Borough Council of
King's Lynn &
West Norfolk

2024 Air Quality Annual Status Report (ASR)

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

Date: June 2024

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Report Reference Number	BCKLWN_ASR_2024_final

Executive Summary: Air Quality in Our Area

Air Quality in the Borough Council of King's Lynn and West Norfolk (BCKLWN)

Air pollution affects us all through a number of adverse health impacts. There is growing evidence that air pollution is a significant contributor to preventable ill health and early death. It can cause and worsen health effects in all individuals particularly society's most vulnerable populations and those with pre-existing health conditions. There is often a strong correlation with equality issues because the areas with poor air quality are often the less affluent areas[1,2].

Long-term exposure to air pollution can cause chronic conditions such as cardiovascular and respiratory diseases as well as lung cancer, leading to reduced life expectancy. Short-term increases in levels of air pollution can also cause a range of health impacts including effects on lung function, exacerbation of asthma, increases in respiratory and cardiovascular hospital admissions and mortality. In addition, there is a growing evidence base which suggests that air pollution may also affect the brain and is linked to dementia and cognitive decline[3].

The mortality burden of air pollution within the UK is equivalent to 29,000 to 43,000 deaths at typical ages[4,5] with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[6]. These health damage costs associated with air pollution demonstrate a need for measures that not just target the areas where air pollution is highest, such as the Air Quality Management Areas (AQMAs) in King's Lynn but with interventions that also benefit the wider population district-wide.

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[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017; https://www.local.gov.uk/publications/air-quality-briefing-directors-public-health
[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006; https://uk-air.defra.gov.uk/library/reports?report_id=424
[3] Health Matters: Air Pollution, Public Health England 2018 Health matters: air pollution - GOV.UK (www.gov.uk)
[4] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022 https://assets.publishing.service.gov.uk/media/62ab19c4e90e07038e6df074/CHaPR_AQ_Special_Edition_2206116.pdf
[5] Defra. Air quality appraisal: damage cost guidance, March 2023; https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance
[6] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/708855/Estimation_of_costs_to_the_NHS_and_social_care_due_to_the_health_impacts_of_air_pollution_-_summary_report.pdf

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

As background to the area, it is essentially rural, being the tenth largest district council area in England and Wales covering approximately 550 sq. miles with a population of 154,300 (based on 2021 Census). It comprises two market towns of King's Lynn and Downham Market, the Victorian coastal town of Hunstanton and more than a hundred villages of varying sizes.

The main source of air pollution in the area is from road traffic emissions. Major roads include the A148 through King's Lynn, the A47, A17 and A10. These roads, amongst others, form the main highway arterial network within the borough.

There are two Air Quality Management Areas (AQMAs) within BCKLWN (Railway Road and Gaywood Clock[7]). They have been declared due to nitrogen dioxide (NO_2) exceeding the annual mean air quality objective (40µg/m^3 NO_2). Principal source is traffic emissions.

The last exceedance in the NO_2 annual mean was in 2019 within the Railway Rd AQMA. For the Gaywood Clock AQMA it is longer still with last exceedance occurring in 2010. Summary of the designations is shown in Table 2.1.

The current status of air quality is much improved following the Covid outbreak, with around a 20% reduction in the NO_2 annual mean being observed when compared to the

[7] Defra, UK-Air; https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=138

pre-Covid period. These trends in the NO_2 annual means are discussed in more detail in Section 3.2 against the individual pollutants. The general reduction in concentrations is considered consistent with trends observed more widely following the pandemic.

An Air Quality Action Plan (AQAP, 2015) sets out the required measures to reduce emissions (see Table 2.2). As this AQAP was adopted more than five years ago it is considered out of date. To progress matters we have already gone out to public consultation on a revised version (Draft AQAP 2024[8]). Once all of the comments from the consultation have been considered and final report prepared it will be put to the members for a decision on whether to adopt the updated AQAP. This is planned for summer 2024. At around the same time and due to continued period of compliance within Gaywood Clock AQMA this will also be put forward for a decision on whether to revoke this AQMA, leaving the Railway Rd AQMA.

In relation to the fine particulate matter emissions, as explained in Section 2.3 there are new national targets (see Table E.2) as introduced by the Environment Act 2021 on $PM_{2.5}$ to consider. These do not form part of LAQM duties; however we are expected to work towards these national targets. The challenge with these targets as explained is the population exposure reduction target (PERT) for BCKLWN that must reduce by 35% in 2040 when compared to 2018 annual mean levels. The current $PM_{2.5}$ annual mean (2023) for the BCKLWN area when based on Defra background maps is currently higher. This shows the extent of work that is still necessary in support of the national targets.

Measures to reduce this pollutant that are in support of the national targets are set out in more detail in Section 2.3.

In addition to this background data we also carry out industrial background monitoring for particulate matter as explained in Appendix C. No exceedances in the objectives were identified in these areas monitored during the 2023 period.

Furthermore, no new sources were identified likely to significantly impact air quality either from new developments, or from changes to sites regulated by environmental permitting either by the Council or Environment Agency.

[8] BCKLWN AQAP 2024-2029 consultation; https://www.west-norfolk.gov.uk/aqap-consultation

Actions to Improve Air Quality

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

The National Air Quality Strategy (NAQS, 2023[9]) provides the strategic framework for local authorities and other partners to follow to improve air quality. The NAQS consolidated local air quality management (LAQM) duties with new responsibilities from the Environment Act 2021 including additional powers on smoke controls plus new national targets on $PM_{2.5}$.

In terms of actions specific to $PM_{2.5}$ the NAQS sets out that all local authorities should support the delivery of the national $PM_{2.5}$ targets by taking action to reduce emissions from sources within their control. This is discussed further in Chapter 2.

The Road to Zero[10] details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel, and the majority of Air Quality Management Areas (AQMAs) are designated due to transport emissions.

Improving air quality is a complex problem and only by working in partnership with key stakeholders to facilitate these improvements can appropriate actions be taken. Examples of this work are set out below:

Actions arising through the AQAP:

King's Lynn and West Norfolk Council have implemented a number of measures that are likely to have reduced concentrations of NO_2 and associated $PM_{2.5}$ in the borough though existing AQAP for example;

- Improvements have been carried out to King's Lynn Transport Interchange (bus-rail) to help incentivise the use of public transport;
- Urban traffic control systems and selective vehicle detection systems have also been implemented in the town centre to help improve traffic flows;

[9] NAQS, 2023; https://www.gov.uk/government/publications/the-air-quality-strategy-for-england/air-quality-strategy-framework-for-local-authority-delivery
[10] DfT, 2018, The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy; https://www.gov.uk/government/publications/reducing-emissions-from-road-transport-road-to-zero-strategy

- Securing best practice mitigation wherever possible through our work on planning applications. In the 2023 period we assessed 111 planning applications.
- The most significant are set out in Appendix-C (Table C.1).

Electric Vehicle (EV) Charging Infrastructure:

- The Council successfully applied to OZEV in December 2021 for a grant to install twenty-six double fast EV charging points at council owned car parks across the district. As of June 2023 six sites with eighteen fast (7kW) charging points are currently operational with one further site still to be completed. This additional site is planned to have eight fast charging points installed. They have been installed to give local residents with no off-street parking provision the opportunity to charge their electric vehicle overnight at one of the selected sites. They are available also for daytime use.
- The Council has also replaced the four legacy 50kW Rapid charging points. Three new Rapid EVCP have been installed at St James' multi -storey car park, King's Lynn and one Rapid EVCP at Central car park, Hunstanton.
- In addition, we have through the normal course of development and ahead of the Approved Document Part S of the Building Regulations secured conditions for EV. This includes future proofing the strategic growth area of the A10 corridor (West Winch ref 13/01615/OM and 18/02289/OM)) plus North Wootton (ref 20/01954/RMM) with suitable schemes of around 2,000 EV charging units. This is in addition, to the Council's own housing development (Parkway, 21/01873/FM) of 226 dwellings with respective EV charging units.
- The locations and type of EV charging points district-wide is regularly updated so we recommend the use of zap map[11,12] to keep up to date on the type and locations of EV infrastructure.
- The Council is currently developing a car parking strategy which considers future EV charge point provision.

[11] Zap Map; https://www.zap-map.com/live/
[12] BCKLWN; Locations of EV charging infrastructure; https://www.west-norfolk.gov.uk/info/20095/energy_and_climate_change/921/electric_vehicle_charging_points

Traffic Management schemes:

BCKLWN are working with Norfolk County Council on progressing the King's Lynn Area Transport Strategy. The outline business case from the preferred options includes measures to improve the accessibility to cycling and walking and a re-routing of buses that is considered necessary for the town centre. Redesigning the transport infrastructure towards active travel is considered a priority.

Work is also underway on redevelopment of the South Gate entrance into King's Lynn with improved connectivity to more sustainable forms of transport. This area forms the southern extent of the Railway Rd AQMA.

These projects are challenging as the London / Railway Rd (A148) through the town centre is the main arterial route and of importance to the economy of King's Lynn. It requires a careful balance to ensure a vibrant economy but also with measures that improve air quality. An update can be reported in next year's ASR once the business case and transport assessments are further developed.

Local Cycling and Walking Infrastructure Plans:

The council is also working with Norfolk County Council on progressing a local cycling and walking infrastructure plan (LCWIP) for the King's Lynn area[13]. A number of the measures have been prioritised and secured with funding (£6.7m) as part of the council's Active and Clean Connectivity Plan[14]. There is also a Norfolk wide LCWIP[15] to enable wider connectivity across the county.

Measures aimed at $PM_{2.5}$:

We are working closely with Public Health on the Public Health Outcomes Framework (PHOF) indicator D01 on actions in relation to $PM_{2.5}$. Measures are explained further within Chapter 2. Initial work has reviewed principal (primary) $PM_{2.5}$ sources with a view to develop a strategy/project in conjunction with Public Health aimed at reducing exposure to this pollutant borough wide.

[13] NCC LCWIP; https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/roads-and-travel-policies/local-cycling-and-walking-infrastructure-plans
[14] BCKLWN ACCP; https://www.visionkingslynn.co.uk/projects/active-and-clean-connectivity/
[15] NCC; https://www.norfolk.gov.uk/news/2023/05/have-your-say-on-the-future-of-cycling-and-walking-in-norfolk

Conclusions and Priorities

The key findings for this year are: -

- *No exceedances of the National Air Quality Strategy standards were identified for Nitrogen Dioxide (NO_2) during 2023.*
- *This is the fourth year running at Railway Rd AQMA where compliant results have been observed with no exceedances of the NO_2 annual mean objective. The compliance period is longer for the Gaywood Clock AQMA.*
- *We assessed 111 planning applications during 2023. The most significant (36) are listed in Appendix C Table C.1. None were identified as likely to significantly impact air quality.*
- *Trends in NO_2 following the first Covid lock-down year of 2020 showed a marked reduction of around 20% in the annual mean NO_2 concentrations. The concern had been the extent of traffic rebound, but annual mean concentrations have subsequently remained relatively constant, with results less than 10% of the NO_2 objective (40*µg/m^3*).*
- *We will continue with the current monitoring programme to further assess changes. An additional NO2 diffusion tube monitoring site was added in 2023.*
- *No exceedances of PM_{10} objectives level were noted during 2023.*
- *No exceedances of the $PM_{2.5}$ annual mean level were noted during 2023.*
- *Monitoring results are not in excess of the air quality objectives outside of the existing AQMA's and therefore we are not proposing to amend or designate a new AQMA.*

Our priories noting any anticipated challenges / changes for the forthcoming year are:

- *The existing Railway Road AQMA will be retained, but we will further review once the traffic studies for the Town Centre one way system, Southgates Masterplan and West Winch have been determined.*
- *A Cabinet Report will be put forward in the Autumn to adopt the draft AQAP and revoke the Gaywood Clock AQMA.*
- *An additional continuous air quality monitoring station (Earthsense Zephyr) has been purchased to help with detailed air quality modelling assessment work. This will be located in Railway Road and will assist assessing the proposed road layout changes in King's Lynn and West Winch.*
- *We will carry out the annual review and amend the monitoring programme to ensure monitoring locations remain valid.*

- *In support of the national population exposure reduction target for $PM_{2.5}$ we will continue to work with Norfolk County Council's public health specialists to develop a health-based West Norfolk air quality project focussing on PM10 & $PM_{2.5}$ across the district by targeting the principal sources that are within this council's control.*
- *Continue to collaborate closely with partners to implement King's Lynn Transport Strategy and assess regeneration and traffic management projects which will assist with reducing traffic related emissions.*
- *Continue to review planning applications.*
- *To attend and work jointly with the Norfolk countywide Air Quality Group.*

Local Engagement and How to get Involved.

The following section is aimed at providing information on the work we undertake and how it is possible to get involved.

The framework that underpins this work comes under what is termed Local Air Quality Management (LAQM) framework. LAQM provides the tools to assess and monitor the pollution sources as well as the means to mitigate and where necessary offset these emissions through associated guidance.

As the air quality pollutants are common to sources of the greenhouse gases the LAQM framework has the potential to deliver ancillary benefits. Barriers can potentially form but can be minimised through effective policies & partnership working.

To help direct people to the relevant area of interest, we have structured the information on air quality within the Council's website under the following web-topic pages:

- Air Pollution Levels[16]; this web page includes further information about the pollutants we monitor in the borough and how to access to view / download automatic air quality monitoring data[17].
- Air Quality Reports[18]: this includes the Annual Status Reports (ASR) on air quality, previous source apportionment studies and the current AQAP (2015).

[16] https://www.west-norfolk.gov.uk/info/20137/air_quality/171/air_pollution_levels
[17] https://www.norfolkairquality.net/
[18] https://www.west-norfolk.gov.uk/downloads/download/346/air_quality_information_documents

- Air Quality Information[19]: this web page provides a summary of the current priorities taken from the Executive summary of the ASR. This is updated annually.
- Air Quality Management Areas[20]: provides summary of the AQMAs in King's Lynn and current version of the AQAP (2015).
- Burning Wood and Coal[21]: this is a dedicated web page on burning of wood and coal with practical advice on minimising emissions with link to Defra's Burn Better, Breathe Better campaign. This section provides details on the Smoke Control Areas in King's Lynn.
- Indoor Air Quality[22]: We also have a webpage on indoor air quality with information on some of the in-door pollutant sources and checklist from Asthma and Lung UK to help with conditions like asthma and COPD.
- Smoke Control Areas[23]; this is a webpage on the Smoke Control Areas (SCA) in King's Lynn. The page has been updated to include the new enforcement provisions on smoke from a chimney in an SCA. The webpage includes an online tool to make it easier to report smoke within the SCAs.

Information is also available from Norfolk County Council's website on the Local Transport Plan's strategy for King's Lynn[24, 25] and also a Local Cycling and Walking Infrastructure Plan (LCWIP[13]) for the area.

Further information on air quality and daily index forecasts is held nationally on Defra's UK Air resource site: https://uk-air.defra.gov.uk/.

We participate in Clean Air Day[26] each year and support the initiatives via the Council's communications network.

[19] https://www.west-norfolk.gov.uk/info/20137/air_quality/169/air_quality_information
[20] https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas
[21] https://www.west-norfolk.gov.uk/info/20137/air_quality/633/burning_wood_and_coal
[22] https://www.west-norfolk.gov.uk/info/20137/air_quality/870/indoor_air_quality
[23] https://www.west-norfolk.gov.uk/homepage/309/smoke_control_areas
[24] Local Transport Plan v.4 Strategy for King's Lynn; https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/roads-and-travel-policies/local-transport-plan
[25] NCC, King's Lynn Area Transport Strategy; https://www.norfolk.gov.uk/roads-and-transport/major-projects-and-improvement-plans/kings-lynn/about-transport-for-kings-lynn

[26] Clean Air Day; https://www.actionforcleanair.org.uk/files/cad_24_events_guide_final.pdf

To obtain further information on these air quality issues or how to get involved with some of the issues / challenges please email the environmental quality team; environmental.quality@west-norfolk.gov.uk.

Local Responsibilities and Commitment

This Annual Status Report on air quality for 2024 has been prepared by the Environmental Quality section of the Borough Council. This report sits within the Directorship of Environment & Planning of the Borough Council of King's Lynn and West Norfolk. Officers involved in preparation and review of this ASR are set out within the preface to this report.

Responsibility for the air quality function rests with BCKLWN whereas Norfolk County Council are the highways / public health authority.

This ASR has been signed-off by the Director of Public Health of Norfolk County Council with the following comments:

- *Public Health is pleased to see the continuing improvement of air quality in King's Lynn. It believes that the decision to seek the revocation of the Gaywood Clock AQMA can be justified whilst welcoming the cautious approach to continue with the Railway Road AQMA whilst further air quality improvement measures come to fruition.*
- *Public Health is actively supporting the source apportionment project being carried out by the Borough Council of King's Lynn and West Norfolk and values the contribution that the Borough Council is making to the Countywide Air Quality Group's projects and aspirations to improve the air quality of Norfolk.*

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Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in the Borough Council of King's Lynn and West Norfolk's (BCKLWN) area during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out.

This Annual Status Report (ASR) is an annual requirement showing the strategies employed by the BCKLWN 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 BCKLWN can be found Table 2.1. The table presents a description of the two AQMAs that are currently designated within the BCKLWN.

Maps of the AQMAs and also the air quality monitoring locations in relation to the AQMAs are shown in Appendix D.

The air quality objective pertinent to the current AQMA designations is the:

- **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?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Gaywood Clock AQMA	Declared 04/01/2009	NO_2 Annual Mean	Area encompassing a number of properties around the Gaywood Clock junction of A148 and A1076.	No	45.1 µg/m3	27.4 µg/m3	13	AQAP 2015	https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas
Railway Road AQMA	Declared 01/11/2003 Amended 01/02/2007	NO_2 Annual Mean	An area encompassing a number of properties along the A148 within the town centre.	No	55.0 µg/m3	32.5 µg/m3	4	AQAP 2015	https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas

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

☒ **BCKLWN confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in BCKLWN

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed, and provided the information specified in the Guidance. The appraisal added the following commentary;

1. *BCKLWN have two AQMAs, both of which have been compliant for at least 3 consecutive years. The Council are strongly urged to progress with revocation of the Gaywood Clock AQMA which has not seen an exceedance of the annual mean NO_2 objective since 2016. The Council decision to wait for further monitoring data supporting compliance before considering revocation of the Railway Road AQMA is supported.*

   Response: This is being progressed as mentioned.

2. *The 2023 ASR by BCKLWN has been approved by the Public Health Manager for Norfolk County Council. This is welcomed; collaboration and consultation with those who have responsibility for Public Health is expected to increase support for measures to improve air quality, with co-benefits for all.*

   Response: The same collaborative approach is taken forward in this ASR.

3. *Priorities for the coming year are clearly defined in the report, including the adoption of an updated AQAP in 2023/2024.*

   Response: We continue to assign priorities as mentioned.

4. *It is noted BCKLWNs AQAP is out of date, this was first published in 2015. The report states a new AQAP has been drafted and is expected to be adopted in the coming year, however this update seems largely unchanged from last year's appraisal. BCKLWN are reminded if they intend to retain the Railway Road AQMA, they should proceed with updating their AQAP.*

   Response: We intend to retain the Railway Rd AQMA and are proceeding to update the AQAP as mentioned.

5. *BCKLWN have referred to the Public Health Outcomes Framework and have quoted the local value of indicator D01. Additionally, the report details several measures in place to reduce $PM_{2.5}$ emissions and concentrations. This is encouraging to see; it demonstrates the Councils proactive and dedicated commitment to reducing public health impacts from air pollution.*

   Response: A similar approach has been taken forward in this ASR.

6. *The Council have four Turnkey Osiris monitors, which they have reported on in the main report. These monitoring results are useful as indicative monitoring but cannot be reported on for LAQM purposes. The additional monitoring is appreciated; however results and additional information should be within the appendix of the ASR rather than the main body of the report.*

   Response: This has been actioned as mentioned with results appended.

7. *There is a reduction of two diffusion tube sites compared to 2021 (75 sites), it is not clear which sites have been decommissioned or reasons as to why they were removed. It would be beneficial to include this information.*

   Response: An update on the diffusion tube sites has been included in Section 3.1.2.

8. *Trends have been discussed, with a robust comparison to air quality objectives. Discussing monitoring results by location, i.e. by AQMAs, which allows for easy interpretation of spatial and temporal trends.*

   Response: This approach is taken forward within this ASR.

9. *Figures A.1 to A.3 display trends in monitoring data of some sites. It would be beneficial to include all monitoring locations, or at least sites within AQMAs.*

   Response: All monitoring locations within AQMAs are included in trend figures.

10. *There are some minor errors in the completion of tables of the report:*

    a. *In Table A.2, the information for site 75 does not indicate which AQMA the site is located within.*

       Response: This has been actioned showing site 75 with Gaywood Clock AQMA.

    b. *The site type of continuous NO_2 monitors is inconsistent between Table A.1 compared to Tables A.3 and A.5. This should be clarified.*

       Response: This has been actioned with sites shown as roadside.

    c. *The bias adjustment factor used from 2019 to 2022 has not been provided in Table C.3. 2022s bias adjustment factor can be ascertained from the text, but it would be useful to be able to easily compare this to previous years bias adjustment factors.*

       Response: This has been actioned with Table C.3 updated.

11. *QAQC procedures are generally considered robust, with detailed supporting discussion provided for all procedures applied, including annualisation and bias adjustment.*

    Response: Similar approach to QA/QC taken forward in this ASR.

12. *There are some minor issues with data capture:*

a. *In Table A.3 and A.4 it is not clear why data capture for the monitoring period differs to data capture for 2022. Unless the monitoring site was installed or decommissioned mid-year, both data capture for the monitoring period and data capture for 2022 should be identical.*

   Response: This has been actioned.

b. *Site 102 is reported to have a data capture of 74.8% in Table A.4. Text throughout the report indicates annualisation has been applied where data capture is <75%, and >25%, however site 102 has not been annualised. It is assumed data capture in Table A.4 was calculated using the Defra Diffusion Tube Processing Tool, which is based on the number of days exposed, whilst a data capture based on the number of months exposed was used to determine annualisation (i.e. 9 out of 12 months of data in 2022 gives 75%). Whilst it is acceptable to use this method to determine the requirement for annualisation, it is confusing to use different methods of calculating data capture for different purposes across the report. In future this discrepancy between reported data capture in Table A.2 and data capture used to determine annualisation should at least be explained, or a consistent approach applied.*

   Response: This has been actioned.

13. The report provides a detailed summary of major planning applications received in 2022, and how they have been assessed for air quality impacts. This is commended.

    Response: A similar approach to planning applications is taken forward in this ASR.

Action Plan Measures:

As mentioned above, the priority has been to update the existing AQAP, as this was adopted more than 5-years ago. We have been progressing an updated version, having gone out to public consultation on a draft updated AQAP[8] between January and March 2024 and holding meetings with key stakeholders on the revised measures and their priorities. This updated AQAP is to be put forward for adoption and to revoke Gaywood Clock AQMA (summer 2024).

In terms of the existing measures, BCKLWN in conjunction with key stakeholders have taken forward these measures during the current reporting period that are in pursuit of improving air quality. The details of all the AQAP measures are set in out in Table 2.2 that are either shown as completed, in progress or planned.

In total there are 20 measures included within Table 2.2 that show the type of measure and the progress made. Barriers restricting implementation of any of the measures are also shown.

More detail on the specific measures can be found in their respective plans such as King's Lynn area Transport Strategy[24, 25] and the Local Cycling and Walking Infrastructure Plan[13].

Key completed measures are:

a) **Measure 2:** *To consider air quality considerations in the Local Plan and adopt development management policy on air quality having regard to the NPPF*;

   Existing local policy[27] on air quality includes policy DM15 which sets out that development should '*protect and enhance the amenity of the wider environment including air quality*'. Other related policy includes those listed as core policy such as CS08 that expects development to achieve high standards of sustainable design and CS11 relating to transport.

   The emerging Local Plan[28] was submitted for examination in March 2022 that adopts existing policy plus related policies LP21 (Environment, Design and Amenity), LP13 (Transport) and LP18 (Design and Sustainable Development).

   In conjunction with national (NPPF) policies these are considered as sufficient.

b) **Measure 3**; *To Adopt Norfolk Technical Guidance on Air Quality*:

   This local planning guidance document has been superseded by the Institute of Air Quality Management's (2017[29]) guidance on development control.

c) **Measure 5**; *To Create new access road for buses to Boal Street*:

   This measure involved creating a bus route along Hardings Way and has been in operation for a number of years (complete). The route forms part of NCN Route 1 removing a number of buses from Railway Rd AQMA.

d) **Measure 7 and Measure 8**; *Improvements to Urban Traffic Control Systems and installation of Selective Vehicle Detection Systems*;

   Traffic management systems to help reduce traffic congestion through King's Lynn have been completed. The systems incorporate SCOOT technology.

e) **Measure 11**; *Installation of variable message signs*;

[27] Current Local Plan; https://www.west-norfolk.gov.uk/homepage/23/current_local_plan
[28] Local Plan Review Pre-Submission Stage 2021; https://west-norfolk-consult.objective.co.uk/kse/event/36371/section/s1625822757694#s1625822757694
[29] Institute of Air Quality Management, IAQM / EPUK (2017); https://iaqm.co.uk/guidance/

Variable message signs have been installed on the approach to King's Lynn town centre to indicate where parking spaces are available.

BCKLWN anticipates that the measures stated above and set out in Table 2.2 will continue to ensure compliance with Railway Rd and Gaywood Clock AQMAs.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Consideration of Air Quality Impacts when providing comments on planning applications within an AQMA or where an AQMA could be impacted or created.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2014	2015	Borough Council (LPA & Env Quality Team)	Borough Council	No	Funded	< £10k	Implementation	Up to 1	Number of pre application discussions and planning applications responded to	In 2023 there were 111 applications considered using relevant guidance.	This will always be an on-going measure as long as relevant planning application are received.
2	With regard to National Planning Policy Framework, include air quality considerations in the Local Plans and adopt an air quality Development Management Policy.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2014	2016	Borough Council (LPA & Env Quality Team)	Borough Council	No	Funded	< £10k	Completed	Up to 1	Production of documents	Completed	The emerging Local Plan was submitted for examination in March 2022 that adopts existing policy on air quality (DM15), with policies LP21 (Environment, Design and Amenity), LP13 (Transport) and LP18 (Design and Sustainable Development). In conjunction with national (NPPF) policies these are considered as sufficient
3	With regard to National Planning Policy Framework, adopt Norfolk Technical Guidance on Air Quality and provide preapplication advice on planning applications.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2014	2017	Borough Council (LPA & Env Quality Team)	Borough Council	No	Funded	< £10k	Completed	Up to 1	Production of documents	Completed	Norfolk Technical Guidance now superseded by IAQM-EPUK (2017) Guidance.
4	Develop Parking Management Plan	Transport Planning and Infrastructure	Other	2014	2024	County Council/ Borough Council	Future High Streets Fund	No	Funded	£10k - 50k	Implementation	Up to 2	Publication of and implementation of plan	A review of parking is currently underway, which will consider car parking arrangements in the town centre.	

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
5	New access road from Wisbech Road through Friars to Boal Street.	Traffic Management	UTC, Congestion management, traffic reduction	2010	2022	County Council/ Borough Council	County Council/ Borough Council	No	Partially Funded	£100k - £500k	Planning	2 to 3	Continued air quality monitoring. Bus flow counts on London Road and new route	The access road has been completed and is well used by buses	Further consideration is being given to the road as part of the King's Lynn Transport Study with the Harding's Way Feasibility Study due to be completed in 2021/2022.
6	Incentivise the use of public transport.	Alternatives to private vehicle use	Other	2014	2017	County Council	County Council	No	Funded	< £10k	Completed	Up to 1	Continued air quality monitoring. Bus usage figures	The King's Lynn Transport Interchange has been completed making a physically nicer environment for public transport users. New air conditioned and Wi-Fi enabled train carriages were introduced on routes between King's Lynn and London in May 2017.	Consideration is being given to public transport, and encouraging its use, as part of the King's Lynn Transport Study.
7	Implementation of Urban Traffic Control system (UTC) at principal junctions within AQMA and adjacent to AQMA.	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2010	2017	County Council	County Council	No	Funded	£10k - 50k	Completed	2 to 5	Continued air quality monitoring. Queue length at junctions at peak times	Completed	Will be reviewed within the Kings Lynn Transport Study currently underway
8	Installation of selective vehicle detection (SVD) system	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2011	2017	County Council	County Council	No	Funded	£10k - 50k	Completed	Up to 1	Number of vehicles fitted with SVD Annual average daily traffic numbers	Completed	
9	Decriminalisation of parking. Review of parking controls and enforcement in AQMAs and King's Lynn Town Centre	Transport Planning and Infrastructure	Other	December 2010 option validation Jan-March 2011	2022	Borough Council/ County Council	Borough Council/ County Council/ Future High Streets Fund	No	Funded	£10k - 50k	Planning	Up to 1	Implementation of enforcement in AQMAs and Town Centre. Continued air quality monitoring.	Will be considered within the Kings Lynn Transport Study and Parking Strategy currently underway.	
10	Variable car parking rates	Transport Planning and Infrastructure	Other	2014	2022	Borough Council	Future High Streets Fund	No	Funded	£10k - 50k	Planning	Up to 1	Continued air quality monitoring, car park usage and queue lengths	Parking will be considered within the Car Parking Strategy currently in draft.	
11	Variable message signs	Traffic Management	Other	2014	2019	Borough Council/ County Council	Borough Council/ County Council/ Future High Streets Fund	No	Funded	£10k - 50k	Completed	Up to 1	Peak hour parking usage, car park usage and continued air quality monitoring queue lengths	Signs have been installed on approach to King's Lynn town centre to indicate where spaces are available.	These will be reviewed as part of the King's Lynn Parking Study currently in draft.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
12	Investigate potential for residents only parking in or close to AQMAs	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2014	2022	Borough Council	Borough Council/ Future High Streets Fund	No	Funded	£10k - 50k	Planning	Up to 1	Peak hour parking usage Car park usage Continued air quality monitoring	Residents parking permits have been introduced in South Quay area, on Portland Road (the link between the railway station and the King's Lynn Transport Interchange), Hiighgate and Archdale Street which are all close to the town centre AQMA. This had made these areas unavailable for commuter parking.	A King's Lynn Parking Study is currently underway, which will consider car parking arrangements in the town centre.
13	Support the use of West Lynn ferry	Promoting Travel Alternatives	Promote use of rail and inland waterways	2012	2022	Borough Council	Borough Council	No	Not Funded	£100k - £500k	Planning	Up to 1	Number of passengers using ferry	The West Lynn ferry will be considered as part of the King's Lynn Transport and Car Parking Strategy.	
14	Changes to the Road Layout within the King's Lynn Gyratory as proposed by Kings Lynn Transport Study	Traffic Management	UTC, Congestion management, traffic reduction	2011 (Linked to measure 3)	2023	County Council	County Council/ Business Rates Pool	No	Partially Funded	£100k - £500k	Planning	2 to 10	Continued air quality monitoring. Daily traffic flow data and queue lengths.	King's Lynn Transport Strategy (v.3, 2019) used to inform Feasibility Study including cost estimates, high-level project plan and programme for delivery.	
15	Traffic Management at London Road and Southgates	Traffic Management	UTC, Congestion management, traffic reduction	2014	2023	County Council	County Council	No	Not Funded	> £10 million	Planning	1 to 5	Continued air quality monitoring. Queue length at junctions at peak times	The King's Lynn Transport Study includes London Road and the Southgates area. Feasibility work for the Southgates area has now been completed.	Feasibility work was carried out looking at London Road and the Southgates area. This priority area from the Transport Strategy gave rise to the submission of the South Gate Gateway project in the Future High Street Fund (FHSF) bid. Unfortunately, the project was not prioritised, and no other funding sources have been identified yet for the project or the Southgates Roundabout improvements.
16	Traffic Management at Gaywood clock	Traffic Management	UTC, Congestion management, traffic reduction	2014	2026	County Council	County Council	No	Not Funded	£10k - 50k	Planning	1 to 5	Continued air quality monitoring. Traffic queue lengths.	The King's Lynn Transport Study will include the Gaywood Clock area. Planning permission has also been granted for the Parkway development which includes the bridge over the sandline.	Traffic management at Gaywood Clock will be aided by the construction of the bridge over the sandline as part of the Parkway development. No funding has been obtained for the project yet. Traffic management at Gaywood Clock is also considered within measure STS11 within the King's Lynn

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															Transport Study Implementation Plan.
17	Promotion of travel plans, school travel plans and promotion of car sharing.	Promoting Travel Alternatives	Personalised Travel Planning	2014	2015	County Council/ Borough Council	County Council/ Borough Council	No	Partially Funded	< £10k	Implementation	Up to 1	Continued air quality monitoring. Number of travel plans	Travel plans are requested by BCKLWN and County Council in response to relevant planning application. Whilst Norfolk County Council no longer provide staff support to help schools create / implement travel plans, they pay for a licence for a school travel plan platform which can be used.	The promotion of travel plans for schools are considered within measure STM17 of the King's Lynn Transport Study Implementation Plan.
18	Improved cycling and walking provision	Promoting Travel Alternatives	Promotion of cycling	2014	2021	County Council/ Borough Council	County Council/ Borough Council	No	Funded	£10k - 50k	Planning	Up to 1	Cycle usage and walking provision. Number of cycle/foot path improvements.	A Local Cycling and Walking Infrastructure Plan (LCWIP) is being drawn up as part of the transport strategy work. Active transport will be considered in the King's Lynn Transport Study.	Improved cycling and walking provision are considered within measures SAM5, SAM6, SAM7, SAM8, and MAM4 within the King's Lynn Transport Study Implementation Plan.
19	Investigate feasibility and if viable to provide Electric Vehicle (EV) charging points in car parks and in new developments	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure to promote low emission Vehicles, EV recharging, Gas fuel recharging	2014	2022	Borough Council	Borough Council/ Future High Streets Fund	No	Funded	£10k - 50k	Implementation	Up to 1	Number & use of EV charging points installed	Charging points are recommended on new developments as a mitigation. Options are being considered as part of the Climate Change district carbon emission reduction plan. A number of housing and commercial developments are being constructed with EV charging in place or are 'EV ready.' The emerging Local Plan includes Policy LP14 – Parking Provision in New Development which specifies one secure electric vehicle charging point wherever possible in new dwellings.	The introduction of electric charging points within car parks will be considered within the draft Parking Strategy and the King's Lynn Transport Study.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
20	Quality Bus Partnerships and Contracts	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2014	2022	County Council	County Council	No	Not Funded	£500k - £1 million	Planning	Up to 1	Continued air quality monitoring. % Buses Euro 3 or better. Installation of SVD	A quality bus partnership is in place but there are still a high number of older vehicles used on King's Lynn Town Centre routes. New targets will be set on bus fleets and engines as part of the National Bus Strategy later in the year.	Bus providers have been included within stakeholder engagement as part of the King's Lynn Transport Study.

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 National Air Quality Strategy local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ of sources that are within their control. There is clear evidence that $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases. There is also a growing body of evidence that $PM_{2.5}$ is linked to dementia. This is of particular interest in Norfolk which has a rapidly ageing population, and where dementia is now one the leading causes of mortality[30].

The Public Heath Outcome Framework (PHOF) indicator D01 provides an attributable mortality estimate (5.2%[31]) for the area when based on an average or population weighted exposure to the human derived proportion of $PM_{2.5}$[32]. This relative risk is important as it forms the basis of action through all delivery partners as set out in Norfolk's Joint Strategic Needs Assessment to tackle air pollution in the area.

To help drive forward improvements in air quality the Environment Act 2021 set new national targets for $PM_{2.5}$ that local authorities are tasked to support. The national targets include an annual mean concentration target and also a population exposure reduction target. Table E.2 shows the targets and respective concentrations to be met when based on Defra background maps. It must be noted that the Defra background maps are based on a current 2018 version that is based on modelled, rather than monitored data over 1km grid squares, but in summary this highlights;

a) **$PM_{2.5}$ annual mean concentration target (AMCT)**; there are no 1km x 1km grid squares that exceeded the 10 μgm^{-3} $PM_{2.5}$ annual mean in 2023 for the BCKLWN area; and,
b) **$PM_{2.5}$ population exposure reduction target (PERT)**; For the BCKLWN area a 35% reduction from 2018 baseline will require annual mean $PM_{2.5}$ concentrations to reduce as an average to 6.1 μgm^{-3} by 2040.

[30] Air Pollution and dementia *BMJ* 2023; 381 doi: https://doi.org/10.1136/bmj.p655 (Published 05 April 2023)
[31] Office for Health Improvement and Disparities: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/1/gid/1000043/pat/6/par/E12000006/ati/301/are/E07000146/yrr/1/cid/4/tbm/1
[32] Defra UK-Air; https://uk-air.defra.gov.uk/data/pcm-data

Current average $PM_{2.5}$ concentration for the BCKLWN area when based on Defra background maps is 8.6µgm^{-3} (2023).

As this is higher than the PERT it shows the extent of work that is still necessary to meet projected levels in 2040.

To further provide context to these modelled Defra background levels we also carry out monitoring for $PM_{2.5}$ using indicative (iMCERTS) sensor type devices as explained in Section 3.2.3 with results appended to this report in Table C.5. This provides additional background information around some industrial sources in the areas monitored.

In terms of measures to reduce average $PM_{2.5}$ levels we are already carrying out the following;

- We review planning applications and where necessary recommend suitable conditions to help mitigate pollution from new developments.
- Have an Air Quality Action Plan which will further help reduce $PM_{2.5}$ emissions through the measures.
- Implement the King's Lynn Transport Strategy which will help reduce levels of $PM_{2.5}$ from the vehicle emissions including secondary $PM_{2.5}$ produced from road-NO_x.
- Regulation of LAPPC prescribed processed though environmental permits to ensure compliance with Best Available Techniques (BAT) and where necessary compliance with any emissions limits.
- We have adopted a Climate Change Strategy and Action Plan and provided a £1,000,000 budget to help implement the Strategy. This work will help reduce carbon emissions but also $PM_{2.5}$ emissions through the reduction in fossil fuel usage through:
    - vehicles (via EV charging and active travel alternatives);
    - domestic residential properties (Warm Homes, ECO 3 & 4);
- Published advice on Council's website about indoor quality with links to check lists from Asthma and Lung UK to help reduce exposure to the indoor $PM_{2.5}$ and other pollutants.
- We continue to work with colleagues within the Countywide Air Quality Group on $PM_{2.5}$ work.

- Carry out reviews of National Atmospheric Emissions Inventory (NAEI) submissions[33]. Currently the NAEI shows that the domestic sector burning wood is responsible close to a third of all $PM_{2.5}$ emitted in 2021 (17.1kt). National estimates from domestic sources are noted by NAEI to be prone to uncertainty due to lack of comprehensive wood fuel sales data.
- To help improve the understanding of these sources of $PM_{2.5}$ district-wide and to support the national targets we are looking to develop a health-based project focussing on particulate matter. This project forms part of the updated AQAP and is a partnership with Norfolk County Council's Public Health plus other specialists. The project is still being developed. Further details can be reported in next year's ASR.
- Since wood burning from the domestic sector is thought to be responsible for such a large proportion of the total primary $PM_{2.5}$ load we have made it easier for individuals to report smoke from chimneys within any of the 8 Smoke Control Areas (SCAs) in King's Lynn via an online tool[34,35]. The webpage has also been refreshed with reference to the new civil penalties. This tool only went live in December 2023. For the 2023 period there were no reports of smoke from a chimney within any of these SCAs. Conversely and outside of the SCAs it was noted that there were 13 smoke nuisance complaints from domestic dwellings within the same period.
- To help promote best practice within the domestic sector burning wood we promote the national Better Burn, Breathe Better (Defra) campaign through the council's website. This sets out the types of solid fuel which should be used and how to minimise $PM_{2.5}$ emissions.
- We also participate in Clean Air Day.
- Lastly, for the larger boilers burning wood (>45kW_{th}) we assess these individually and maintain an inventory of their emission rates. A summary of these installations is shown in Table F.1. Within the year we assessed one additional biomass boiler through planning application ref 23/01524/F (see Table C.1). None of these larger heating systems were identified as likely to cause a significant impact. The largest by aggregated thermal capacity in the area remains as c. 3MW.

[33] NAEI, UK Informative Inventory Report, https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2303151609_UK_IIR_2023_Submission.pdf
[34] SCA reporting tool; https://www.west-norfolk.gov.uk/info/20137/air_quality/633/burning_wood_and_coal
[35] Defra UK-Air; https://uk-air.defra.gov.uk/data/sca/

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

- BCKLWN undertook automatic monitoring during 2023 via two sites with NO_2 chemiluminescent analysers. Table A.1 shows the details of these automatic monitoring sites.
- There is also indicative particulate matter monitoring via 4 Turnkey Osiris monitors that analyse both $PM_{2.5}$ and PM_{10} background concentrations around some industrial areas, such as either side of King's Lynn Port and around an animal feed mill in Stoke Ferry. As these are non-reference the details / results are appended to this report (see Appendix C in Tables C.3 to C.5). Whilst non-reference, they benefit from MCERTS accreditation for the PM_{10} and $PM_{2.5}$.
- 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.
- Results are disseminated to the public via a Norfolk wide portal (www.norfolkairquality.net/). These results are also simultaneously uploaded to Defra's UK-Air website (https://uk-air.defra.gov.uk).

3.1.2 Non-Automatic Monitoring Sites

BCKLWN undertook non-automatic (passive by diffusion tubes) monitoring of NO_2 at 73 sites during 2023.

- Table A.2 presents the details of the non-automatic sites.
- This compares to 72 sites in 2022.

- The extra site was added along Elm High Rd in Wisbech due to increasing traffic flows as noted from DfT traffic survey point (17963[36]) along this road link and also to help asssess NO_2 prior to the now approved Energy from Waste (EfW) facility in Wisbech.
- 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 (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes the full 2023 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

In terms of bias adjustment, the local co-location study carried out at the Southgates CM1 station for the diffusion tubes (Socotec 50% TEA, bias factor 0.78) has been used. This is preferred as it takes into local weather conditions than an average obtained from other studies outside of the area. Furthermore, data capture and acquisition levels were

[36] Dept. of Transport Survey Point; https://roadtraffic.dft.gov.uk/manualcountpoints/17963

considered good for the Southgates co-location study and reason for its use than the national factor.

Diffusion tube data has been annualised for 4 sites (31, 48, 68 and 70) due to data acquisition as less than 75%.

In relation to the NO_2 results there were no exceedances of the annual mean objective for NO_2 in 2023 (40µg/m^3).

Trends in the annual NO_2 mean results are shown in Figure A.1 to Figure A.5. that show the spatial extent of concentrations within the AQMA's and also outside.

Exceedances (see Table B.1) were last observed in the annual mean NO_2 concentrations from:

- Gaywood Clock AQMA in 2010 (42.4µg/m^3) and,
- Railway Rd AQMA in 2019 (42.4µg/m^3).

Railway Rd AQMA

In terms of NO_2 monitoring within Railway Rd AQMA it benefits from 26 diffusion tubes, a continuous analyser plus the triplicate co-location study at CM1 (Southgates).

Trend data is shown in Figure A.1 to Figure A.5. This shows trends in concentrations separately along the north and south bound sections of the A148 that forms Railway Rd AQMA.

It can be seen that concentrations progressively increase and peak along the north bound section at monitoring site 2 (32.5 µg/m^3 NO_2 annual mean) and historically where the highest NO_2 is observed. This corresponds to an area where the highway opens up to multiple lanes with stop-start traffic plus and with buildings close to the kerb. This area also receives a contribution of road-NOx from vehicles that exit the bus station at the Albion St / Railway Rd junction which is just south of site 2. Trend data even at this area that experiences highest NO_2 annual mean concentration shows relatively consistent results over the last four years as less than 10% of the objective.

Whilst it is recognised that there has been four years of compliant NO_2 annual mean results within the Railway Rd AQMA, a further review will need to be carried out once the options to the Southgates Masterplan and Gyratory transport systems have been completed. Once detailed traffic data has been provided, we will be able to review the overall air quality impacts, including impacts from the proposed West Winch housing

growth area. We can then determine if the current AQMA should remain, be amended, or revoked.

This is considered important as a study of the impacts from the West Winch housing growth area showed the potential for NO_2 to increase within Railway Rd AQMA with levels reverting back towards the annual mean objective. This additional study is explained in more detail in Appendix-C. This initial assessment is however considered worse case as it does not take into account the transport schemes coming forward through the LTP and King's Lynn Transport Strategy.

To assist with this process we have decided to purchase a continuous (indicative) air quality monitoring station (Earthsense Zephyr) to be located within Railway Rd AQAMA and close to the area of highest NO_2. This will help to assess diurnal changes and can be used to verify this more detailed assessment work.

Gaywood Clock AQMA

Within the AQMA at Gaywood Clock there are 6 diffusion tubes and the automatic reference chemilumiscence analyser (CM2 Gaywood Clock). Highest (bias adjusted) annual mean concentration within the AQMA in 2023 was recorded at diffusion tube monitoring site 44 (27.4µg/m^3) located adjacent to the junction with Queen Mary Rd.

Trend data within Gaywood Clock over the last five years is presented in Figure A.2 showing results as all less than 30µg/m^3 of the annual mean NO_2 objective.

Due to the continued compliance of more than 5-year's a report to Cabinet is being prepared to recommend the revocation of the Gaywood Clock AQMA.

Monitoring outside of AQMAs

Selected NO_2 monitoring trend data outside of the AQMAs is shown in Figure A.4. Results were all less than the NO_2 annual mean objective, therefore no amendments or variations to any of the AQMAs is proposed.

It can be seen from Figure A.4;

- An area that attracts public attention is the A10 as traffic levels are relatively high. The area is also identifed as a strategic growth area with a new housing access road to link the A10 to the A47. We have a monitoring site along the A10 (site 73) at West Winch. Trends from this site show NO_2 to be relatively constant and significantly less than the objective since pre-Covid period.

- The Albion St monitoring site (site 87) is useful as it is located along the exit from the bus station and where it forms the junction with Railway Rd. The monitoring site is set back from the junction and therefore shows the proportion of NO_2 from vehicles, especially buses leaving the station.

Short term NO_2 exposure

Short term (1-hour) exposure can be a concern along some routes that run parallel to busy roads, or at some bus stations / taxi ranks. Relevant and potential exposure occurs at King's Lynn Transport Interchange (site 5) and Vancouver car-park where taxi bays are located within a covered carpark (site 86).

Trend data is shown in Figure A.4 for these sites that are located outside of AQMAs but nevertheless where potential short-term exposure can occur.

As can be seen, results are significantly less than the 60µg/m^3 NO_2 level that would otherwise indicate an exceedance in the short-term mean objective.

Also presented in Table A.5 are results from the ratified continuous monitored NO_2 hourly mean concentrations for the past five years that are compared to the short term mean objective of 200µg/m^3 that must not to be exceeded more than 18 times per year. This shows no exceedances.

3.2.2 Particulate Matter (PM_{10})

PM_{10} monitoring is carried out using Turnkey Osiris indicative sensor type devices, with results reported in Appendix C. The Osiris devices benefit from heated air inlets and accreditation to MCERTS.

3.2.3 Particulate Matter ($PM_{2.5}$)

We are not required to carry out monitoring for this pollutant but do so in conjunction with the PM_{10} analysis through the four Osiris instruments. Results are reported in Appendix C.

Appendix A: Monitoring Results

Table A.1- Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1 SG	Southgates Park, King's Lynn	Roadside	562225	319191	NO2	YES Railway Rd AQMA	Chemiluminescent	5	5	1.7
CM2 GW	Gaywood, King's Lynn	Roadside	563437	320472	NO2	YES Gaywood Clock AQMA	Chemiluminescent	5	1	1.7

Notes:

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
1	Railway Road 1	Kerbside	562073	320303	NO2	Yes. Railway Rd AQMA	2.0	0.8	No	2.5
2	Railway Road 4	Roadside	562108	320196	NO2	Yes. Railway Rd AQMA	0.0	1.7	No	2.4
3	Railway Road 5	Roadside	562117	320094	NO2	Yes. Railway Rd AQMA	0.0	1.5	No	2.4
5	Bus Station - Shelters, Bay D	Urban Centre	562003	320098	NO2	No	0.0	0.5	No	2.2
6, 7, 8	Southgates Monitoring Station	Roadside	562225	319191	NO2	Yes. Railway Rd AQMA	4.0	3.7	Yes	3.2
9	Mill Fleet	Roadside	561911	319710	NO2	No	0.0	6.0	No	2.5
10	London Road 1	Roadside	562100	319679	NO2	Yes. Railway Rd AQMA	0.0	6.0	No	1.4
11	London Road 2	Roadside	562165	319575	NO2	Yes. Railway Rd AQMA	0.0	6.8	No	2.2
12	London Road 3	Roadside	562242	319452	NO2	Yes. Railway Rd AQMA	0.0	4.4	No	2.1
13	London Road 4	Roadside	562263	319374	NO2	Yes. Railway Rd AQMA	0.0	5.0	No	2.2
14	London Road 5	Roadside	562227	319266	NO2	Yes. Railway Rd AQMA	0.0	4.3	No	2.2
15	HSS Southgates	Roadside	562189	319101	NO2	No	1.0	0.5	No	2.2
18	Hardwick Rd	Roadside	562266	319042	NO2	No	0.0	9.0	No	2.2

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)
19	Vancouver Avenue	Roadside	562277	319098	NO2	No	0.0	5.6	No	1.7
20	London Road 10	Roadside	562244	319260	NO2	Yes. Railway Rd AQMA	0.0	3.7	No	2.2
22	London Road 6	Roadside	562284	319385	NO2	Yes. Railway Rd AQMA	0.0	5.0	No	2.1
23	London Road 7	Roadside	562161	319614	NO2	Yes. Railway Rd AQMA	0.0	4.5	No	2.1
24	London Road 8	Roadside	562135	319650	NO2	Yes. Railway Rd AQMA	0.0	5.3	No	2.0
25	The Walks	Urban Background	562190	319694	NO2	No	0.0	77.0	No	1.8
26	Railway Road 7	Roadside	562131	319996	NO2	Yes. Railway Rd AQMA	0.0	3.0	No	2.2
27	St John's Terrace	Roadside	562177	319999	NO2	Yes. Railway Rd AQMA	0.0	5.1	No	2.1
28	St John's Terrace/Blackfriar's	Roadside	562253	320015	NO2	Yes. Railway Rd AQMA	0.0	1.4	No	2.6
29	Waterloo Street	Urban Background	562183	320055	NO2	No	0.0	3.0	No	1.6
30	Portland Street	Urban Background	562204	320108	NO2	No	2.7	0.8	No	2.4
31	Railway Road 2	Roadside	562128	320131	NO2	Yes. Railway Rd AQMA	0.0	2.0	No	2.3
32	Railway Road 3	Roadside	562119	320216	NO2	Yes. Railway Rd AQMA	0.0	2.0	No	2.4
33	Wellesley Street	Roadside	562202	320158	NO2	No	1.8	1.4	No	2.4

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)
34	Blackfriars 2	Roadside	562244	320128	NO2	Yes. Railway Rd AQMA	0.0	2.3	No	2.4
35	Blackfriars 1	Roadside	562244	320238	NO2	Yes. Railway Rd AQMA	0.0	4.4	No	2.3
36	Norfolk Street	Roadside	562219	320318	NO2	No	0.0	2.0	No	2.2
37	The Shrubberies, Blackfriars 3	Roadside	562253	320258	NO2	Yes. Railway Rd AQMA	0.0	4.4	No	2.2
38	Littleport Street	Roadside	562256	320322	NO2	Yes. Railway Rd AQMA	0.0	2.6	No	2.4
39	Gaywood Road 2	Roadside	562822	320426	NO2	No	0.0	7.0	No	4.0
40	The Swan (1) Gayton Road	Roadside	563490	320469	NO2	Yes, Gaywood Clock	0.0	2.8	No	2.5
41	Wotton Road 2	Roadside	563477	320514	NO2	Yes, Gaywood Clock	0.0	2.0	No	4.0
42	Wootton Road 1	Roadside	563480	320581	NO2	Yes, Gaywood Clock	0.0	3.0	No	1.7
43	Lynn Road 1	Roadside	563411	320476	NO2	Yes, Gaywood Clock	0.0	6.0	No	3.3
44	Lynn Road 2	Roadside	563377	320484	NO2	Yes, Gaywood Clock	0.0	2.0	No	3.8
45	Gaywood Road 3	Roadside	563202	320488	NO2	No	0.0	4.5	No	2.2
46	Gaywood Road 1	Roadside	562565	320509	NO2	No	0.0	6.5	No	2.1

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)
47	Austin Street 1	Roadside	562186	320376	NO2	Yes. Railway Rd AQMA	0.0	3.2	No	2.1
48	Austin Street 2	Roadside	562180	320365	NO2	Yes. Railway Rd AQMA	0.0	2.1	No	2.6
51	Wootton Road 3	Roadside	563521	320628	NO2	No	0.0	6.9	No	1.8
52	Lynn Road 3	Roadside	563288	320504	NO2	No	0.0	6.6	No	1.7
58	Nar Ouse Way Roundabout	Roadside	562171	319018	NO2	No	40.0	2.5	No	2.5
62	Burney Road	Roadside	561614	318591	NO2	No	0.0	6.8	No	1.8
66	Highgate Primary School, Gaywood Road	Urban Background	562595	320526	NO2	No	0.0	N/a	No	2.4
67	Greyfriars School, London Road	Urban Background	562235	319578	NO2	No	0.0	N/a	No	2.3
68	King's Lynn Nursery School, London Road	Urban Background	562142	319837	NO2	No	0.0	N/a	No	2.0
69	Whitefriars School 1, Whitefriars Road	Urban Background	561993	319394	NO2	No	0.0	N/a	No	2.2
70	Whitefriars School 2, Whitefriars Road	Urban Background	561929	319354	NO2	No	0.0	N/a	No	2.4
73	A10 Main Road, West Winch	Roadside	563161	315848	NO2	No	0.9	1.6	No	2.0
75	The Swan (2) Gayton Road	Roadside	563468	320469	NO2	Yes, Gaywood Clock	0.0	2.1	No	2.9

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)
76	Hardwick Road	Roadside	562597	318739	NO2	No	0.0	8.5	No	1.7
79	Tennyson Ave	Roadside	562803	320422	NO2	No	0.0	1.8	No	4.0
86	Bus Station - Taxi Rank	Other	562018	320138	NO2	No	0.0	1.0	No	2.3
87	Albion Street	Roadside	562102	320163	NO2	No	0.0	2.5	No	2.1
89	Whitefriars Terrace	Roadside	561887	319466	NO2	No	0.0	1.4	No	2.4
90	Spenser Road	Roadside	563366	322065	NO2	No	0.0	6.0	No	1.8
91	Reid Way	Roadside	563255	321613	NO2	No	0.0	4.7	No	2.3
92	Garden Court	Roadside	563256	321588	NO2	No	0.0	15.0	No	2.2
94	Wisbech Road	Roadside	561957	318963	NO2	No	0.0	7.3	No	2.0
95	Harvest House, Wisbech Road	Roadside	562058	319038	NO2	No	0.0	7.2	No	1.9
96	Carp Terrace, King's Lynn	Roadside	562042	319011	NO2	No	0.0	8.4	No	1.9
97	Low Road, King's Lynn	Roadside	564503	322411	NO2	No	0.0	8.0	No	2.0
98	7 Greenpark Avenue	Roadside	562821	320964	NO2	No	0.0	4.8	No	1.8
99	108 School Road, Wisbech	Suburban	547960	313115	NO2	No	0.0	23.0	No	1.8

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)
100	83 Chapnall Road, Wisbech	Suburban	547902	310395	NO2	No	0.0	14.0	No	1.8
101	62 Elm High Road, Wisbech	Roadside	547094	307850	NO2	No	0.0	5.2	No	1.8
102	6-7 Railway Rd, PE30 1NG	Roadside	562104	320208	NO2	Yes. Railway Rd AQMA	0.0	1.7	No	2.1
103	17-19 Railway Rd, PE30 1NF	Roadside	562116	320128	NO2	Yes. Railway Rd AQMA	0.0	1.7	No	2.1
104	Fenman Pub, Blackfriars Rd	Roadside	562247	320075	NO2	Yes. Railway Rd AQMA	1.0	2.0	No	2.1
110	14 Elm High Rd, Wisbech	Roadside	546884	308315	NO2	No	0.0	6.0	No	2.2

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CM1 SG	562225	319191	Roadside	93	93	21.0	14.2	17.6	14.0	14.8
CM2 GW	563437	320472	Roadside	92	92	37.0	26.7	26.4	24.0	24.8

☒ **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.**

Notes:

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

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

All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
1	562073	320303	Kerbside	100	100.0	36.3	25.8	28.7	28.4	27.5
2	562108	320196	Roadside	92.3	92.3	**42.4**	33.2	33.7	32.9	32.5
3	562117	320094	Roadside	100	100.0	37.5	26.4	30.1	29.1	28.5
5	562003	320098	Urban Centre	100	100.0	28.8	17.5	20.5	20.3	19.9
6, 7, 8	562225	319191	Roadside	100	100.0	24.3	15.7	18.2	17.6	14.3
9	561911	319710	Roadside	100	100.0	20.5	13.7	15.2	15.0	12.9
10	562100	319679	Roadside	82.7	82.7	35.5	26.6	29.0	27.8	26.2
11	562165	319575	Roadside	92.3	92.3	28.4	21.2	22.3	22.8	21.1
12	562242	319452	Roadside	100	100.0	31.4	22.5	23.5	24.5	23.6
13	562263	319374	Roadside	100	100.0	29.0	21.7	22.9	22.2	21.0
14	562227	319266	Roadside	82.7	82.7	33.2	25.9	25.5	24.0	23.5
15	562189	319101	Roadside	92.3	92.3	36.7	27.0	29.6	28.2	26.9
18	562189	319042	Roadside	90.4	90.4	25.1	18.9	19.9	19.7	17.8

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
19	562277	319098	Roadside	100	100.0	23.9	19.9	18.4	18.6	16.5
20	562244	319260	Roadside	76.9	76.9	28.2	21.7	23.8	22.7	23.0
22	562284	319385	Roadside	100	100.0	31.0	21.8	25.2	23.7	23.3
23	562161	319614	Roadside	100	100.0	31.2	23.1	26.4	25.4	24.2
24	562135	319650	Roadside	100	100.0	29.7	21.4	23.8	23.9	23.4
25	562190	319694	Urban Background	100	100.0	15.3	11.4	11.5	11.7	11.9
26	562131	319996	Roadside	84.6	84.6	31.5	23.0	26.3	25.4	25.2
27	562177	319999	Roadside	100	100.0	27.6	20.0	22.8	22.2	21.2
28	562253	320015	Roadside	100	100.0	29.8	19.5	22.4	22.5	21.5
29	562183	320055	Urban Background	100	100.0	18.9	12.7	13.3	13.4	12.5
30	562204	320108	Urban Background	100	100.0	20.5	13.8	14.9	14.6	13.2
31	562128	320131	Roadside	73.1	73.1	29.1	21.2	24.0	19.8	28.1
32	562119	320216	Roadside	100	100.0	27.8	21.3	22.8	21.9	20.5
33	562202	320158	Roadside	100	100.0	28.5	20.3	20.8	21.9	20.9

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
34	562244	320128	Roadside	100	100.0	28.8	22.9	23.5	24.1	23.1
35	562244	320238	Roadside	100	100.0	27.6	20.7	22.4	22.3	21.7
36	562219	320318	Roadside	100	100.0	27.7	19.4	21.0	21.6	19.9
37	562253	320258	Roadside	100	100.0	29.7	23.3	23.9	22.1	19.8
38	562256	320322	Roadside	100	100.0	34.2	24.9	26.9	27.9	25.2
39	562822	320426	Roadside	100	100.0	24.5	17.7	19.3	18.9	16.9
40	563490	320469	Roadside	100	100.0	32.0	24.6	25.6	26.7	26.0
41	563477	320514	Roadside	92.3	92.3	34.9	24.5	25.2	26.3	25.1
42	563480	320581	Roadside	100	100.0	29.7	22.9	23.7	23.2	21.6
43	563411	320476	Roadside	100	100.0	29.4	22.0	25.4	24.4	23.5
44	563377	320484	Roadside	100	100.0	34.6	26.3	27.0	27.8	27.4
45	563202	320488	Roadside	100	100.0	26.8	19.5	22.3	21.4	20.5
46	562565	320509	Roadside	100	100.0	24.1	17.6	20.1	19.1	17.8
47	562186	320376	Roadside	100	100.0	29.7	21.5	23.6	24.7	22.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
48	562180	320365	Roadside	65.4	65.4	27.2	19.1	15.6	21.9	23.9
51	563521	320628	Roadside	100	100.0	18.6	13.6	14.6	14.3	13.2
52	563288	320504	Roadside	100	100.0	28.4	21.7	23.6	23.1	22.4
58	562171	319018	Roadside	100	100.0	27.4	19.7	20.9	21.0	18.7
62	561614	318591	Roadside	100	100.0	14.1	9.9	10.9	10.4	10.0
66	562595	320526	Urban Background	90.4	90.4	22.1	16.7	17.5	17.3	16.4
67	562235	319578	Urban Background	92.3	92.3	16.8	12.1	11.6	12.0	10.6
68	562142	319837	Urban Background	48.1	48.1	19.1	15.2	14.1	13.2	14.4
69	561993	319394	Urban Background	82.7	82.7	13.3	9.4	9.8	9.2	9.0
70	561929	319354	Urban Background	65.4	65.4	13.5	11.8	9.1	8.1	10.4
73	563161	315848	Roadside	92.3	92.3	22.1	16.2	16.5	16.6	15.5
75	563468	320469	Roadside	100	100.0	35.8	26.5	28.0	27.7	25.4
76	562597	318739	Roadside	100	100.0	19.8	13.9	14.0	14.8	13.0
79	562803	320422	Roadside	100	100.0	33.2	23.8	26.0	25.8	24.7

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 2023 (%) [2]	2019	2020	2021	2022	2023
86	562018	320138	Other	100	100.0	27.7	19.5	20.1	22.1	19.9
87	562102	320163	Roadside	100	100.0	30.0	19.3	24.1	23.0	21.3
89	561887	319466	Roadside	100	100.0	13.5	9.7	9.7	9.7	8.5
90	563366	322065	Roadside	92.3	92.3	16.1	11.5	11.8	11.8	10.4
91	563255	321613	Roadside	100	100.0	14.5	11.0	11.0	11.1	9.8
92	563256	321588	Roadside	92.3	92.3	14.0	9.2	9.7	10.1	8.3
94	561957	318963	Roadside	100	100.0		15.9	16.4	16.9	15.5
95	562058	319038	Roadside	100	100.0		12.0	13.0	12.6	13.0
96	562042	319011	Roadside	100	100.0		14.4	15.1	15.7	13.7
97	564503	322411	Roadside	100	100.0		14.1	15.1	15.6	14.2
98	562821	320964	Roadside	100	100.0			11.2	11.6	9.9
99	547960	313115	Suburban	100	100.0			7.8	7.4	6.5
100	547902	310395	Suburban	100	100.0			9.5	9.2	8.3
101	547094	307850	Roadside	90.4	90.4			27.8	28.3	26.5

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
102	562104	320208	Roadside	90.4	90.4				32.1	29.7
103	562116	320128	Roadside	100	100.0				30.7	29.3
104	562247	320075	Roadside	100	100.0				27.2	24.8
110	546884	308315	Roadside	100	100.0					14.6

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

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

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

Notes:

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

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

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

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

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations along Railway Rd

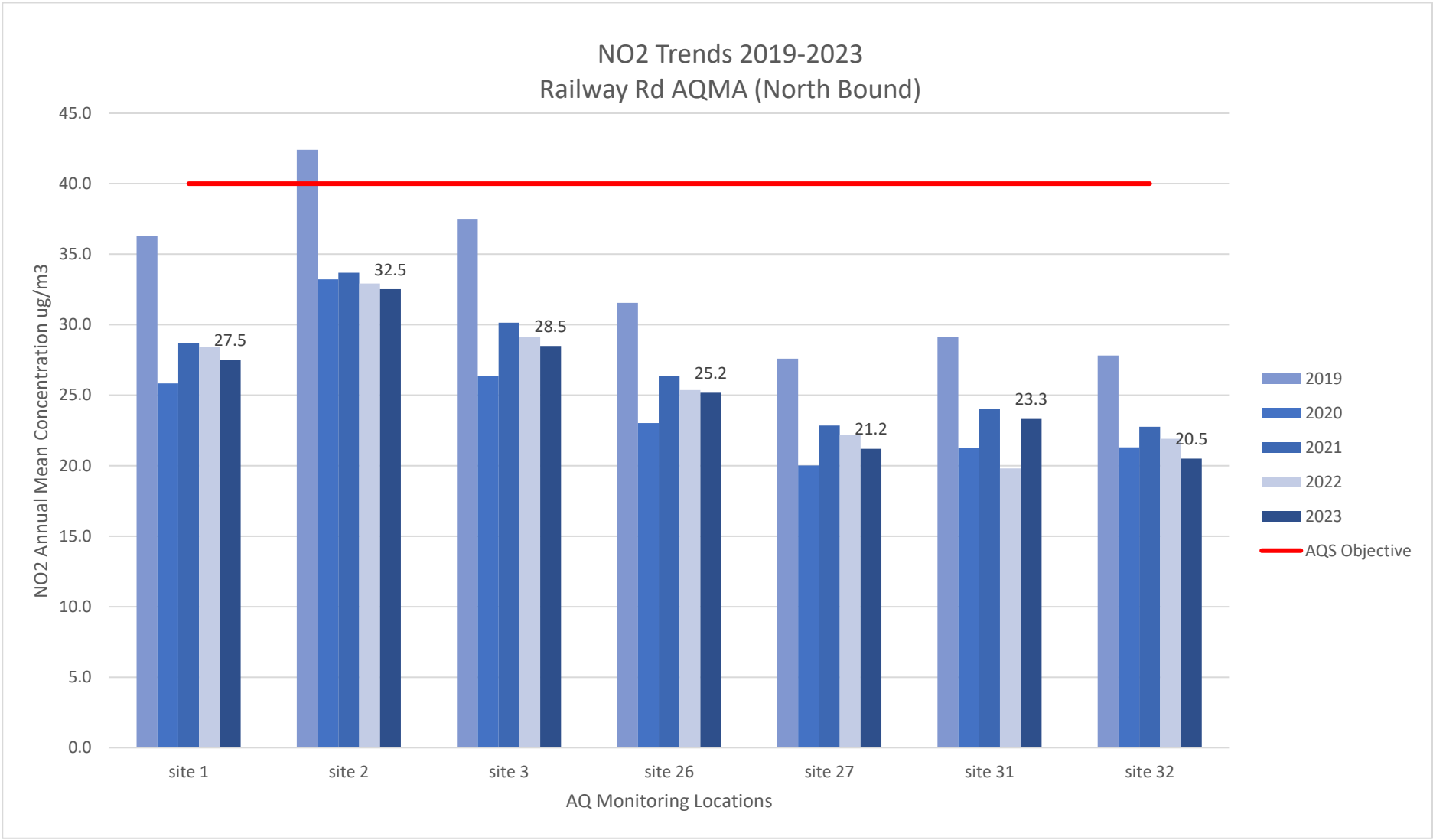

Figure A.2 – Trends in Annual Mean NO_2 concentrations within Gaywood Clock AQMA

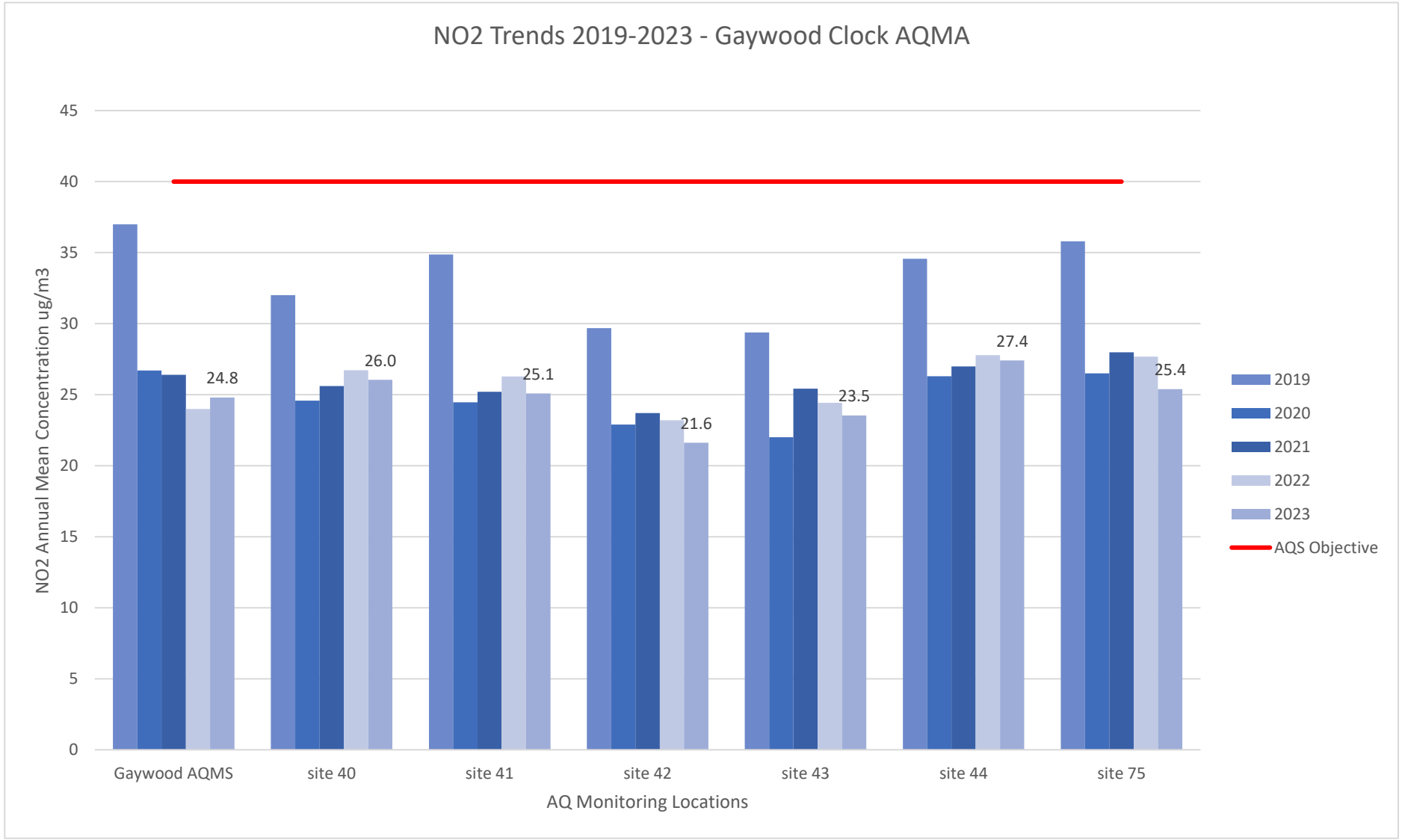

Figure A.3 – Trends in Annual Mean NO_2 concentrations along the South Bound section of Railway Rd AQMA

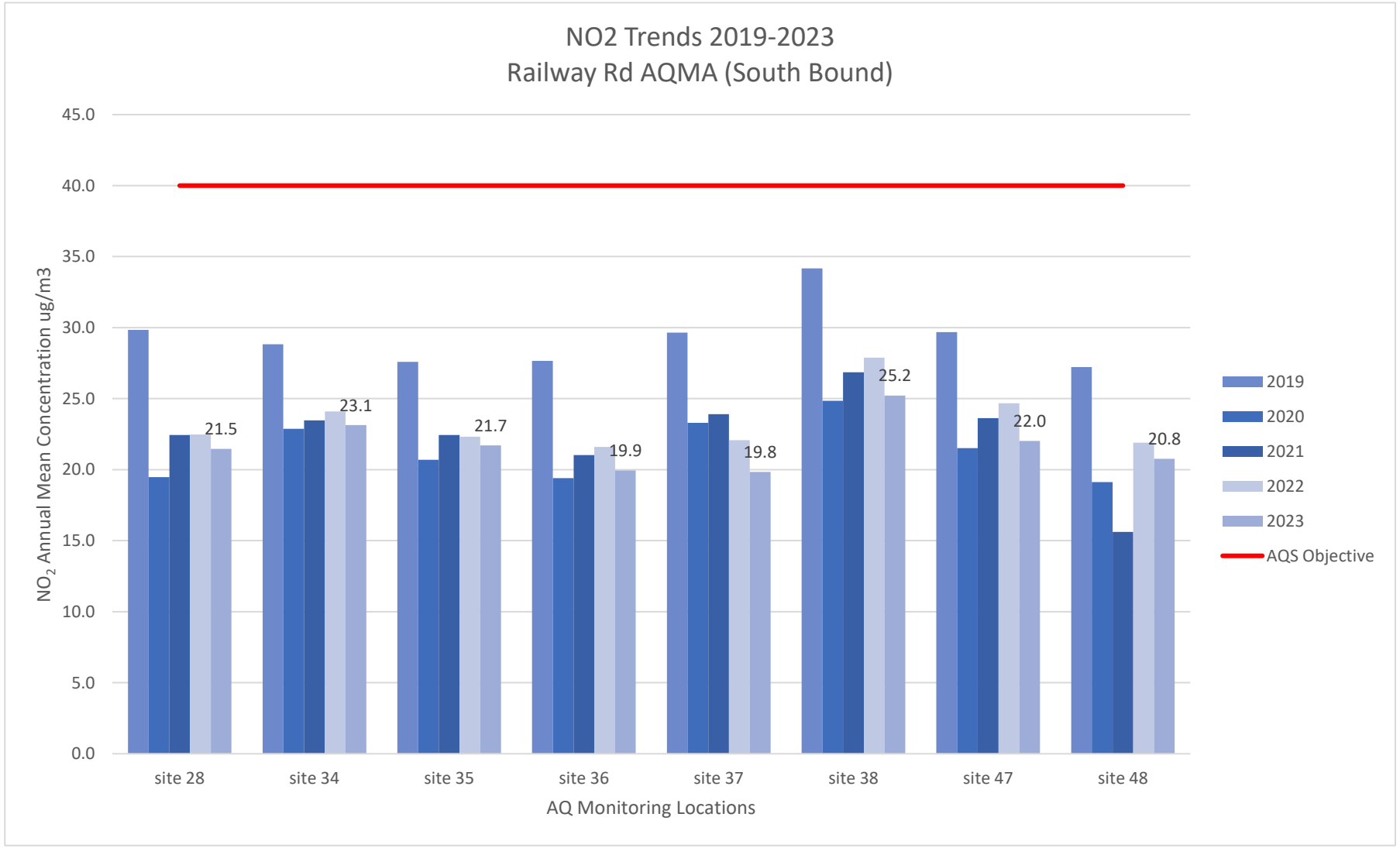

Figure A.4 – Trends in Annual Mean NO_2 concentrations outside of AQMAs

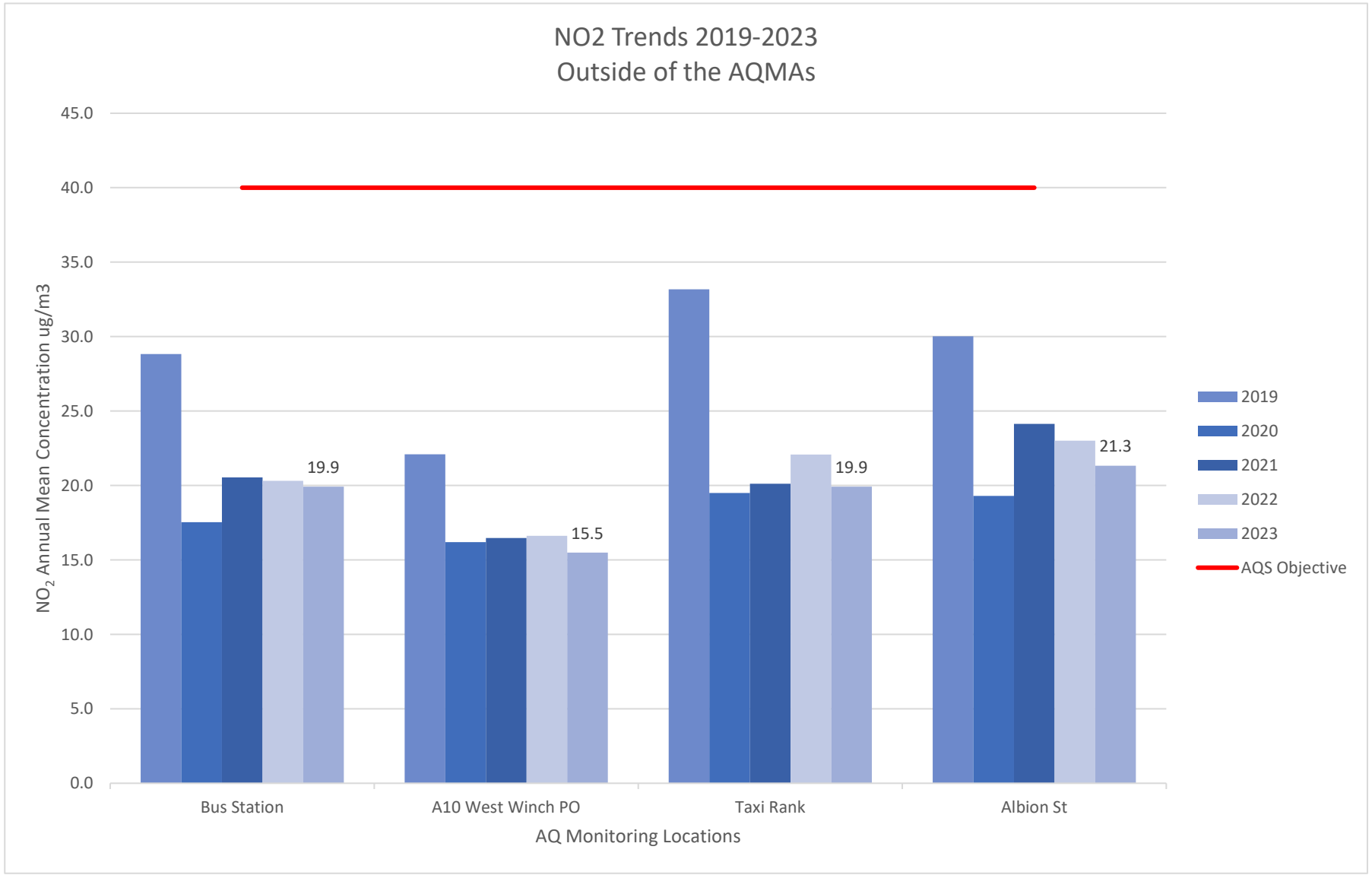

Figure A.5 – Trends in NO2 Annual Mean for sites within AQMA

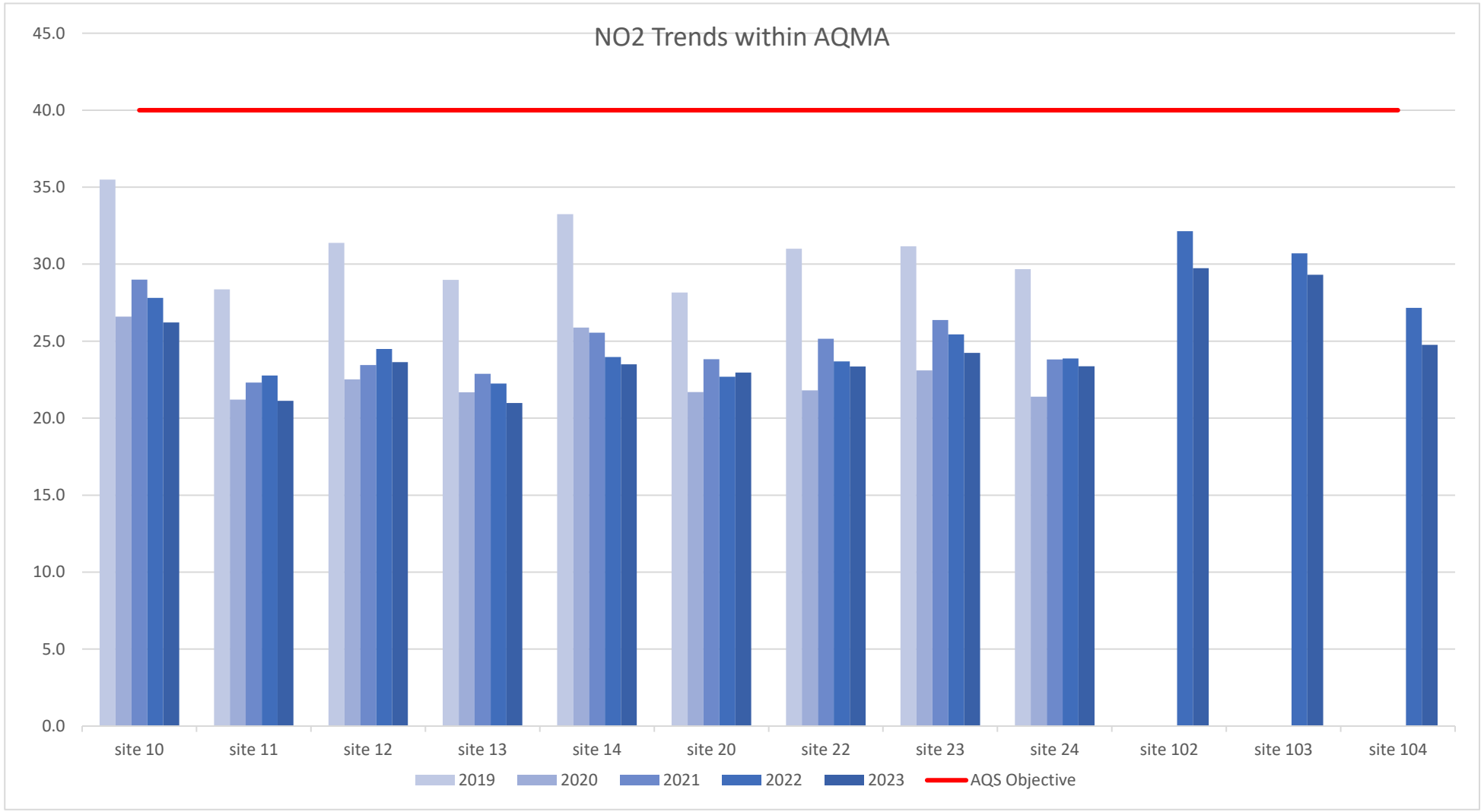

Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3.

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CM1 SG	562225	319191	Roadside	93	93	0	0	0	0	0
CM2 GW	563437	320472	Roadside	91	91	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%).

(3) Monitoring is also performed by diffusion tube in areas where public could be exposed for more than 1-hr with results explained in Section 3.2.1.

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1– NO2 2023 Diffusion Tube Results (µg/m3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)			Comment
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.78) and Annualised	Distance Corrected to Nearest Exposure	
1	562073	320303	47.0	47.3	33.5	30.9	25.5	28.1	28.0	32.0	33.1	37.6	43.1	37.0	35.3	27.5	-	
2	562108	320196	48.5		45.7	37.7	34.7	33.8	40.3	39.9	43.1	41.9	52.1	40.9	41.7	32.5	-	
3	562117	320094	44.8	48.8	39.1	34.2	31.6	31.7	32.5	37.7	35.0	37.7	39.1	26.2	36.5	28.5	-	
5	562003	320098	29.4	32.9	29.7	25.2	25.0	24.7	21.4	23.8	25.4	24.1	29.7	15.1	25.5	19.9	-	
6	562225	319191	26.7	26.5	9.7	16.8	14.4	16.1	15.1	16.9	17.9	20.0	22.5	18.5	-	-	-	Triplicate Site with 6, 7 and 8 - Annual data provided for 8 only
7	562225	319191	23.5	27.9	15.8	17.0	15.0	17.0	15.0	16.8	17.4	15.9	23.6	16.1	-	-	-	Triplicate Site with 6, 7 and 8 - Annual data provided for 8 only
8	562225	319191	25.0	17.7	21.0	16.4	15.3	16.4	15.2	16.7	17.5	20.6	21.9	16.1	18.4	14.3	-	Triplicate Site with 6, 7 and 8 - Annual data provided for 8 only
9	561911	319710	24.7	26.9	17.4	15.1	15.5	15.2	9.5	13.3	17.8	18.2	11.0	13.6	16.5	12.9	-	
10	562100	319679	45.4			36.0	27.4	30.6	28.5	35.7	38.7	37.6	26.0	30.2	33.6	26.2	-	
11	562165	319575	34.5	33.9	29.7		18.5	22.3	20.8	24.6	33.1	25.7	28.9	26.0	27.1	21.1	-	
12	562242	319452	39.7	38.8	32.8	27.9	18.6	23.1	31.6	31.3	30.6	32.5	34.7	22.1	30.3	23.6	-	
13	562263	319374	36.9	37.8	24.2	23.1	20.3	20.7	24.7	28.1	26.9	27.1	25.2	27.9	26.9	21.0	-	
14	562227	319266	39.9			26.8	21.4	23.9	26.0	27.5	29.5	34.8	38.3	33.1	30.1	23.5	-	
15	562189	319101	39.2		35.8	39.2	29.8	36.7	31.6	36.3	31.8	35.4	34.1	29.8	34.5	26.9	-	
18	562266	319042	29.8	30.0	25.1	22.4	19.5	21.0	20.7	20.6	24.2	13.5		24.1	22.8	17.8	-	
19	562277	319098	28.0	30.5	24.7	19.2	15.0	18.3	19.7	18.9	21.0	21.7	13.8	23.7	21.2	16.5	-	
20	562244	319260	32.4		27.7		30.6	31.5	22.3	29.3	33.6		30.9	26.6	29.4	23.0	-	
22	562284	319385	35.7	37.3	30.2	35.7	30.2	28.6	23.5	26.7	30.1	30.6	23.1	27.5	29.9	23.3	-	

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)			Comment
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.78) and Annualised	Distance Corrected to Nearest Exposure	
23	562161	319614	33.9	35.6	29.7	38.8	41.0	35.0	21.2	29.1	29.6	29.1	29.9	20.0	31.1	24.2	-	
24	562135	319650	27.8	32.2	26.3	37.2	37.8	36.6	21.6	27.1	33.3	29.4	27.6	22.7	30.0	23.4	-	
25	562190	319694	23.0	18.7	14.3	12.2	8.3	9.6	10.8	12.8	12.0	14.7	19.3	28.1	15.3	11.9	-	
26	562131	319996	36.2	37.9	27.4	34.5	31.8	33.9	25.7	31.4		30.1	33.8		32.3	25.2	-	
27	562177	319999	33.9	34.3	26.2	26.5	25.3	23.3	22.2	26.5	24.0	27.2	31.8	24.8	27.2	21.2	-	
28	562253	320015	36.6	37.5	27.8	23.1	24.3	22.7	22.7	31.0	29.4	20.3	27.0	27.8	27.5	21.5	-	
29	562183	320055	23.6	21.9	15.5	13.1	9.8	10.9	11.8	13.4	16.2	16.6	21.2	17.9	16.0	12.5	-	
30	562204	320108	24.5	24.9	16.6	15.7	13.8	14.0	10.0	15.2	14.5	17.7	18.5	18.3	17.0	13.2	-	
31	562128	320131	35.4	39.2	27.6	28.0	31.8		19.3			28.8	31.3	27.7	29.9	28.1	-	
32	562119	320216	33.5	31.2	27.2	24.4	23.8	25.9	16.2	24.7	27.2	27.8	26.3	27.2	26.3	20.5	-	
33	562202	320158	35.4	34.6	23.6	24.2	17.6	22.8	22.0	23.9	26.8	27.5	31.3	32.4	26.8	20.9	-	
34	562244	320128	40.9	39.3	30.0	26.9	21.3	20.3	25.0	27.7	28.8	28.4	36.0	31.4	29.7	23.1	-	
35	562244	320238	34.9	36.8	23.9	23.4	21.1	23.4	22.7	27.3	31.0	27.6	33.3	28.5	27.8	21.7	-	
36	562219	320318	33.2	32.5	23.7	24.8	21.9	24.4	17.5	23.7	27.0	27.8	30.8	19.5	25.6	19.9	-	
37	562253	320258	33.6	35.7	17.8	23.9	28.1	29.1	16.8	24.4	24.5	22.2	29.4	19.7	25.4	19.8	-	
38	562256	320322	39.4	34.9	31.5	30.3	24.6	31.6	23.0	33.2	35.5	32.6	37.1	34.3	32.3	25.2	-	
39	562822	320426	31.4	29.8	24.6	21.7	14.5	17.1	16.6	20.5	21.0	17.4	25.1	20.7	21.7	16.9	-	
40	563490	320469	44.6	41.1	34.0	31.3	23.4	29.9	29.0	31.4	33.6	32.8	34.5	35.1	33.4	26.0	-	
41	563477	320514		41.1	31.0	33.7	27.8	36.7	26.2	32.0	36.2	31.8	32.3	24.9	32.2	25.1	-	
42	563480	320581	39.3	37.2	26.4	18.8	24.2	22.0	26.1	24.9	25.4	27.2	31.8	29.2	27.7	21.6	-	

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)			Comment
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.78) and Annualised	Distance Corrected to Nearest Exposure	
43	563411	320476	39.6	39.5	32.0	29.2	31.4	25.2	25.1	27.8	26.1	25.4	34.7	26.2	30.2	23.5	-	
44	563377	320484	41.0	35.7	29.2	39.6	39.3	39.8	22.4	36.4	37.8	34.0	37.8	28.7	35.1	27.4	-	
45	563202	320488	32.9	38.8	26.2	28.4	29.9	21.8	16.3	22.8	25.3	24.8	24.9	23.8	26.3	20.5	-	
46	562565	320509	30.2	24.9	22.4	17.8	23.6	20.5	16.1	21.6	24.1	23.2	27.5	21.7	22.8	17.8	-	
47	562186	320376	37.7	38.2	11.8	30.2	25.3	26.2	22.1	27.8	30.0	32.4	31.0	26.1	28.2	22.0	-	
48	562180	320365	29.7	33.8	23.8	26.5	17.5					28.7	28.5	24.5	26.6	23.9	-	
51	563521	320628	25.1	24.1	17.2	16.0	11.5	12.5	11.8	12.5	16.2	16.2	20.8	19.2	16.9	13.2	-	
52	563288	320504	34.6	36.6	28.4	30.6	27.7	25.1	21.2	27.8	26.2	26.7	32.1	28.1	28.8	22.4	-	
58	562171	319018	28.5	32.2	19.5	25.4	23.6	24.5	16.8	21.3	25.1	25.1	26.6	19.2	24.0	18.7	-	
62	561614	318591	19.6	18.0	12.2	11.2	7.3	8.4	8.6	11.9	13.5	14.4	16.9	12.1	12.8	10.0	-	
66	562595	320526	29.1	26.6	21.0	19.6	14.9		15.3	18.7	18.9	20.8	25.4	21.3	21.1	16.4	-	
67	562235	319578	21.8	18.5	13.8	11.6	7.0	8.2	10.1	11.4		14.6	18.7	14.2	13.6	10.6	-	
68	562142	319837	22.6	20.8							13.2	16.1	18.3	15.2	17.7	14.4	-	
69	561993	319394	17.7	15.6	9.9	9.6	7.8	8.6			10.3	14.5	10.0	10.8	11.5	9.0	-	
70	561929	319354	15.7	15.7	9.6	10.1					10.2	13.0	12.3	8.9	11.9	10.4	-	
73	563161	315848	20.8	24.1	19.9	23.2	21.2	19.0	12.3	19.2	19.1		22.2	17.5	19.9	15.5	-	
75	563468	320469	40.6	43.2	33.4	35.6	30.5	36.0	26.4	31.4	24.2	32.2	28.4	28.7	32.6	25.4	-	
76	562597	318739	22.3	21.5	16.9	16.9	9.6	12.0	14.2	15.1	15.2	17.6	20.8	18.6	16.7	13.0	-	
79	562803	320422	39.8	41.9	32.1	29.1	27.5	26.4	25.7	28.3	29.7	31.3	37.0	30.8	31.6	24.7	-	
86	562018	320138	33.8	32.2	27.8	24.4	17.8	22.5	19.0	24.9	25.4	23.9	29.2	25.6	25.5	19.9	-	

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)			Comment
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.78) and Annualised	Distance Corrected to Nearest Exposure	
87	562102	320163	33.9	34.9	23.3	29.8	30.5	27.2	18.8	25.2	26.1	28.2	29.2	20.9	27.3	21.3	-	
89	561887	319466	15.7	16.7	10.8	10.1	7.4	7.5	6.9	7.9	9.5	13.0	14.4	10.1	10.8	8.5	-	
90	563366	322065	20.8	20.7	11.3	14.4	10.3	8.4	10.6	11.5		14.1	12.9	11.9	13.4	10.4	-	
91	563255	321613	19.4	19.5	12.4	10.8	11.2	8.2	8.6	12.8	11.5	13.9	10.1	13.0	12.6	9.8	-	
92	563256	321588	16.3	17.6	8.6	10.2	7.7	7.1	7.3	8.0	9.4	12.7	12.0		10.6	8.3	-	
94	561957	318963	28.5	26.5	17.9	18.6	12.0	16.3	17.1	18.7	19.1	20.8	23.9	19.4	19.9	15.5	-	
95	562058	319038	42.7	20.8	14.3	13.5	13.6	12.2	10.0	13.3	14.3	17.8	16.0	12.2	16.7	13.0	-	
96	562042	319011	26.8	24.6	16.5	17.9	12.9	14.8	11.4	15.1	16.6	17.2	23.0	13.7	17.5	13.7	-	
97	564503	322411	23.2	23.6	14.6	19.8	15.2	16.6	14.3	18.2	14.9	19.9	20.7	17.7	18.2	14.2	-	
98	562821	320964	20.6	19.4	12.8	11.8	6.4	7.0	9.5	9.0	10.8	13.8	17.2	14.3	12.7	9.9	-	
99	547960	313115	13.4	11.7	8.5	8.0	5.8	5.8	4.7	6.0	7.3	8.8	12.2	7.8	8.3	6.5	-	
100	547902	310395	16.2	16.6	10.9	7.3	5.1	7.6	6.8	8.3	8.9	11.0	16.7	12.5	10.7	8.3	-	
101	547094	307850	44.1	37.7		34.8	28.6	30.4	34.5	35.3	36.4	36.3	24.2	30.9	33.9	26.5	-	
102	562104	320208	51.4	42.3	37.4	38.7	32.1	28.5	34.4		36.0	41.3	42.6	34.6	38.1	29.7	-	
103	562116	320128	46.9	51.1	37.1	34.1	29.2	26.3	34.6	38.7	38.3	34.0	42.4	38.2	37.6	29.3	-	
104	562116	320128	43.1	41.6	29.9	33.2	26.7	28.2	27.2	35.0	33.2	35.4	25.9	21.6	31.8	24.8	-	
110	563161	315848	26.0	26.3	20.7	19.0	14.8	15.3	12.9	15.0	18.2	21.7	20.5	13.5	18.7	14.6	-	

☒ **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.**

☒ **BCKLWN confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within BCKLWN During 2023

For the 2023 review period Table C.1 below highlights some of the most significant new developments considered for air quality;

- Overall there were **111 planning applications considered in 2023**, with the following 36 applications listed in Table C.1 as being the most potentially significant.
- A summary of the potential changes are noted against each development.

None of these potential new sources were considered to significantly impact air quality.

Table C.1: Most Significant Planning Applications in 2023

Planning Ref.	Address	Proposal	Comments
13/01615/OM 18/02289/OM	West Winch Strategic Growth Area (WWGA)	Up to 1110 dwellings plus primary school and local centre. Up to 500 dwellings plus neighbourhood centre.	Both applications are still pending.
EN010110	Land On Algores Way Industrial Estate Wisbech Cambridgeshire	DCO application for Energy from Waste Facility (EfW) combined heat and power plant with a maximum gross capacity of 58MW	BCKLWN Relevant Representation and Local Impact Report were submitted as part of the DCO application. The development is conditional on a detailed ambient Air Quality Monitoring Strategy (AQMS) being approved. The monitoring scheme to be jointly delivered within Fenland DC and BCKLWN areas.
23/01023/FM	Chestnut House Hillington	Demolition and redevelopment of	Access to the Flats (65) is from the Railway Rd AQMA. The flats are also

Planning Ref.	Address	Proposal	Comments
	Square King's Lynn	blocks of flats known as Aitken House, Norris House and Chestnut House in by Freebridge Community Housing.	located within an SCA. Traffic once operational and construction dusts assessed by AQA that showed negligible impacts from NO_2, PM_{10} and $PM_{2.5}$. Construction dusts controlled through Construction Environmental Management Plan (CEMP) as secured by condition (to protect amenity). NOx from flats to be mitigated via ASHPs either individual to each apartment or via a communal heating system. EV charging infrastructure and cycle parking also secured though conditions.
23/00867/FM	Development Site E of Nar Ouse Way King's Lynn	New Health Hub located off Nar Ouse Way just south of King's Lynn AQMA. Development to provide new community care and outpatient (Physio and Maternity) services.	As the AQA did not consider AQMA, a travel plan was secured though condition to secure modal shift towards more sustainable transport options to the Hub. Site to have EV charging spaces (10) i.e. above the building regulations minimum and also to install secure cycle parking spaces (32) for staff and visitors. A proportion of staff spaces to have secure / lockable bicycle enclosures.
23/01237/FM 23/02215/DM	Queen Elizabeth Hospital King's Lynn	Proposed new administration and discharge lounge buildings within the Queen Elizabeth Hospital (QEH) following prior notification for demolition.	Construction dusts mitigated by a Construction Management Plan (CMP). Requested further information, subject to condition on low NOx energy systems that confirmed heating to be sourced from zero NOx / electrical (Air Source Heat Pump, ASHP) than a connection to existing gas boilers. Designs to include photo voltaic (PV) plus Mechanical Ventilation Heat Recovery (MVHR) systems to help improve air quality.

Planning Ref.	Address	Proposal	Comments
23/01132/FM	Queen Elizabeth Hospital King's Lynn	The development of surface-level temporary car parks, together with associated works, including landscaping and highways	Temporary 228 car parking spaces to be provided to cover the first phase of associated Multi-Storey Car Park permission (22/01947/FM) that would see the loss of 218 spaces. Further information on the QEH travel plan requested as an informative, to ensure targets on modal shift are being achieved.
23/01201/F	Riverside Business Centre Cross Bank Road King's Lynn	Variation of Conditions 1, 13 and 24 of Planning Permission 21/02449/F: Variation of Conditions 2, 14a and 25 of Planning Permission 21/00800/F: Variation of condition 25 of planning permission 20/00694/F to change allowance of daily movements.	The application concerned an increase in feedstocks to the anaerobic digestion facility to take total capacity from 55,000 tpa to 80,000 tonnes per annum (tpa). Daily traffic movements also to change. A holding objection was recommended to obtain further information.
23/01276/F	Wellington Lodge Farm Northwold	REMOVAL OF CONDITIONS 1, 8, 12 AND VARIATION OF CONDITIONS 2, 7, 9, 10, 13, 18 of Planning Permission 16/01151/FM: Installation of an anaerobic digester (AD) plant and associated infrastructure	Proposal to vary the design with a number a new buildings, including new location for the combined heat and power (CHP) plant and site office plus a new manure (storage) building to allow reduction in feedstock clamp area. As no new sensitive receptors were likely to be introduced and an environmental permit likely to control the emissions to BAT, no objection raised.

Planning Ref.	Address	Proposal	Comments
23/01524/F	Downham Country Garden Store Bexwell Downham Market	Biomass heating system of 295kW to replace existing oil boiler.	Emission rates compared to adjusted background rates that showed no significant effect. Wood fuel quality to be controlled by method statement than a building to keep wood fuel dry. No objection raised.
23/00178/RMM	Furlong Store Furlong Road Stoke Ferry	Reserved Matters Application for 30 dwellings including layout, external appearance, scale and landscaping.	The following 3 developments noted as coming forward within Stoke Ferry that include; Development located north of Indigo Rd and the north of the mill in Stoke Ferry. Outline already approved (19/00272/OM) that secured a CMP through condition to protect amenity from construction dusts.
23/00177/RMM	Land Rear of Travena and Lynton Lynn Road Stoke Ferry.	Reserved Matters Application for 62 dwellings including layout, external appearance, scale and landscaping.	The principle of development was approved at outline when air quality assessment reviewed. This reserved matters application sets out that the development is to be phased. First phase to include demolition of the mill and providing main access to the site off Buckenham Drive. The later Phase-2 is to develop a green field area (Self's Field). A CMP was secured at outline to protect the neighbouring residential amenity from construction dusts. A travel plan was submitted but not secured through condition.
23/01475/FM	Land Between Bramcote House and Village Hall Lynn Road Stoke Ferry	Full application for the erection of 29 no. dwellings, Village Hall car park and associated infrastructure.	Development located south of Indigo Rd with access and new junction from Lynn Rd. The site is located north of the mill in Stoke Ferry. Likely traffic movements screened based on IAQM criteria. Construction dusts to be controlled through a CMP to protect

Planning Ref.	Address	Proposal	Comments
			amenity. No objection based on no significant change to traffic flows.
23/00735/FM	Omex Agriculture Ltd Estuary Road King's Lynn	Construction of new office building with areas to the rear to store and blend products using a negative pressure bag-house system located at the rear.	Requested further information on bagging system and EV infrastructure, as a new car park for additional 24 spaces proposed in addition to bagging area. Revised plans submitted confirm 6 EV charging spaces i.e. above building regulations minimum. Recommended a condition to secure reduction in the building NOx emissions using low carbon / renewable systems under core policy CS08.
22/02265/FM	Land Opposite Walpole Sub Station Walpole Bank Walpole St Andrew	Proposed development of a Battery Energy Storage Scheme (BESS) of up to 100MW capacity to import, store and export electricity to the National Grid.	Construction of BESS as in addition to a number of other BESS sites coming forward around the substation. Traffic screened based on likely traffic movements. Not considered a significant change. Construction traffic controlled through a CTMP as required by LHA.
FUL/2023/0009 FUL/2023/0010 FUL/2023/0011 FUL/2023/0012	Pentney Quarry Abbey Road Pentney	Wormegay: Pentney Quarry, Pentney, King's Lynn, Norfolk: Extraction of Sand and Gravel (550,000 Tonnes) and to vary conditions to extend use of existing operations with restoration by 2036; Middleton Aggregates Ltd	Proposed extension of the existing quarry to extract further c.550,000 tonnes of sands / gravel, with extraction to commence eastwards over a phased approach until 2036. An air quality assessment submitted as part of the ES assessed impacts at sensitive receptors. None were located 'near' to the extraction, however some within 250m to the main site access road. Assessment showed a negligible

Planning Ref.	Address	Proposal	Comments
			impact once dust management plan (DMP) measures implemented.
FUL/2023/0037 FUL/2023/0038	Sibelco Minerals & Chemicals Station Road Leziate King's Lynn	Leziate: Grandcourt Quarry Extension (East Winch Charities Field), Leziate Works, Station Road, Leziate, Norfolk, PE32 1EH for the extraction of industrial sand with progressive restoration and to vary conditions 2, 7, and 8. of decision APP/X2600/W/21/3289252: Sibelco UK Ltd	The applications are for an extension of extraction operations south of the existing quarry into an area of land called the Charities Land (5.19ha; FUL/2023/0038) and a related application (FUL/2023/0037) to vary associated conditions (plans, scheme of working and restoration). As the area to be extracted is within the existing site and no nearer to any human sensitive receptors we had no objection.
DIS/2023/0013	Sibelco Minerals & Chemicals Station Road Leziate King's Lynn	COUNTY MATTERS APPLICATION: Discharge of condition No. 9 (Dust Management Plan) of planning permission reference APP/X2600/W/21/3289250	Application seeking to discharge measures set out in dust management plan (DMP) that will apply to quarry activities until 2031. AQ monitoring scheme within the DMP includes continuous indicative dust monitoring. Short-term PM10 trigger level concentrations agreed to be added to the DMP as well as minimum level of data acquisition to ensure monitoring is both effective and representative over the extended period of operations.
FUL/2022/0064 FUL/2022/0065 FUL/2022/0066 FUL/2022/0067 FUL/2022/0068 FUL/2022/0069	Middleton Aggregates Limited Offices Mill Drove Blackborough End King's Lynn	Middleton: Middleton/East Winch Quarry, Land to East of Mill Drove, Mill Drove, Blackborough End, King's Lynn, PE32 1SW: To vary conditions to extend	The applications concerned a variation to alter the timescales in line with overall wider site activities than necessarily a change in the extraction operations. We had no objection to the proposals. New PV panels to be installed to office.

Planning Ref.	Address	Proposal	Comments
		use of site office, a bagging plant, recycling area, storage bays and plant workshop to 2032 and restoration by 2033; Middleton Aggregates Ltd	
FUL/2022/0059 FUL/2022/0060 FUL/2022/0061	Frimstone Ltd Crimplesham Quarry Main Road Crimplesham	West Dereham: Frimstone Ltd, Crimplesham Quarry, Main Road, Crimplesham, PE33 9EB: Non-compliance with conditions 1 and 12 of planning permission ref. C/2/2018/2011 to allow continued restoration operation until 30 April 2024: Mick George Ltd	The application is for a variation to conditions to provide an extension of time for the restoration operations to be undertaken, from 31st December 2022 to 30th April 2024. Changes affect the period of time for HGVs accessing the site rather than an increase in extraction rates or operations that could cause pollution levels to change.
21/02220/DISC_A	The Ffolkes Arms Hotel Lynn Road Hillington King's Lynn	DISCHARGE OF CONDITIONS 2, 3, 6, 7, 9 AND 11 OF PLANNING PERMISSION 21/02220/FM: Improvements and extension to the existing facilities to include 6no. new hotel cabins, alterations and extension to the courtyard hotel rooms, alterations to the stables function room courtyard and the	The 6 Cabins located to the rear of the Hotel were fitted with wood burners. Provided an informative on measures to improve air quality in accordance with NPPF para 180(e).

Planning Ref.	Address	Proposal	Comments
		provision of additional parking.	
23/01107/F	Docking Lodge Farm Fakenham Road Docking	Retention and completion of hotel incorporating two storey extension.	Screened based on likely daily traffic movements (additional 68 vehicle trips per day via new junction formed with the B1454). Informatives provided on the solid fuel heating proposed and EV provision. No objection, as not considered a significant change for air quality purposes when considering the generally good background levels in the area.
23/01775/RMM	Church Farm Distribution Depot Northgate Way Terrington St Clement	Reserved Matters Application: Erection of 76 Dwellings with means of site access following demolition of existing structures.	At outline we had recommended best practice principles to minimise emissions especially when considering the potential additional traffic generated. At this reserved matters, building designs show asymmetrical roofs to help maximise potential for solar gains, PV systems and zero NOx ASHP. EV charging to be delivered through building regulations.
23/00768/FM	Land S of 16 Lynn Road Great Bircham.	Construction of 12 new dwellings, change of use of land adjoining to shared woodland/meadow outdoor space.	Screened based on likely daily traffic movements. To help improve AQ recommended a condition to secure a reduction in building NOx emissions through core policy CS08. EV charging to be delivered through building regulations. No objection as not considered a significant change in daily traffic.

Planning Ref.	Address	Proposal	Comments
23/00824/FM	Land S of 7 To 23 Foresters Avenue Hilgay	Residential development of 17 dwellings	Screened based on likely daily traffic movements. To help improve AQ recommended a condition to secure a reduction in building emissions through core policy CS08. EV charging to be delivered through building regulations. No objection as not considered a significant change in daily traffic.
23/00496/FM	Land Opposite 1 To 4 Beacon Hill Burnham Market	The erection of 12 dwellings with associated landscaping, vehicular access and parking provision	Screened based on likely daily traffic movements. To help improve AQ recommended a condition to secure a reduction in building emissions through core policy CS08. Development proposes electric (ASHP) heating. EV charging to be delivered through building regulations. No objection as not considered a significant change in daily traffic.
22/02181/FM	Manor Farm 6 Nursery Lane Hockwold cum Wilton	The renovation and conversion of existing redundant farmstead to create 23 no. dwellings.	Development not considered a significant change in traffic movements. Recommended conditions on EV charging, ensuring low NOx energy systems and an CEMP. Informative on wood burning, given some of the plots (9-12) showing chimneys.
23/01127/RMM	Buildings SE of 21 Sutton Road Walpole Cross Keys	Reserved matters application for 16 Dwellings	Additional traffic from 16 dwellings not considered significant when based on the generally good existing background air quality. Recommended conditions on ensuring low NOx energy systems and EV charging. At outline, construction dusts controlled through condition as part of CMP.

Planning Ref.	Address	Proposal	Comments
23/01141/FM	Land South of Railway Road Downham Market	Erection of 32 Dwellings (Use Class C3)	AQ assessment (RSK 2023) assessed construction dusts and operational (traffic) emissions. Traffic was noted with relatively high trip rate (6.8vpd) but was screened out based on IAQM criteria. A DMP controls construction dusts. To improve AQ the applicant proposed betterment of thermal U-values, inclusion of air source heat pumps and PV panels. This was recommended to be secured though condition.
23/01763/FM	Manor Farm Back Street Gayton	Proposed Residential Development of 36 dwellings involving the demolition of existing buildings.	Screened based on likely traffic flows. To improve air quality heat pumps, PV / solar hot water were proposed. Recommended that this was secured through condition as well as EV charging scheme. Informative on wood burners as plot designs (A and B) showed chimneys.
23/00985/FM	STREET RECORD Jensons Way Whittington	Proposed residential development of 11 dwellings to Passivhaus standards.	The development was additional to a recent site approved under ref 21/02103/FM for 10 dwellings and to a similar Passivhaus standard. Screened based on cumulative effects on receptors at the junction with Methwold Rd. Mitigation is by way of EV charging as buildings already of low emission (Passivhaus) type. No objection as new junction less than TG-22 screening criteria.
22/02147/OM	Land E of Fenway Basin Road Outwell	Proposed residential development (affordable dwellings)	Development to create a new junction on to Basin Rd and where sensitive receptors located within 10m to the kerb. When based on DfT traffic survey point, combined effect less than 10,000vpd from all arms of the

Planning Ref.	Address	Proposal	Comments
			junction. Recommended conditions for low emission / NOx energy systems under Policy CS08 and EV charging scheme.
23/00618/FM	Pondworld Retail Park Lynn Road Walsoken	Proposed Commercial Units - Use Classes A1 A2 and B1.	Proposal to extend the car-parking by 50 spaces to accommodate expansion of retail area (1009m2). Recommended conditions for low emission / NOx energy systems under Policy CS08 and EV charging scheme. No objection given change in daily traffic not considered as significant.
23/00760/F	Lidl 43 Lynn Road Heacham	Full Planning Application for the improvements to the existing access and an extension to the existing car park to provide additional 29 car parking spaces including electric vehicle (EV) charging spaces and other associated works.	Revised application seeks to extend existing carpark by another 29 spaces from current capacity (123). The reason given was to prevent capacity issues at peak times. Additional EV charging spaces (15) are proposed including two rapid charges and passive bgl cabling to future proof. No objection raised as the change in daily traffic not considered significant.
22/01654/FM	Baytree Garden Centre, Hilgay, Downham Market, PE38 0QH	Erection of extension to the farm shop and parking area.	Expansion of retail area by more than 1000m2 plus additional parking (50 spaces). Staff travel plan to be adopted as part of the proposals. Recommended conditions on EV charging and low NOx / emission energy systems. No objection as change in daily traffic not considered as significant.

Planning Ref.	Address	Proposal	Comments
23/01826/FM	Newcome Baker Farms Ltd William Barber Whin Close Farm Docking Road Sedgeford	Erection of two poultry sheds and associated development, including feed silos, two weigh rooms, an extension to the dead bird shed, an additional water tank, extension to the access road and re-positioning of the existing landscaped earth bund.	The application was for two additional poultry units to house an additional 76,000 chickens at an already permitted site. This would take the total capacity on site up to 380,000 birds. The additional according to the EA will require an application to vary the existing permit. PM10 emissions were screened out of the ES based on TG16 guidance. Additional traffic not considered a significant change for AQ purposes (total as 3 per day).
22/00860/FM 22/00866/FM	Woodlark Farming Ltd Breckland and Feltwell Farms Methwold Norfolk	Demolition of existing with construction of 20 new poultry sheds to house up to 870,000 birds, new piggery to house 14,000 pigs over 30kg and workers dwellings	ES submitted for both applications that included air quality and odour assessments. Emissions to be controlled by separate permits for the chicken and pig facilities to BAT and regulated by the EA. AQ matters have been considered.

Additional Air Quality Works Undertaken by BCKLWN During 2023

West Winch Growth Area AQ study; Bureau Veritas report AIR18756036

During 2023 the council carried out a review of the air quality impacts from the West Winch Growth Area (WWGA); an area identified in the emerging local plan of housing of up to 4,000 dwellings and associated infrastructure including a primary school.

Bureau Veritas were commissioned to carry out an air quality assessment of the impacts from the WWGA from operational traffic and construction dusts using traffic data supplied by WSP.

This study was used as part of consultation into the Local Plan examination process. It is listed within the additional evidence base documents as part of this process (report F51(j)[37]).

In terms of results, construction dusts were assessed as not a significant impact once effective mitigation measures were implemented. This will be taken forward in applications coming forward.

However, in terms of traffic impacts, the assessment showed NO_2 annual mean to revert back towards the objective level on receptors within the Railway Rd AQMA e.g. Receptor R35 (39.4µg/m^3 NO_2). PM_{10} was also assessed with highest annual mean concentration occurring with the Railway Rd AQMA (Receptor R35 20.3µg/m^3 PM_{10}).

It must be noted that the transport data that informed this study should be considered as a worse case, as it does not take into account transport schemes coming forward through the LTP and King's Lynn Transport Strategy, namely;

- The Southgates and town centre's Gyratory transport schemes;
- West Winch Housing Access Road (WWHAR) and its traffic calming measures on the A10.

Once transport data is available from these schemes a more detailed assessment can be carried out and reported in the ASR.

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

PM_{10} and $PM_{2.5}$ is monitored by four Turnkey Osiris instruments as shown in Table C.2. Results are indicative to iMCERTS and shown in Table C.3 to Table C.5.

Two of these monitoring sites are located either side of King's Lynn docks (OS1 and OS2) and the other two around an industrial animal feed mill in Stoke Ferry (OS3 and OS4). The mill is subject to control through an environmental permit regulated by the Environment Agency.

PM_{10} results in summary:

- Results indicate no exceedances in the annual objective (40µg/m3), or short-term 24-hr mean (50µg/m^3) that must not be exceeded more than 35 times per year.

[37] BCKLWN consultation on Local Plan; https://www.west-norfolk.gov.uk/info/20216/local_plan_review_2016_-_2036/1070/consultation_on_additional_evidence_base_documents

Table C.2: Details of Non-reference Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
OS1 PS	Page Stair Lane, King's Lynn	Urban Background	561527	320437	PM10 / PM2.5	No	Indicative, Nephelometer	5	3.3	3.5
OS2 ER	Estuary Road, King's Lynn	Urban Background	561593	321466	PM10 / PM2.5	No	Indicative, Nephelometer	2	1	3.5
OS3 WR	Wretton Road, Stoke Ferry	Urban Background	570438	299905	PM10 / PM2.5	No	Indicative, Nephelometer	24	19	3.5
OS4 BD	Buckenham Drive, King's Lynn	Urban Background	570264	299943	PM10 / PM2.5	No	Indicative, Nephelometer	12	1	3.2

Short term alerts are programmed into the instruments to help identify the cause of the daily mean exceedances wherever possible e.g.;

- Page Stair Lane site (OS1) exceeded the daily mean PM_{10} AQS objective of 50µgm^{-3} on 1 day (27th of February 2023).
- Wretton Rd site (OS3) exceeded the PM_{10} daily mean on 3 occasions (30th, 31st October and 02nd December 2023).

PM_{10} Levels were observed to peak on Halloween day at 280ug/m^3 at the Wretton Rd site.

The PM_{10} results for 2023 were annualised owing to poor data acquisition (less than 75%) for sites OS1 (Page Stair Lane) and OS4 (Buckingham Drive). Annualisation results are shown in Table C.9.

Monitoring of $PM_{2.5}$

$PM_{2.5}$ results in summary;

- The $PM_{2.5}$ results shown in Table C.5 are indicative of the industrial background concentrations in the area they monitor.
- Results show annual mean concentrations are less than the national objective (20ug/m3) and also less than their respective 1 km Defra background grid square for 2023.

Whilst not suitable for LAQM reporting purposes the results for 2023 are annualised owing to poor data acquisition (less than 75%) for OS1 and OS4 as shown in Table C.9.

The particulate matter monitoring is to continue in its present form, albeit with the addition of an Earthsense Zephyr device to be located within Railway Rd AQMA. These units are considered useful to monitor some of the industrial (background) sources.

Table C.3 – Indicative annual mean PM_{10} Monitoring Results (µg/m^3) from Osiris monitors.

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
OS1 PS	561527	320437	Industrial	44	44	11.0	14.7	8.0	19.0	11.3
OS2 ER	561593	321466	Industrial	97	97	13.0	10.1	16.0	15.1	13.1
OS3 WR	570438	299905	Industrial	89	89	11.0	11.0	12.0	16.1	15.8
OS4 BD	570264	299943	Industrial	54	54	10.0	12.8	12.0	15	16.3

☒ **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.

Exceedances of the PM_{10} 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 Table C.9 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%).

Table C.4 – Indicative 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 2022 (%) (2)	2019	2020	2021	2022	2023
OS1 PS	561527	320437	Industrial	44	44	0	4 (29)	0	5	1 (20.5)
OS2 ER	561593	321466	Industrial	97	97	0	0	2	0	0
OS3 WR	570438	299905	Industrial	89	89	0	0	0	0	3
OS4 BD	570264	299943	Industrial	54	54	0	0	0	1	0

Notes:

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

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

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

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

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

Table C.5 – Indicative Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
OS1 PS	561527	320437	Industrial	44	44	5.9	7.9	4	7	6.6
OS2 ER	561593	321466	Industrial	97	97	7.2	6.7	6	6.5	6.1
OS3 WR	570438	299905	Industrial	89	89	6.8	6.4	5	7.5	7.0
OS4 BD	570264	299943	Industrial	54	54	5.3	5.4	6	6	7.5

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

Notes:

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

All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Table C.9 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%).

QA/QC of Diffusion Tube Monitoring

The choice of passive sampling methods by diffusion tubes and correcting bias against reference analysers is considered a relatively simple and cost-effective method of monitoring air quality in the borough.

Diffusion Tube Annualisation

There were four diffusion tube monitoring locations that recorded data capture was less than 75% but greater than 25% (sites 31, 48, 68 and 70). In such instances it is necessary to annualise the data. Results are presented in Table C.6 below.

Table C.6: Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor AURN 1 Wicken Fen Rural Background	Annualisation Factor AURN 2 St Osyth Rural Background	Annualisation Factor AURN 3 Northampton Spring Rural Background	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
31	0.9049	1.0005	0.9165	0.9406	29.9	28.1
48	0.8551	0.9638	0.8722	0.8970	26.6	23.9
68	0.8015	0.8735	0.7698	0.8149	17.7	14.4
70	0.8449	0.9217	0.8421	0.8696	11.9	10.4

Diffusion Tube Bias Adjustment Factors

The Council used diffusion tubes supplied by Socotec using the 50% TEA preparation method during the 2023 period.

The diffusion tube data presented within the 2023 ASR have been corrected for bias using a local bias adjustment factor as shown in Table C.8.

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.

A triplicate co-location study was used to determine a local bias factor based on the comparison of diffusion tube results to the CM1 Southgates NO_x/NO_2 continuous analyser. Using a local factor is considered preferable as diffusion tube results can be affected by

local meteorological conditions. The alternative is to use national database of diffusion tube co-location surveys that provides bias factors for the relevant laboratory and preparation method.

BCKLWN have applied a local bias adjustment factor of 0.78 to the 2023 monitoring data as good overall data capture and precision was obtained from the co-location study. The calculation to derive local bias factor is shown in Table C.7 below.

Table C.7: Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	9
Bias Factor A	0.78 (0.7 – 0.87)
Bias Factor B	29% (15% – 42%)
Diffusion Tube Mean (µg/m^3)	17.3
Mean CV (Precision)	4.0%
Automatic Mean (µg/m^3)	13.5
Data Capture	97%
Adjusted Tube Mean (µg/m^3)	14 (12 – 15)

A summary of bias adjustment factors used by BCKLWN over the past five years is presented in Table C.8.

Table C.8: Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Local	-	0.78
2022	National	03/23 (27 studies)	0.83
2021	National	03/22 (32 studies)	0.84
2020	National	06/21	0.81
2019	Local	-	0.93

NO_2 Fall-off with Distance from the Road

The NO_2 diffusion tube monitoring locations did not require any distance correction during 2023 period.

QA/QC of Automatic Monitoring

- Data management for the six automatic monitors was carried out by Air Quality Data Management (AQDM) services and Envitech Europe who host the results via a county-wide web portal (www.norfolkairquality.net). The NO_2 results are also uploaded simultaneously to Defra's UK-Air network (https://uk-air.defra.gov.uk/).
- Servicing of the 2x chemiluminescent NOx/NO_2 analysers was carried out by Matts Monitors which comprises a 6-monthly routine maintenance program plus 24-hr call outs to help ensure continuity of data. Air conditioning is serviced under contract by EDI Ltd.
- LSO drift calibrations of the 2x chemiluminescent NOx/NO2 analysers is carried out by BCKLWN monthly with frequency increased depending on performance.
- Ricardo carried out annual external QC of CM1 and CM2 against a certified standard of the NO span gas. This was carried out in March 2023.
- The Osiris PM monitors are serviced under a 24-month contract by the supplier (Turnkey). The service contract covers parts such as battery, pump, and photometer plus consumables such as filters. These analysers benefit from heated inlet. They are subject to quarterly filter change and flow rate check by BCKLWN. The data is supplied by Turnkey but as explained above is managed by AQDM and uploaded by Envitech Europe to the Norfolk web portal for public dissemination.

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

The PM_{10} and $PM_{2.5}$ Osiris analysers are co-located every 24 months by Turnkey against their reference analyser. There was no adjustment factor necessary for the 2023 period (factor 1.0).

Automatic Monitoring Annualisation

Annualisation was carried out for two automatic monitoring sites (OS1 and OS4) which recorded data capture less than 75% but greater than 25%. A summary of annualisation is presented in Table C.9.

Table C.9: Annualisation Summary (concentrations presented in µg/m3)

Background Site	PM10 AM	PM10 Period Mean	Ratio AM/PM
Norwich Lakenfields Background	11.8	12.12	0.97
Wicken Fen Background	10.7	9.97	1.07
		Average Ratios	1.02
Page Stair Lane OS1		Raw PM	11.1
		PM10 Annualised Mean	**11.3**
Norwich Lakenfields Background	11.8	10.62	1.11
Wicken Fen Background	10.7	9.67	1.10
		Average Ratios	1.11
Buckenham Drive OS4		Raw PM	14.7
		PM10 Annualised Mean	**16.32**

Background Site	PM2.5 AM	PM2.5 Period Mean	Ratio AM/PM
Norwich Lakenfields Background	7.6	7.94	0.957
Wicken Fen Background	6.5	6.40	1.015
		Average Ratios	0.986
Page Stair Lane OS1		Raw PM 2.5	6.7
		PM2.5 Annualised Mean	**6.6**
Norwich Lakenfields Background	7.6	6.49	1.17
Wicken Fen Background	6.5	5.22	1.245
		Average Ratios	1.21
Buckenham Drive OS4		Raw PM2.5	6.2
		PM2.5 Annualised Mean	**7.5**

NO_2 Fall-off with Distance from the Road for automatic monitoring results.

No automatic NO_2 monitoring locations within BCKLWN required distance correction during 2023.

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

Figure D.1– Map of the Monitoring Sites around Railway Rd AQMA

Figure D.2 – Map of the Monitoring Sites around Gaywood Clock AQMA

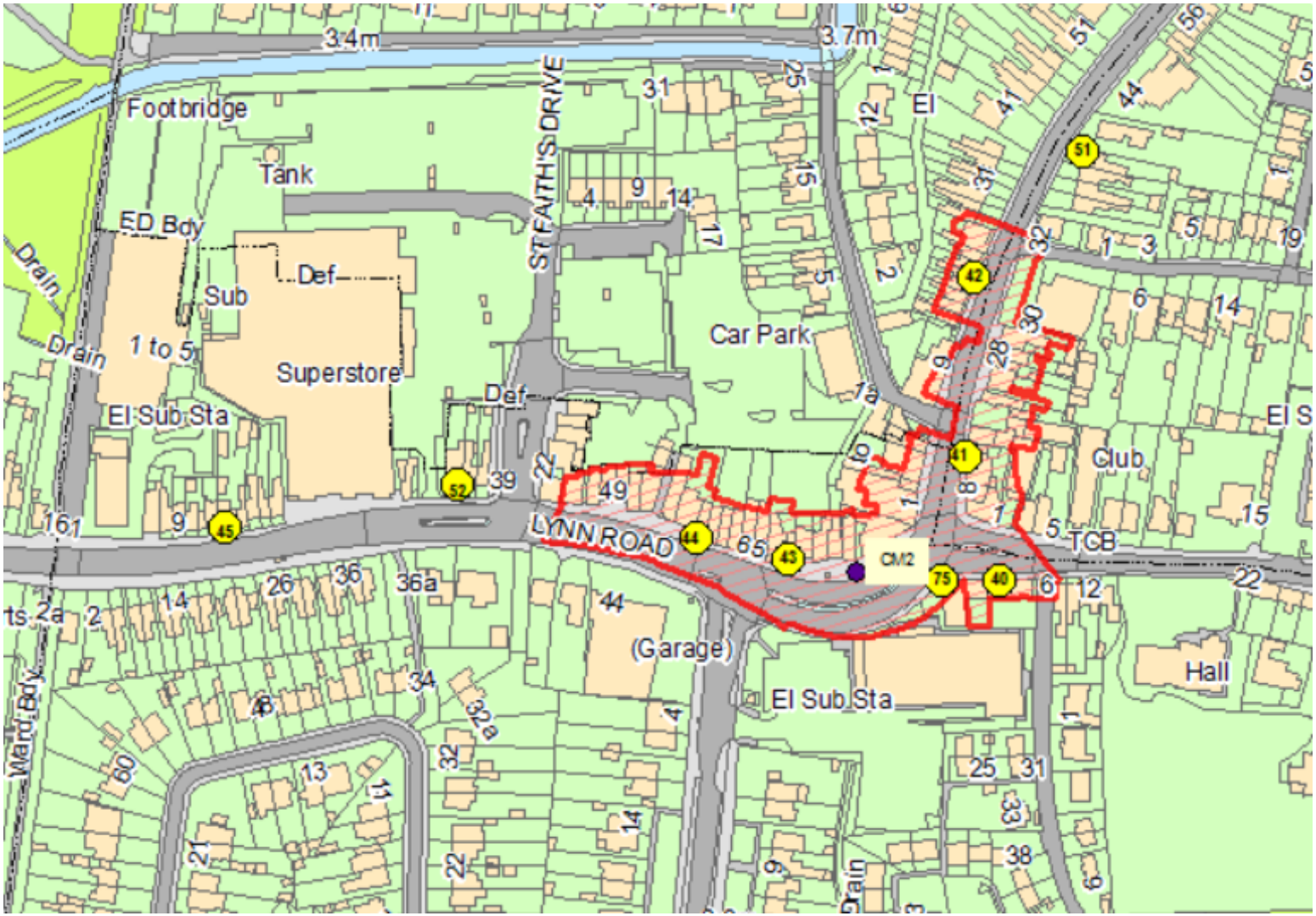

Figure D.3 – Map of the Monitoring Sites around the northern approach to King's Lynn and the Docks area

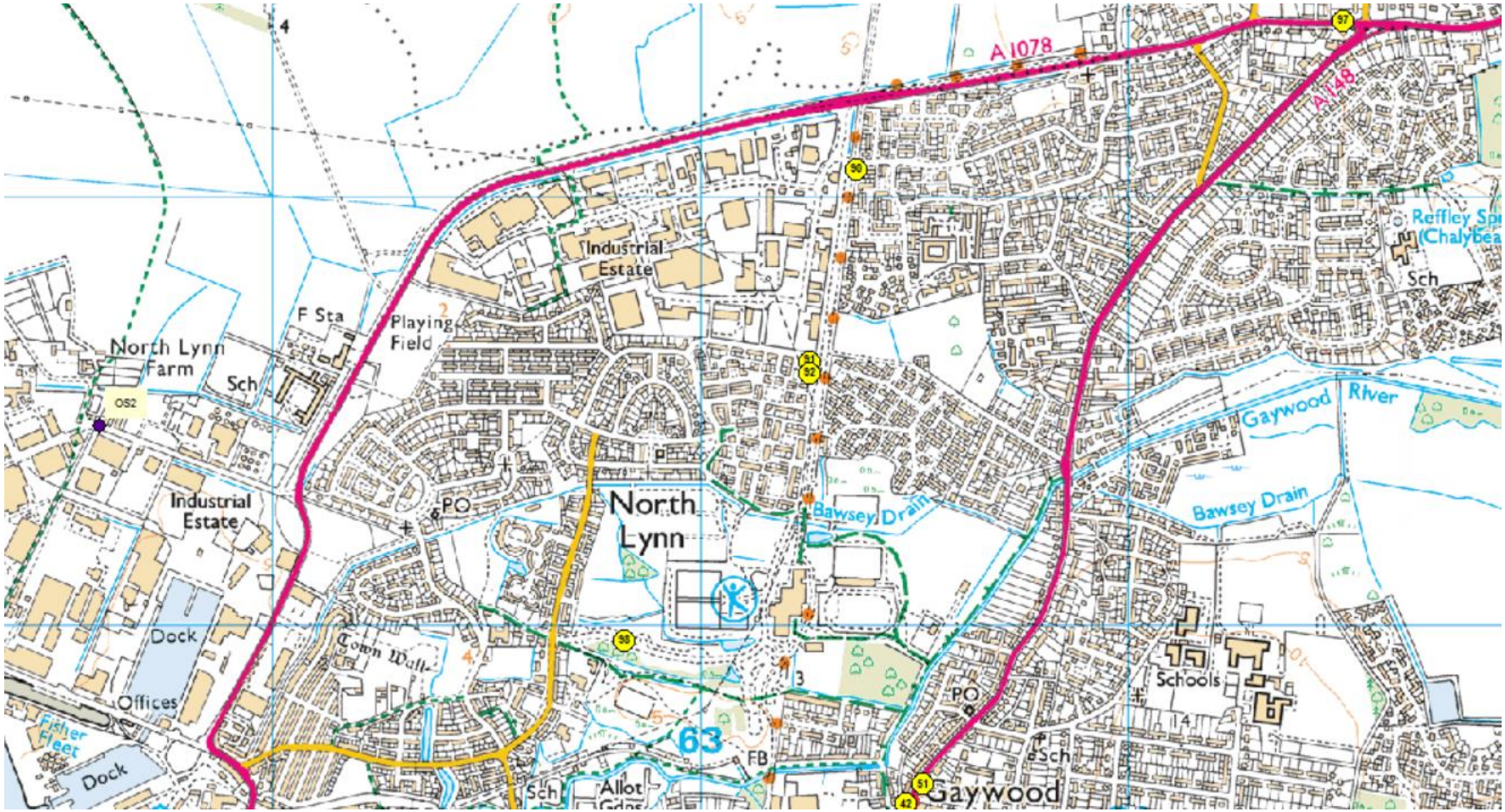

Figure D.4 – Map of the monitoring sites around the southern approach to King's Lynn including A10 corridor.

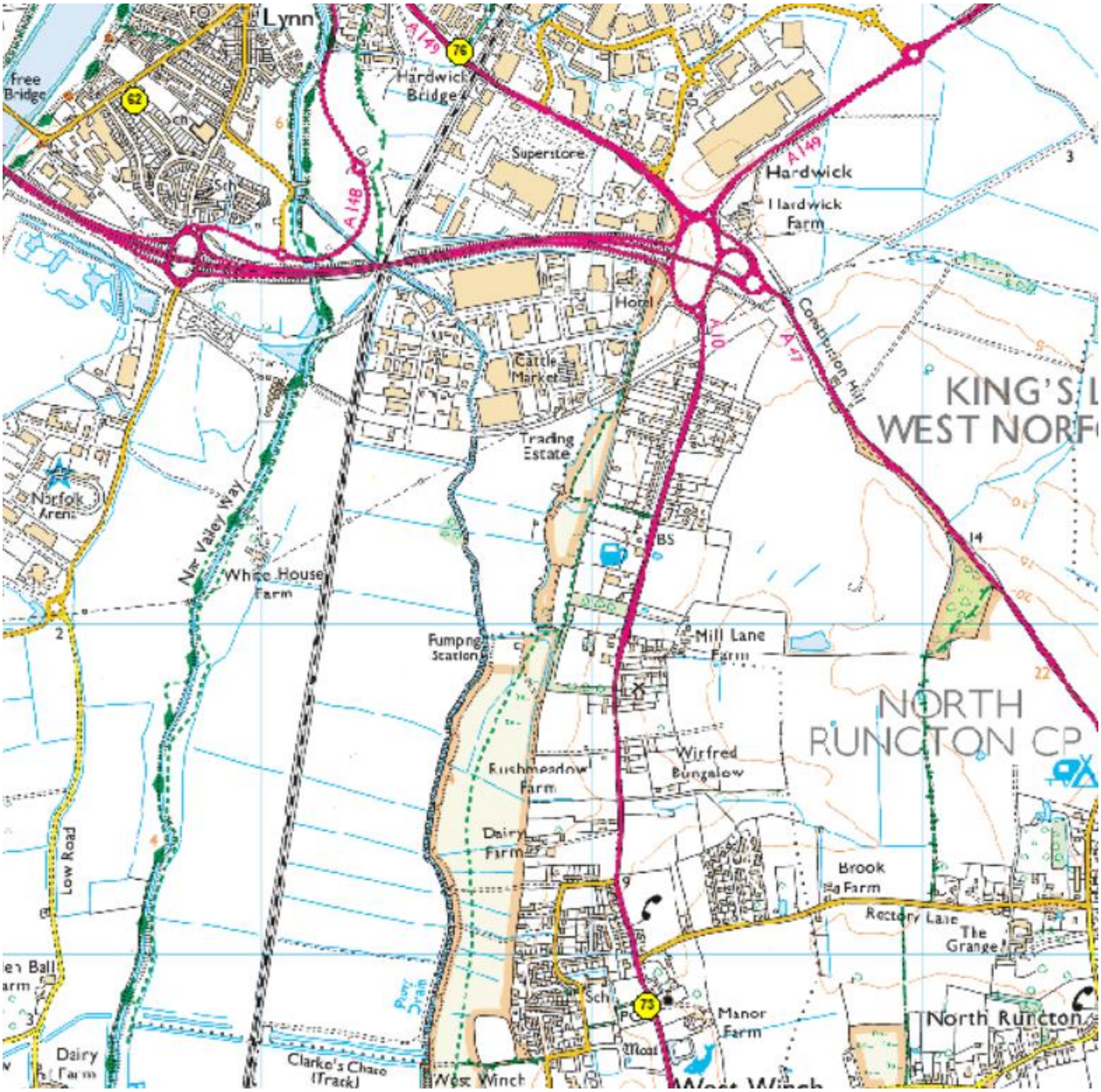

Figure D.5 – Map of the monitoring sites around Wisbech area

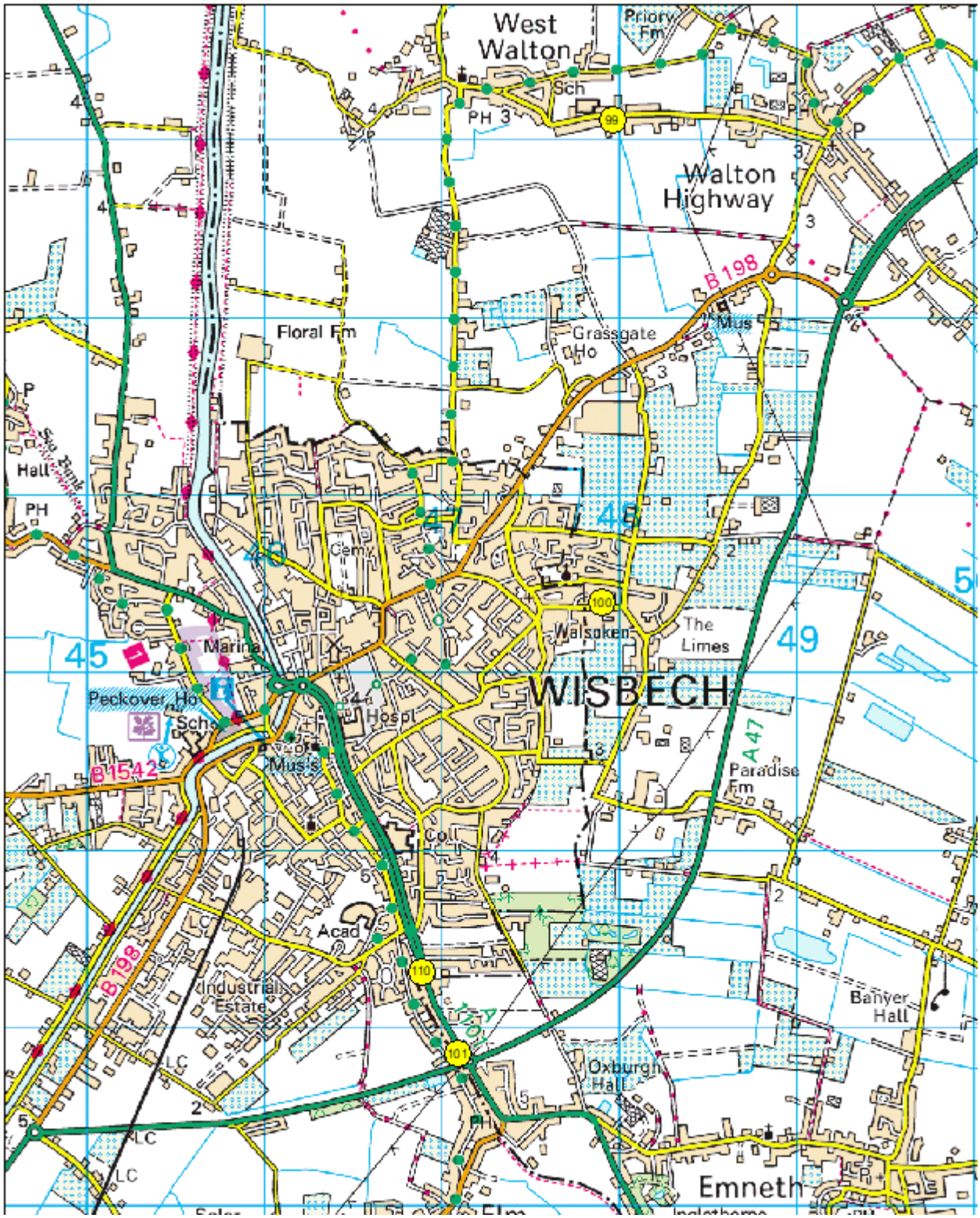

Figure D.6 – Map of the monitoring sites around Stoke Ferry

Appendix E: Summary of Air Quality Objectives in England

Table E.1: Air Quality Objectives in England[38]

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

Table E.2: National $PM_{2.5}$ Targets

National Target	$PM_{2.5}$ National Target measure	BCKLWN Target µg/m^3	Deadline
Annual Mean target	10µg/m^3 concentration to be achieved nationwide	10µg/m^3	By 2040
Interim Annual Mean Target	12µg/m^3 concentration to be achieved nationwide	12µg/m^3	By 2028
Population exposure reduction target	35% reduction in average population exposure compared to 2018 baseline	6.1µg/m^3	By 2040
Interim Population exposure reduction target	22% reduction in average population exposure compared to 2018 baseline	7.33µg/m^3	By 2028
	Current average PM2.5 in BCKLWN (2023)	8.6µg/m^3	

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

Appendix F: Biomass Heating Systems >45kW$_{th}$

Table F.1: Biomass Inventory

Name	Planning / Permit reference	therm_output (kW)	make appliance	fuel type
Kevley, Upwell	12/00356/F 13/00292/F	3x 995kW	Linka	Straw bales
Hillgate Nurseries, Terrignton St Clement	12/00349/F	990	Uniconfort	Woodchip
Belmont nursery, Terrington St Clement PE34 4JL	LAPPC066	990	Uniconfort	Waste wood
Houghton Hall	12/01975/F 12/01976/LB	700	Gilles HPKI-K 700 multi-cyclone	
Construction Industry Training Centre CITB	11/01819/F	600	Herz BioFire 600	Wood chip pellets
Big K Ltd, Whittingham	21/00794/FM	600	Talbotts MWE 600	Wood chip
Iceni Academy, Methwold	15/01767/F	500	ETA Hack VRBG3	Wood Pellet
Rokewood Nursery, Walsoken	14/00417/F	390	FARM 2000 HT80R	logs
Downham Country Garden Store, Stonecross Rd, PE38 0AD	23/01524/F	295	Glenfarrow 295	Waste wood (non-treated)
Whitegate Nurseries, Terrington St John	22/01103/F	240	Remeha Gilles HPKI-240	Woodchip
Reeve Flooring, King's Lynn	14/00974/F	199	ETA Hack 199	chips
Dersingham St George's Church of England Junior School	14/01483/F	199	ETA Hack 199	pellets
Roydon Hall Farm	15/00103/F	150	HDG Compact 150	
Eastgate Farm, Marham	20/00181/F	150	HDG 150 Hackgut	
College of West Anglia (COWA)	12/00696/F 11/00609/FM	130	Hertz Firematic Biocontrol	pellets
Barwick Hall Farm, Stanhoe	19/01224/LDE	120	GILLES HPK-RA 120	Wood Chip
Ken Hill Farms Estate, Snettisham	21/00601/F	88	E Classic 3200	Logs

Newcome-Baker Farms Limited, Wethered Manor, Sedgeford	17/01685/F	Thermal capacity not known		Straw
Wiggenhall St Germans Primary School, Wiggenhall	Y/7/2010/2021	Thermal capacity not known		

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'
AQA	Air Quality Assessment
ASHP	Air Source Heat Pump
AADT	Annual Average Daily Traffic
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
BCKLWN	The Borough Council of King's Lynn and West Norfolk
BAT	Best Available Technology
BESS	Battery Energy Storage Systems
CMP / CEMP / CTMP	Construction Management Plan / Construction Environmental Management Plan / Construction Traffic Management Plan
CHP	Combined Heat and Power
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
DMP	Dust Management Plan
EfW	Energy from Waste Facility
ES	Environmental Statement
EV	Electric Vehicle Charging
EU	European Union
FDMS	Filter Dynamics Measurement System
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management

Abbreviation	Description
LHA / HA	Local Highways Authority / Highways Authority
LAPPC	Local Air Pollution Prevention and Control
MVHR	Mechanical Ventilation and Heat Recovery
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
QEH	Queen Elizabeth Hospital
RMM	Reserved Matters planning application
SO_2	Sulphur Dioxide
SCA	Smoke Control Area
TP / TA / TS	Travel Plan / Transport Assessment / Transport Statement
tpa	Tonnes per annum
TSP	Total Suspended Particulates
vpd	Vehicles per day