Borough Council of King's Lynn & West Norfolk

2022 Air Quality Annual Status Report (ASR)

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

Date: Oct. 2022

Borough Council of King's Lynn and West Norfolk

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Executive Summary: Air Quality in Our Area

Air Quality in Borough Council of King's Lynn and West Norfolk

Air pollution is associated with 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. 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. More recent research has associated air pollution with affecting the brain causing dementia and cognitive decline; diabetes and affecting early life leading to various birth outcomes, for example, low birth weight and developmental problems.

The annual mortality of human-made air pollution in the UK is roughly equivalent to between 28,000 and 36,000 deaths every year at typical ages[1]. It is estimated that between 2017 and 2025 the total cost to the NHS and social care system of air pollutants (fine particulate matter and nitrogen dioxide), for which there is more robust evidence for an association, will be £1.6 billion[1, 2].

Moreover while air pollution can affect anyone's health, vulnerable populations are more susceptible than others, leading to widening health inequalities. These vulnerable groups include children, the elderly, those with existing cardiovascular or respiratory diseases, pregnant women and low-income communities[3,4].

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[1] Defra. Air quality appraisal: damage cost guidance, July 2021

[2] Office for Health Improvement and Disparities; https://www.gov.uk/government/publications/air-pollution-applying-all-our-health/air-pollution-applying-all-our-health

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

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

The health damage costs associated with air pollution highlights the need for change with measures that not only tackle the pollution hot spots but also more generally focus on population-wide measures.

The Borough of King's Lynn and West Norfolk covers approximately 550 square miles and is essentially rural in nature with population of 154,300 (2021 Census). Traffic arises in the area with important junctions associated with the A47(T), A17 and A10. These roads link the main settlements of King's Lynn / Downham Market / Hunstanton to Norwich, Cambridge, and Peterborough and more generally to London and the Midlands.

In terms of the hot spots, there are two Air Quality Management Areas (AQMA[5]) designated in King's Lynn that have been declared due to nitrogen dioxide (NO_2) exceeding the air quality objective of 40ug/m^3 over an annual mean exposure period. The cause of the pollution is primarily traffic related. The areas occur in the town centre (Railway Rd AQMA) and also around a busy junction Gaywood Clock AQMA just off from the centre. Historically NO_2 levels are raised along parts of the main arterial road through King's Lynn and especially along a section (Railway Rd) where the highway opens out into multiple lanes with stop-start traffic and buildings close to the kerb.

An Air Quality Action Plan (AQAP[5]) sets out the required measures to reduce the emissions in these areas as set out in Table 2-2.

The current status of air quality is much improved with substantial reductions in NO_2 concentrations being observed since the Covid outbreak in 2020 (trends shown in Appendix A); consistent generally with trends in NO_2 observed more widely[6]. The Railway Rd monitoring site 2 for example has seen around a 20% reduction in the annual mean NO_2 when compared to pre-Covid period; although trends for the current year show a slight increase in concentrations when compared to the Covid lockdown year of 2020. During the current (2021) monitoring period all NO_2 results were less than 10% of this objective.

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5 Air Quality Management Areas in King's Lynn; https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas

6 Defra, National Statistics, Concentrations of NO2; https://www.gov.uk/government/statistics/air-quality-statistics/ntrogen-dioxide#trends-in-concentrations-of-no2-in-the-uk

Monitoring is also performed for particulate matter within the size fractions of less than 10 and 2.5 microns (PM_{10} and $PM_{2.5}$). No exceedances in the objectives were indicated during the 2021 period.

No new sources were identified likely to significantly impact air quality either from new developments or from changes to environmental permits regulated by the Council and Environment Agency [7,8].

There are currently no plans to amend or revoke either AQMA. We will keep this under review. We will continue with the current monitoring regime to assess if there is any further return to pre-covid traffic movements which could lead to an increase in emissions.

7 BCKLWN Register of Environmental Permits; https://www.west-norfolk.gov.uk/info/20097/pollution/104/industrial_pollution_control

8 Environment Agency Environmental Permitting Public Register; https://environment.data.gov.uk/public-register/view/search-industrial-installations

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[9] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[10] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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. This is seen as a key priority. Some examples of this work / outcomes that we are undertaking include the following:

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, the King's Lynn Transport Interchange has been improved to help incentivise the use of public transport. In addition, urban traffic control systems and selective vehicle detection systems have also been implemented in the town centre to help improve traffic flows.
- We are also currently in the process of appraising an updated Air Quality Action Plan with relevant stakeholders / partners ahead of adoption and submission to Defra. This follows a review of other AQAP's and low emission / air quality strategies.

Actions from assessing of new development / new pollution sources:

- A priority of this Council's work is in preventing poor air quality through new developments and existing pollution sources. We have for example within the year assessed 89 planning applications that were considered as of potential material

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[9] Defra. Clean Air Strategy, 2019; https://www.gov.uk/government/publications/clean-air-strategy-2019

[10] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018; https://www.gov.uk/government/publications/reducing-emissions-from-road-transport-road-to-zero-strategy

planning concern for air quality. The most significant are explained within Appendix-C noting any mitigation or offsetting of the emissions.

Electric Vehicle (EV) Charging Infrastructure:

- The Council has previously installed 3 Rapid EV Chargers in King's Lynn and 1 in Hunstanton. It has been agreed however that these units will now be replaced with newer units. Working with BP Pulse they will be installed in Autumn 2022.

- The Council successfully applied to OZEV in December 2021 for grant to install 26 double EV charges at Council owned car parks across the district. These units will assist local residents with no off-street parking provision the opportunity to charge their electric vehicle overnight at one of the selected sites.

- The growing number of publicly available EV charging points, including proportion of fast (>43kW) charging within this Council's area is shown out in Appendix G.

- We have also through the normal course of development and ahead of the Approved Document-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.

Traffic Management:

- We are working with Norfolk County Council on progressing the King's Lynn Area Transport Strategy[20] (now at Stage-3 of implementation). The work includes measures to improve air dispersion around a street canyon that the London Rd / Railway Rd creates, but at the same time to improve the accessibility to cycling and walking and a re-routing of buses, as necessary for the town centre.

  Work is also underway on redevelopment of the South Gate area based on a preferred masterplan for improved traffic management.

  The projects are challenging as the London / Railway Rd through the Town is the main arterial route and of importance to the economy of King's Lynn. It means managing a resource than necessarily restricting traffic flows. Air dispersion modelling is planned to be carried out once the preferred options are agreed. This can be reported in next year's ASR.

Local Cycling and Walking Infrastructure Plans:

- The Council's regeneration dept. is also working with Norfolk County Council on progressing a local cycling and walking infrastructure plan (LCWIP) for the King's Lynn area. This went out to public consultation in February 2022[11]. The plan includes a number of measures and routes to help promote cycling and walking. Outcomes can be reported in next year's ASR.

Measures aimed at PM$_{2.5}$:

- We are working closely with public health on the Public Health Outcomes Framework indicator on actions in relation to PM$_{2.5}$. Measures are explained further within Chapter 2. Initial work has focussed on a review into source apportionment and as a result, updated the inventory on larger capacity biomass installations in the area. These are newly listed in Appendix F (Figure F-1) showing largest capacity installation up to 1.5MW$_{th.}$

- The long-term aim is to prepare an air quality strategy that ultimately replaces the AQAP with measures that will facilitate low emission improvements in the area.

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11 NCC Local Cycling and Walking Infrastructure Plan for King's Lynn, Consultation Feb 2022; 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

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 2021. This is the second year running where compliant results have been observed with no exceedances of the NO_2 annual mean objective noted.

- Trends associated with the NO_2 annual mean concentrations in 2021 have shown a slight increase when compared to the first Covid outbreak year of 2020 but remain below 10% of the objective levels.

- The level of traffic rebound following the recovery period from Covid is still being closely monitored. As such it is not considered appropriate at this stage to alter or seek a revocation of either Air Quality Management Areas.

- No exceedances of PM_{10} objectives level were noted during 2021

- No exceedances of the $PM_{2.5}$ annual mean level were noted during 2021

Our Priories for the forthcoming year are to: -

- Continue with the current air quality monitoring programme.

- Review and amend the monitoring programme as required.

- Continue to implement the current Air Quality Action Plan.

- Complete a review and put forward an updated Air Quality Action Plan for adoption during 2022/23.

- Continue to work 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 continue to work closely with Norfolk County Council Public Health to review options to assess the impact of $PM_{2.5}$ emissions and what measures are available to reduce local residents' general exposure.

- Develop an Air Quality Strategy to help reduce $PM_{2.5}$ exposure.

Local Engagement and How to get Involved

Local Air Quality Management (LAQM) and the potential impacts and mitigating / offsetting measures is a complex area. 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 generally as Local Air Quality Management (LAQM). LAQM whilst it provides tools to assess and monitor the pollution sources, it also provides ways to mitigate and potentially offset these emissions through associated guidance. As emissions are generally derived from common sources to those that come under climate change work, this function has the potential to deliver ancillary benefits. Barriers can potentially form but are 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 topic areas:

- Air Pollution Levels[12]: this includes further information about the pollutants we monitor in the Borough and public access route to view / download real-time Council air quality monitoring data[13].

- Air Quality Reports[14]: including the Annual Status Reports (ASR) on air quality, previous source apportionment studies and the AQAP.

- Air Quality Information[15]: provides a summary of the current priorities; the Executive summary of the ASR is used to update this section annually.

- Air Quality Management Areas[16]; provides summary of the AQMA's in King's Lynn and current version of the AQAP (v.1).

- Burning Wood and Coal[17]: further information on clean air initiatives plus link to the Borough Council's Smoke Control Areas.

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12 https://www.west-norfolk.gov.uk/info/20137/air_quality/171/air_pollution_levels

13 https://www.norfolkairquality.net/

14 https://www.west-norfolk.gov.uk/downloads/download/346/air_quality_information_documents

15 https://www.west-norfolk.gov.uk/info/20137/air_quality/169/air_quality_information

16 https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas

17 https://www.west-norfolk.gov.uk/info/20137/air_quality/633/burning_wood_and_coal

- [Indoor Air Quality](link)[18]: Indoor air quality is an emerging subject and topical in relation to Covid-19.

Information is also available from Norfolk CC's website on the Local Transport Plan's strategy for King's Lynn[19, 20] and also a Local Cycling and Walking Infrastructure Plan (LCWIP[11]) 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 also participate in Clean Air Day[21] each year and support the initiatives via the Council's communications network.

We have responded to the consultations on Policy Guidance LAQM PG (16)[22] and new environmental targets proposed for $PM_{2.5}$[23] to help keep updated on likely changes.

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.

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18 https://www.west-norfolk.gov.uk/info/20137/air_quality/870/indoor_air_quality

19 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

20 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

21 Clean Air Day; https://www.globalactionplan.org.uk/news/clean-air-day-2022-theme-confirmed?msclkid=6b01288ac7a011ec9e155999491e8315

22 https://consult.defra.gov.uk/air-quality-and-industrial-emissions/consultation-on-the-review-of-the-local-air-qualit/

23 https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/

Local Responsibilities and Commitment

This Annual Status Report on air quality for 2022 was 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 this Council whereas Norfolk County Council are the highways / public health authority.

This ASR has been approved by the Public Health manager of Norfolk County Council with the following comments:

- *Health effects within the Executive Summary to include description of respiratory diseases and the emerging links between dementia and air quality. Dementia is now one of leading causes of death in Norfolk.*

- *Public Health notes the substantial reductions in NO_2 in King's Lynn AQMA.*

- *Whilst the reduction in pollution achieved would allow KLWNBC to revoke its Air Quality Management Areas, Public Health welcomes the decision to keep them in place for the time being to continue close monitoring of emissions, especially as the last two years have not reflected normal traffic flows due to the pandemic.*

- *Public Health supports KLWNBC's decision to broaden its approach to air quality management from addressing hotspots to improving air quality at a population health level.*

- *Public Health is pleased to see additional comments in the report about changes being introduced in the Environment Act 2021 on $PM_{2.5}$ and looks forward to supporting this work.*

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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 during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy[24] and Technical Guidance[25] documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Borough Council of King's Lynn and West Norfolk 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.

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[24] Defra, LAQM PG(16), Policy Guidance, 2016; https://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf

[25] Defra, LAQM TG(16), Technical Guidance, April 2021; https://laqm.defra.gov.uk/documents/LAQM-TG16-April-21-v1.pdf

2 Actions to Improve Air Quality

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 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by this Council can be found in Table 2-1. The table presents a description of the two AQMA's designated within the Borough Council of King's Lynn and West Norfolk.

Appendix D: Map(s) of Monitoring Locations and AQMAs) provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs e.g. Gaywood Clock AQMA in Figure D-1 and Railway Rd AQMA in Figure D-2.

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

- NO_2 annual mean;

Table 2-1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Gaywood Clock AQMA	Declared 04/01/2009	NO2 Annual Mean	Area encompassing a number of properties around the Gaywood Clock junction of A148 (Lynn Rd) and A1076 (Gayton Rd)	NO	45.1 µg/m3	28.0 µg/m3	AQAP for Gaywood Clock AQMA, 2015	Visit the AQAP for AQMA Gaywood Clock; 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	NO2 Annual Mean	An area encompassing a number of properties along the A148 within the Town Centre that includes the gyratory system (Blackfriars Rd) plus extends along London Rd down to the South Gate entrance to King's Lynn.	NO	55.0 µg/m3	30.1 µg/m3	E.g. AQAP for AQMA 2, May 2015	Visit the AQAP for Railway Rd: https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas

☒ **Borough Council of King's Lynn and West Norfolk confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Borough Council of King's Lynn confirm that all current AQAPs have been submitted to Defra.**

Progress and Impact of Measures to address Air Quality in the Borough Council of King's Lynn and West Norfolk

Defra's appraisal of last year's ASR is summarised below with responses shown against respective actions:

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

- *"The Council have provided a thorough report which contains the required content."*

- *"The name of the "Town Centre AQMA" as displayed in Table 2.1 is different from the one registered on the portal ("Railway Road AQMA"). The Council should contact the LAQM helpdesk so that it can be corrected."* This has been corrected.

- *"Monitoring locations have been reviewed and four additional tubes locations have been introduced, which is encouraged."* We continually review the locations to help ensure the monitoring is representative both within the AQMAs and outside.

- *"Monitoring location mapping is comprehensive and clearly demonstrates the extent of the monitoring network."* The comments are noted.

- *"QA/QC is thorough and detailed supporting discussion is provided for all procedures applied, including annualization and bias adjustment. This adheres with good practice and is encouraged for all future reports."* The comments are noted.

- *"As in the previous ASR, clear priorities for 2021 were outlined, including completion of the Kings Lynn Transport Study and progression of an update to the Council's AQAP. These priorities are considered appropriate, and it is expected that a detailed update be provided in the Council's 2021 ASR."* The LTP Transport Strategy for the King's Lynn area is now at Stage-3 of its implementation (2019[20]). The strategy sets out a number of transport improvements over the short-medium and long-term periods. The strategy includes an objective to '*reduce harmful emissions and air quality impacts*'.

In terms of the AQAP the Borough Council of King's Lynn and West Norfolk in conjunction with Norfolk County Council has taken forward direct measures during the current reporting year of 2021 in pursuit of improving air quality. Details of all the measures completed, in progress or planned are set in out in Table 2-2.

There are 20 measures listed within Table 2-2, with the type of measure and the progress that the borough has made during the reporting year of 2021 presented. Where there have been or continue to be barriers restricting the implementation of the measure, these are also presented. Additional details on the measures can be found in their respective action plans, such as the Transport Strategy for the King's Lynn area[19,20] and the Local Cycling and Walking Infrastructure Plan[11] .

Key updates to the Table 2-2 AQAP measures are noted below:

- M1 – *Consideration of air quality during development control*; this is on-going. During 2021 89 planning applications were reviewed for air quality. In practice we consider all planning applications than necessarily just those within or adjacent to the AQMA's as set out under M1.

- M2 - *To consider air quality considerations in the Local Plan and adopt development management policy on air quality having regard to the NPPF*; The emerging Local Plan[26] has been submitted for examination in March 2022 which includes existing policies that relate to air quality i.e. DM-15 adopted by LP-21 and CS-11 by LP-13.   In conjunction with NPPF local policies appear adequate.

- M3 – *Adopt Norfolk Technical Guidance on Air Quality*: This has been superseded by updated IAQM (2017[27]) guidance on development control.

- M4, M9, M10, M12– *Develop a parking management plan, parking enforcement, residents only parking and parking rates;* A car parking strategy for the borough is still considered a relevant measure.

- M5 – *Create new access road for buses to Boal Street*: The bus only route (Hardings Way) has been completed and links to NCN route-1.

- M6 – *Incentivise the use of public transport*; This project was centred around planned improvements to King's Lynn Transport Interchange (completed). On-going actions to improve the connectivity within King's Lynn are contained in the King's Lynn Transport Strategy and LTP.

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26 Local Plan Review Pre-Submission Stage 2021; https://west-norfolk-consult.objective.co.uk/kse/event/36371/section/s1625822757710#s1625822757710

27 Institute of Air Quality Management / EPUK (2017); Planning for Air Quality

- M7 and M8 – *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. Systems now incorporate higher SCOOT technology. Upgrades to the traffic management systems forms part of the LTP.

- M11 – *Installation of variable message signs*; These have been installed on the approach to King's Lynn town centre to indicate where parking spaces are available.

- M13 – Support use of West Lynn Ferry; the action is still considered important, although costs / budget remain uncertain.

- M14 - *Changes to the Road Layout within the King's Lynn Gyratory as proposed by the Kings Lynn Transport Study;* The borough in conjunction with Norfolk CC are progressing this measure in the town centre's gyratory system. The measures are intended to also help improve air quality with improvements to cycling / walking and bus routes.

- M15 - *Traffic Management at London Road and Southgates*; This measure is being appraised as part of master planning for the Southgate area.

- M16 - *Traffic Management at Gaywood clock junction*; Measure 16 set out that traffic management will be aided by the construction of a bridge over the railway line (Sandline). This measure is not considered a viable option especially following the smaller Parkway development of 226 residential dwellings as approved under 21/01873/FM (see Appendix C).

- M17 – *Promotion of travel plans, school travel plans and promotion of car sharing*; This action is on-going and is of some importance to the Gaywood Clock junction owing to number of schools and the Queen Elizabeth Hospital that form on road links to the junction.

The Council expects the following project to be progressed over the course of the next reporting year;

- M18 - *Improved cycling and walking provision*; A public consultation on the cycling and walking plan for the King's Lynn area has been submitted[11] and a more detailed plan is expected.

The Borough Council of King's Lynn and West Norfolk anticipates that the measures stated above and in Table 2-2 will achieve compliance with Railway Rd and Gaywood Clock AQMAs.

Table 2-2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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	-	Borough Council (LPA & Env Quality Team)	Borough Council	NO	Funded	< £10k	Implementation	Owing to range of measures not possible to estimate % in NOx / PM$_{2.5}$ reduction. Reporting the reduction in daily trip rates from Travel Plans is encouraged i.e. as a proxy for NOx / PM$_{2.5}$.	Number of planning applications.	In 2021 there were 89 applications that were commented upon which had potential air quality impacts. The most significant are highlighted in Appendix C.	This is on-going measure.
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	Circa less than 1% NOx	Production of documents	Completed	The King's Lynn and West Norfolk Local Plan - Site Allocations & Development Management Policies (SADMP) Plan was formally adopted on 29 September 2016. This includes policy DM15 Environment, Design and Amenity, which provides for the assessment of air quality in planning applications. This policy approach is continued in the Local Plan Review (March 2019) as Policy LP18. The July 2011 Adopted Core Strategy's Transport Policy CS11 aimed to achieve improvements where there were air quality issues in the towns of Downham Market, Hunstanton and King's Lynn. The Local Plan Review (March 2019) Policy LP13 continues this approach, particularly with reference to the approved King's Lynn Transport Study and Strategy.
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	2015	Borough Council (LPA & Env Quality Team)	Borough Council	NO	Funded	< £10k	Completed	N/a (measure superseded).	Production of documents	Completed	Norfolk Technical Guidance now superseded by IAQM EPUK Guidance.
4	Develop Parking Management Plan	Transport Planning and Infrastructure	Other	2014	2022-23	County Council/ Borough Council	Future High Streets Fund	NO	Funded	£10k - 50k	Implementation	Up to 1% NOx	Publication of and implementation of plan	A King's Lynn Parking Study is currently underway, which will consider car parking arrangements in the town centre.	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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	Completed	Extent of buses (NOx) using Hardings Way as opposed to London Rd (Railway Rd AQMA).	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. Avoids access into Railway Rd AQMA.	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% NOx	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 it's use, as part of the King's Lynn Transport Study.
7	Implement action 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	-	County Council	County Council	NO	-	-	Completed	2 to 5% NOx	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	-	County Council	County Council	NO	-	-	Completed	Up to 1% NOx	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	2022	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	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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, Highgate 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	-	Planning	Less than 0.1%	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)	2021	County Council	County Council/ Business Rates Pool	NO	Partially Funded	£100k - £500k	Planning	Depends on AQ modelling results against various options.	Continued air quality monitoring. Daily traffic flow data and queue lengths.	A King's Lynn Transport Study is underway, this will identify possible transport schemes and develop a model to test them and develop a preferred strategy.	The Gyratory Scheme Feasibility Study describing implementable schemes, setting out budget cost estimates, a high-level project plan, and programme for delivery will be completed by 2021.
15	Traffic Management at London Road and Southgates	Traffic Management	UTC, Congestion management, traffic reduction	2014	2022	County Council	County Council	NO	Not Funded	-	Planning	Depends on AQ modelling results against various options.	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 wasn't 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	-	Planning	Less than 0.1% NOx	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 Transport Study Implementation Plan.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
17	Promotion of travel plans, school travel plans and promotion of car sharing.	Promoting Travel Alternatives	Personalised Travel Planning	2014	On-going	County Council/ Borough Council	County Council/ Borough Council	NO	Partially Funded	< £10k	Implementation	Up to 1%	Number of travel plans adopted in accordance with best practice / trip rate reduction.	Travel plans are requested by BCKLWN and County Council in response to relevant planning application.	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	2022-23	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, provide Electric Vehicle 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 measure in line with IAQM guidance. 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.
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	-	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.

PM$_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM$_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less) in consultation with public health officials and others that can help to define the role. There is clear evidence that PM$_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Borough Council of King's Lynn & West Norfolk is already completing work which will help reduce of PM$_{2.5}$ exposure within the district: -

- Monitor PM$_{2.5}$ levels using Osiris Dust Screening Units and publish data online and via app to provide local residents information on levels within the district. Whilst not MCERT accredited, the units provide an indicative level of PM$_{2.5}$.

- Review of planning applications, and where required recommend suitable conditions to mitigate PM$_{2.5}$ emissions.

- Have started to review options for revised Air Quality Action Plan which will help reduce PM$_{2.5}$ emissions

- Implementation of King's Lynn Transport Strategy which will help reduce levels primary PM$_{2.5}$ from vehicle emissions and secondary PM$_{2.5}$ produced from vehicle emissions such as NO$_x$

- Regulation of LAPPC prescribed processed though issuing Environmental Permits which ensure compliance with best available techniques and process emissions comply with emissions limits

- Participate in the national Burn Right campaign and publish advice on the Council's website on the types of solid fuel which should be used and how to minimise PM$_{2.5}$ emissions.

- Completed a source apportionment review which highlights the areas which produce the PM$_{2.5}$.

- Held preliminary meetings with Norfolk County Council Public Health regarding how to minimise $PM_{2.5}$ exposure across the district and forthcoming targets as proposed within the Environment Act 2021[28] namely:
  - **Annual Mean Concentration Target** ('concentration target') – a target of 10 micrograms per cubic metre ($\mu g\ m^{-3}$) to be met across England by 2040.
  - **Population Exposure Reduction Target** ('exposure reduction target') – a 35% reduction in population exposure by 2040 (compared to a base year of 2018).
- We have plotted primary $PM_{2.5}$ from NAEI as shown in Appendix F (Figure F-1) which shows combustion of wood to be the principal *primary* source of $PM_{2.5}$ by several factors with trend upwards. Bonfires are also noted as an important local contributor too.
- As a result the biomass inventory has been reviewed and is newly presented in Appendix F (Table F-1) showing installations by capacity (kW_{hr}). Biomass assessments to continue and form an important control of $PM_{2.5}$ emission rates.
- There are 8 Smoke Control Areas[17] within King's Lynn as a further control of $PM_{2.5}$.
- Agreed to develop an Air Quality Strategy to focus on reducing $PM_{2.5}$ exposure.
- 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 primary $PM_{2.5}$ and secondary $PM_{2.5}$ emissions by the reduction in fossil fuel usage in vehicles (EV charging provision, active travel alternatives), domestic residential properties (Warm Homes, ECO 3 & 4) and by industry and commercial premises (Business Expo 2022).
- Published advice on Council's website about indoor quality and measures to reduce $PM_{2.5}$ and other pollutants within the home.
- We also continue to liaise with colleagues within the Norfolk EP group on $PM_{2.5}$ work and Norfolk CC public health on the Public Heath Outcome Framework (PHOF) indicator 3.01.

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[28] Defra, Consultation on Environmental Targets: https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/

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

This section sets out the monitoring undertaken within 2021 by the Borough Council of King's Lynn and West Norfolk and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This Council carries out automatic (continuous) monitoring at two reference automatic monitors for NO_2 at the Southgate (CM1) and Gaywood Clock (CM2) stations. CM1 Southgate is located at the southern extent of the Railway Rd AQMA and CM2 Gaywood Clock towards the centre of the Gaywood Clock AQMA. Maps showing the location of the monitoring sites are provided in Appendix D.

There are also four Turnkey Osiris (non-reference / indicative) dust monitors that monitor particulate matter (PM_{10}, $PM_{2.5}$) by light scattering (nephelometer) technique.

Table A.1 in Appendix A shows the details of the automatic monitoring sites. Results are also available from the Council's six continuous monitors as real-time via the following site www.norfolkairquality.net/, which links into Defra's UK-Air website.

Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

The Council undertook non- automatic (i.e. passive diffusion tube) monitoring of NO_2 at 77 sites during 2021. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

3.2 Individual Pollutants

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

3.1.1 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.

A national bias adjustment factor for the diffusion tubes (Gradko 20% TEA, bias factor 0.84) has been used rather than a local factor from co-location study carried out at Southgates CM1 station.

Data acquisition within the year was good for the NO$_2$ monitoring i.e. >75% and therefore no correction to annualise the data was required. The values are exclusive of any consideration to fall-off with distance adjustment.

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B in Table B.1. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

In relation to the NO$_2$ results there were no exceedances of the annual mean objective for NO$_2$ in 2021 (40ug/m3), which continues with the trend downwards when compared to pre-Covid years.

Trends in the annual NO$_2$ mean results are shown in Figures A.1 to A.4 to help show the spatial extent of concentrations within the AQMA's and also outside. The last exceedance observed in the annual mean NO$_2$ concentrations from both AQMA's was;

- Gaywood Clock AQMA in 2016 (45.0ug/m^3) and,
- Railway Rd AQMA in 2019 (42.4ug/m^3).

Railway Rd AQMA

In terms of monitoring Railway Rd AQMA benefits from 25 diffusion tubes and the continuous CM1 Southgates analyser plus a triplicate collocation study. Due to poor data

capture at CM1 was the reason to use the national bias adjustment factor from Gradko (20% TEA; 0.84).

Trend data as shown in Figure A.1 and A.3 shows concentrations along the Railway Rd section of the A148 (north and south bound). It can be seen that where the highway opens up to multiple lanes (north bound) and with stop-start traffic at site-2 gives the highest concentrations in annual mean. As site-2 is located on the building façade it therefore represents relevant public exposure. For the 2022 period an additional monitoring site has been located next to site-2 to help quantifiy spatial extent. The monitoring carried out is also important to help verfiy modelling (pending) of various transport management options currently being appraised and any detailed assessment used to revoke AQMA's.

Gaywood Clock AQMA

Within the AQMA at Gaywood Clock there are 6 diffusion tubes and the CM2 (Gaywood Clock reference chemilumiscence analyser). Whilst the highest annual mean concentration was recorded at site-75 (by diffusion tube) with an annual mean of $28\mu g/m^3$ all results within the AQMA were similar as shown by trend data over the last five years in Figure A.2.

Monitoring outside of AQMA

The 2021 period was the last year of the 5-year monitoring programme of NO_2 around the Palm Paper factory following the development consent for a 162MW Gas power station. The program consisted of monitoring at sites 61, 62, 63, 64, 72, 73, 74 and 83.

On review the results have showed annual mean NO_2 concentrations close to background levels and therefore the decision has been made to cease further monitoring. Two of the sites West Winch A10 (site 73) and at Burney Rd / Wisbech Rd (site 62) have been retained as they provide useful information to help monitor new developments / changes to traffic flows. Three of the sites have been relocated within the Railway Rd AQMA to help further assess this AQMA and any changes occuring to this road layout.

The diffusion tube at Site 101 (Elm High Rd, Wisbech, A1101) is on a dwelling façade and was newly installed at the start of 2021 (NO_2 annual mean 27.8ug/m^3). A DfT traffic survey point (ref 17963[29]) is located just north of this site and showed similar AADT between 2016 and the Covid lock down year of 2020. It will be useful to monitor trends in

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[29] DfT Traffic Survey Point; https://roadtraffic.dft.gov.uk/manualcountpoints/17963

NO_2 at this site as a result of any changes in traffic flows from to new developments. Traffic counts from both DfT and locally by Norfolk County Council are important metrics.

Short term NO_2 exposure

Exposure to traffic emissions over the 1-hour short term exposure period is of potential concern along some walking / cycle routes that run parallel to busy roads, shopping areas / 'high streets' where public may are likely to spend an hour next to busy roads or at bus stations / taxi ranks. An NO_2 annual mean of $60\mu g/m^3$ is indicative of short-term exceedance (1-hour mean of $200\mu g/m^3$).

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

There is the potenial for short-term (1-hr) exposure occurs at King's Lynn Transport Interchange (site-5) and Vancouver car-park where taxi bays are located (site 86). Trend data is shown in Figure A.4 for these sites that shows NO_2 annual mean was well below the $60\mu g/m^3$ and therefore unlikely to represent an exceedance in the short-term objective ($200\mu g/m^3$ NO_2).

3.1.2 Particulate Matter (PM_{10})

Table A.6 and Table A.7 Appendix A: Monitoring Results compares indicative results for PM_{10} for the past five years against air quality objectives of:

- Annual Mean ($40\mu g/m^3$) and,
- Short-term Mean ($50\mu g/m^3$ not to be exceeded more than 35 times per year).

PM_{10} is analysed by the four Turnkey Osiris instruments (light scattering type). The technique is non-reference results are indicative only. Osiris PM_{10} technique benefits from MCERTS accreditation.

PM_{10} results for 2021 are annualised owing to poor data acquisition (less than 75%) for the Page Stair Lane and Buckingham Drive instruments as shown in Table C.2. Poor data acquisition was in part due to the relatively long turn-around period for servicing / maintenance during the Covid outbreak.

In terms of site locations two of the units are situated either end of King's Lynn docks (Page Stair Lane (OS1) and Estuary Rd (OS2)) plus a further two around an industrial animal feed mill in Stoke Ferry (Wretton Rd (OS3) and Buckingham Drive (OS4)). The

industrial animal feed mill in Stoke Ferry is subject to control through an environmental permit regulated by the Environment Agency.

As reported in the ASR 2020 raised PM_{10} concentrations were identified previously during monitoring over the 2012 period. Results were indicating PM_{10} annual mean (70µgm^{-3}) and short-term exceedances of 193 days during 2012. As a consequence, the decision was taken to relocate the Council's gravimetric TEOM analyser from North Lynn once a suitable location was identified with power etc. (in 2018). Subsequent monitoring has not reported further exceedances but continues around the industrial animal feed mill in Stoke Ferry through units OS3 and OS4 as shown in Tables A.6 and A.7. The TEOM is no longer operational.

PM_{10} results for the 2021 period indicate no exceedances in the annual (40 ug/m3) or short-term mean objectives (no more than 35 hourly exceedances of 50ug/m^3)). There were only two recorded periods of over the short-term concentration (31st March and 08th November 2021).

PM_{10} monitoring is to continue in its present format as relatively low cost / indicative type to monitor some of the industrial point sources.

3.2.3 Particle Matter (PM2.5)

$PM_{2.5}$ is still not at present incorporated into LAQM Regulations, and therefore there is no statutory requirement to monitor.

This Council monitor $PM_{2.5}$ in conjunction with PM_{10} through the four indicative Osiris (light-scattering) instruments as reported above. The analysis of $PM_{2.5}$ is not MCERTS accredited (unlike the PM_{10}) and therefore should be interpreted with care. The results are indicative only of the area they monitor and are shown in Table A.8 in Appendix A with annual mean concentrations shown for the past five years.

Results for 2021 are annualised owing to poor data acquisition (less than 75%) for the Page Stair Lane and Buckingham Drive instruments as shown in Table C.2.

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	Southgates Park, King's Lynn	Urban Background	562225	319191	NO2	YES Railway Rd AQMA	Chemiluminescent	N/A	5	1.7
CM2	Gaywood, King's Lynn	Roadside	563437	320472	NO2	YES Gaywood Clock AQMA	Chemiluminescent	5	1	1.7
OS1	Page Stair Lane, King's Lynn	Industrial	561527	320437	PM10 / PM2.5	No	Indicative, Nephelometer	5	3.3	3.5
OS2	Estuary Road, King's Lynn	Industrial	561593	321466	PM10 / PM2.5	No	Indicative, Nephelometer	2	1	3.5
OS3	Wretton Road, Stoke Ferry	Industrial	570438	299905	PM10 / PM2.5	No	Indicative, Nephelometer	24	19	3.5
OS4	Buckenham Drive, King's Lynn	Industrial	570264	299943	PM10 / PM2.5	No	Indicative, Nephelometer	12	1	3.2

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.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	2.0	No	2.5
2	Railway Road 4	Roadside	562108	320196	NO2	Yes, Railway Rd AQMA	0.0	2.0	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	5.0	Yes	3.2
9	Mill Fleet	Roadside	561911	319710	NO2	No	0.0	4.0	No	2.5
10	London Road 1	Roadside	562100	319679	NO2	Yes, Railway Rd AQMA	0.0	3.0	No	1.4
11	London Road 2	Roadside	562165	319575	NO2	Yes, Railway Rd AQMA	0.0	3.0	No	2.2
12	London Road 3	Roadside	562242	319452	NO2	Yes, Railway Rd AQMA	1.0	3.0	No	2.1
13	London Road 4	Roadside	562263	319374	NO2	Yes, Railway Rd AQMA	0.0	4.5	No	2.2
14	London Road 5	Roadside	562227	319266	NO2	Yes, Railway Rd AQMA	0.5	4.0	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	7.0	No	1.6

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	6.0	No	1.5
20	London Road 10	Roadside	562244	319260	NO2	Yes, Railway Rd AQMA	0.0	3.5	No	2.2
22	London Road 6	Roadside	562284	319385	NO2	Yes, Railway Rd AQMA	0.0	5.0	No	1.3
23	London Road 7	Roadside	562161	319614	NO2	Yes, Railway Rd AQMA	0.0	4.5	No	1.3
24	London Road 8	Roadside	562135	319650	NO2	Yes, Railway Rd AQMA	0.0	5.5	No	2.2
25	The Walks	Roadside	562190	319694	NO2	No	0.0	75.0	No	1.7
26	Railway Road 7	Roadside	562131	319996	NO2	Yes, Railway Rd AQMA	0.0	2.0	No	2.3
27	St John's Terrace	Roadside	562177	319999	NO2	Yes, Railway Rd AQMA	3.0	2.0	No	2.1
28	St John's Terrace / Blackfriar's	Roadside	562253	320015	NO2	Yes, Railway Rd AQMA	0.0	1.5	No	2.6
29	Waterloo Street	Urban Background	562183	320055	NO2	No	1.0	1.0	No	1.6
30	Portland Street	Urban Background	562204	320108	NO2	No	1.0	1.0	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	0.5	0.5	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	2.5	No	2.4
35	Blackfriars 1	Roadside	562244	320238	NO2	Yes, Railway Rd AQMA	0.0	1.5	No	2.3
36	Norfolk Street	Roadside	562219	320318	NO2	Yes, Railway Rd AQMA	0.0	2.0	No	2.2
37	The Shrubberies, Blackfriars 3	Roadside	562253	320258	NO2	Yes, Railway Rd AQMA	0.0	2.0	No	2.5
38	Littleport Street	Roadside	562256	320322	NO2	Yes, Railway Rd AQMA	0.0	2.5	No	2.4
39	Gaywood Road 2	Roadside	562822	320426	NO2	No	0.0	7.0	No	5.0
40	The Swan (1) Gayton Road	Roadside	563490	320469	NO2	Yes, Gaywood Clock AQMA	0.0	2.0	No	2.5
41	Wotton Road 2 showed a level of 39	Roadside	563477	320514	NO2	Yes, Gaywood Clock AQMA	0.0	2.0	No	3.4
42	Wootton Road 1	Roadside	563480	320581	NO2	Yes, Gaywood Clock AQMA	0.0	3.0	No	1.7
43	Lynn Road 1	Roadside	563411	320476	NO2	Yes, Gaywood Clock AQMA	0.0	5.0	No	3.4
44	Lynn Road 2	Roadside	563377	320484	NO2	Yes, Gaywood Clock AQMA	0.0	2.0	No	3.4
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
47	Austin Street 1	Roadside	562186	320376	NO2	Yes, Railway Rd AQMA	0.5	1.0	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)
48	Austin Street 2	Roadside	562180	320365	NO2	Yes, Railway Rd AQMA	0.0	2.0	No	2.6
51	Wootton Road 3	Roadside	563521	320628	NO2	No	0.0	1.5	No	1.8
52	Lynn Road 3	Roadside	563288	320504	NO2	No	0.0	1.0	No	1.6
58	Nar Ouse Way Roundabout	Kerbside	562171	319018	NO2	No	18.0	2.0	No	2.5
61	Sydney Terrace	Roadside	561853	318272	NO2	No	0.0	3.5	No	1.6
62	Burney Road	Roadside	561614	318591	NO2	No	0.0	7.0	No	1.6
63	High Road, Saddlebow 1	Roadside	560593	315712	NO2	No	0.0	15.0	No	1.7
64	High Road, Saddlebow 2	Roadside	560916	316765	NO2	No	0.0	22.0	No	1.7
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	1.6
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

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)
72	Ferry Square, West Lynn	Roadside	561223	320295	NO2	No	0.5	1.5	No	2.2
73	A10 Main Road, West Winch	Roadside	563161	315848	NO2	No	10.0	11.0	No	1.7
74	Saddlebow Caravan Park	Other	561754	317910	NO2	No	0.0	1.0	No	2.2
75	The Swan (2) Gayton Road	Roadside	563468	320469	NO2	No	0.0	2.0	No	2.8
76	Hardwick Road	Roadside	562597	318739	NO2	No	0.0	8.0	No	1.6
79	Tennyson Ave	Roadside	562803	320422	NO2	No	0.0	2.0	No	3.8
83	The Elms	Other	560779	318508	NO2	No	0.0	115.0	No	1.7
86	Bus Station - Taxi Rank	Other	562018	320138	NO2	No	0.0	8.0	No	2.2
87	Albion Street	Roadside	562102	320163	NO2	No	0.0	2.6	No	2.1
89	Whitefriars Terrace	Roadside	561887	319466	NO2	No	0.0	1.0	No	2.4
90	Spenser Road	Roadside	563366	322065	NO2	No	0.0	8.0	No	1.8
91	Reid Way	Roadside	563255	321613	NO2	No	0.0	8.0	No	2.5
92	Garden Court	Roadside	563256	321588	NO2	No	0.0	16.0	No	2.0
94	Wisbech Road	Roadside	561957	318963	NO2	No	0.0	6.5	No	2.0

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)
95	Harvest House, Wisbech Road	Roadside	562058	319038	NO2	No	1.0	7.5	No	1.7
96	Carp Terrace, King's Lynn	Roadside	562042	319011	NO2	No	0.0	6.5	No	2.0
97	Low Road, King's Lynn	Roadside	564503	322411	NO2	No	0.0	7.5	No	2.0
98	7 Greenpark Avenue	Roadside	562821	320964	NO2	No	0.0	1.0	No	1.6
99	108 School Road, Wisbech	Suburban	547960	313115	NO2	No	0.0	4.0	No	1.6
100	83 Chapnall Road, Wisbech	Suburban	547902	310395	NO2	No	0.0	3.0	No	1.6
101	62 Elm High Road, Wisbech	Roadside	547094	307850	NO2	No	0.0	1.0	No	1.6

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 NO₂ Monitoring Results: Automatic Monitoring (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
CM1	562225	319191	Roadside	100	82	25	23.9	21	14.2	17.6
CM2	563437	320472	Roadside	100	95	38	34.5	37	26.7	26.4

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **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/m³.

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 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 NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

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 2021 (%) [2]	2017	2018	2019	2020	2021
1	562073	320303	Kerbside	100	100.0	35.9	33.8	36.3	25.8	28.7
2	562108	320196	Roadside	100	83.3	**45.5**	**43.2**	**42.4**	33.2	33.7
3	562117	320094	Roadside	100	83.3	38.5	37.4	37.5	26.4	30.1
5	562003	320098	Urban Centre	100	100.0	35.5	28.8	28.8	17.5	20.5
6, 7, 8	562225	319191	Roadside	100	100.0	24.6	23.8	24.3	15.7	18.2
9	561911	319710	Roadside	100	100.0	19.5	19.9	20.5	13.7	15.2
10	562100	319679	Roadside	100	83.3	37.2	36.2	35.5	26.6	29.0
11	562165	319575	Roadside	100	100.0	27.7	28.1	28.4	21.2	22.3
12	562242	319452	Roadside	100	100.0	33.5	29.8	31.4	22.5	23.5
13	562263	319374	Roadside	100	100.0	29.9	28.8	29.0	21.7	22.9
14	562227	319266	Roadside	100	83.3	33.6	33.6	33.2	25.9	25.5
15	562189	319101	Roadside	100	100.0	34.9	35.3	36.7	27.0	29.6
18	562266	319042	Roadside	100	100.0	25.9	24.1	25.1	18.9	19.9

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 2021 (%) [2]	2017	2018	2019	2020	2021
19	562277	319098	Roadside	100	92	24.0	21.9	23.9	19.9	18.4
20	562244	319260	Roadside	100	100.0	28.2	30.0	28.2	21.7	23.8
22	562284	319385	Roadside	100	100.0	30.1	34.0	31.0	21.8	25.2
23	562161	319614	Roadside	100	100.0	29.6	32.6	31.2	23.1	26.4
24	562135	319650	Roadside	100	100.0	26.4	30.5	29.7	21.4	23.8
25	562190	319694	Roadside	100	92	15.3	15.9	15.3	11.4	11.5
26	562131	319996	Roadside	100	92	30.7	32.9	31.5	23.0	26.3
27	562177	319999	Roadside	100	100.0	27.8	28.5	27.6	20.0	22.8
28	562253	320015	Roadside	100	92	30.5	28.9	29.8	19.5	22.4
29	562183	320055	Urban Background	100	92	18.7	19.0	18.9	12.7	13.3
30	562204	320108	Urban Background	100	100.0	19.7	19.4	20.5	13.8	14.9
31	562128	320131	Roadside	100	100.0	28.3	30.2	29.1	21.2	24.0
32	562119	320216	Roadside	100	100.0	28.3	28.8	27.8	21.3	22.8
33	562202	320158	Roadside	100	100.0	27.8	27.4	28.5	20.3	20.8

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 2021 (%) [2]	2017	2018	2019	2020	2021
34	562244	320128	Roadside	100	92	28.9	31.1	28.8	22.9	23.5
35	562244	320238	Roadside	100	100.0	28.2	27.7	27.6	20.7	22.4
36	562219	320318	Roadside	100	100.0	27.6	27.4	27.7	19.4	21.0
37	562253	320258	Roadside	100	83	26.5	30.6	29.7	23.3	23.9
38	562256	320322	Roadside	100	100.0	33.2	34.0	34.2	24.9	26.9
39	562822	320426	Roadside	100	100.0	24.3	24.5	24.5	17.7	19.3
40	563490	320469	Roadside	100	100.0	31.2	31.3	32.0	24.6	25.6
41	563477	320514	Roadside	100	100.0	32.1	36.7	34.9	24.5	25.2
42	563480	320581	Roadside	100	100.0	30.5	30.0	29.7	22.9	23.7
43	563411	320476	Roadside	100	100.0	29.2	30.9	29.4	22.0	25.4
44	563377	320484	Roadside	100	100.0	32.4	36.0	34.6	26.3	27.0
45	563202	320488	Roadside	100	100.0	25.2	28.8	26.8	19.5	22.3
46	562565	320509	Roadside	100	100.0	22.5	24.6	24.1	17.6	20.1
47	562186	320376	Roadside	100	100.0	29.3	30.6	29.7	21.5	23.6

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 2021 (%) [2]	2017	2018	2019	2020	2021
48	562180	320365	Roadside	100	100.0	27.8	27.7	27.2	19.1	15.6
51	563521	320628	Roadside	100	100.0	19.0	18.8	18.6	13.6	14.6
52	563288	320504	Roadside	100	100.0	28.7	30.1	28.4	21.7	23.6
58	562171	319018	Kerbside	100	100.0	24.7	28.2	27.4	19.7	20.9
61	561853	318272	Roadside	100	100.0	16.9	16.7	17.1	12.1	12.6
62	561614	318591	Roadside	100	100.0	14.9	13.9	14.1	9.9	10.9
63	560593	315712	Roadside	100	100.0	9.8	10.2	9.7	7.3	7.5
64	560916	316765	Roadside	100	83	10.4	10.5	10.3	7.6	7.8
66	562595	320526	Urban Background	100	92	19.5	20.6	22.1	16.7	17.5
67	562235	319578	Urban Background	100	100.0	17.2	16.4	16.8	12.1	11.6
68	562142	319837	Urban Background	100	92	19.5	20.5	19.1	15.2	14.1
69	561993	319394	Urban Background	100	75	12.5	13.7	13.3	9.4	9.8
70	561929	319354	Urban Background	100	75	12.7	12.7	13.5	11.8	9.1
72	561223	320295	Roadside	100	83	12.3	12.3	11.6	8.6	8.1

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 2021 (%) [2]	2017	2018	2019	2020	2021
73	563161	315848	Roadside	100	100.0	19.6	24.3	22.1	16.2	16.5
74	561754	317910	Other	100	100.0	14.2	14.2	13.4	10.3	10.7
75	563468	320469	Roadside	100	100.0	31.6	34.1	35.8	26.5	28.0
76	562597	318739	Roadside	100	100.0	19.6	18.8	19.8	13.9	14.0
79	562803	320422	Roadside	100	100.0	32.8	32.7	33.2	23.8	26.0
83	560779	318508	Other	100	100.0	11.8	12.9	13.0	9.2	9.8
86	562018	320138	Other	100	100.0	27.6	27.1	27.7	19.5	20.1
87	562102	320163	Roadside	100	100.0	29.3	32.0	30.0	19.3	24.1
89	561887	319466	Roadside	100	100.0	13.2	13.2	13.5	9.7	9.7
90	563366	322065	Roadside	100	100.0	15.0	15.9	16.1	11.5	11.8
91	563255	321613	Roadside	100	100.0	13.7	14.4	14.5	11.0	11.0
92	563256	321588	Roadside	100	100.0	12.6	12.9	14.0	9.2	9.7
94	561957	318963	Roadside	100	100.0				15.9	16.4
95	562058	319038	Roadside	100	100.0				12.0	13.0

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 2021 (%) [2]	2017	2018	2019	2020	2021
96	562042	319011	Roadside	100	100.0				14.4	15.1
97	564503	322411	Roadside	100	100.0				14.1	15.1
98	562821	320964	Roadside	100	100.0					11.2
99	547960	313115	Suburban	100	100.0					7.8
100	547902	310395	Suburban	100	92					11.5
101	547094	307850	Roadside	100	100.0					25.9

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **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 $\mu g/m^3$.

Exceedances of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

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

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 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 NO₂ (µg/m³) along Railway Rd section of the A148

Figure A-2 Trends in Annual Mean NO₂ (µg/m³) within Gaywood Clock AQMA
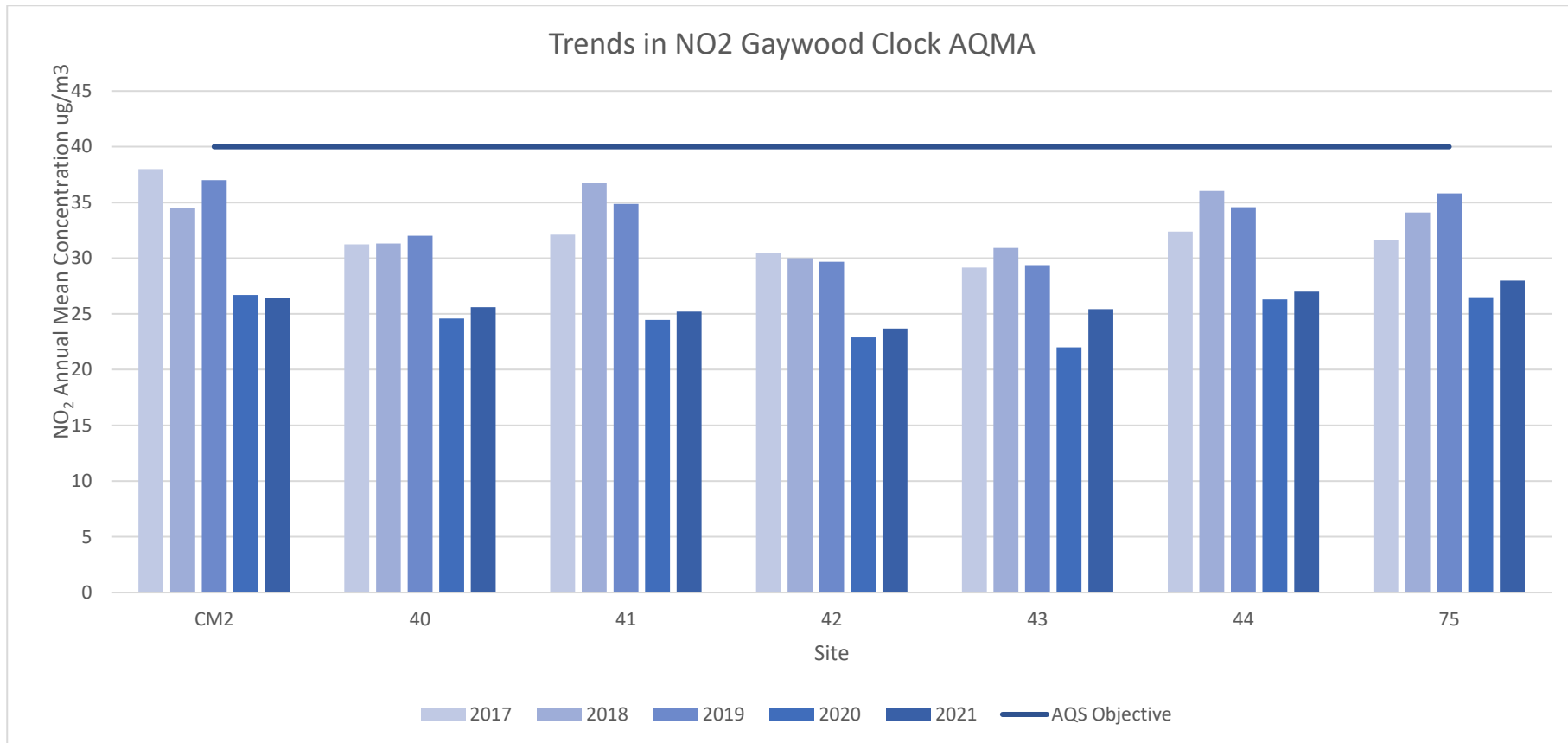
Figure A-3 Trends in Annual Mean NO$_2$ (µg/m^3) along south-bound section of the Railway Rd AQMA

Trends along Blackfriars Rd - Austin St
Railway Rd AQMA
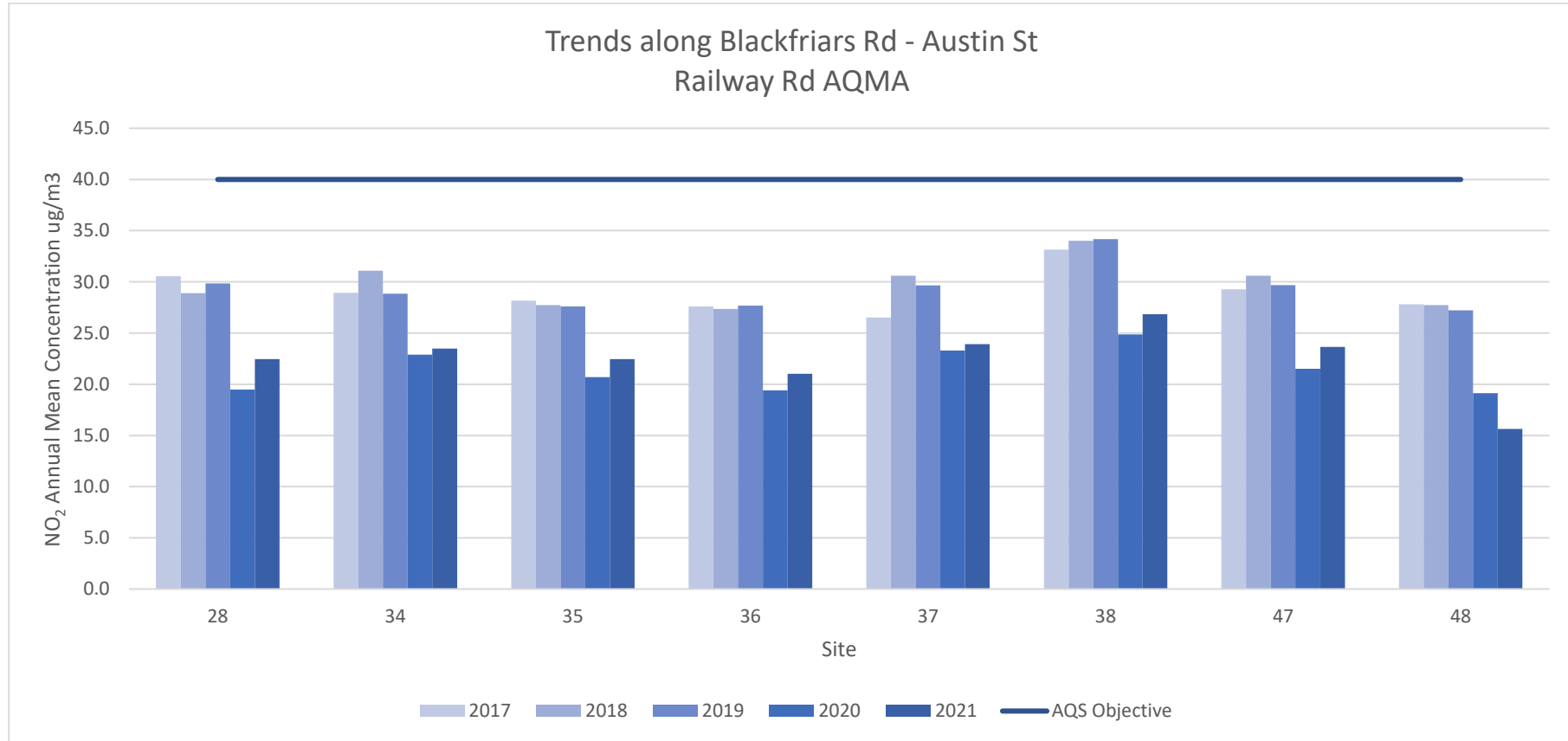
Figure A-4 - Trends in Annual Mean NO₂ outside AQMA's at Sites 5 (Bus Station), 73 (West Winch, A10) and 86 (Taxi Rank).

Trends in NO2 at Site 5 (Bus Station), Site 73 (West Winch, A10) and Site 86 (Taxi Rank)

Table A.5 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
CM1	562225	319191	Roadside	100	82	0	0	0	0	0
CM2	563437	320472	Roadside	100	95	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m³ have been recorded.

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

Table A.6 – Annual Mean PM$_{10}$ Monitoring Results (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 2021 (%) [2]	2017	2018	2019	2020	2021
CM3	562086	321325	Roadside	N/A	N/A	19				
CM4	570339	300083	Roadside	N/A	N/A		18.4	16	14.9	
OS1	561527	320437	Industrial	100	53.1	18	16.4	11	14.7	9.6
OS2	561593	321466	Industrial	100	88.4	13	14.6	13	10.1	16
OS3	570438	299905	Industrial	100	83.7	12	13.2	11	11.0	12
OS4	570264	299943	Industrial	100	69.8		12.7	10	12.8	12.5

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

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.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
CM3	562086	321325	Roadside	N/A	N/A	3	0			
CM4	570339	300083	Roadside	N/A	N/A		0	5	0	
OS1	561527	320437	Industrial	100	53.1	3	4	0	**16 (29.4)**	0
OS2	561593	321466	Industrial	100	88.4	0	0	0	0	**2**
OS3	570438	299905	Industrial	100	83.7	0	0	0	0	0
OS4	570264	299943	Industrial	100	69.8		0	0	0	0

Notes:

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

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

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

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

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

Table A.8 – Annual Mean PM$_{2.5}$ Monitoring Results (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 2021 (%) [2]	2017	2018	2019	2020	2021
OS1	561527	320437	Roadside	100	53.1	6	7	5	7.9	4.1
OS2	561593	321466	Roadside	100	88.4	6	6.9	7	6.7	6
OS3	570438	299905	Roadside	100	83.7	5	6.2	7	6.4	5
OS4	570264	299943	Roadside	100	69.8		5.9	5	5.4	5.1

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

Notes:

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO₂ 2021 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1	562073	320304	39.1	31.8	37.9	27.6	34.2	31.0	28.7	28.5	38.9	36.6	43.2	32.5	34.2	28.7	-	
2	562109	320196	45.9	36.6		31.5	41.9	37.9		33.4	41.8	44.8	52.0	35.0	40.1	33.7	-	
3	562117	320095	35.6	30.5	37.6	30.7	33.8	34.9			33.5	38.3	49.1	34.9	35.9	30.1	-	
5	562003	320099	25.1	23.9	26.7	23.7	24.0	24.2	22.1	21.4	24.9	25.2	28.5	23.6	24.4	20.5	-	
6	562225	319191	26.4	22.6	20.5	21.8	17.5	18.3	18.2	18.0	20.4	23.3	29.1	23.5	-	-	-	Triplicate Site with 6, 7 and 8 - Annual data provided for 8 only
7	562225	319191	25.5	23.4	22.1	20.3	17.9	18.4	17.4	18.3	18.7	24.5	29.9	22.8	-	-	-	Triplicate Site with 6, 7 and 8 - Annual data provided for 8 only
8	562225	319191	27.8	25.0	22.4	20.7	18.3	18.3	18.0	17.6	21.2	23.8	28.4	19.3	21.7	18.2	-	Triplicate Site with 6, 7 and 8 - Annual data provided for 8 only
9	561912	319711	19.1	21.8	17.2	17.5	16.6	15.0	14.6	13.1	17.5	19.0	24.2	21.2	18.1	15.2	-	
10	562101	319679	37.2	36.0	34.2	30.2	35.6	30.5	31.7	31.2	38.9		39.7		34.5	29.0	-	
11	562165	319575	29.3	28.1	25.3	23.1	24.6	24.3	24.8	21.4	27.4	30.9	29.6	29.7	26.6	22.3	-	
12	562242	319452	33.5	26.2	21.1	22.8	28.0	24.7	24.0	24.6	31.6	34.4	33.6	30.6	27.9	23.5	-	
13	562264	319375	30.5	25.4	29.1	26.2	24.8	24.1	22.3	22.6	26.6	28.6	36.5	30.1	27.2	22.9	-	
14	562227	319266	33.2	32.5	32.7	25.6	28.9	27.0	26.7	27.1			37.9	32.6	30.4	25.5	-	
15	562190	319102	34.7	34.6	34.7	34.8	36.0	34.2	34.4	33.1	37.4	32.8	40.5	34.8	35.2	29.6	-	
18	562266	319043	27.2	25.9	23.1	22.6	23.0	20.8	20.1	20.1	22.3	24.9	28.5	25.2	23.6	19.9	-	
19	562277	319098	25.3		21.0	18.9	20.5	17.8	18.8	17.0	24.2	24.6	27.7	25.3	21.9	18.4	-	
20	562244	319261	30.3	35.2	26.1	30.7	29.7	25.7	27.2	25.0	27.4	28.3	27.2	27.6	28.4	23.8	-	
22	562285	319386	31.9	33.4	27.9	32.5	30.6	24.6	28.0	25.7	32.1	31.0	32.4	29.3	30.0	25.2	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
23	562162	319614	29.5	35.3	29.1	37.3	32.5	29.1	33.0	28.0	32.7	30.0	32.3	27.9	31.4	26.4	-	
24	562136	319651	26.9	32.6	24.4	34.5	31.6	26.9	30.6	26.7	25.6	24.4	28.3	27.4	28.3	23.8	-	
25	562191	319695	19.7	15.3	14.7	11.3		8.9	9.9	10.5	12.8	15.6	17.4	15.0	13.7	11.5	-	
26	562131	319996		28.5	33.8	31.9	31.9	31.8	32.1	30.8	29.8	31.8	33.9	28.6	31.4	26.3	-	
27	562178	319999	28.4	20.2	29.2	27.1	26.0	27.8	24.7	24.7	26.8	28.7	34.8	28.2	27.2	22.8	-	
28	562253	320016	30.2	21.6	30.3	23.1	26.1	25.8	25.2	25.9	27.6	31.4		26.9	26.7	22.4	-	
29	562184	320055	20.5	15.7	17.0	13.2	14.6	11.5	11.6	11.4		18.2	21.3	18.9	15.8	13.3	-	
30	562204	320108	22.3	18.1	19.9	17.4	15.4	14.9	14.9	13.7	14.8	19.2	23.3	19.5	17.8	14.9	-	
31	562129	320132	33.8	28.1	30.3	28.8	25.5	26.9	26.0	25.0	27.2	30.0	33.1	28.0	28.6	24.0	-	
32	562119	320216	30.9	27.6	28.1	27.7	27.1	23.5	25.2	22.6	27.9	27.2	30.4	26.9	27.1	22.8	-	
33	562203	320159	30.1	24.9	25.9	19.4	25.9	20.5	20.6	18.7	26.8	28.1	30.1	26.3	24.8	20.8	-	
34	562244	320129		23.8	33.2	21.5	25.2	27.1	23.9	24.9	28.2	32.1	37.0	30.5	27.9	23.5	-	
35	562245	320238	30.3	22.5	29.9	25.7	25.6	25.5	22.3	24.3	24.4	29.3	34.5	26.3	26.7	22.4	-	
36	562219	320319	29.1	26.4	24.6	22.4	25.0	20.7	22.3	19.5	27.1	26.3	29.4	27.7	25.0	21.0	-	
37	562254	320259	31.7	31.4	29.9	32.3	28.7	25.0		24.8	29.2		29.5	22.3	28.5	23.9	-	
38	562257	320323	36.2	34.9	33.7	24.7	32.4	26.3	28.3	26.4	36.5	35.7	35.7	32.9	32.0	26.9	-	
39	562822	320427	27.8	27.7	23.3	21.5	21.5	18.1	19.5	18.9	23.8	26.6	24.5	23.1	23.0	19.3	-	
40	563490	320469	37.3	27.5	34.3	25.7	30.6	26.0	25.3	26.8	28.6	33.3	36.3	34.2	30.5	25.6	-	
41	563478	320515	36.7	36.1	30.4	32.3	32.7	26.3	29.8	24.3	31.2	16.0	35.1	29.0	30.0	25.2	-	
42	563480	320582	34.6	27.3	30.4	26.5	26.4	22.5	23.5	24.3	27.7	32.4	31.9	31.0	28.2	23.7	-	
43	563412	320477	33.1	27.0	31.4	35.6	28.9	27.1	28.1	29.8	27.9	30.0	35.6	28.6	30.3	25.4	-	

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44	563377	320484	38.0	36.2	34.5	38.8	30.6	29.4	33.6	31.6	25.0	33.0	20.8	33.9	32.1	27.0	-	
45	563202	320488	28.1	26.4	30.0	32.0	25.7	24.3	23.1	27.1	26.6	24.0	30.6	20.5	26.5	22.3	-	
46	562565	320509	21.8	23.0	26.5	26.2	22.0	21.5	22.9	20.7	22.4	25.5	29.7	24.8	23.9	20.1	-	
47	562186	320376	32.7	29.8	27.4	28.0	28.2	23.8	27.9	21.2	28.8	27.9	32.4	29.4	28.1	23.6	-	
48	562180	320365	6.6	11.1	26.3	17.1	25.4	19.7	20.5	19.1	25.3	19.4	9.3	23.4	18.6	15.6	-	
51	563521	320628	24.2	19.3	18.9	14.6	14.1	13.9	12.2	12.5	15.8	20.1	22.7	20.8	17.4	14.6	-	
52	563289	320504	29.0	28.8	30.6	32.1	25.5	24.8	27.9	26.2	26.4	27.9	32.0	26.7	28.1	23.6	-	
58	562171	319019	29.3	28.7	22.5	27.1	25.3	21.4	23.0	18.8	23.7	25.9	27.5	25.2	24.9	20.9	-	
61	561853	318272	20.7	17.6	15.0	13.3	12.5	10.3	10.5	10.6	13.9	16.6	21.2	18.2	15.0	12.6	-	
62	561615	318591	18.6	15.8	13.3	11.0	10.8	8.3	9.0	9.3	12.1	13.8	18.5	15.0	13.0	10.9	-	
63	560593	315712	14.3	11.2	9.4	7.9	8.0	5.5	5.4	6.0	7.3	10.1	11.3	10.5	8.9	7.5	-	
64	560917	316766	13.2	11.9	8.6	8.7	7.9	6.3	6.6	6.1			12.2	11.2	9.3	7.8	-	
66	562595	320527	25.9	23.0	23.0	18.2		16.5	15.6	14.8	18.4	23.8	27.0	22.7	20.8	17.5	-	
67	562236	319579	18.9	15.7	14.9	10.2	12.3	9.8	10.3	9.5	12.8	17.7	19.6	14.6	13.9	11.6	-	
68	562143	319838	21.2	16.7	18.9	13.9	15.5	14.2	13.9	13.6	14.6	19.4	22.8		16.8	14.1	-	
69	561994	319395	17.2	14.8			9.6	7.9	8.2	7.2	10.8	12.5	16.4		11.6	9.8	-	
70	561930	319355	15.3	15.0			9.8	7.1	7.8	6.4	10.5	12.1	14.0		10.9	9.1	-	
72	561224	320295	15.9		10.6	8.6	8.5	7.7	7.1	7.3	9.9		14.5	6.5	9.7	8.1	-	
73	563162	315849	23.2	23.6	18.8	27.3	17.4	19.5	20.2	18.2	3.2	19.6	23.6	20.8	19.6	16.5	-	
74	561754	317910	14.6	15.4	13.9	13.2	11.3	9.5	6.2	10.1	11.2	13.8	17.9	15.2	12.7	10.7	-	
75	563468	320469	40.6	37.9	35.0	34.3	31.0	27.0	31.1	27.4	32.7	34.3	35.3	33.1	33.3	28.0	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
76	562597	318739	19.3	20.0	15.7	13.4	16.7	11.4	14.3	12.6	17.6	20.7	20.1	18.7	16.7	14.0	-	
79	562804	320422	35.4	32.7	33.5	30.9	23.2	26.0	28.6	28.7	30.3	34.1	34.7	33.5	31.0	26.0	-	
83	560779	318509	14.9	14.5	11.2	12.7	10.1	9.4	9.6	10.6	10.4	11.2	14.7	11.3	11.7	9.8	-	
86	562019	320139	27.9	22.8	27.4	21.4	23.0	21.5	21.2	20.0	24.5	26.1	24.5	27.0	23.9	20.1	-	
87	562102	320164	28.3	26.7	29.6	31.8	22.8	23.5	25.6	24.9	45.6	27.0	30.9	28.2	28.7	24.1	-	
89	561888	319467	16.8	15.1	11.5	10.7	9.7	8.1	8.6	7.4	9.7	12.6	15.4	13.2	11.6	9.7	-	
90	563366	322066	16.9	17.7	14.5	10.9	12.5	11.0	10.6	9.9	13.3	16.7	18.4	15.5	14.0	11.8	-	
91	563256	321613	16.7	14.9	14.8	10.3	11.6	9.3	9.5	9.4	12.3	16.1	17.1	15.4	13.1	11.0	-	
92	563257	321589	17.2	13.9	11.9	8.4	9.7	7.9	7.6	7.7	9.6	14.0	15.0	15.5	11.6	9.7	-	
94	561958	318963	24.3	20.5	20.5	18.4	17.4	15.6	17.0	16.2	17.2	22.5	23.7	21.3	19.6	16.4	-	
95	562058	319038	20.2	17.7	14.4	13.6	12.7	11.8	12.9	11.1	16.4	18.3	18.5	18.0	15.5	13.0	-	
96	562043	319012	22.0	23.3	17.5	17.3	15.2	13.1	15.4	11.9	18.5	21.8	20.7	19.7	18.0	15.1	-	
97	564504	322412	21.9	19.1	17.8	16.2	17.5	14.5	14.6	12.6	17.9	20.8	22.4	19.6	17.9	15.1	-	
98	562822	320964	18.9	16.0	13.5	9.5	11.1	8.8	8.6	9.2	12.8	17.2	18.1	16.6	13.4	11.2	-	
99	547961	313115	14.0	11.5	11.8	7.2	8.0	5.3	5.7	5.2	7.5	10.7	13.3	11.6	9.3	7.8	-	
100	547903	310395	16.1	14.7		9.5	8.9	6.5	32.8	6.9	9.9	13.9	17.1	14.0	13.7	11.5	-	
101	547094	307850	36.2	29.0	37.9	33.2	30.6	24.2		32.9	31.5	38.8	36.4	33.0	30.9	27.8	-	

☒ **All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☐ **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 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

Exceedances of the NO$_2$ annual mean objective of 40µg/m^3 are shown in **bold**.

NO$_2$ annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO$_2$ 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within the Borough Council of King's Lynn and West Norfolk During 2021

There were 89 developments that were appraised for air quality in 2021. The following 24 were considered as most signifiant namely:

Table C-1 – Most Significant Planning Applications

24 Most Significant Planning Applications			
Planning Ref.	Address	Proposal	Response
13/01615/OM 18/02289/OM	West Winch Strategic Growth Area	Up to 1110 dwellings plus primary school and local centre Up to 500 dwellings plus neighbourhood centre	Both developments, whilst separately submitted form part of the same growth area and with related infrastructure and hence cumulative traffic impacts. Transport assessments show daily movements as 6097 and 3491 vehicles per day respectively with distribution towards the AQMA's in King's Lynn at around 25%. We have estimated damage cost (£334,549 and £142,219) associated with the traffic requiring additional offsetting. An update can be reported in next year's ASR.
21/01873/FM	Parkway, Off Gaywood Clock Junction	226 Dwellings	The development is located on land with road link to the Gaywood Clock AQMA junction. Traffic assessments (TA Sept 21 and Addendum Nov 21) estimated additional daily trips as AADT as additional 714 when based on good existing connectivity in the area. Air quality impacts were modelled as negligible at all receptors including the AQMA. Mitigation measures agreed include an EV charging scheme, travel plan, 20mph speed limit, air source heat pumps and improvements to local cycling and walking infrastructure. Dust monitoring scheme was agreed with PM_{10}

		24 Most Significant Planning Applications	
Planning Ref.	**Address**	**Proposal**	**Response**
			trigger level (alerts) due to schools at either sides of the development. Alerts do not form part of LAQM reporting purposes.
21/00152/RMM	Nightingale Lane, Downham Market	Reserved matters (RMM) for up to 300 homes	Initial development at outline (16/01322/OM) was based on 170 dwellings but later approved for up to 300 dwellings. An air quality screening assessment was submitted at outline with no objection. Construction management plan (CMP) recommended by condition and implemented. Informative added for electric vehicle charging scheme as mitigation at RMM.
21/00995/FM	Edward Benefer Way	Proposed primary care centre including new junction onto A1078	Screened based on peak AM/PM trips and proposed car-spaces (99). 3x EV charging points for 6 spaces. Bus stop not adjacent and 250m distant but with secure cycle parking proposed (21) but conditioned (45). Informative on mitigation for travel plan to be implemented with provisions for its on-going monitoring. Condition recommended for construction management plan. No objection.
21/00855/FM	Off Aconite Way, King's Lynn	Residential development of 96 dwellings	An AQ Addendum requested which was submitted by Mott McDonald (Sept 2021). Air dispersion modelling re-run and confirmed negligible impact with max. change of NO_2 of as $0.1\mu g/m3$. The model was verified against this Council's monitoring. HGV movements (up to 20 per day) were to be routed northwards to the A1078 and away from air quality management areas, which was conditioned to help prevent any unacceptable impacts. Scheme includes mitigation such as air source heat pumps (low NOx), some PV, good levels of existing connectivity, EV charging and travel plan. Informative added for consideration of fast (>7.4kW) EV where practicable. No objection.

24 Most Significant Planning Applications			
Planning Ref.	Address	Proposal	Response
20/02127/FM	Chequer House, 12 King Street, King's Lynn	Redevelopment and change of use from office building (listed) to a residential development comprising 40 no. self-contained flats	Development within the town centre. Screened. Transport Statement submitted showing projected reduction in trips with development served only by 3 car parking spaces all with EV charging. Secure cycle spaces (55) to be provided and supported by Travel Plan. Dusts managed by construction management plan. No objection.
SCO/2021/0001	West Winch Housing Access Road	Scoping opinion	EIA scooping report submitted. It was recommended that risks from operational traffic to be based on IAQM (2017) methodology as informed by suitable TA. Receptors should include AQMAs with cumulative impacts to be fully considered. Contruction activitities to include measures in accordance with IAQM guidance.
21/00601/F	5-11 Fring Road, Snettisham PE31 7NE	Retention of biomass boiler	Emission rates from boiler with thermal capacity of 88kW assessed as less than respective targets. Whilst no objection raised it was noted that on review that negative height difference exists.
21/00774/CM, FUL/2021/0013	Warren Energy Ltd, Breckland Farm, Methwold	County matters application for variation to feedstock for Anaerobic Digestion (AD) plant	Proposal to reduce capacity of feedstock and vary types to the AD plant (to 49,000 tonnes). Screened with Transport Statement submitted showing daily movements for HGVs as 67 in peak months of September and October. AQ assessment for dusts submitted with impacts predicted as negligible and mitigation was not considered to be necessary. No objection raised.
21/01412/RMM	Cheney Hill, Heacham	Reserved matters application for 64 dwellings	Screened based on transport assessment submitted at outline as less that indicative IAQM criteria. Plans show primary heating via heat pumps but with secondary by biomass

24 Most Significant Planning Applications			
Planning Ref.	**Address**	**Proposal**	**Response**
			fuels. Informative on PM$_{2.5}$ emissions and recommended electric vehicle charging.
21/00623/RMM	Tamar Nurseries, School Road, West Walton, Wisbech	Reserved matters application for 49 Dwellings with Village Store and Post Office	Screened based transport statement submitted at outline with change in AADT of 443 which was not considered a significant to warrant more detailed assessment for air quality. Informatives added on PM$_{2.5}$ (solid fuel combustion) as chimneys shown on plans and also suitable electric vehicle charging points / infrastructure in line with AQAP (Measure 19). Construction environmental management plan recommended for condition to minimise risk from dusts. No objection raised.
21/02308/RMM	Reserved matters application for erection of 50 dwellings	Land W of Tikka Chef, Isle Road, Outwell	Screened at outline based on likely AADT. Recommended mitigation with condition for suitable EV charging scheme, including consideration of fast (>7kW) charging provision. No objection.
21/00800/F	Application to vary condition 25 of planning permission 20/00694/F to allow for a change in the number of daily vehicular moments allowed on the public / private highway	Riverside Business Centre, Cross Bank Road, King's Lynn	Screened based on updated Transport Plan showing HGV movements (14vpd). No further assessment required. No objection.
21/00589/RMM	Reserved Matters Application for 44 dwellings	Benns Lane, Terrington St Clement	Screened at outline as unlikely to exceed IAQM indicative criteria and further confirmed at reserved matters based on extent of car parking provision. No objection raised

	24 Most Significant Planning Applications		
Planning Ref.	**Address**	**Proposal**	**Response**
			especially when considering good background air quality (PM_{10} (15.44 µgm-3) and NO_2 (8.34 µgm-3). A construction environmental management plan recommended by condition. Informative added in terms of electric vehicle charging points / infrastructure.
21/00551/RMM	Limagrain UK Ltd, Station Rd, Docking	Reserved matters application for 30 dwellings	Screened; Transport Statement submitted at earlier outline application (19/01654/OM) compared peak traffic movements to the proposed which was not deemed as significant to warrant more detailed AQ assessment, especially when based on good general background air quality (PM_{10} (15.72 µgm-3) and NO_2 (7.39 µgm-3)). Condition recommended for electrical vehicle charging scheme and construction management plan. Informative / advice given on solid fuel combustion and risk from $PM_{2.5}$.
21/00243/FM	BCKLWN Southend Car Park Seagate Hunstanton	Construction of 32 apartments	Screened; 32 car spaces for the apartments plus 8 for visitor. 2 electric vehicle charging points. Additional traffic flows as AADT unlikely to be significant in line with IAQM (2017) with net loss to existing spaces. To help mitigate traffic emissions 2 bike store shelters provided that each hold 20 spaces. No objection raised.
21/02066/OM	Former Works Adj Gayton Mill, Litcham Road, Gayton	Outline Application for up to 33 dwellings	Screened based on likely AADT generated from 33 dwellings in the absence of a Transport Statement / Assessment being submitted. No objection raised. Recommended conditions in terms of travel plan and construction environmental management plans. Informative added for electric vehicle charging.
FUL/2021/0014	Park Farm, Castle Road, Wormegay	County matters application to vary conditions	Transport Statement and an HGV Management Plan submitted. Screened based on likely AADT (approx. 10 HGV). HGV movements

24 Most Significant Planning Applications			
Planning Ref.	Address	Proposal	Response
		1, 2, 5, 12, and 17 of permission C/2/2011/2035 relating to mineral extraction	proposed to go by the approved access routes to avoid local villages, including educating drivers, regular monitoring by the quarry manager, and the use of signage. HGVs will travel along a 0.9km hard surfaced site track to avoid mud or debris being carried into the public highway. Informative added regarding wheel washing where required. No objection.
21/00631/FM	Cruso & Wilkin, Waterloo Street, King's Lynn	Conversion of vacant offices into 12 apartments	Development adjacent to Railway Rd AQMA. Screened. No new car parking spaces being proposed as part of the development. In the event that some were to be utilised an informative added for EV charging in accordance with AQAP plan measure 19. Current levels of NO2 as annual mean monitored by diffusion tube sites 28 and 29, showing AQ currently as below the objective. Mitigation proposed with 15 cycle parking spaces. Informative also added to reduce exposure to air pollution through design and that where habitable rooms are ventilated with windows opening towards Blackfriars Road, consideration should be given to an alternative means of ventilation to further reduce adverse effects on occupiers on days when air quality may be poor.
21/00925/O	West Norfolk Deaf Association Car Park, Old Market Street	Outline application for the erection of 3-storey building of up to 6 dwellings on former car park	Located adjacent Railway Rd AQMA. Screened. Mitigation includes secure bicycle storage. Advisory comment made regarding location of habitable rooms to be designed to minimise exposure to air pollutants. No objection raised in terms of air quality.
FUL/2020/0107 and related applications	Middleton Aggregrates, Pentney	County Matters application to extend period of	Screened based on existing use / proximity to sensitive receptors and review of complaints. Mitigation continues in accordance with existing

24 Most Significant Planning Applications			
Planning Ref.	**Address**	**Proposal**	**Response**
	Quarry, Abbey Road, Pentney	operation, stock piling etc for mineral extraction	arrangements Dust Management Plan. No objection.
FUL/2021/0007	Mick George Ltd, Watlington Road, Tottenhill	County matters application for extraction of sand/gravel with site restoration etc	Proposal is to extend extraction of sand, gravels and underlying clay of over c. 1 million cubic metres southwards and towards receptors with a perimeter bund (2m height). Given the proposed methodology based on visual inspections and annual reviews over the timescale as proposed we have recommended a condition to require prior to commencement of Phase-5 a satisfactory air quality assessment to be submitted to include review of dust complaints arising from earlier phases and details of any air quality monitoring scheme required.
21/01087/F	Greenworld Sales Ltd, Estuary Farm, Edward Benefer Way, King's Lynn	Application for 3 Biomass Boilers (3x 370kW)	Screened based on background adjusted emission rates and distance from nearest residential dwelling down wind (SW).

Additional Air Quality Works Undertaken by the Borough Council of King's Lynn and West Norfolk During 2021

DMRB screening assessment along the A-10

A screening assessment was carried out to assess air quality along the A-10 following an enquiry from a member of public. The A-10 is recognised with relatively high number of HGV movements recorded by DfT traffic survey point 56158[30] (manual count of 2207 HGV

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[30] https://roadtraffic.dft.gov.uk/manualcountpoints/56158

movements (including buses / coaches) in 2019). Whilst these were less than Defra screening criteria for roads with high levels of HDV's (2,500) as trend appeared upwards DMRB screening assessment carried out and reported via the Council's website[31]. This was based on exposure 10m from the kerb. Results confirmed exceedances in both the short and long-term objectives (NO_2 and PM_{10}) were unlikely. A diffusion tube (site 73) is located in West Winch along the A-10 and helps to monitor situation as well as the DfT traffic survey point.

Review of Source Apportionment Study by Bureau Veritas:

Source apportionment study that was previously carried out by Bureau Veritas (2017[32]) for NO_2 in the AQMA's has also been reviewed. Whilst the main source for the NO_2 was traffic it was noted that around 50% of the oxides of nitrogen (NO_x) was from sources other than the main road links modelled and which applied to both AQMA's. On review, rather than widening the boundary of the AQMA, it highlights importance of wider measures than proposed necessarily under measure M1. This is to be taken forward in the review of the AQAP.

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

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

Diffusion Tube Bias Adjustment Factors

The Council uses diffusion tubes supplied by Gradko International using the 20% TEA preparation method.

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[31] https://www.west-norfolk.gov.uk/info/20137/air_quality/171/air_pollution_levels

[32] https://www.west-norfolk.gov.uk/downloads/download/346/air_quality_information_documents

The diffusion tube data presented within the ASR has been corrected for bias using the national adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring.

A triplicate co-location study has been employed 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 locally by wind / UV.

For the review period the Borough Council of King's Lynn and West Norfolk have applied a national bias adjustment factor of **0.84** to the 2021 monitoring data (v.03/22, result of 32 studies). The national factor was chosen ahead of the triplicate co-location study due to poor level of data acquisition from the Southgates CM1 instrument.

A summary of bias adjustment factors used by the borough over the past five years is presented in Table C.2:

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	03/22 (32 studies)	0.84
2020	National	03/21	0.81
2019	National	03/20	0.93
2018	Local	-	0.93
2017	Local	-	0.85

Gradko International participates in the AIR PT inter-comparison scheme of analysing spiked standards to test the laboratories analytical performance on a quarterly basis. Results are published by LAQM helpdesk[33] that show rounds that were satisfactory. It is noted that some rounds were not completed due to the Covid outbreak.

For the 2021 period deployment dates of diffusion tubes were in accordance with the exposure periods (+/- 2 days) given by Defra's LAQM calendar.

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[33] LAQM helpdesk, Air P-T Rounds 3—42; https://laqm.defra.gov.uk/air-quality/air-quality-assessment/qa-qc-framework/

Diffusion tube NO₂ Fall-off with Distance from the Road

None of the NO2 diffusion tube monitoring locations required distance correction during 2021.

QA/QC of Automatic Monitoring

To ensure that the air quality data obtained by the borough is representative and fully complies with the requirements LAQM process, a comprehensive set of QA/QC procedures are in place including:

- The 2x Teledyne API 200E (reference) monitors for NO₂ by chemiluminescent are subject to at least monthly drift check by the borough's Environmental Quality team whereby zero and span gases are analysed, and filter changed. Data is subject to ratification / data management by AQDM services who ensure data is appropriately ratified / scaled. The instruments are also maintained under contract with minimum 6-monthly service visits and external QC by NPL annually who check the analysis using certified NO source that ensures the span gas is traceable to national / international standards. Both monitoring stations were calibrated by NPL 9th Feb 2022.

- The 4x Turnkey Osiris PM instruments (PM₁₀ to MCERTS) are serviced under enhanced service contract that covers 12-month calibration and essential maintenance parts (battery, pump, and photometer plus consumables such as filters). Annual calibration consists of comparison against reference analyser by Turnkey. Instruments are subject to quarterly filter change and flow rate checks plus auto zero to correct for instrument drift.

- Live / historic data is available via https://www.norfolkairquality.net/ which is also loaded into Defra's UK Air website.

PM₁₀ and PM₂.₅ Monitoring Adjustment

The type of PM₁₀/PM₂.₅ monitor(s) utilised within the Borough Council of King's Lynn and West Norfolk do not require the application of a correction factor.

Automatic Monitoring Annualisation

As instruments OS1 and OS4 (Page Stair Lane and Buckingham Drive) gave less than 75% data acquisition for the year, results have been annualised as shown in Table C.2

Table C.3 – Annualisation Summary (concentrations presented in µg/m³)

Background Site	Type	PM10 Annual Mean	PM10 Period Mean-A	Ratio AM/PM-A
Norwich Lakenfields	Urban Background	13.1	13.9	0.94
Leicester University	Urban Background	12.2	12.7	0.96
			Average Ratios	0.95
Page Stair Lane OS1			Raw PM	10.1
			PM10 Annualised Mean	**9.61**
Norwich Lakenfields	Urban Background	13.1	12.2	1.07
Leicester University	Urban Background	12.2	11.4	1.07
			Average Ratios	1.07
Buckingham Drive OS4			Raw PM	11.70
			PM10 Annualised Mean	**12.52**

Background Site	Type	PM2.5 Annual Mean	PM2.5 Period Mean-A	Ratio AM/PM-A
Norwich Lakenfields	Urban Background	8.5	9.11	0.93
Leicester University	Urban Background	7.5	7.9	0.95
			Average Ratios	0.94
Page Stair Lane OS1			Raw PM 2.5	4.3
			PM2.5 Annualised Mean	**4.05**
Norwich Lakenfields	Urban Background	8.5	8.0	1.06
Leicester University	Urban Background	7.5	7	1.07
			Average Ratios	1.07
Buckingham Drive OS4			Raw PM2.5	4.80
			PM2.5 Annualised Mean	**5.14**

**Table C.4 – Local Bias Adjustment Calculation**

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	8				
Bias Factor A	0.78 (0.7 - 0.88)				
Bias Factor B	28% (13% - 43%)				
Diffusion Tube Mean (µg/m^3)					
Mean CV (Precision)	22.9				
Automatic Mean (µg/m^3)	4.0%				
Data Capture					
Adjusted Tube Mean (µg/m^3)	17.8				
Overall Diffusion Tube Precision	**Good Overall Precision**				
Overall Continuous Monitor Data Capture	**Poor Overall Data Capture**				

Notes:

A single local bias adjustment triplicate co-location study was carried out in 2021.

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

Figure D-1 - Map of Monitoring Sites around Gaywood Clock AQMA (junction)
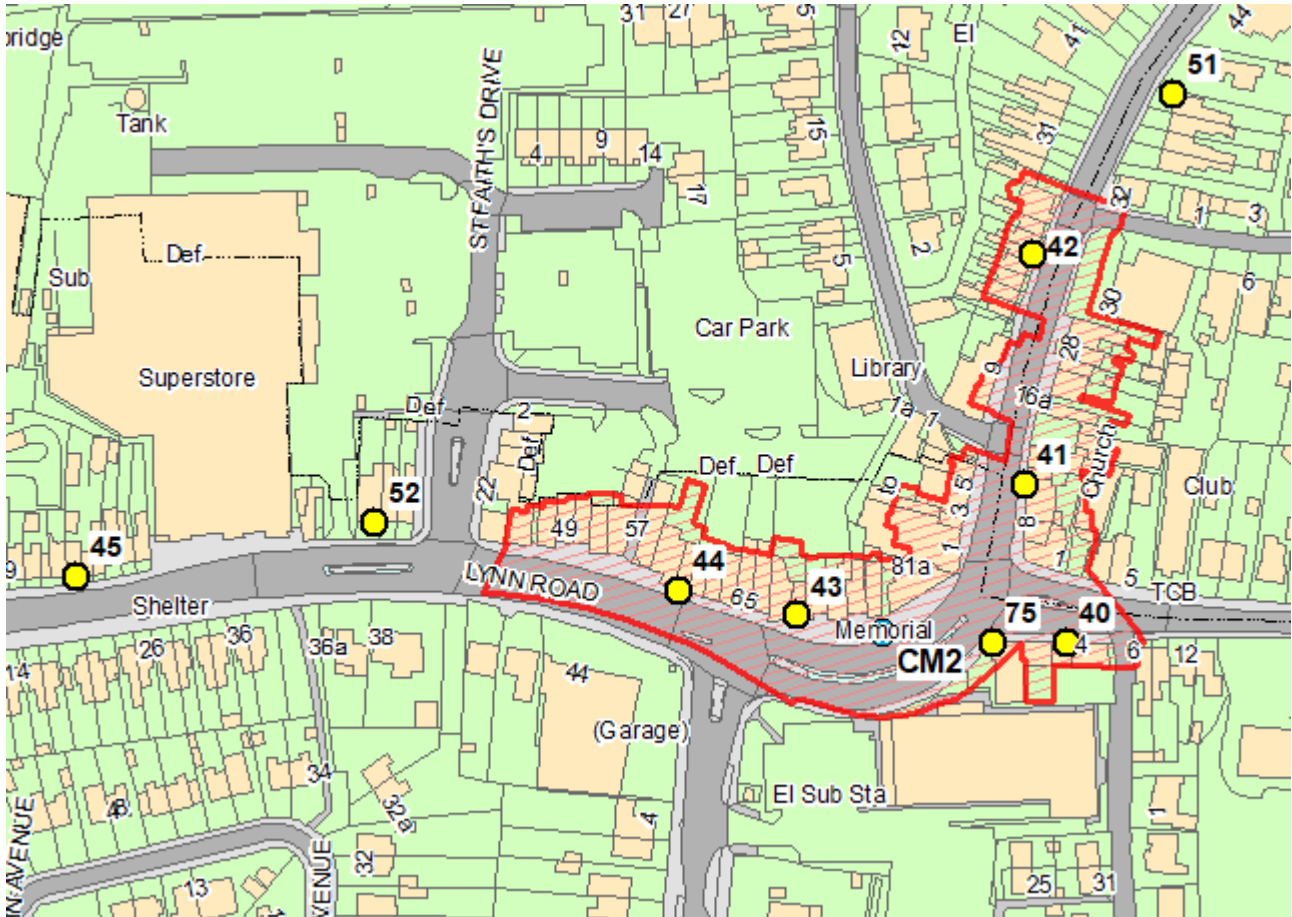
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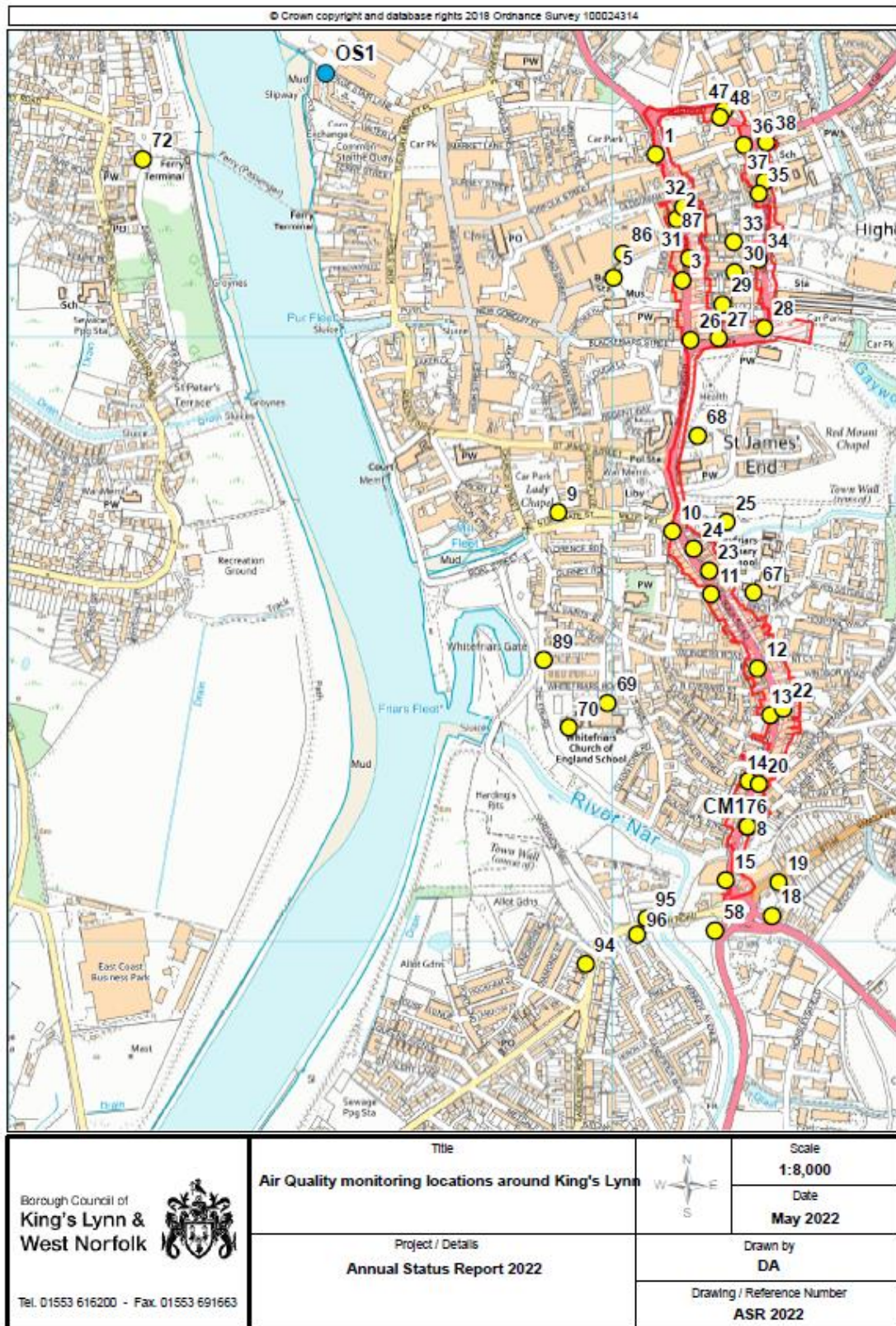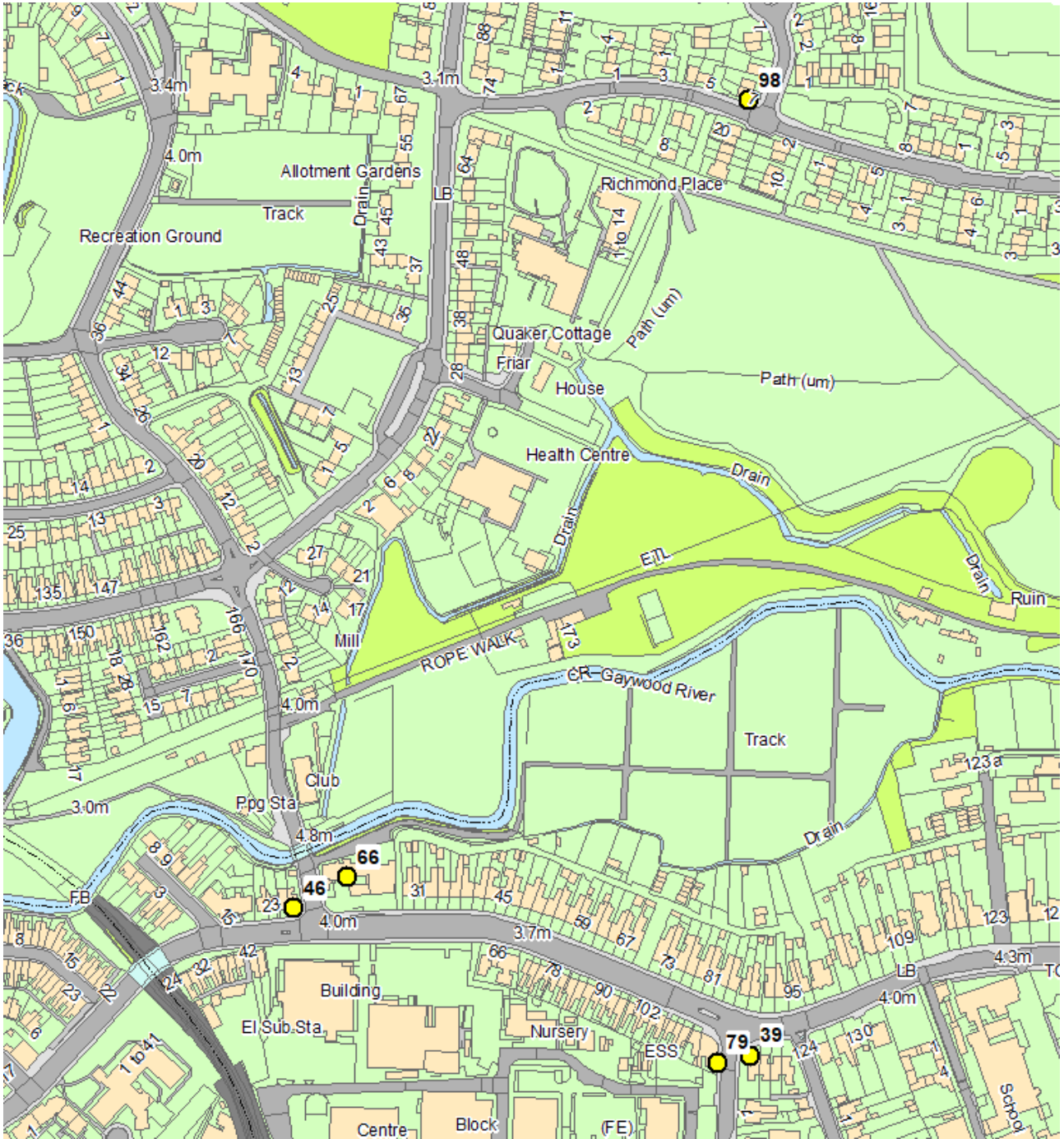**Figure D-2 Map of Monitoring Sites around the town centre of King's Lynn and the Railway Rd AQMA.**
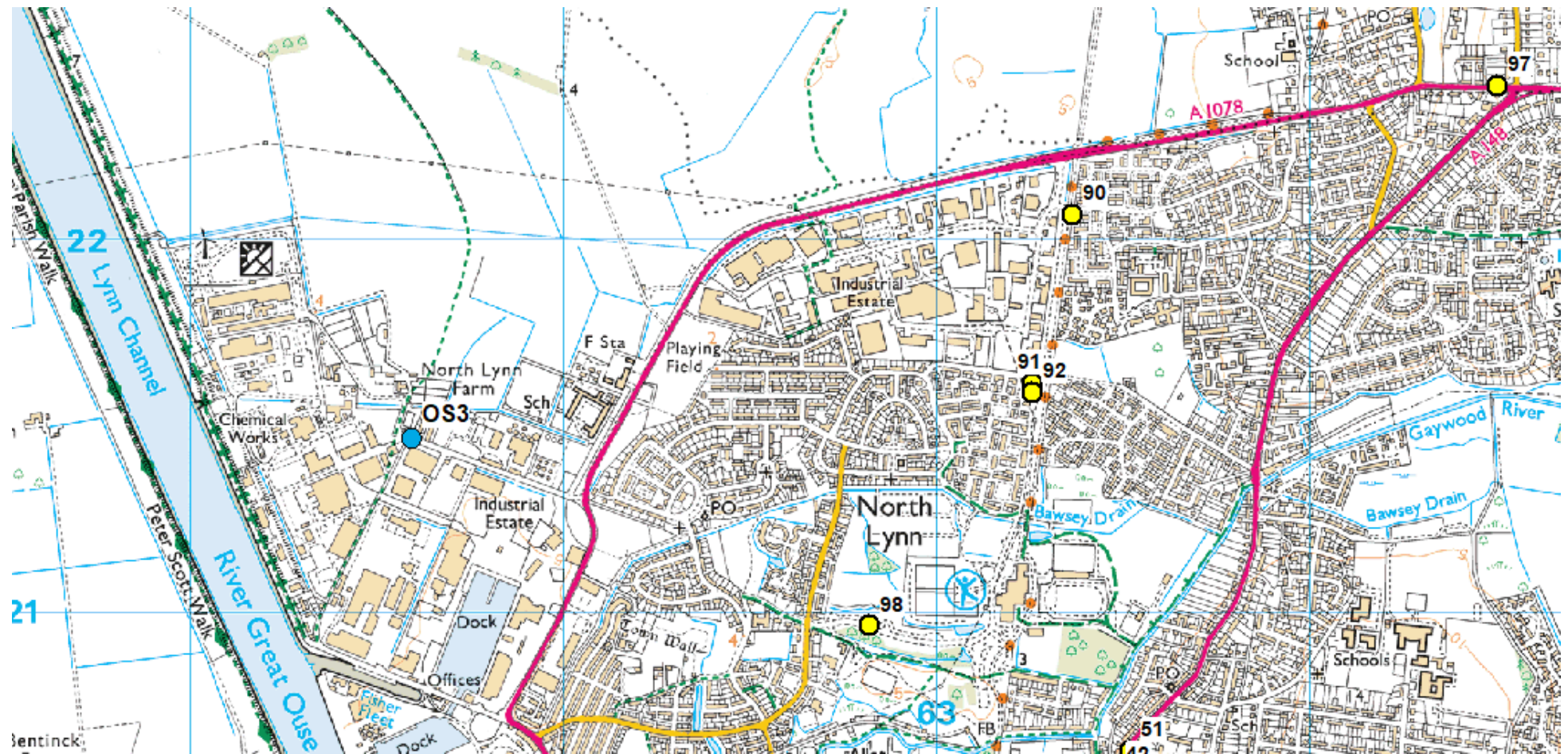
Figure D-3 Map of Monitoring Sites in King's Lynn between both AQMA's
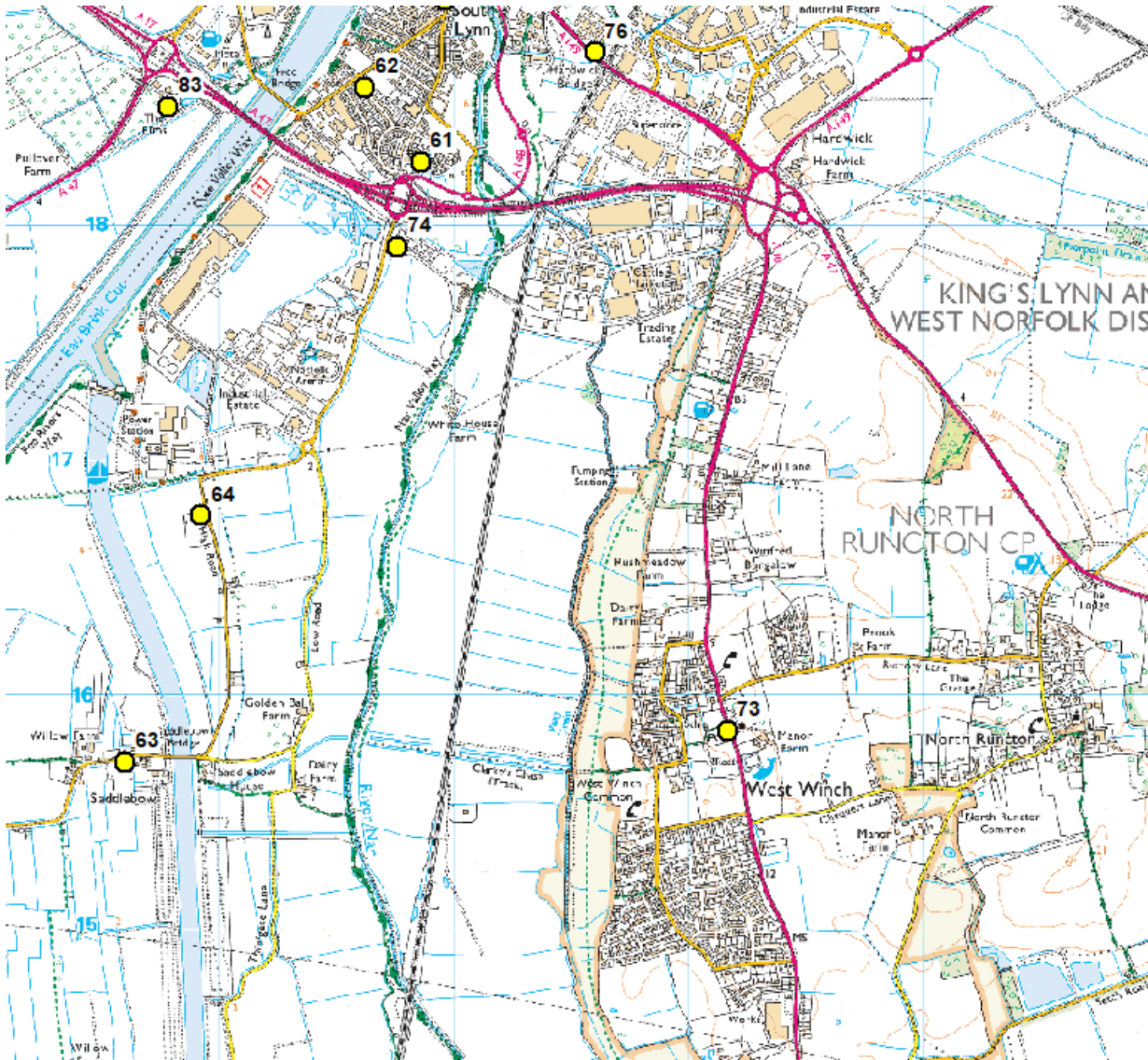

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Figure D-4 Map of Monitoring Sites in North Lynn

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Figure D-5 Map of Monitoring Sites in South Lynn

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Figure D-6 Map of Monitoring Sites around Wisbech

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Figure D-7 Map of Monitoring Sites in Stoke Ferry

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Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[34]

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

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[34] 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	1500	REKA HKRST	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
Reeve Timber, King's Lynn	14/00974/F	220	ETA Hack 199	chips
Dersingham St George's Church of England Junior School	14/01483/F	220	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		

Figure F-1 Trends in Primary PM2.5 (from NAEI 1990 – 2019)
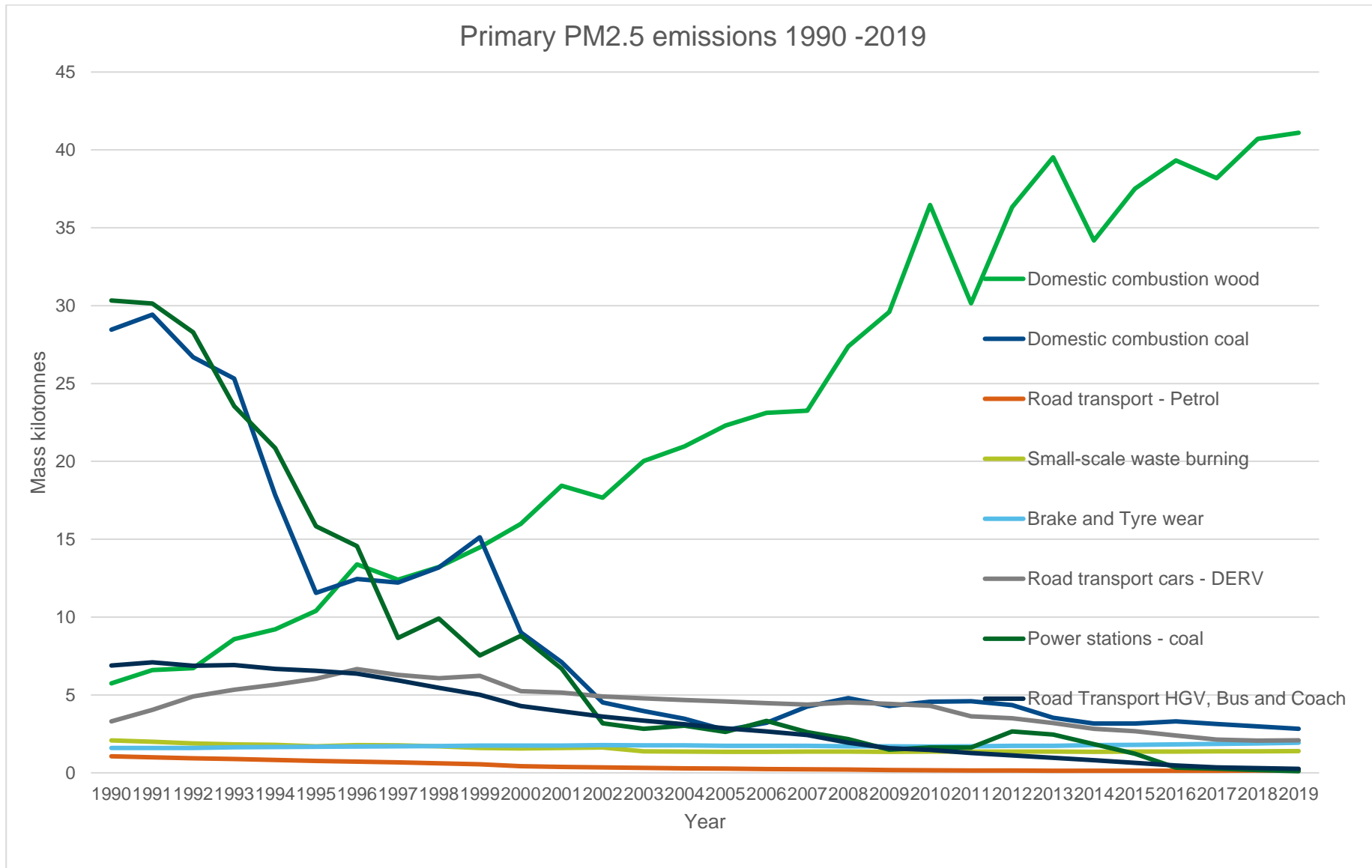
Appendix G: Electric Vehicle Charging Devices

Table G-2: Publicly available charging devices

	April 22	April 21	April 20	Oct 19
Total devices	62	47	30	19

Table G-2: Publicly available electric vehicle charging rapid devices (i)

	April 22	April 21	April 20	Oct 19
Total devices	62	47	30	19

(i)   Above 43kW

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
AADT	Annual Average Daily Traffic
ASR	Annual Status Report
BCKLWN	Borough Council of King's Lynn and West Norfolk
Defra	Department for Environment, Food and Rural Affairs
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
EV	Electric Vehicle
FDMS	Filter Dynamics Measurement System
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LCWIP	Local Cycling and Walking Plan
NAEI	National Atmospheric Emission Inventory
NAQS	National Air Quality Standards
NPPF	National Planning Policy Framework
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PEIR	Preliminary Environmental Information Report
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

Abbreviation	Description
TA	Traffic Assessment