean limit. The highest recorded value was 70.7 µg/m³.

At the Norwich Lakenfields AURN (CM2) site, there was 1 exceedance of the 24 hour mean limit. The highest recorded value was 56.1 µg/m³.

No automatic monitoring stations exceeded the annual exceedance allowance of 35 days in 2025.

A chart produced by Air Quality Data Management (AQDM) shows Gravimetric PM_{10} Annual Averages (µg/m³) from 2010 to 2025 is below:



The data chart shows annual mean PM_{10} concentrations recorded at Castle Meadow 2 are significantly lower than those historically measured at the former Castle Meadow site. This is likely attributable to differences in monitoring location and instrumentation. The former Tapered Element Oscillating Microbalance (TEOM) monitor has been replaced by a gravimetric-equivalent Automatic Urban and Rural Network (AURN)-compliant Air Quality Station (AQS), providing more reliable and representative measurements.

The AQS at Castle Meadow 2 was commissioned in March 2023. Whilst the dataset remains limited in terms of establishing a long-term trend, confidence in data accuracy and comparability has improved. Monitoring results from 2023 to 2025 indicate a gradual increase in PM_{10} concentrations; however, levels remain below those previously recorded at the original Castle Meadow location.

An increase in annual mean PM_{10} concentrations is observed across Norwich monitoring sites in 2025. This reflects national trends and is associated with an unusually high number of regional PM_{10} pollution episodes occurring during the year, compared to the one or two episodes typically experienced annually.

These episodes were primarily driven by a combination of meteorological and regional factors, including:

- Periods of anticyclonic conditions, resulting in reduced dispersion, light winds, and temperature inversions
- Long-range transport of particulate matter, including Saharan dust events and pollution from mainland Europe
- Enhanced formation of secondary particulates (notably ammonium nitrate) from primary emissions
- Dry conditions contributing to the resuspension of particulate matter

Whilst these factors were the main contributors to elevated concentrations during 2025, local sources such as road traffic, domestic combustion, and other urban activities will also have contributed.

Currently, PM_{10} monitoring within Norwich is limited to automatic monitoring stations. The City Council continues to explore opportunities to expand the monitoring network both within and outside the Air Quality Management Area (AQMA) to improve spatial coverage and understanding of particulate concentrations.

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.

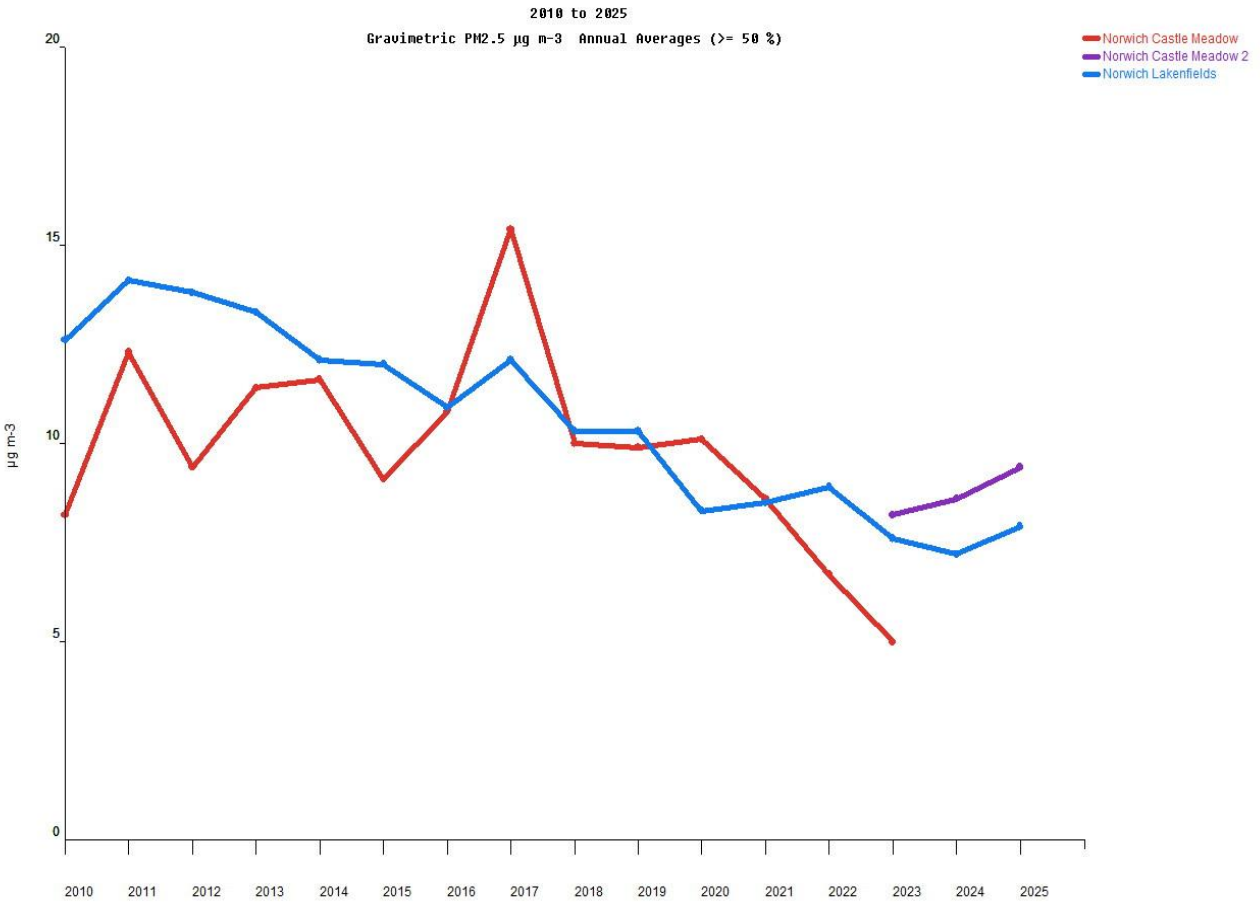
At the Castle Meadow 2 (CM3) automatic monitoring site, the 2025 annual mean $PM_{2.5}$ concentration was 9.4 µg/m³, an increase from 8.6 µg/m³ in 2024.

This may be attributed to the FIDAS monitor, which was installed in March 2023, meaning the long-term trend for $PM_{2.5}$ at this site has not yet been established. This increase again reflects the rest of the UK due to an unusual series of high $PM_{2.5}$ episodes in 2025, where there would only normally be one or two during a year.

At the AURN Norwich Lakenfields (CM2) site, the annual mean $PM_{2.5}$ concentration was 8 µg/m³, again increasing from 7.2 µg/m³ in 2024.

Both sites remained well below the annual air quality objective of 20 µg/m³.

The chart below produced by Air Quality Data Management (AQDM) shows Gravimetric $PM_{2.5}$ Annual Averages (µg/m³) from 2010 to 2025.



Annual mean $PM_{2.5}$ concentrations have been measured at three monitoring locations in Norwich: Castle Meadow (CM1 decommissioned January 2024), Norwich Lakenfields (CM2), and Castle Meadow 2 (CM3).

The long-term dataset (2010–2025) indicates an overall downward trend in $PM_{2.5}$ concentrations, particularly evident from 2017 onwards across the Castle Meadow and Lakenfields sites. At the former Castle Meadow site, concentrations reduced significantly from a peak of approximately 15 µg/m³ in 2017 to around 5 µg/m³ by 2023, prior to decommissioning. A similar, although more gradual decline is observed at Lakenfields (CM2), where concentrations decreased from approximately 12 µg/m³ in 2017 to around 8 µg/m³ by 2025.

This reduction is consistent with national improvements in particulate emissions, including tighter vehicle emission standards and wider air quality management measures.

The Castle Meadow 2 (CM3) monitoring site was commissioned for particulate monitoring in March 2023, and therefore a full calendar year of ratified data was not available for 2023. As a result, the dataset for CM3 remains limited, and caution should be applied when interpreting emerging trends. Initial results show concentrations of 7.6 µg/m³ in 2023, increasing to around 9 µg/m³ by 2025.

Direct comparisons between the former Castle Meadow site (CM1) and Castle Meadow 2 (CM3) should be made with caution due to differences in both instrumentation and location. The previous TEOM monitor at the Castle Meadow site was not equivalent to the reference measurement method, however, due to the long duration of the dataset, it remains useful for identifying long-term trends. The new FIDAS monitor at CM3 provides gravimetric-equivalent measurements, resulting in improved accuracy and robustness of the data. Additionally, CM3 is located in a different area to CM1, and therefore variations in measured concentrations may reflect differences in local sources, activity patterns, and dispersion characteristics.

Although an overall downward trend has been observed since 2022, a slight increase in $PM_{2.5}$ concentrations is evident in 2025, particularly at CM3 and to a lesser extent at Lakenfields. This increase is consistent with national observations and is attributed to an unusually high number of regional pollution episodes during 2025, exceeding the typical frequency of one or two events per year.

These episodes were driven by a combination of:

- Persistent anticyclonic conditions, limiting dispersion and promoting pollutant accumulation
- Long-range transport of particulate matter, including contributions from mainland Europe
- Enhanced formation of secondary particulates, particularly ammonium nitrate
- Periods of dry weather, increasing the resuspension of surface dust

Whilst these regional factors were the primary drivers of elevated concentrations, local sources such as road traffic, domestic combustion, and urban activities will also have contributed to measured $PM_{2.5}$ levels.

Currently, $PM_{2.5}$ monitoring within Norwich is limited to automatic monitoring stations. The City Council is actively exploring funding opportunities to expand the monitoring network and include additional locations within the AQMA, with the aim of improving spatial

coverage and developing a more comprehensive understanding of $PM_{2.5}$ concentrations across the city.

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? (1)	Monitoring Technique	Distance to Relevant Exposure (m) (1,2)	Distance to kerb of nearest road (m) (1)	Inlet Height (m)
CM2	Lakenfields	Urban Background	623637	306940	NO_2, PM_{10}, $PM_{2.5}$	No	Central	Chemiluminescent (thermo); FDMS	10.0	1.5	2.5
CM3	Castle Meadow 2	Kerbside	623112	308532	NO_2, PM_{10}, $PM_{2.5}$	Yes	Central	Chemiluminescent (APNA-370); FDMS	4.0	1.0	1.8

Notes:

(1) N/A if not applicable

(2) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

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)
DT1A, DT1B	256 King St B	Roadside	623863	307679	NO_2	Yes, Norwich	0.0	3.5	No	1.7
DT4A, DT4B, DT4C	Lakenfields AQS	Urban Background	623681	307016	NO_2	No, Urban Background	20.0	1.5	Yes	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)
DT6	130 Magdalen St	Roadside	623160	309550	NO_2	Yes, Norwich	0.0	4.0	No	2.5
DT9	13 St Augustine's St	Kerbside	622906	309496	NO_2	Yes, Norwich	1.0	1.5	No	2.5
DT11	52 St Augustine's St	Kerbside	622826	309573	NO_2	Yes, Norwich	0.0	1.0	No	2.5
DT13	Castle Meadow (Middle)	Roadside	623141	308607	NO_2	Yes, Norwich	0.0	2.5	No	2.5
DT16	Zipfel House	Roadside	623186	309650	NO_2	Yes, Norwich	0.0	3.0	No	2.3
DT19	27 Cattle Market St	Roadside	623321	308431	NO_2	Yes, Norwich	0.0	2.0	No	2.6
DT22	Carrow Bridge House	Roadside	623901	307710	NO_2	Yes, Norwich	0.0	5.0	No	2.5
DT25	Bargate Court	Roadside	623422	309388	NO_2	Yes, Norwich	0.0	4.0	No	2.4
DT26A, DT26B, DT26C	3 Riverside Rd	Roadside	623870	308516	NO_2	Yes, Norwich	0.0	3.0	No	2.5
DT29A, DT29B, DT29C	Chapelfield North	Kerbside	622532	308490	NO_2	Yes, Norwich	1.5	1.0	No	2.5
DT31A, DT31B, DT31C	Quantrell House	Kerbside	623380	307700	NO_2	Yes, Norwich	0.0	3.0	No	2.3
DT34	41 St Stephens Street	Kerbside	622898	308114	NO_2	Yes, Norwich	10.0	0.5	No	2.3
DT37	7a Gunns Court	Kerbside	622492	308520	NO_2	Yes, Norwich	3.0	2.5	No	2.3
DT39	49 Duke St	Kerbside	622884	309082	NO_2	Yes, Norwich	0.0	1.0	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)
DT40	St Stephens Rd (Kingsley Rd)	Roadside	622695	307855	NO_2	No	1.5	2.0	No	2.2
DT41	Magdalen St (RSPCA)	Roadside	623148	309277	NO_2	Yes, Norwich	1.5	3.5	No	2.5
DT42	Magdalen St (Fly Over)	Roadside	623151	309326	NO_2	Yes, Norwich	25.0	2.5	No	2.5
DT44	Botolph/Edwards St	Roadside	622910	309391	NO_2	Yes, Norwich	20.0	2.0	No	2.2
DT45	Pitt St W	Roadside	622904	309418	NO_2	Yes, Norwich	25.0	2.2	No	2.5
DT46	Pitt St E	Roadside	622987	309486	NO_2	Yes, Norwich	20.0	2.1	No	2.3
DT47	Duke St/St Crispin's	Roadside	622869	309187	NO_2	Yes, Norwich	27.0	2.5	No	2.4
DT48	Riverside/Aspland	Roadside	623878	308532	NO_2	Yes, Norwich	0.0	1.2	No	2.2
DT49	Queens Rd N	Roadside	623480	307679	NO_2	Yes, Norwich	0.0	2.0	No	2.0
DT50	Queens Rd S	Roadside	623474	307692	NO_2	Yes, Norwich	0.0	1.1	No	2.2
DT52	73 Heigham Road	Roadside	621958	309000	NO_2	No	0.0	5.0	No	1.8
DT60	Forum Car Park, Bethel St	Roadside	622797	308454	NO_2	Yes, Norwich	1.0	1.0	No	2.3
DT61	Aldwych House, Bethel St	Roadside	622655	308506	NO_2	Yes, Norwich	2.0	2.0	No	2.4
DT62	Chapelfield North/Cleveland Rd	Roadside	622497	308499	NO_2	Yes, Norwich	9.0	1.0	No	2.3
DT63	53 St Giles St	Roadside	622638	308595	NO_2	Yes, Norwich	2.0	0.5	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)
DT64	28 St Giles St	Roadside	622788	308569	NO_2	Yes, Norwich	2.0	1.5	No	2.4
DT65	Outside 72 Bracondale	Roadside	624050	307313	NO_2	No	2.2	3.2	No	2.5
DT66	Opposite 72 Bracondale	Roadside	624068	307319	NO_2	No	14.9	2.2	No	2.3
DT67, DT68, DT69	Castle Meadow 2	Roadside	623099	308478	NO_2	Yes, Norwich	5.2	1.9	Yes	1.8

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 2025 (%) (2)	2021	2022	2023	2024	2025
CM2	623637	306940	Urban Background	99.0	99.0	10	10	8.5	8.5	9
CM3	623112	308532	Kerbside	98.6	98.6			24	22	21

☒ **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 2025**

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 2025 (%) (2)	2021	2022	2023	2024	2025
DT1A, DT1B	623863	307679	Roadside	100	100	25.7	27.1	26.6	23.7	26.6
DT4A, DT4B, DT4C	623681	307016	Urban Background	100	92	9.8	8.5	8.5	7.7	9.1
DT6	623160	309550	Roadside	100	100	21.8	21.9	23.1	20.0	20.6
DT9	622906	309496	Kerbside	100	100	32.8	34.3	31.1	26.9	27.2
DT11	622826	309573	Kerbside	100	100	**40.2**	**40.3**	38.4	37.2	33.7
DT13	623141	308607	Roadside	100	75	36.4	34.1	36.8	26.2	26.2
DT16	623186	309650	Roadside	100	83	28.6	28.8	28.5	27.1	25.8
DT19	623321	308431	Roadside	100	100	23.7	25.9	25.6	24.2	25.6
DT22	623901	307710	Roadside	100	100	21.6	20.9	22.4	20.6	20.6
DT25	623422	309388	Roadside	100	100	25.9	24.8	26.2	23.4	25.9
DT26A, DT26B, DT26C	623870	308516	Roadside	100	100	30.6	27.2	33.3	29.0	30.3
DT29A, DT29B, DT29C	622532	308490	Kerbside	100	94	29.4	27.7	28.6	20.2	20.7
DT31A, DT31B, DT31C	623380	307700	Kerbside	100	97	28.0	28.8	29.7	28.5	27.9
DT34	622898	308114	Kerbside	100	100	26.4	23.9	30.2	24.0	24.9
DT37	622492	308520	Kerbside	100	83	22.6	23.4	23.9	19.6	21.1
DT39	622884	309082	Kerbside	100	92	22.6	23.4	19.1	17.7	20.4
DT40	622695	307855	Roadside	100	100	21.3	19.8	21.8	18.9	19
DT41	623148	309277	Roadside	100	92	29.4	28.2	28.3	24.9	22.9
DT42	623151	309326	Roadside	100	67	27.4	26.7	25.6	23.1	24.7
DT44	622910	309391	Roadside	100	100	21.3	20.7	35.5	17.2	17.7

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 2025 (%) (2)	2021	2022	2023	2024	2025
DT45	622904	309418	Roadside	100	92	22.7	22.5	21.8	19.9	20.7
DT46	622987	309486	Roadside	100	67	23.9	24.0	22.9	21.3	20.3
DT47	622869	309187	Roadside	100	100	22.1	20.7	20.5	17.9	19.5
DT48	623878	308532	Roadside	100	92	26.8	23.0	27.3	25.4	27.1
DT49	623480	307679	Roadside	100	100	24.7	26.7	29.2	27.3	29
DT50	623474	307692	Roadside	100	92	24.2	25.5	26.8	23.5	23.7
DT52	621958	309000	Roadside	100	100		16.0	16.9	14.3	15.2
DT60	622797	308454	Roadside	100	92				14.4	15.8
DT61	622655	308506	Roadside	100	83			18.2	13.3	14
DT62	622497	308499	Roadside	100	100				24.2	25.6
DT63	622638	308595	Roadside	100	83				13.8	16.2
DT64	622788	308569	Roadside	100	83			21.6	17.4	18.8
DT65	624050	307313	Roadside	100	100				41.0	**40.1**
DT66	624068	307319	Roadside	100	100				30.7	31.7
DT67, DT68, DT69	623099	308478	Roadside	100	94				22.5	22.7

☒ **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.1A – Trends in Annual Mean NO_2 Concentrations

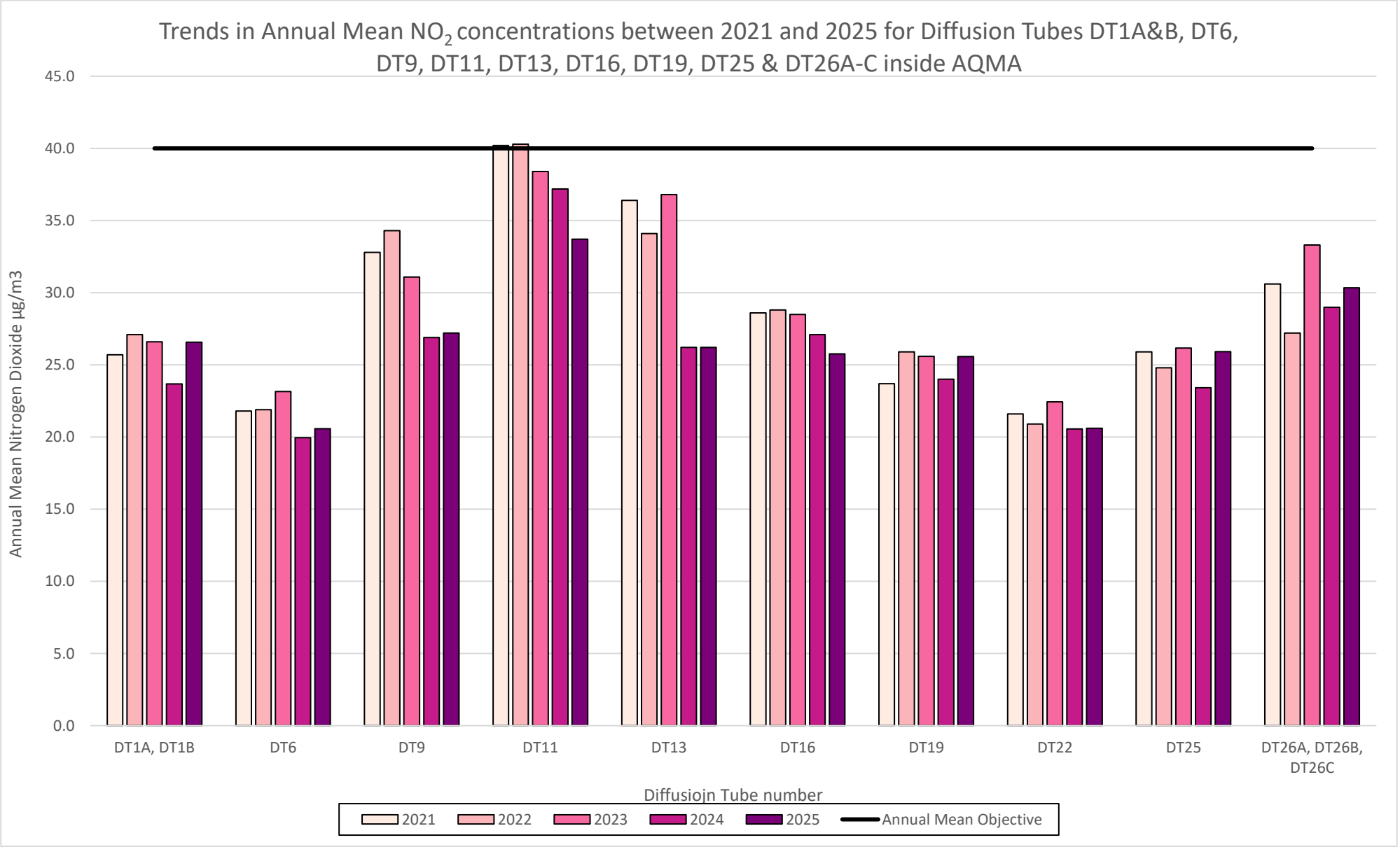


Fig A1.B

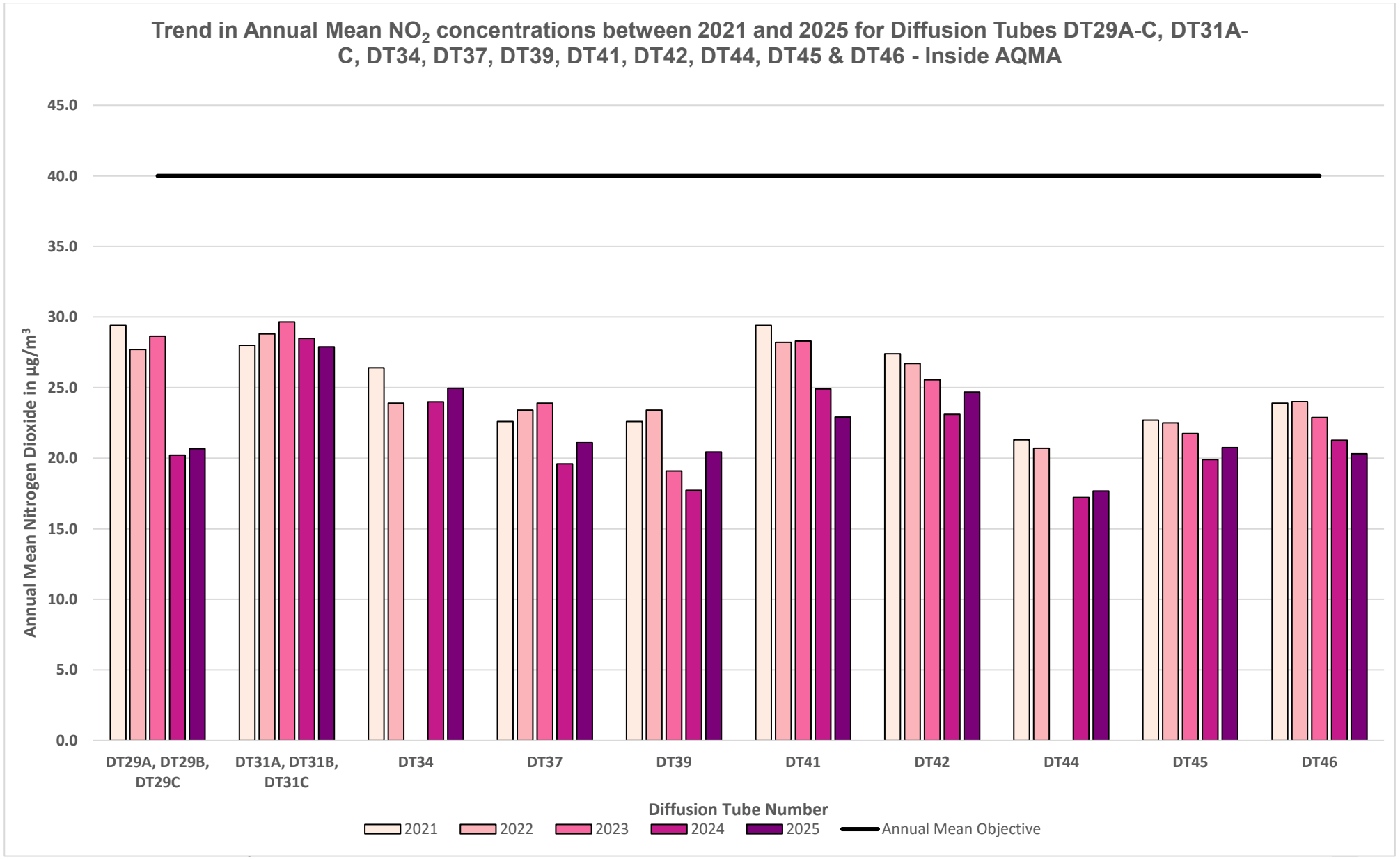

Trend in Annual Mean NO2 concentrations between 2021 and 2025 for Diffusion Tubes DT29A-C, DT31A-C, DT34, DT37, DT39, DT41, DT42, DT44, DT45 & DT46 - Inside AQMA
Annual Mean Nitrogen Dioxide in µg/m3
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
DT29A, DT29B, DT29C
DT31A, DT31B, DT31C
DT34
DT37
DT39
DT41
DT42
DT44
DT45
DT46
Diffusion Tube Number
2021
2022
2023
2024
2025
Annual Mean Objective

Fig A1.C

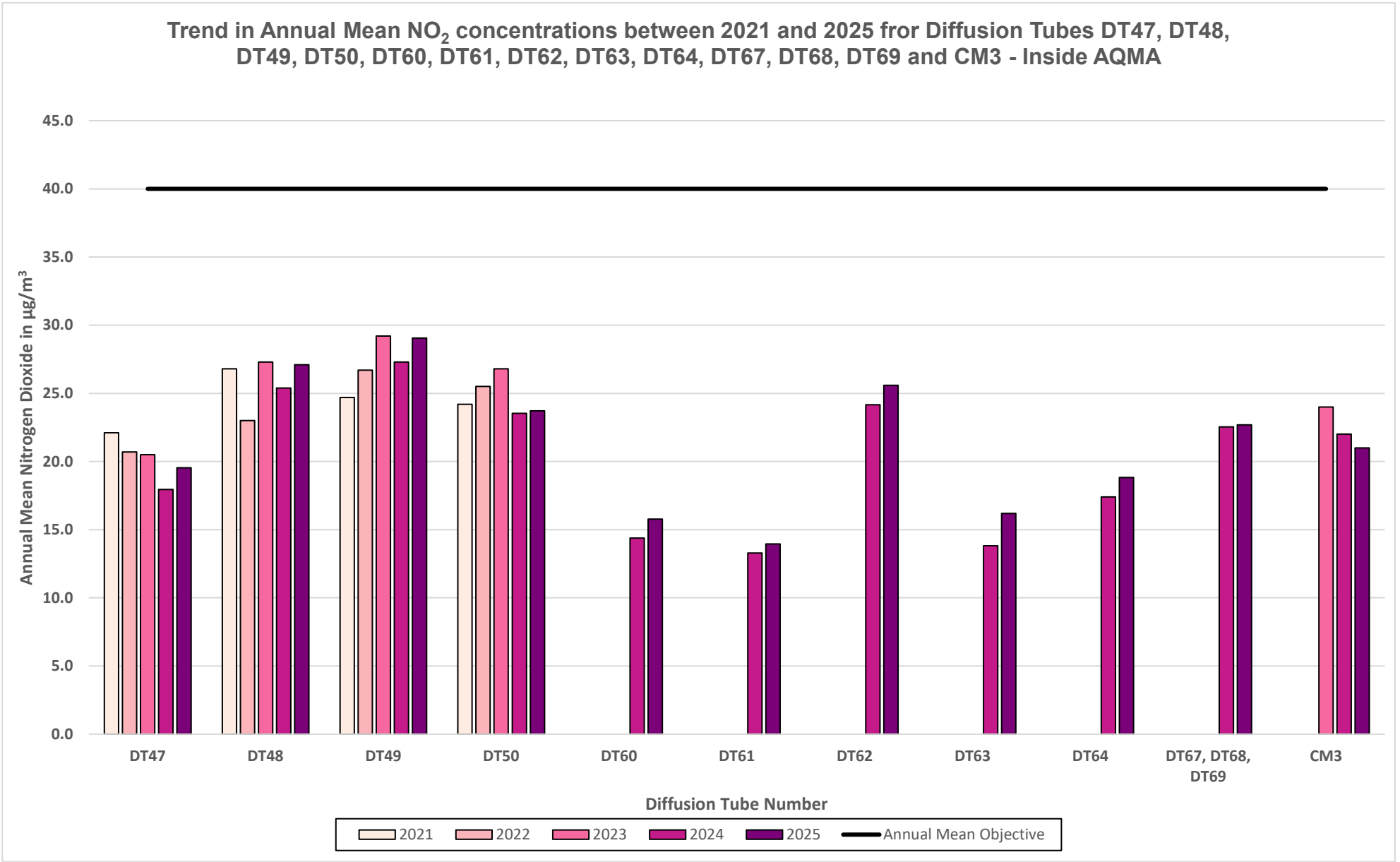

Trend in Annual Mean NO2 concentrations between 2021 and 2025 fror Diffusion Tubes DT47, DT48, DT49, DT50, DT60, DT61, DT62, DT63, DT64, DT67, DT68, DT69 and CM3 - Inside AQMA
Annual Mean Nitrogen Dioxide in µg/m3
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
DT47
DT48
DT49
DT50
DT60
DT61
DT62
DT63
DT64
DT67, DT68, DT69
CM3
Diffusion Tube Number
2021
2022
2023
2024
2025
Annual Mean Objective

Fig A1.D

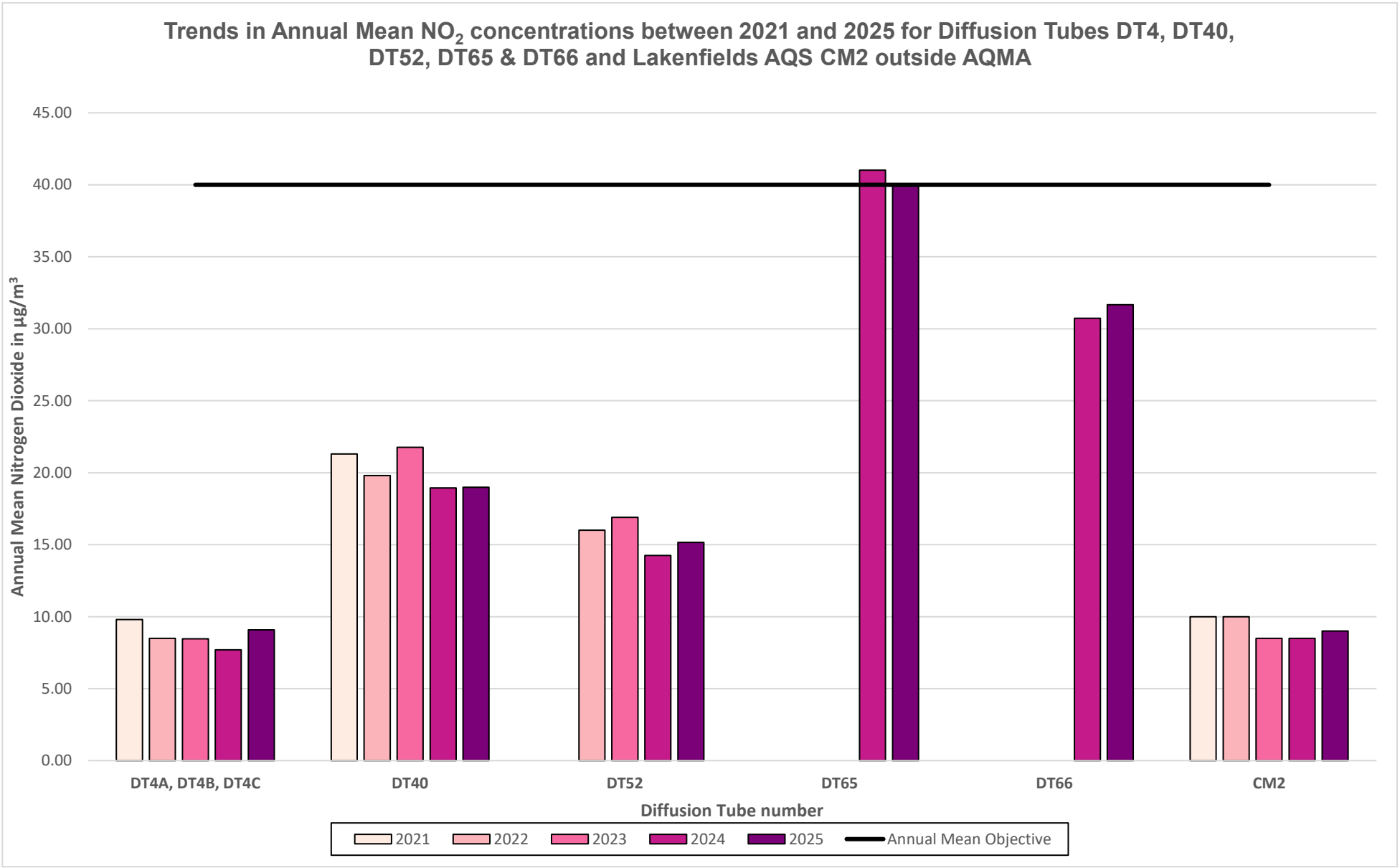

Trends in Annual Mean NO2 concentrations between 2021 and 2025 for Diffusion Tubes DT4, DT40, DT52, DT65 & DT66 and Lakenfields AQS CM2 outside AQMA
Annual Mean Nitrogen Dioxide in µg/m3
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
DT4A, DT4B, DT4C
DT40
DT52
DT65
DT66
CM2
Diffusion Tube number
2021
2022
2023
2024
2025
Annual Mean Objective

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 2025 (%) (2)	2021	2022	2023	2024	2025
CM2	623637	306940	Urban Background	99.0	99.0	0	0	0	0(45)	0
CM3	623112	308532	Kerbside	98.6	98.6	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 2025 (%) (2)	2021	2022	2023	2024	2025
CM2	623637	306940	Urban Background	98.0	98.0	13	14	11.8	11.1	12
CM3	623112	308532	Kerbside	100.0	100.0			13.8	14.5	16.6

☒ **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

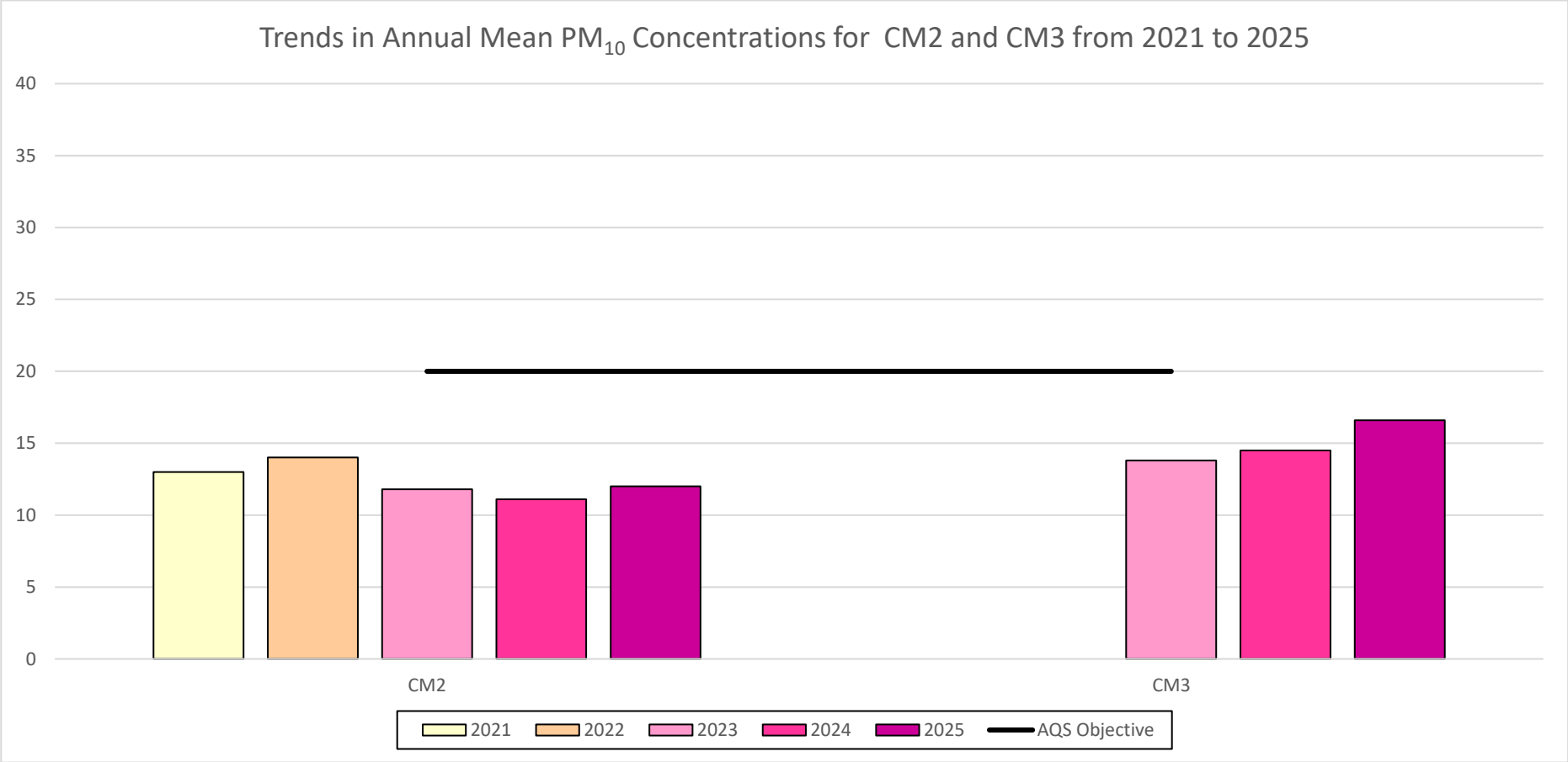


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2025 (%) (2)	2021	2022	2023	2024	2025
CM2	623637	306940	Urban Background	98	98	0	3	0	0	1
CM3	623112	308532	Kerbside	100	100			0	0(26)	3

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%).

Figure A.3 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m³

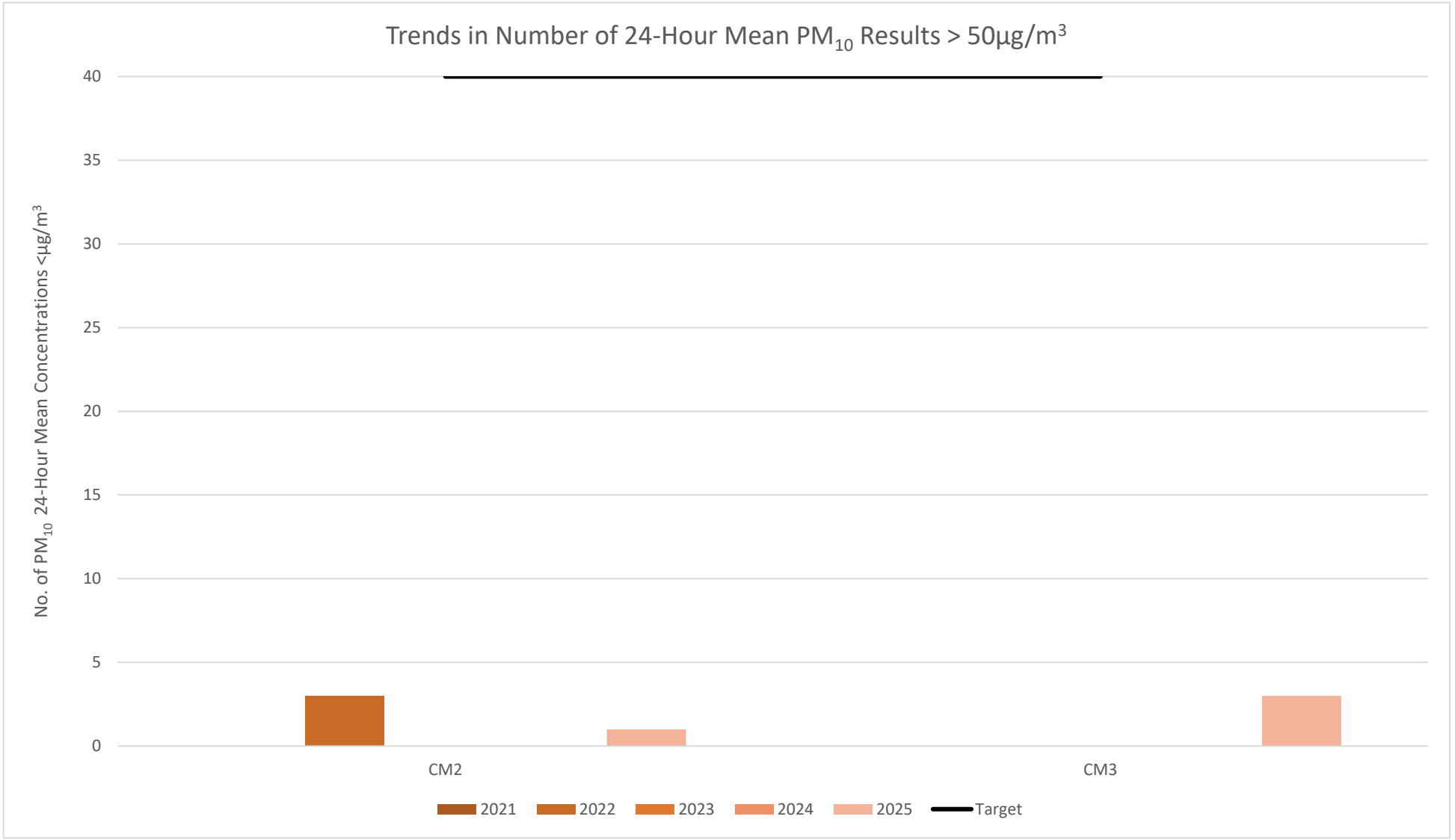


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2025 (%) (2)	2021	2022	2023	2024	2025
CM2	623637	306940	Urban Background	98	98	9	9	7.6	7.2	8
CM3	623112	308532	Kerbside	100	100			8.2	8.6	9.4

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

Notes:

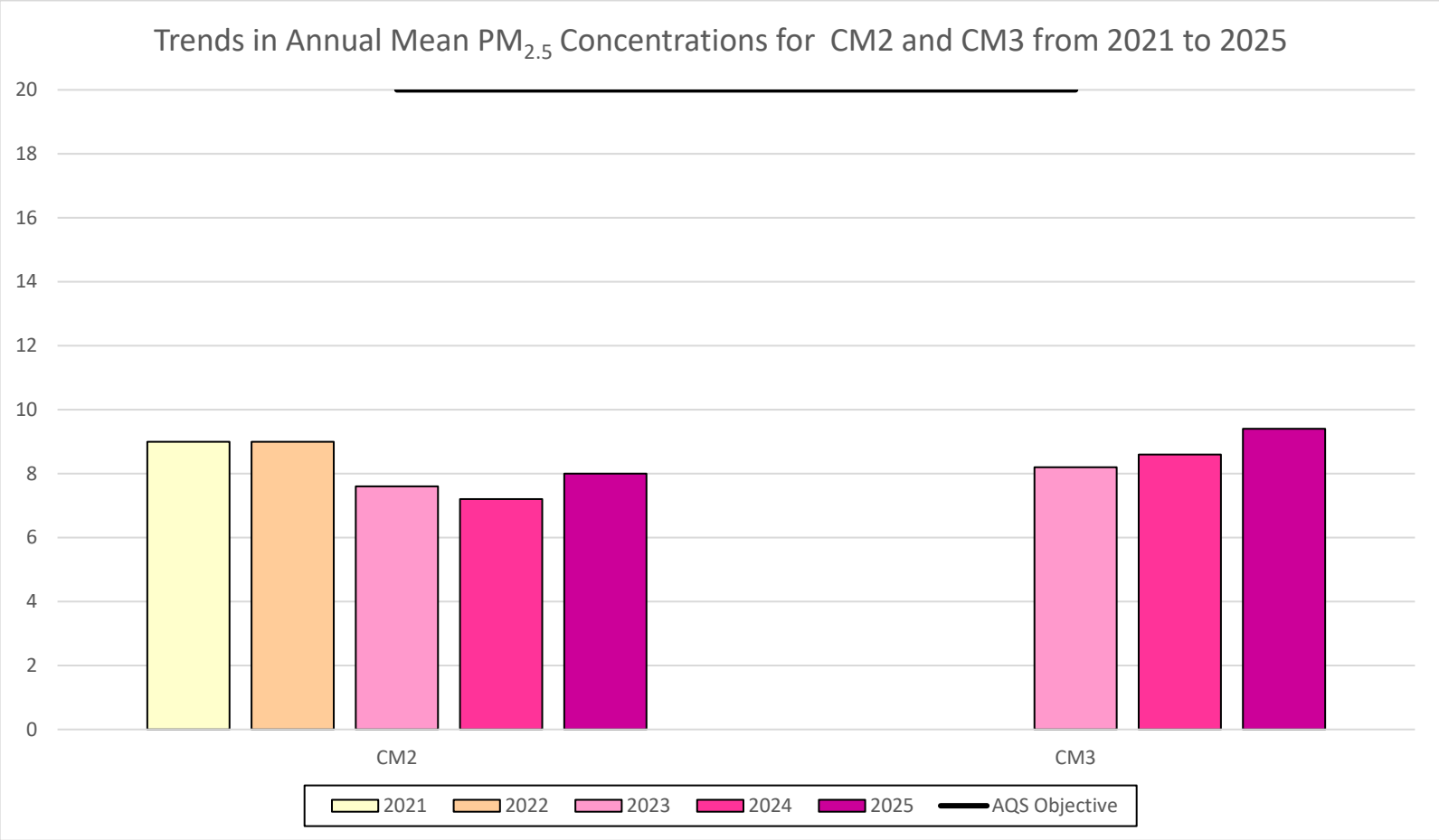
The annual mean concentrations are presented as µg/m^3.

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



Appendix B: Full Monthly Diffusion Tube Results for 2025

Table B.1 – NO_2 2025 Diffusion Tube Results (µg/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 (0.97)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DT1A	623863	307679	41.1	32.9	30.2	26.3	18.6	28.4	20.5	28.9	26.6	26.4	28.7	25.6	-	-		Duplicate Site with DT1A and DT1B - Annual data provided for DT1B only
DT1B	623863	307679	35.5	30.7	33.9	25.9	19.0	26.8	21.9	25.1	26.0	25.8	28.9	26.0	27.5	26.6	-	Duplicate Site with DT1A and DT1B - Annual data provided for DT1B only
DT4A	623681	307016	13.5	12.4	12.9	8.6	5.4	7.2	8.3	6.1	7.9	9.2		19.1	-	-	-	Triplicate Site with DT4A, DT4B and DT4C - Annual data provided for DT4C only
DT4B	623681	307016	15.9	12.6	12.9	8.4	5.9	6.7	6.3	6.1	8.3	9.1	9.4	9.6	-	-	-	Triplicate Site with DT4A, DT4B and DT4C - Annual data provided for DT4C only
DT4C	623681	307016	14.5		11.7	8.5	6.0		6.2	6.0	7.5	8.7	9.6	9.1	9.4	9.1	-	Triplicate Site with DT4A, DT4B and DT4C - Annual data provided for DT4C only
DT6	623161	309550	31.7	24.6	23.7	16.5	16.7	15.4	18.6	18.3	19.3	23.4	23.7	23.7	21.3	20.6	-	
DT9	622906	309496	33.9	33.4	29.8	27.3	29.0	24.8	23.9	28.4	27.5	27.1	28.2	24.6	28.2	27.2	-	
DT11	622826	309573	43.4	36.5	40.4	30.4	29.5	36.5	28.5	32.7	33.7	38.7	36.7	31.7	34.9	33.7	-	
DT13	623141	308607	30.2	29.9		27.9	20.6	29.1	24.2			26.1	29.6	26.6	27.1	26.2	-	
DT16	623186	309650	41.6	32.1	32.6	23.1	18.2	28.9	23.8	25.6	25.1	31.5	10.9		26.7	25.8	-	
DT19	623321	308431	32.8	35.2	28.9	27.3	20.4	25.5	21.9	23.8	27.7	25.9	22.8	25.5	26.5	25.6	-	
DT22	623901	307710	29.6	24.4	24.6	18.9	16.7	19.0	21.0	18.8	17.2	21.9	23.1	20.9	21.3	20.6	-	
DT25	623422	309388	32.3	28.8	31.8	23.5	24.7	23.4	23.8	25.8	25.4	27.7	29.5	25.0	26.8	25.9	-	
DT26A	623870	308516	41.4	28.5	35.7	31.0	24.6	34.4	26.4	31.8	32.5	29.9	31.6	34.8	-	-	-	Triplicate Site with DT26A, DT26B and DT26C - Annual data provided for DT26C only
DT26B	623870	308516	40.6	37.7	30.8	34.4	24.9	34.8	27.2	32.6	34.4	26.8	33.4	28.9	-	-	-	Triplicate Site with DT26A, DT26B and DT26C - Annual data provided for DT26C only
DT26C	623870	308516	41.4	20.0	27.1	32.2	23.4	34.2	26.6	32.5	32.1	29.7	32.6	29.7	31.4	30.3	-	Triplicate Site with DT26A, DT26B and DT26C - Annual data provided for DT26C only
DT29A	622532	308490	27.5	25.2	27.4	19.3	16.5	19.9	17.9	17.2	19.4	24.1	24.1	20.2	-	-	-	Triplicate Site with DT29A, DT29B and DT29C - Annual data provided for DT29C only

DT29B	622532	308490	27.2	25.1	26.7	20.0	17.5	18.2	18.7	17.2	20.0	21.2	23.0	19.3	-	-	-	Triplicate Site with DT29A, DT29B and DT29C - Annual data provided for DT29C only
DT29C	622532	308490	27.2	24.8	28.2	19.0	16.6	20.6	20.0			22.4	22.7	19.2	21.4	20.7	-	Triplicate Site with DT29A, DT29B and DT29C - Annual data provided for DT29C only
DT31A	623380	307700	39.9	32.6	34.1	25.4	23.1	31.1	24.7	27.4		29.5	31.7	31.2	-	-	-	Triplicate Site with DT31A, DT31B and DT31C - Annual data provided for DT31C only
DT31B	623380	307700	43.5	33.5	35.8	26.3	20.7	32.4	24.1	26.4	31.2	30.1	28.0	28.9	-	-	-	Triplicate Site with DT31A, DT31B and DT31C - Annual data provided for DT31C only
DT31C	623380	307700	9.1	31.9	28.1	26.1	20.3	30.8	26.3		29.6	26.8	32.0	29.2	29.5	28.5	-	Triplicate Site with DT31A, DT31B and DT31C - Annual data provided for DT31C only
DT34	622898	308114	34.2	30.6	31.3	23.2	20.2	21.6	19.4	24.2	24.6	24.9	28.5	27.3	25.8	24.9	-	
DT37	622492	308520	33.7	27.6	25.8		10.4	16.6	17.1	18.0	19.8	22.9		26.6	21.8	21.1	-	
DT39	622884	309082	27.2	26.9	27.1	21.0	16.6	17.8	16.0		19.8	19.3	22.5	18.5	21.1	20.4	-	
DT40	622695	307855	27.8	23.7	23.5	16.4	15.4	15.7	15.6	17.2	17.4	21.4	22.2	19.5	19.6	19.0	-	
DT41	623148	309277	30.4	27.3	33.9		21.1	17.7	24.2	4.8	23.3	26.2	27.9	24.2	23.7	22.9	-	
DT42	623151	309326					16.5	20.3	19.9	19.8	20.7	23.3	27.6	22.8	21.3	24.7	-	
DT44	622910	309391	19.0	23.3	21.4	17.5	12.6	14.1	13.8	11.6	14.6	30.5	20.1	21.1	18.3	17.7	-	
DT45	622904	309418	32.8	27.3	24.7	20.7	14.0	16.8	14.7	20.6	22.2	20.3		22.1	21.5	20.7	-	
DT46	622987	309486	30.5	24.6	26.5	20.3		22.6	19.9	8.7		23.0			22.0	20.3	-	
DT47	622869	309187	26.6	25.9	24.2	20.2	16.6	15.3	16.0	17.2	18.9	18.4	23.7	19.6	20.2	19.5	-	
DT48	623878	308532	37.0	30.9	30.3		19.5	25.3	25.4	27.5	28.9	27.9	28.0	27.9	28.1	27.1	-	
DT49	623480	307679	31.4	35.2	38.1	32.2	30.1	26.3	26.0	28.4	26.2	30.1	28.5	28.2	30.1	29.0	-	
DT50	623474	307692	36.1	28.7	26.0	21.4	18.5	24.8	21.5	22.3	25.1	22.5		23.1	24.5	23.7	-	
DT52	621958	309000	20.7	20.6	19.2	13.2	11.7	14.7	12.8	12.0	15.9	14.8	16.2	16.6	15.7	15.2	-	
DT60	622797	308454	23.6	22.4	22.4	14.6	10.9	14.0	13.0	10.6		15.4	19.0	13.8	16.3	15.8	-	
DT61	622655	308506		21.6	20.3	12.3	8.6	12.9	11.0	10.8	13.7	15.3		18.0	14.4	14.0	-	
DT62	622497	308499	34.2	28.9	24.0	21.7	21.3	27.1	25.0	24.6	27.3	27.0	30.4	26.2	26.5	25.6	-	
DT63	622638	308595	24.9	21.7	21.0	16.1	10.5	13.2		11.6	14.6	15.5	18.5		16.8	16.2	-	

DT64	622788	308569	29.4	23.6	23.2	16.7	13.9	16.8	14.9		15.6	18.9	21.7		19.5	18.8	-	
DT65	624050	307313	36.7	46.4	46.8	45.2	37.7	44.5	36.7	46.7	42.9	41.8	32.9	39.5	41.5	**40.1**	35.7	
DT66	624068	307319	44.9	34.2	34.2	25.1	22.8	33.1	32.9	31.6	30.7	30.3	45.4	28.1	32.8	31.7	-	
DT67	623099	308478	30.8	27.2	31.2	23.5	19.6	23.3	20.8	23.2	22.5	24.3	26.6	25.3	-	-	-	Triplicate Site with DT67, DT68 and DT69 - Annual data provided for DT69 only
DT68	623099	308478	24.0	26.9	10.6	20.8	19.3	21.5		22.0	24.6	25.2	26.8	19.6	-	-	-	Triplicate Site with DT67, DT68 and DT69 - Annual data provided for DT69 only
DT69	623099	308478	29.7	27.5	28.8	18.1	20.2	21.7	20.4	22.7	22.9	24.4	26.0		23.5	22.7	-	Triplicate Site with DT67, DT68 and DT69 - Annual data provided for DT69 only

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

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

☒ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **Norwich City Council confirm that all 2025 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Removed as higher than other tubes in triplicate

Missing

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 Norwich City Council During 2025

Norwich City Council has not identified any new sources relating to air quality within the reporting year of 2025.

Additional Air Quality Works Undertaken by Norwich City Council During 2025

Norwich City Council has not completed any additional works within the reporting year of 2025.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes deployed in 2025 were supplied and analysed by Gradko International using the 50% TEA in acetone preparation method. Gradko International are a UKAS accredited laboratory, partaking in the AIR-PT scheme for NO_2 diffusion tube analysis and Annual Field Intercomparison Exercise. These provide strict criteria relating to the performance that participating laboratories must meet, thereby ensuring that the reported NO_2 concentrations are of a high calibre.

The Gradko diffusion tubes demonstrated variable performance in early 2025, with 50% and 75% of results deemed satisfactory in the first two rounds. However, performance improved in subsequent rounds, with 100% of results within ±2 z-scores for the remainder of the year, indicating satisfactory performance overall.

AIR-PT Round	Monitoring Period	Gradko Result (%)	Performance Interpretation
AR068	January – February 2025	50%	Below satisfactory (partial compliance)
AR069	April – June 2025	75%	Majority satisfactory, some exceedances

AR071	July – September 2025	100%	Fully satisfactory
AR072	October – December 2025	100%	Fully satisfactory
R074	January-February	100%	Fully satisfactory

For all 18 observations in 2025, the precision of NO_2 diffusion tubes supplied by Gradko International were classified as 'good'. The precision is an indication of the laboratory's performance and consistency in both the preparation, analysis and handling of the diffusion tubes. Full details of the precision summary results are available here.

During 2025, the diffusion tubes were deployed in line with the monitoring calendar, with January and July being 1 day late and April being 1 day earlier than the calendar. (see figure below) However, no diffusion tube was left out beyond the recommended four to five weeks of TG(22). As a result, data has not had to be removed for any month, and all data has been used in the annual results.

Month	Defra Start Dates 2025	Actual Start Dates 2025	Defra End Dates 2025	Actual End Dates 2025
January	08/01/2025	09/01/2025	05/02/2025	05/02/2025
February	05/02/2025	05/02/2025	05/03/2025	05/03/2025
March	05/03/2025	05/03/2025	02/04/2025	01/04/2025
April	02/04/2025	01/04/2025	30/04/2025	30/04/2025
May	30/04/2025	30/04/2025	04/06/2025	04/06/2025
June	04/06/2025	04/06/2025	02/07/2025	03/07/2025
July	02/07/2025	03/07/2025	06/08/2025	06/08/2025
August	06/08/2025	06/08/2025	03/09/2025	03/09/2025
September	03/09/2025	03/09/2025	01/10/2025	01/10/2025
October	01/10/2025	01/10/2025	05/11/2025	05/11/2025
November	05/11/2025	05/11/2025	03/12/2025	03/12/2025
December	03/12/2025	03/12/2025	07/01/2026	07/01/2026

Diffusion Tube Annualisation

There were 2 diffusion tube locations that recorded data capture less than 75% but greater than 25% which were DT42 and DT46. In such instances it is necessary to annualise the data. The results are presented in Table C.1 below.

The data capture across the diffusion tube network in 2025 ranged from a minimum of 67% to a maximum of 100%, with 26 of the 35 diffusion tube locations meeting the 100% which is 74% of the diffusion tubes, which is a 20% more than last year's 54%. We will

continue to keep the diffusion tube sites under review and we shall amend them if we find particular problem areas where the tubes go missing repeatedly.

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Castle Meadow	Annualisation Factor Lakenfields	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
DT42	1.1254	1.2689	1.1971	21.3	25.6
DT46	0.9695	0.9413	0.9554	22.0	21.0

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2025 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.

Norwich City Council have applied a local bias adjustment factor of 0.97 to the 2025 monitoring data. A summary of bias adjustment factors used by Norwich City Council over the past five years is presented in Table C.2.

Norwich City Council has one automatic monitoring station (Castle Meadow 2 CM3) and there is an AURN (Lakenfields CM2) in Norwich where diffusion tubes are co-located. A local bias adjustment calculation was carried out and is presented in Table C.3. Data capture at both co-location sites was above 85%, and the diffusion tube precision met the requirements of LAQM.TG22.

Care has been taken when applying the local bias adjustment factor to ensure it is appropriate for the concentrations measured across the survey. The co-location sites at Castle Meadow 2 (CM3) and Lakenfields AURN (CM2) are considered representative of typical urban roadside conditions within Norwich, including the influence of local NOx sources. As such, the derived local bias adjustment factor is considered suitable for application to the wider network.

The national bias adjustment factor (0.92) is lower than the locally derived factor (0.97) and would therefore result in lower adjusted NO_2 concentrations. Use of the local factor is

considered more representative of local conditions and provides greater confidence that concentrations are not being underestimated, although it is acknowledged that applying a single factor across sites introduces some degree of uncertainty in line with Section 7.229 of LAQM.TG22 guidance.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2025	Local	-	0.97
2024	National	03/25 (12 studies)	0.88
2023	Local	-	0.88
2022	National	06/23 (15 studies)	0.82
2021	National	03/22 (14 studies)	0.83

Table C.3 – Local Bias Adjustment Calculation

Norwich City Council co-located the diffusion tubes at Lakenfields Automatic Station CM2 and Castle Meadow 2 AQS CM3 for 2025.

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	11	11			
Bias Factor A	1.06 (0.96 - 1.19)	0.88 (0.82 - 0.96)			
Bias Factor B	-6% (-16% - 4%)	13% (4% - 22%)			
Diffusion Tube Mean (µg/m^3)	8.9	23.5			
Mean CV (Precision)	4.3%	5.8%			
Automatic Mean (µg/m^3)	9.5	20.7			
Data Capture	99%	97%			
Adjusted Tube Mean (µg/m^3)	9 (9-11)	21 (19-23)			

Notes:

A combined local bias adjustment factor of 0.97 has been used to bias adjust the 2025 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.

One diffusion tube NO_2 monitoring location with Norwich City Council required a distance correction during 2024. This was a new diffusion tube location for 2025 at Bracondale DT65. The results of the calculation are shown in Table C.4. DT65 is just outside of the AQMA.

Table C.4 – 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
DT65	3.2	5.4	40.1	8.0	35.7	*Predicted concentration at receptor below 10% of the Air Quality objective of 40 µg/m^3*

QA/QC of Automatic Monitoring

In order to satisfy the requirements outlined in LAQM TG(22), at the Norwich City Council owned automatic monitoring station Castle Meadow 2 (CM3), the following QA/QC procedures were implemented;

- The analysers are now calibrated every four weeks by a member of the Norwich City Council Environmental Protection Team. This frequency was reduced from every two weeks due to supply issues with nitric oxide (NO) gas, which is essential for the calibration process.
- Annual audits.
- 6-monthly servicing of the monitoring sites.
- Data ratification.

Calibration of the analysers was carried out using certified compressed gas standards (ISO17025). This ensured that the calibration gas was traceable to the national and international standards. In addition to the calibration, sample filters were changed for Horiba APNA-370 – Nox Monitor and any faults were rectified swiftly, thus minimising data loss. Audits of the monitoring sites were carried out by Ricardo-AEA Ltd and consisted of a number of performance checks to identify any faults with the equipment. The calibration cylinders were also checked against other standard gas to confirm the gas concentration. Any identified faults were forwarded on to the service engineer for repair.

Both the validation and ratification of data from the Castle Meadow 2 automatic monitoring station is provided by Air Quality Data Management (AQDM) for details to the standards described in LAQM TG(22). Validation is the process that operates on data during the collection stage; all data is continually screened algorithmically and manually for anomalies. The anomalies may occur due to equipment failure, human error, power failure, interferences or other disturbances. Ratification is the process that finalises the data to produce the measurements suitable for reporting. All available data is critically assessed so that the best data scaling is applied and all anomalies are appropriately edited; generally, this occurs at three, six or twelve month intervals. Public access to live/historic data is available on the Norfolk Air Quality (AQDM) website.

The Norwich Lakenfields automatic monitoring station is part of the AURN operated by Bureau Veritas. The AURN have appointed LSO's and servicing is conducted by Ricardo AEA on a six monthly basis. Audits are conducted by Ricardo-AEA Ltd annually. Live and historic data is available through the Defra website.

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

The Castle Meadow 2 Station and Norwich Lakenfields AURN sites both have a FIDAS analyser to monitor PM_{10} and $PM_{2.5}$.

The Gravimetric $PM_{2.5}$ is the FIDAS $PM_{2.5}$ divided by 1.06 as detailed in Chapter 7 of the LAQM.TG22.

No adjustment is required for PM_{10}.

Automatic Monitoring Annualisation

All automatic monitoring locations within Norwich City Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data.

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 NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, automatic annual mean NO_2 concentrations corrected for distance are presented in Table A.3.

No automatic NO_2 monitoring locations within Norwich City Council required distance correction during 2025.

QA/QC of Automatic Air Quality Instruments

Air quality measurements from the automatic instruments are validated and ratified by Air Quality Data Management (AQDM) http://www.aqdm.co.uk to the standards described in the Local Air Quality Management – Technical Guidance LAQM (TG22) https://laqm.defra.gov.uk/technical-guidance.

Validation

This process operates on data during the data collection stage. All data are continually screened algorithmically and manually for anomalies. There are several techniques designed to discover spurious and unusual measurements within a very large dataset. These anomalies may be due to equipment failure, human error, power failures, interference or other disturbances. Automatic screening can only safely identify spurious results that need further manual investigation.

Raw data from the gaseous instruments (e.g. NO_x, O_3, SO_2 and CO) are scaled into concentrations using the latest values derived from the manual and automatic calibrations. These instruments are not absolute and suffer drifts. Both the zero baseline (background) and the sensitivity may change over time. Regular calibrations with certified gas standards are used to measure the zero and sensitivity. However, these are only valid for the moment of the calibration since the instrument will continue to drift. Raw measurements from particulate instruments (e.g. PM_{10} and $PM_{2.5}$) generally do not require scaling into concentrations. The original raw data are always preserved intact while the processed data are dynamically scaled and edited.

Ratification

This is the process that finalises the data to produce the measurements suitable for reporting. All available information is critically assessed so that the best data scaling is applied and all anomalies are appropriately edited. Generally this operates at three, six or twelve month intervals. However, unexpected faults can be identified during the instrument routine services or independent audits which are often at 6-monthly intervals. In practice, therefore, the data can only be fully ratified in 12-month or annual periods. The data processing performed during the three and six monthly cycles helps build a reliable dataset that is finalised at the end of the year.

There is a diverse range of additional information that can be essential to the correct understanding and editing of data anomalies. These may include

- the correct scaling of data
- ignoring calibrations that were poor e.g. a spent zero scrubber
- closely tracking rapid drifts or eliminating the data
- comparing the measurements with other pollutants and nearby sites
- corrections due to span cylinder drift
- corrections due to flow drifts for the particulate instruments
- corrections for ozone instrument sensitivity drifts
- eliminating measurements for NO_2 conversion inefficiencies
- eliminating periods where calibration gas is in the ambient dataset
- identifying periods were instruments are warming-up after a powercut
- identification of anomalies due to mains power spikes

- correcting problems with the date and time stamp
- observations made during the sites visits and services

The identification of data anomalies, the proper understanding of the effects and the application of appropriate corrections requires expertise gained over many years of operational experience. Instruments and infrastructure can fail in numerous ways that significantly and visually affect the quality of the measurements. There are rarely simple faults that can be discovered by computer algorithms or can be understood without previous experience.

The PM_{10} and $PM_{2.5}$ concentrations may require scaling into Gravimetric Equivalent concentration units by use of the Volatile Correction Model (VCM) http://www.volatile-correction-model.info or by corrections published by Defra https://uk-air.defra.gov.uk/networks/monitoring-methods?view=mcerts-scheme depending on the measurement technique.

Further information about air quality data management, expert data ratification and examples of bad practices are given on the Air Quality Data Management (AQDM) website http://www.aqdm.co.uk.

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

Figure D.1.A-D – Maps of Non-Automatic Monitoring Sites including AQMA boundary line and Automatic Monitoring Stations.

Figure D.1.A - Diffusion Tube Location Overview with AQMA Boundary

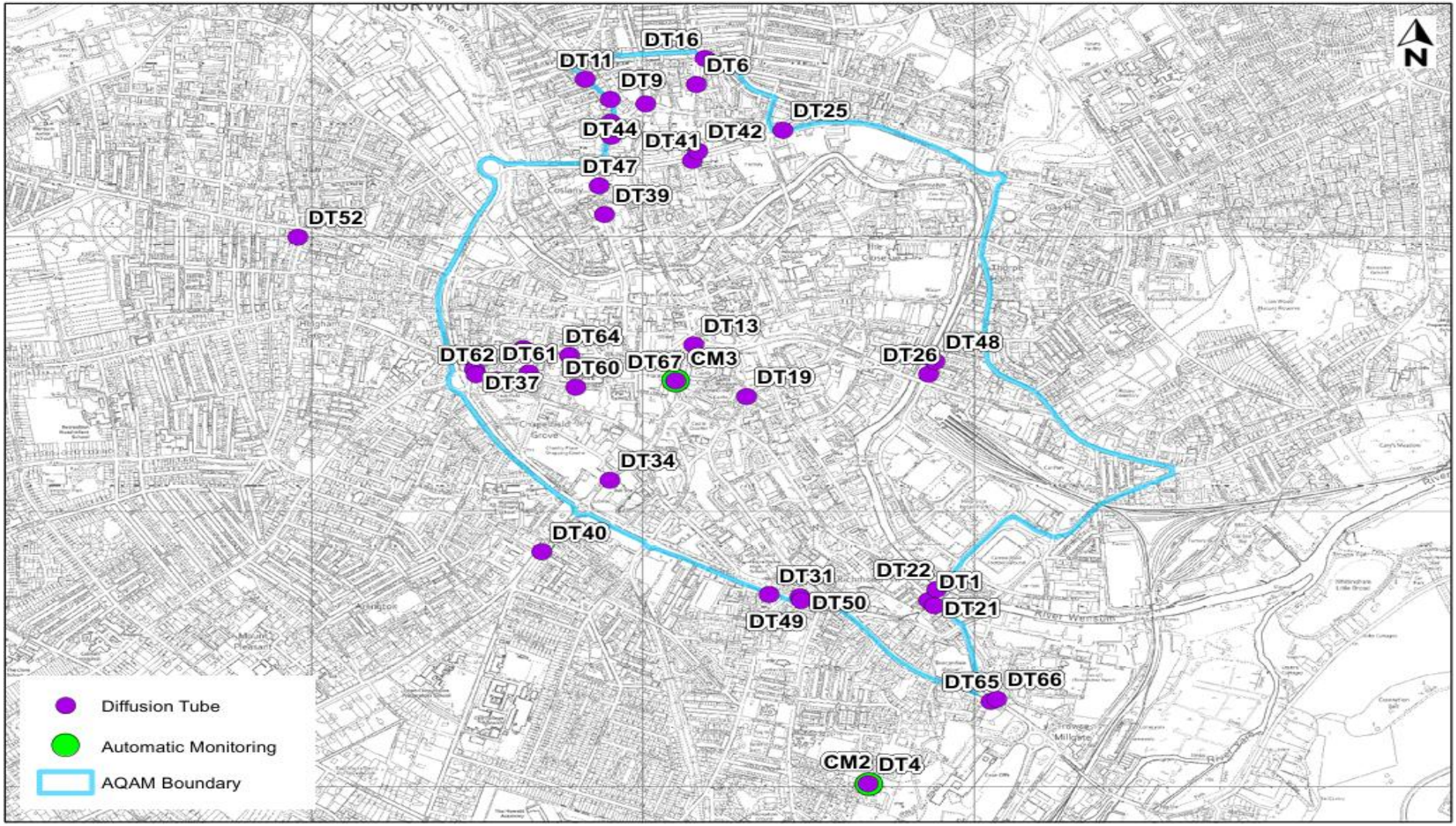


Figure D.1.B - Diffusion Tubes – Central Norwich

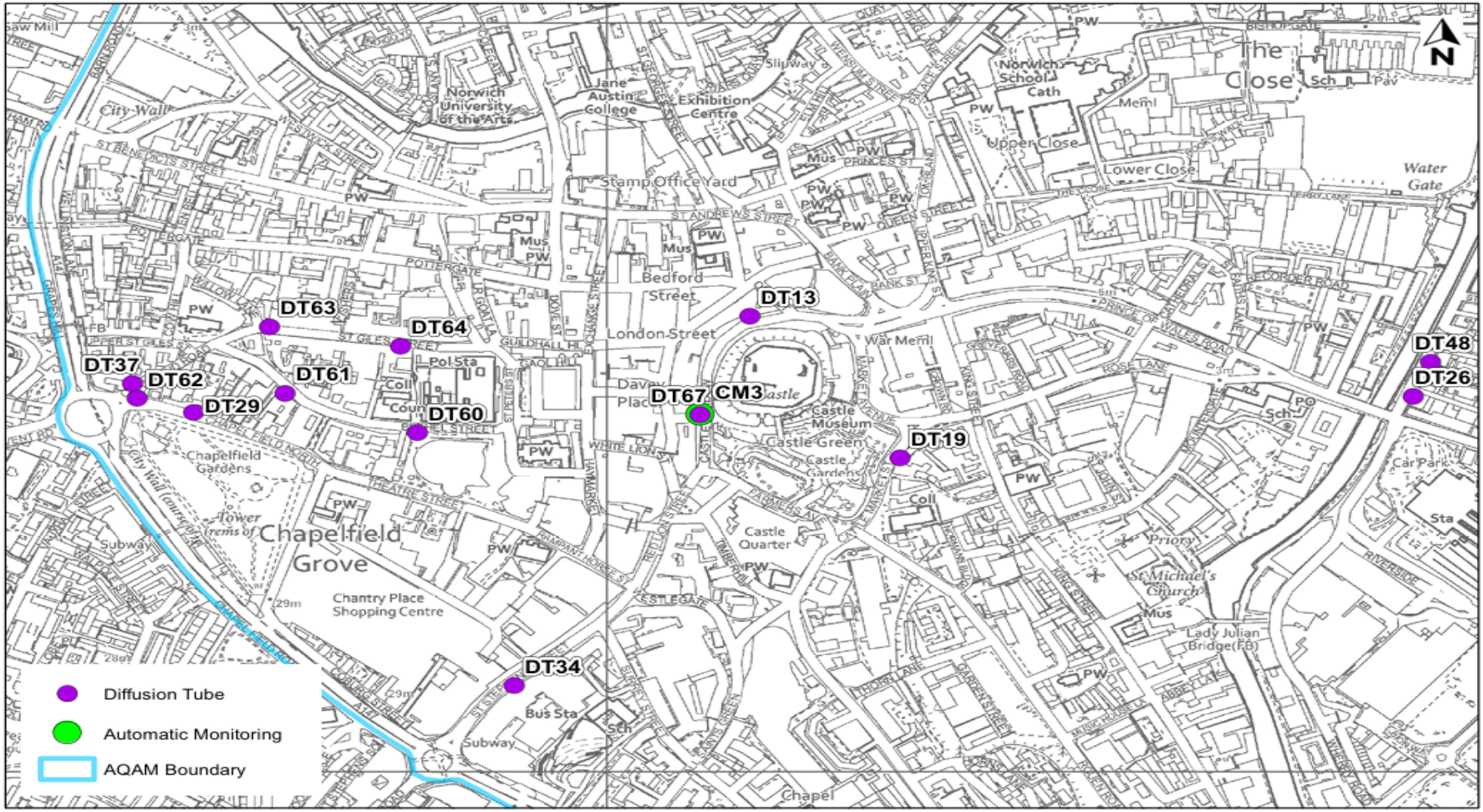


Figure D.1.C - Diffusion Tubes – North Norwich

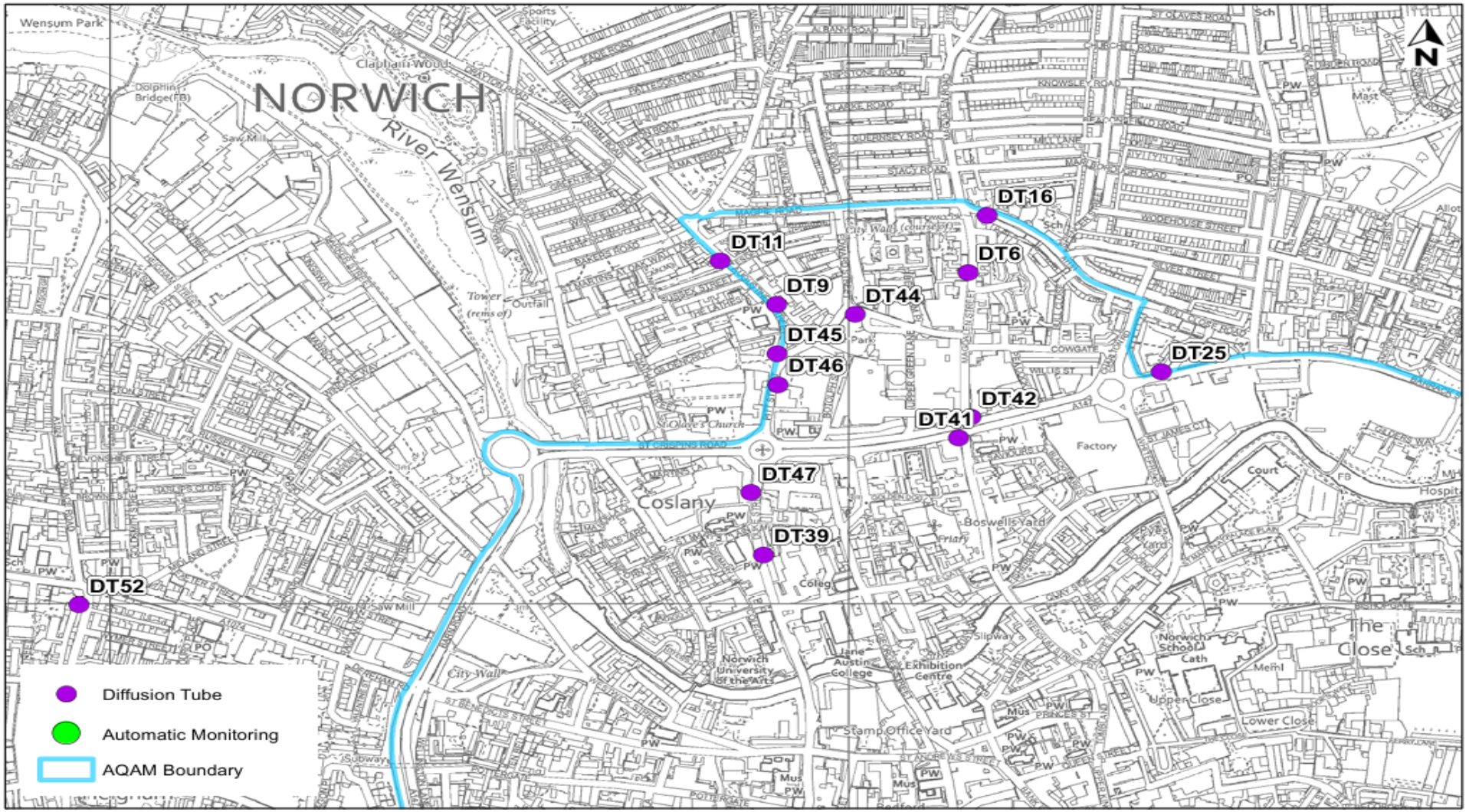
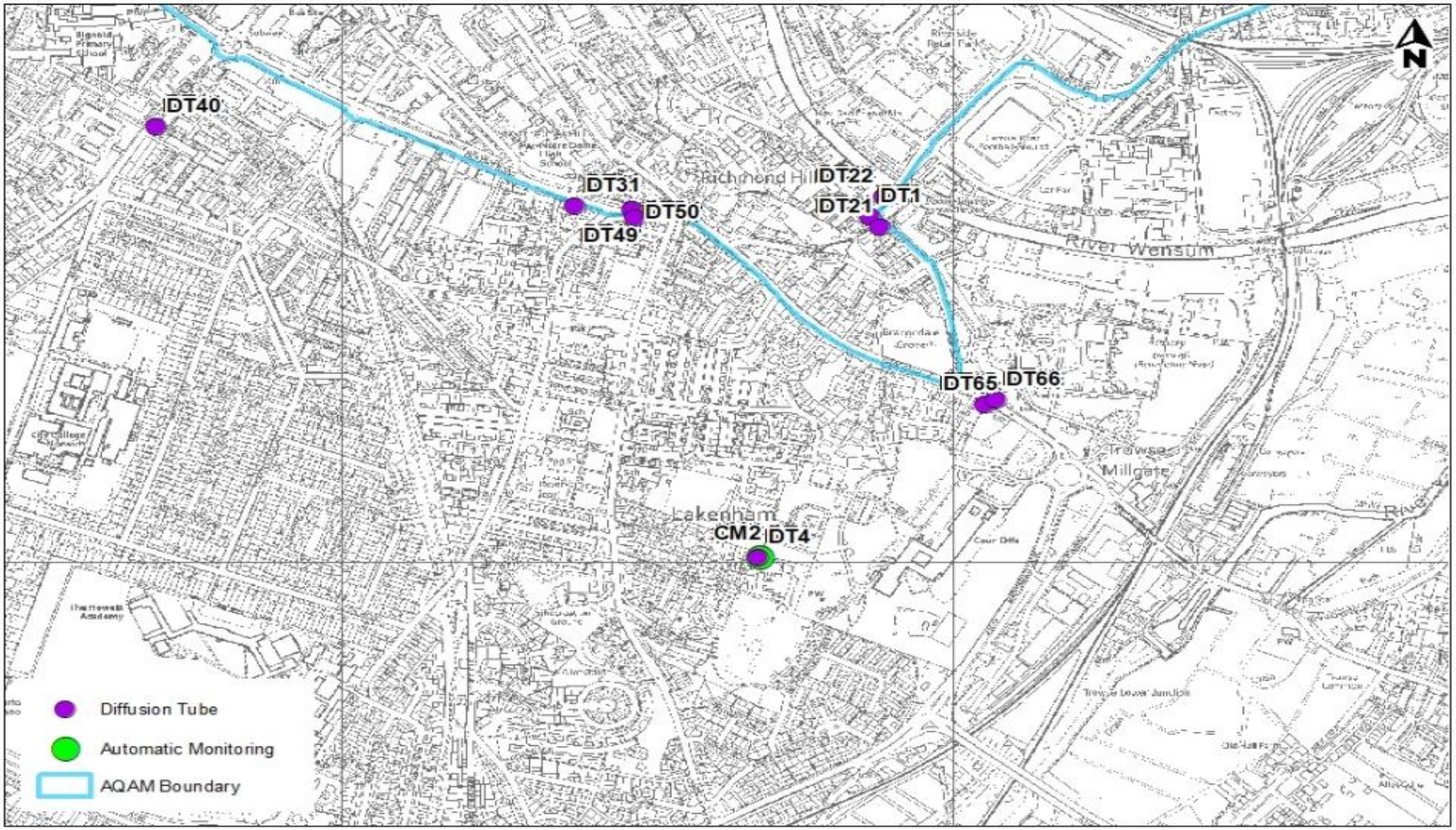


Figure D.1.D - Diffusion Tubes – South of Norwich



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[11]

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
AQS	Air Quality Station or Air Quality Standards
AURN	Automatic Urban and Rural Network
BSIP	Bus Service Improvement Plan
CHP	Combined Heat and Power
CM1	Castle Meadow 1 - decommissioned
CM2	Lakenfields AQS
CM3	Castle Meadow 2 AQS
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
DT	Diffusion Tube/s
EV	Electric Vehicle
GNLP	Greater Norwich Local Plan
LAQM	Local Air Quality Management
LAQM.TG22	Local Air Quality Management Technical Guidance 2022
LEZ	Low Emission Zone
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
ONS	Office for National Statistics
PHOF	Public Health Outcomes Framework
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less

Abbreviation	Description
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
UEA	University of East Anglia
ZEBRA	Zero Emission Bus Regional Area

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.
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- Environment Act 1995 / 2021 updates
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.
- Greater Norwich Local Plan - https://www.gnlp.org.uk/
- Office for National Statistics - Office for National Statistics (ONS), Mid-Year Estimates 2024/25 https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/populationestimatesforenglandandwales/mid2024
- Norwich AQAP 2021
- Department for Transport (DfT) EV charging statistics
- Norwich City on-street chargepoint project - Norfolk County Council
- Electric vehicle charging infrastructure statistics: data tables (EVCI) - GOV.UK
- Norwich Local Cycling and Walking Infrastructure Plan (LCWIP)