



***Borough Council of King's Lynn & West Norfolk  
Annual Status Report 2018***

*Bureau Veritas*

*August, 2018*

### Document Control Sheet

Issue/Revision	Issue 1.0	Issue 2.0
Remarks	Draft	Final
Date	June, 2018	August, 2018
Submitted to	Kate Penn	Kate Penn
Prepared by	Paul Bentley Consultant	Paul Bentley Consultant
Signature		
Approved by	Hannah Smith Senior Consultant	Hannah Smith Senior Consultant
Signature		
Project number	6476763	

#### Disclaimer

This Report was completed by Bureau Veritas on the basis of a defined programme of work and terms and conditions agreed with the Client. Bureau Veritas' confirms that in preparing this Report it has exercised all reasonable skill and care taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project.

Bureau Veritas accepts no responsibility to any parties whatsoever, following the issue of the Report, for any matters arising outside the agreed scope of the works.

This Report is issued in confidence to the Client and Bureau Veritas has no responsibility to any third parties to whom this Report may be circulated, in part or in full, and any such parties rely on the contents of the report solely at their own risk.

Unless specifically assigned or transferred within the terms of the agreement, the consultant asserts and retains all Copyright, and other Intellectual Property Rights, in and over the Report and its contents.

Any questions or matters arising from this Report should be addressed in the first instance to the report author.

Borough Council of  
**King's Lynn &  
West Norfolk**



2018 Air Quality Annual Status Report  
(ASR)

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

August 2018

## Borough Council of King's Lynn & West Norfolk

Local Authority Officer	Kate Penn
Department	Environmental Quality
Address	King's Court, Chapel Street, King's Lynn, Norfolk, PE30 1EX
Telephone	01553 616324
E-mail	kate.penn@west-norfolk.gcsx.gov.uk
Report Reference number	6476763v2.0
Date	August 2018

## 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. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas<sup>1,2</sup>.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

The borough of King's Lynn and West Norfolk is located in Norfolk. The air quality in the borough is generally good however the two main pollutants of concern, in line with the majority of the UK, are nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub>). The main source of NO<sub>2</sub> in the borough is from road traffic emissions, notably at Gaywood Clock junction (Lynn Road, Gayton Road and Wootton Road) and in King's Lynn town centre (London Road leading to the one way system at Railway Road, Blackfriars and Austin Street). Other pollution sources, including commercial, industrial and domestic sources also contribute to background NO<sub>2</sub> concentrations. As a result of monitoring in these sensitive areas, two Air Quality Management Areas (AQMAs) have been declared in King's Lynn, where exceedances of the annual mean objective for NO<sub>2</sub> were reported. An Air Quality Action Plan (AQAP) was adopted by the Council in 2015 and a source apportionment study undertaken in 2008. An update to the 2008 source apportionment study was completed in December 2017, and this updated data is to be used to revise the 2015 AQAP.

One exceedance of the annual mean NO<sub>2</sub> air quality objective was reported inside the AQMAs, this was at the Railway Road 4 (Site ID 2) diffusion tube located within the Town Centre AQMA. This location is at a location of relevant exposure therefore has not been distance corrected.

---

<sup>1</sup> Environmental equity, air quality, socioeconomic status and respiratory health, 2010

<sup>2</sup> Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013

## **Borough Council of King's Lynn & West Norfolk**

PM<sub>10</sub> monitoring is completed at five locations within the borough, full details of the monitoring sites are provided in Table A.1. The main source of PM<sub>10</sub> concentrations continue to be from industrial processes. Monitoring is carried out in the North Lynn area of King's Lynn and the village of Stoke Ferry. Concentrations in these areas have remained below the annual mean and 24-hour mean air quality objectives for PM<sub>10</sub> since 2013.

Monitoring of PM<sub>2.5</sub> is also carried out at four of the PM<sub>10</sub> locations. The concentrations recorded for 2016 and 2017 have been below the obligatory annual mean standard of 25µg/m<sup>3</sup>. The monitoring is completed using Osiris instruments that do not hold an accreditation for PM<sub>2.5</sub> monitoring; therefore the concentrations should not be taken as absolutes. Full details of the PM<sub>2.5</sub> monitoring completed within the borough are provided in Table A.1.

### **Actions to Improve Air Quality**

The declaration of the two AQMAs (Gaywood Clock and the Town Centre) and the adoption of the AQAP have previously driven the actions being taken to improve air quality in the borough. The AQAP comprises Policy, Road Traffic and Emissions actions to help reduce pollutant levels. The measures are wide ranging and include considerations of air quality impacts within the planning process by commenting on specific planning applications as well as making sure air quality is embedded within local policies. On-going actions include implementation of urban traffic control systems, promotion of public transport and electric vehicle charging. A full list of measures is detailed in Table 2.2.

The 2015 AQAP is currently being updated to take account of source apportionment completed in December 2017. This will ensure that the measures taken forward are designed to reduce pollutant concentrations from the sources that have been identified in the source apportionment study.

### **Conclusions and Priorities**

During 2017 there was only one reported exceedance of the annual mean NO<sub>2</sub> air quality objective, this was at the Railway Road 4 location (Site ID 2). The site is located within the Town Centre AQMA, which was extended in 2007 to encompass the wider road network. This is the same monitoring outcome as within the previous

## **Borough Council of King's Lynn & West Norfolk**

ASR, and from the conclusions of the 2017 ASR a review of the current AQMAs was commissioned and completed in December 2017.

The Air Quality Modelling study completed in December 2017 found that the exceedances predicted within both AQMAs were localised along the roadways passing through the AQMAs. It was concluded that no current changes were required to the boundaries of the Town Centre or Gaywood Clock AQMAs. However, areas were highlighted where monitoring should continue to ensure pollutant concentrations do not worsen.

The main priorities for the Council in 2018 are to:

- Continue to monitor both NO<sub>2</sub> and PM<sub>10</sub> concentrations throughout the borough;
- Regularly review the locations within the monitoring network to ensure that any hotspots are identified;
- Relocate the North Lynn PM<sub>10</sub> monitor to Stoke Ferry to provide PM<sub>10</sub> monitoring data for a Detailed Assessment to be completed;
- Continue to develop the revised AQAP, reviewing the measures based upon the results of the updated source apportionment completed in the Air Quality Modelling study; and
- Begin detailed data collection to provide evidence in support of AQAP measures to be reported in the 2019 ASR.

## **Local Engagement and How to get Involved**

Information on air quality in the borough is available on The Council's website ([https://www.west-norfolk.gov.uk/info/20137/air\\_quality/170/air\\_quality\\_management\\_areas/](https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas/)) and a wider view of air quality in the Norfolk region can be viewed at <http://www.norfolkairquality.net/> where live data from the Council's continuous monitoring stations is published.

The following are suggested as alternatives to private travel that would contribute to improving the air quality in the borough:

## **Borough Council of King's Lynn & West Norfolk**

- Use public transport where available – This reduces the number of private vehicles in operation reducing pollutant concentrations through the number of vehicles and reducing congestion;
- Walk or cycle if your journey allows – From choosing to walk or cycle for your journey the number of vehicles is reduced and also there is the added benefit of keeping fit and healthy;
- Car/lift sharing – Where a number of individuals are making similar journeys, such as travelling to work or to school car sharing reduces the number of vehicles on the road and therefore the amount of emissions being released. This can be promoted via personal travel plans which can be obtained from Norfolk Country Council here <https://www.norfolk.gov.uk/rubbish-recycling-and-planning/planning-applications/design-of-developments/travel-plans/>;
- Alternative fuel / more efficient vehicles – Choosing a vehicle that meets the specific needs of the owner, fully electric, hybrid fuel and more fuel efficient cars are available and all have different levels benefits by reducing the amount of emissions being released; and
- Turning engines off where possible – Reduce the amount of idling vehicles, for example when dropping children at school or waiting at level crossings, will help reduce harmful emissions from vehicle exhausts.

# Table of Contents

<b>Executive Summary: Air Quality in Our Area</b> .....	<b>i</b>
Air Quality in Borough Council of King's Lynn and West Norfolk .....	i
Actions to Improve Air Quality .....	ii
Conclusions and Priorities .....	ii
Local Engagement and How to get Involved .....	iii
<b>1 Local Air Quality Management</b> .....	<b>1</b>
<b>2 Actions to Improve Air Quality</b> .....	<b>2</b>
2.1 Air Quality Management Areas.....	2
2.2 Progress and Impact of Measures to address Air Quality in Borough Council of King's Lynn and West Norfolk .....	4
2.3 PM <sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations.....	11
<b>3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance</b> .....	<b>13</b>
3.1 Summary of Monitoring Undertaken .....	13
3.1.1 Automatic Monitoring Sites .....	13
3.1.2 Non-Automatic Monitoring Sites.....	13
3.2 Individual Pollutants .....	13
3.2.1 Nitrogen Dioxide (NO <sub>2</sub> ).....	13
3.2.2 Particulate Matter (PM <sub>10</sub> ).....	16
3.2.3 Particulate Matter (PM <sub>2.5</sub> ) .....	16
3.2.4 Sulphur Dioxide (SO <sub>2</sub> ).....	17
<b>4 Conclusions and Priorities</b> .....	<b>18</b>
<b>Appendix A: Monitoring Results</b> .....	<b>19</b>
<b>Appendix B: Full Monthly Diffusion Tube Results for 2017</b> .....	<b>40</b>
<b>Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC</b> .....	<b>44</b>
<b>Appendix D: Maps of Monitoring Locations and AQMAs</b> .....	<b>49</b>
<b>Appendix E: Summary of Air Quality Objectives in England</b> .....	<b>56</b>
<b>Appendix F: Summary of Planning Applications Commented Upon in 2017</b> ....	<b>57</b>
<b>Glossary of Terms</b> .....	<b>62</b>
<b>References</b> .....	<b>63</b>

## List of Tables

Table 2.1 – Declared Air Quality Management Areas.....	3
Table 2.2 – Progress on Measures to Improve Air Quality .....	8
Table A.1 – Details of Automatic Monitoring Sites.....	19
Table A.2 – Details of Non-Automatic Monitoring Sites .....	20
Table A.3 – Annual Mean NO <sub>2</sub> Monitoring Results.....	24
Table A.4 – 1-Hour Mean NO <sub>2</sub> Monitoring Results .....	33
Table A.5 – Annual Mean PM <sub>10</sub> Monitoring Results.....	34
Table A.6 – 24-Hour Mean PM <sub>10</sub> Monitoring Results.....	36
Table A.7 – PM <sub>2.5</sub> Monitoring Results .....	38
Table C.1 – Diffusion Tube Short Term to Long Term Monitoring Data Adjustment (2017) .....	48
Table C.2 – NO <sub>2</sub> Fall-Off with Distance Calculations.....	48
Table F.1 – Summary of Planning Applications with Air Quality Assessments.....	57
Table F.2 – Summary of all Other Planning Applications .....	59

## List of Figures

No table of figures entries found.	
Figure A.1 – Trends in Annual Mean NO <sub>2</sub> Concentrations: Automatic Stations.....	29
Figure A.2 – Trends in Annual Mean NO <sub>2</sub> Concentrations: Town Centre AQMA .....	30
Figure A.3 – Trends in Annual Mean NO <sub>2</sub> Concentrations: Gaywood Clock AQMA .....	31
Figure A.4 – Trends in Annual Mean NO <sub>2</sub> Concentrations: Outside AQMAs.....	32
Figure A.5 – Trends in Annual Mean PM <sub>10</sub> Concentrations .....	35
Figure A.6 – Trends in Number of 24-Hour Mean PM <sub>10</sub> Results >50µg/m <sup>3</sup> .....	37
Figure A.7 – Trends in Annual Mean PM <sub>2.5</sub> Concentrations.....	39
Figure C.1 - Local Bias Correction Output: Southgates (Tubes 6/7/8).....	44
Figure C.2 – Gradko 2017 National Bias Adjustment Factor .....	45
Figure D.1 – Automatic Monitoring Sites: King's Lynn.....	49
Figure D.2 – Automatic Monitoring Sites: North Lynn.....	50
Figure D.3 – Automatic Monitoring Sites: Stoke Ferry .....	51
Figure D.4 – Diffusion Tube Monitoring Locations: Town Centre AQMA.....	52
Figure D.5 – Diffusion Tube Monitoring Locations: Gaywood Clock AQMA .....	53
Figure D.6 – Diffusion Tube Monitoring Locations: North Lynn .....	54
Figure D.7 – Diffusion Tube Monitoring Locations: Palm Paper Survey .....	55

## **1 Local Air Quality Management**

This report provides an overview of air quality in the Borough Council of King's Lynn and West Norfolk (the Council) during 2017. 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 and Technical Guidance documents.

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

The statutory air quality objectives applicable to LAQM in England can be found in Appendix E and all 2017 planning applications where air quality was considered can be found in Appendix F.

## 2 Actions to Improve Air Quality

### 2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by the Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at [https://www.west-norfolk.gov.uk/info/20137/air\\_quality/170/air\\_quality\\_management\\_areas](https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas).

Alternatively, see Appendix D: Maps of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMAs.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan		
						At Declaration	Now	Name	Date of Publication	Link
Gaywood Clock	01/04/2009	NO <sub>2</sub> Annual Mean	King's Lynn	An area encompassing a number of properties at the junction of the A148 (Lynn Road/Wootton Road) and the A1076 (Gayton Road)	NO	45.1µg/m <sup>3</sup>	38.0µg/m <sup>3</sup>	Borough Council of King's Lynn and West Norfolk AQAP	2015	<a href="https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas">https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas</a>
Town Centre	Declared: 01/11/2003 Amended: 01/02/2007	NO <sub>2</sub> Annual Mean	King's Lynn	A 'P' shaped area encompassing a number of properties comprising the main road to/from the town centre of King's Lynn (London Road and St James' Road) and the town centre one way system (Railway Road, Austin Street and Blackfriars Road).	NO	55µg/m <sup>3</sup>	45.5µg/m <sup>3</sup>	Borough Council of King's Lynn and West Norfolk AQAP	2015	<a href="https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas">https://www.west-norfolk.gov.uk/info/20137/air_quality/170/air_quality_management_areas</a>

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

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

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

*"The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are made:*

- 1. At present, there are no exceedances of the national air quality objective for NO<sub>2</sub> inside the Gaywood Clock AQMA at locations of relevant exposure. However concentrations at the automatic monitoring site appear to be increasing.*
- 2. We suggest the Local Authority keep this under review. If concentrations within the AQMA remain below 36µg/m<sup>3</sup> for three consecutive years, the Local Authority should consider revoking Gaywood Clock AQMA.*
- 3. It is noted that the Local Authority had commissioned dispersion modelling studies to assist them in their management of the AQMAs and development of their AQAP. This is supported and further details should be provided in their 2018 ASR.*
- 4. It is unclear whether additional sites to the Gaywood continuous monitoring sites have been corrected for distance. Distance correction should be applied to all sites which are not representative of relevant exposure.*
- 5. Distance corrected results should be presented in the final column in Table B.1. Results presented for comparison to objective levels, including Table A.3 should be presented as fully corrected for bias and annualisation, and for distance.*
- 6. It would be useful if the Local Authority could provide further detail on how they are working with Public Health to improve local air quality, including exposure to PM<sub>2.5</sub>."*

The comments made within the appraisal report, as shown above, have been taken into account for the completion of the 2018 ASR.

The Council has taken forward a number of direct measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in the Council's Action Plans. A list of measures completed prior to 2017 can be found in the 2017 ASR.

## Borough Council of King's Lynn & West Norfolk

The Council expects the following measure to be completed over the course of the next reporting year, subject to the review of the AQAP following the completion of an Air Quality Modelling Report completed in December 2017:

- Measure 4: Development Parking Management Plan.

The AQAP is due to be updated to align new measures to address the key issues driving the reduction of the high concentrations that are currently experienced within the declared AQMAs.

The TEOM particulate monitor at North Lynn was switched off in February 2018, and works are ongoing to move the monitor to a location in Stoke Ferry. The monitor is being moved to Stoke Ferry in response to complaints that continue to be received by the Council and the Environment Agency relating to an animal feed mill in Stoke Ferry. Currently there are two Osiris monitors located in Stoke Ferry that monitor indicative concentrations of PM<sub>10</sub>, and also concentrations of PM<sub>2.5</sub> (the Osiris does not hold an MCERTS accreditation for the indicative monitoring of PM<sub>2.5</sub>, only for PM<sub>10</sub>). The concentrations recorded are well below the objective levels.

In response to the complaints, both the Council and the Environmental Agency attend a quarterly meeting which is attended by the local Parish Council, village representatives and representatives of the company. The meetings are used to discuss complaints and concerns from members of the public, to provide ongoing updates on the monitored concentrations and any changes in operational processes at the facility.

The King's Lynn and West Norfolk Local Plan – Site Allocations and Development Management Policies Plan was formerly adopted by the Council on the 29<sup>th</sup> of September 2016. The plan is designed to allocate land to deliver the development requirements of the Core Strategy. Policy DM 15 has been adopted within the plan to ensure that that any development is assessed in terms of its potential environmental impact, including air quality.

Policy DM 15 – Environment, Design and Amenity:

*“Development must protect and enhance the amenity of the wider environment including its heritage and cultural value. Proposals will be assessed against their impact on neighbouring uses and their occupants as well as the amenity of any future*

*occupiers of the proposed development. Proposals will be assessed against a number of factors including:*

- *Heritage impact;*
- *Overlooking, overbearing, overshadowing;*
- *Noise;*
- *Odour;*
- *Air quality;*
- *Light pollution;*
- *Contamination;*
- *Water quality; and*
- *Visual impact.*

*The scale, height, massing, materials and layout of a development should respond sensitively and sympathetically to the local setting and pattern of adjacent streets including spaces between buildings through high quality design and use of materials.*

*Development that has a significant adverse impact on the amenity of others or which is of a poor design will be refused.*

Through the implementation of Policy DM 15 the Environmental Quality team at the Council will continue to assess developments in terms of their potential impact upon local air quality, and where relevant refuse or impose conditions on applications that are predicted to have detrimental impacts

An Air Quality Modelling report was completed in December 2017 to provide updated predictions of NO<sub>2</sub> concentrations within both designated AQMAs and also to provide updated source apportionment calculations. Exceedances of the NO<sub>2</sub> annual mean objective were found to follow the roadways within each of the AQMAs, with concentrations dropping before reaching most areas of potential exposure.

Through the completion of an updated source apportionment study it was found that cars are the greatest vehicle contributor to NO<sub>x</sub> emissions within both AQMAs, but the NO<sub>x</sub> contribution from HGVs and buses/coaches was higher in the Town Centre AQMA compared to the Gaywood Clock AQMA. Understanding the source

## **Borough Council of King's Lynn & West Norfolk**

apportionment will help to ensure that the measures to be implemented within the revised AQAP are focused to the specific issues associated with each AQMA.

The assessment concluded that no current changes are required to the boundaries of either AQMA, and it highlighted areas where NO<sub>2</sub> monitoring should continue to ensure that concentrations do not worsen over time.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, the Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of the Gaywood Clock and Town Centre AQMAs.

### Kings Lynn Transport Study

A Transport Study is currently being undertaken in Kings Lynn which was initiated in 2017 and has been designed to analyse current and future transport issues within the town. The purpose of the strategy is to develop a series of implementable schemes which will support the ongoing regeneration and development of Kings Lynn whilst aiming to improve the flow of traffic in and out of the town.

The Transport Study is being complete across a number of different agencies and will analyse current and future transport issues within Kings Lynn, leading to the development of a Borough wide Transport Strategy. The study is to include traffic modelling, evidence analysis, and an audit of walking, cycling, public transport, motor vehicles and signage. Once the Transport Study has been completed the findings will be used to update the current AQAP, this update is likely to be initiated within 2019.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ( $\mu\text{g}/\text{m}^3$ )	Progress to Date	Estimated / Actual Completion 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	Borough Council (LPA & Env Quality Team)	On going	On going	Number of pre application discussions and planning applications responded to	Up to 1	In 2017 over 39 applications were commented upon which had potential air quality impacts. They were screened according to Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) guidance and air quality assessments required where appropriate. Best practice measures were also recommended.	N/A - on going measure	This will always be an on-going measure as long as relevant planning application are received
2	With regard to National Planning Policy Framework, include air quality considerations in the Local Plans and adopt an air quality Development Management Policy.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Borough Council (LPA & Env Quality Team)	Completed	2014	Production of documents	Up to 1	Completed	Completed	The King's Lynn and West Norfolk Local Plan - Site Allocations & Development Management Policies (SADMP) Plan was formerly adopted on 29 September 2016. This includes policy DM15 Environment, Design and Amenity.

## Borough Council of King's Lynn & West Norfolk

4	Develop Parking Management Plan	Transport Planning and Infrastructure	Other	County Council/ Borough Council	2014	On going	Publication of and implementation of plan	Up to 2	A King's Lynn Transport Study is now underway, this will consider car parking arrangements in the town centre.	2017/2018	
5	New access road from Wisbech Road through Friars to Boal Street.	Traffic Management	UTC, Congestion management, traffic reduction	County Council/ Borough Council	2010	Dec-11	Continued air quality monitoring. Bus flow counts on London Road and new route	2 to 3	The new access road has been completed and is well used by Stagecoach buses.	2018/2019	Permission has been given to open up part of this route to all traffic.
6	Incentivise the use of public transport.	Alternatives to private vehicle use	Other	County Council	2014	2015	Continued air quality monitoring. Bus usage figures	Up to 1	The King's Lynn Transport Interchange has been completed making a physically nicer environment for public transport users. New air conditioned and wifi enabled train carriages were introduced on routes between King's Lynn and London in May 2017.	2017	
13	Support the use of West Lynn ferry	Promoting Travel Alternatives	Promote use of rail and inland waterways	Borough Council	2012	On going	Number of passengers using ferry	Up to 1	BCKLWN has provided funding for the West Lynn ferry.	On going	The ferry service is well used, but remains for sale. This measure may need reviewing in future depending on the outcome of the sale.
14	Changes to the Road Layout within the King's Lynn Gyratory as proposed by KLATS	Traffic Management	UTC, Congestion management, traffic reduction	County Council	2011 (Linked to measure 3)	On going	Continued air quality monitoring. Daily traffic flow data and queue lengths.	2 to 10	A King's Lynn Transport Study is now underway, this will identify possible transport schemes and develop a model to test them and develop a preferred strategy.	2018/2019	

## Borough Council of King's Lynn & West Norfolk

16	Traffic Management at Gaywood clock	Traffic Management	UTC, Congestion management, traffic reduction	County Council	2014	2015	Continued air quality monitoring. Traffic queue lengths.	1 to 5	The King's Lynn Transport Study will include the Gaywood Clock area.	2018/2019	
17	Promotion of travel plans, school travel plans and promotion of car sharing	Promoting Travel Alternatives	Personalised Travel Planning	County Council/ Borough Council	2014	On going	Continued air quality monitoring. Number of travel plans.	Up to 1	Travel plans are requested by BCKLWN and County Council in response to relevant planning applications.	On going	
18	Improved cycling and walking provision	Promoting Travel Alternatives	Promotion of cycling	County Council/ Borough Council	2014	On going	Cycle usage and walking provision. Number of cycle/foot path improvements.	Up to 1	King's Lynn Transport Study.		
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	Borough Council	2014	On going	Number & use of EV charging points installed	Up to 1	Charging points are requested on new development as a mitigation measure in line with IAQM guidance.	On going	
20	Quality Bus Partnerships and contracts	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	County Council	2014	On going	Continued air quality monitoring. % buses Euro 3 or better. Installation of SVD	Up to 1	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.	On going	

## 2.3 PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Council monitors PM<sub>2.5</sub> concentrations at four locations within the borough, two within King's Lynn and two within Stoke Ferry. Monitoring is completed using four Osiris instruments that do not hold an MCERTs accreditation for the indicative monitoring of PM<sub>2.5</sub>, therefore the reported concentrations should not be taken as absolutes.

The annual mean concentrations of PM<sub>2.5</sub>, as presented in Table A.7 show that the highest annual mean concentration recorded in 2017 was 7µg/m<sup>3</sup>. This is well below the PM<sub>2.5</sub> obligatory standard of 25µg/m<sup>3</sup>.

The Public Health Outcomes Framework<sup>4</sup> data tool compiled by Public Health England quantifies the mortality burden of PM<sub>2.5</sub> within England on a county and local authority scale. The 2016 fraction of mortality attributable to PM<sub>2.5</sub> pollution across England is 5.3%, and in contrast the fraction within The Council is 5.0%. This is lower than the fraction of mortality attributable to PM<sub>2.5</sub> pollution in England and also the East of England region which was estimated to be 5.4%.

The measures already being undertaken in the Councils AQAP have been reviewed against the Toolbox of Annex II within LAQM.TG(16) to determine which can have an effect on reducing PM<sub>2.5</sub> emissions. It was determined, that measures 6, 7, 8, 13, 15, 16, 17, 18, and 20 will also have an impact on reducing PM<sub>2.5</sub> emissions.

In addition to these measures, the Council continues to take the following measures to address PM<sub>2.5</sub>:

- The Single Issue Silica Sand Review was published in December 2017 that details the appropriateness of each site. The Council will continue to provide

---

<sup>4</sup> Public Health Outcomes Framework, Public Health England. data tool available online at <http://www.phoutcomes.info/public-health-outcomes-framework>

## **Borough Council of King's Lynn & West Norfolk**

comments on any planning applications relating to the search areas/sites to ensure that there are no adverse effects on air quality.

- Where there is potential for a construction site to impact on the local amenity by way of dust emissions a Construction Management Statement is requested as a pre-commencement planning condition. The statement has to include methods used and the measures taken to control the emission of dust and therefore minimise potential short term exposure to PM<sub>2.5</sub>.
- Dust complaints received from local residents in relation to the animal feed mill located in Stoke Ferry, as outlined in Section 2.2, are investigated by the Council and quarterly liaison meetings are held with all relevant parties in attendance. Due to the complaints received, two Osiris monitors are currently located close to the facility, and works are ongoing to relocate the TEOM PM<sub>10</sub> monitor from its location in North Lynn to also monitor in Stoke Ferry.

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

### 3.1 Summary of Monitoring Undertaken

This section sets out what monitoring has taken place and how it compares with objectives.

#### 3.1.1 Automatic Monitoring Sites

The Council undertook automatic (continuous) monitoring at seven sites during 2017, two for NO<sub>2</sub> and five for PM<sub>10</sub>. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at <https://uk-air.defra.gov.uk/>.

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

#### 3.1.2 Non-Automatic Monitoring Sites

The Council undertook non-automatic (passive) monitoring of NO<sub>2</sub> at sixty five sites during 2017. Table A.2 in Appendix A shows the details of the 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, “annualised” and distance corrected. Further details on adjustments are provided in Appendix C.

#### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

## **Borough Council of King's Lynn & West Norfolk**

In 2017 there was only one location where the annual mean objective for NO<sub>2</sub> was exceeded; the diffusion tube Site ID 2 located on Railway Road within the Town Centre AQMA. The diffusion tube location represents a relevant exposure location for the annual mean objective, therefore the concentration has not been distance corrected.

The annual mean NO<sub>2</sub> concentration was not greater than 60µg/m<sup>3</sup> at any non-automatic monitoring site. In particular, the diffusion tube located at Site 5 (Bus Station - Shelters, Bay D) reported concentrations below 60µg/m<sup>3</sup>, which is where short term exposure is most relevant. Therefore exceedances of the 1-hour mean objective are unlikely at all monitoring locations. Furthermore, there were no exceedances of the 1-hour mean NO<sub>2</sub> objective reported at either of the continuous monitoring stations.

Figure A.2, Figure A.3 and Figure A.4 present trends in the measured annual mean NO<sub>2</sub> concentrations over the past five years for NO<sub>2</sub> monitoring, inside and outside of the designated AQMAs.

### Town Centre AQMA

There was only one exceedance of the NO<sub>2</sub> annual mean objective recorded during 2017, this was at the diffusion tube Site ID 2 location as stated above, this location has been in exceedance of the objective for the past five years. All other NO<sub>2</sub> monitoring sites recorded annual means below the 40µg/m<sup>3</sup> annual mean objective. There has not been an exceedance of the annual mean objective at a location other than at Site ID 2 since 2013.

When compared to 2016 values, overall NO<sub>2</sub> concentrations have remained relatively constant within the Town Centre AQMA in 2017 with twelve sites increasing in concentration, twelve sites decreasing and three sites reporting the same concentration in both 2016 and 2017.

### Gaywood Clock AQMA

There were no exceedances of the NO<sub>2</sub> annual mean objective recorded within the Gaywood Clock AQMA during 2017. The highest concentration was 38µg/m<sup>3</sup> recorded at the Gaywood automatic monitoring station. Due to this monitoring station not being at a location representative of relevant exposure the concentration has been distance corrected, following this correction the annual mean is 29.0µg/m<sup>3</sup>.

## **Borough Council of King's Lynn & West Norfolk**

Taking distance correction at the Gaywood automatic monitoring station into account, there has not been an exceedance of the NO<sub>2</sub> annual mean objective for the past five years.

When compared to 2016 values, there has been a decrease in overall NO<sub>2</sub> concentrations with Gaywood Clock AQMA. Five sites have decreased in concentration and two sites have increased in concentration between 2016 and 2017.

### Outside AQMAs

There were no exceedances of the NO<sub>2</sub> annual mean objective recorded outside the designated AQMAs during 2017. The highest concentration was recorded at diffusion tube Site ID 5 located within the King's Lynn Bus Shelter. This diffusion tube has been deployed to monitor short term exposure within the bus shelter. As the annual mean concentration was below 60µg/m<sup>3</sup>, exceedances of the 1-hour mean NO<sub>2</sub> objective are unlikely.

When compared to 2016 values, overall NO<sub>2</sub> concentrations outside of the two AQMAs have remained relatively constant in 2017 with fifteen sites increasing in concentration and fourteen sites decreasing in concentration between 2016 and 2017.

### Palm Paper CCGT Power Station Study

In addition to the LAQM monitoring network, there is currently a network of eight diffusion tubes that are providing baseline NO<sub>2</sub> concentrations in relation to the construction and operation of a Combined Cycle Gas Turbine (CCGT) power station located at the existing Palm Paper premises at Poplar Avenue, Kings Lynn. As part of the development order, Palm Paper have funded a series of diffusion tubes to monitor NO<sub>2</sub> in the area surrounding the CCGT power station. The tubes were deployed in 2017 to provide background NO<sub>2</sub> concentrations before the CCGT becomes operational.

The NO<sub>2</sub> concentrations recorded at the eight Palm Paper diffusion tube monitoring locations in 2017 were all below 20µg/m<sup>3</sup>. The highest concentration recorded (19.6µg/m<sup>3</sup>) was recorded at the diffusion tube Site ID 72 location that is located on Main Road in West Winch.

### **3.2.2 Particulate Matter (PM<sub>10</sub>)**

Table A.5 in Appendix A compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

Table A.6 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> daily mean concentrations for the past 5 years with the air quality objective of 50µg/m<sup>3</sup>, not to be exceeded more than 35 times per year.

PM<sub>10</sub> is monitored by a TEOM, and indicitvly by four Osiris dust monitors at five different sites within the borough. There were no exceedances of the annual mean objective at any of the monitoring sites, nor was the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times a year) exceeded.

Figure A.5 presents trends in annual mean PM<sub>10</sub> concentrations measured at the five automatic monitoring sites. It can be seen that overall the annual mean PM<sub>10</sub> concentration has remained steady between 2013 and 2016, with slight fluctuations year on year. Between 2016 and 2017 there has been a decrease at all monitoring sites except for at North Lynn where there was a slight increase. The highest concentration over the past five years was 23µg/m<sup>3</sup> recorded at the North Lynn site.

Figure A.6 in Appendix A shows the number of exceedances of the PM<sub>10</sub> daily mean air quality objective of 50µg/m<sup>3</sup> at the five automatic monitoring sites. It can be seen that the number of exceedances have been well below the limit of 35 exceedances a year for the past five years.

### **3.2.3 Particulate Matter (PM<sub>2.5</sub>)**

Table A.7 in Appendix A presents the ratified and adjusted monitored PM<sub>2.5</sub> annual mean concentrations for the past 5 years. In addition to indicative PM<sub>10</sub> monitoring, PM<sub>2.5</sub> is monitored at the four Osiris dust monitoring locations within the borough. The MCERTs accreditation for the Osiris instrument is only for the indicative measurement of PM<sub>10</sub> and not PM<sub>2.5</sub>, therefore the PM<sub>2.5</sub> concentrations should not be taken as absolutes.

There were no exceedances of the obligatory annual mean standard of 25µg/m<sup>3</sup> at any of the monitoring sites.

Figure A.7 presents trends in annual mean PM<sub>2.5</sub> concentrations measured at the four automatic monitoring sites. It can be seen that annual mean PM<sub>2.5</sub> concentration

## **Borough Council of King's Lynn & West Norfolk**

has been below the obligatory annual mean standard of  $25\mu\text{g}/\text{m}^3$  within both 2016 and 2017. The concentrations have remained constant at both the Page Stair Lane and Furlong Road monitoring sites, there has been an increase at the Estuary Close site and a decrease at the Wretton Road site.

### **3.2.4 Sulphur Dioxide (SO<sub>2</sub>)**

The Council does not carry out any monitoring of SO<sub>2</sub> within its area.

## 4 Conclusions and Priorities

During 2017 there was only one reported exceedance of the annual mean NO<sub>2</sub> air quality objective, this was at the Railway Road 4 location (Site ID 2). The site is located within the Town Centre AQMA, which was extended in 2007 to encompass the wider road network. This is the same monitoring outcome as within the previous ASR, and from the conclusions of the 2017 ASR a review of the current AQMAs was commissioned and completed in December 2017.

The Air Quality Modelling study completed in December 2017 found that the exceedances predicted within both AQMAs were localised along the roadways passing through the AQMAs. It was concluded that no current changes were required to the boundaries of the Town Centre or Gaywood Clock AQMAs. However, areas were highlighted where monitoring should continue to ensure pollutant concentrations do not worsen.

The main priorities for the Council in 2018 are to:

- Continue to monitor both NO<sub>2</sub> and PM<sub>10</sub> concentrations throughout the borough;
- Regularly review the locations within the monitoring network to ensure that any hotspots are identified;
- Relocate the North Lynn PM<sub>10</sub> monitor to Stoke Ferry to provide PM<sub>10</sub> monitoring data for a Detailed Assessment to be completed;
- Continue to develop the revised AQAP, reviewing the measures based upon the results of the updated source apportionment completed in the Air Quality Modelling study; and
- Begin detailed data collection to provide evidence in support of AQAP measures to be reported in the 2019 ASR.

## Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
CM1	Southgates Park, King's Lynn	Roadside	562225	319191	NO <sub>2</sub>	YES	Chemiluminescent	N/A	5	1.7
CM2	Gaywood, King's Lynn	Roadside	563437	320472	NO <sub>2</sub>	YES	Chemiluminescent	5	1	1.7
CM3	North Lynn, King's Lynn	Roadside	562086	321325	PM <sub>10</sub>	NO	TEOM	35	17	3
OS1 <sup>(3)</sup>	Page Stair Lane, King's Lynn	Roadside	561527	320437	PM <sub>10</sub> / PM <sub>2.5</sub>	NO	Osiris	5	3.3	3.5
OS2 <sup>(3)</sup>	Furlong Road, Stoke Ferry	Roadside	570339	300083	PM <sub>10</sub> / PM <sub>2.5</sub>	NO	Osiris	5	1	3.5
OS3 <sup>(3)</sup>	Estuary Road, King's Lynn	Roadside	561593	321466	PM <sub>10</sub> / PM <sub>2.5</sub>	NO	Osiris	2	1	3.5
OS4 <sup>(3)</sup>	Wretton Road, Stoke Ferry	Roadside	570438	299905	PM <sub>10</sub> / PM <sub>2.5</sub>	NO	Osiris	24	19	3.5

**Notes:**

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

(2) N/A if not applicable.

(3) The Osiris monitors are not an equivalence method of monitoring for either PM<sub>10</sub> or PM<sub>2.5</sub>. The monitoring is accredited by the Environmental Agency's MCERTs scheme (Monitoring Certification Scheme) for indicative PM<sub>10</sub> monitoring, but no accreditation is held by the Osiris for monitoring of PM<sub>2.5</sub>.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
1	Railway Road 1	Roadside	562073	320304	NO <sub>2</sub>	YES	2	2	NO	2.5
2	Railway Road 4	Roadside	562100	320222	NO <sub>2</sub>	YES	0	2	NO	2.4
3	Railway Road 5	Roadside	562117	320095	NO <sub>2</sub>	YES	0	1.5	NO	2.4
5	Bus Station - Shelters, Bay D	Roadside	562003	320099	NO <sub>2</sub>	NO	N/A	N/A	NO	2.2
6,7,8	Southgates Monitoring Station	Roadside	562226	319191	NO <sub>2</sub>	YES	No but property façade 4m from kerb further north	5	YES	3.2
9	Mill Fleet	Roadside	561912	319711	NO <sub>2</sub>	NO	0	4	NO	2.5
10	London Road 1	Roadside	562101	319679	NO <sub>2</sub>	YES	2.5	3	NO	1.4
11	London Road 2	Roadside	562165	319575	NO <sub>2</sub>	YES	0	3	NO	2.2
12	London Road 3	Roadside	562243	319452	NO <sub>2</sub>	YES	1	3	NO	2.1
13	London Road 4	Roadside	562264	319375	NO <sub>2</sub>	YES	0	4.5	NO	2.2
14	London Road 5	Roadside	562227	319266	NO <sub>2</sub>	YES	0.5	4	NO	2.2
15	Southgates	Roadside	562190	319102	NO <sub>2</sub>	YES	1	0.5	NO	2.4
18	Hardwick Rd	Roadside	562266	319043	NO <sub>2</sub>	NO	0	7	NO	1.6
19	Vancouver Avenue	Roadside	562277	319098	NO <sub>2</sub>	NO	0	6	NO	1.5
20	London Road 10	Roadside	562244	319261	NO <sub>2</sub>	YES	0	3.5	NO	2.2
22	London Road 6	Roadside	562285	319386	NO <sub>2</sub>	YES	0	5	NO	1.3

## Borough Council of King's Lynn & West Norfolk

23	London Road 7	Roadside	562162	319614	NO <sub>2</sub>	YES	0	4.5	NO	2.1
24	London Road 8	Roadside	562136	319651	NO <sub>2</sub>	YES	0	5.5	NO	2.2
25	The Walks	Roadside	562191	319695	NO <sub>2</sub>	NO	0	75	NO	1.7
26	Railway Road 7	Roadside	562131	319996	NO <sub>2</sub>	YES	0	2	NO	2.3
27	St John's Terrace	Roadside	562178	319999	NO <sub>2</sub>	YES	3	2	NO	2.1
28	St John's Terrace/Blackfriars	Roadside	562253	320015	NO <sub>2</sub>	YES	0	1.5	NO	2.6
29	Waterloo Street	Kerbside	562175	320055	NO <sub>2</sub>	NO	2.5	1	NO	1.6
30	Portland Street	Kerbside	562204	320108	NO <sub>2</sub>	NO	2.5	1	NO	2.4
31	Railway Road 2	Roadside	562129	320132	NO <sub>2</sub>	YES	0	2	NO	2.3
32	Railway Road 3	Roadside	562119	320216	NO <sub>2</sub>	YES	0	2	NO	2.4
33	Wellsley Street	Roadside	562203	320159	NO <sub>2</sub>	NO	2.5	0.5	NO	2.4
34	Blackfriars 2	Roadside	562244	320129	NO <sub>2</sub>	YES	0	2.5	NO	2.4
35	Blackfriars 1	Roadside	562245	320238	NO <sub>2</sub>	YES	3	1.5	NO	2.3
36	Norfolk Street	Roadside	562219	320319	NO <sub>2</sub>	YES	0	2	NO	2.2
37	Blackfriars 3	Roadside	562254	320259	NO <sub>2</sub>	YES	N/A	2	NO	2.5
38	Littleport Street	Roadside	562257	320323	NO <sub>2</sub>	YES	0	2.5	NO	2.4
39	Gaywood Road 2	Roadside	562822	320427	NO <sub>2</sub>	NO	0	7	NO	5
40	The Swan (1) Gayton Road	Roadside	563490	320469	NO <sub>2</sub>	YES	0	2	NO	2.5
41	Wootton Road 2	Roadside	563478	320515	NO <sub>2</sub>	YES	0	2	NO	3.4
42	Wootton Road 1	Roadside	563480	320582	NO <sub>2</sub>	YES	0	3	NO	1.7
43	Lynn Road 1	Roadside	563412	320477	NO <sub>2</sub>	YES	0	5	NO	3.4
44	Lynn Road 2	Roadside	563377	320484	NO <sub>2</sub>	YES	0	2	NO	3.4
45	Gaywood Road 3	Roadside	563202	320488	NO <sub>2</sub>	NO	0	4.5	NO	2.2

## Borough Council of King's Lynn & West Norfolk

46	Gaywood Road 1	Roadside	562565	320509	NO <sub>2</sub>	NO	0	6.5	NO	2.09
47	Austin Street 1	Roadside	562186	320376	NO <sub>2</sub>	YES	0.5	1	NO	1.7
48	Austin Street 2	Roadside	562180	320365	NO <sub>2</sub>	YES	0	2	NO	2.6
51	Wootton Road 3	Roadside	563521	320628	NO <sub>2</sub>	NO	6	1.5	NO	1.8
52	Lynn Road 3	Roadside	563289	320504	NO <sub>2</sub>	NO	5.5	1	NO	1.6
58	NORR	Roadside	562171	319019	NO <sub>2</sub>	NO	18	2	NO	2.5
66	Gaywood Road	Urban Background	562595	320527	NO <sub>2</sub>	NO	0	N/A	NO	2.4
67	Greyfriars , London Road	Urban Background	562236	319579	NO <sub>2</sub>	NO	0	N/A	NO	2.3
68	Nursery, London Road	Urban Background	562143	319838	NO <sub>2</sub>	NO	0	N/A	NO	1.6
69	Whitefriars 1, Whitefriars Road	Urban Background	561994	319395	NO <sub>2</sub>	NO	0	N/A	NO	2.2
70	Whitefriars 2, Whitefriars Road	Urban Background	561930	319355	NO <sub>2</sub>	NO	0	N/A	NO	2.4
75	The Swan (2) Gayton Road	Roadside	563469	320469	NO <sub>2</sub>	YES	0	2	NO	2.8
76	Hardwick Road	Roadside	562597	318740	NO <sub>2</sub>	NO	1	8	NO	1.58
79	Tennyson Ave	Roadside	562804	320423	NO <sub>2</sub>	NO	0	2	NO	3.8
86	Bus Station - Taxi Rank	Other	562019	320139	NO <sub>2</sub>	NO	0	N/A	NO	2.2
87	Albion Street	Roadside	562103	320164	NO <sub>2</sub>	NO	0	2.6	NO	2.1
88	Tennyson Avenue (2)	Roadside	562795	320290	NO <sub>2</sub>	NO	0	7.4	NO	2
89	Whitefriars Terrace	Roadside	561888	319467	NO <sub>2</sub>	NO	0	1	NO	2.4
90	Spenser Road	Roadside	563366	322065	NO <sub>2</sub>	NO	0	8	NO	1.8
91	Reid Way	Roadside	563255	321613	NO <sub>2</sub>	NO	0	8	NO	2.5
92	Garden Court	Roadside	563256	321589	NO <sub>2</sub>	NO	0	16	NO	2
93	Front Way	Roadside	563213	321283	NO <sub>2</sub>	NO	0	9.7	NO	2

## Borough Council of King's Lynn & West Norfolk

61	Sydney Terrace	Roadside	561854	3318272	NO <sub>2</sub>	NO	0	3.5	NO	1.55
62	Burney Road	Roadside	561604	318601	NO <sub>2</sub>	NO	0	7	NO	1.55
63	High Road, Saddlebrow 1	Roadside	560593	315712	NO <sub>2</sub>	NO	0	15	NO	1.7
64	High Road, Saddlebrow 2	Roadside	560917	316766	NO <sub>2</sub>	NO	0	22	NO	1.7
71	Ferry Square, West Lynn	Roadside	561223	320295	NO <sub>2</sub>	NO	0.5	1.5	NO	2.2
72	Main Road, West Winch	Roadside	563161	315848	NO <sub>2</sub>	NO	10	11	NO	1.7
73	Saddlebrow Caravan Park	Roadside	561754	317910	NO <sub>2</sub>	NO	0	1	NO	2.2
77	The Elms	Suburban	560778	318503	NO <sub>2</sub>	NO	0	115	NO	1.7

**Notes:**

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

(2) N/A if not applicable.

Highlighted in green - diffusion tubes associated with the Palm Paper CCGT development order.

Table A.3 – Annual Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2017 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2013	2014	2015	2016	2017
CM1	Roadside	Automatic	99.7	99.7	26.0	21.0	21.0	25.0	25.0
CM2	Roadside	Automatic	99.8	99.8	39.0	36.0	<b>42.0</b>	<b>45.0</b>	38.0 <sup>(4)</sup>
1	Roadside	Diffusion Tube	100	100	37.1	38.2	36.6	35.5	35.9
2	Roadside	Diffusion Tube	100	100	<b>47.1</b>	<b>47.0</b>	<b>46.6</b>	<b>44.6</b>	<b>45.5</b>
3	Roadside	Diffusion Tube	100	100	<b>42.2</b>	39.7	36.9	38.6	38.5
5	Roadside	Diffusion Tube	91.7	91.7	<b>43.9</b>	<b>46.0</b>	<b>53.0</b>	32.4	30.4
6,7,8	Roadside	Diffusion Tube	100	100	26.2	26.7	25.2	24.6	24.6
9	Roadside	Diffusion Tube	100	100	22.9	21.2	20.3	20.8	19.5
10	Roadside	Diffusion Tube	100	100	35.1	36.7	37.8	36.3	37.2 <sup>(4)</sup>
11	Roadside	Diffusion Tube	100	100	28.4	30.4	28.5	27.9	27.7
12	Roadside	Diffusion Tube	100	100	33.5	34.7	33.1	32.0	33.5
13	Roadside	Diffusion Tube	100	100	30.8	31.5	30.3	31.0	29.9
14	Roadside	Diffusion Tube	100	100	34.4	35.0	33.1	33.1	33.6
15	Roadside	Diffusion Tube	100	100	36.7	38.4	37.2	35.4	34.9
18	Roadside	Diffusion Tube	100	100	26.4	26.5	25.8	24.5	25.9

## Borough Council of King's Lynn & West Norfolk

19	Roadside	Diffusion Tube	100	100	24.8	23.6	23.7	23.0	24.0
20	Roadside	Diffusion Tube	91.7	91.7	33.5	33.1	30.8	30.6	28.2
22	Roadside	Diffusion Tube	100	100	33.3	34.2	31.4	32.6	30.1
23	Roadside	Diffusion Tube	100	100	36.2	35.3	31.6	32.5	29.6
24	Roadside	Diffusion Tube	100	100	32.5	32.0	28.7	28.9	26.4
25	Roadside	Diffusion Tube	83.3	83.3	16.4	16.3	15.0	14.4	15.3
26	Roadside	Diffusion Tube	91.7	91.7	37.2	36.0	33.8	31.5	31.4
27	Roadside	Diffusion Tube	100	100	30.4	30.0	27.5	28.5	27.8
28	Roadside	Diffusion Tube	100	100	32.1	30.0	30.2	30.0	30.5
29	Kerbside	Diffusion Tube	91.7	91.7	21.8	19.1	18.6	18.3	18.7
30	Kerbside	Diffusion Tube	100	100	22.8	21.3	21.4	20.4	19.7
31	Roadside	Diffusion Tube	100	100	32.7	30.9	30.4	28.2	28.3
32	Roadside	Diffusion Tube	100	100	30.6	30.9	27.7	29.0	28.3
33	Roadside	Diffusion Tube	100	100	26.9	29.7	27.4	26.1	27.8
34	Roadside	Diffusion Tube	100	100	31.3	32.1	30.1	28.7	28.9
35	Roadside	Diffusion Tube	100	100	29.9	29.0	28.5	27.2	28.2
36	Roadside	Diffusion Tube	100	100	28.6	29.2	27.9	27.3	27.6
37	Roadside	Diffusion Tube	100	100	35.2	33.1	27.3	26.5	26.5

## Borough Council of King's Lynn & West Norfolk

38	Roadside	Diffusion Tube	91.7	91.7	31.7	35.1	32.5	31.5	33.2
39	Roadside	Diffusion Tube	100	100	27.5	26.8	24.3	24.1	24.3
40	Roadside	Diffusion Tube	100	100	31.7	32.8	31.2	30.2	31.2
41	Roadside	Diffusion Tube	91.7	91.7	37.1	35.2	31.2	32.2	32.1
42	Roadside	Diffusion Tube	100	100	30.8	29.7	29.8	29.3	30.5
43	Roadside	Diffusion Tube	100	100	30.6	30.9	28.7	30.0	29.2
44	Roadside	Diffusion Tube	91.7	91.7	35.5	36.6	31.8	32.8	32.4
45	Roadside	Diffusion Tube	91.7	91.7	31.5	26.8	26.0	27.0	25.2
46	Roadside	Diffusion Tube	100	100	26.3	26.2	23.8	24.0	22.5
47	Roadside	Diffusion Tube	100	100	33.9	34.9	29.6	30.3	29.3
48	Roadside	Diffusion Tube	91.7	91.7	30.2	32.1	28.4	26.8	27.8
51	Roadside	Diffusion Tube	100	100	19.6	19.0	17.3	18.3	19.0
52	Roadside	Diffusion Tube	91.7	91.7	29.4	28.7	27.2	27.3	28.7
58	Roadside	Diffusion Tube	91.7	91.7	30.1	28.9	26.7	28.2	24.7
66	Urban Background	Diffusion Tube	66.7	66.7	22.3	22.6	20.9	20.4	18.5
67	Urban Background	Diffusion Tube	100	100	18.2	16.8	16.4	15.7	17.2
68	Urban Background	Diffusion Tube	100	100	21.0	19.4	18.8	19.0	19.5
69	Urban Background	Diffusion Tube	100	100	13.8	14.1	12.8	12.7	12.5

**Borough Council of King's Lynn & West Norfolk**

70	Urban Background	Diffusion Tube	100	100	12.5	13.9	12.4	12.3	12.7
75	Roadside	Diffusion Tube	83.3	83.3	34.8	35.1	33.0	32.2	31.6
76	Roadside	Diffusion Tube	100	100	20.1	20.8	18.8	18.2	19.6
79	Roadside	Diffusion Tube	100	100	35.2	34.7	34.0	34.6	32.8
86	Other	Diffusion Tube	100	100	-	-	27.6	27.7	27.6
87	Roadside	Diffusion Tube	100	100	-	-	28.7	30.5	29.3
88	Roadside	Diffusion Tube	100	100	-	-	18.9	18.3	17.8
89	Roadside	Diffusion Tube	100	100	-	-	13.3	13.0	13.2
90	Roadside	Diffusion Tube	100	100	-	-	-	14.0	15.0
91	Roadside	Diffusion Tube	100	100	-	-	-	13.6	13.7
92	Roadside	Diffusion Tube	100	100	-	-	-	12.9	12.6
93	Roadside	Diffusion Tube	91.7	91.7	-	-	-	13.1	11.9
61	Roadside	Diffusion Tube	100	100	-	-	-	-	16.9
62	Roadside	Diffusion Tube	100	100	-	-	-	-	14.9
63	Roadside	Diffusion Tube	91.7	91.7	-	-	-	-	9.7
64	Roadside	Diffusion Tube	100	100	-	-	-	-	10.4
71	Roadside	Diffusion Tube	100	100	-	-	-	-	12.3
72	Roadside	Diffusion Tube	100	100	-	-	-	-	19.6

73	Roadside	Diffusion Tube	100	100	-	-	-	-	14.2
77	Suburban	Diffusion Tube	91.7	91.7	-	-	-	-	11.8

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) Distance corrected results presented in Table C.2

Figure A.1 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Automatic Stations

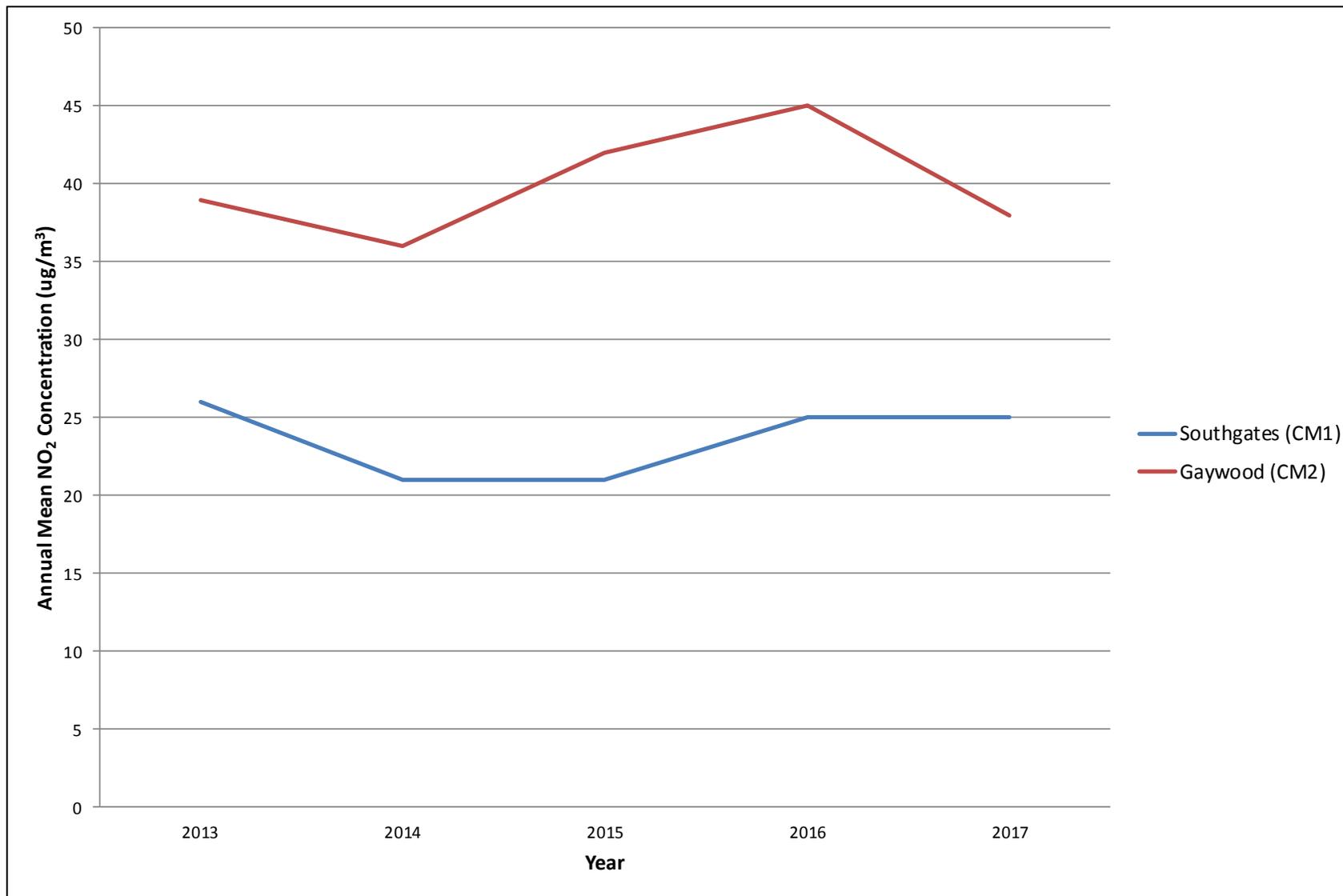


Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Town Centre AQMA

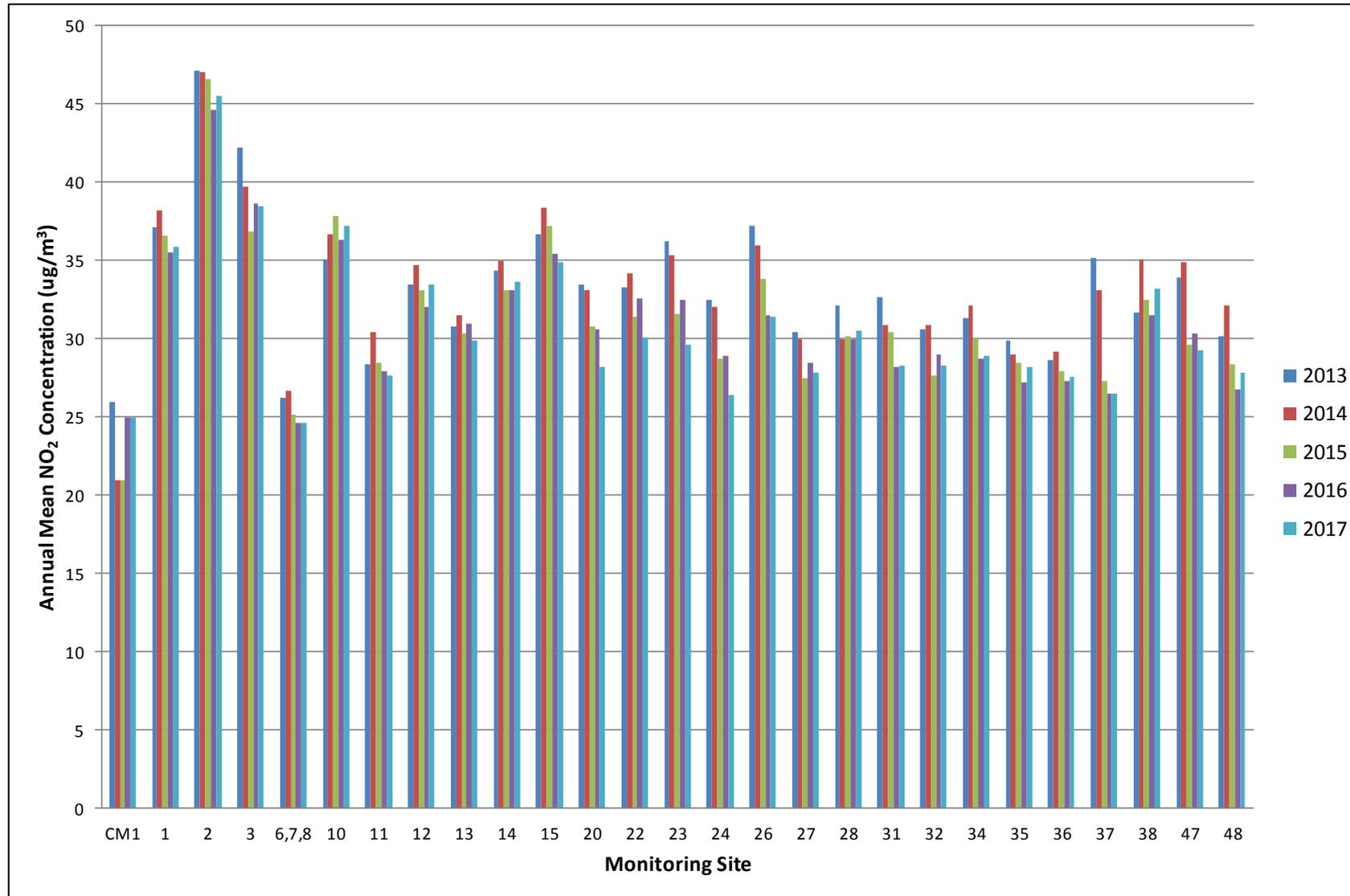


Figure A.3 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Gaywood Clock AQMA

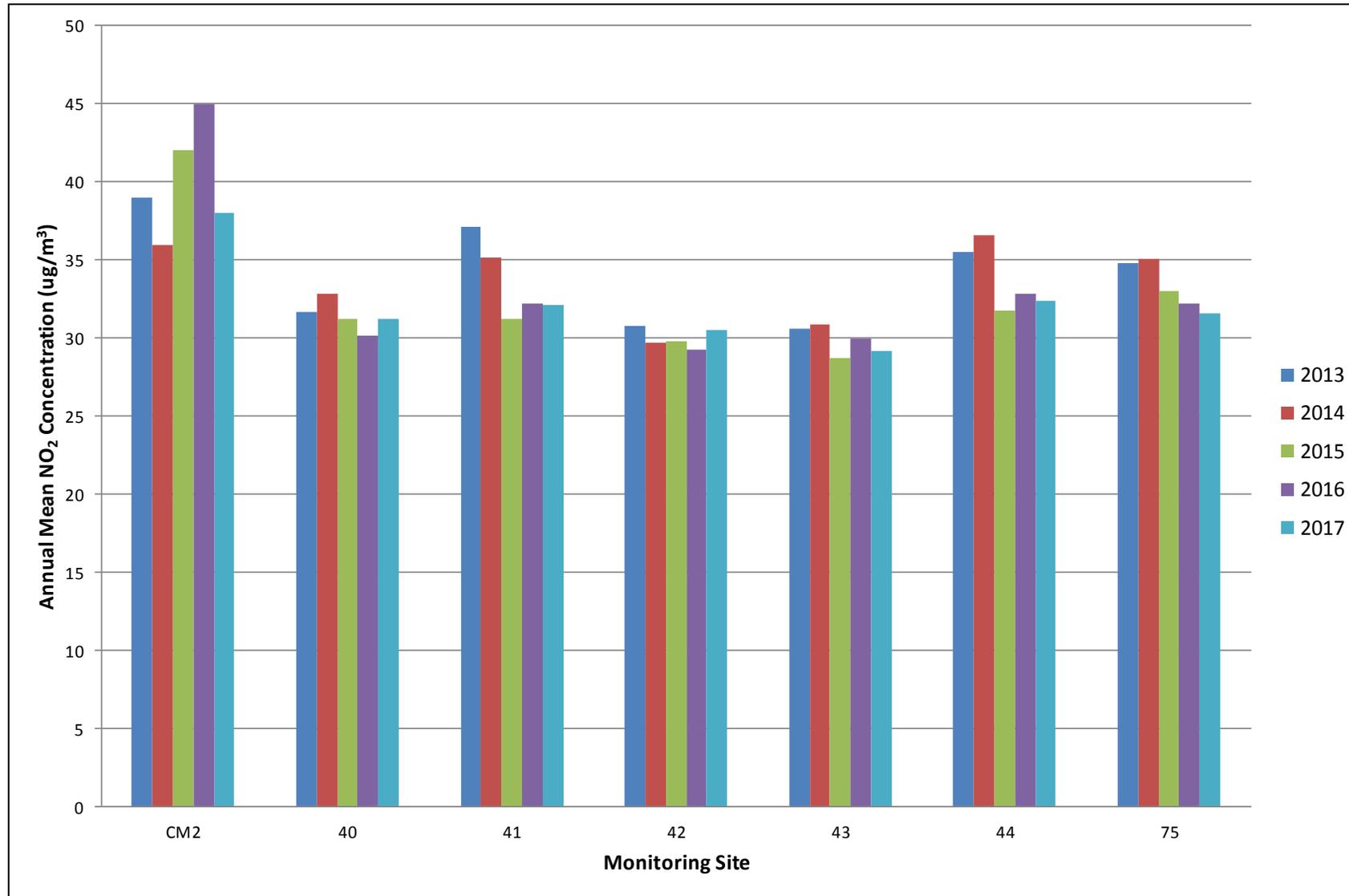
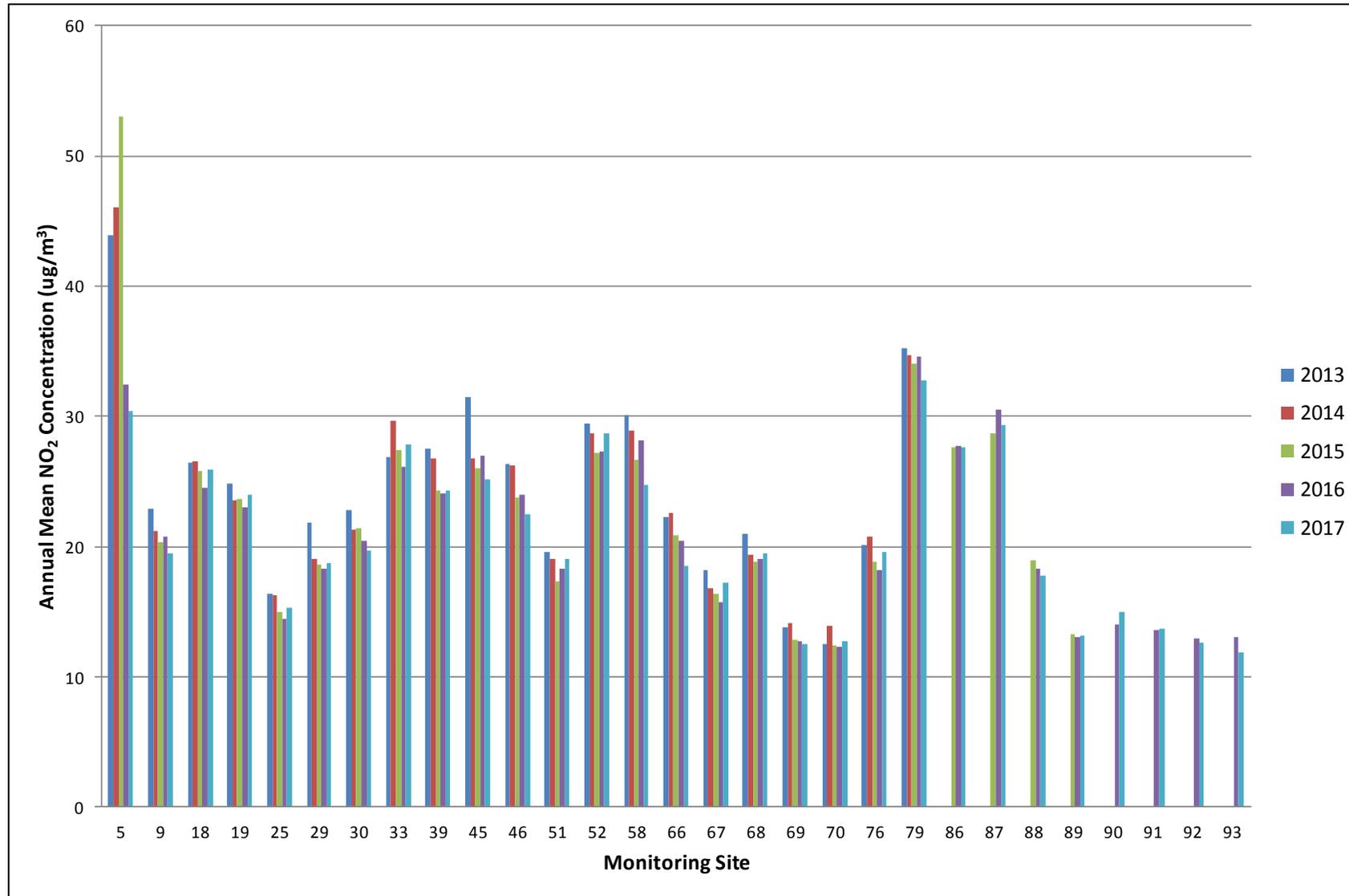


Figure A.4 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Outside AQMAs



**Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2017 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
					2013	2014	2015	2016	2017
CM1	Roadside	Automatic	99.7	99.7	0	0	0	0	0
CM2	Roadside	Automatic	99.8	99.8	0	0	0	0	0

**Notes:**

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

(3) If the period of valid data is less than 85%, the 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM<sub>10</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2017 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2013	2014	2015	2016	2017
CM3	Industrial	97.4	97.4	23	18	18	18	19
OS1	Industrial	90.8	90.8	20	19	19	21	18
OS2	Industrial	88.9	88.9	17	18	16	21	17
OS3	Industrial	82.8	82.8	18	16	20	15	13
OS4	Industrial	91.5	91.5	-	-	-	16	12

Annualisation has been conducted where data capture is <75%

**Notes:**

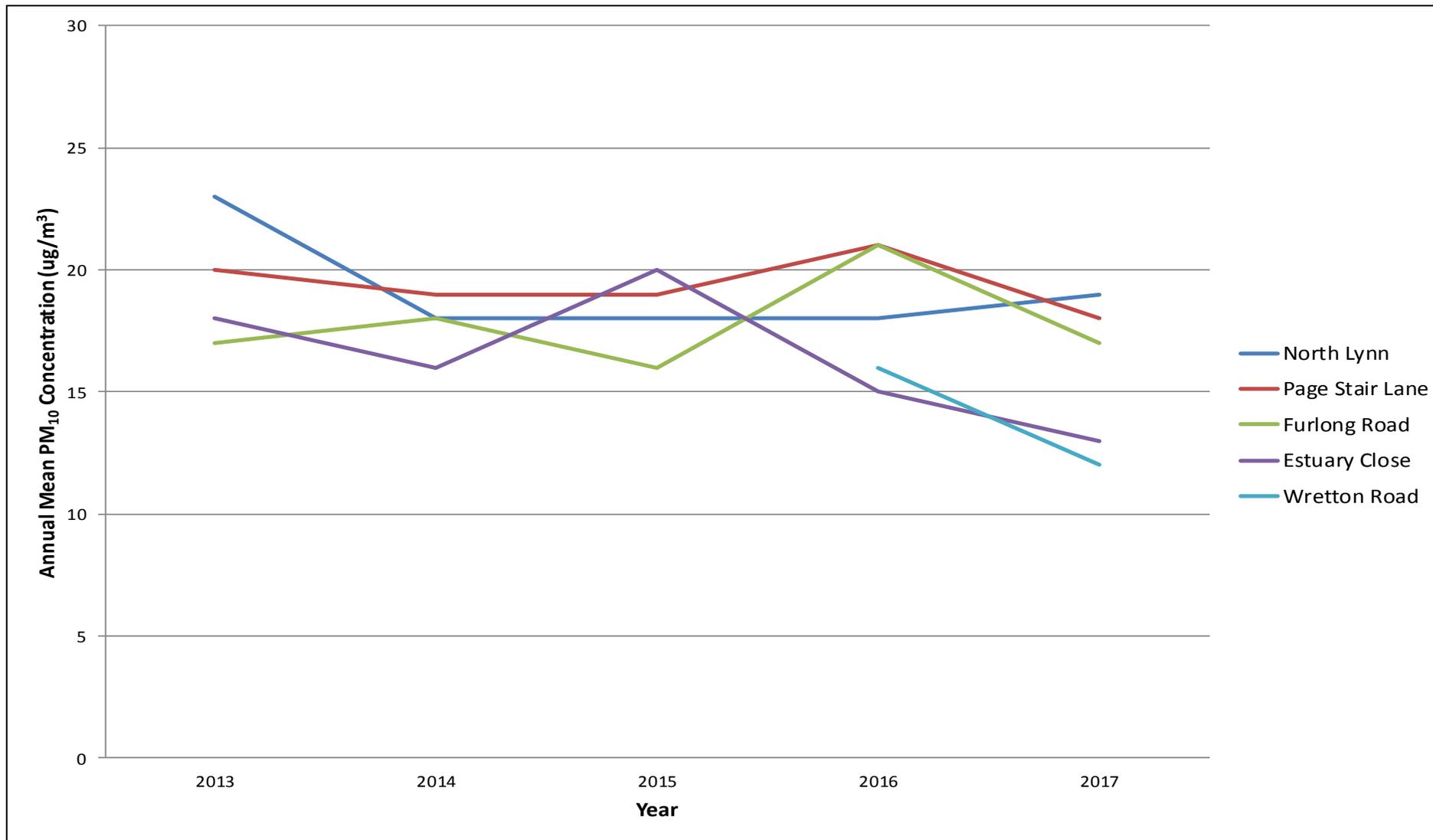
Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

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

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

(3) All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.5 – Trends in Annual Mean PM<sub>10</sub> Concentrations



**Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results**

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2017 (%) <sup>(2)</sup>	PM <sub>10</sub> 24-Hour Means > 50µg/m <sup>3</sup> <sup>(3)</sup>				
				2013	2014	2015	2016	2017
CM3	Industrial	97.4	97.4	1	4	3	5	3
OS1	Industrial	90.8	90.8	6	7	4	9	3
OS2	Industrial	88.9	88.9	20	3	9	3	2
OS3	Industrial	82.8	82.8	1	2	8	2	0 (21)
OS4	Industrial	91.5	91.5	-	-	-	0	0

**Notes:**

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

(3) If the period of valid data is less than 85%, the 90.4<sup>th</sup> percentile of 24-hour means is provided in brackets.

Figure A.6 – Trends in Number of 24-Hour Mean PM<sub>10</sub> Results >50µg/m<sup>3</sup>

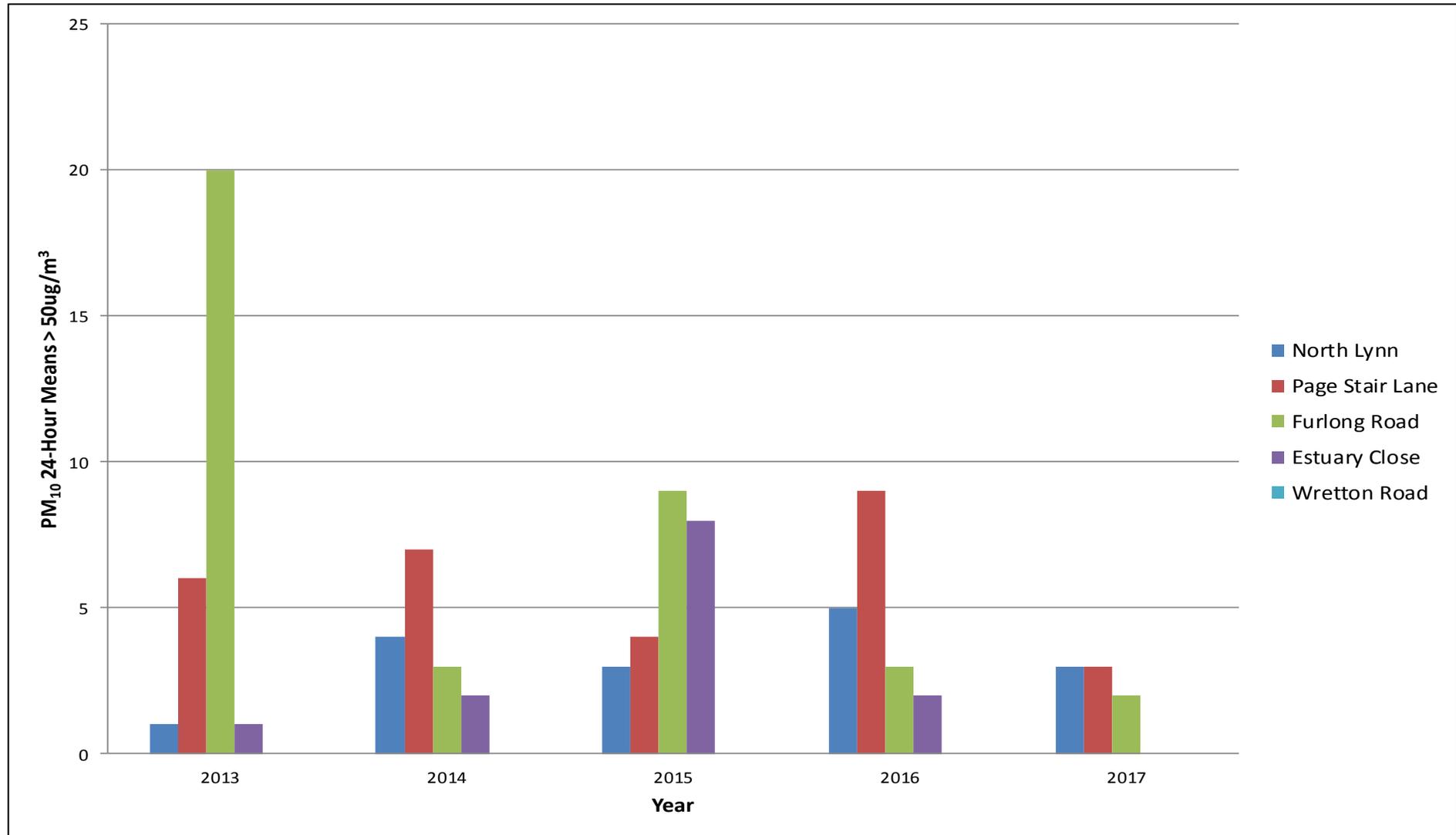


Table A.7 – PM<sub>2.5</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2017 (%) <sup>(2)</sup>	PM <sub>2.5</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2013	2014	2015	2016	2017
OS1	Industrial	90.8	90.8	-	-	-	6	6
OS2	Industrial	88.9	88.9	-	-	-	6	7
OS3	Industrial	82.8	82.8	-	-	-	4	6
OS4	Industrial	91.4	91.4	-	-	-	10	5

Annualisation has been conducted where data capture is <75%

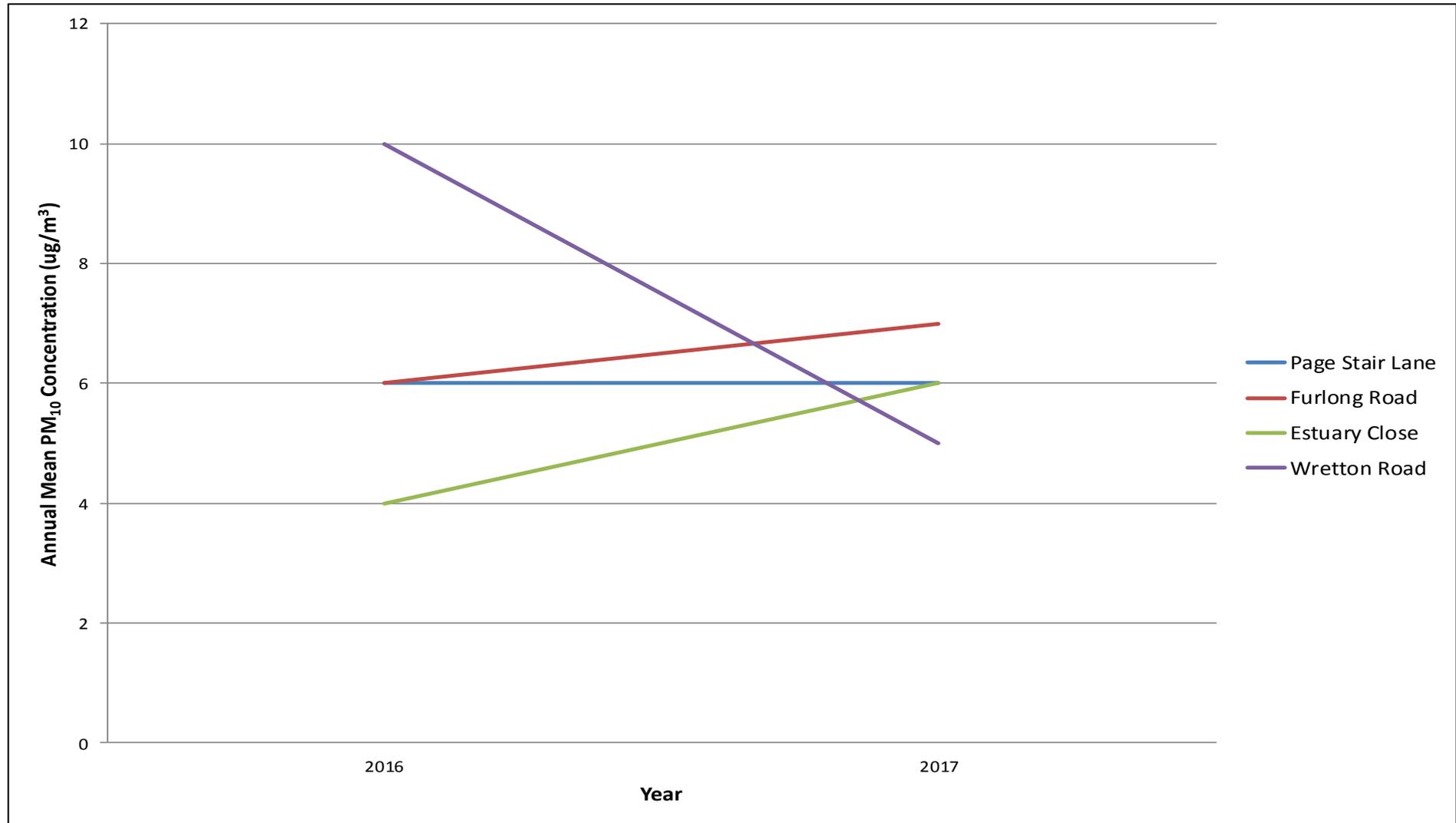
**Notes:**

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

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

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.7 – Trends in Annual Mean PM<sub>2.5</sub> Concentrations



## Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2017

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.85) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
1	58.1	47.0	46.0	38.0	35.0	40.0	40.0	36.0	38.0	42.0	44.0	42.0	42.2	35.9	-
2	60.7	59.0	42.0	50.0	40.0	55.0	59.0	55.0	52.0	54.0	62.0	54.0	53.6	45.5	45.5
3	55.0	53.0	43.0	45.0	36.0	42.0	45.0	44.0	44.0	44.0	49.0	43.0	45.2	38.5	38.5
5 <sup>(3)</sup>	44.7	-	36.0	38.0	35.0	35.0	37.0	36.0	36.0	32.0	34.0	30.0	35.8	30.4	-
6	37.1	34.0	31.0	28.0	22.0	23.0	24.0	24.0	28.0	30.0	34.0	31.0	28.8	24.5	-
7	37.1	35.0	34.0	30.0	23.0	25.0	24.0	24.0	26.0	28.0	31.0	29.0	28.8	24.5	-
8	41.0	33.0	33.0	26.0	22.0	23.0	23.0	24.0	27.0	30.0	33.0	32.0	28.9	24.6	-
9	36.8	29.0	25.0	21.0	20.0	16.0	15.0	18.0	21.0	21.0	27.0	25.0	22.9	19.5	-
10	55.1	50.0	45.0	45.0	40.0	43.0	39.0	39.0	40.0	42.0	44.0	43.0	43.8	37.2	33.7
11	41.6	36.0	31.0	32.0	29.0	33.0	29.0	29.0	35.0	32.0	34.0	30.0	32.6	27.7	-
12	47.3	43.0	43.0	39.0	30.0	41.0	36.0	38.0	37.0	37.0	45.0	36.0	39.4	33.5	-
13	43.2	41.0	36.0	37.0	26.0	32.0	30.0	33.0	33.0	34.0	40.0	37.0	35.2	29.9	-
14	44.8	47.0	44.0	37.0	30.0	39.0	37.0	38.0	37.0	38.0	44.0	39.0	39.6	33.6	-
15	50.0	47.0	44.0	44.0	37.0	43.0	36.0	39.0	36.0	35.0	45.0	37.0	41.1	34.9	-
18	39.0	34.0	34.0	29.0	25.0	30.0	25.0	26.0	30.0	29.0	33.0	31.0	30.4	25.9	-
19	37.0	33.0	32.0	27.0	24.0	27.0	22.0	24.0	26.0	28.0	32.0	27.0	28.3	24.0	-

## Borough Council of King's Lynn & West Norfolk

20	42.0	40.0	38.0	31.0	32.0	Missing	29.0	30.0	29.0	30.0	33.0	31.0	33.2	28.2	-
22	45.0	40.0	37.0	38.0	35.0	33.0	30.0	31.0	33.0	32.0	36.0	35.0	35.4	30.1	-
23	48.0	41.0	37.0	35.0	38.0	31.0	31.0	29.0	34.0	28.0	34.0	32.0	34.8	29.6	-
24	41.0	35.0	33.0	30.0	36.0	29.0	27.0	28.0	31.0	26.0	29.0	27.0	31.0	26.4	-
25	Missing	Missing	21.0	17.0	13.0	15.0	13.0	16.0	18.0	18.0	25.0	24.0	18.0	15.3	-
26 <sup>(3)</sup>	42.2	41.0	38.0	-	34.0	36.0	35.0	35.0	38.0	35.0	38.0	34.0	36.9	31.4	-
27	40.1	34.0	34.0	34.0	29.0	29.0	28.0	29.0	32.0	32.0	36.0	35.0	32.7	27.8	-
28	43.2	37.0	34.0	35.0	30.0	35.0	33.0	35.0	36.0	34.0	41.0	38.0	35.9	30.5	-
29	33.1	Missing	23.0	19.0	16.0	17.0	17.0	17.0	21.0	24.0	28.0	27.0	22.0	18.7	-
30	36.7	28.0	25.0	20.0	19.0	16.0	17.0	18.0	22.0	21.0	28.0	28.0	23.2	19.7	-
31	52.1	36.0	35.0	30.0	33.0	28.0	29.0	26.0	32.0	32.0	32.0	35.0	33.3	28.3	-
32	49.0	40.0	37.0	34.0	29.0	28.0	27.0	29.0	31.0	29.0	33.0	33.0	33.2	28.3	-
33	43.2	34.0	36.0	30.0	24.0	30.0	28.0	31.0	31.0	34.0	36.0	35.0	32.7	27.8	-
34	43.3	38.0	36.0	38.0	27.0	35.0	31.0	11.0	31.0	38.0	45.0	35.0	34.0	28.9	-
35	39.7	35.0	34.0	37.0	26.0	29.0	30.0	27.0	32.0	33.0	39.0	36.0	33.1	28.2	-
36	45.7	34.0	36.0	30.0	27.0	29.0	29.0	26.0	31.0	33.0	35.0	34.0	32.5	27.6	-
37	42.2	35.0	34.0	30.0	28.0	24.0	25.0	25.0	31.0	29.0	35.0	36.0	31.2	26.5	-
38	52.1	49.0	43.0	35.0	35.0	38.0	33.0	33.0	34.0	38.0	Missing	39.0	39.0	33.2	-
39	38.2	32.0	25.0	31.0	25.0	26.0	22.0	24.0	29.0	28.0	31.0	32.0	28.6	24.3	-
40	42.0	38.0	40.0	45.0	30.0	39.0	23.0	33.0	31.0	38.0	42.0	40.0	36.7	31.2	-
41	45.5	Missing	43.0	39.0	36.0	37.0	31.0	32.0	38.0	34.0	43.0	37.0	37.8	32.1	-
42	42.1	33.0	36.0	39.0	28.0	37.0	31.0	31.0	35.0	37.0	43.0	38.0	35.8	30.5	-
43	41.6	31.0	32.0	42.0	30.0	31.0	27.0	32.0	35.0	32.0	40.0	38.0	34.3	29.2	-
44	51.9	Missing	43.0	42.0	36.0	38.0	32.0	29.0	35.0	29.0	44.0	39.0	38.1	32.4	-
45	42.5	34.0	30.0	31.0	Missing	25.0	24.0	25.0	28.0	24.0	32.0	31.0	29.7	25.2	-
46	36.2	30.0	28.0	28.0	26.0	22.0	20.0	19.0	25.0	23.0	32.0	29.0	26.5	22.5	-
47	49.2	37.0	37.0	32.0	30.0	30.0	27.0	29.0	35.0	33.0	39.0	35.0	34.4	29.3	-

## Borough Council of King's Lynn & West Norfolk

48	40.1	37.0	32.0	33.0	28.0	31.0	27.0	29.0	32.0	34.0	37.0	Missing	32.7	27.8	-
51	32.0	25.0	25.0	21.0	17.0	18.0	15.0	17.0	21.0	21.0	28.0	28.0	22.3	19.0	-
52	43.0	34.0	35.0	35.0	33.0	Missing	27.0	28.0	28.0	30.0	40.0	38.0	33.7	28.7	-
58	50.0	38.0	34.0	26.0	29.0	24.0	19.0	22.0	25.0	Missing	25.0	28.0	29.1	24.7	-
66 <sup>(3)</sup>	36.0	28.0	14.0	24.0	Missing	21.0	17.0	-	Missing	24.0	31.0	Missing	24.4	18.5	-
67	30.0	23.0	20.0	17.0	14.0	16.0	14.0	16.0	18.0	21.0	28.0	26.0	20.3	17.2	-
68	32.0	25.0	21.0	19.0	18.0	17.0	18.0	17.0	24.0	25.0	31.0	28.0	22.9	19.5	-
69	26.0	18.0	16.0	13.0	11.0	9.0	9.0	11.0	15.0	14.0	17.0	18.0	14.8	12.5	-
70	30.0	19.0	17.0	11.0	10.0	9.0	9.0	10.0	13.0	14.0	18.0	19.0	14.9	12.7	-
75	52.0	Missing	41.0	41.0	32.0	38.0	29.0	34.0	20.0	Missing	42.0	43.0	37.2	31.6	-
76	31.0	25.0	27.0	22.0	17.0	20.0	18.0	22.0	18.0	24.0	26.0	26.0	23.0	19.6	-
79	48.0	41.0	41.0	43.0	37.0	39.0	30.0	35.0	35.0	35.0	46.0	33.0	38.6	32.8	-
86	40.0	36.0	33.0	31.0	30.0	35.0	29.0	32.0	29.0	31.0	34.0	30.0	32.5	27.6	-
87	46.0	38.0	36.0	33.0	34.0	30.0	31.0	31.0	35.0	31.0	38.0	31.0	34.5	29.3	-
88	31.0	25.0	24.0	20.0	17.0	16.0	14.0	15.0	20.0	20.0	25.0	24.0	20.9	17.8	-
89	30.0	19.0	16.0	14.0	12.0	9.0	10.0	11.0	14.0	14.0	20.0	18.0	15.6	13.2	-
90	29.0	20.0	19.0	15.0	13.0	13.0	12.0	14.0	17.0	16.0	22.0	22.0	17.7	15.0	-
91	27.0	18.0	16.0	15.0	11.0	10.0	11.0	12.0	14.0	16.0	23.0	20.0	16.1	13.7	-
92	27.0	18.0	16.0	13.0	10.0	8.0	9.0	10.0	13.0	14.0	21.0	19.0	14.8	12.6	-
93	22.0	16.0	14.0	11.0	9.0	8.0	9.0	Missing	13.0	17.0	22.0	13.0	14.0	11.9	-
61	30.0	25.0	22.0	18.0	14.0	14.0	13.0	15.0	18.0	21.0	26.0	23.0	12.0	16.9	-
62	30.0	21.0	20.0	16.0	12.0	12.0	11.0	13.0	13.0	16.0	24.0	23.0	12.0	14.9	-
63	21.0		12.0	9.0	8.0	7.0	6.0	7.0	10.0	12.0	15.0	18.0	11.0	9.7	-
64	22.0	17.0	13.0	9.0	10.0	8.0	7.0	8.0	10.0	12.0	15.0	16.0	12.0	10.4	-
72	29.0	19.0	16.0	11.0	9.0	9.0	8.0	9.0	13.0	13.0	18.0	19.0	12.0	12.3	-
73	38.0	30.0	14.0	23.0	25.0	16.0	18.0	19.0	24.0	19.0	28.0	22.0	12.0	19.6	-
74	28.0	21.0	18.0	16.0	12.0	11.0	7.0	10.0	16.0	16.0	23.0	22.0	12.0	14.2	-

## Borough Council of King's Lynn & West Norfolk

83	Missing	18.0	16.0	13.0	11.0	10.0	10.0	11.0	16.0	13.0	19.0	16.0	11.0	11.8	-
----	---------	------	------	------	------	------	------	------	------	------	------	------	------	------	---

**Local bias adjustment factor used**

**National bias adjustment factor used**

**Annualisation has been conducted where data capture is <75%**

**Where applicable, data has been distance corrected for relevant exposure**

### Notes:

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) As per LAQM.TG(16) guidance, distance correction has been applied to all concentrations to those within 10% of the objective.

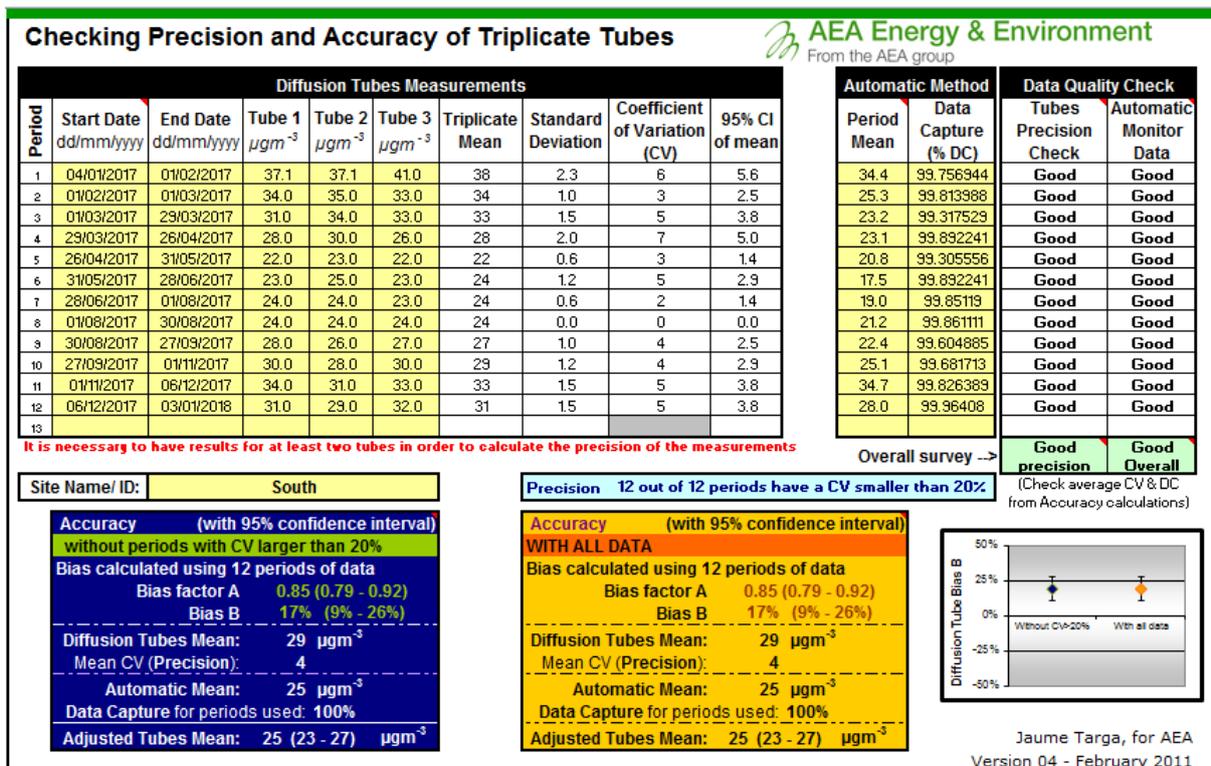
(3) Four monthly results have been removed from the dataset; February results for tubes 5 and 63 due to water droplets contained within the tubes, April result for tube 26 and August result for 66 due to the tubes being found on the ground.

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

### Diffusion Tube Local Bias Adjustment Factors

King's Lynn Council operate one continuous NO<sub>2</sub> analyser (Southgates) that has a triplicate site of diffusion tubes co-located at the monitoring site. A local bias adjustment factor has been calculated for the location using the Precision and Bias adjustment spreadsheet (v04), the output is presented below in Figure C.1.

Figure C.1 - Local Bias Correction Output: Southgates (Tubes 6/7/8)



### Diffusion Tube National Bias Adjustment Factor

The diffusion tubes used by King's Lynn Council are supplied and analysed by Gradko International, the tubes were prepared using the 20% TEA in acetone preparation method. The 2017 national bias adjustment factor for Gradko 20% TEA in water is 0.89, based on thirty four studies, as derived from the national bias adjustment factor spreadsheet<sup>5</sup> as presented in Figure C.2.

<sup>5</sup> National Diffusion Tube Bias Adjustment Factor Spreadsheet version 03/18 available at <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Figure C.2 – Gradko 2017 National Bias Adjustment Factor

National Diffusion Tube Bias Adjustment Factor Spreadsheet						Spreadsheet Version Number: 03/18				
Follow the steps below in the correct order to show the results of relevant co-location studies						This spreadsheet will be updated at the end of June 2018				
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods						Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet				
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.						LAQM Helpdesk Website				
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.						Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.				
Step 1:	Step 2:	Step 3:	Step 4:							
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor <sup>2</sup> shown in blue at the foot of the final column.							
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data <sup>2</sup>	If you have your own co-location study then see footnote <sup>1</sup> . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953							
Analysed By <sup>1</sup>	Method <sup>2</sup>	Year <sup>2</sup>	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m <sup>3</sup> )	Automatic Monitor Mean Conc. (Cm) (µg/m <sup>3</sup> )	Bias (B)	Tube Precision <sup>3</sup>	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2017	R	Borough Council of King's Lynn & West Norfolk	12	29	25	16.0%	G	0.86
Gradko	20% TEA in water	2017	R	Bath & North East Somerset	12	45	45	-0.2%	G	1.00
Gradko	20% TEA in water	2017	R	NOTTINGHAM CITY COUNCIL	12	38	41	-6.6%	G	1.07
Gradko	20% TEA in water	2017	R	Lancaster City Council	12	35	32	9.7%	G	0.91
Gradko	20% TEA in water	2017	R	Thurrock Borough Council	12	54	52	3.3%	S	0.97
Gradko	20% TEA in water	2017	R	Thurrock Borough Council	11	35	33	7.0%	G	0.93
Gradko	20% TEA in water	2017	R	Thurrock Borough Council	9	33	29	14.3%	G	0.87
Gradko	20% TEA in water	2017	UB	Thurrock Borough Council	11	30	28	8.0%	S	0.93
Gradko	20% TEA in water	2017	R	Dudley MBC	12	50	50	0.8%	G	0.99
Gradko	20% TEA in water	2017	UB	Dudley MBC	12	24	19	26.6%	G	0.79
Gradko	20% TEA in water	2017	R	City of Lincoln Council	12	42	31	33.2%	G	0.75
Gradko	20% TEA in water	2017	R	Gedling Borough Council	12	35	31	10.1%	G	0.91
Gradko	20% TEA in water	2017	R	Gateshead Council	12	36	37	-2.7%	G	1.03
Gradko	20% TEA in water	2017	R	Gateshead Council	12	29	25	17.5%	G	0.85
Gradko	20% TEA in water	2017	R	Gateshead Council	12	34	35	-5.3%	G	1.06
Gradko	20% TEA in water	2017	R	LB Hounslow	12	65	54	22.2%	G	0.82
Gradko	20% TEA in water	2017	R	LB Hounslow	12	59	53	10.6%	G	0.90
Gradko	20% TEA in water	2017	B	LB Hounslow	11	28	30	-6.0%	G	1.06
Gradko	20% TEA in water	2017	R	LB Hounslow	11	43	34	28.8%	G	0.78
Gradko	20% TEA in water	2017	B	LB Hounslow	9	38	33	14.3%	G	0.87
Gradko	20% TEA in water	2017	R	LB Hounslow	11	52	42	24.4%	G	0.80
Gradko	20% TEA in water	2017	UB	Liverpool	11	20	17	15.2%	G	0.87
Gradko	20% TEA in water	2017	R	North Ayrshire Council	12	26	21	23.2%	G	0.81
Gradko	20% TEA in water	2017	R	South Gloucestershire Council	12	25	23	10.3%	G	0.91
Gradko	20% TEA in water	2017	KS	Marlyebone Road Intercomparison	12	101	79	28.6%	G	0.78
Gradko	20% TEA in water	2017		<b>Overall Factor<sup>2</sup> (34 studies)</b>					<b>Use</b>	<b>0.89</b>

Discussion of Choice of Bias Adjustment Factor to Use

The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. The Defra LAQM.TG(16) provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring.

Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO<sub>x</sub>/NO<sub>2</sub> continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

The local bias adjustment factor calculated as 0.85 has been used to adjust the 2017 diffusion tube data. The site had a good data capture for the period and the diffusion tubes had good precision throughout.

For previous data, years 2013 to 2016, the bias adjustment factors have been taken from the councils previous LAQM annual reports. The factors used were 0.90 (2013), 0.73 (2014), 0.88 (2015) and 0.85 (2016).

### **QA/QC of Automatic Monitoring**

Data from the automatic monitoring stations is collected by Air Quality Data Management (AQDM) on behalf of the Council. The TEOM data has the Volatile Correction Model (VCM) for Indicative Gravimetric Equivalence applied, and the Osiris data has a gravimetric factor of 1.3 for Indicative Gravimetric Equivalence applied. Both the TEOM and NO<sub>x</sub> analysers are serviced biannually by Air Monitors, and calibration data is collected fortnightly from the NO<sub>x</sub> analysers by council officers and passed to AQDM who carry out any adjustment of the data. Both the TEOM and the NO<sub>x</sub> analysers were inspected in January and September 2017 by the National Physics Laboratory (NPL) for the purposes of performing QA/QC checks to ISO17025:2005, no problems were found during these checks. The Osiris instruments are serviced and calibrated annually by Turnkey Instruments.

### **QA/QC of Diffusion Tube Monitoring**

The diffusion tubes for the year 2017 were supplied and analysed by Gradko. Gradko is a UKAS accredited laboratory that participates in the AIR-PT scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) for NO<sub>2</sub> tube analysis and the Annual Field Inter-Comparison Exercise. There provide strict performance criteria for participating laboratories to meet, thereby ensuring NO<sub>2</sub> concentrations are reported to a high level of accuracy. The laboratory follows the procedures as outlined within its Harmonisation Practical Guidance.

In the 2017 AIR-PT results, rounds AIR-PT AR 0018 (January to February 2017), AIR-PT AR019 (April to May 2017), AIR-PT AR021 (July to August 2017) and AIR-PT AR022 (September to October 2017) Gradko scored 100% on all results. This is the percentage of results submitted which were subsequently determined to be satisfactory based upon the z-score of  $< \pm 2$ .

### **Short-term to Long-term Data Adjustment**

In regards to the 2017 diffusion tube data set, annualisation was required at one diffusion tube location due to data capture being below 75%. Annualisation has been completed in line with Box 7.10 within LAQM.TG(16) and full working details are presented in Table C.1.

In completing the annualisation process, data has been taken from a number of automatic monitoring sites that are part of the AURN. In line with LAQM.TG(16) the monitoring sites that have been used lie within a radius of approximately 50 miles of

the sites to be annualised. The monitoring stations used are background monitoring stations and as such are not influenced by local sources of air pollution such as road traffic emissions at roadside monitoring sites.

### **Distance from Road Correction**

In line with LAQM.TG(16) distance correction has been applied to NO<sub>2</sub> monitoring sites that have recorded an annual mean concentration above the annual mean objective, or within 10% of the annual mean objective. There were four sites within the NO<sub>2</sub> monitoring network that were above, or within 10% of the NO<sub>2</sub> annual mean objective in 2017; the automatic monitoring site CM2, and diffusion tube locations 2, 3 and 10. All four sites are located within the designated AQMAs

The NO<sub>2</sub> Fall-Off with Distance Calculator (v4.2)<sup>6</sup> has been used to derive the NO<sub>2</sub> concentration at a location of relevant exposure; the results of the calculations are presented in Table C.2. The diffusion tube sites 2 (Railway Road 4) and 3 (Railway Road 5) are representative of exposure therefore cannot be distance corrected.

---

<sup>6</sup> NO<sub>2</sub> Fall-Off with Distance Calculator (Version 4.2), available online at <https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>

**Table C.1 – Diffusion Tube Short Term to Long Term Monitoring Data Adjustment (2017)**

Site ID	Unadjusted Diffusion Tube Mean ( $\mu\text{g}/\text{m}^3$ )	Annualisation Factor Wicken Fen	Annualisation Factor Norwich Lakenfields	Annualisation Factor Market Harbourough	Average Annualisation Factor	Annualised & Bias Adjusted (0.85) Concentration ( $\mu\text{g}/\text{m}^3$ )
Site 66	24.4	0.877	0.905	0.893	0.892	18.5

**Table C.2 – NO<sub>2</sub> Fall-Off with Distance Calculations**

Site ID	Distance (m)		NO <sub>2</sub> Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )		
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitoring at Site <sup>(1)</sup>	Predicted at Receptor
Site CM2	1	6	13.1	38.0	29.0
Site 10	3	5.5	14.9	37.2	33.7

**Notes:**

(1) Background NO<sub>2</sub> concentrations have been taken from the 2017 Defra Background Maps for Kings Lynn.

## Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Automatic Monitoring Sites: King's Lynn

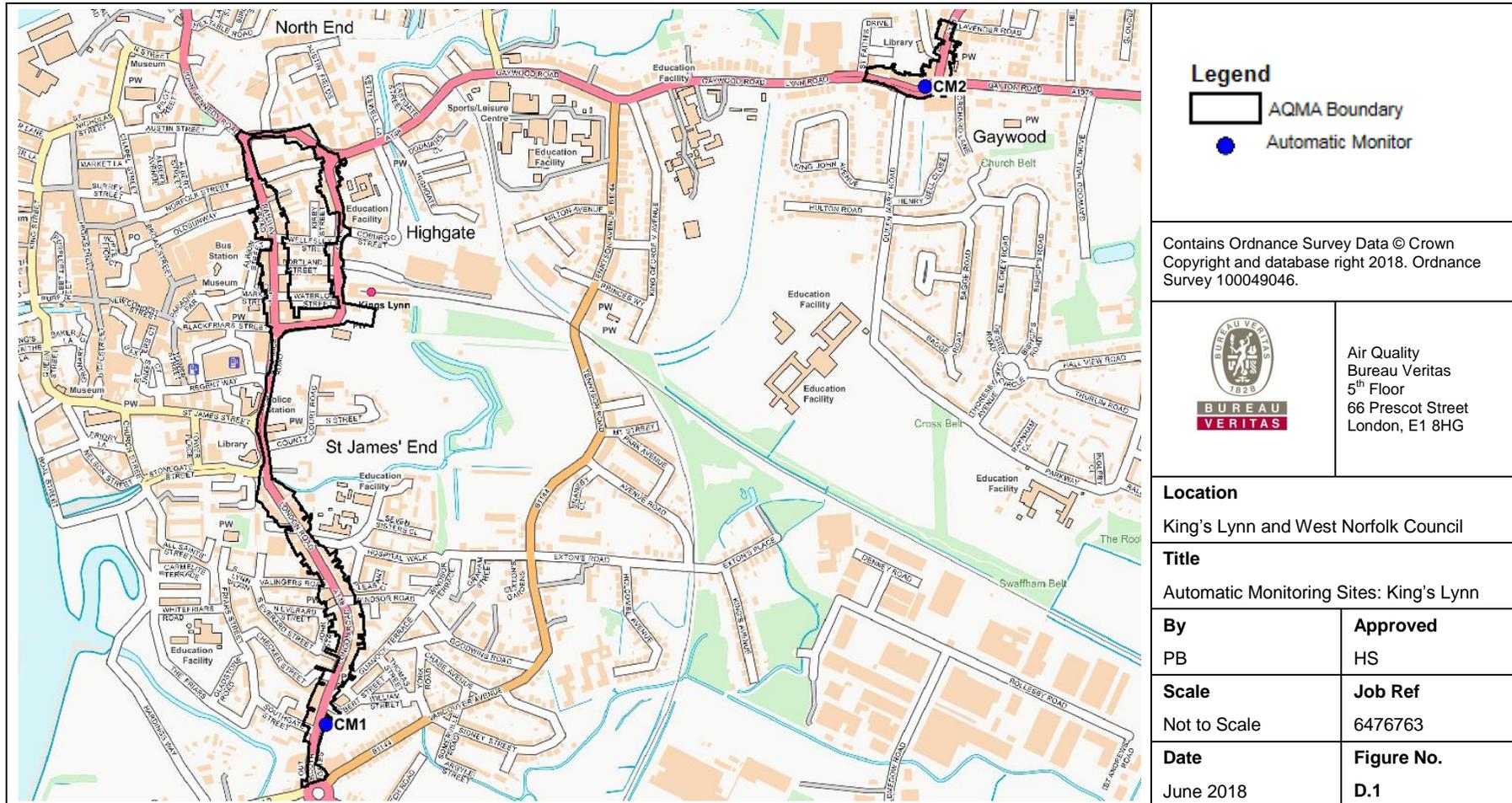


Figure D.2 – Automatic Monitoring Sites: North Lynn

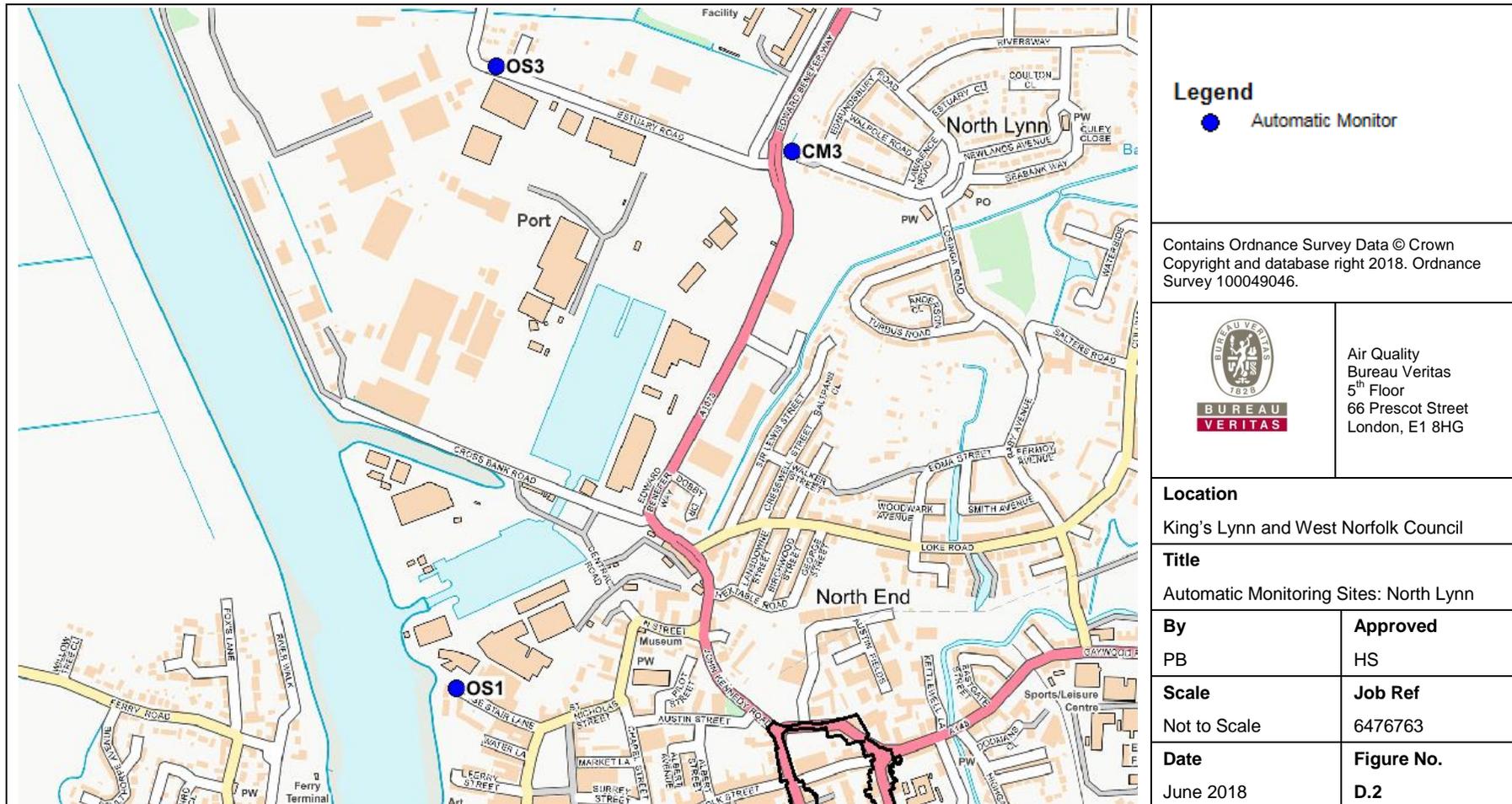


Figure D.3 – Automatic Monitoring Sites: Stoke Ferry

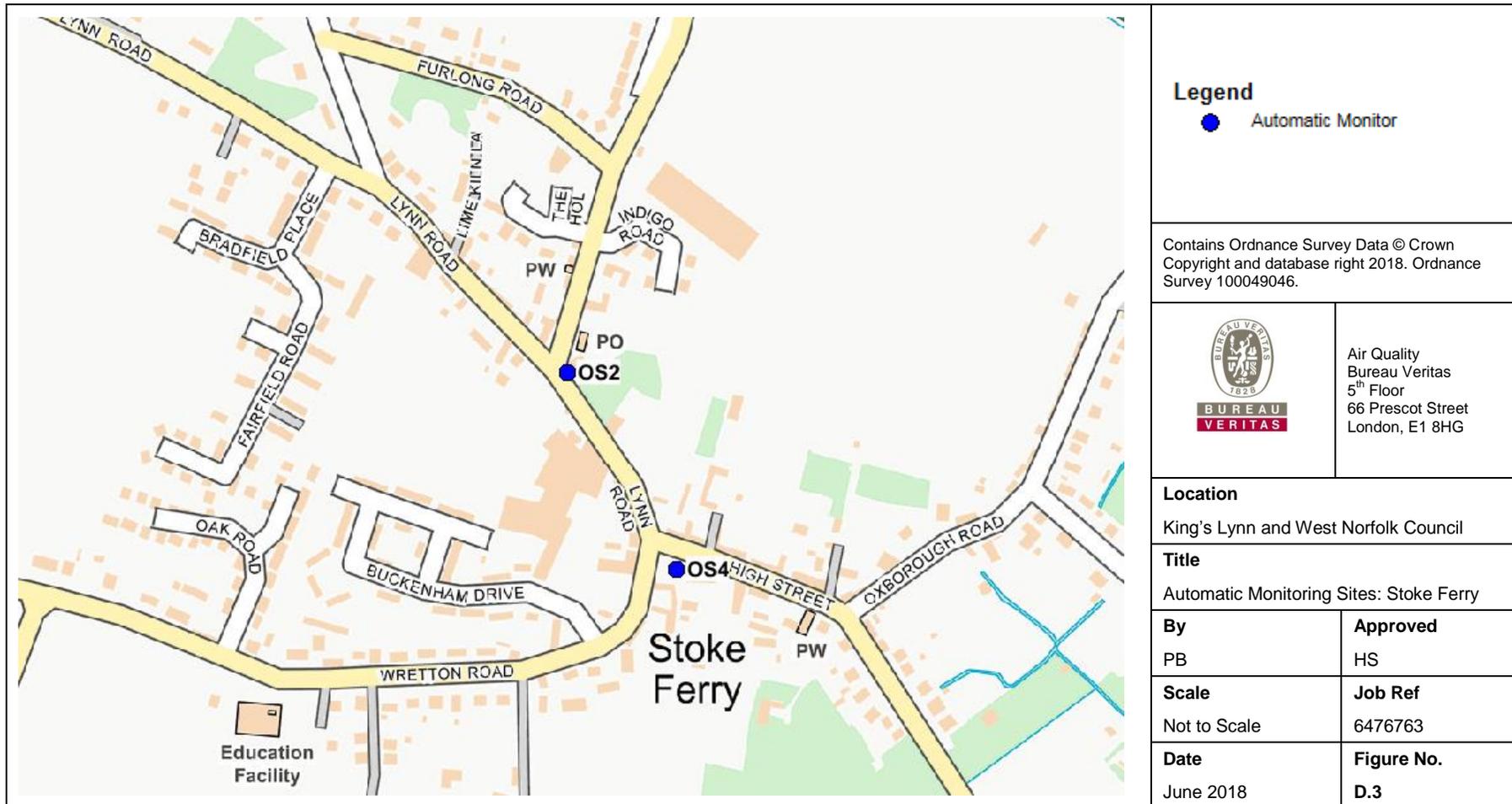


Figure D.4 – Diffusion Tube Monitoring Locations: Town Centre AQMA

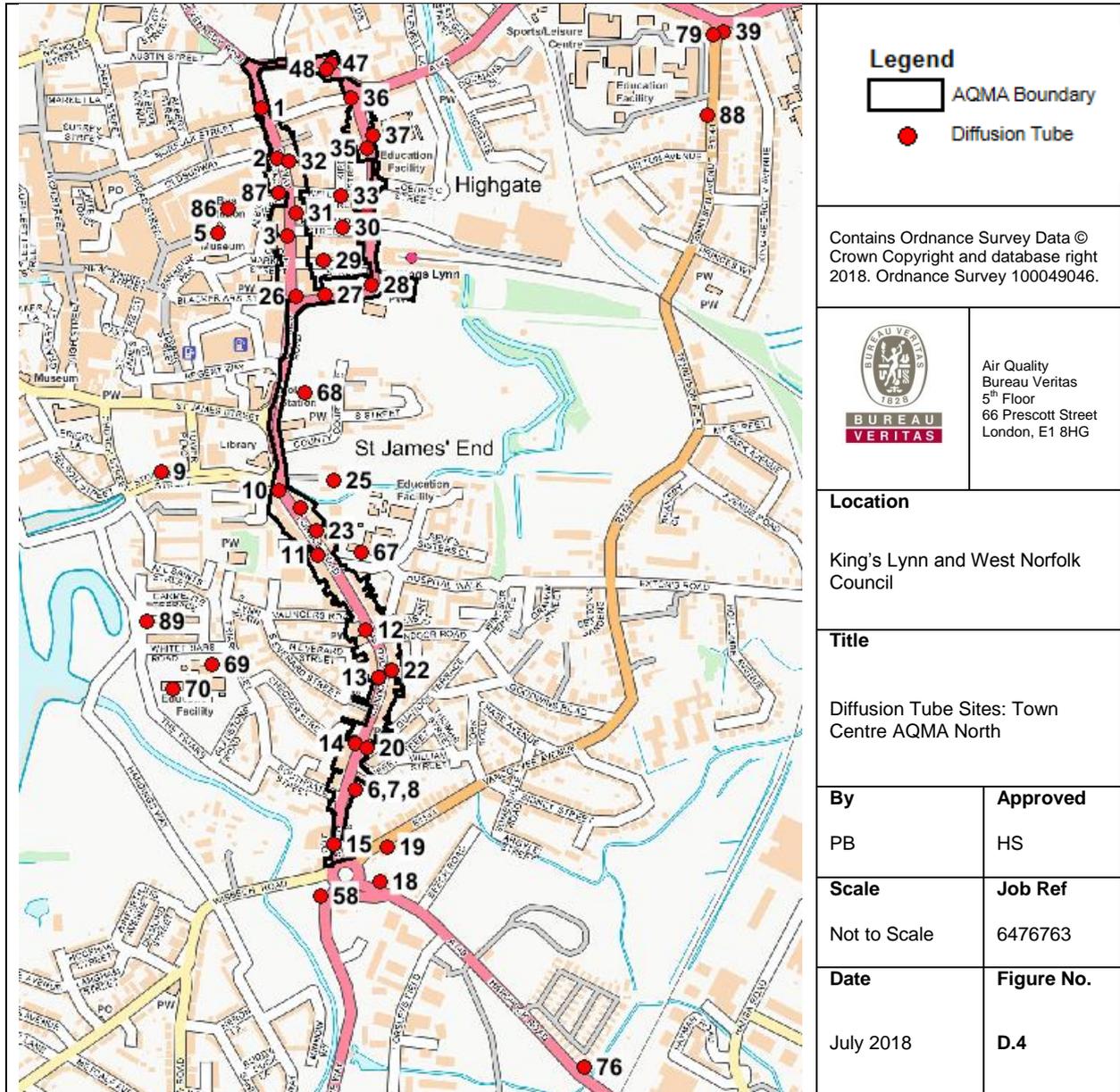


Figure D.5 – Diffusion Tube Monitoring Locations: Gaywood Clock AQMA

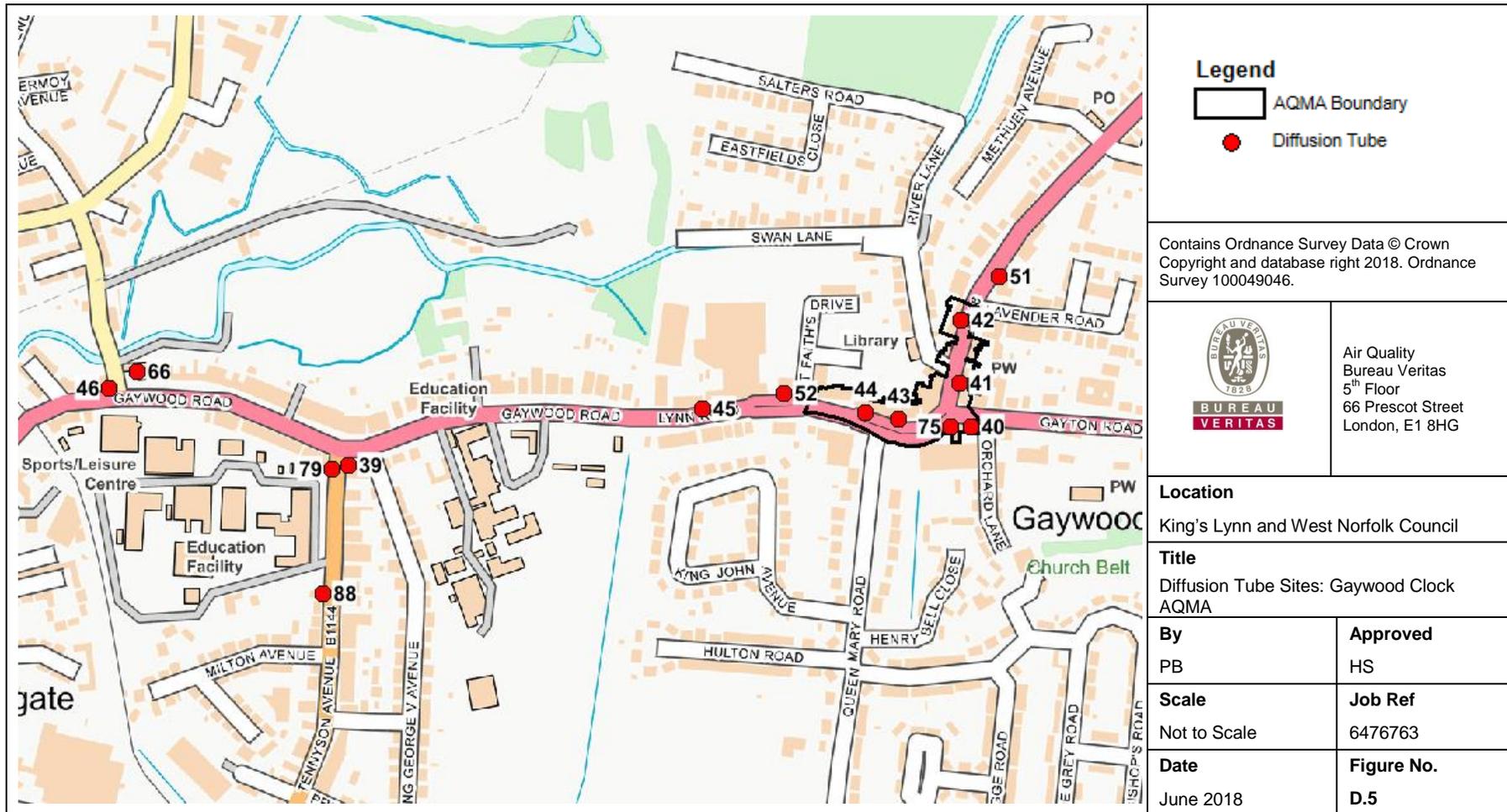


Figure D.6 – Diffusion Tube Monitoring Locations: North Lynn

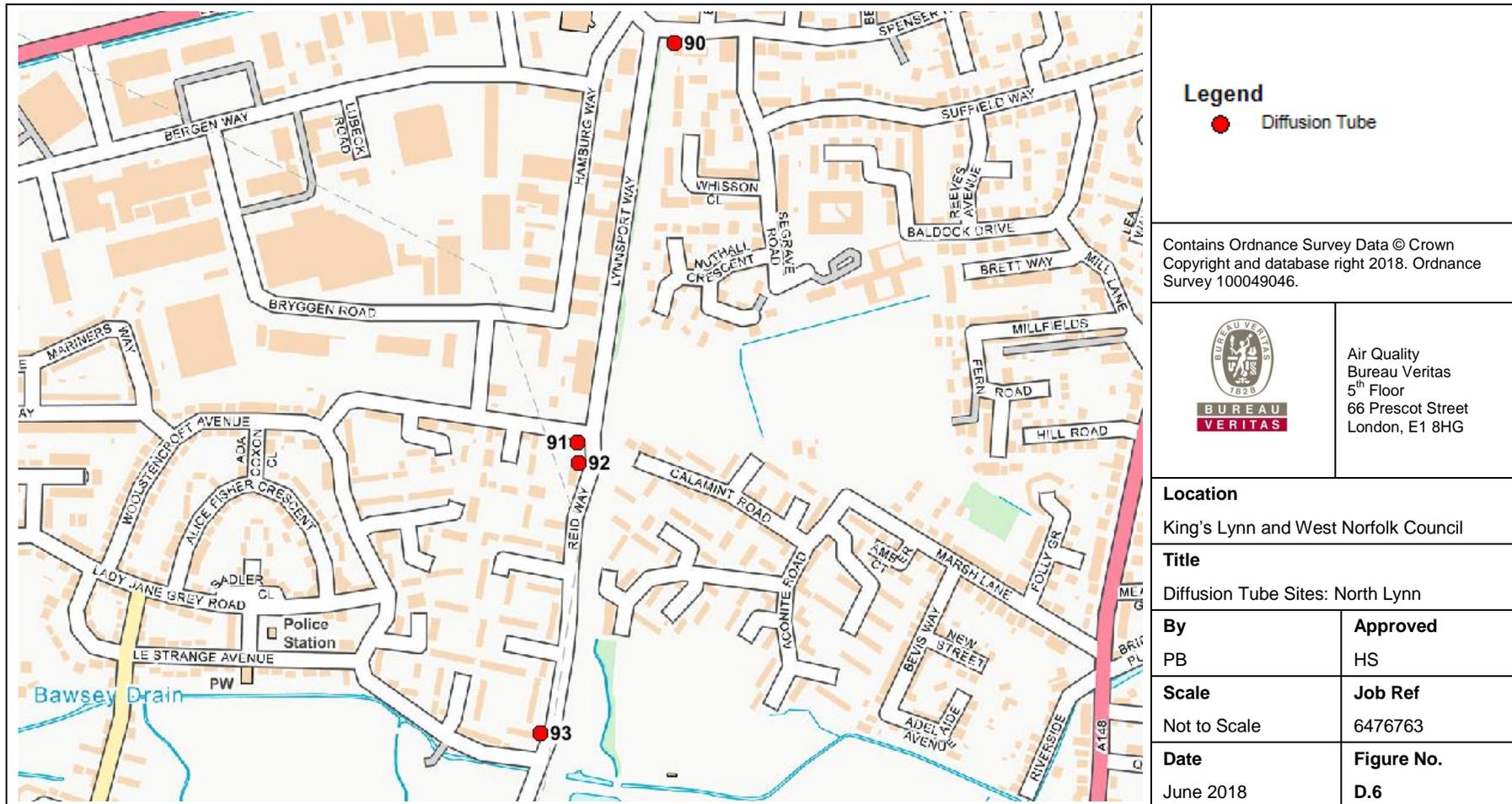
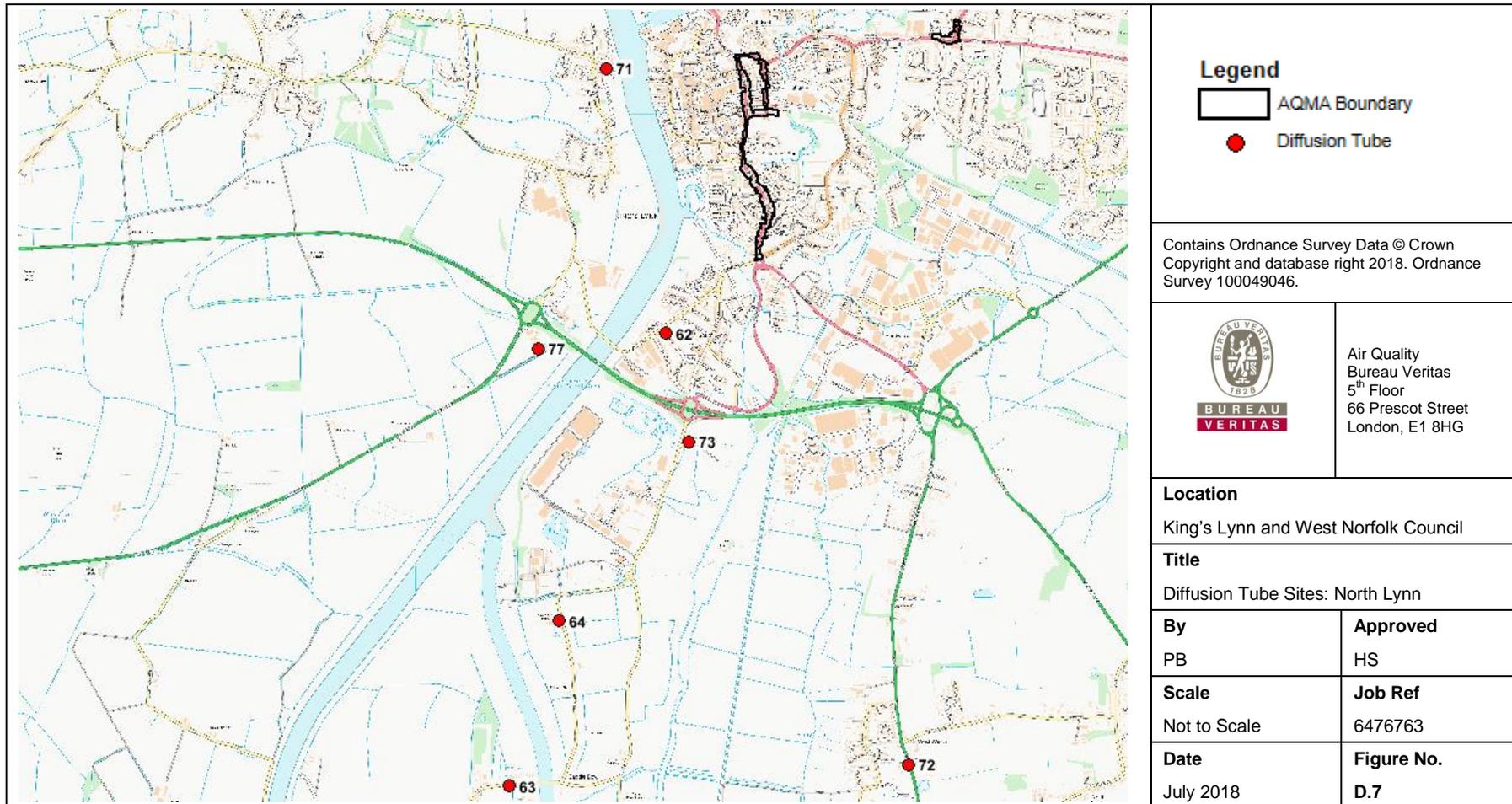


Figure D.7 – Diffusion Tube Monitoring Locations: Palm Paper Survey



## Appendix E: Summary of Air Quality Objectives in England

Pollutant	Air Quality Objective	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

## Appendix F: Summary of Planning Applications Commented Upon in 2017

In 2017 the Environmental Quality Team commented on over 39 applications with air quality relevance. These were screened according to EPUK & IAQM guidance and air quality assessments required where appropriate. Best practice measures were also recommended.

**Table F.1 – Summary of Planning Applications with Air Quality Assessments**

Industrial	Note on potential impact
<p>Erection of anaerobic digestion facility (to process up to 19,250 tonnes of biomass/slurry) at Cross Bank Road, PE30 2HD.</p>	<p>The application was accompanied by an air quality assessment which confirms no adverse impacts. The proposal is not within or in close proximity to any Air Quality Management Areas, and will not result in a requirement for a new Air Quality Management Area (AQMA). The plant has the capacity to process slurry and the necessary EA consents. Slurry would be fed directly into the digesters from tankers via no return valves and would not be stored at the site, thus avoiding any potential release of odour. Operation of the site would be strictly controlled under an Environmental Permit.</p> <p>The application was refused on the 19<sup>th</sup> of October 2017 by Norfolk County Council.</p>
<p>Scoping report to the King's Lynn B Proposed Combined Cycle Gas Turbine CCGT Power Station on Willows Road, PE34 3RD.</p>	<p>Due to the type and scale of the development, an Environmental Impact Assessment (EIA), including a chapter within the Environmental Statement (ES) on the potential impacts of air quality was required to be completed by the applicant. The EIA was submitted to the Council on the 2nd of May 2018, therefore details on the application and the decision made will be commented upon in the 2019 ASR.</p>
Residential	
<p>Residential development of up to 635 dwellings, together with a local centre for use A1, A2, A3 and/or A5, D2 community floor space at Grimston Road, South Wootton.</p>	<p>An air quality assessment is included in Chapter 11 of the ES. The assessment refers to appropriate technical guidance and considers the air quality impact of traffic on nearby residential properties and future occupants. Data from the Transport Assessment is used to assess the increase in traffic. Cumulative impacts of this and other committed developments are considered. The assessment also considers the potential for dust from construction.</p> <p>The assessment reports that predicted NO<sub>2</sub> and PM<sub>10</sub> concentrations will be below the relevant air quality objectives during the completion year. Therefore the assessment concludes that the predicted magnitude of impact is negligible. The evidence supplied supports this conclusion, therefore we have no objection regarding air quality impacts.</p> <p>The risk assessment for potential dust impacts during construction concluded that the site is deemed to be a medium to high risk site for dust soiling impacts and low risk for human health and ecological impacts. To mitigate this impact I recommend that a construction environmental management plan (CEMP) be required by condition which should contain the mitigation measures set out within the EIA. Construction should be carried out in accordance with the approved CEMP.</p> <p>The application is currently awaiting decision.</p>

## Borough Council of King's Lynn & West Norfolk

Industrial	Note on potential impact
<p>Residential development for up to 130 dwellings together with associated works at Nursery Lane, South Wootton.</p>	<p>We are concerned to ensure that the development does not create a new AQMA due to the impact of additional traffic. Additional traffic from the development could also have an impact on the King's Lynn and Gaywood AQMAs. I have also considered the cumulative impact with other nearby proposed major developments including extension of this development (17/01151/OM).</p> <p>The traffic assessment suggests that there will be 86 vehicle movements during the AM peak period and 101 during the PM peak period from the development. However, the annual average daily traffic could be significantly more and it is not known how many of these trips will continue into King's Lynn town centre or the Gaywood AQMA.</p> <p>The mitigation set out in the draft travel plan is reasonable and should prevent unacceptable levels of air pollution, providing it is implemented. Therefore it is recommended that the development shall not be occupied until a final Travel Plan is submitted and agreed upon. It is recommended that monitoring of the travel plan shall take place over a minimum period of 5 years post final dwelling being occupied and annual data reported to the LPA. During the course of construction, occupation and use of the development the owner shall carry out all requirements of the approved Travel Plan.</p> <p>The application is currently awaiting decision.</p>
<p>Sustainable mixed-use urban extension comprising: up to 450 dwellings, a mixed use local centre comprising Class A uses, Class D1 and B1 uses at Edward Benefer Way, King's Lynn.</p>	<p>We are concerned to ensure that the development does not create a new AQMA due to the impact of additional traffic. Additional traffic from the development could also have an impact on the King's Lynn and Gaywood AQMAs. I have also considered the cumulative impact with other nearby proposed major developments including extension of this development (17/01106/OM).</p> <p>The traffic assessment suggests that there will be in excess of 500 annual average daily traffic movements associated with the proposed development. It is indicated that traffic from the development will have an impact elsewhere on the road network. It is not known how many of these trips will continue onto King's Lynn town centre or the Gaywood AQMA.</p> <p>A Screening Air Quality Assessment (AQA) dated April 2017 is included with the application. The AQA assesses baseline air quality and identifies the presence of the AQMAs in King's Lynn and Gaywood. However, the AQA states that the proposed development is not located within or nearby to the AQMAs. The report does not directly assess any impact on AQMAs but it should be noted that some of the additional traffic will enter the AQMAs and contribute to air pollution in these areas. The AQA also assesses construction dust and identifies that mitigation will be required to minimise the impact on nearby sensitive receptors.</p> <p>Due to distance from AQMAs the AQA considers that the impact of the development on local air quality will be limited. However, recommendations are made to minimise the impacts and that 'reasonable air quality and environmental-friendly measures be implemented'. Recommendations include low NO<sub>x</sub> boilers for domestic space and water heating, provision of electric charge points, and the implementation of a Travel Plan produced as a part of the Transport Assessment.</p> <p>The application is currently awaiting decision.</p>

## Borough Council of King's Lynn & West Norfolk

Industrial	Note on potential impact
Outline planning application for up to 300 dwellings and associated infrastructure and access at Nightingale Lane, Downham Market.	<p>We are concerned to ensure that the development does not give rise to an exceedance of the air quality standards for NO<sub>2</sub> or PM<sub>10</sub> due to emissions from traffic in the operational stage or dust from construction.</p> <p>The applicant has submitted a Screening AQA dated July 2016 as part of the application. The development is not situated within an existing AQMA. The assessment concludes that as background pollution is low, that the impact of exhaust emissions from traffic generated by the proposed development is not considered likely to be significant. However, the report recommends that reasonable measures to reduce any adverse air quality impacts from the development be implemented. We recommend that the good practice measures set out Chapter 5 of the EPUK/IAQM Planning for air quality guidance be included in the design. A number of measures are also detailed to mitigate any dust impact during construction.</p> <p>The application was refused on the 4<sup>th</sup> of July 2017 by the Council.</p>

**Table F.2 – Summary of all Other Planning Applications**

Industrial	Note on potential impact
Erection of a packaged CHP plant building on Scania Way, PE30 4LR.	Emissions from stack deemed not significant.
Construction of five new glass reinforced plastic (GRP) kiosks for Anglian Water Services Ltd on Sherbourne Road, PE31 6PE.	Fugitive PM <sub>10</sub> emissions deemed not significant.
Installation of anaerobic digestion facility comprising two tanks, gas holder, control building and combined heat and power (CHP) unit, feeder, digester separator, lagoon and silage clamp at Southery Road Farm, Feltwell.	Application withdrawn.
Regrading of site and construction of Gas Pressure Reduction and Metering Station on Poplar Avenue, PE24 2AL.	Fugitive PM <sub>10</sub> emissions deemed not significant.
Erection of biomass building at Close Farm, Docking Road, PE36 5LL.	Emissions from stack deemed not significant.
EIA Screening / Scoping Opinion: Proposed extension to quarry (MIN 76) with continued use of conveyor (part), service track and plant site at Watlington Quarry, Lynn Road, Tottenham.	Response provided.
Proposal to allow extraction of clay with restoration to continue until 31 December 2018 at Middleton Aggregates Ltd, Setch Road, Blackborough End.	Fugitive PM <sub>10</sub> emissions deemed not significant.
Retrospective application for National Grid Compound including revised layout, plant and landscaping scheme to that approved under planning permission ref. C/2/2015/2010 for Warren Energy Ltd at Breckland Farm, IP26 4RJ.	Fugitive PM <sub>10</sub> emissions deemed not significant.
Construction of a sewage pumping station, ancillary apparatus, access road and telemetry aerial for Anglian Water Services Ltd on Station Road, PE31 6DE.	Fugitive PM <sub>10</sub> emissions deemed not significant.
Commercial/Communal	

## Borough Council of King's Lynn & West Norfolk

Erection of an industrial building, with offices/staff facilities, perimeter fence, concrete yard, associated parking and use of site as a skip hire and recycling business with ancillary sale of aggregate at St John's Business Estate, Downham Market.	Fugitive PM <sub>10</sub> emissions deemed not significant and NO <sub>2</sub> from traffic deemed not significant.
Retrospective application to amend/expand site area to accommodate revised site layout including 2 no. lagoons, weighbridge office, site office, 2 no. containers and substation.	NO <sub>2</sub> from traffic deemed not significant.
Proposed New Offices, car Park and associated works on Nar Ouse Way, King's Lynn.	NO <sub>2</sub> from traffic deemed not significant.
Three independent sites to be developed into car parking provision for both visitors and staff of the Hospital, including charging for electric vehicles at The Queen Elizabeth Hospital, PE30 4ET.	NO <sub>2</sub> from traffic deemed not significant.
Construction of new retail unit (use class A1) with associated car parking and servicing arrangements and other works to include re-alignment of existing car park layout at Tesco, Campbells Meadow, PE30 4WQ.	NO <sub>2</sub> from traffic deemed not significant.
<b>Agricultural/Animals</b>	
Replacement poultry shed, construction of managers bungalow, erection of feed bins, dead bird shed, general purpose block, water tank and pump house and construction of roadway and hardstanding areas on Little London Road, Northwold.	Fugitive PM <sub>10</sub> emissions deemed not significant.
Amendments to the approved poultry farm development comprising of the erection of a general purpose building, erection of welfare block, dead bird shed and two weigh rooms, installation of water tanks, gas tanks, a generator and a substation, re-positioning of feed silos, surfacing of the farm access road, formation of 6 car parking spaces, enlargement of a turning head and relocation of a swale at Whin Close Farm, Sedgeford.	Fugitive PM <sub>10</sub> emissions deemed not significant.
<b>Residential</b>	
Outline application for a residential development of 10 dwellings at 21 Sutton Road, PE34 4HD.	NO <sub>2</sub> from traffic deemed not significant.
Construction of 82 dwellings, associated access roads, footways and new areas of public open space and associated external works at Greenpark Avenue, PE30 2NB.	NO <sub>2</sub> from traffic deemed not significant.
Demolition of existing structures and for the erection of up to 47 dwellings (Use Class C3) with means of site access from Benns Lane, Terrington St Clement.	NO <sub>2</sub> from traffic deemed not significant.
Construction of a ten dwelling proposal comprising of 6 buildings on a brownfield site at Chapel Lane, Ringstead.	NO <sub>2</sub> from traffic deemed not significant.
Proposed 19 2 and 3 bedroom with associated garages/parking, access road, landscaping and open space at Prince Harry Place, Downham Market.	NO <sub>2</sub> from traffic deemed not significant.
Demolition of old print works and the construction of 15 number 2 bed flats and 1 number 1 bed flat with associated car parking at 19-21 Church Street, Hunstanton.	NO <sub>2</sub> from traffic deemed not significant.
Development of 10 2 bedroom terraced houses built in 2 blocks of 5 with parking and landscaping to the front and gardens to the rear at 51 Sutton Road, PE34 4HD.	NO <sub>2</sub> from traffic deemed not significant.
Residential development of 30 houses on Doddshill Road, Dersingham.	NO <sub>2</sub> from traffic deemed not significant.

## Borough Council of King's Lynn & West Norfolk

Proposed residential development consisting of 17 dwellings on Churchgate Way, Terrington St Clement.	NO <sub>2</sub> from traffic deemed not significant.
Construction of 12 residential units on Saw Mill Road, Brancaster.	NO <sub>2</sub> from traffic deemed not significant.
Residential development of 11 dwellings on the Trafford Estate, West Walton.	NO <sub>2</sub> from traffic deemed not significant.
Development of 25 dwellings following demolition 28-30 and Coal Yard Bungalow at 28 Long Lane, IP26 4BJ.	Application withdrawn.
Proposed demolition of existing dwelling and construction of 12 residential dwellings on Fring Road, Great Bircham.	NO <sub>2</sub> from traffic deemed not significant.
Change of use of vacant space to residential accommodation with associated use to the West Norfolk Islamic Centre on London Road, PE30 5PY.	NO <sub>2</sub> from traffic deemed not significant.
Installation of a flue to the north elevation of "Crossways" detached house and construction of brick chimney to enclose the flue at Crossways, Ringstead Road, PE31 8PL.	Emissions from stack deemed not significant.
Revised Scheme - Installation of a flue to the north elevation of "Crossways" detached house at Crossways, Ringstead Road, PE31 8PL.	Emissions from stack deemed not significant.

## Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
TEOM	Tapered Element Oscillating Microbalance

## References

- Local Air Quality Management Technical Guidance LAQM.TG(16). February 2018. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/18 published in March 2018.
- Borough Council of King's Lynn and West Norfolk Annual Status Report 2017.
- Borough Council of King's Lynn and West Norfolk, Local Plan - Site Allocations and Development Management Policies Plan
- Borough Council of King's Lynn and West Norfolk, Air Quality Modelling Report, December 2017
- Norfolk County Council, Norfolk Minerals and Waste Local Plan, Minerals Site Specific Allocations Development Plan Document: Single Issue Silica Sand Review, December 2017