IPSWICH
BOROUGH COUNCIL

2020 Air Quality Annual Status Report (ASR)

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

June, 2020

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Executive Summary: Air Quality in Our Area

Air Quality in Ipswich Borough

This report provides an overview of air quality in Ipswich Borough during 2019. 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.

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 often a strong correlation with equalities issues, because areas with poor air quality are also often less affluent[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

In order to comply with its duty to review the air quality within its area, Ipswich Borough Council (IBC) monitors nitrogen dioxide (NO_2) levels within the town using two automatic monitors located on St Matthews Street and Chevallier Street and a total of 92 diffusion tubes positioned at 81 carefully selected locations across the borough. Changed and analysed on a monthly basis, the data from the diffusion tubes provides a measure of how nitrogen dioxide levels vary over time and is used to calculate an annual mean concentration at each monitoring location. Once corrected for experimental bias and adjusted to take into account the location of the tubes relative to any likely human exposure, these annual values should not exceed the national air quality objective level of 40µg/m3. In the event that this level is, or is likely, to be exceeded on a consistent basis Local Authorities have a legal duty to declare an Air Quality Management Area (AQMA) encompassing the relevant locations. Both nationally and locally the main source of high levels of nitrogen dioxide is road transport.

To date, Ipswich Borough Council has declared a total of five AQMAs, all due to continued exceedance of the annual mean NO_2 objective level:

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

- *Ipswich AQMA No.1* - Encompassing the land in and around the junction of Norwich Road, Chevallier Street and Valley Road, extending along Chevallier Street to beyond the junction with Waterloo Road (declared 2006; amended 2017);
- *Ipswich AQMA No. 2* - From the junction with Peel Street, extending along Crown Street, St Margarets Street and St Helens Street to the junction with Palmerston Road, and from St Margarets Street extending up Woodbridge Road to just beyond the junction with Argyle Street. (declared 2006; amended 2017);
- *Ipswich AQMA No. 3* - Following the route of the Star Lane / Key Street / College Street gyratory clockwise from the junction with Lower Orwell Street, extending along Star Lane, Grimwade Street, Fore Street, Salthouse Street, Key Street and College Street, terminating at the junction with Bridge Street (declared 2006; amended 2017);
- *Ipswich AQMA No. 4* - Incorporating the Bramford Road / Yarmouth Road / Chevallier Street junction and part of Chevallier Street (declared 2010);
- *Ipswich AQMA No*. 5 - Incorporating the land in or around St. Matthews Street / Norwich Road between the Civic Drive roundabout and Bramford Road (declared 2017).

Further information on the above AQMAs (including maps showing their location and boundaries) is available on Ipswich Borough Council's AQMA webpage on the DEFRA website – https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=133.

Following the amendment of AQMA Nos. 1 to 3 and the declaration of AQMA No. 5 in September 2017, Ipswich Borough Council worked closely with the local Highway Authority, Suffolk County Council and other stakeholders, including Public Health, to develop a new Air Quality Action Plan (AQAP) to address the challenge of poor air quality within the Borough. The AQAP was published in February 2019.

Ipswich Borough Council is a member of the Suffolk Air Quality Management Group which includes all of the Suffolk Local Authorities.

As illustrated by the trend line plots in Figure A.1 of mean NO_2 concentrations in the vicinity of each of the AQMAs over the last 6 years, levels appear to have remained essentially static with a very marginal downward trajectory. Within the last 6 years, average daily traffic flows across Ipswich have increased by approximately 3%, indicating some air quality improvements have occurred despite higher traffic volumes. No exceedances of the annual NO_2 concentration were noted in AQMA's 1, 3 or 4 following both local bias adjustment and distance correction in 2019. However, it should be noted that diffusion tubes at both AQMA 1 (tube 14) and AQMA 3 (tube 5) recorded levels within 10% of the annual mean objective level. Furthermore, exceedances were noted just outside the scope of AQMA 3 (tube 30) and AQMA 4 (tube 18). In light of this, the Council will continue to monitor these sites in order to determine future trends before deciding whether to revoke AQMA's 1 and 4. Due to continuing exceedances outside AQMA 3, the Council will look to amend the boundary of AQMA 3 over the next year and report on this in next year's ASR.

Actions to Improve Air Quality

Installation of second continuous Air Quality Monitoring Station

The Council have successfully obtained a third consecutive year of automatic monitoring data from the air quality analyser on Chevallier Street. Due to continued confidence with the reliability of this analyser, the Council arranged the installation of a second air quality analyser on St Matthews Street, just outside Ipswich AQMA No.5. The analyser has been installed and collecting data since June 2019. Given that no exceedances of the annual mean or hourly averages were recorded at the site, the installation of the analyser has helped to define the boundary of AQMA No.5. Furthermore, in future years, data gathered by the analyser will help contribute towards the calculation of a Local Bias Correction Factor.

Continuing commitment to procuring Zero Emission Fleet

At the time of writing this report, the Council have fourteen electric pool cars and seventeen small electric vans within the fleet, replacing a proportion of the older diesel vehicles. Three more electric vans are due to arrive mid-June. In addition, the larger vehicle fleet now includes seven pickups, six tippers, six refuse collection vehicles and one skip loader, all of which are Euroclass VI standard. The Council are approximately 2 years in to a 3-year programme committed to upgrading all the small

vehicle fleet to electric vehicles. Larger vehicles will be continue to be Euroclass VI standard.

Launch of Suffolk wide Anti-Idling Campaign

Officers across the Suffolk Local Authorities worked together to prepare materials for a Suffolk wide anti-idling campaign which was fully launched during the second half of 2019.

Commissioning of an air quality modelling report for the Ipswich Strategic Partnership Area (ISPA)

Suffolk County Council (SCC) on behalf of Ipswich Borough Council (IBC) commissioned an air quality modelling study to provide an assessment of the potential local air quality impacts of the proposed aligned local plans for the administrative areas of Ipswich Borough Council, Babergh District Council, Mid Suffolk District Council and the former Suffolk Coastal District Council element of the administrative area of East Suffolk. Together these areas form the Ipswich Strategic Planning Area (ISPA). The focus of the study was on the impacts of air pollutant levels due to changes in road traffic emissions within the IBC administrative area associated with the Ipswich Local Plan Review.

Modelled NO_2 concentrations with the Ipswich Local Plan Review proposals, indicated that in 2026 most human receptors would experience concentrations that are 30% lower than in the 2017 base year used in the study without any transport mitigation. The situation in 2036 with the Ipswich Local Plan Review proposals is very similar, with modelling indicating that most human receptors will experience concentrations that are approximately 40% lower than in 2017.

The only adverse impacts for human receptors with the Local Plan Review proposals, where there is an exceedance of the annual mean NO_2 objective level, is predicted at one location within AQMA No.2 on Crown Street, Ipswich. This is despite the SCC transport mitigation strategy for the ISPA area being applied. However, it should be noted that the area modelled as an exceedance is not currently a 'relevant receptor' for the purposes of the air quality objectives. The findings from the modelling are positive, but further work not yet prescribed will be required in subsequent years to achieve compliance at this location.

Development of the Suffolk County Council Transport Mitigation Strategy for the Ipswich Strategic Planning Area

The Ipswich Strategic Planning Area (ISPA) transport mitigation plan was published in August 2019 and developed to support the update of local plans in the strategic area. Currently, from an Ipswich perspective, this plan is still at a draft stage although it will form a significant element of the town strategy for Ipswich. Measures in this mitigation include delivery of modal shift through improved infrastructure and a smarter choices programme.

Development of a Low Emissions Supplementary Planning Document (SPD)

Officers have developed a draft low emissions SPD for developers which will help to mitigate against air quality issues arising from development. Unfortunately, due to resource issues and the ongoing COVID-19 outbreak, progress with finalising the document has been delayed. Comments on the document have been received by internal and external partners and the report is currently undergoing further amendment prior to going to Council Executive for approval in summer 2020.

Development of an Air Quality Profile Report for Suffolk

During the latter part of 2019 and early 2020, the Council, together with all the other Local Authorities across Suffolk were working with Suffolk County Council's Transport and Public Health colleagues to prepare an 'Air Quality Profile' report for Suffolk. The report will map, at a district and borough level, local air pollution levels and explore evidence-based interventions that can be undertaken by local authorities, businesses, communities and individuals to improve air quality. Once the

draft report has been prepared, the working group is planning to hold a public health summit, involving a range of stakeholders to highlight the findings and discuss the interventions prior to the final copy being published. This summit was planned for April 2020, but unfortunately has been delayed due to COVID-19. A new date for the summit has not been finalised yet.

Conclusions and Priorities

For the second year running the Council opted to analyse this year's data using the locally derived bias adjustment factor. Once bias adjusted using the local factor and distance corrected, the nitrogen dioxide diffusion tube data for 2019 shows that the national air quality objective for mean annual NO_2 concentrations was exceeded at 8 of Ipswich Borough Council's 81 monitoring locations; 2 were located within AQMA 2, 4 were located in AQMA 5 and 2 of which fall just outside of the current AQMA boundaries. No exceedances were noted in AQMAs 1, 3 & 4 following bias adjustment and distance correction. However, it should be noted that the 2 exceedances which fall outside the current AQMA boundaries were just outside AQMAs No's 3 and 4. The 8 exceedances were noted in the same locations as those recorded in 2018, except for diffusion tube 18, which is located on the periphery of AQMA No.4. Due to continuing exceedances outside AQMA 3, the Council will look to amend the boundary of AQMA 3 over the next year and report on this in next years ASR.

As the local and national bias correction factors were the same this year, the exceedances were noted in the same areas as per the exceedances shown with the local bias correction factor.

Over the coming year, Ipswich Borough Council's principal air quality priority is to continue to work towards implementing the measures in the AQAP.

The continued growth in housing development and business activity will be a major challenge when addressing air quality in the Borough. Ensuring all developments have suitable measures in place to mitigate against their impacts will be essential in ensuring air quality is maintained and improved in Ipswich.

The ongoing situation with the COVID-19 outbreak will likely present challenges during the next reporting year. At the time of writing this report, the Council is

currently preparing a recovery planning document which includes the consideration of the implications of COVID-19 on air quality and the actions that the Council can take to mitigate against its impacts. In light of the ongoing outbreak, the measures in the Air Quality Action Plan will be reviewed further and updated where required.

The Council will continue to monitor air quality across Ipswich as this is essential for informing our air quality work and developing measures that can provide potential improvements.

Local Engagement and How to get Involved

The main source of air pollution in Ipswich is road traffic. We are working to meet the challenge set by the Government for NO_2, PM_{10} and $PM_{2.5}$ targets but it will also require a concerted public effort with each person doing their bit in order to try and increase active travel and reduce the use of the motor vehicle where possible. Below are a few suggestions on how to get involved:

- Try to use your car less. Walking and cycling are much cleaner, cheaper and healthier forms of travel. A map showing cycle routes across Ipswich is available on the Green Suffolk Website: https://tinyurl.com/y4y9sr6u.
- Use public transport, such as the bus and train.
- If you have to use your car, you can reduce emissions by not idling when parked. You can also reduce emissions from your car by ensuring it is regularly serviced and by driving efficiently.
- Consider purchasing an electric vehicle. The Council is working to improve the local charging infrastructure across Ipswich. Electric vehicles are reducing in cost and technology is improving to make this technology more viable. If you opt to purchase a traditionally fuelled vehicle, consider the most fuel efficient petrol vehicle rather than buying a diesel vehicle. See the Zap Map website for locations of charging points: https://www.zap-map.com/
- Consider car sharing to reduce emissions and save money. See the Suffolk car share website for details: www.suffolkcarshare.com

More information on air quality within Ipswich is available on the Ipswich Borough Council Air Quality Management website (https://tinyurl.com/mzjsurv).

If you have any specific questions or concerns, or if you would like to make suggestions on possible improvements and/or supply additional air quality information, please contact Environmental Health at Ipswich Borough Council on 01473 433115 or environmental.health@ipswich.gov.uk.

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1 Local Air Quality Management

This report provides an overview of air quality in Ipswich Borough during 2019. 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 Ipswich Borough 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 Table E.1 in Appendix E.

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 Ipswich Borough 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://uk-air.defra.gov.uk/aqma/local-authorities?la_id=133 – see full list at https://uk-air.defra.gov.uk/aqma/list. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides a map of air quality monitoring locations in relation to the AQMA(s).

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
Ipswich AQMA No.1	Declared 11/04/2006 Amended 12/09/2017	NO_2 Annual Mean	Ipswich	An area encompassing the land in and around the junction of Norwich Road, Chevallier Street and Valley Road, extending along Chevallier Street to beyond the junction with Waterloo Road.	NO	50	µg/m^3	40	µg/m^3	Ipswich Borough Council Air Quality Action Plan 2019-2024	2019	https://tinyurl.com/y2ozjoqx
Ipswich AQMA No.2	Declared 11/04/2006 Amended 12/09/2017	NO_2 Annual Mean	Ipswich	An area from the junction with Peel Street, extending along Crown Street, St Margarets Street and St Helens Street to the junction with Palmerston Road, and from St Margarets Street extending up Woodbridge Road to just beyond the junction with Argyle Street.	NO	45	µg/m^3	47	µg/m^3	Ipswich Borough Council Air Quality Action Plan 2019-2024	2019	https://tinyurl.com/y2ozjoqx

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
Ipswich AQMA No.3	Declared 11/04/2006 Amended 12/09/2017	NO_2 Annual Mean	Ipswich	An area following the route of the Star Lane / Key Street / College Street gyratory clockwise from the junction with Lower Orwell Street, extending along Star Lane, Grimwade Street, Fore Street, Salthouse Street, Key Street and College Street, terminating at the junction with Bridge Street.	NO	50	µg/m^3	38	µg/m^3	Ipswich Borough Council Air Quality Action Plan 2019-2024	2019	https://tinyurl.com/y2ozjoqx
Ipswich AQMA No.4	Declared 14/12/2010	NO_2 Annual Mean	Ipswich	Incorporating the Bramford Road/Yarmouth Road/Chevallier Street junction and part of Chevallier Street.	NO	55	µg/m^3	35	µg/m^3	Ipswich Borough Council Air Quality Action Plan 2019-2024	2019	https://tinyurl.com/y2ozjoqx

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
Ipswich AQMA No.5	Declared 12/09/2017	NO_2 Annual Mean	Ipswich	An area incorporating the land in or around St. Matthews Street / Norwich Road between the Civic Drive roundabout and Bramford Road.	NO	49	µg/m^3	50	µg/m^3	Ipswich Borough Council Air Quality Action Plan 2019-2024	2019	https://tinyurl.com/y2ozjoqx

☒ **Ipswich Borough Council 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 Ipswich Borough

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

"*On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants.*

The next step for Ipswich Borough Council is to submit the next Annual Status Report, which is due to be submitted in 2020."

Specific points were raised as follows:

- *'It is recommended that the Council consider extending the AQMA boundaries to the locations of further exceedances falling outside of current AQMA boundaries. It's noted that the Council has already increased its number of monitoring locations to investigate this further. An update on this should be provided in the next Annual Status Report.'*

  Diffusion tube site 17 recorded an exceedance of the annual mean NO_2 concentration which was reported on in the 2019 ASR. This site did not record an exceedance in 2019 following bias and distance correction.

  Diffusion tube site 30 again recorded an exceedance of the annual mean NO_2 concentration in 2019. Due to this site continuing to record an exceedance, the Council will now arrange for detailed dispersion modelling work to be carried out to support the decision to amend the boundary of AQMA 3. The results of the detailed dispersion modelling and amending AQMA 3 will be reported on in next years ASR.

  As this is the first year site 18 has recorded an exceedance of the annual mean NO_2 concentration, the Council will continue to monitor the site and review whether to amend the boundary of AQMA 4 should further exceedances of the objective level be noted. The Council will report on this in future ASR's.

  In order to further understand pollution levels around key junctions in the town, four additional non-monitoring locations were installed in 2019. The locations were at Crown Street, Grove Lane, Fore Hamlet and Vernon Street. Once distance and bias corrected, none of these locations were in exceedance of the

annual mean NO_2 concentration. The Council will continue to monitor levels of pollution at these sites in 2020.

- *'It is not clear where funding for some measures originates from in Table 2.2 (i.e. is the organisation involved and the source of funding the same entity). In future reports it is advised that the Council elaborate on this where information is available.'*

  Where possible, the sources of funding have been elaborated on in Table 2.2 of this year's ASR.

- *'It is stated clearly in the report where distance correction has taken place. However, there is no example calculation within the report itself, and instead the reader is directed to the guidance for an example. In future reports, it would be beneficial to have an example calculation in the appendices.'*

  An example calculation of where distance correction has taken place is included in Appendix C.

Ipswich Borough Council has taken forward a number of direct measures during the current reporting year of 2020 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 Ipswich Borough Council Air Quality Action Plan 2019 - 2024. Key completed measures are:

- EV charging infrastructure has now been installed at the Councils headquarters to support the delivery of the new fleet. The Council's electric fleet now consists of 14 electric cars and 17 small electric vans. Furthermore, the Councils larger vehicle fleet includes a number euroclass 6 vehicles - 7 pickups, 6 tippers, 6 refuse collection vehicles and 1 skip loader. Five more refuse collection vehicles are on order.

- EV charging points have been installed at the Councils offices and several Council owned car parks. See measure 10 in table 2.2. below for further information on the locations and numbers of charging points installed.

- The Suffolk Wide anti-idling campaign has been launched. To date, anti-idling events have been carried out in partnership with two schools in Ipswich with the intention of running further events in other schools. Additional anti-idling events

were planned outside schools in May 2020, but due to the ongoing COVID-19 outbreak these have been postponed. At the time of writing this report, it is hoped these events can be held in October 2020.

- The Council participated in the 2019 National Clean Air Day. As part of the Council's Clean Air Event, officers visited seven primary schools and delivered a workshop on air quality. Workshops were aimed at raising awareness of the importance of improved air quality and the steps we all can take to reduce air pollution. Every school the Council visited got the opportunity to participate in a five-day walking challenge between 17th – 21st June, that saw each pupil who walked to school every day get a free 10-day pass at one of the Council's sports facilities. 1124 passes were issued to pupils. Officers also visited a local café and delivered a presentation on air quality which was promoted via social media.
- The Introduction of a Hackney Carriage and Private Hire Licensing Policy 2019-2022 which sets standards in relation to vehicle age to help reduce the levels of pollutants emitted from the local taxi fleet.

Furthermore, the findings of the air quality modelling study for the Ipswich urban area have been published. The report assessed the potential local air quality impact of the proposed aligned local plans for the administrative areas of Ipswich Borough Council, Babergh and Mid Suffolk District Councils and East Suffolk Council which form the Ipswich Strategic Planning Area (ISPA). The assessment considered the impacts of the IBC Local Plan without and with Transport Mitigation Measures. The report can be found at: https://www.ipswich.gov.uk/sites/default/files/d33_-_ipswich_local_plan_review_aqa_vol_l_report_final.pdf and the figures/appendices that accompany the report can be found at: https://www.ipswich.gov.uk/content/submission-documents (see ref: D33, D33.1, D33.2). The results of the assessment show that the Ipswich Local Plan, even without transport mitigation in place, would not cause any exceedances of the relevant air quality standards for NO_2, PM_{10} and $PM_{2.5}$ in 2026 and 2036. This is with the exception of a predicted exceedance of the NO_2 annual mean at one location within AQMA No.2 on Crown Street. It should be noted that this location is currently a

public house where there is no relevant exposure for the purposes of the air quality objectives.

Although not a specific measure in the AQAP, the Ipswich Strategic Planning Area (ISPA) mitigation plan[4] was published in August 2019 and developed to support the update of local plans in the strategic area. Currently, from an Ipswich perspective, this plan is still at a draft stage although it will form a significant element of the town strategy for Ipswich. Measures in this mitigation include delivery of modal shift through improved infrastructure and a smarter choices programme.

Mitigation of the transport issues within Ipswich has been identified as delivering modal shift in the order of 7% for new development and 9% for existing trips. The mitigation approach considers key areas that could deliver these changes.

Smarter Choices considers influencing travel choices through behaviour change or nudges. This is a flexible concept for understanding how people think, make decisions and behave. It helps people improve their decision making, manage change and modify existing behaviour based on the choices available to them. This is a more sophisticated and sustainable approach to achieving change than the traditional methods of instruction, enforcement and regulation. It is often achieved through a number of small interactions rather than one large (and therefore unachievable or sustainable) action.

As detailed further in section 3.1.1 below, the Council also arranged for the installation and commissioning of a second automatic monitor. It was commissioned during June 2019, just outside the boundary of AQMA 5. Given that no exceedances of the annual mean or hourly averages were recorded at the site, the installation of the analyser has helped to define the boundary of AQMA No.5. Furthermore, in future years, data gathered by the analyser will contribute towards the calculation of the Local Bias Correction Factor.

Ipswich Borough Council expects the following measures to be completed over the course of the next reporting year:

- Low Emissions Strategy SPD which will help to mitigate against air quality issues arising from development.

[4] https://www.suffolk.gov.uk/assets/Roads-and-transport/public-transport-and-transport-planning/ISPA-Transport-Mitigation-v13F.pdf

- The implementation of the Councils emerging Local Plan - Policy DM3 of the Core Strategy and Policies Development Plan Document Review Final Draft specifically relates to air quality. Proposed policy CS20 relates to key transport proposals and sets out measures to mitigate against traffic impacts from planned growth within the ISPA (Ipswich Strategic Planning Area). At the time of writing this report, the Local Plan was about to be submitted to the Planning Inspectorate.
- Updating the Local Transport Plan to create a more efficient use of the highway in and around the town, and across Suffolk –The LTP strategy is currently being reviewed, once completed local town strategies will be developed which will include a medium term plan of measures to reduce congestion and increase sustainable transport. The Ipswich Strategic Planning Area (ISPA) mitigation plan developed to support the update of local plans in the strategic area, will form a significant element of the town strategy for Ipswich. Measures in this mitigation include delivery of modal shift through improved infrastructure and a smarter choices programme. Measures should start in 2020/21.
- Suffolk County Council's development of Local Ipswich Cycling and Walking Infrastructure Plans – SCC estimate completion of first LCWIP Q2, 2020. Linking in with the above strategy, SCC on the 5th June 2020 submitted plans to the Department for Transport to access the first tranche of funding for swift emergency interventions to make cycling and walking safer during the COVID-19 pandemic, in order to avoid over crowding the transport network. The measures planned will ensure those people who need and want to make essential journeys and take daily exercise by foot or bike can do so whilst maintaining social distancing.

  There are initially eighteen schemes in the first tranche across Suffolk worth £337k and subject to successful delivery of these schemes (temporarily or semi-permanently) in a 4-8 week period SCC will have the opportunity to access another £1.34m in tranche 2 for permanent schemes. The cycling schemes identified have the greatest potential to generate the highest number of additional cycling trips.

- Although not a measure listed in the AQAP, the Council has been working in partnership with Suffolk County Council (SCC) and the University of Suffolk (UoS) to determine the locations of ten portable real-time air quality monitoring stations as part of the Smarter Suffolk Live Labs trial. The trial is a two year project led by Suffolk County Council and is funded (£.4.4 million) by the Department for Transport (DfT). The air quality monitors included as part of the project measure for NO_2, PM_{10}, $PM_{2.5}$ and O_3. It is hoped that the trial will help Suffolk County Council decide what types of sensor to introduce on a larger scale to help deliver a better road network and develop initiatives aimed at improving air quality. At the time of writing, officers at the Borough Council are working with SCC and the UoS to access the real-time data. The Council will support SCC with the project and help determine the value of the data generated.
- Again, although not a measure listed in the AQAP, the Council, together with all the other Local Authorities across Suffolk have been working with Suffolk County Council's Transport and Public Health colleagues to prepare an 'Air Quality Profile' report for Suffolk. The report will map, at a district and borough level, local air pollution levels and explore evidence-based interventions that can be undertaken by local authorities, businesses, communities and individuals to improve air quality. Once the draft report has been prepared, the working group is planning to hold a public health summit, involving a range of stakeholders to highlight the findings and discuss the interventions prior to the final copy being published. This summit was planned around April 2020, but unfortunately has been delayed due to COVID-19. The proposed date for the summit has not been finalised yet but it is hoped that it will be planned for the latter part of 2020 and reported on in next year's ASR.

Ipswich Borough Council's priorities for the coming year are:

- To continue to work towards implementing the measures in the AQAP.
- To continue to monitor air quality across Ipswich as this is essential for informing our air quality work and developing measures that can provide potential improvements.

- To commission detailed dispersion modelling work to examine the boundary of AQMA 3. If the modelling indicates the boundary is to be amended, then the Council will take the necessary steps to amend the boundary of AQMA 3.
- To continue to assess and comment on planning applications and major developments in relation to air quality. This is essential in order to ensure future emission reductions within the district, and to reduce the likelihood of additional AQMAs being declared and further deterioration of air quality in existing AQMAs.
- To continue to plan a return to business continuity following the COVID-19 outbreak. At the time of writing this report, the Council is currently preparing a recovery planning document which also considers the implications of COVID-19 on air quality and the actions that the Council can take to mitigate against its impacts.

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

- Low Emissions Strategy SPD – Delays have occurred as a result of officers focusing resources on the Local Plan submission. In addition, delays have occurred as a result of officers working through comments received by internal and external partners, in particular in relation to the threshold criteria classifying the scale and type of a development and car parking standards within the IP-ONE area.

The principal challenges and barriers to implementation that Ipswich Borough Council anticipates facing are:

- Limitations on the level of dedicated resource available for air quality management activities; and
- Difficulty in obtaining sufficient support to include potentially more intrusive and/or costly interventions to secure significant and necessary improvements in air quality throughout the AQMAs.
- Officers have previously tried to engage with Primary Schools with the air quality campaign being rolled out across Ipswich, particularly those nearest to our AQMAs. Unfortunately, to date, only one school near to an AQMA has expressed an interest in participating. Officers will continue to attempt to engage with schools, but it is anticipated that uptake will be low.

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

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Low Emissions Strategy SPD	Policy Guidance and Development Control	Low Emissions Strategy	Q2, 2019	Ipswich Borough Council	Ipswich Borough Council	-	Medium	A first draft has been prepared. This is currently with the planning team who are working through comments/issues raised by Suffolk County Council as the Highways Authority. Final draft going to Council Executive in summer 2020.	Q4, 2020	Delays due to working through comments received by SCC
2	Support the Local Transport Plan to create a more efficient use of the highway in and around the town, and across Suffolk	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2019	Suffolk County Council	Suffolk County Council	-	Medium	The LTP strategy is currently being reviewed, once completed local town strategies will be developed which will include a medium term plan of measures to reduce congestion and increase sustainable transport. The Ipswich Strategic Planning Area (ISPA) mitigation plan developed to support the update of local plans in the strategic area, will form a significant element of the town strategy for Ipswich. Measures in this mitigation include delivery of modal shift through improved infrastructure and a smarter choices programme.	The LTP update is due Q3 2020, once that is published, SCC will move to create town based strategies. Starting 2020/21 duration to 2025/26	Funding through LTP allocation and from ISPA LPA's. COVID-19 outbreak may offer more opportunities to increase active travel, especially if funding is allocated for long term solutions.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
3	Embed air quality considerations in the Councils Local Plan	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Q1, 2019	Ipswich Borough Council	Ipswich Borough Council	Air quality considerations embedded in Local Plan	Medium	Final draft of plan agreed on 8th Jan 2020 by full Council. Public consultation ended 2nd March 2020. At the time of writing this report, the final draft of the Local Plan was being prepared for submission to the planning inspectorate.	2020	Adopted Local Plan 2017 currently implemented. Policy DM3 of the Core Strategy and Policies Development Plan Document Review Final Draft specifically relates to air quality. Proposed policy CS20 relates to key transport proposals and sets out measures to mitigate against traffic impacts from planned growth within the ISPA (Ipswich Strategic Planning Area)
4	Support Suffolk County's development of Local Ipswich Cycling and Walking Infrastructure Plans, and work to improve existing cycle routes	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2019	Suffolk County Council	Suffolk County Council	-	-	Policy Development Panel complete, first LCWIP produced Q2 2020.	Q2 2020	Funding not allocated, only schemes identified & scored as per Cabinet approval

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
5	Comment on best practice measures in relation to air quality in planning applications and major developments. Support alternatives to single occupancy car use arising from new developments, through the use of robust travel plans secured through the planning process	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2019	Ipswich Borough Council	Ipswich Borough Council	100% of relevant planning applications assessed	Medium	Ongoing measure - all relevant applications assessed	Ongoing measure - all relevant applications assessed	Air Quality Assessments asked for in line with EPUK/IAQM guidance. Low emissions SPD should support this measure. SCC are able to deliver travel plans to new developments, which helps with a number of factors and ensures consistency of messages regarding active and sustainable travel options across all developments. The first ever Modeshift award for a residential development was in Ipswich: https://www.modeshiftstars.org/first-residential-development-achieves-national-stars-accreditation Unfortunately, the ongoing COVID-19 outbreak has hampered the opportunity to promote this.
6	Introduction of taxi emissions standards policy	Promoting Low Emission Transport	Taxi Licensing conditions	Q2, 2018	Ipswich Borough Council	Ipswich Borough Council	Reduction in non-Euro 6 Diesel	Low	Completed - New Hackney Carriage and Private Hire Licensing Policy 2019-2022	Completed	Policy came into place relating to age of vehicles in 2020. Average age of vehicle licenced by IBC approx. 8 years. In order to be licenced, vehicles must be less than 15 years old.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
7	Work with Ipswich Buses bus fleet to encourage the renewal of their fleet to cleaner i.e. Euro VI or better and/or low emission, hybrid buses, on certain routes	Vehicle Fleet Efficiency	Other	2020	Ipswich Borough Council, Ipswich Buses	Ipswich Buses	4 Euro IIII buses projected for replacement in 2020. 9 Euro IV buses projected for replacement in 2023 with buses at least Euro V or better. 8 buses projected for replacement in 2026 with buses at least Euro V or better. Reduced fleet emissions	Low	13 Euro V buses acquired in 2019. IBC has signed up to a Quality Bus Partnership with SCC, Ipswich Buses and First on 25 May 2020. The QBP work is linked to ISPA and town strategy.	2020 (and 2026)	Due to the ongoing COVID-19 outbreak, and the uncertainty of trading across the economy, it is unlikely that any of the fleet will be replaced over the next year. SCC had also been working with operators and IBC to submit a bid for the All Electric Bus Town Grant. Unfortunately, SCC were not able to meet the requirements of the expression of interest, largely due to the amount of match funding required from the bus operators. It would have been very challenging prior to the COVID-19 outbreak and was made much more difficult given the uncertainty around public transport and the much reduced vehicle capacity. Despite being unable to provide an expression of interest, a letter has been sent by SCC to the DfT to emphasise that we remain keen to move towards electric buses and to explain the difficulties presented to our bus operators. Air quality officers have also spoken to Ipswich Buses about refraining from idling the fleet where possible.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
8	Work with other Bus Operators in the town (i.e. First, Norse, Beestons) to encourage the renewal of their fleet to cleaner i.e. Euro VI or better and/or low emission, hybrid buses, on certain routes	Vehicle Fleet Efficiency	Other	2019	Ipswich Borough Council	Bus Operators	Reduced fleet emissions	Low	Ongoing. IBC has signed up to a Quality Bus Partnership with SCC, Ipswich Buses and First on 25 May 2020. The QBP work is linked to ISPA and town strategy.	Ongoing	SCC had been working with operators and IBC to submit a bid for the All Electric Bus Town Grant. Unfortunately, SCC were not able to meet the requirements of the expression of interest, largely due to the amount of match funding required from the bus operators. Air Quality Officers have also have spoken to operators about not idling vehicles.
9	Procurement of low emission vehicles in Ipswich Borough Council Fleet	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2019	Ipswich Borough Council	Ipswich Borough Council, (OLEV part funded via plug in grants)	Provision of new vehicles	Low	Electric fleet now consists of 14 electric cars and 17 small electric vans. 3 more electric vans arriving mid-June (delayed from April due to Covid-19 lockdown). Euro 6 fleet now comprised of 7 pickups, 6 tippers, 6 refuse collection vehicles and 1 skip loader. 5 more refuse collection vehicles on order.	2022	3 year replacement plan for small vehicle fleet to zero emission. Larger vehicles to be euro VI standard

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
10	Provision of EV charging points across IBC officers, Crown Street and Elm Street public car parks and investigate the feasibility of additonal charging points across IBC car parks	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2019	Ipswich Borough Council	Ipswich Borough Council	Provision of 4 charging stations (8 points) at Grafton House. Usage of EV charging points by the public	Low	Number of charging points now installed at the following locations: Grafton House – 26 Gipping House – 8 Christchurch Mansion – 4 Chantry Park – 2 Holywells Park – 2 Crematorium – 1 Gainsborough sports centre – 2 Crown Car Park – 27 Elm St Car Park – 3 Majors Garage – 1 Upper Orwell Street North Car Park soon to open and will have 3 charging points. Portman road car park application currently being considered with 149 points proposed with capacity for 298 points.	Completed but ongoing in additional IBC car parks	Provision of additional charging points depends on success of usage of current charging points. Current usage at Crown Car Park low – no more than 5%.
11	Development and implementation of an anti-idling campaign, including where appropriate an enforcement regime	Public Information	Other	2019	Ipswich Borough Council	Ipswich Borough Council	Development of campaign materials	Low	Campaign materials produced by the Suffolk Air Quality Working Group. The Council have engaged with two schools to deliver anti-idling events outside the school gates	2020 - to investigate/ implement enforcement regime. Ongoing - campaigns	Awaiting new guidance and proposals from DfT on updated anti-idling measures and enforcement before deciding whether to implement an enforcement regime. COVID-19 has delayed engaging with schools/ organisations to deliver further anti-idling campaigns

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
12	Campaign to raise awareness of air quality issues in schools near AQMAs to subsequently influence behavioural change and improve air quality near schools	Public Information	Other	2019	Ipswich Borough Council	Ipswich Borough Council	Present information to schools near AQMAs and within the borough.	Low	All schools nearest to the AQMAs have been contacted. Presentation delivered in seven primary schools. 1124 sports passes were issued to pupils for walking, cycling or scooting to school between 17th – 21st June 2019. One school who has engaged is near to AQMA 2	Ongoing awareness campaign in schools willing to engage with the campaign	COVID-19 has delayed in engaging with schools. School events planned for May 2020, but now postponed until October 2020 which coincides with International Walk to School month and Clean Air Day on 8th October.
13	Active participation in annual Clean Air Days	Public Information	Other	2019	Ipswich Borough Council	Ipswich Borough Council	Participation in annual Clean Air Days	Low	Participated in an event in 2019. Started to plan an event for 2020 but COVID-19 has delayed this	Ongoing commitment	COVID 19 has delayed the planning and date of this years event. Clean Air Day now planned for 8th October and IBC will take part.
14	Promote the Councils Green Travel Plan to employees, including use of agile working	Promoting Travel Alternatives	Workplace Travel Planning	2019	Ipswich Borough Council	Ipswich Borough Council	Annual promotion of travel plan. Increase in the number of employees walking, cycling or using public transport in the Councils Travel Plan survey	Low	Travel Plan questionnaire was rolled out to staff in May 2019 and baseline levels of walking, cycling and public transport obtained Findings of travel survey communicated with staff via internal blog in November 2019. Due to COVID 19 outbreak, next travel plan questionnaire has been postponed untill September 2020.	Ongoing promotion	For IBC employees travelling to work of journeys up to 4 miles, found that it takes on average 18 minutes to cycle, whilst car journeys of the same distance take approximately 22 minutes. 4 minute saved on your commute by cycling. Message communicated in internal blog to staff. Due to the ongoing COVID-19 outbreak, most office based employees have been working remotely from home.

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15	Investigating the feasibility of promoting air quality messages on non-IBC owned variable message signs around Ipswich (e.g. Bury Road)	Public Information	Other	2019	Ipswich Borough Council, Suffolk County Council	Suffolk County Council		Low	Previously agreed with SCC that signs could be used to promote 2019 Clean Air Day event. Unfortunately, SCC decided against this near the campaign launch due to the messages not satisfying their requirements. IBC will work with SCC to try and determine messages that satisfy their requirements.		SCC requirements to use the VMS largely restrict messages that can be displayed. They cannot be too long, refer to secondary sources of information or ask a question.
16	Investigate the feasibility of promoting air quality messages on IBC procured variable message signs around Ipswich	Public Information	Other	2019	Ipswich Borough Council	Ipswich Borough Council	Promote anti-idling messages quarterly	Low	Unfortunately there has been a delay in procuring and installing the VMS. The order for the VMS is now forecast for Q3, 2020	Ongoing use	VMS capable of issuing air quality messages

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17	Explore opportunities to increase Ipswich's Park and Ride scheme, including consideration given to re-opening the Bury Road Park and Ride, and promote current schemes to incentivise people coming into Ipswich town centre to use public transport over private cars	Alternatives to private vehicle use	Bus based Park & Ride	2019	Ipswich Borough Council	Not known at this stage	Increase in Park and Ride uptake	Low	None	TBC	Currently looking for alternative sites. Old Bury Road Park and Ride site in use and further development planned in the vicinity. The Bury Rd P&R is in the ISPA transport mitigation strategy but not for immediate action. It is important to increase bus patronage across the town first otherwise additional routes will just split existing use and challenge financial viability of all services. This will be progressed through the QBP in future. Barriers to development of this measure include increasing bus patronage, linked to level and cost of parking in the town.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
18	Review (in conjunction with other IBC/ SCC work streams), the traffic management arrangements in the St Matthews St/ Norwich Rd corridor. Maintaining delivery facilities, whilst minimising disruption to traffic flows	Freight and Delivery Management	Quiet & out of hours delivery	Q1, 2019	Suffolk County Council	Suffolk County Council	Reduction in congestion along Norwich Road & St Matthews Street	Low	A working group was established between SCC and IBC to review the traffic arrangements in the area and regular meetings been taking place to discuss a way forward. Shortly will engage businesses with the group. Currently a questionnaire was being prepared between a local business representative in the area and the working group to establish business views on air quality, loading and parking. Hopefully survey will establish issues such as times of delivery/ size of vehicle/what we can do to help businesses with any changes/what changes they would like to see. Lines along the road have been recently reviewed/repainted to ensure the current loading restrictions can be enforced.	TBC - depends on measures implemented	Discussed a number of possible options including: Removing loading/unloading restrictions on the road altogether, but would need to find a suitable location for loading/unloading; removing lunchtime restriction and extend am/pm restrictions; different restrictions on opposite sides of the road; loading/unloading at other specified times; 20mph speed limit; one way system at junction of Norwich Rd/Orford St. Hopefully survey with businesses with reveal business preferences.

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19	Promote the use of South Street (to be renamed Norwich Road Car Park), short term parking bays behind businesses on Norwich Road. Incentivising use of allocated parking and enforcement against unauthorised on street loading/ parking.	Traffic Management	Other	2019	Ipswich Borough Council	Ipswich Borough Council	Reduction in congestion along Norwich Road/St Matthews Street. Number of penalty notices served.	Low	Destination Norwich Road website produced. Previously raised issue that website does not promote free short term car parking spaces although it does mention the car park. Will raise this again with project team.	Ongoing promotion	16 PCN's were issued between 01/03/2019 – 01/03/2020 for overstaying in the 15 minute bays in the car park. Lines along Norwich Road/St Matthews Street were reviewed/repainted in June 2020 to ensure the current loading restrictions can be enforced.
20	Review opportunities for alterations to traffic management to reduce congestion in AQMAs (including opportunities on Berners Street while still providing a convenient facility for pedestrians)	Traffic Management	Other	2019	Suffolk County Council	Suffolk County Council	Reduction in congestion on Civic Drive/ St Matthews Street roundabout	AQMA No.5 approx. 2% reduction in NOx	Ipswich Strategic Planning Area commissioned an air quality assessment which modelled the impacts of the proposed Local Plan on Air Quality. Delays encountered with receiving report but now finalised. Report indicates that by 2026 and 2036 only 1 exceedance of the annual mean air quality objective for NO_2 should be experienced at Crown Street in AQMA 2. Currently the location predicted as an exceedance is not classed as a relevant receptor for the purposes of the air quality objectives. Opportunities to alterations to traffic management inked to ISPA mitigation work and town strategy.	No deadlines known	Possible mitigation dependant on funding and appropriate support from stakeholders. Likely that funding will be sought as and when opportunity arises, unless suitable funding agreement made available from other sources eg Defra or DfT.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
21	Consider and explore the feasibility of further measures that would improve air quality within both AQMAs and across the borough, including emissions testing within AQMAs, clean air zones, low emission zones and congestion charging	Promoting Low Emission Transport	Other	2019	Ipswich Borough Council	Not known at this stage - depends on the measures proposed	-	High (if LEZ/ congestion charging introduced)	Ipswich Strategic Planning Area commissioned an air quality assessment which modelled the impacts of the proposed Local Plan on Air Quality. Delays encountered with receiving report but now finalised. Report indicates that by 2026 and 2036 only 1 exceedance of the annual mean air quality objective for NO_2 should be experienced at Crown Street in AQMA 2. Currently the location predicted as an exceedance is not classed as a relevant receptor for the purposes of the air quality objectives.	2026 and 2036 for local plan growth across the ISPA areas	Possible mitigation dependant on funding and appropriate support from stakeholders.
22	Provision of A rated boilers in IBC owned housing stock	Promoting Low Emission Plant	Other Policy	2019	Ipswich Borough Council	Ipswich Borough Council	All larger properties are to have low NOx boilers, defined as boilers that meet a dry NOx emission rating of 40mg/kWh	Low	Ongoing installation	2022	
23	Work with the Private Sector Housing team to improve their renovation grant criteria and include air quality considerations	Policy Guidance and Development Control	Other policy	2019	Ipswich Borough Council	Ipswich Borough Council	100% of all grants with air quality implications	Low	None to date	Ongoing rollout of renovation grants	Currently the renovation grant criteria is being reviewed which may impact on whether this measure can be progressed. It may need amending. Any changes will be reported on in next years ASR.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
24	Development and implementation of campaign to provide information about the impacts of domestic burning and good practice, including wood burners and burning of garden waste	Public Information	Other	2019	Ipswich Borough Council	Ipswich Borough Council	Reduction in number of domestic burning complaints received	Low	Updated website to include information on domestic burning.	Ongoing promotion once campaign launched	Aware that coal and wet wood will be banned from sale in 2021. Furthermore, aware that gas central heating boilers are to be banned in new build properties by 2025. In light of planned changes to legislation, currently reviewing whether a domestic burning campaign is currently required, particularly considering Ipswich's air quality problems are largely attributed to traffic issues. IBC currently preparing a recovery plan in light of COVID-19 outbreak which includes reviewing whether a bonfire bylaw is required. Comms messages have been published to try and educate the public regarding the health impacts of domestic burning and alternatives.
25	Investigate what other organisations in the town are doing with regards to fleet renewal (e.g. other Local Authorities and large businesses) and whether there are opportunities (and funding) for an accelerated take up of ULEVs in the town	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2019	Ipswich Borough Council. Other organisations	Depends on organisation as to the funding source	-	Low	SCC have set up an EV officer group to review options for EV charging.	Unknown at this point. Likely to be ongoing engagement with organisations	IBC currently considering the best approach and department to progress this measure. DfT have announced extra funding for On-Street Residential Charging Scheme, not yet known if SCC or IBC will apply. Need to scope a number of factors including power, households with most need, infrastructure requirements etc before deciding

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
26	Assist the Councils Car Parking Services in the development of their policies and strategies to promote clean travel and improved air quality. Review use of short and long stay car parks	Promoting Low Emission Transport	Other	2019	Ipswich Borough Council	Ipswich Borough Council	-	Low	The Council has not reviewed any parking tariffs since the last ASR. It may consider reviewing them during the next reporting period. Current IBC parking strategy restricts new long term parking in central car parking core to encourage employees to travel to work by sustainable means.	Unknown at this point	
27	Continue to explore the possibility and apply to DEFRA for grant funding under Air Quality Grant Schemes and any other appropriate funding	Promoting Low Emission Transport	Other	2019	Ipswich Borough Council (and Suffolk County Council depending on the nature of the bid)	DEFRA/ other sources of funding	-	Depends on the nature of the works relating to grant funding	Applied for a grant under DEFRA's Air Quality Grant Programme in 2019 to address air pollution in AQMA 5. Unfortunately was unsuccessful with the bid. Discussions are taking place between air quality officers across Local Authorities in Suffolk regarding whether to submit a joint bid to DEFRA in the next round of funding.	TBC – dependant on grant availability and successful bid for funding	Measure dependant on grant availability and successful bid for funding. SCC had been working with operators and IBC to submit a bid for the All Electric Bus Town Grant. Unfortunately, SCC were not able to meet the requirements of the expression of interest, largely due to the amount of match funding required from the bus operators. It would have been very challenging prior to the COVID-19 outbreak and was made much more difficult given the uncertainty around public transport and the much reduced vehicle capacity. Despite being unable to provide an expression of interest, a letter has been sent by SCC to the DfT to emphasise that we remain keen to move towards electric buses and to explain the difficulties presented to our bus operators.

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

As detailed in Policy Guidance LAQM.PG16[5] (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Suffolk Air Quality Group, of which Ipswich Borough Council is a member, has engaged with Suffolk County Council (SCC) Public Health and Protection to pursue a unified approach to tackling $PM_{2.5.}$ This is focused on promoting modal shift away from motor vehicle use towards active means of travel such as walking and cycling. Further details on this approach can be found in the Healthy Suffolk Joint Strategic Needs Assessment (JSNA) Topic Report on Air Quality[6].

The Public Health Outcomes Framework (PHOF) is a Public Health England data tool, intended to focus public health action on increasing healthy life expectancy and reducing differences in life expectancy between communities. The PHOF includes an indicator, based on the effect of particulate matter ($PM_{2.5}$) on mortality. According to the public health outcomes framework, the fraction of mortality in those aged over 30 years, attributable to particulate air pollution (measured as $PM_{2.5}$) in 2018 in Ipswich is 5.91%, above the average for England (5.15%), and similar to that of the East of England Region (5.52%). This would suggest that $PM_{2.5}$ concentrations in Ipswich are slightly higher than other areas in the UK[7].

As highlighted in section 2.2 above, the Council commissioned a study to assess the air quality impact of the proposed aligned local plans for the Ipswich Strategic Planning Area (ISPA). The assessment considered the impacts of the IBC Local Plan without and with Transport Mitigation Measures. The results of the assessment show that, based on the significance criteria taken from the Environmental Protection UK / Institute of Air Quality Management (EPUK/IAQM) guidance '*Land-Use Planning &*

[5] https://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf
[6] https://www.healthysuffolk.org.uk/jsna/air-quality
[7] https://fingertips.phe.org.uk/static-reports/public-health-outcomes-framework/at-a-glance/e07000202.html

Development Control: Planning For Air Quality"[8], the effects of the Ipswich Local Plan are predicted to be negligible in 2026 and 2036 for PM_{10} and $PM_{2.5}$. This is a positive finding, but the Council will continue to work towards reducing concentrations of particulates. The modal shift to more active & sustainable travel choices, delivered through the ISPA strategy will also contribute to the reduction of particulates. Through reduced vehicle use, tyre and brake dust will lessen, increased walking and cycling will reduce the need for short journeys in urban areas in and through the AQMAs.

Ipswich Borough Council anticipates that the measures within the Action Plan, whilst primarily targeted at NO_2, will also contribute toward a reduction in $PM_{2.5}$. Proposals focussing on measures such as supporting the development of the local transport plan, promoting public transport and the staff travel plan will also help to reduce overall vehicle trips, reducing $PM_{2.5}$ emissions both through reductions in fuel usage and brake and tyre wear. However, sources of $PM_{2.5}$ extend beyond transport. Ipswich Borough Council continues to enforce statutory controls on combustion emissions from both industrial and domestic sources, which both contribute to $PM_{2.5}$ concentrations.

During the latter part of 2019 and early 2020, the Council, together with all the other Local Authorities across Suffolk were working with Suffolk County Council's Transport and Public Health colleagues to prepare an 'Air Quality Profile' report for Suffolk. The report will map, at a district and borough level, local air pollution levels and explore evidence-based interventions that can be undertaken by local authorities, businesses, communities and individuals to improve air quality. Once the draft report has been prepared, the working group is planning to hold a public health summit, involving a range of stakeholders to highlight the findings and discuss the interventions prior to the final copy being published. This summit was planned around April 2020, but unfortunately has been delayed due to COVID-19. The proposed date for the summit has not been finalised yet.

[8] http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

We will continue to consult with Suffolk County Council Public Health colleagues and be advised by them, and national guidance, on any relevant measures that will reduce exposure to $PM_{2.5}$.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

The Councils first automatic monitor is positioned just outside the boundary of AQMA No.1. on Chevallier Street.

The Councils second automatic monitor was positioned just outside the boundary of AQMA No.5. on St Matthews Street. The location was chosen due to a number of factors including:

- The location was nearby to AQMA 5, which has recorded the highest level of exceedance over the annual mean objective level for NO_2 for the last 5 years. Receptors are set back from the monitoring location but remain in the vicinity.
- Not close to point source of emissions.
- Access to a permanent power supply, in an open, but relatively discreet location (largely obscured by metal railings), but can be accessed easily and safely. A street works licence was obtained by Suffolk County Council for the site.

Ipswich Borough Council undertook automatic (continuous) monitoring at two sites during 2019. Note: The Councils second automatic monitor was commissioned during June 2019, hence at the time of writing this report a full years' worth of data has yet to be obtained. The monitor has been operating reliably with a high data capture rate since installation, so it is hoped that by the time of next years ASR, a full years data will have been obtained.

Table A.1 in Appendix A shows the details of the monitoring sites.

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.

National monitoring results are available at https://uk-air.defra.gov.uk/.

3.1.2 Non-Automatic Monitoring Sites

As part of its normal monitoring programme, Ipswich Borough Council undertook non- automatic (passive) monitoring of NO_2 at 81 sites during 2019. **Error! Reference source not found.** 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 distance correction), are included in Appendix C.

In order to further understand pollution levels around key junctions in the town, four additional non-automatic monitoring locations were installed in 2019. These locations are at:

- Crown Street (in AQMA.No.2)
- Grove Lane (just outside AQMA. No.2 near to the Junction with Spring Road and St Helens Street)
- Fore Hamlet. This was located on a relevant receptor in proximity to where an exceedance of the annual average air quality objective was found during the special project conducted in 2017 (site ID: SP25). The special project was reported on in the 2018 ASR. For ease of reference, the annual mean NO_2 monitoring results from the special project are included at the bottom of Table A.3 of this year’s ASR.
- Vernon Street. This was located on a relevant receptor in proximity to where an exceedance of the annual average air quality objective was found during the special project conducted in 2017 (site ID: SP5). The special project was reported on in the 2018 ASR. For ease of reference, the annual mean NO_2 monitoring results from the special project are included at the bottom of Table A.3 of this year’s ASR.

Once distance and bias corrected, none of these new locations were in exceedance of the annual mean NO_2 concentration. Further details can be found in Appendix B. The Council will continue to monitor levels of pollution at these sites in 2020 and report on them in the 2021 ASR.

In addition to the above new monitoring sites, the position of five existing diffusion tube locations were relocated at the beginning of 2019. These locations were:

- Diffusion Tube 4 – Formerly location on Berners Street. Moved to Norwich Road to a relevant receptor in AQMA 5. Moved from Berners Street due to readings consistently below the NO_2 annual average objective level and the presence of other diffusion tubes on the road.
- Diffusion Tube 18 – Previously located on the side of the same relevant receptor (dwelling house) in the vicinity of AQMA 4. Relocated to the front of the property due to the presence of a downpipe that enabled the tube to be securely fitted.
- Diffusion Tube 37 – Formerly located on Lower Brook Street. Moved from Lower Brook Street due to readings consistently below the NO_2 annual average objective level. Relocated to Star Lane due to the presence of a new introduced relevant receptor (a building converted into flats).
- Diffusion Tube 39 – Previously located on the junction of Star Lane and Fore Street. Relocated to Star Lane, near to the same junction previously monitored. Relocated due to the presence of a new introduced relevant receptor (a building converted into flats).
- Diffusion Tube 75 – Previously located on Grimwade Street near to commercial premises due to be demolished. Relocated to a relevant receptor (dwelling house) in the vicinity of the previous monitoring location.

Once distance and bias corrected, diffusion tube 18 recorded an exceedance of the annual mean NO_2 concentration. None of the other tubes recorded an exceedance of the annual mean NO_2 concentration. Further details can be found in Appendix A. The Council will continue to monitor levels of pollution at these sites in 2020 and report on them in the 2021 ASR.

Additional non-automatic locations were installed in 2020. These locations are at:

- Upper Orwell Street (just outside AQMA. No.2 approximately 20m from the junction with Old Foundary Road, St Margaret’s Street and St Helens Street). Location chosen due to becoming aware of new receptors being introduced in the area.

- Northgate Street. Location chosen due to becoming aware of new receptors in the area.
- Stoke Street. Location chosen in order to further understand pollution levels around the town.
- Hadleigh Road (two Locations) and London Road (one location). Locations were chosen as a result of an allocation of housing just outside the Ipswich Borough boundary. This development may impact of pollution levels within the town as the additional traffic generated from the development may travel along the roads into/out of Ipswich. Monitoring levels of pollution now will help to establish a current baseline level.
- Ipswich Hospital. Location chosen in order to further understand pollution levels around the town.

The findings of the additional monitoring will be reported on in the 2021 ASR.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[9], "annualisation" (where the data capture falls below 75%), and distance correction[10]. Further details on adjustments are provided in Appendix C. The local and national bias correction factors were both calculated as 0.75, hence bias adjustment and analysis has been carried out on the 2019 data using both the local and national correction factors.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. Note that the concentration data presented in Table A.3 represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes

[9] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[10] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

distance corrected values, only where relevant. There are no annual averages greater than 60µg/m^3 that would indicate an exceedance of the 1-hour mean objective.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year – during 2019 no exceedances were recorded.

Looking at the locally bias adjusted and distance corrected data for the non-automatic monitoring locations, exeedances of the annual mean NO_2 concentration were found at 8 unique locations, 6 of which are located within current AQMA boundaries. Of the 6 exceedances within AQMAs;

- 2 located in AQMA 2 (sites 11, 12 &19 – triplicate, 68)
- 4 located AQMA 5 (sites 49, 52, 53, 64&65 – duplicate)

The remaining 2 exceedances are:

- Site 18, which has an annual mean NO_2 concentration of 40.5µg/m^3 and is located on the periphery of AQMA 4.
- Site 30, which has an annual mean NO_2 concentration of 43µg/m^3 and is located on the periphery of AQMA 3.

As this is the first year site 18 has recorded an exceedance of the annual mean NO_2 concentration, the Council will continue to monitor the site and review whether to amend the boundary of AQMA 4 should further exceedances of the objective level be noted. The Council will report on this in future ASR's.

Due to site 30 exceeding the annual mean NO_2 concentration for the last few years, the Council will now arrange for detailed dispersion modelling work to be carried out to support the decision to amend the boundary of AQMA 3. The results of the detailed dispersion modelling and amending AQMA 3 will be reported on in next years ASR.

Site 31 is shown as an exceedance in the tables and maps below but there is no relevant receptor near to this site so the annual mean objective level does not apply. In light of this, site 31 has not been included in the number of exceedances listed above.

No exceedances were located in AQMA's 1, 3 and 4. However, site 14 in AQMA 1 and sites 5 and 39 in AQMA 3 were within 10% of the annual mean objective level. Given the influence of meteorological conditions on pollutant concentrations, further monitoring will be carried out over future years to confirm levels remain below the objective. If levels within the AQMAs continue to fall below the objective, the Council will conduct a detailed assessment with a view to revoking the AQMAs. Having said that, consideration will also be given to any exceedances outside the boundaries of the AQMAs (such as sites 18 and 30 mentioned above) and whether the AQMAs need to be amended rather than revoked. Such matters will be considered during the dispersion modelling work to be carried out when reviewing the boundary of AQMA 3.

When comparing the 2019 results to the 2018 results generated using the locally derived bias adjustment factor, six less exceedances overall are noted. These were in AQMA 1 (site 14), AQMA 2 (sites 24, 27 and 66) and AQMA 3 (sites 5 and 39). Site 17 outside the periphery of AQMA 2 also no longer exceeds the annual mean objective level, however as site 18 now exceeds the objective level, the number of exceedances less is six not seven. In general, prior to distance correction, concentrations across all sites within the borough have fallen on average by around 1-3µg/m^3 *Note – this comparison excludes new monitoring locations. This is with the exception of site 63 which increased by 1µg/m^3. Currently the reason for this is unkown but the Council will continue to monitor the site and report on this in next years ASR.

Despite using the local bias adjustment factor for this years ASR (which also happens to be the nationally dervived bias adjustement factor – both at 0.75), the data was also compared against the 2018 results analysed using the nationally dervided bias adjustment factor. Looking at the data corrected via the national factor and subsequent distance correction, the same number of exceedances were recorded for both 2018 and 2019 results i.e. 8 exceedances. In general, prior to distance correction, concentrations across 16 sites have remained unchanged, 47 have increased (by 1-2µg/m^3 on average) and 8 have decreased (by 1-2µg/m^3 on average) * Note – this comparison excludes new monitoring locations. The Council will continue to review the choice of bias correction factors in future ASR's and if the

locally dervived factor is selected, the results will nonetheless be examined using the national factor to assist with trend analysis.

Figure A.1 shows bias and distance corrected trendline plots for clusters of passive monitoring locations in and around each of the 5 AQMAs. All would appear to indicate that annual mean NO_2 levels remain essentially unchanged, with a marginal downward trajectory when looking at the results analysed via the local bias correction factor.

3.2.2 Particulate Matter (PM_{10})

Ipswich Borough Council does not monitor for particulate matter (PM_{10}) – historical studies / monitoring have not identified any exceedance of the objective levels.

3.2.3 Particulate Matter ($PM_{2.5}$)

Ipswich Borough Council does not monitor for particulate matter ($PM_{2.5}$).

3.2.4 Sulphur Dioxide (SO_2)

Ipswich Borough Council does not monitor for Sulphur Dioxide (SO_2) – previous screening work has not suggested that there will be any exceedance of the objective levels.

Appendix A: Monitoring Results

Table A.1 - Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
IPS3	Chevallier Street	Roadside	615261	245350	NO_2	YES *AQMA 1*	Chemiluminescent	2.5	2.5	1.5
IPS04	St Matthews Street	Roadside	615870	244858	NO_2	NO	Chemiluminescent	12.8	2.9	1.38

Notes:

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

(2) N/A if not applicable

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

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
1	Civic Drive	Kerbside	615992	244412	NO_2	NO	18.8	6	NO	2.63
2	Chevallier Street	Kerbside	615144	245245	NO_2	Yes - AQMA 4	1.55	1.95	NO	2.43
3	Coprolite Street / Duke Street	Kerbside	617070	244039	NO_2	NO	N/A	0.8	NO	2.55
4	Norwich Road	Kerbside	615620	245000	NO_2	Yes- AQMA 5	0	5.7	NO	2.4
5	Fore Street	Kerbside	616887	244128	NO_2	Yes - AQMA 3	0.9	3.3	NO	2.44
6	Kings Avenue	Background	617286	244420	NO_2	NO	N/A	3.8	NO	2.45
7	Bramford Road	Kerbside	615007	245239	NO_2	NO	0	5.6	NO	2.3
8	Bramford Road	Kerbside	615125	245209	NO_2	NO	4.25	2.2	NO	2.45
9	Bramford Road	Kerbside	615125	245209	NO_2	NO	4.25	2.2	NO	2.45
10	Bramford Road	Kerbside	615125	245209	NO_2	NO	4.25	2.2	NO	2.45
11	St Margaret's Street / Piper's Court	Kerbside	616593	244753	NO_2	Yes - AQMA 2	0	2.45	NO	2.27
12	St Margaret's Street / Piper's Court	Kerbside	616593	244753	NO_2	Yes - AQMA 2	0	2.45	NO	2.27
13	Bramford Lane	Kerbside	615117	245305	NO_2	NO	3.3	1.2	NO	2.52

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
14	Chevallier Street	Kerbside	615285	245393	NO_2	Yes - AQMA 1	0.35	2.5	NO	2.2
15	Tavern Street	Background	616282	244643	NO_2	NO	N/A	N/A	NO	2.62
16	Valley Road / Westwood Court	Kerbside	615362	245437	NO_2	NO	2.6	3.1	NO	2.48
17	Woodbridge Road	Kerbside	616993	244659	NO_2	NO	2.1	1.78	NO	2.49
18	Yarmouth Road	Kerbside	615090	245178	NO_2	NO	0	3.15	NO	2.24
19	St Margaret's Street / Piper's Court	Kerbside	616593	244753	NO_2	Yes - AQMA 2	0	2.45	NO	2.27
20	Fonnereau Road	Kerbside	616458	244829	NO_2	NO	1.8	2.22	NO	2.6
21	St Margaret's Plain	Kerbside	616494	244807	NO_2	Yes - AQMA 2	N/A	2	NO	2.42
22	St Margaret's Plain / Northgate Street	Kerbside	616489	244785	NO_2	Yes – AQMA 2	N/A	1.55	NO	2.59
23	St Margaret's Green	Kerbside	616645	244784	NO_2	NO	0	3.25	NO	2.49
24	St Margaret's Street	Kerbside	616663	244692	NO_2	Yes - AQMA 2	N/A	3.3	NO	2.38
25	St Helen's Street	Kerbside	616753	244582	NO_2	Yes - AQMA 2	1.05	2.95	NO	2.54

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
26	St Helen's Street / Grimwade Street	Kerbside	616971	244511	NO_2	NO	0	3.6	NO	2.29
27	Argyle Street	Kerbside	616965	244546	NO_2	Yes - AQMA 2	0.3	1.2	NO	2.32
28	Chevallier Street	Kerbside	615194	245292	NO_2	Yes - AQMA 4	2.62	1.9	NO	2.48
29	Fore Hamlet	Kerbside	617118	244074	NO_2	NO	0	2.2	NO	2.65
30	Fore Street	Kerbside	616939	244114	NO_2	NO	1.4	2.65	NO	2.46
31	Star Lane	Kerbside	616332	244149	NO_2	NO	N/A	2.4	NO	2.3
32	Spring Road	Kerbside	617398	244573	NO_2	NO	2.9	2	NO	2.5
33	Key Street	Kerbside	616666	244114	NO_2	Yes - AQMA 3	0	2	NO	2.47
34	College Street	Kerbside	616467	244072	NO_2	Yes- AQMA 3	N/A	1.75	NO	2.52
35	Cobden Place	Kerbside	616746	244696	NO_2	NO	0	1.12	NO	2.37
36	Valley Road	Kerbside	616820	246158	NO_2	NO	15	2.2	NO	2.45
37	Star Lane	Kerbside	616845	244252	NO_2	NO	0	1.1	NO	2.45
38	Civic Drive	Kerbside	615904	244805	NO_2	NO	6.3	0.85	NO	2.47
39	Star Lane	Kerbside	616712	244228	NO_2	Yes - AQMA 3	1.25	0.75	NO	2.35
40	Norwich Road	Kerbside	615460	245148	NO_2	NO	5.7	2.75	NO	2.4

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
41	Bramford Road / Norwich Road	Kerbside	615564	245010	NO_2	NO	0.5	1.3	NO	2.52
42	Norwich Road	Kerbside	615744	244901	NO_2	Yes - AQMA 5	0	2.3	NO	2.54
43	Bramford Road / Yarmouth Road	Kerbside	615109	245200	NO_2	Yes - AQMA 4	0.55	3.6	NO	2.4
44	Bramford Road	Kerbside	615052	245237	NO_2	NO	4.8	1.6	NO	2.4
45	Chevallier Street	Kerbside	615261	245350	NO_2	Yes - AQMA 1	2.5	4.15	YES	1.2
46	Chevallier Street	Kerbside	615261	245350	NO_2	Yes - AQMA 1	2.5	4.15	YES	1.2
47	Chevallier Street	Kerbside	615261	245350	NO_2	Yes - AQMA 1	2.5	4.15	YES	1.2
48	Valley Road	Kerbside	615425	245486	NO_2	NO	7.35	2.55	NO	2.73
49	St Matthew's Street	Kerbside	615792	244876	NO_2	Yes - AQMA 5	0	1.85	NO	2.58
50	Barrack Lane	Kerbside	615773	244890	NO_2	Yes - AQMA 5	1.52	1.4	NO	2.44
51	St Matthew's Street	Kerbside	615769	244866	NO_2	Yes - AQMA 5	4.53	0.85	NO	2.58
52	St Matthew's Street	Kerbside	615826	244871	NO_2	Yes - AQMA 5	0	2.15	NO	2.52
53	St Matthew's Street	Kerbside	615820	244858	NO_2	Yes - AQMA 5	0	2.15	NO	2.33

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
54	St Matthew's Street Roundabout	Kerbside	615893	244855	NO_2	NO	10.4	1.3	NO	2.48
55	Berners Street	Kerbside	615917	244898	NO_2	NO	0	2.28	NO	2.52
56	Berners Street	Kerbside	615931	244911	NO_2	NO	0	1.5	NO	2.52
57	Berners Street	Kerbside	615941	244981	NO_2	NO	0	8.12	NO	2.54
58	Berners Street	Kerbside	615978	245042	NO_2	NO	7.65	0.5	NO	2.46
59	St Matthew's Street Roundabout	Kerbside	615926	244837	NO_2	NO	N/A	2.85	NO	2.46
60	Colchester Road	Kerbside	617438	246168	NO_2	NO	14.5	3.1	NO	2.43
61	Valley Road	Kerbside	616099	246105	NO_2	NO	19.5	2.35	NO	2.52
62	St Matthew's Street	Kerbside	615935	244803	NO_2	NO	2.9	1.83	NO	2.63
63	St Matthew's Street	Kerbside	615950	244790	NO_2	NO	0	3.3	NO	2.44
64	Norwich Road	Kerbside	615688	244939	NO_2	Yes - AQMA 5	0.35	1.3	NO	2.38
65	Norwich Road	Kerbside	615688	244939	NO_2	Yes - AQMA 5	0.35	1.3	NO	2.38
66	Woodbridge Road	Kerbside	616807	244669	NO_2	Yes - AQMA 2	0	3.35	NO	2.37
67	Blanche Street	Kerbside	616890	244676	NO_2	NO	6.3	1.35	NO	2.57

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
68	Woodbridge Road	Kerbside	616905	244657	NO_2	Yes - AQMA 2	0	3.35	NO	2.5
69	Argyle Street	Kerbside	616978	244590	NO_2	NO	0	4.75	NO	2.48
70	Argyle Street	Kerbside	616965	244583	NO_2	NO	N/A	1.57	NO	2.27
71	St Helen's Street	Kerbside	617032	244537	NO_2	NO	0	14.5	NO	2.46
72	St Helen's Street	Kerbside	617123	244535	NO_2	Yes - AQMA 2	0	1.9	NO	2.6
73	Regent Street	Kerbside	617124	244517	NO_2	NO	0	0.95	NO	2.59
74	Grimwade Street	Kerbside	616953	244443	NO_2	NO	N/A	2.12	NO	2.53
75	Grimwade Street	Kerbside	616926	244377	NO_2	NO	0	6.95	NO	2.3
76	St Helen's Street	Kerbside	616951	244521	NO_2	Yes - AQMA 2	0	2.95	NO	2.46
77	St Helen's Street	Kerbside	616902	244542	NO_2	NO	0	4.7	NO	2.49
78	Orchard Street	Kerbside	616870	244586	NO_2	NO	1.5	1.4	NO	2.59
79	Woodbridge Road	Kerbside	617052	244677	NO_2	NO	N/A	0.45	NO	2.4
80	St Helen's Street	Kerbside	616821	244546	NO_2	Yes - AQMA 2	N/A	1	NO	2.4
81	St Helen's Street	Kerbside	616821	244546	NO_2	Yes - AQMA 2	N/A	1	NO	2.4
82	St Helen's Street	Kerbside	616821	244546	NO_2	Yes - AQMA 2	N/A	1	NO	2.4
83	Bond Street	Kerbside	616792	244498	NO_2	NO	1.58	1.6	NO	2.24

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
84	Carr Street / Major's Corner	Kerbside	616702	244601	NO_2	NO	N/A	4.35	NO	2.47
85	Old Foundry Road	Kerbside	616681	244623	NO_2	NO	0.17	1.32	NO	2.51
B1	Crown Street	Kerbside	616279	244807	NO_2	Yes - AQMA 2	2.2	0.9	NO	2.4
B2	Grove Lane	Kerbside	617360	244536	NO_2	NO	0	4.75	NO	2.4
B3	Fore Hamlet	Kerbside	617363	243887	NO_2	NO	0	7.5	NO	2.67
B4	Vernon Street	Kerbside	616415	243776	NO_2	NO	0	6.1	NO	2.4
D1	St Matthew's Street	Kerbside	615870	244858	NO_2	NO	11.9	4.18	YES	1.38
D2	St Matthew's Street	Kerbside	615870	244858	NO_2	NO	11.9	4.18	YES	1.38
D3	St Matthew's Street	Kerbside	615870	244858	NO_2	NO	11.9	4.18	YES	1.38

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3) (4)				
							2015 (National Factor)	2016 (National Factor)	2017 (National Factor)	2018 (Local Factor)	2019 (Local Factor)
IPS3	615261	245350	Roadside	Automatic	98	98	N/A	N/A	29	28	26
IPS04	615870	244858	Roadside	Automatic	100	51	N/A	N/A	N/A	N/A	37
1	615992	244412	Kerbside	Diffusion Tube	100	100	26	24	27	26	24
2	615144	245245	Kerbside	Diffusion Tube	100	100	**41**	39	**40**	**42**	38
3	617070	244039	Kerbside	Diffusion Tube	100	100	27	27	26	27	26
4	615620	245000	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	31
5	616887	244128	Kerbside	Diffusion Tube	100	100	**42**	**41**	**44**	**42**	39
6	617286	244420	Background	Diffusion Tube	100	100	16	17	18	17	16
7	615007	245239	Kerbside	Diffusion Tube	100	100	33	30	32	31	30
8	615125	245209	Kerbside	Diffusion Tube	100	100	34	35	35	34	32
9	615125	245209	Kerbside	Diffusion Tube	100	100	34	35	35	34	32
10	615125	245209	Kerbside	Diffusion Tube	100	100	34	34	35	34	32
11	616593	244753	Kerbside	Diffusion Tube	83	83	**47**	**45**	**50**	**48**	**47**
12	616593	244753	Kerbside	Diffusion Tube	100	100	**49**	**47**	**50**	**48**	**47**
13	615117	245305	Kerbside	Diffusion Tube	100	100	22	24	25	24	23

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015 (National Factor)	2016 (National Factor)	2017 (National Factor)	2018 (Local Factor)	2019 (Local Factor)
14	615285	245393	Kerbside	Diffusion Tube	100	100	**48**	**47**	**45**	**45**	**41**
15	616282	244643	Background	Diffusion Tube	100	100	24	23	24	26	22
16	615362	245437	Kerbside	Diffusion Tube	100	100	36	35	37	35	33
17	616993	244659	Kerbside	Diffusion Tube	100	100	**43**	**42**	**46**	**46**	**42**
18	615090	245178	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	**41**
19	616593	244753	Kerbside	Diffusion Tube	100	100	**48**	**45**	**50**	**48**	**47**
20	616458	244829	Kerbside	Diffusion Tube	100	100	33	29	34	33	29
21	616494	244807	Kerbside	Diffusion Tube	100	100	37	36	37	38	34
22	616489	244785	Kerbside	Diffusion Tube	100	100	38	36	36	39	34
23	616645	244784	Kerbside	Diffusion Tube	100	100	23	21	23	21	21
24	616663	244692	Kerbside	Diffusion Tube	100	100	**40**	38	37	**40**	38
25	616753	244582	Kerbside	Diffusion Tube	100	100	**40**	36	38	39	36
26	616971	244511	Kerbside	Diffusion Tube	100	100	31	30	32	36	34
27	616965	244546	Kerbside	Diffusion Tube	100	100	35	39	**42**	**43**	38
28	615194	245292	Kerbside	Diffusion Tube	100	100	37	36	36	38	35

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015 (National Factor)	2016 (National Factor)	2017 (National Factor)	2018 (Local Factor)	2019 (Local Factor)
29	617118	244074	Kerbside	Diffusion Tube	100	100	31	32	33	32	31
30	616939	244114	Kerbside	Diffusion Tube	100	100	**47**	**46**	**51**	**49**	**46**
31	616332	244149	Kerbside	Diffusion Tube	100	100	34	36	**43**	**45**	**44**
32	617398	244573	Kerbside	Diffusion Tube	100	100	32	30	34	31	30
33	616666	244114	Kerbside	Diffusion Tube	100	100	33	33	33	34	32
34	616467	244072	Kerbside	Diffusion Tube	100	100	38	37	**40**	39	33
35	616746	244696	Kerbside	Diffusion Tube	100	100	27	24	27	27	26
36	616820	246158	Kerbside	Diffusion Tube	100	100	30	30	33	31	31
37	616845	244252	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	31
38	615904	244805	Kerbside	Diffusion Tube	100	100	33	33	34	35	33
39	616712	244228	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	**41**
40	615460	245148	Kerbside	Diffusion Tube	100	100	27	27	31	30	27
41	615564	245010	Kerbside	Diffusion Tube	100	100	37	34	35	37	36
42	615744	244901	Kerbside	Diffusion Tube	100	100	34	41	33	38	37
43	615109	245200	Kerbside	Diffusion Tube	100	100	**40**	37	39	38	36

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015 (National Factor)	2016 (National Factor)	2017 (National Factor)	2018 (Local Factor)	2019 (Local Factor)
44	615052	245237	Kerbside	Diffusion Tube	100	100	37	37	38	38	34
45	615261	245350	Kerbside	Diffusion Tube	92	92	29	27	27	28	26
46	615261	245350	Kerbside	Diffusion Tube	92	92	28	27	27	28	26
47	615261	245350	Kerbside	Diffusion Tube	92	92	28	28	27	28	26
48	615425	245486	Kerbside	Diffusion Tube	100	100	27	27	29	27	25
49	615792	244876	Kerbside	Diffusion Tube	100	100	**42**	**41**	**41**	**46**	**42**
50	615773	244890	Kerbside	Diffusion Tube	92	92	28	26	28	27	24
51	615769	244866	Kerbside	Diffusion Tube	67	67	38	38	37	42	37
52	615826	244871	Kerbside	Diffusion Tube	92	92	**47**	**47**	**47**	**46**	**45**
53	615820	244858	Kerbside	Diffusion Tube	92	92	**46**	**45**	**42**	**46**	**44**
54	615893	244855	Kerbside	Diffusion Tube	100	100	31	31	36	37	36
55	615917	244898	Kerbside	Diffusion Tube	100	100	31	29	28	29	27
56	615931	244911	Kerbside	Diffusion Tube	92	92	28	29	29	29	27
57	615941	244981	Kerbside	Diffusion Tube	100	100	26	25	27	25	24
58	615978	245042	Kerbside	Diffusion Tube	92	92	27	23	25	25	24

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015 (National Factor)	2016 (National Factor)	2017 (National Factor)	2018 (Local Factor)	2019 (Local Factor)
59	615926	244837	Kerbside	Diffusion Tube	100	100	34	32	33	32	32
60	617438	246168	Kerbside	Diffusion Tube	100	100	34	36	31	29	28
61	616099	246105	Kerbside	Diffusion Tube	100	100	34	36	**42**	**40**	38
62	615935	244803	Kerbside	Diffusion Tube	100	100	38	33	37	36	34
63	615950	244790	Kerbside	Diffusion Tube	100	100	38	35	37	36	37
64	615688	244939	Kerbside	Diffusion Tube	100	100	**55**	**50**	**56**	**55**	**51**
65	615688	244939	Kerbside	Diffusion Tube	100	100	**51**	**51**	**56**	**55**	**51**
66	616807	244669	Kerbside	Diffusion Tube	100	100	38	35	**40**	**42**	39
67	616890	244676	Kerbside	Diffusion Tube	100	100	27	26	26	28	27
68	616905	244657	Kerbside	Diffusion Tube	100	100	**43**	**41**	**45**	**44**	**43**
69	616978	244590	Kerbside	Diffusion Tube	100	100	26	26	26	27	26
70	616965	244583	Kerbside	Diffusion Tube	100	100	33	33	36	38	36
71	617032	244537	Kerbside	Diffusion Tube	100	100	27	24	24	25	24
72	617123	244535	Kerbside	Diffusion Tube	100	100	36	36	38	38	35
73	617124	244517	Kerbside	Diffusion Tube	92	92	23	23	23	23	22

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015 (National Factor)	2016 (National Factor)	2017 (National Factor)	2018 (Local Factor)	2019 (Local Factor)
74	616953	244443	Kerbside	Diffusion Tube	100	100	27	26	27	27	26
75	616926	244377	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	22
76	616951	244521	Kerbside	Diffusion Tube	100	100	37	34	36	37	36
77	616902	244542	Kerbside	Diffusion Tube	100	100	28	28	28	29	26
78	616870	244586	Kerbside	Diffusion Tube	100	100	24	25	25	24	23
79	617052	244677	Kerbside	Diffusion Tube	75	75	30	37	36	36	35
80	616821	244546	Kerbside	Diffusion Tube	100	100	35	32	36	38	36
81	616821	244546	Kerbside	Diffusion Tube	100	100	35	33	36	38	36
82	616821	244546	Kerbside	Diffusion Tube	100	100	35	33	36	38	36
83	616792	244498	Kerbside	Diffusion Tube	100	100	30	27	29	31	29
84	616702	244601	Kerbside	Diffusion Tube	100	100	26	24	25	26	24
85	616681	244623	Kerbside	Diffusion Tube	100	100	32	29	31	32	30
B1	616279	244807	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	**42**
B2	617360	244536	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	32
B3	617363	243887	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	26

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015 (National Factor)	2016 (National Factor)	2017 (National Factor)	2018 (Local Factor)	2019 (Local Factor)
B4	616415	243776	Kerbside	Diffusion Tube	100	100	N/A	N/A	N/A	N/A	24
D1	615870	244858	Kerbside	Diffusion Tube	100	42	N/A	N/A	N/A	N/A	**41**
D2	615870	244858	Kerbside	Diffusion Tube	100	42	N/A	N/A	N/A	N/A	**41**
D3	615870	244858	Kerbside	Diffusion Tube	100	42	N/A	N/A	N/A	N/A	**41**
SP1	616029	243694	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	36	N/A	N/A
SP2	615925	243619	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	38	N/A	N/A
SP3	616150	243834	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	28	N/A	N/A
SP4	616372	243868	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	31	N/A	N/A
SP5	616471	243679	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	**45**	N/A	N/A
SP6	616593	243568	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	28	N/A	N/A
SP7	616572	243469	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	28	N/A	N/A
SP8	616454	243433	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	28	N/A	N/A
SP9	616487	243259	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	27	N/A	N/A
SP10	616379	243152	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	30	N/A	N/A
SP11	616147	242101	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	32	N/A	N/A

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015 (National Factor)	2016 (National Factor)	2017 (National Factor)	2018 (Local Factor)	2019 (Local Factor)
SP12	616160	242204	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	24	N/A	N/A
SP13	616176	242223	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	33	N/A	N/A
SP14	616317	242883	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	24	N/A	N/A
SP15	617153	243847	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	29	N/A	N/A
SP16	617476	243199	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	22	N/A	N/A
SP17	617227	243223	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	21	N/A	N/A
SP18	617185	243068	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	26	N/A	N/A
SP19	618285	242280	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	29	N/A	N/A
SP20	618989	242308	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	31	N/A	N/A
SP21	618792	242479	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	29	N/A	N/A
SP22	618497	242888	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	27	N/A	N/A
SP23	618842	243286	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	24	N/A	N/A
SP24	617725	243754	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	36	N/A	N/A
SP25	617406	243885	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	**44**	N/A	N/A
SP26	617112	243355	Kerbside	Diffusion Tube	N/A	N/A	N/A	N/A	23	N/A	N/A

☒ **Diffusion tube data has been bias corrected**

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

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

Notes:

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

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

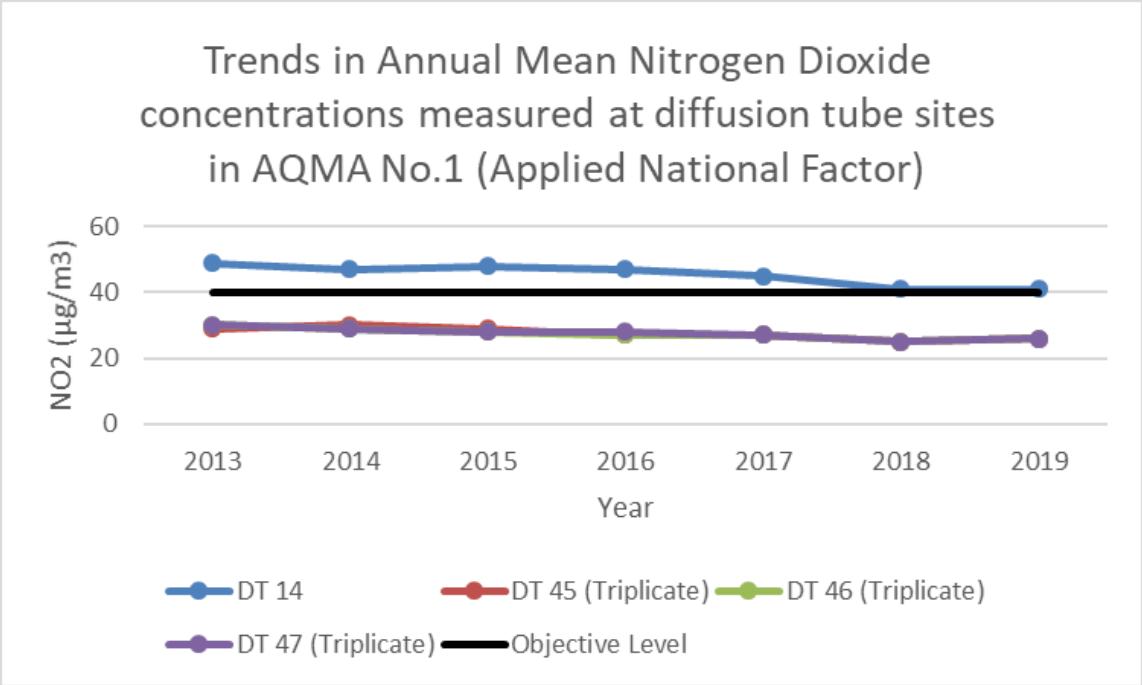
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

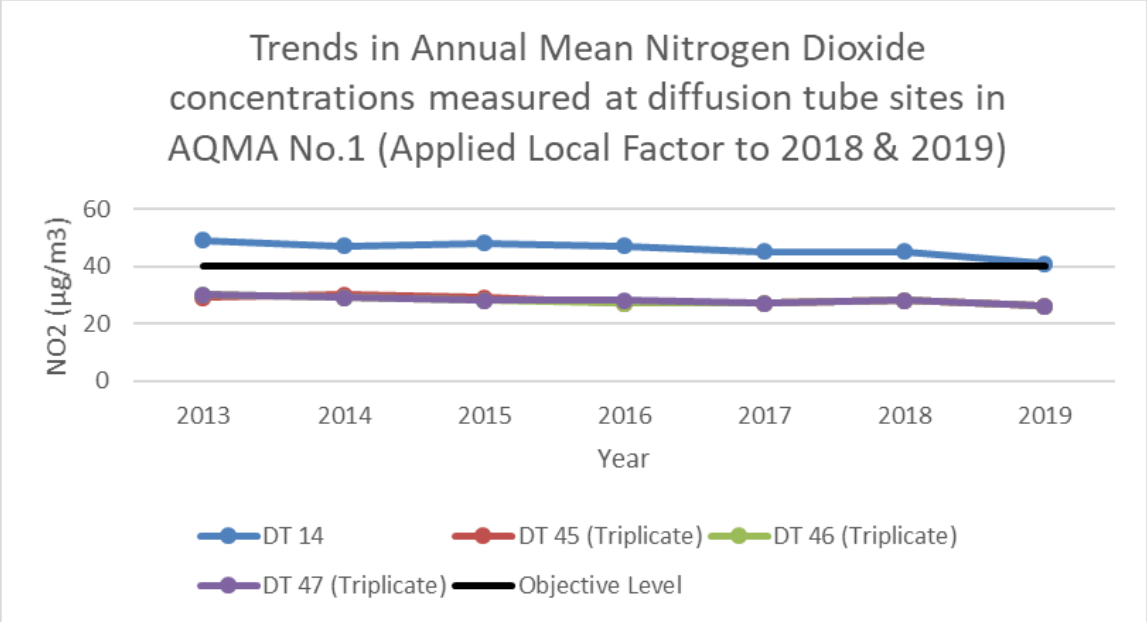
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

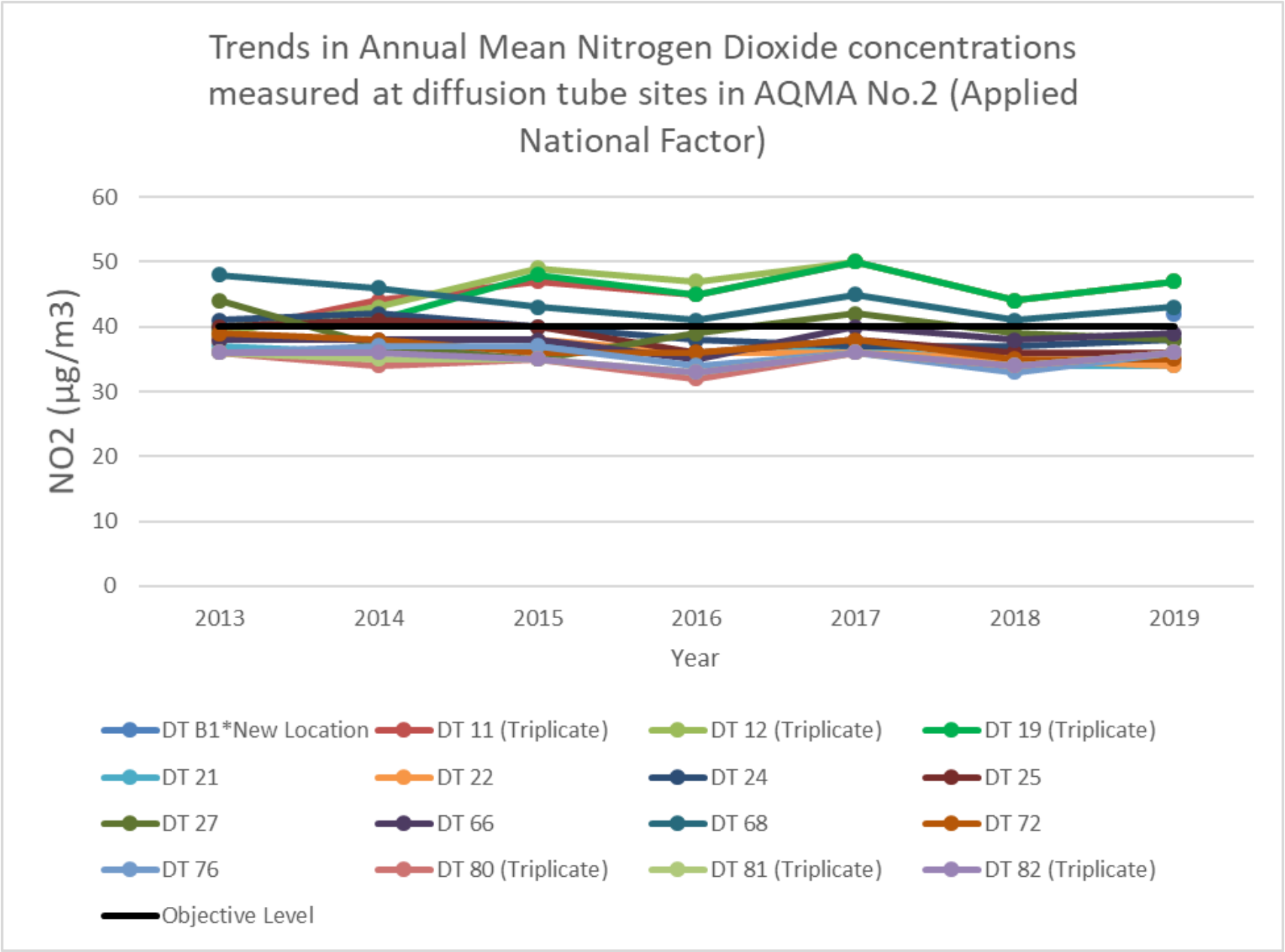
(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

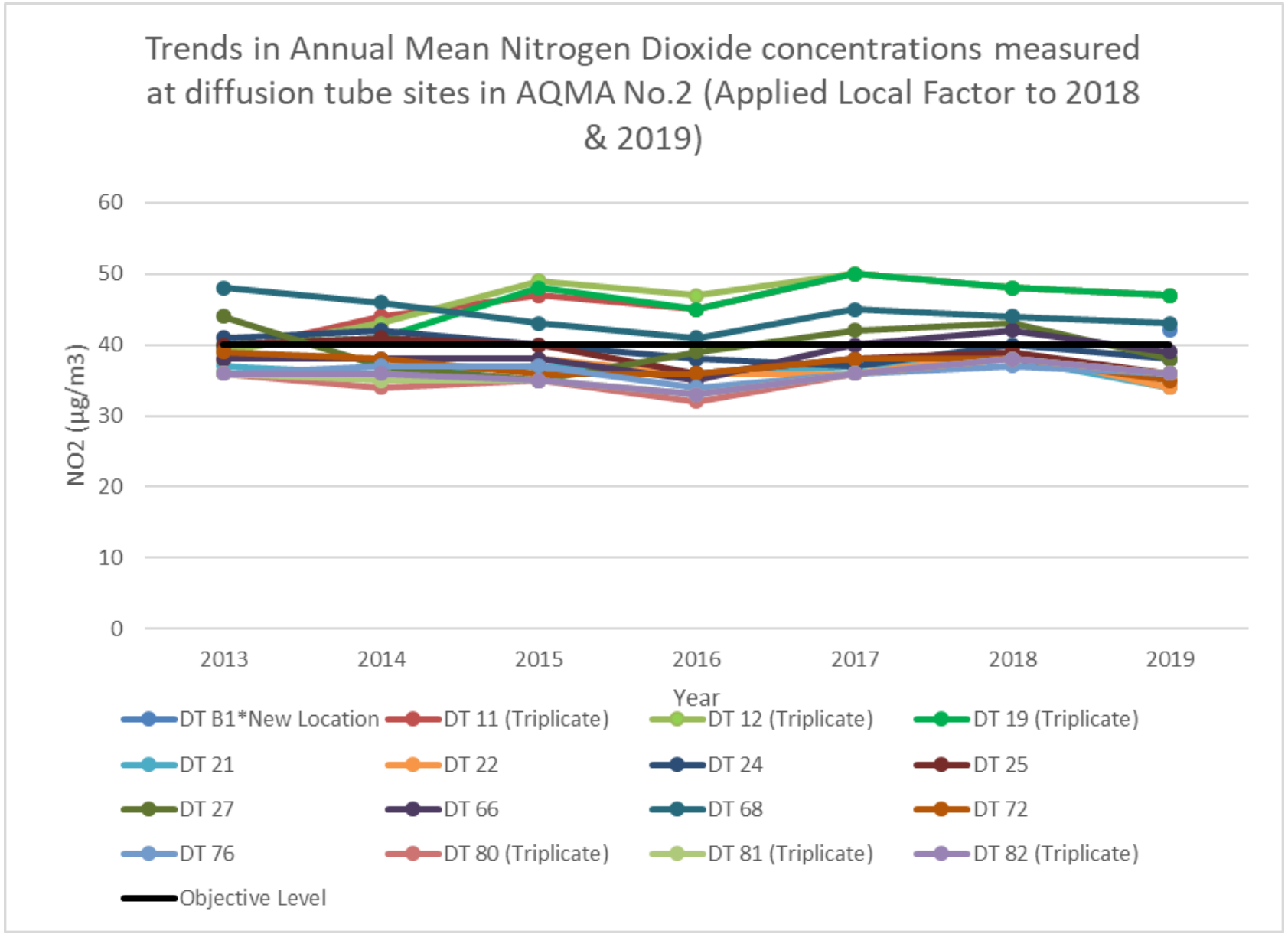
(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

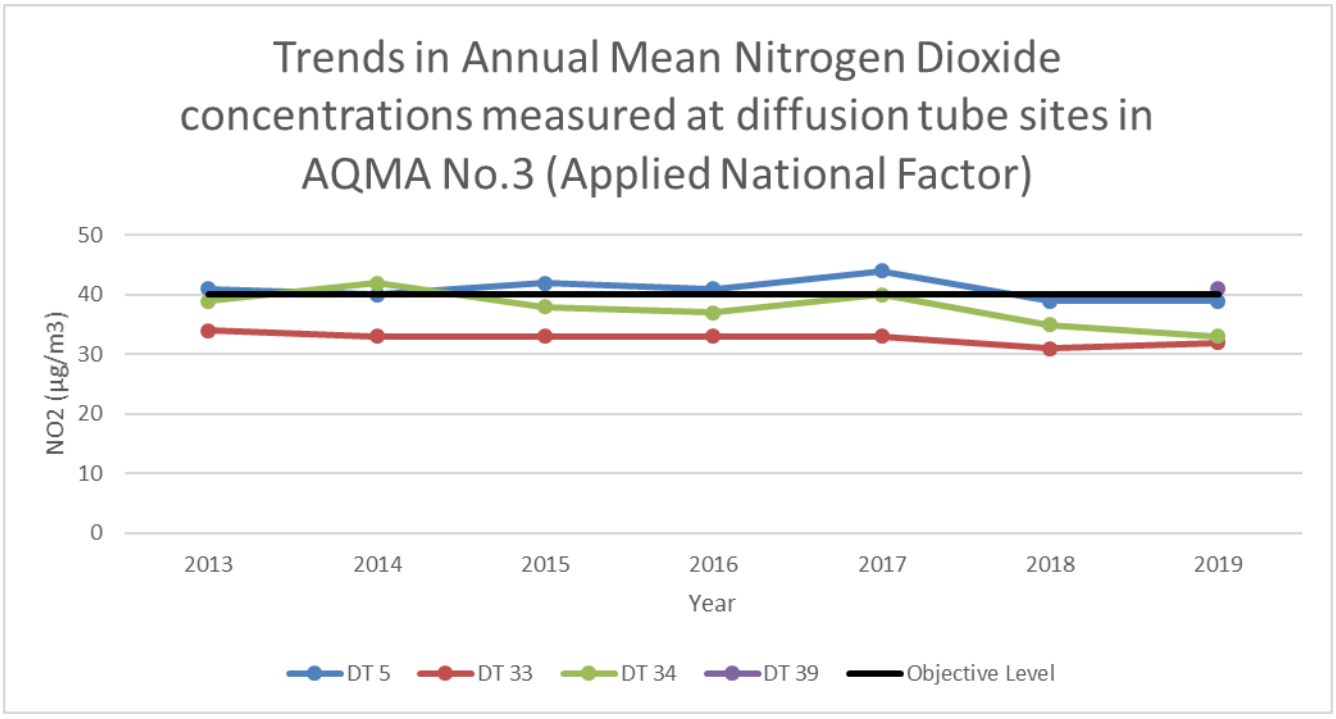
Figure A.1 – Trends in Annual Mean NO_2 Concentrations (not distance corrected)

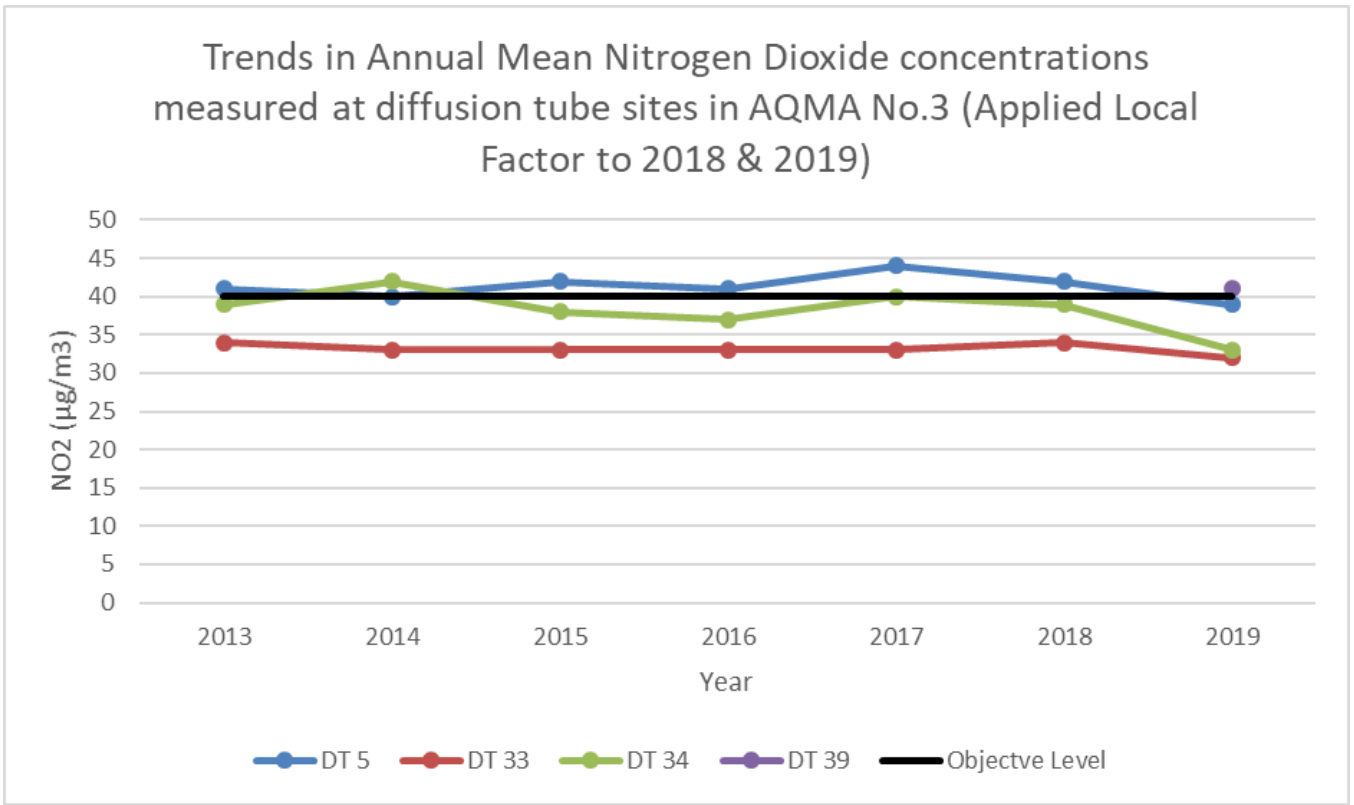


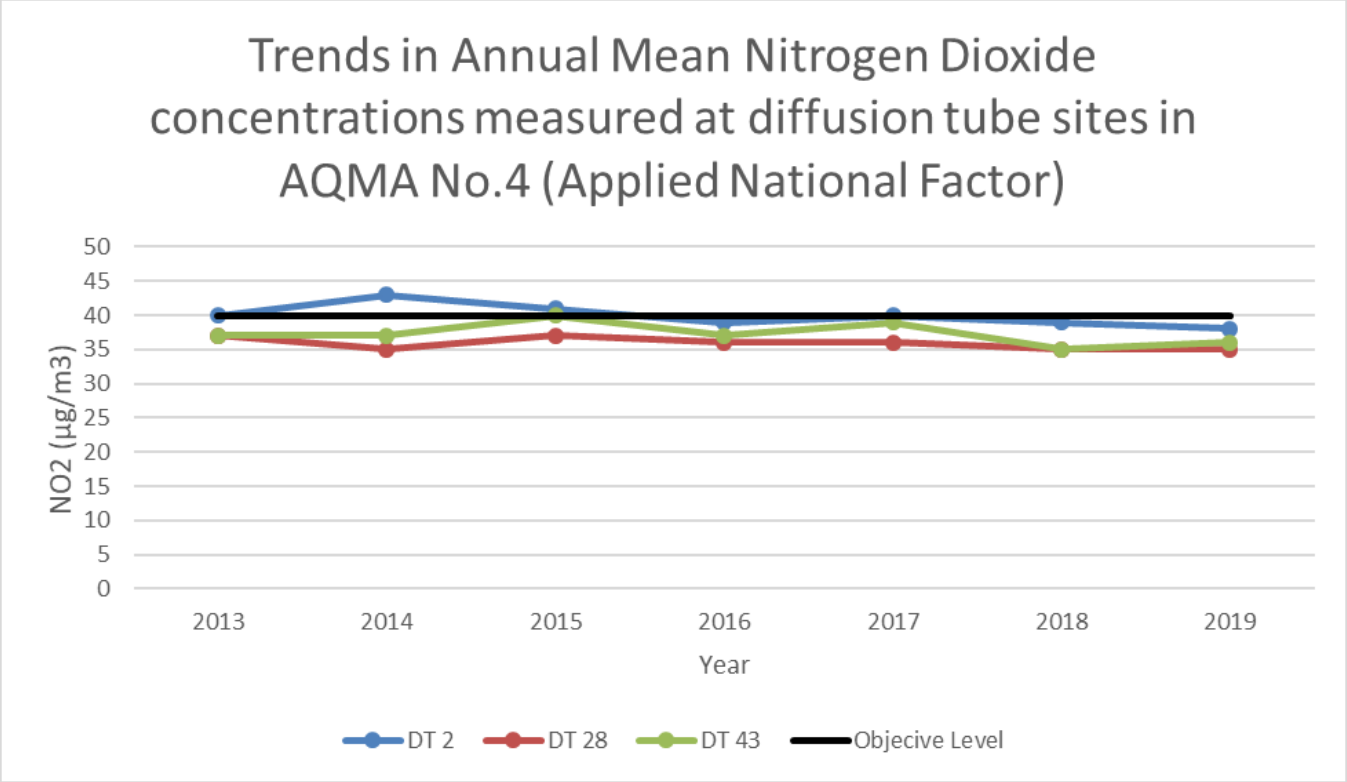


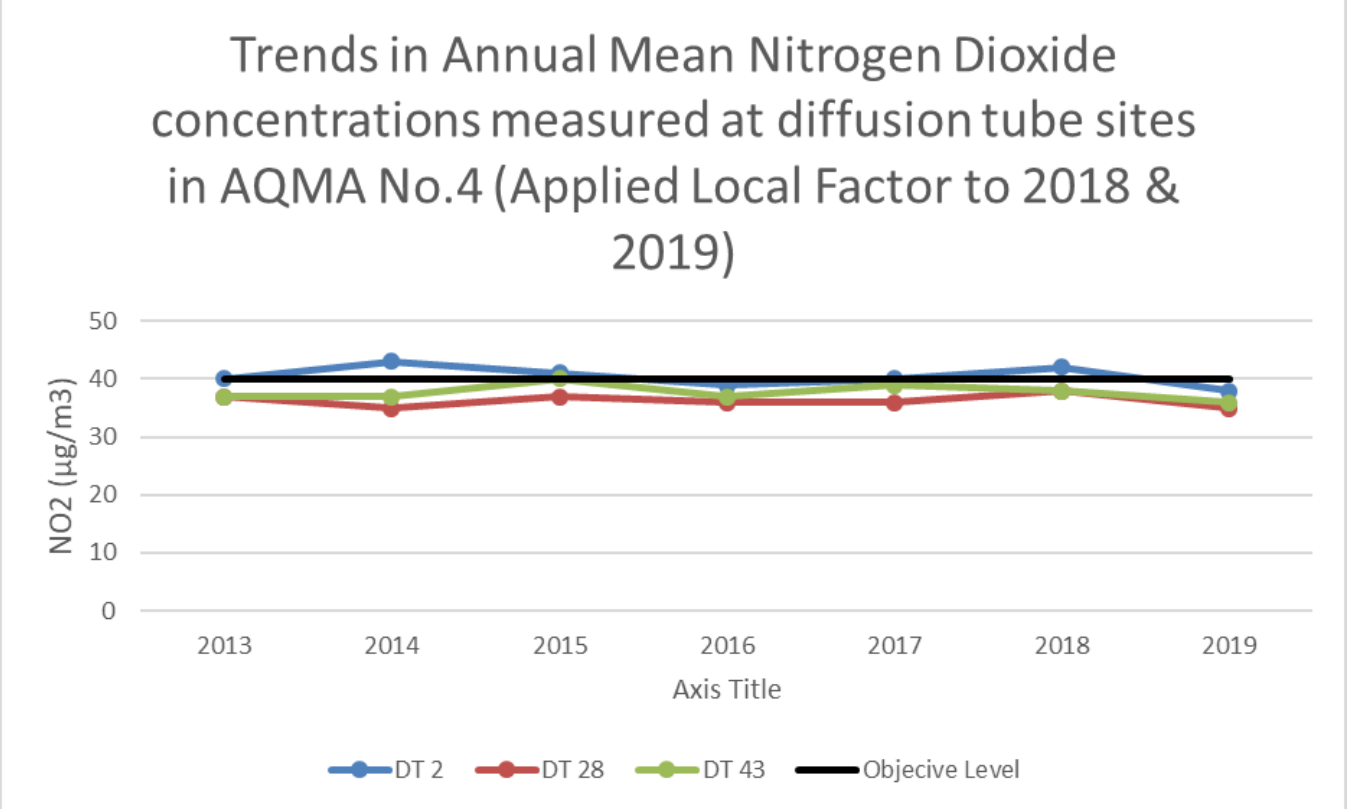

Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites in AQMA No.2 (Applied National Factor)
NO2 (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
Year
DT B1*New Location
DT 11 (Triplicate)
DT 12 (Triplicate)
DT 19 (Triplicate)
DT 21
DT 22
DT 24
DT 25
DT 27
DT 66
DT 68
DT 72
DT 76
DT 80 (Triplicate)
DT 81 (Triplicate)
DT 82 (Triplicate)
Objective Level

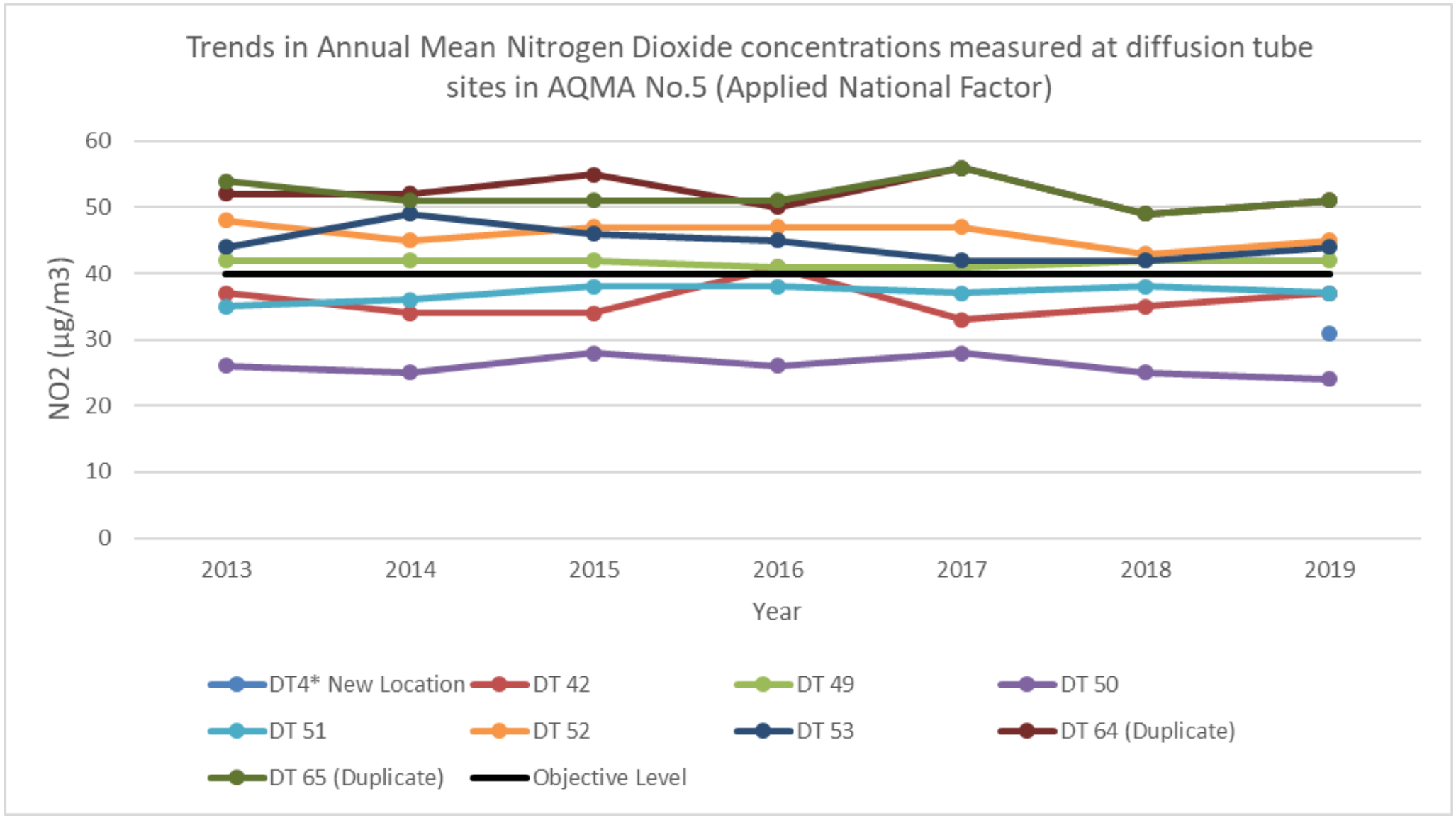

Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites in AQMA No.2 (Applied Local Factor to 2018 & 2019)
NO2 (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
Year
DT B1*New Location
DT 11 (Triplicate)
DT 12 (Triplicate)
DT 19 (Triplicate)
DT 21
DT 22
DT 24
DT 25
DT 27
DT 66
DT 68
DT 72
DT 76
DT 80 (Triplicate)
DT 81 (Triplicate)
DT 82 (Triplicate)
Objective Level

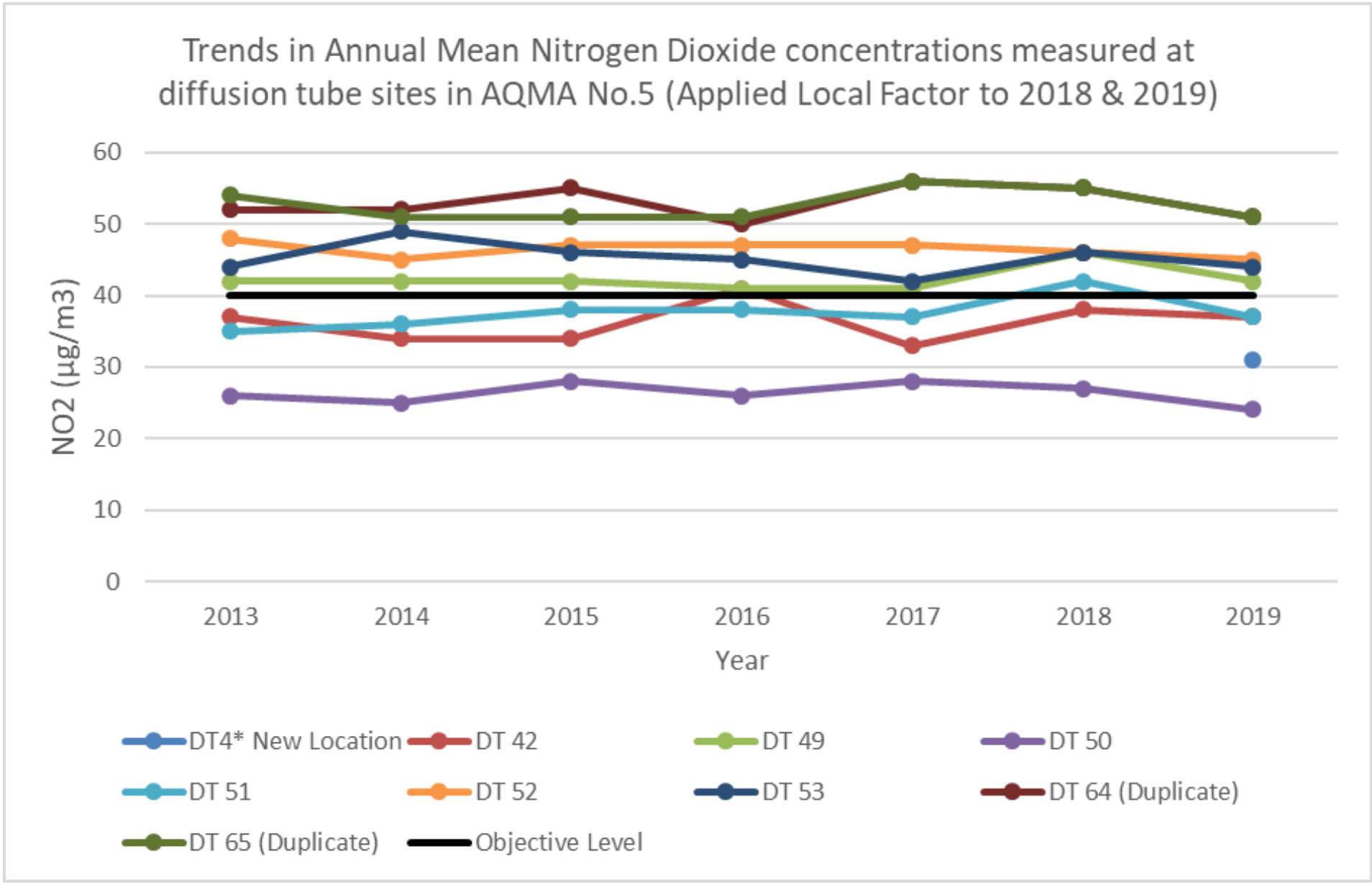

Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites in AQMA No.3 (Applied National Factor)
NO2 (µg/m3)
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
Year
DT 5
DT 33
DT 34
DT 39
Objective Level

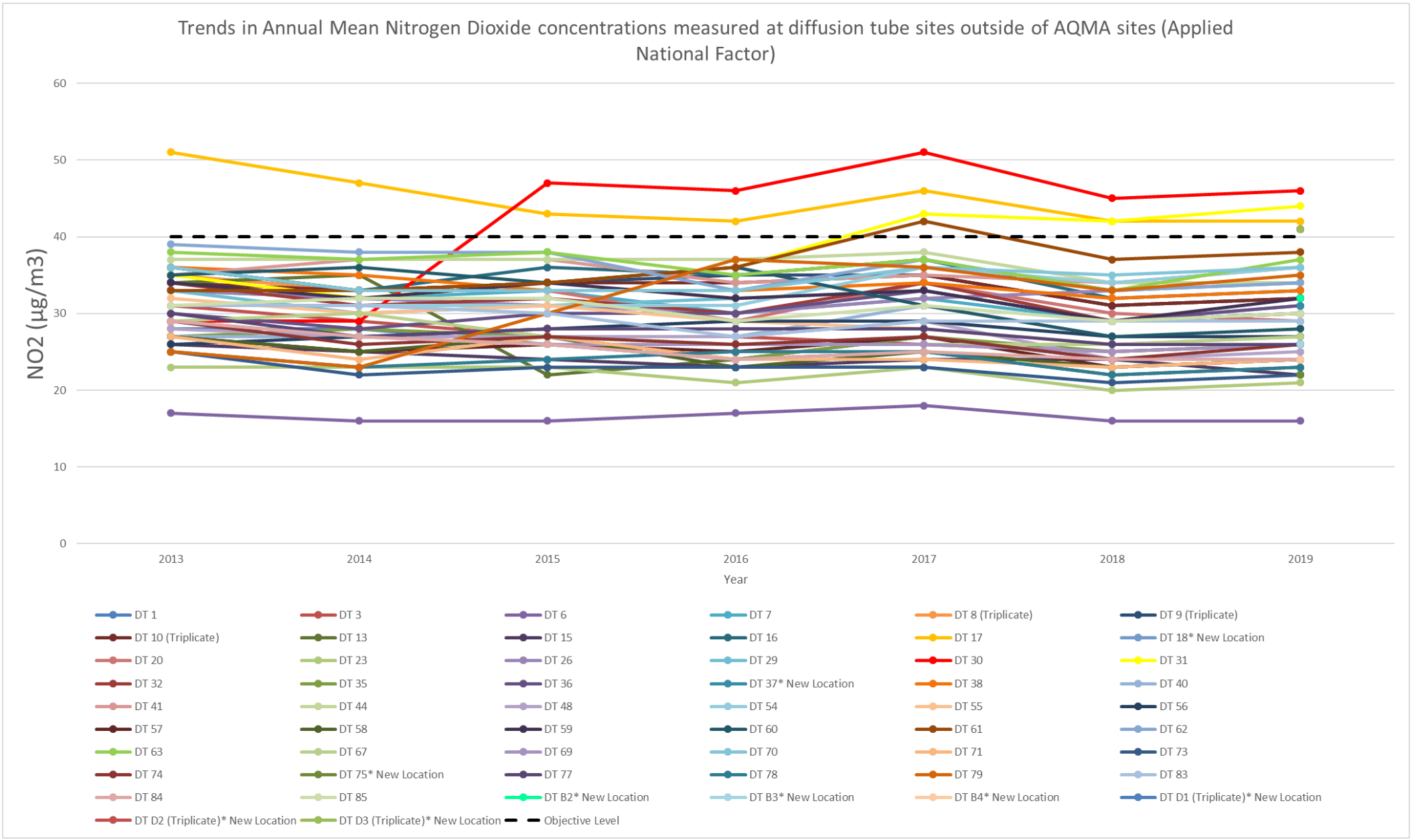

Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites in AQMA No.3 (Applied Local Factor to 2018 & 2019)
NO2 (µg/m3)
50
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
2018
2019
Year
DT 5
DT 33
DT 34
DT 39
Objectve Level


Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites in AQMA No.4 (Applied National Factor)
NO2 (µg/m3)
50
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
2018
2019
Year
DT 2
DT 28
DT 43
Objecive Level


Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites in AQMA No.4 (Applied Local Factor to 2018 & 2019)
NO2 (µg/m3)
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
Axis Title
DT 2
DT 28
DT 43
Objecive Level


Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites in AQMA No.5 (Applied National Factor)
NO2 (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
Year
DT4* New Location
DT 42
DT 49
DT 50
DT 51
DT 52
DT 53
DT 64 (Duplicate)
DT 65 (Duplicate)
Objective Level


Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites in AQMA No.5 (Applied Local Factor to 2018 & 2019)
NO2 (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
Year
DT4* New Location
DT 42
DT 49
DT 50
DT 51
DT 52
DT 53
DT 64 (Duplicate)
DT 65 (Duplicate)
Objective Level


Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites outside of AQMA sites (Applied National Factor)
NO2 (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
Year
DT 1
DT 3
DT 6
DT 7
DT 8 (Triplicate)
DT 9 (Triplicate)
DT 10 (Triplicate)
DT 13
DT 15
DT 16
DT 17
DT 18* New Location
DT 20
DT 23
DT 26
DT 29
DT 30
DT 31
DT 32
DT 35
DT 36
DT 37* New Location
DT 38
DT 40
DT 41
DT 44
DT 48
DT 54
DT 55
DT 56
DT 57
DT 58
DT 59
DT 60
DT 61
DT 62
DT 63
DT 67
DT 69
DT 70
DT 71
DT 73
DT 74
DT 75* New Location
DT 77
DT 78
DT 79
DT 83
DT 84
DT 85
DT B2* New Location
DT B3* New Location
DT B4* New Location
DT D1 (Triplicate)* New Location
DT D2 (Triplicate)* New Location
DT D3 (Triplicate)* New Location
Objective Level

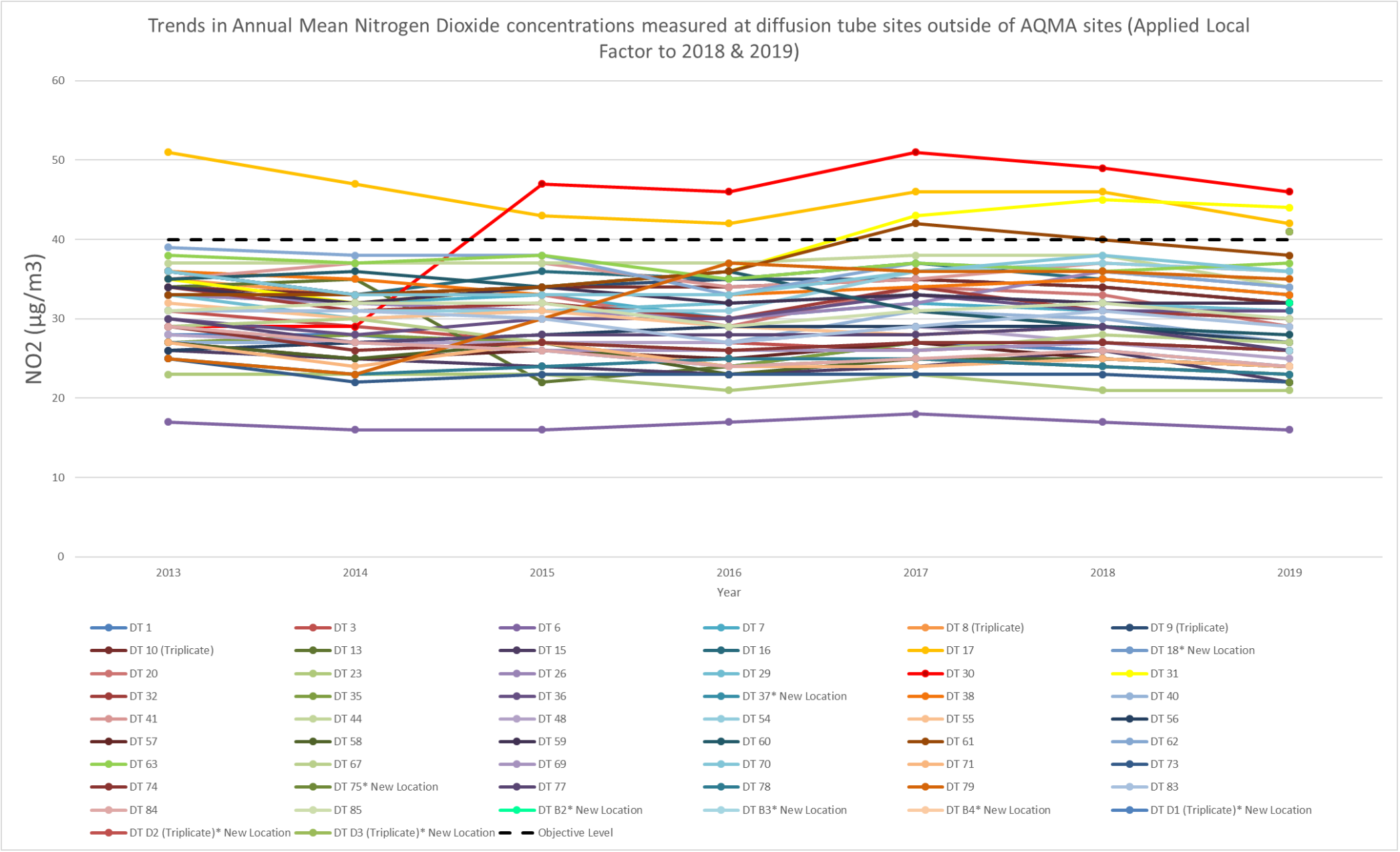

Trends in Annual Mean Nitrogen Dioxide concentrations measured at diffusion tube sites outside of AQMA sites (Applied Local Factor to 2018 & 2019)
NO2 (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
Year
DT 1
DT 3
DT 6
DT 7
DT 8 (Triplicate)
DT 9 (Triplicate)
DT 10 (Triplicate)
DT 13
DT 15
DT 16
DT 17
DT 18* New Location
DT 20
DT 23
DT 26
DT 29
DT 30
DT 31
DT 32
DT 35
DT 36
DT 37* New Location
DT 38
DT 40
DT 41
DT 44
DT 48
DT 54
DT 55
DT 56
DT 57
DT 58
DT 59
DT 60
DT 61
DT 62
DT 63
DT 67
DT 69
DT 70
DT 71
DT 73
DT 74
DT 75* New Location
DT 77
DT 78
DT 79
DT 83
DT 84
DT 85
DT B2* New Location
DT B3* New Location
DT B4* New Location
DT D1 (Triplicate)* New Location
DT D2 (Triplicate)* New Location
DT D3 (Triplicate)* New Location
Objective Level

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
							2015	2016	2017	2018	2019
IPS3	615261	245350	Roadside	Automatic	98	98	N/A	N/A	0	0	0
IPS04	615870	244858	Roadside	Automatic	100	51	N/A	N/A	N/A	N/A	0(117)

Notes:

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

(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 99.8th percentile of 1-hour means is provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations ($\mu g/m^3$)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.75) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
1	615992	244412	36.2	42.6	30.2	28.8	25.8	23.9	22.5	31.5	30.1	32.1	42.2	43.6	32.5	24.3	20.5
2	615144	245245	44.9	58.9	39.5	50.1	46.9	45.5	46.1	53.6	47.0	50.9	57.9	58.3	50.0	37.5	34.4
3	617070	244039	36.6	44.6	34.3	31.1	27.5	27.5	27.3	38	33.2	37.1	41.7	39.2	34.8	26.1	26.1
4	615620	245000	43.3	45.1	41.3	48.7	38.9	35.6	34.7	36.7	38.7	40	50.6	44.7	41.5	31.1	31.1
5	616887	244128	52.1	57.5	49.8	39.6	49.4	45.3	50.5	59.8	50.7	51.2	59.8	58.3	52.0	39.0	37.7
6	617286	244420	28.8	27.4	21.3	19.6	14.6	13	14.1	19.3	19	21.5	28.8	24.8	21.0	15.8	15.8
7	615007	245239	44	48.8	38.8	34	33.1	31.8	40.5	43	37.5	39.1	46.1	46.7	40.3	30.2	30.2
8	615125	245209	46.5	45.6	40.1	47.9	39.5	32.8	37.8	39.7	40.5	44.9	51.9	43.6	43.0	32.3	27.9
9	615125	245209	47.3	47.6	38.7	44.6	39.3	34.9	34.9	41.5	40.7	44.1	52.5	46.2	43.0	32.3	27.9
10	615125	245209	51.4	48	42	43.2	41.4	36	37.9	40.4	39.3	43.9	53.2	47.7	43.0	32.3	27.9
11	616593	244753	62.2	72.4		39.4	51.4		65.5	70.1	56.9	61.7	71.9	70.8	62.1	**46.6**	**46.6**
12	616593	244753	70.4	77.1	64.8	38.2	59.4	50.3	59.7	62.5	59.1	61.7	66.9	69.9	62.1	**46.6**	**46.6**
13	615117	245305	38.1	38.7	28.2	30.7	20	24.2	23.2	27.8	28.1	31.7	43.8	37.7	31.0	23.3	21.1
14	615285	245393	51.9	63.8	55.4	51.8	50.5	41.1	48.7	52.2	54.3	57.3	65.8	57.5	54.2	**40.6**	39.8

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.75) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
15	616282	244643	36.2	40.4	29.4	20.6	21.4	19.1	19.3	28.7	29.4	34.5	40.7	34.4	29.5	22.1	22.1
16	615362	245437	48.1	49.8	30.1	34.8	38.1	39.2	40.3	51.8	50	50	48	50.1	44.2	33.1	30.3
17	616993	244659	64.7	64.2	52.9	51.2	48.2	45.9	47.7	55	55.8	58.8	59.3	68.4	56.0	**42.0**	37.8
18	615090	245178	43.1	58.9	47	60.5	51.6	53.7	51.6	59	51.6	56.8	61.1	52.4	53.9	**40.5**	**40.5**
19	616593	244753	63.9	75.8	57.1	40.6	54.4	57.8	58.3	74.2	64	63.1	65.9	73	62.1	**46.6**	**46.6**
20	616458	244829	44.8	45.7	30.9	30.9	33.1	33.1	36.4	42.6	40.3	41.6	39.9	47.8	38.9	29.2	27.7
21	616494	244807	52.8	50.5	45	42.9	40.2	40.1	37.4	45.1	41.5	47	55.4	50.9	45.7	34.3	34.3
22	616489	244785	41.3	51.3	46.8	51.1	38.7	40.9	41.3	45.8	41.9	43.6	56.1	48.3	45.6	34.2	34.2
23	616645	244784	34.1	32.1	27.7	24.6	23.4	20.6	22.5	27.7	25	30	33	32.3	27.8	20.8	20.8
24	616663	244692	58.5	63	47.4	35.3	42.4	42.8	46.2	50.8	51.7	55.2	59.5	60.8	51.1	38.4	38.4
25	616753	244582	43.9	52.6	46.4	41.1	45.3	44.2	48.6	54.8	49.4	49.5	55	50.5	48.4	36.3	34.9
26	616971	244511	48.7	48.8	41.4	46.6	44.7	38.4	41.5	43.3	42	47.1	57.2	45.2	45.4	34.1	34.1
27	616965	244546	53.8	62.9	51.5	44.3	46.7	42.3	45.4	49.3	47.4	50	58.8	54.2	50.6	37.9	37.0
28	615194	245292	45.1	59.8	43.1	45.4	36.5	40.9	37.2	45.9	42.6	47.6	54.1	54.3	46.0	34.5	30.8
29	617118	244074	42.8	38.1	40.7	46.5	46.2	34.8	32.8	37.5	37.6	44.1	52.4	40.9	41.2	30.9	30.9
30	616939	244114	50.2	75.4	60.6	50.1	54.7	50.4	64.4	66.6	58.8	63.4	68.8	70.4	61.2	**45.9**	**43.0**
31	616332	244149	69.6	71.8	64.2	47	50.5	44.6	49	57.9	56.9	58.2	66.4	63.5	58.3	**43.7**	**43.7**
32	617398	244573	44.9	49.4	41.9	29.8	33.8	31.5	30.9	41.4	39.1	42.1	48.2	49.6	40.2	30.2	27.3
33	616666	244114	51	46.2	44	42.5	39.6	34.1	38.9	43.8	41.8	41.4	47.5	43.4	42.9	32.1	32.1

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.75) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
34	616467	244072	44	53.6	39.7	42.1	38.7	36.6	38.4	49.7	41.4	45.7	55.3	41.9	43.9	32.9	32.9
35	616746	244696	37.6	42.5	34.4	27.9	23.5	26.3	28.5	33.4	33.1	37.1	42.5	43	34.2	25.6	25.6
36	616820	246158	46.9	54.4	39.6	34.6	27.4	28.2	31	42.8	39.3	42.3	52.8	48.1	40.6	30.5	22.4
37	616845	244252	46.8	45.6	43.6	39.3	37.2	32.8	36.5	40.6	42.6	42.7	54.5	40.7	41.9	31.4	31.4
38	615904	244805	46.4	44.2	42.3	44.7	38.2	39	39.6	42.4	42.4	46.4	56.9	49.9	44.4	33.3	26.1
39	616712	244228	59.6	59.2	51.1	51.6	56.3	45.6	48.8	53.5	52.5	59.9	62	59.5	55.0	**41.2**	37.0
40	615460	245148	47.6	36.4	33.9	32.9	30.8	28	25.3	32.1	32.5	38.6	49.8	42	35.8	26.9	23.6
41	615564	245010	48.7	60.9	41.1	34	41.6	43.6	45	56	44.4	51	53.7	55.2	47.9	36.0	34.6
42	615744	244901	40.5	49.1	45.8	59.5	53.1	45.4	44.7	42.7	43.7	49.8	67.7	48.4	49.2	36.9	36.9
43	615109	245200	54.8	47.5	45.6	47.9	41.1	42.3	42	51.2	44.1	47	52.3	51.5	47.3	35.5	34.7
44	615052	245237	46.9	55.4	43.4	42.9	40.2	35.6	39.1	41	46	47.7	60.9	45.6	45.4	34.0	28.2
45	615261	245350	38.7	41.2	33.2	36.9	32.3	28.6	27.2	34.5	33.1	37.2		36	34.2	25.7	24.3
46	615261	245350	37.7	39.2	32.4	37	31.5	31.2	27.4	34.5	32.2	35.6		39	34.2	25.7	24.3
47	615261	245350	37.8	40.3	34	34.9	29.6	29.4	27.7	33.4	32.3	37.2		37.4	34.2	25.7	24.3
48	615425	245486	35.1	36.8	35.2	29.5	26.8	22.6	25.7	35.1	33.9	33.2	43.6	41.1	33.2	24.9	21.6
49	615792	244876	49.8	56	52.5	68.4	56.4	49.9	48.6	49	52	58.3	69.6	57.7	55.7	**41.8**	**41.8**
50	615773	244890	38.8		30.7	25.1	23.2	24.1	27.1	33.2	33.1	36.4	43.1	41.7	32.4	24.3	23.0
51	615769	244866		55.7	38.9	54.3	44.3	42.1				50.4	61.8	56.1	49.3	37.0	29.4
52	615826	244871	67.6	64.3	50.1	65.7	59.4	56.7	55.8	56.8	59.1	62.5		62.3	60.0	**45.0**	**45.0**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.75) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
53	615820	244858	60.1	71.6	48.7	44.4	50.5	50.5	52.9		55.3	61.7	72.5	71.1	58.1	**43.6**	**43.6**
54	615893	244855	48.4	64.7	41.8	41.3	36	40	36.3	47.2	46.3	51.9	62.5	59.9	48.0	36.0	26.6
55	615917	244898	42.4	47.7	36.7	31.4	29.3	30.2	29.6	33.7	32.1	37.3	42.8	41	36.2	27.1	27.1
56	615931	244911	43.7	44.9	34.1	35.7	37	31.7	31.2	38.8	30.4	40.2		32.8	36.4	27.3	27.3
57	615941	244981	35.9	42.6	31	24.1	24.7	26.1	23.2	30.6	29.3	32	42.6	38.9	31.8	23.8	23.8
58	615978	245042	38	39.4	27.8	27.6	24.4		20.2	28.7	23.8	33.3	42.3	41.5	31.5	23.7	19.5
59	615926	244837	43.2	54.7	41.6	34.7	36	33.6	32.3	42.1	42	45.3	53.2	49.8	42.4	31.8	31.8
60	617438	246168	43.3	48.3	36.9	26.1	27.5	28.4	29.3	36.5	36.1	39.4	47.4	42.2	36.8	27.6	21.3
61	616099	246105	59.9	61.7	49.1	41	44	39.9	44.4	50.8	46	44.6	61	59.2	50.1	37.6	24.8
62	615935	244803	47.5	52.5	42.1	30.5	39.3	40	41.7	51.9	45.5	49.1	51.1	55.9	45.6	34.2	30.2
63	615950	244790	50.2	59.8	46.7	39.1	40.6	41.9	43.4	53.9	49.2	51.1	57	58.1	49.3	36.9	36.9
64	615688	244939	74.3	80	62.6	44.3	60	55.8	65.4	71.5	69.2	73	82.1	89.7	68.5	**51.4**	**49.6**
65	615688	244939	83.4	74.9	70	49.9	64.5	60.4	60	77.6	62	66.9	67.1	79.8	68.5	**51.4**	**49.6**
66	616807	244669	54	58.2	51.3	39.2	47.8	46.4	47.5	59.4	49.3	53.7	55.9	57.3	51.7	38.8	38.8
67	616890	244676	39.8	46.8	36.1	30.6	28.3	28.7	27.1	39.5	33.3	39.7	44.3	44.6	36.6	27.4	24.1
68	616905	244657	69.6	60.2	55.8	53.7	50.2	49.5	50.5	58.4	50.5	58.3	71.6	63.5	57.7	**43.2**	**43.2**
69	616978	244590	32.9	43	33.4	35.5	29.1	27.4	28.4	32.2	32.9	36.1	44.7	38.5	34.5	25.9	25.9
70	616965	244583	57.9	57.2	47.2	36.6	38.9	37.6	40.3	43.8	45.6	49.8	57.7	55.8	47.4	35.5	35.5
71	617032	244537	37.4	38.4	31.5	29.3	27.6	24.4	24.3	28.4	29.8	33	39.8	34.6	31.5	23.7	23.7

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.75) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
72	617123	244535	50.2	49.4	48.7	51.8	41.1	39.9	40	44.3	46.2	46.4	56.9	49.1	47.0	35.3	35.3
73	617124	244517	36.8	34.5	35.7	28.3	23.8	22.3	19.8		26.5	29.2	38.1	32.8	29.8	22.4	22.4
74	616953	244443	48.1	44.5	34.5	33	26.3	24.4	26.7	29.5	30.9	31.8	43.4	39	34.3	25.8	25.8
75	616926	244377	33.8	34.3	31.6	22.9	26.4	20.7	21.3	28.9	27.3	31.8	35.5	33.8	29.0	21.8	21.8
76	616951	244521	49.9	48.8	52.2	47.8	50.6	42	39.6	49.8	35.3	46	58.5	56.4	48.1	36.1	36.1
77	616902	244542	42.2	32.1	31.5	41.6	30.7	29.8	27.9	33.7	31	35.8	47.1	36	35.0	26.2	26.2
78	616870	244586	30.2	41.9	33.2	25.1	23.1	20.3	20.3	29.2	28.3	32.7	41.4	40.5	30.5	22.9	22.2
79	617052	244677				44	36.1	37.3	40	50.1	43.9	46.5	60	57.1	46.1	34.6	34.6
80	616821	244546	45.7	60.2	48.1	40	37.9	41.5	47.5	56.9	20.5	55.3	55.4	56.2	48.3	36.2	36.2
81	616821	244546	54	58.9	56.4	40.2	41	42.8	46.4	55.7	33.7	51.1	58.2	61.2	48.3	36.2	36.2
82	616821	244546	46.7	62.5	46.9	40.4	12.3	43.1	48.5	54.9	48.6	52.7	56.9	59.2	48.3	36.2	36.2
83	616792	244498	41.8	48.5	33.3	35	38.5	31.2	30.7	35	34.7	43.6	48	43.8	38.7	29.0	27.4
84	616702	244601	39.8	35.6	31.6	27.7	28.5	25	25.9	29	31.6	32	40.1	36	31.9	23.9	23.9
85	616681	244623	48.7	49.3	40.3	33.8	34.2	32.3	34.1	41.9	34.2	43.3	48.1	46.3	40.5	30.4	30.1
B1	616279	244807	54.9	70.5	54.2	41.3	49	48.1	47	58.4	54.1	60.8	70	65	56.1	**42.1**	36.4
B2	617360	244536	52.2	54.3	51.6	31.2	31.9	33.7	31	43.3	39.7	41.3	50.1	47.2	42.3	31.7	31.7
B3	617363	243887	37.1	46.9	36.4	26.8	26.9	26.1	30.6	38.1	31.9	34.3	41.7	37.3	34.5	25.9	25.9
B4	616415	243776	40.8	32.2	33.1	29.1	27	22.7	24.3	29.1	29.8	30	43.5	34.4	31.3	23.5	23.5
D1	615870	244858								44.9	43.7	50.6	65.3	57.3	53.0	**40.5**	31.1

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations ($\mu g/m^3$)													
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
															Raw Data	Bias Adjusted (0.75) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
D2	615870	244858								49.8	45.1	50.4	60.4	62.1	53.0	**40.5**	31.1
D3	615870	244858								48.3	43	48.7	63.7	60.7	53.0	**40.5**	31.1

☒ **Local bias adjustment factor used (the Local bias adjustment factor was the same as the National bias adjustment factor – 0.75)**

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

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

Notes:

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

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

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

(2) Distance corrected to nearest relevant public exposure.

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

Automatic Monitoring

The automatic monitor on St Matthews Street (IPS04) was installed and commissioned by Matts Monitors in June 2019. A copy of the Installation and Commissioning Certificate for the site is displayed below (Figure C.1)

The automatic monitors located on Chevallier Street (IPS3) and St Matthews Street (IPS04) are subject to fortnightly routine calibration by an Ipswich Borough Council Environmental Health Officer or Technical Officer. The analysers are also serviced and the monitoring site audited biannually by Matts Monitors and Ricardo Energy & Environment respectively. Copies of the Certificate of Calibration issued following the most recent site audits (December 2019) are displayed below (Figures C.2 and C.3).

All automatic monitoring data collected at the Chevallier Street and St Matthews Street sites are managed by Ricardo Energy & Environment using the same quality control procedures utilised by Defra's national air quality network stations. These procedures represent best practice and fully meet the requirements set out in LAQM.TG(16). Ricardo Energy & Environment currently provide UKAS accredited quality control audits and data management services to all Defra national network (AURN) air quality monitoring stations.

All collected data is screened and scaled (based on site calibrations) and the final data sets presented within this report (Figures C.4 and C.5) have benefitted from a full process of data ratification, including thorough additional data quality checks that include site audits and a ratification process that corrects data for instrument sensitivity drift between routine calibrations.

St Matthews Street Monitor Annualisation

Due to the monitor on St Matthews Street being installed and commissioned on 27th June 2019, the data capture for the year was less than 75%. As Para 7.178 LAQM.TG16 states that "if the data capture was below 75% for the year, then it is

necessary to annualise the data…". The data from the continuous monitoring site has been annualised in accordance with the procedure detailed in LAQM.TG16 Box 7.9.

This adjustment was undertaken using whole year datasets from the following AURN monitoring sites (all within a 50 mile radius of Ipswich and with data capture rates of in excess of 85%):

- Southend-on-Sea (UKA 00409) – Type: Urban Background;
- St Osyth (UKA 00445) – Type: Rural Background; and
- Norwich Lakenfields (UKA 00549) – Type: Urban Background.

The average ratio (R_a) of the annual mean to period mean ratios (A_m/P_m) for these sites was: 1.08442 and is therefore the annualisation factor. The measured period mean concentration (M) for the monitor was 33.8µg/m^3.
The estimate of the annualised average for the monitor was therefore M x R_a = 33.8 x 1.08442 = 36.7µg/m^3.

Figure C.1 – Installation and Commissioning Certificate for IPS04

MATTS MONITORS
AIR MONITORING SYSTEMS

ENGINEER'S REPORT

Customer: Ipswich

Engineer's Name: Richard Bingham

Site: St Matthews Street **Visit Type:** Enclosure Installation

Site Visit Start Date: 27/06/19 **Time:** 07:30 GMT

Site Visit End Date: 27/06/19 **Time:** 12:30 GMT

Reported Fault/Task:

Install enclosure and commision site.

Engineer's Comments:

Enclosure bolted to concrete base. Wired in by electrician. Site powered up. Left to warm up. Calibrated to MM cylinder. Fitted AEA supplied modem no 67. Comms tested by AEA OK. Trained customer on LSO procedure. Calibration is pressure span. L10 cylinder is only to be turned on for LSO calibration. IZS setup for zero only. Cylinder removed from site (customers cylinder to be delivered soon).

Parts Used:

Description	Quantity

Total Time: 4 hrs

Tel: (01453) 807470
customerservice@mattsmonitors.co.uk
www.mattsmonitors.co.uk

MATTS MONITORS
AIR MONITORING SYSTEMS

NOX ANALYSER DATA AND CALIBRATION SHEET

Brand:	TAPI	Model No:	T200	Serial No:	2696

	Pre Test Data		Post Test Data	
Time:			12:18	
Range:		ppb	2000	ppb
Sample Flow:		cc/min	498	cc/min
Ozone Flow:		cc/min	95	cc/min
PMT:		mV	31.4	mV
Norm PMT:		mV	6.3	mV
Azero:		mV	18.9	mV
HPVS:		V	722	V
Rcell Temp:		oC	50	oC
Box Temp:		oC	28.2	oC
PMT Temp:		oC	7.2	oC
IZS Temp:		oC	N/A	oC
Moly Temp:		oC	315	oC
Rcell Press:		IN-Hg-A	4.5	IN-Hg-A
Sample Press:		IN-Hg-A	29	IN-Hg-A
NOx Slope:			0.976	
NOx Offset:		Mv	-0.1	Mv
NO Slope:			0.973	
NO Offset:		Mv	-1.5	Mv
Displayed Faults:			NONE	

Ambient Cylinder:		Dilution Calibrator:		Ambient Cylinder:	MM Cylinder.	Dilution Calibrator:	
NO Cyl. No:		Make:		NO Cyl. No:	237684	Make:	
Cyl. Barcode		Model No:		Cyl. Barcode	2.1901E+13	Model No:	
Cyl. Press:		Serial No:		Cyl. Press:	500 PIS	Serial No:	
NO Conc:	ppb	MM No:		NO Conc:	472 ppb	MM No:	
NOx Conc:	ppb	Cyl. No:		NOx Conc:	472 ppb	Cyl. No:	
NO2 Cyl. No:		Cyl. Conc:		NO2 Cyl. No:		Cyl. Conc:	
Cyl. Press:		Cyl. Press:		Cyl. Press:		Cyl. Press:	
NOx Conc:	ppb	Output Conc:	ppb	NOx Conc:	ppb	Output Conc:	ppb

CALIBRATION RESULTS

	No Display	No Logger	ppb	NOx Display	NOx Logger		No Display	No Logger	ppb	NOx Display	NOx Logger
Zero						Zero	-0.1			-0.1	
							-0.1			-0.1	
							-0.1			-0.1	
Avg	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	Avg	-0.1			-0.1	
Analyser Stability at Zero:					ppb	Analyser Stability at Zero:					ppb
No						No	490.3			489.1	
							490.3			489.1	
							490.3			489.1	
Avg	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		490.3			489.1	
Analyser Stability at Span:					ppb	Analyser Stability at Span:					ppb
No2						No2					

Molybdenum Converter Efficiency	No	NOx		Molybdenum Converter Efficiency	No	NOx
GPT (1):				GPT (1):		
GPT (2):				GPT (2):		
GPT (3):				GPT (3):		
Mo Converter:		%	NO2 Conc:	Mo Converter:	%	NO2 Conc:

Figure C.2 – Certificate of Calibration for IPS3

0401

CERTIFICATE OF CALIBRATION

Ricardo Energy and Environment, Gemini Building, Fermi Avenue Harwell, Didcot,

Page 1 of 3

Approved Signatories:

- ☐ S. Eaton
- ☐ D Hector
- ☐ N Rand
- ☐ B Davies
- ☐ B Stacey
- ☐ S Stratton
- ☐ S Telfer
- ☐ S Gray
- ☑ D Lane

Signed:

Date of issue: 27 Dec 19

Certificate Number: 04787

Customer Name and Address:

Ipswich Borough Council
Grafton House
15-17 Russell Road
Ipswich
IP1 2DE

Description: Calibration factors for the air monitoring station at Ipswich Chevallier Street

Ricardo Energy & Environment ID: ED79001143/December 2019

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95% The uncertainty evaluation has been carried out in accordance with UKAS requirements.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory

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Ipswich Chevallier Street_Cert 04787_Dec 2019 1 of 3

CERTIFICATE OF CALIBRATION

0401

Date of issue: 27 Dec 19

Certificate Number: 04787

Ricardo Energy & Environment ID: ED79001143/December 2019

Ipswich Chevallier Street
Date of audit: 12 Dec 2019

	Species	Analyser Serial no	Zero Response[1]	Zero uncertainty ppb	Calibration Factor[2]	Factor uncertainty %	Converter eff. (%)[3]
	NOx	CM080500004	-1.4	2.6	1.1779	3.5	100.5
	NO	CM080500004	-1.3	2.6	1.1812	3.5	n/a

CERTIFICATE OF CALIBRATION

0401

Date of issue: 27 Dec 19

Certificate Number: 04787

Ricardo Energy & Environment ID: ED79001143/December 2019

The gaseous ambient analysers listed above have been tested for zero response, calibration factor, linearity and converter efficiency (NOx analysers) by documented methods. The factors have been calculated using certified gas standards. Note that the test results are valid on the day of test only, as analyser drift over time cannot be quantified. All results for gaseous species are given in ppb (parts per billion) mole fractions or ppm (parts per million) mole fractions.

[1] The zero response is the zero reading on the data logging system of the analyser when audit zero gas was introduced to the analysers under test.

[2] The calibration factor is the multiplying factor required to scale the reading on the data logging system of the analyser into reported concentration units (ppb for NO, NOx, SO_2, O_3 and ppm for CO. Where 1ppm = 1000ppb). It should be used in conjunction with the zero response. A corrected concentration is calculated using the following equation:

Concentration = F(Output - Zero Response)
Where F = Calibration Factor provided on this certificate
Output = Reading on the data logging system of the analyser
Zero Response = Zero Response provided on this certificate

[3] Converter eff. is the measured efficiency of the NO_2 to NO converter within the oxides of nitrogen analyser under test.

The calibration results shaded are those that fall within our scope of accreditation, all other results on this certificate are not UKAS accredited, but have been included for completeness.

Figure C.3 – Certificate of Calibration for IPS04

0401

CERTIFICATE OF CALIBRATION

Ricardo Energy and Environment, Gemini Building, Fermi Avenue Harwell, Didcot,

Page 1 of 3

Approved Signatories:

- ☐ S. Eaton
- ☐ D Hector
- ☐ N Rand
- ☐ B Davies
- ☐ B Stacey
- ☐ S Stratton
- ☐ S Telfer
- ☐ S Gray
- ☑ D Lane

Signed:

Date of issue: 27 Dec 19

Certificate Number: 04788

Customer Name and Address:

Ipswich Borough Council
Grafton House
15-17 Russell Road
Ipswich
IP1 2DE

Description: Calibration factors for the air monitoring station at Ipswich St Matthews Street

Ricardo Energy & Environment ID: ED79001143/December 2019

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95% The uncertainty evaluation has been carried out in accordance with UKAS requirements.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory

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Ipswich St Matthews Street_Cert 04788_Dec 2019 1 of 3

0401

CERTIFICATE OF CALIBRATION

Date of issue: 27 Dec 19

Certificate Number: 04788

Ricardo Energy & Environment ID: ED79001143/December 2019

Ipswich St Matthews Street
Date of audit: 11 Dec 2019

Species	Analyser Serial no	Zero Response[1]	Zero uncertainty ppb	Calibration Factor[2]	Factor uncertainty %	Converter eff. (%)[3]
NOx	2696	2.5	2.8	1.6602	3.5	100.1
NO	2696	3.0	2.9	1.6725	3.5	n/a

0401

CERTIFICATE OF CALIBRATION

Date of issue:	27 Dec 19
Certificate Number:	04788
Ricardo Energy & Environment ID:	ED79001143/December 2019

The gaseous ambient analysers listed above have been tested for zero response, calibration factor, linearity and converter efficiency (NOx analysers) by documented methods. The factors have been calculated using certified gas standards. Note that the test results are valid on the day of test only, as analyser drift over time cannot be quantified. All results for gaseous species are given in ppb (parts per billion) mole fractions or ppm (parts per million) mole fractions.

[1] The zero response is the zero reading on the data logging system of the analyser when audit zero gas was introduced to the analysers under test.

[2] The calibration factor is the multiplying factor required to scale the reading on the data logging system of the analyser into reported concentration units (ppb for NO, NOx, SO_2, O_3 and ppm for CO. Where 1ppm = 1000ppb). It should be used in conjunction with the zero response. A corrected concentration is calculated using the following equation:

Concentration = F(Output - Zero Response)
Where F = Calibration Factor provided on this certificate
Output = Reading on the data logging system of the analyser
Zero Response = Zero Response provided on this certificate

[3] Converter eff. is the measured efficiency of the NO_2 to NO converter within the oxides of nitrogen analyser under test.

The calibration results shaded are those that fall within our scope of accreditation, all other results on this certificate are not UKAS accredited, but have been included for completeness.

Figure C.4 – 2019 Air Pollution Report – Ipswich Chevallier Street (Site ID: IPS3)

Air Pollution Report

Air Quality England

1st January to 31st December 2019

Ipswich Chevallier Street (Site ID: IPS3)

These data have been fully ratified

Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³
Number Days Low	-	364	-
Number Days Moderate	-	0	-
Number Days High	-	0	-
Number Days Very High	-	0	-
Max Daily Mean	221	73	411
Annual Max	793	133	1,278
Annual Mean	26	26	67
99.8th Percentile of hourly mean	-	105	-
98th Percentile of hourly mean	180	75	340
95th Percentile of hourly mean	100	60	203
50th Percentile of hourly mean	14	23	45
% Annual data capture	**97.85%**	**97.82%**	**97.82%**

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-

1 / 2

Report produced by Ricardo Energy & Environment

Annual Graph

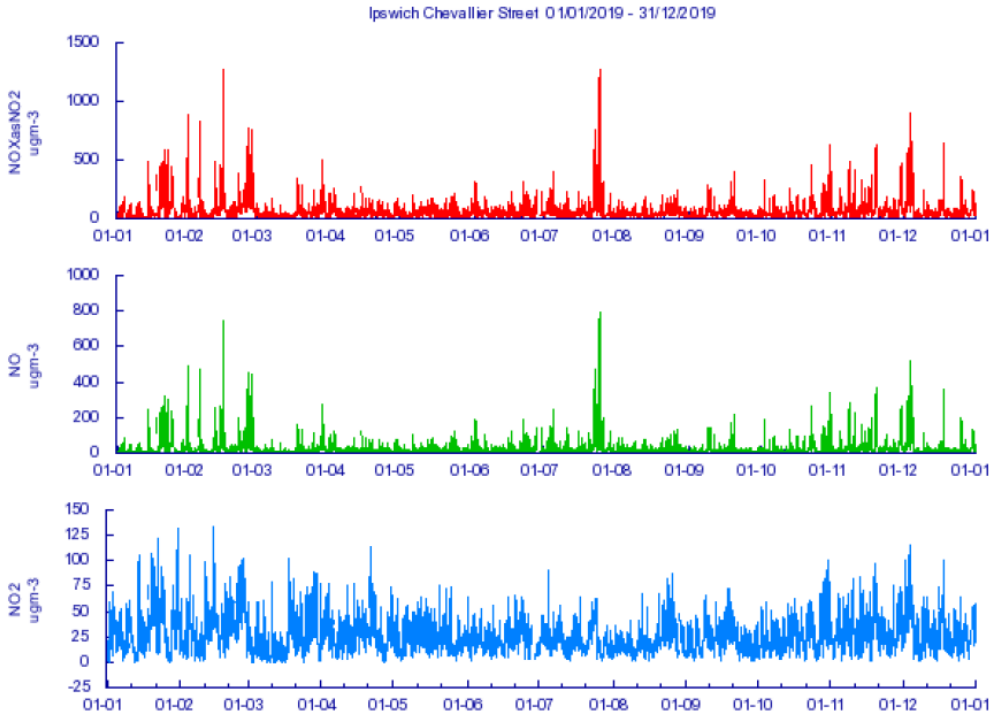


Figure C.5 – 2019 Air Pollution Report – Ipswich St Matthews Street (Site ID: IPS04)

Air Pollution Report

Air Quality England

1st January to 31st December 2019

Ipswich St Matthews Street (Site ID: IPS04)

These data have been fully ratified

Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³
Number Days Low	-	188	-
Number Days Moderate	-	0	-
Number Days High	-	0	-
Number Days Very High	-	0	-
Max Daily Mean	237	85	449
Annual Max	531	153	932
Annual Mean	30	34	81
99.8th Percentile of hourly mean	-	117	-
98th Percentile of hourly mean	141	82	284
95th Percentile of hourly mean	88	70	204
50th Percentile of hourly mean	21	30	63
% Annual data capture	**51.15%**	**51.14%**	**51.14%**

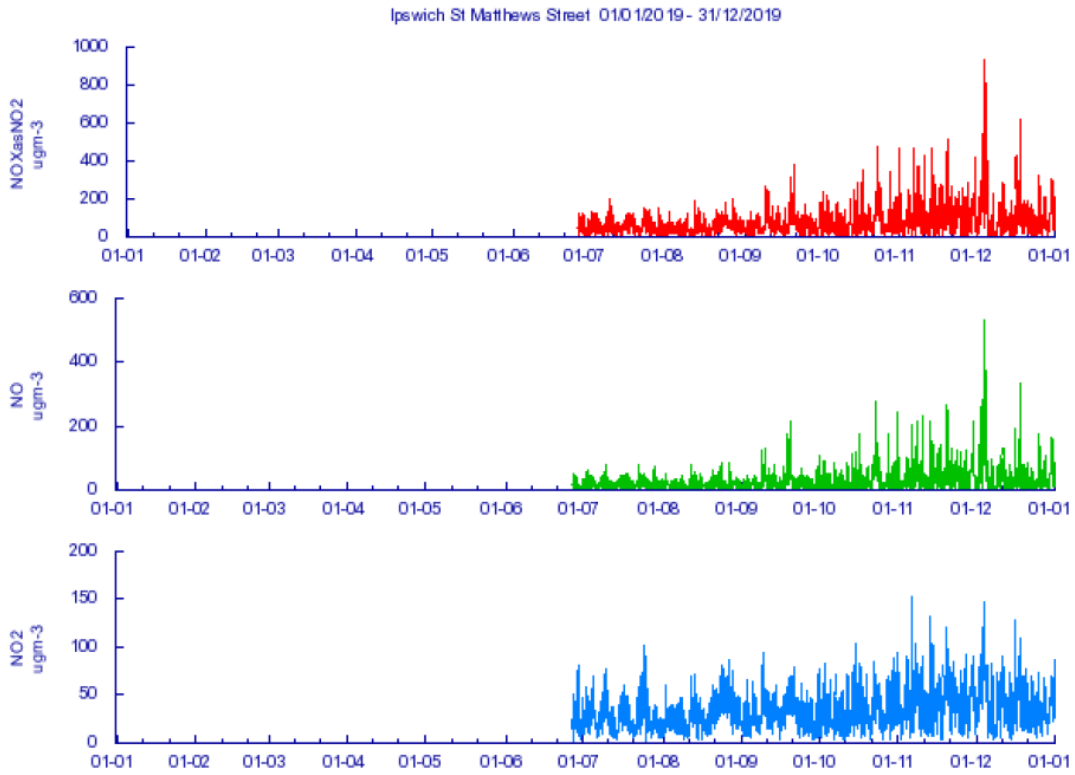
All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Standards regulations 2010	Exceedances	Days
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-

1 / 2

Report produced by Ricardo Energy & Environment

Annual Graph



Diffusion Tube Analysis

Nitrogen dioxide diffusion tubes are supplied by SOCOTEC, Didcot.

The exposed tubes are analysed in accordance with SOCOTEC's standard operating procedure which complies with the guidelines set out in DEFRA's *'Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance'*. The analysis of diffusion tube samples to determine the amount of nitrogen dioxide present on the tubes is within the scope of their UKAS schedule. SOCOTEC participates in the AIR NO_2 PT scheme, the results of which indicate that during 2019 97% of QC samples were analysed satisfactorily.

Using the *AEA_DifTPAB_v04.xls* spreadsheet published on the DEFRA LAQM Support website to check the precision of collocated tubes, the results for all collocated monitoring sites within Ipswich were shown to demonstrate "*Good precision"* (see Figure C.6).

A control tube (travel blank) is sent with each month's tubes

Figure C.6 – Precision and Accuracy of Collocated Diffusion Tubes

a) Bramford Road (Site ID: 8, 9 & 10)

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	02/01/2019	05/02/2019	46.5	47.3	51.4	48	2.6	5	6.5			Good	
2	05/02/2019	05/03/2019	45.6	47.6	48.0	47	1.3	3	3.2			Good	
3	05/03/2019	03/04/2019	40.1	38.7	42.0	40	1.7	4	4.1			Good	
4	03/04/2019	01/05/2019	47.9	44.6	43.2	45	2.4	5	6.0			Good	
5	01/05/2019	03/06/2019	39.5	39.3	41.4	40	1.2	3	2.9			Good	
6	03/06/2019	03/07/2019	32.8	34.9	36.0	35	1.6	5	4.0			Good	
7	03/07/2019	07/08/2019	37.8	34.9	37.9	37	1.7	5	4.2			Good	
8	07/08/2019	04/09/2019	39.7	41.5	40.4	41	0.9	2	2.3			Good	
9	04/09/2019	02/10/2019	40.5	40.7	39.3	40	0.8	2	1.9			Good	
10	02/10/2019	06/11/2019	44.9	44.1	43.9	44	0.5	1	1.3			Good	
11	06/11/2019	02/12/2019	51.9	52.5	53.2	53	0.7	1	1.6			Good	
12	02/12/2019	09/01/2020	43.6	46.2	47.7	46	2.1	5	5.2			Good	
13													
											Overall survey -->	Good precision	

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

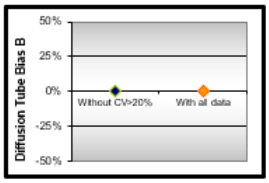
Site Name/ ID: Bramford Road o/s No 122

Precision: 12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 0 periods of data	
Bias factor A	
Bias B	
Diffusion Tubes Mean:	µgm^{-3}
Mean CV (Precision):	
Automatic Mean:	µgm^{-3}
Data Capture for periods used:	
Adjusted Tubes Mean:	µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 0 periods of data	
Bias factor A	
Bias B	
Diffusion Tubes Mean:	µgm^{-3}
Mean CV (Precision):	
Automatic Mean:	µgm^{-3}
Data Capture for periods used:	
Adjusted Tubes Mean:	µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

b) Piper's Court (Site ID: 11, 12 & 19)

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	02/01/2019	05/02/2019	62.2	70.4	63.9	66	4.3	7	10.8			Good	
2	05/02/2019	08/03/2019	72.4	77.1	75.8	75	2.4	3	6.0			Good	
3	08/03/2019	03/04/2019		64.8	57.1	61	5.4	9	48.9			Good	
4	03/04/2019	30/04/2019	39.4	38.2	40.6	39	1.2	3	3.0			Good	
5	30/04/2019	04/06/2019	51.4	59.4	54.4	55	4.0	7	10.0			Good	
6	04/06/2019	03/07/2019		50.3	57.8	54	5.3	10	47.6			Good	
7	03/07/2019	07/08/2019	65.5	59.7	58.3	61	3.8	6	9.5			Good	
8	07/08/2019	04/09/2019	70.1	62.5	74.2	69	5.9	9	14.7			Good	
9	04/09/2019	02/10/2019	56.9	59.1	64.0	60	3.6	6	9.0			Good	
10	02/10/2019	05/11/2019	61.7	61.7	63.1	62	0.8	1	2.0			Good	
11	05/11/2019	02/12/2019	71.9	66.9	65.9	68	3.2	5	8.0			Good	
12	02/12/2019	08/01/2020	70.8	69.9	73.0	71	1.6	2	4.0			Good	
13													
											Overall survey -->	Good precision	

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

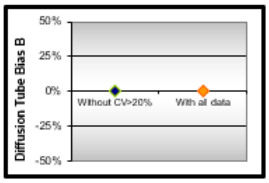
Site Name/ ID: Pipers Court

Precision 12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 0 periods of data
Bias factor A
Bias B
Diffusion Tubes Mean: µgm^{-3}
Mean CV (Precision):
Automatic Mean: µgm^{-3}
Data Capture for periods used:
Adjusted Tubes Mean: µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 0 periods of data
Bias factor A
Bias B
Diffusion Tubes Mean: µgm^{-3}
Mean CV (Precision):
Automatic Mean: µgm^{-3}
Data Capture for periods used:
Adjusted Tubes Mean: µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

c) Chevallier Street (Site ID: 45, 46 & 47 co-located with IPS3)

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	02/01/2019	05/02/2019	38.7	37.7	37.8	38	0.6	1	1.4	31.92	97.31	Good	Good
2	05/02/2019	08/03/2019	41.2	39.2	40.3	40	1.0	2	2.5	32.53	98.66	Good	Good
3	08/03/2019	03/04/2019	33.2	32.4	34	33	0.8	2	2.0	24.84	96.64	Good	Good
4	03/04/2019	01/05/2019	36.9	37	34.9	36	1.2	3	2.9	27.27	92.42	Good	Good
5	01/05/2019	03/06/2019	32.3	31.5	29.6	31	1.4	4	3.4	23.97	98.49	Good	Good
6	03/06/2019	03/07/2019	28.6	31.2	29.4	30	1.3	4	3.3	22.94	93.62	Good	Good
7	03/07/2019	07/08/2019	27.2	27.4	27.7	27	0.3	1	0.6	20.21	99.17	Good	Good
8	07/08/2019	04/09/2019	34.5	34.5	33.4	34	0.6	2	1.6	21.15	97.77	Good	Good
9	04/09/2019	02/10/2019	33.1	32.2	32.3	33	0.5	2	1.2	21.87	99.7	Good	Good
10	02/10/2019	06/11/2019	37.2	35.6	37.2	37	0.9	3	2.3	26.34	99.88	Good	Good
11	06/11/2019	02/12/2019								32.27	99.68		Good
12	02/12/2019	09/01/2020	36	39	37.4	37	1.5	4	3.7	27.95	99.56	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

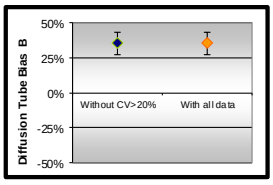
Site Name/ ID: Chevallier Street

Precision 11 out of 11 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A 0.75 (0.7 - 0.79)
Bias B 34% (26% - 42%)
Diffusion Tubes Mean: 34 µgm^{-3}
Mean CV (Precision): 3
Automatic Mean: 26 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 26 (24 - 27) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.75 (0.7 - 0.79)
Bias B 34% (26% - 42%)
Diffusion Tubes Mean: 34 µgm^{-3}
Mean CV (Precision): 3
Automatic Mean: 26 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 26 (24 - 27) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

d) Norwich Road (Site ID: 64 & 65)

Checking Precision and Accuracy of Triplicate Tubes — AEA Energy & Environment, From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	02/01/2019	05/02/2019	74.3	83.4		79	6.4	8	57.8
2	05/02/2019	05/03/2019	80.0	74.9		77	3.6	5	32.4
3	05/03/2019	03/04/2019	62.6	70.0		66	5.2	8	47.0
4	03/04/2019	01/05/2019	44.3	49.9		47	4.0	8	35.6
5	01/05/2019	03/06/2019	60.0	64.5		62	3.2	5	28.6
6	03/06/2019	03/07/2019	55.8	60.4		58	3.3	6	29.2
7	03/07/2019	07/08/2019	65.4	60.0		63	3.8	6	34.3
8	07/08/2019	04/09/2019	71.5	77.6		75	4.3	6	38.8
9	04/09/2019	02/10/2019	69.2	62.0		66	5.1	8	45.7
10	02/10/2019	06/11/2019	73.0	66.9		70	4.3	6	38.8
11	06/11/2019	02/12/2019	82.1	67.1		75	10.6	14	95.3
12	02/12/2019	09/01/2020	89.7	79.8		85	7.0	8	62.9
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
Overall survey -->		Good precision	

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

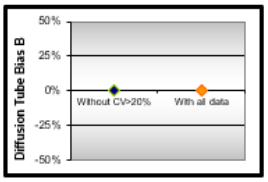
Site Name/ ID: Norwich Road between No 13&15

Precision: 12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 0 periods of data
Bias factor A
Bias B
Diffusion Tubes Mean: µgm^{-3}
Mean CV (Precision):
Automatic Mean: µgm^{-3}
Data Capture for periods used:
Adjusted Tubes Mean: µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 0 periods of data
Bias factor A
Bias B
Diffusion Tubes Mean: µgm^{-3}
Mean CV (Precision):
Automatic Mean: µgm^{-3}
Data Capture for periods used:
Adjusted Tubes Mean: µgm^{-3}



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e) St. Helens Street (Site ID: 80, 81 & 82)

Checking Precision and Accuracy of Triplicate Tubes — AEA Energy & Environment, From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	02/01/2019	05/02/2019	45.7	54.0	46.7	49	4.5	9	11.3
2	05/02/2019	08/03/2019	60.2	58.9	62.5	61	1.8	3	4.5
3	08/03/2019	03/04/2019	48.1	56.4	46.9	50	5.2	10	12.9
4	03/04/2019	30/04/2019	40.0	40.2	40.4	40	0.2	0	0.5
5	30/04/2019	04/06/2019	37.9	41.0		39	2.2	6	19.7
6	04/06/2019	03/07/2019	41.5	42.8	43.1	42	0.9	2	2.1
7	03/07/2019	07/08/2019	47.5	46.4	48.5	47	1.1	2	2.6
8	07/08/2019	04/09/2019	56.9	55.7	54.9	56	1.0	2	2.5
9	04/09/2019	02/10/2019	20.5	33.7	48.6	34	14.1	41	34.9
10	02/10/2019	05/11/2019	55.3	51.1	52.7	53	2.1	4	5.3
11	05/11/2019	02/12/2019	55.4	58.2	56.9	57	1.4	2	3.5
12	02/12/2019	08/01/2020	56.2	61.2	59.2	59	2.5	4	6.3
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Poor Precision	
		Good	
		Good	
		Good	
Overall survey -->		Good precision	

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

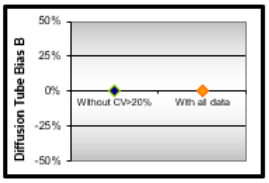
Site Name/ ID: St Helens Street - County Hall

Precision: 11 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 0 periods of data
Bias factor A
Bias B
Diffusion Tubes Mean: µgm^{-3}
Mean CV (Precision):
Automatic Mean: µgm^{-3}
Data Capture for periods used:
Adjusted Tubes Mean: µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 0 periods of data
Bias factor A
Bias B
Diffusion Tubes Mean: µgm^{-3}
Mean CV (Precision):
Automatic Mean: µgm^{-3}
Data Capture for periods used:
Adjusted Tubes Mean: µgm^{-3}



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Version 04 - February 2011

f) St. Matthews Street (Site ID: D1, D2 & D3 co-located with IPS04)

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1													
2													
3													
4													
5													
6													
7													
8	07/08/2019	04/09/2019	44.9	49.8	48.3	48	2.5	5	6.2			Good	
9	04/09/2019	02/10/2019	43.7	45.1	43.0	44	1.1	2	2.7			Good	
10	02/10/2019	06/11/2019	50.6	50.4	48.7	50	1.0	2	2.6			Good	
11	06/11/2019	02/12/2019	65.3	60.4	63.7	63	2.5	4	6.2			Good	
12	02/12/2019	09/01/2020	57.3	62.1	60.7	60	2.5	4	6.1			Good	
13													

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

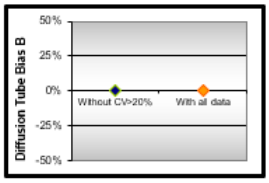
Overall survey --> Good precision

Site Name/ ID: St Matthews Street

Precision 5 out of 5 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%		Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 0 periods of data		Bias calculated using 0 periods of data	
Bias factor A		Bias factor A	
Bias B		Bias B	
Diffusion Tubes Mean:	µgm^{-3}	Diffusion Tubes Mean:	µgm^{-3}
Mean CV (Precision):		Mean CV (Precision):	
Automatic Mean:	µgm^{-3}	Automatic Mean:	µgm^{-3}
Data Capture for periods used:		Data Capture for periods used:	
Adjusted Tubes Mean:	µgm^{-3}	Adjusted Tubes Mean:	µgm^{-3}



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Diffusion Tube Bias Adjustment

Following the resumption of automatic air quality monitoring at the Chevallier Street site (IPS3) in December 2016, for the third consecutive year it has been possible to compare mean collocated diffusion tube values with data captured by the cheminescence analyser using the AEA_DifPAB_v04.xls spreadsheet to obtain a local bias adjustment factor of 0.75 (see Figure C.6c).

Consulting the *National Diffusion Tube Bias Adjustment Factor Spreadsheet Version 03/20* published on the DEFRA LAQM Support website, for the SOCOTEC, Didcot laboratory; preparation method 50% TEA in acetone; for the year 2019, a bias adjustment figure of 0.75 was obtained based on 24 studies.

This year, both the National and Local Bias Correction values are the same, hence the diffusion tubes were analysed using both factors. Had the bias adjustment factors been different, a decision would have been made to apply the local bias adjustment factor having considered the guidance given in Box 7.11 of LAQM.TG16. The reason for this decision would have been due to:

- This is the third year running where the Council has been able to obtain a high data capture rate (98%) of continuous analyser data to benchmark this year's data against.
- The co-located site has good precision for the diffusion tubes and high quality chemiluminescence results.

To assist with providing transparency to the reader, an example of the bias correction factor being applied to a diffusion tube is shown below.

Example of applying the bias correction to diffusion tube data:

Diffusion tube 38 (Civic Drive) – annual mean 44.4µg/m^3 (average from 12 months of monthly diffusion tube readings).
45.4µg/m^3 x 0.75 = 33.3 µg/m^3

Diffusion Tube Annualisation

Unfortunately, the Council was only able to obtain 8 months' worth of data for diffusion tube 51 as tubes were found missing upon changeover. As Para 7.190 of LAQM.TG16 states that "for any monitoring sites with fewer than 9 months' worth of data, it is necessary to perform annualisation". The data from monitoring site 51 has been annualised in accordance with the procedure detailed in LAQM.TG16 Boxes 7.9 and 7.10.

This adjustment was undertaken using whole year datasets from the following AURN monitoring sites (all within a 50 mile radius of Ipswich and with data capture rates of in excess of 85%):

• Southend-on-Sea (UKA 00409) – Type: Urban Background;
• St Osyth (UKA 00445) – Type: Rural Background; and
• Norwich Lakenfields (UKA 00549) – Type: Urban Background.

The average ratio (R_a) of the annual mean to period mean ratios (R) for these sites was: 0.977964 and is therefore the annualisation factor. The measured period mean concentration (M) for diffusion tube 51 (DT 51) was 50.45µg/m^3.

The estimate of the annualised average of DT 51 was therefore DT 51 = M x R_a = 50.45 x 0.977964 = 49.3 µg/m^3.

As the continuous monitor on St Matthews Street was installed in late June 2019, co-located diffusion tubes (D1, D2 and D3) were not installed until August 2019. In light of this, monitoring sites D1, D2 and D3 were also annualised in accordance with the procedure detailed in LAQM.TG16 Boxes 7.9 and 7.10. To assist with the annualisation, datasets were used from the three AURN monitoring sites mentioned above.

Diffusion Tube Distance Correction

Wherever possible diffusion tube monitoring locations are selected to be representative of exposure. However, where this is not practicable measurements should be adjusted to estimate the nitrogen dioxide concentration at the nearest location relevant for exposure.

Where necessary, this correction has been undertaken using the *NO_2 Fall-Off with Distance Calculator Version 4.2* available on the Defra LAQM Support website. An example of distance correction is shown below (see Figure C.7).

Figure C.7 – Example of Distance Correction for Diffusion Tube 38 (Civic Drive)

BUREAU VERITAS

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	0.85	metres
Step 2	How far from the KERB is your receptor (in metres)?	7.15	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	15.90864	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	33.3	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	26.1	µg/m^3

Note:

- The distance from the kerb to the diffusion tube was 0.85m

- The distance from the kerb to the nearest receptor (in this case a residential dwelling) was 7.15m
- The annual mean background NO_2 concentration for the 1kmx1km square in which the tube was located was 15.90864µg/m^3. Background mapping data obtained from DEFRA UK Air website: https://uk-air.defra.gov.uk/data/laqm-background-home – 2017 based background maps for NOx, NO_2, PM_{10} and $PM_{2.5}$ (year selected 2019, base year 2017).
- Measured, bias adjusted annual mean NO_2 concentration was 33.3µg/m^3

Imputing the above data into the calculator, gave a predicted annual mean NO_2 concentration of 26.1µg/m^3

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

Figure D.1 – Overview of Ipswich AQMA boundaries and Monitoring Locations (1&2)

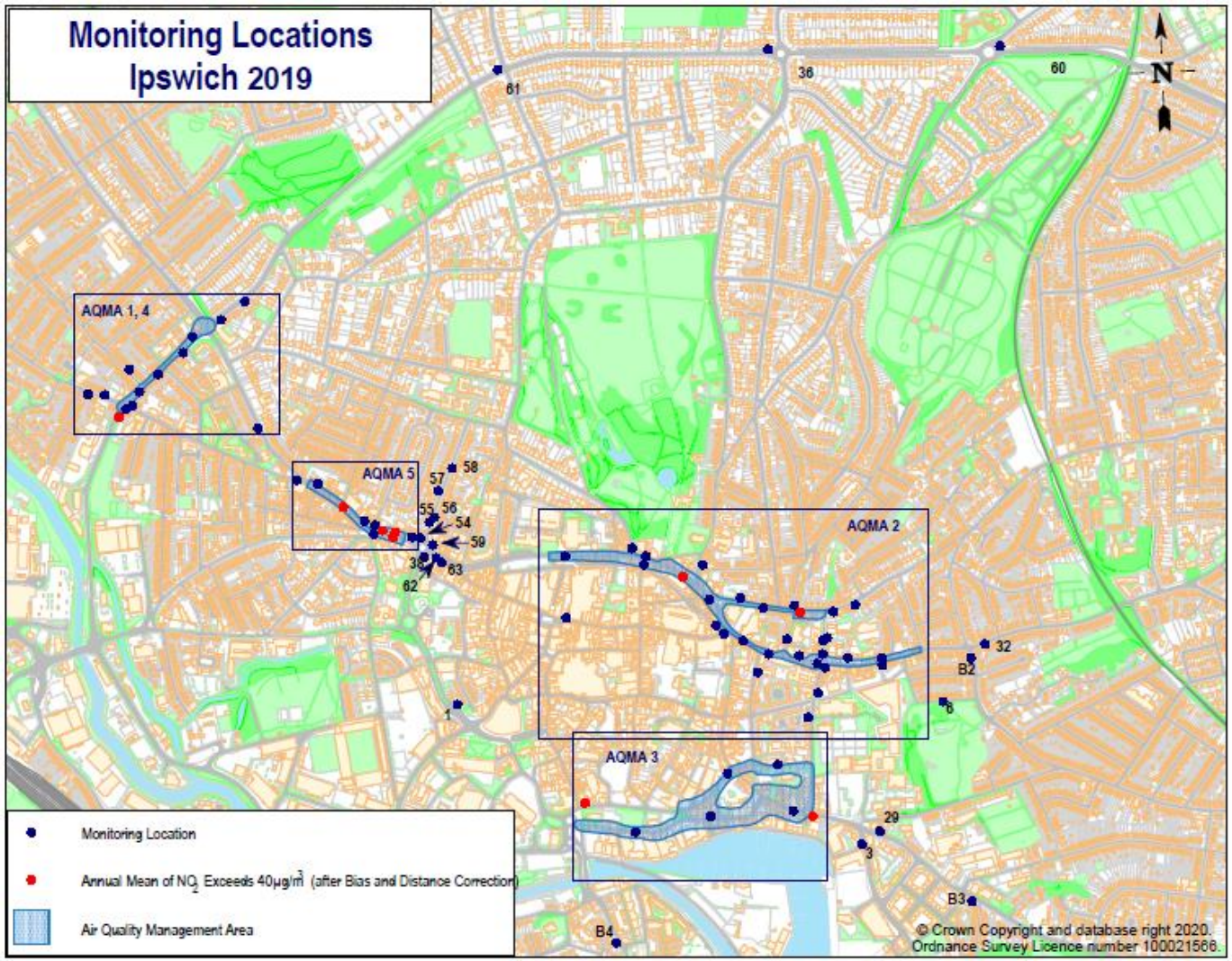


Figure D.2 – Ipswich Air Quality Management Areas 1 and 4 (2)

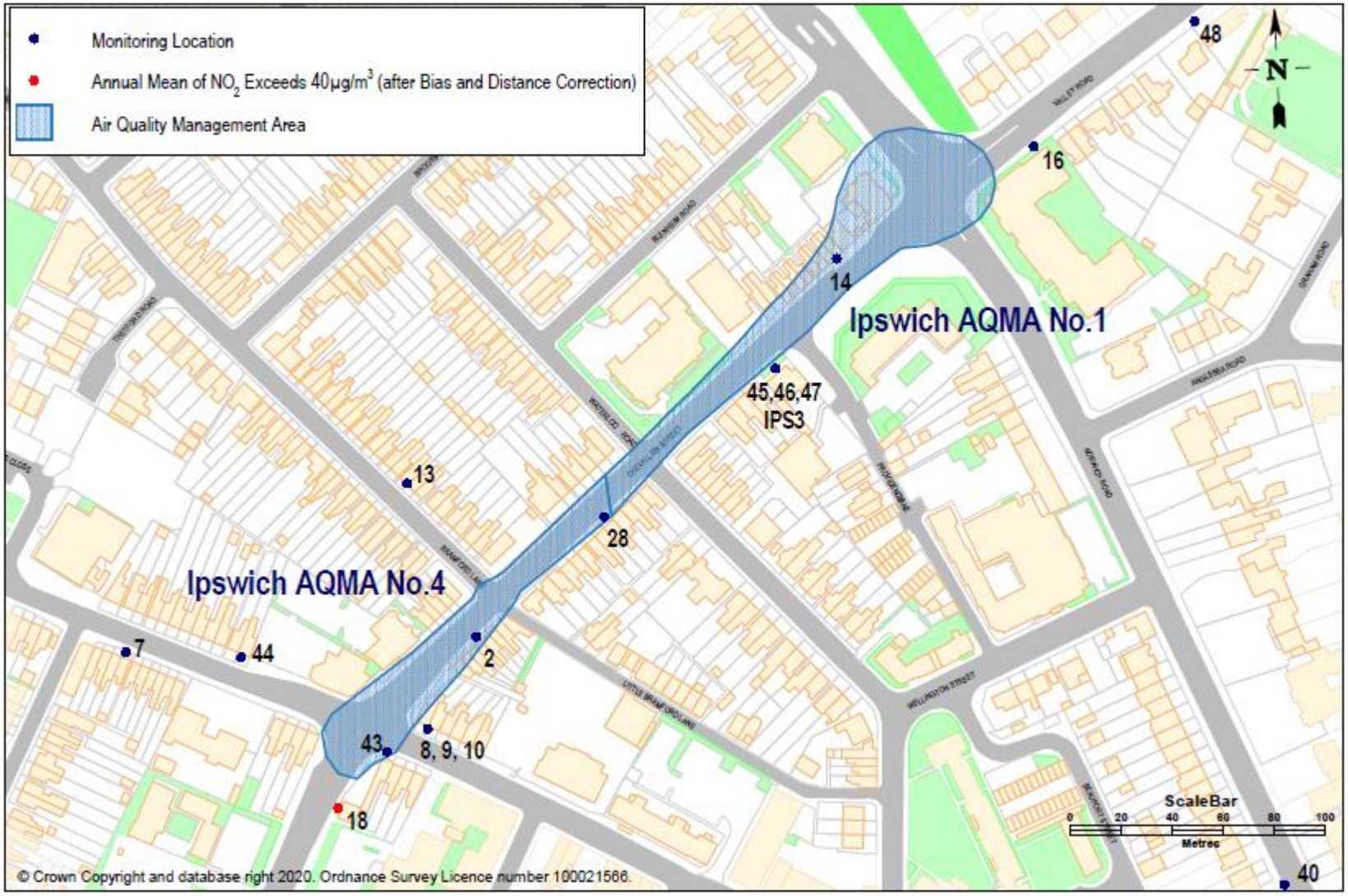


Figure D.3 – Ipswich Air Quality Management Area 2 (2)

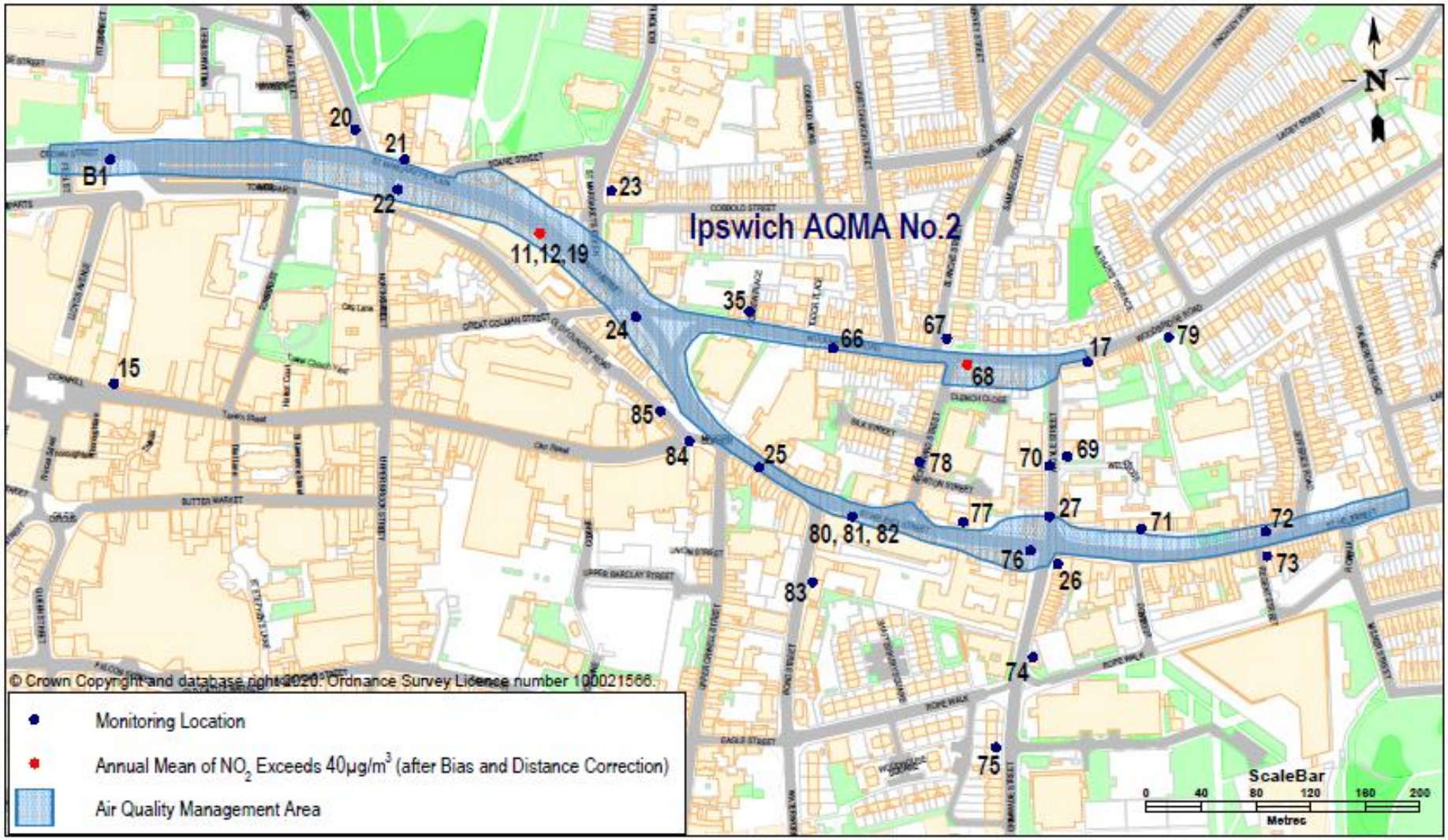


Figure D.4 – Ipswich Air Quality Management Area 3 (1&2)

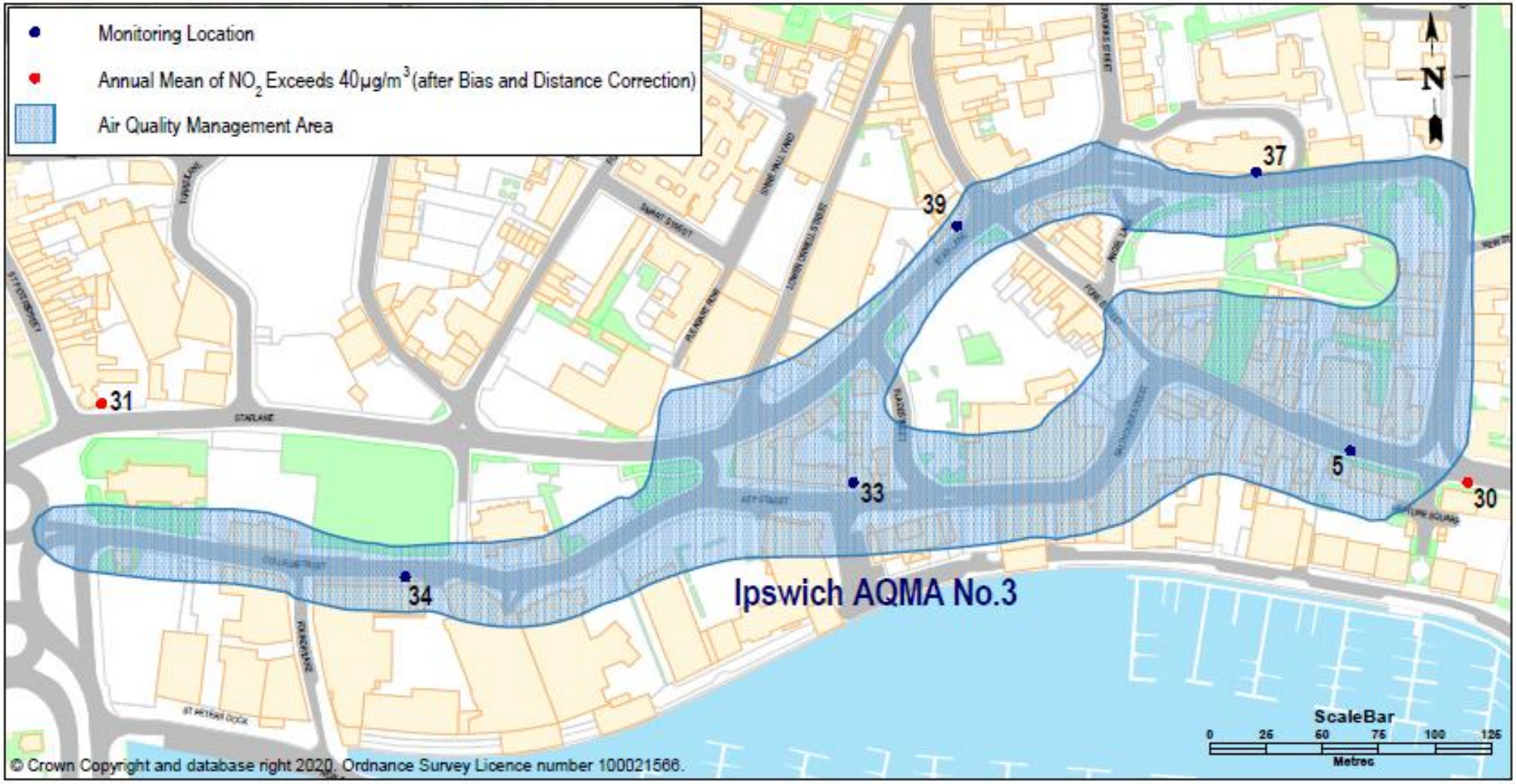
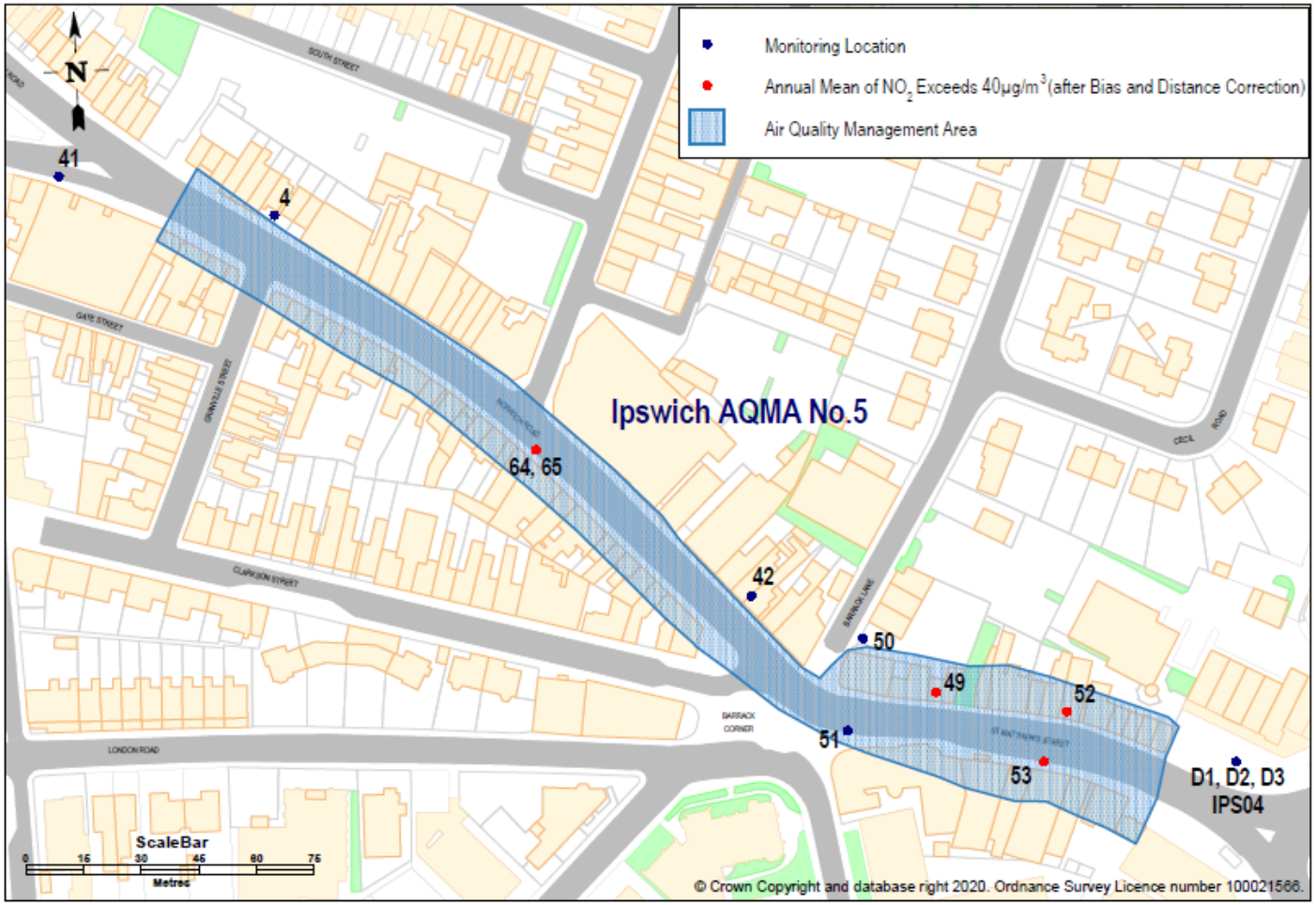


Figure D.5 – Ipswich Air Quality Management Area 5 (1&2)



Notes:
(1) Monitoring locations at which the distance corrected annual mean NO_2 level, bias corrected using the local factor, exceeds the objective of 40µg/m^3 are shown in red.
(2) Monitoring locations at which the annual mean NO_2 level, bias corrected using the local factor, exceeds the objective of 40µg/m^3 are shown in red.

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[11]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
ISPA	Ipswich Strategic Planning Area
LAQM	Local Air Quality Management
LAQM.PG16	Local Air Quality Management Policy Guidance (PG16) [April 2016]
LAQM.TG16	Local Air Quality Management Technical Guidance (TG16) [February 2018]
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SCC	Suffolk County Council
SO_2	Sulphur Dioxide
SPD	Supplementary Planning Document