2024 Air Quality Annual Status Report (ASR)

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

Date: June 2024

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Executive Summary: Air Quality in Our Area

North Norfolk District Council monitors air quality in fulfilment of Part IV of the Environment Act 1995, as amended by the Environment Act 2021. Monitoring currently includes continuous methods of monitoring, primarily in association with our obligations towards nitrogen dioxide and particulate pollution. At this time the Council is still meeting its statutory obligations regarding all obligatory pollutants specified in the 1995 Act. The Council is currently monitoring two sites across the distinct for nitrogen dioxide, PM_{10} and $PM_{2.5}$ with continuous monitors.

In respect to these pollutants, specifically nitrogen dioxide and PM_{10}, the Council is meeting the air quality standards by some margin and concludes that there are no areas where air quality is of such a concern that an Air Quality Management Area (AQMA) is needed or justified.

Regarding $PM_{2.5}$, there is no obligatory standard, however Councils are required to work towards a recommended target of 10µg/m^3. The Council is meeting this recommendation at monitored sites; however 2018 national, modelled background data (Home - Defra, UK) does indicate that there are several areas either slightly breaching the recommendation or are close to doing so. This coupled with the restricted monitoring coverage in the district for $PM_{2.5}$ suggests that there is more monitoring to be done before the Council can confidently be assured that we are meeting the 10 µg/m^3 target.

Regarding wider changes and developments in the district, there have been no notable changes that would dictate or impact nitrogen dioxide and PM_{10} emissions at any of our monitoring sites or any other less priority sites not currently monitored in the short or medium term.

Following on from the work undertaken in 2023 there were several changes to passive monitoring network coverage. Some of this change was in line with intentional and proposed changes, however in reality this was primarily driven by unforeseen logistical issues over the previous annual period. As specified in the previous ASR the NOx diffusion monitoring has been reduced in coverage, although this year it was momentarily ceased as a result of an absence of staffing resource.

Irrespective of the 2023 situation the Council still proposes to reduce diffusive monitoring coverage. This decision was reached after undertaking a cost benefit review comparing the risk associated with pollutant emissions, the likelihood of a AQMA being established in the

district and the justified need to maintain monitoring in those areas with budgetary constraints being considered.

The Council still feels justified in this action and is satisfied that data presented in the 2023 ASR and subsequent data in appendix F supports this course of action and demonstrates that we are maintaining a balance between public health needs and public finances. This data has been provided in Appendix F of this report to assist the reader in their understanding.

Going forward the Council will maintain a diffusive monitoring at site 1 on an annual basis, undertaking check monitoring ever 3 years for the remainder of our monitoring sites. The first of these checks will be undertaken in 2026.

Air Quality in North Norfolk

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year[1].

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution[2].

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

Actions to Improve Air Quality

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

The Environmental Improvement Plan[3] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter ($PM_{2.5}$), the pollutant of most harmful to human health. The Air Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero[5] details the Government's approach to reduce exhaust emissions from road transport through several mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel, and most of the Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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

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

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

One caveat to add to this is that North Norfolk is a rural district, as such, the district is not heavily impacted by road traffic emissions compared to other urban councils, and residents are highly dependent upon on private vehicles for essential transport. Pollutants are normally dominated by cross boundary (particularly in the case of particulates) and local point sources.

Nitrogen dioxide

Nitrogen dioxide emissions have consistently reduced over the last 6 years to the extent that the 2023 ASR reported that emissions were significantly below the national objective of 40µg/m^3. On this basis there was no justification to propose a AQMA in any area. It is difficult to ascertain the precise reasoning for the decline, but assumptions still include the gradual introduction of electric vehicles on the road network and positive impacts translated from the Norwich Northern Distribution Road (NDR).

Although the Councils diffusion tube network during 2023 ceased, the continuous monitor located at Wroxham Bridge (site 1) continues to show that NO2 levels are below the national objective by some margin. However, it was noted that the 2023 data from the unit showed a surprising drop of the most recent annual measurement from 17 µg/m^3 to 14.2 µg/m^3. There is some concern that this may not be reflective of actual reductions, however the margin of error still suggests that the levels are still within national objectives. Further investigation of this value will need to be undertaken, which will include the reintroduction of tubes as a colocation.

Although the Council has collected less data over the 2023 period the Council is still meeting its statutory duties and does not propose to introduce further actions to tackle nitrogen dioxide emissions outside of those existing Council initiatives proposed under Net Zero.

Particulate Matter

The Council have particulate continuous monitors established at 2 sites (Wroxham Bridge and Hamilton Road, Cromer). Wroxham Bridge (site 1) has 3 years of indicative particulate data, so the Council is developing a broader understanding of concentrations in this area with growing confidence regarding its accuracy. In addition, the Council have 12 months of continuous data obtained through the deployment of our second continuous monitor at Hamilton Road, Cromer (site 6). This deployment was a co-location exercise to compare

with the diffusion tube located at the same general location and to provide particulate data for that location also.

The Council still feels that our particulate monitoring is still maturing so there is still a continuing need to develop further strategies for reducing particulate matter and more data will be required and a better understanding of the apportionment of particulate matter from combustion driven vehicles will be needed.

In terms of additional actions, the Council will expand the capacity of our particulate. monitoring network where possible.

Planning and Development

Amendments and changes have been made regarding the validation requirements for planning submissions to the planning authority particularly in reference to $PM_{2.5}$ This was primarily to streamline processes, bring the validation process in line with relevant changes in legislation and to provide guidance to developers. This guidance consists of a simple matrix diagram to inform developers of their obligations and requirements:

	AQMA in Place	Background exceedance (any pollutant)	Background Close to Breach (any pollutant)	Low background
Major application inc. large commercial and public infastructure	R	R	A	IS
Small development < 12 residential units/ small scale commercial and public infastructure	A	A	IS	S
Householder (porches, extensions etc.)	S	S	S	S

R	Recommend refusal
A	Air Quality assessemt required
IS	Air quality impact Statement required
S	No Conditons imposed

Disclaimer
*Each development that requires an AQ assessent does not guarantee approval. Approval will be given where development emissions either fall below objectives or where effective mitigation can be proven.

*Refer to https://uk-air.defra.gov.uk/data/gis-mapping/
*Clear exceedance of national objectives = [PM2.5] >/= 10ugm3, [NO2] >/= 40ugm3, [PM10] >/= 40ugm3
*Background close to a breach = Background within 10% of objective target.

Conclusions and Priorities

Nitrogen Dioxide

Passive diffusion data over the last 6 years has consistently shown a gradual reduction in emissions at all monitoring sites in North Norfolk (Appendix F). Site 1 has always been regarded as a proxy for other sites in North Norfolk and dictated the Councils approach to

air quality in the district. The annual emission at this site meets the national air quality objective of 40µg/m^3 by some margin, and the consistent downward trend still gives some assurance that a breach of the objective in the short to medium term is unlikely unless there is significant development in the district. This hypothesis is still supported by continuous data retrieved from site 1 over the 2023 monitoring period, which although is not Mcerts accredited, does show annual average emissions to be well below the national objective at 14.2 µg/m^3.

It was noted that the 2023 data from the continuous unit at site 1 showed a surprising drop for the 2023 annual measurement from 17 µg/m^3 to 14.2 µg/m^3, especially compared with trend data. There is some concern that this may not be reflective of actual reductions, however the known limit of detection inherent in the monitors combined with the wide margin between the detected concentration and limit threshold still assumes levels are still within national objectives. Further investigation of this value will need to be undertaken as previously specified.

Unfortunaly for the 2023 annual monitoring period no diffusion tubes were deployed due to logistical issues within the Council, as such no co-location data is available to support the results from the continuous monitor. However, this has now been rectified in this current reporting year 2024 with the deployment of a tube at Site 1 and further deployments in 2026.

Given the budgetary pressures placed upon local government and competing priorities, the Council have now temporarily reduced the size of the NOx diffusion network with a decision to monitor all sites periodically every 3 years except for site 1 (This will be annual). Cost was not the only consideration of this action, but also considered were the reducing trends (Appendix F) seen in the district for nitrogen dioxide and the widening margin between current annual concentrations and the national emission objectives.

In the short term the Council considers this to be a low-risk strategy to readdress the balance of public health with the wider considerations of Council at large. The Council is confident that it is meeting its statutory requirements under legislation and there is no prospect of any AQMA being required at this time. This situation will be monitored by reviewing the annual indicative data from continuous monitoring and diffusion tube data that will be obtained in 2026.

Particulate Matter PM2.5

2018 background mapping available from UK Air (Home - Defra, UK) indicated that the district is compliant with $PM_{2.5}$ concentrations except for one grid square area (604500,

332500), recording $PM_{2.5}$ concentrations of 10.7µg/m^3. This site is associated with one of the largest poultry units in the district. This site is primarily rural but there is a medium population centre (Melton Constable/Briston) in the vicinity. On the hypothesis that the primary source of pollution is associated with an agricultural unit, the Local authority has little control over emission release and management of this site which sits primarily with the Environment Agency, DEFRA and Natural England This site has been selected for continuous monitoring to investigate this hypothesis. This will be undertaken during the summer of 2024. The 2018 background mapping also identifies some other areas are close to the 10 µg/m^3 emission objective in the district, confirming the need for an established network of monitors.

Indicative continuous data from site 1 (Wroxham bridge) shows an annual concentration of 5.4µg/m^3 for $PM_{2.5}$ and the additional monitor located in the vicinity of Hamilton Road Cromer (site 6) which has been active over the 2023 annual period has reported $PM_{2.5}$ concentrations of 8 µg/m^3. Both these sites show that $PM_{2.5}$ concentrations are running below the proposed limit of 10µg/m^3

In respect to PM_{10}, both the indicative continuous monitors at sites 1 and 6 confirm that the Council is compliant with the PM_{10} national objective, however as before, the conditions at site 1 and 6 may not be reflective of the wider district.

In view of the above the Council proposes to maintain a fixed indicative automatic monitor at site 1 for $PM_{2.5}$ and PM_{10} and continue to rotate a second indicative automatic monitor across the other 16 sites on a case-by-case basis. The second indicative monitor will be moved to assess the hotspot identified by the DEFRA background mapping; this will hopefully be in place for year beginning 2025.

Local Engagement and How to get Involved.

North Norfolk District Council has good local engagement regarding publishing the ASR for public viewing and maintaining local member contact. In the wider context the Authority gets involved with cooperative publicity events with other local Councils in Norfolk.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection Team Leader of North Norfolk District Council.

This ASR has been approved by:

Emily Capps: Assistant Director for Environmental and Leisure Service.

This ASR has been signed off by a Director of Public Health.

If you have any comments on this ASR, please send them to James Ashby at:

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Table of Contents

Figures

Tables

1 Local Air Quality Management

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

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by North Norfolk District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

North Norfolk District Council currently does not have any declared AQMAs. A countywide Air Quality Strategy is under development to prevent and reduce polluting activities.

2.2 Progress and Impact of Measures to address Air Quality in North Norfolk District Council

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

- The Council undertook automatic monitoring at one monitoring station, Site 1, during 2022. Site 1 had good data capture in 2022 (86%) for NO2, PM10 and PM2.5. Annualisation was not required for these monitors as the data capture rate was 75% or higher. There were no exceedances of the annual mean and 1-hour mean NO2 national objectives. There were no exceedances of the PM_{10} or $PM_{2.5}$ annual mean objective at Site 1 in 2022.
- The Council undertook passive diffusion tube monitoring of NO2 at 16 monitoring locations during 2022. During 2022, there were no exceedances at passive monitoring sites of NO2. The highest NO2 concentration that was recorded in 2022 was at roadside monitoring location Diffusion Tube 1 in Hoveton (23.7 µg/m^3). A general downward trend can be observed in NO2 concentrations over the last six years. The council have attributed this to three contributing factors: establishment and functioning of the Norwich northern distribution route, gradual increase in electric vehicles and increase in the number of commuters working from home.
- The Council has robust QA/QC procedures for diffusion tube monitoring, which were applied appropriately and accurately to the 2022 monitoring data. The national bias adjustment factor has been applied. Annualisation was required for two diffusion tube locations, 4 and 14 due to data capture rate of 75% or below. Distance correction was not required. All calculations were clearly outlined and justified and appear accurate.
- The Council have implemented various measures to improve air quality in the district. Such measures include transferring Council's fleet to electric vehicles and wider installation of electric vehicle charging points.
- Defra recommends that Directors of Public Health approve draft ASRs. Sign off is not a requirement, however collaboration and consultation with those who have responsibility for Public Health is expected to increase support for measures to improve air quality, with co-benefits for all. Please bear this in mind for the next annual reporting process.

- On the basis of the evidence provided by the local authority the conclusions reached in the report are accepted for all sources and pollutants. Following the completion of this report, North Norfolk District Council should submit an Annual Status Report in 2024.

North Norfolk District Council has taken forward a few direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1. Four measures are included within Table 2.1, with the type of measure and the progress North Norfolk District Council have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.1.

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Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Transfer Council fleet to EV	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2020	2030	Local Authority	Internal	No	Fully funded	N/A	Ongoing	Reduced emissions	n/a	First EV pool cars purchased and undergoing trials	Lengthy Timescale and funding
2	Wider Installation of EV charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2020	Ongoing	Local Authority	Internal	No	Fully funded	N/A	Ongoing	Reduced vehicle emissions	n/a	Implementation on-going	Funding
3	NNDC Net Zero 2030 Strategy Action Plan	Policy Guidance and Development Control	Low Emissions Strategy	2020	2030	Local Authority	Internal	No	Fully funded	N/A	Implemented	Reduced Council emissions	n/a	Implementation on-going	First phase successful, second phase on-going
4	Update to Planning validation process	Policy Guidance and Development Control	Development Control	2024	complete	Local Authority	N/A	N/A	N/A	N/A	Implemented	Development control	Complete	Complete	None
5	Collaboration with partners on the Countrywide AQ group.	Policy and strategic development	Policy and Strategy	2024	N/A	Local Authorities	Internal and Central Gov	N/A	N/A	N/A	Ongoing	Monitoring Coverage	Funding Bids	N/A	Time

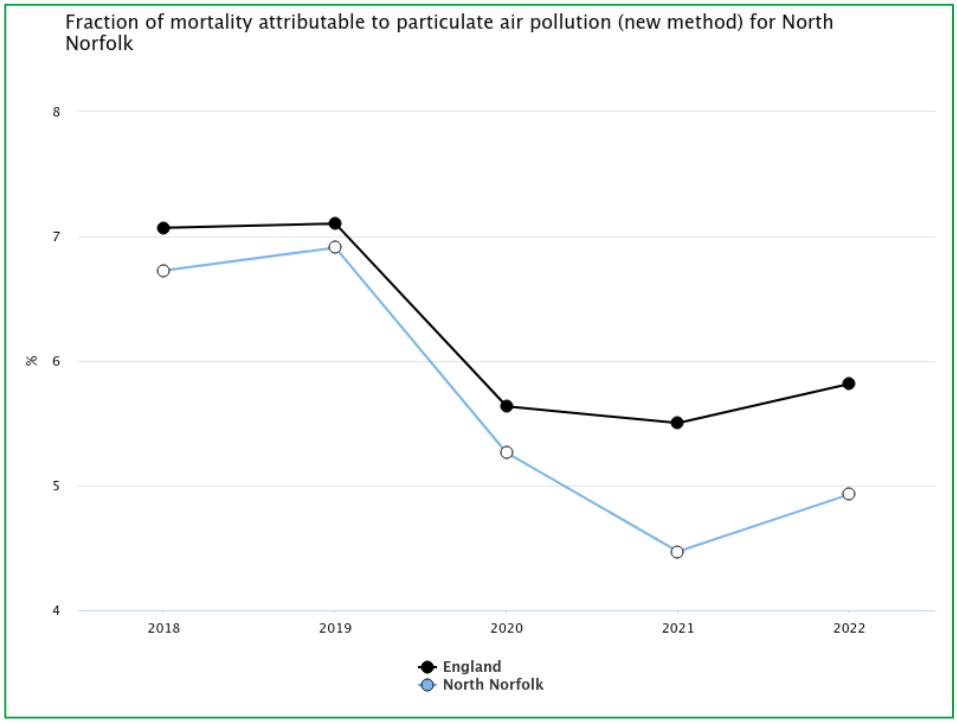
2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations.

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[6], local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter ($PM_{2.5}$)). There is clear evidence that $PM_{2.5}$ (particulate matter smaller 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

North Norfolk District Council is taking the following measures to address $PM_{2.5}$:

Maintaining a political and policy focus of achieving net zero, with a recognition that these proposals will correlated with reductions of pollutants. There are no direct measures proposed on the basis that there are no AQMA in the district, however the Council maintains an obligation to continue to monitor pollutants of concern and manage new development in a way that will either prevent or reduce future emissions.

The latest data regarding the public health outcome framework for the fraction of mortality attributed to particulate air pollution is currently 5.4% for Norfolk, although this is 2022 data as the framework data has not yet provided 2023 outcomes data. Compare to the previous attributed factor (previously presented in the 2021 ASR) this suggests an increase; however, the 2022 data is for Norfolk rather than North Norfolk. The Graph opposite shows the position of North Norfolk in comparison with England as a whole.



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

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

North Norfolk District Council undertook automatic (continuous) monitoring at 2 sites during 2023. Table A.1 in Appendix A shows the details of the automatic 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.

3.1.2 Non-Automatic Monitoring Sites

North Norfolk District Council did not undertake non automatic monitoring during the 2023 period.

Individual Pollutants

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

3.1.3 Nitrogen Dioxide (NO2)

Data collected from continuous monitoring at site 1 and 6, continue to show that concentrations of NO2 remain substantially below the air quality objectives. Site 1 has 3 years of trend data, which also shows a marginal reduction in levels over that period. It remains to be seen if these reductions are significant especially as the quality of the data is indicative only. However, we are confident, that because of the known margin of error inherent within the monitors and the greater margin between recorded levels and the air

quality objective, the Council continues to meet its statutory obligations to manage air quality within the known constraints.

Due to the weight of evidence derived from historic passive monitoring (please refer to the conclusions of the 2023 ASR and appendix F) The Council is confident that the data derived from site 1 is reflective of the wider trends seen within the district, especially in the absence of any notable changes in traffic/infrastructure changes in the district.

Regarding site 6, the indicative data supports the same conclusions in the 2023 ASR drawn from the historic diffusion tube data of the same location, in that levels are well within the confines of the national objective. Site 6 has also provided particulate data for the first time, which will be discussed further under the appropriate sections.

Table A.2 in Appendix A compare the ratified and adjusted monitored NO2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

Table A. in Appendix A compares the ratified continuous monitored NO2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. Regarding exceedances occurring above 200µg/m^3 more than 18 times per year, there were no occasions within 2023 where this occurred.

3.1.4 Particulate Matter (PM_{10})

Monitoring data from the 2023 period at site 1 shows annual concentrations of 8.5µg/m^3, a reduction from 11.1µg/m^3. This continues a visual trend of a reduction on concentrations since 2021. Like the conclusions associated with NO2 in the previous section, the wide margin between the recorded levels and objective provides some confidence that the Council is meeting its statutory obligations regarding PM_{10} and as such no detailed assessment is warranted at this time.

For the first time, the Council were able to obtain particulate data for site 6, which forms part of our wider strategy to collect particulate data from all our historic monitoring points. Site 6 was the first site to obtain 12 months of data in respect to PM_{10} and $PM_{2.5}$ in accordance with our strategy. The continuous monitor at site 6 recorded an annual average of 10.07 µg/m^3, which again is well below the national objective.

Table A. in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year. Regarding the daily mean exceedance, there were no occurrences where concentrations were above 50µg/m^3 on more than 35 occasions for either site 1 or 6.

3.1.5 Particulate Matter ($PM_{2.5}$)

Table A. in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

Concentrations recorded regarding site 1 continue to demonstrate that concentrations are below the 10µg/m^3 objective with recorded 2023 concentrations of 5.4µg/m^3, which is a reduction from 7.2µg/m^3 in 2022 and 8.3µg/m^3 in 2021. Again, these results are indicative, as such the reducing trends seen of the last 3 years may not be significant, however we are confident that this suggests that site 1 is currently below the objective. Given the potential for local sources of $PM_{2.5}$ across the district, we are not confident that this is necessarily a reflection of concentrations across the district. We have already identified potential localised sources associated with intensive agriculture that will require further investigation.

The data acquired from site 6, as with $PM_{2.5}$ is new data, with 2023 annual concentrations of 8µg/m^3, which again is below the required objective.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
Site 1	Hoveton Toy Store	Roadside	318172	630393	NO2, NO, O3, PM1, PM2.5 & PM10	n/a	Electrochemical Sensors & Optical Particulate Counter	0	2	3
Site 6	Hamilton Road	Roadside	621836	342187	NO2, NO, O3, PM1, PM2.5 & PM10	n/a	Electrochemical Sensors & Optical Particulate Counter	0	2	3

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 – Annual Mean NO2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
Site 1	630393	318172	Roadside	100	100			16.56	17.0	14.2
Site 6	621836	342187	Roadside	72	72					15.4

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

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

☒ **Where exceedances of the NO2 annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023.**

Notes:

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

Exceedances of the NO2 annual mean objective of 40µg/m^3 are shown in **bold**.

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

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

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

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

Figure A.1 – Trends in Annual Mean NO2 Concentrations Site 1 (µg/m3)

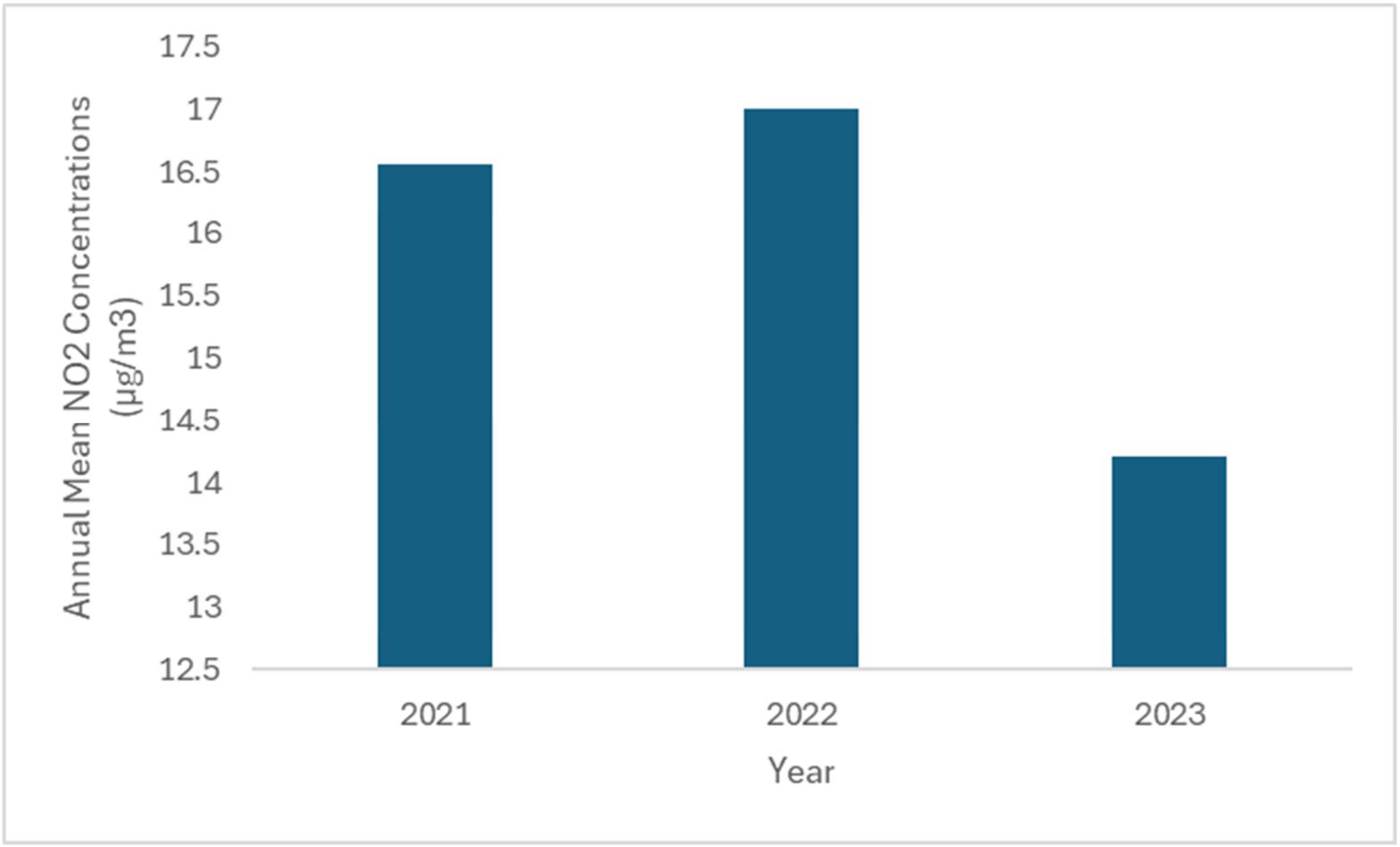


Table A.3 – 1-Hour Mean NO2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
Site 1	630393	318172	Roadside	100	100			0	0	0
Site 6	621836	342187	Roadside	72	72					0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

Table A.4 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
Site 1	630393	318172	Roadside	100	100			12.15	11.1	8.5
Site 6	621836	342187	Roadside	72	72					10.07

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

Notes:

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

Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ are shown in **bold**.

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

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

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

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations (µg/m3) Site 1

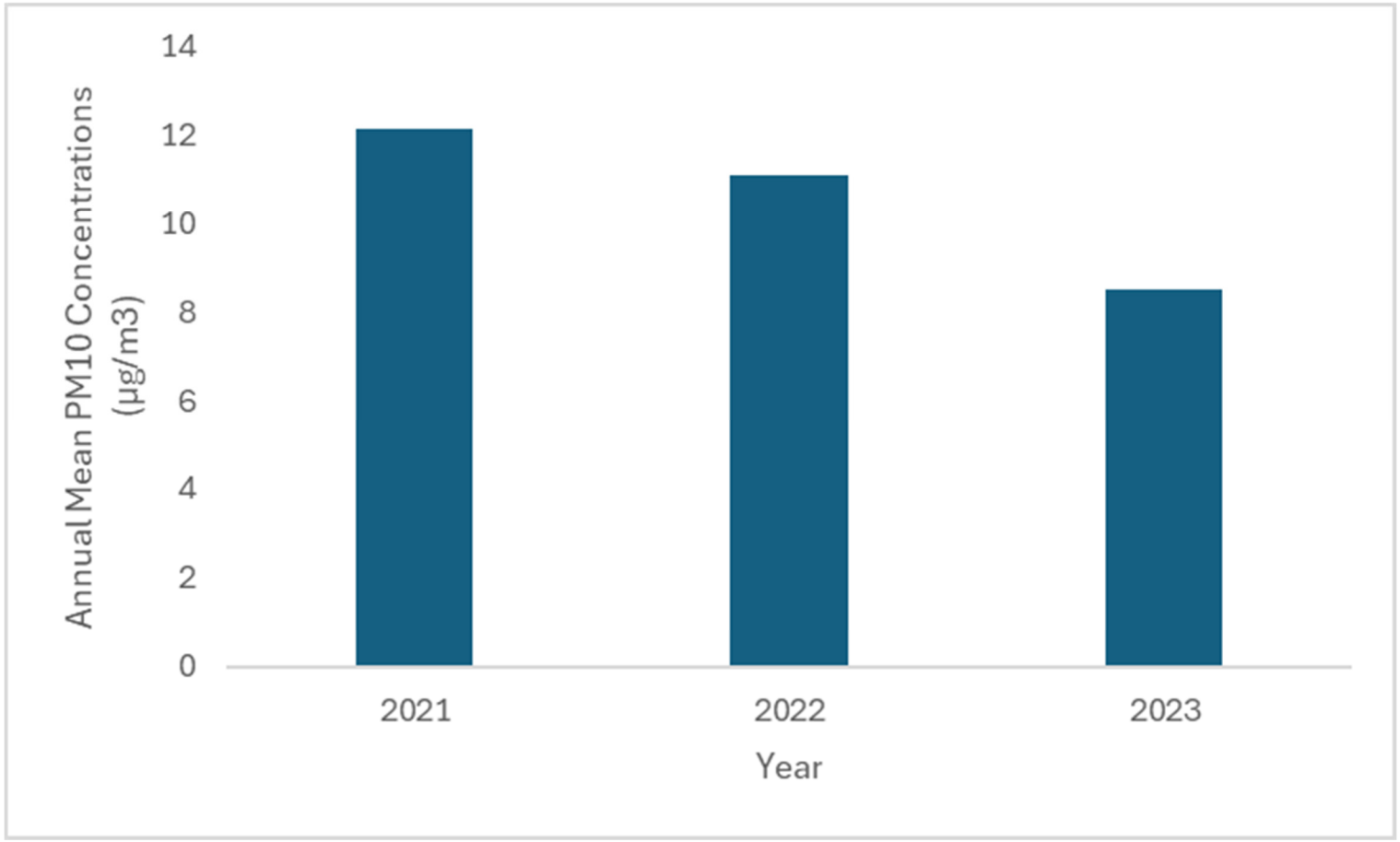


Table A.5 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID		X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
Site 1		630393	318172	Roadside	100	100				1	0
Site 6		621836	342187	Roadside	72	72					0

Notes:

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

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

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

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

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

Table A.6 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)		Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
Site 1	630393	318172		Roadside	100	100			8.30	7.2	5.42
Site 6	621836	342187		Roadside	72	72			-	-	8.0

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

Notes:

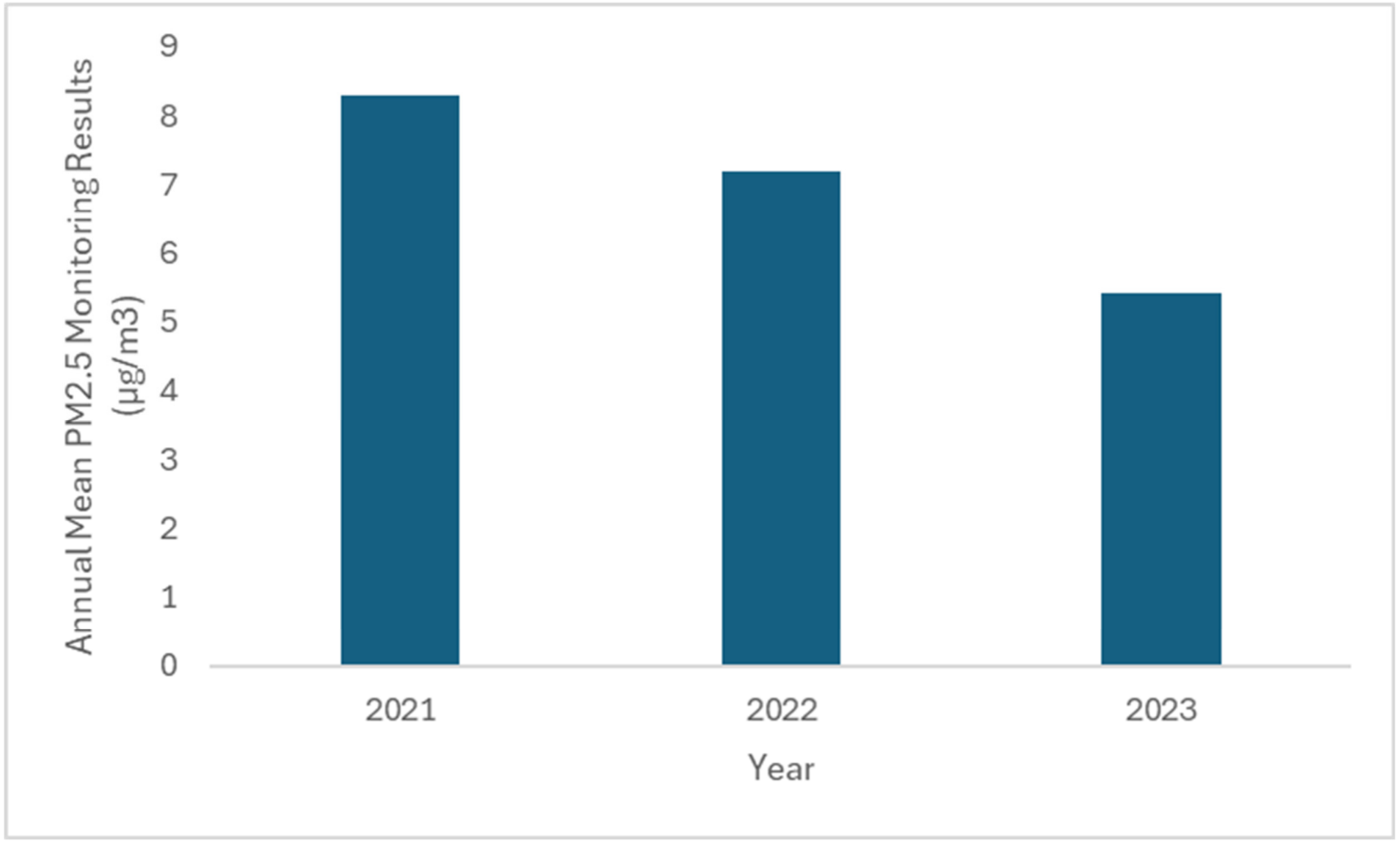
The annual mean concentrations are presented as $\mu g/m^3$.

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

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

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

Figure A.3 – Trends in Annual Mean $PM_{2.5}$ Concentrations Site 1



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

New or Changed Sources Identified Within North Norfolk District Council During 2023

North Norfolk District Council has not identified any new sources relating to air quality within the reporting year of 2023.

Additional Air Quality Works Undertaken by North Norfolk District Council During 2023

North Norfolk District Council has not completed any additional works within the reporting year of 2023.

QA/QC of Diffusion Tube Monitoring

No diffusion tube analysis was undertaken for the reporting year 2023.

QA/QC of Automatic Monitoring

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

The type of PM_{10}/$PM_{2.5}$ monitors utilised within North Norfolk District Council do not require the application of a correction factor. In addition, the monitors have Mcerts accreditation for indicative purposes only.

Automatic Monitoring Annualisation

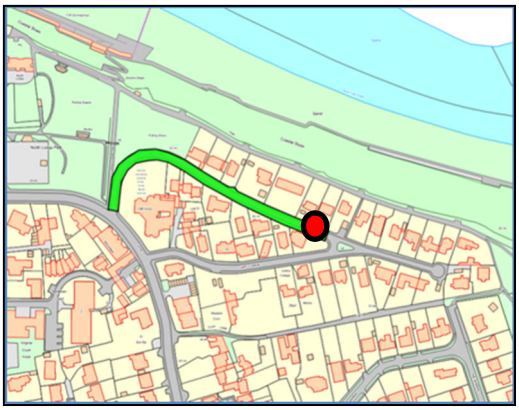
Of the two continuous monitors Site 6 reported missing data between July and November 2023. Annualisation was undertaken in respect to Nitrogen Dioxide, PM_{10} and $PM_{2.5}$ to make corrections. Please refer to table C.1

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

Site ID	Pollutant	Annualisation Factor Wicken Fen	Annualisation Factor Lakenfield's	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
Site 6	NO2	1.35	1.15	1.25	12.3	15.38
	PM10	1.06	1.09	1.07	9.99	10.70
	PM2.5	1.28	1.20	1.24	6.44	7.98

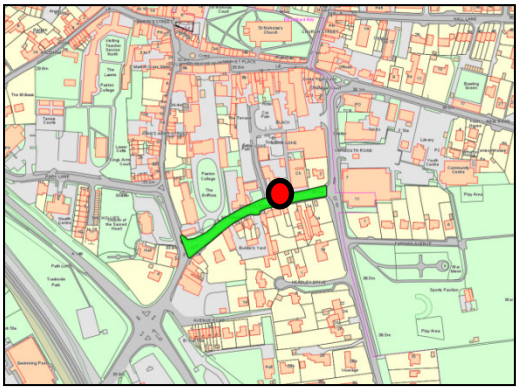
Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Map of Non-Automatic Monitoring Site



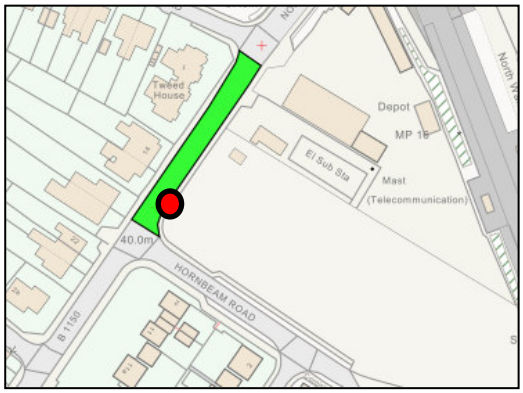
Cliff Drive, Cromer

Site 5



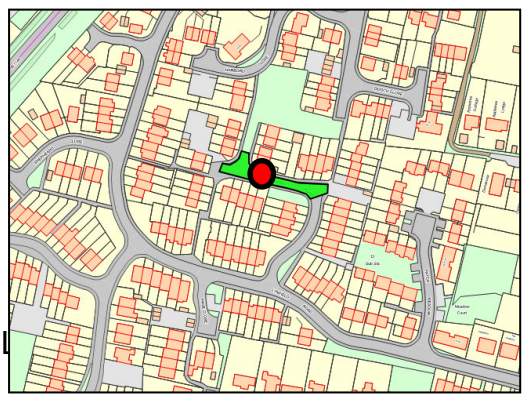
Grammar School Road, North Walsham

Site 3



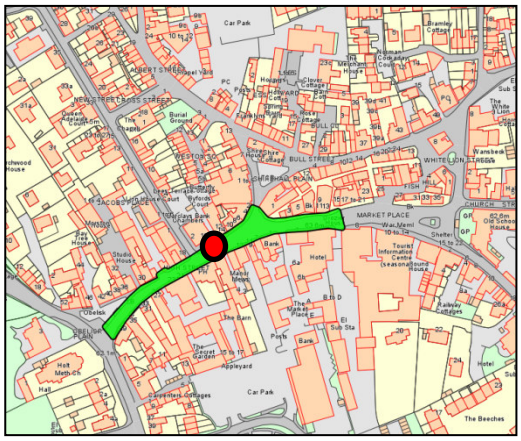
Norwich Road, North Walsham

Site 4



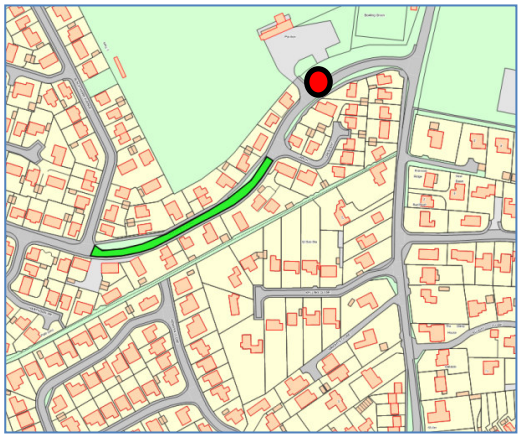
Corbett Road, North Walsham

Site 11



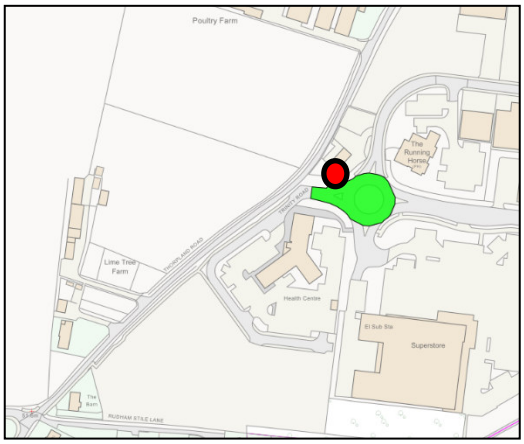
High Street, Holt

Site 12



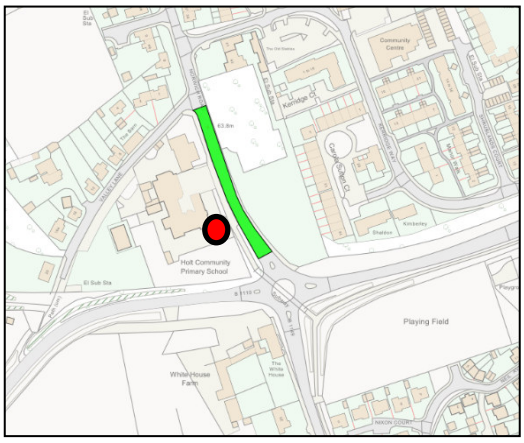
Woodfield Road, Holt

Site 8



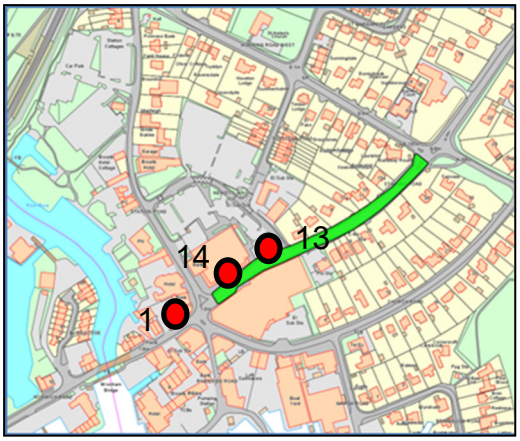
Trinity Road, Fakenham

Site 15



Norwich Road, Holt

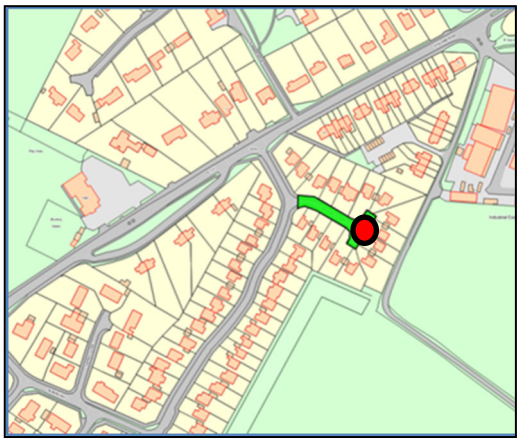
Site 7



Stalham Road, Hoveton

Site 1, 13, 14

Site 1 includes the Zephyr continuous Monitor.

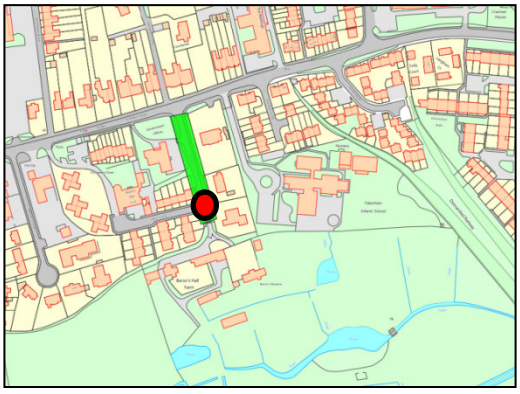


Waveney Close, Hoveton

Site 2

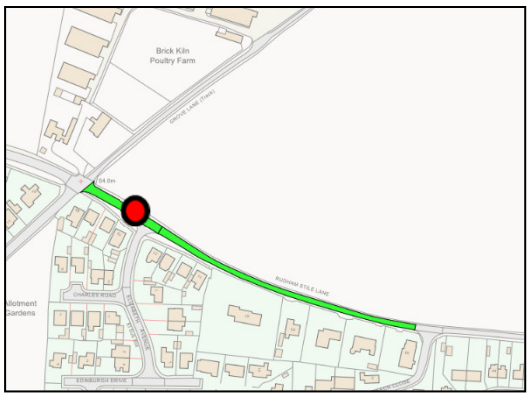
Queens Road, Fakenham

Site 9



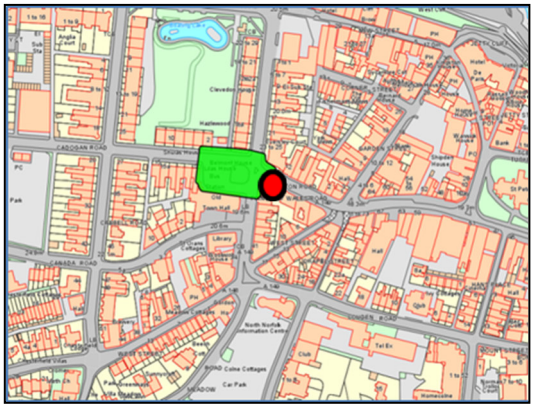
Barons Hall Lane, Fakenham

Site 10



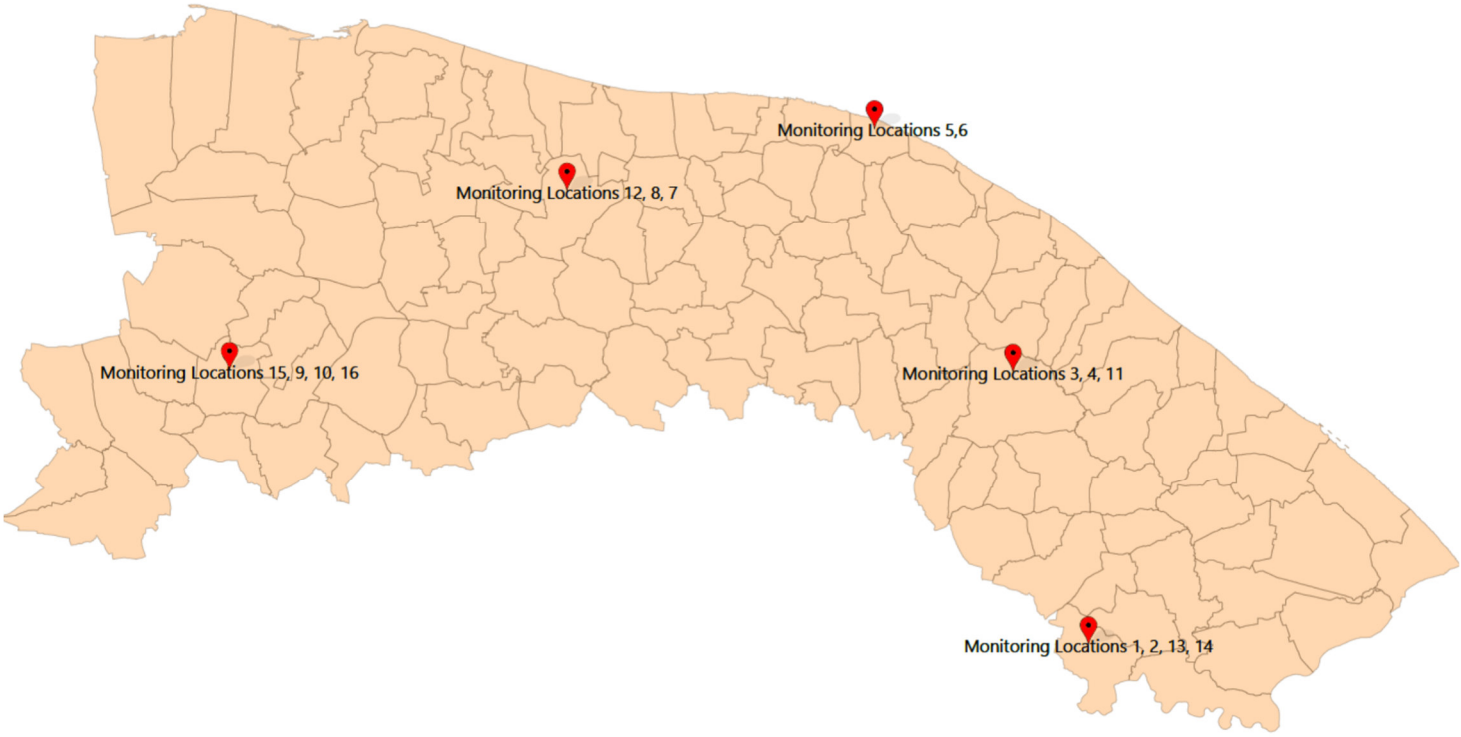
Rudham Stile Lane, Fakenham

Site 16



Hamilton Road, Cromer

Site 6



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

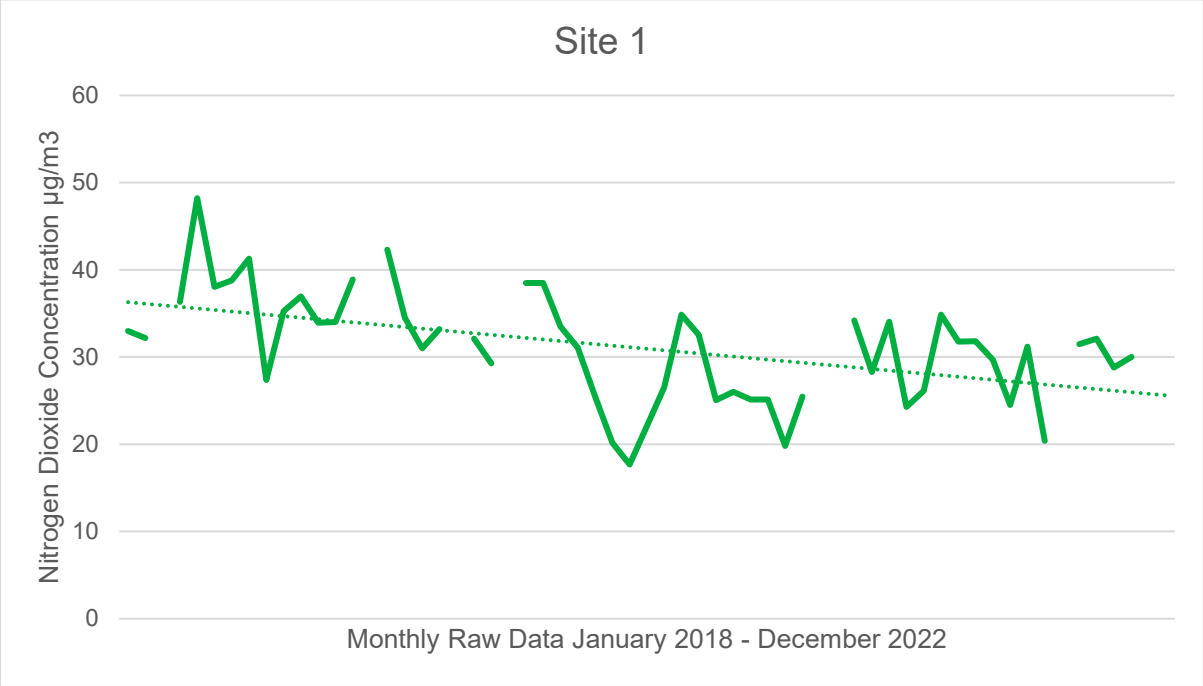
Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO2)	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

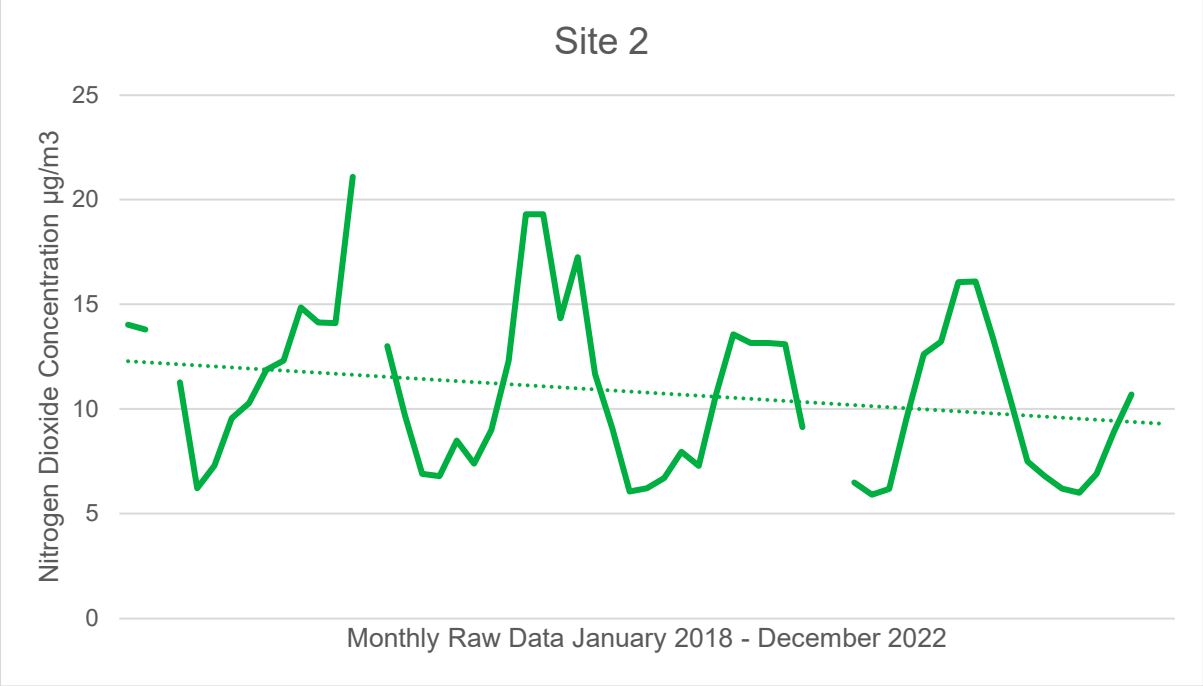
[7] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

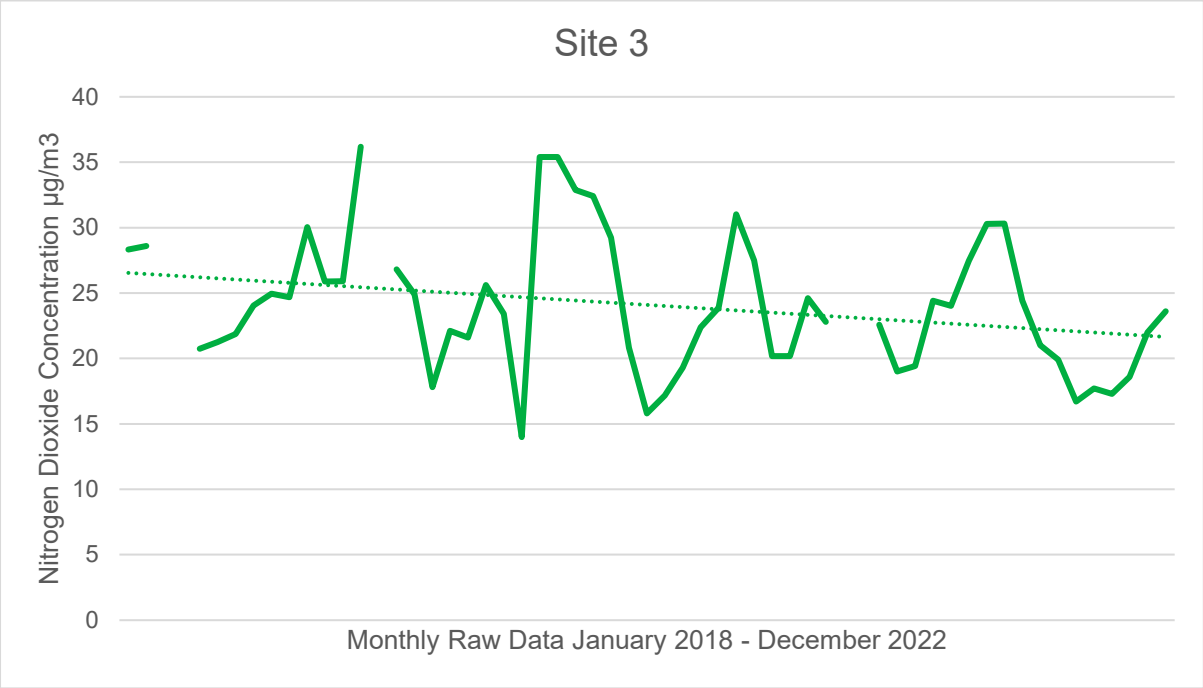
Appendix F: Long Term Trend Data

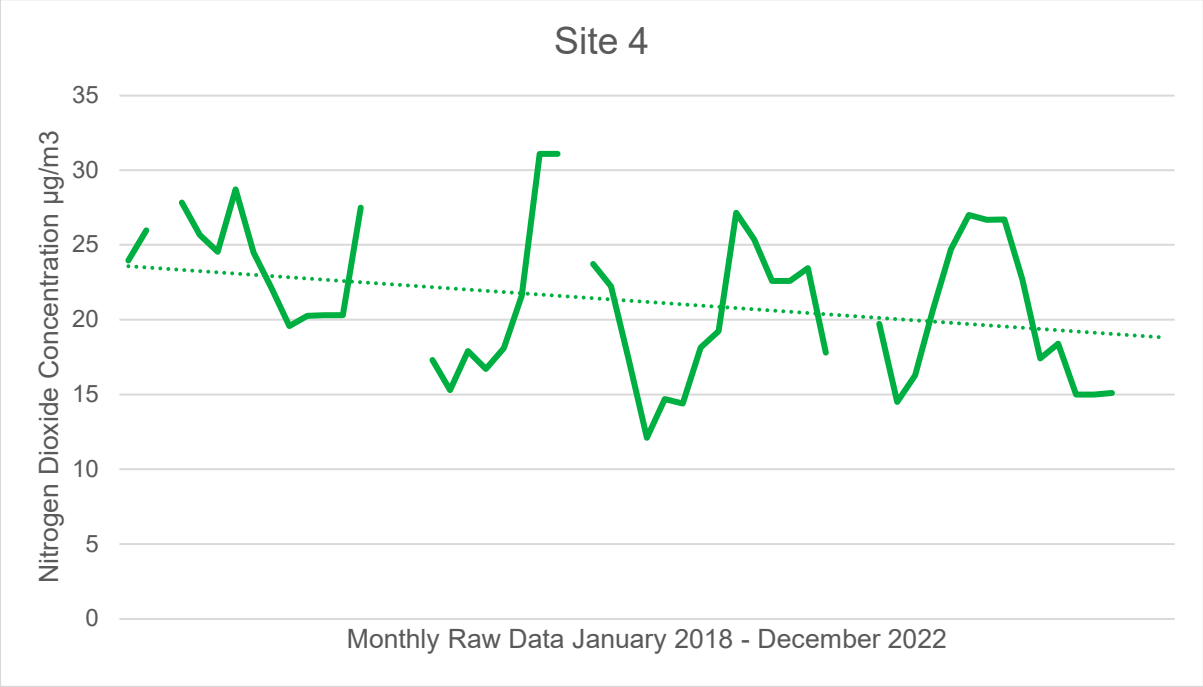
Figure F1

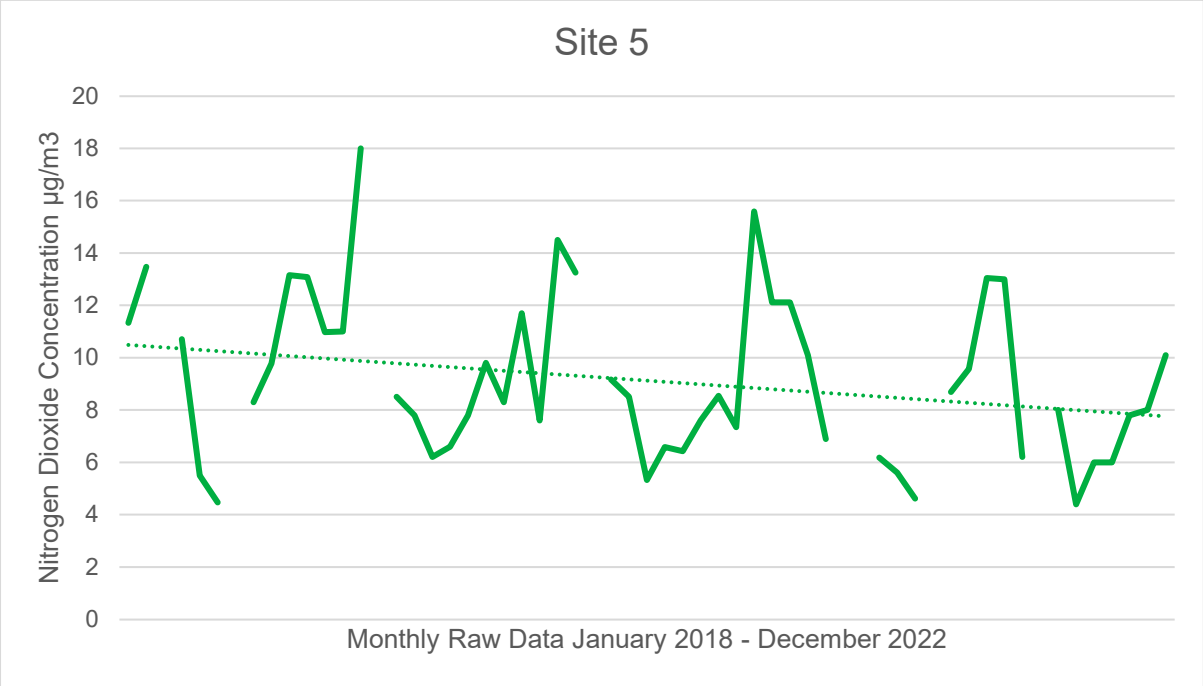
The Charts in this section illustrate the reduction in Nitrogen dioxide emissions between 2018 and 2022. The data is derived from monthly raw tube data collected over the 2018-2022 period.

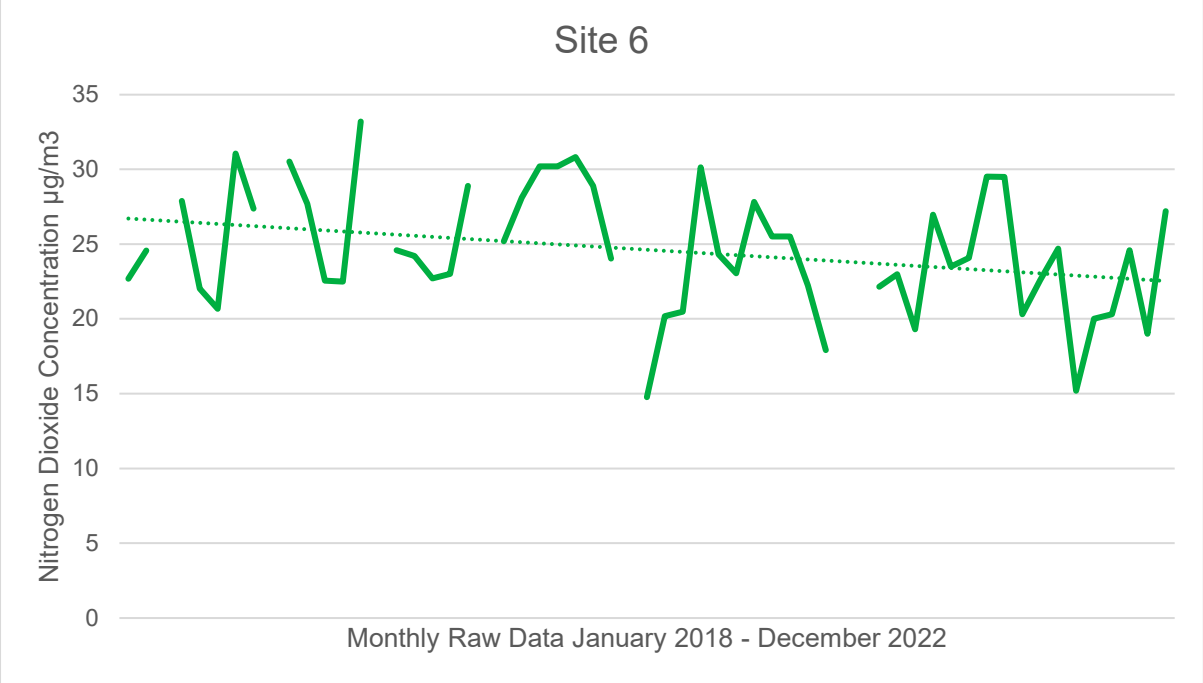


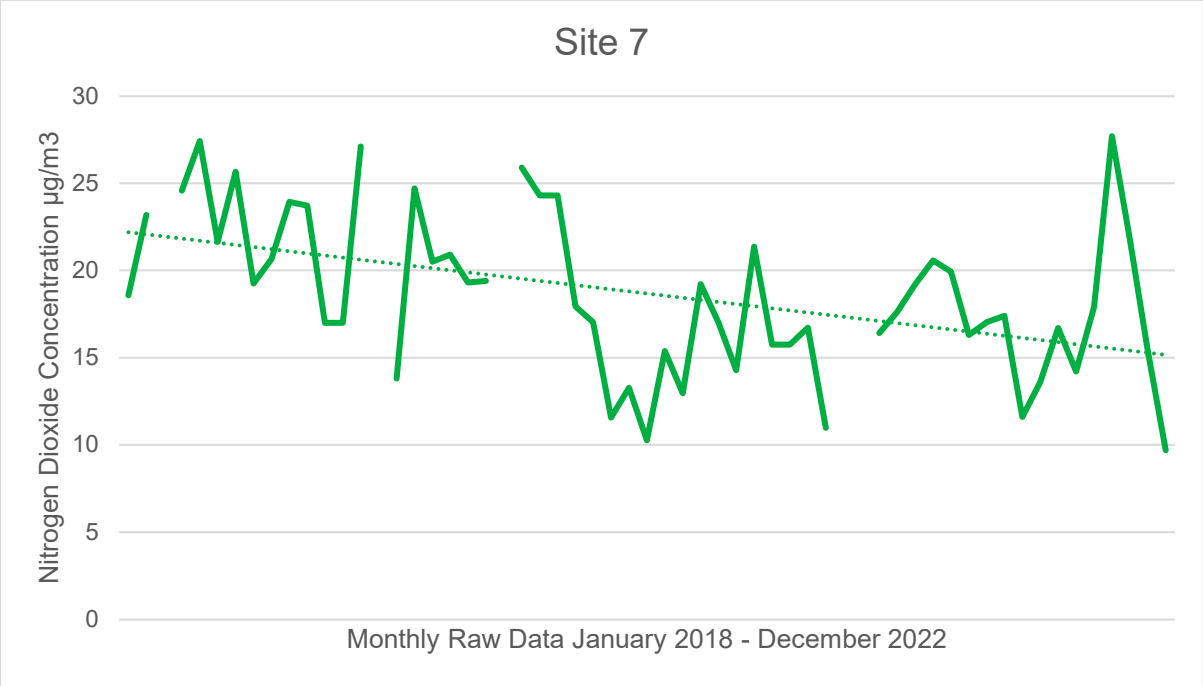


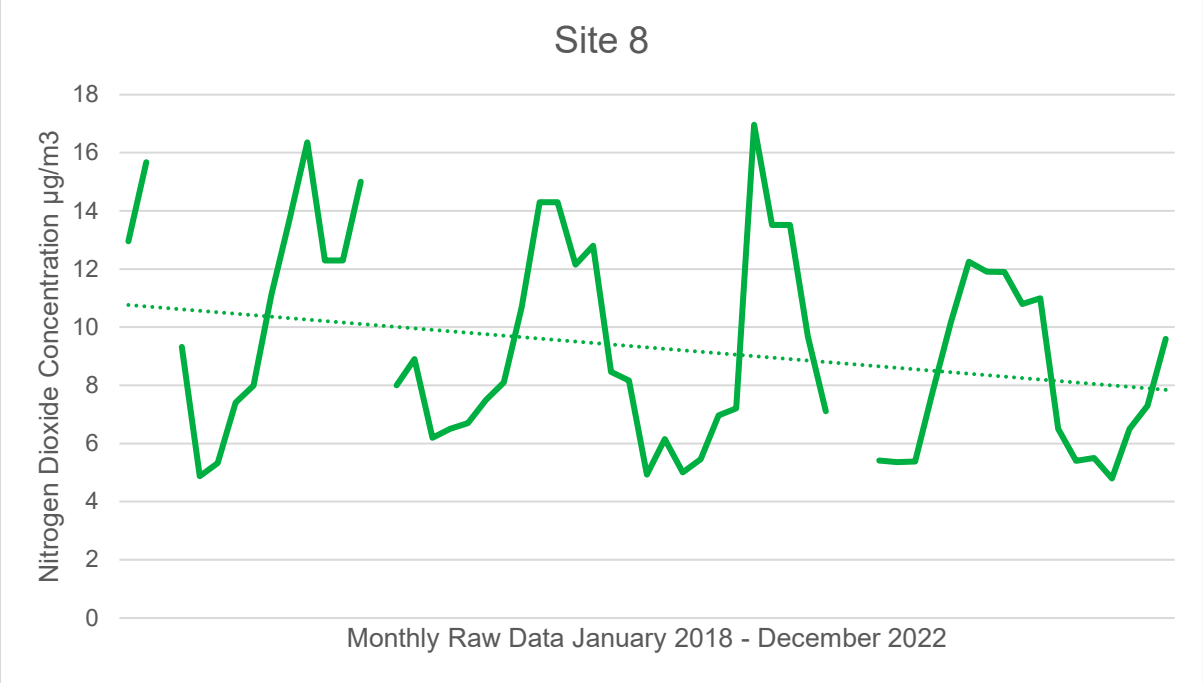

Site 3
Nitrogen Dioxide Concentration µg/m3
40
35
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022

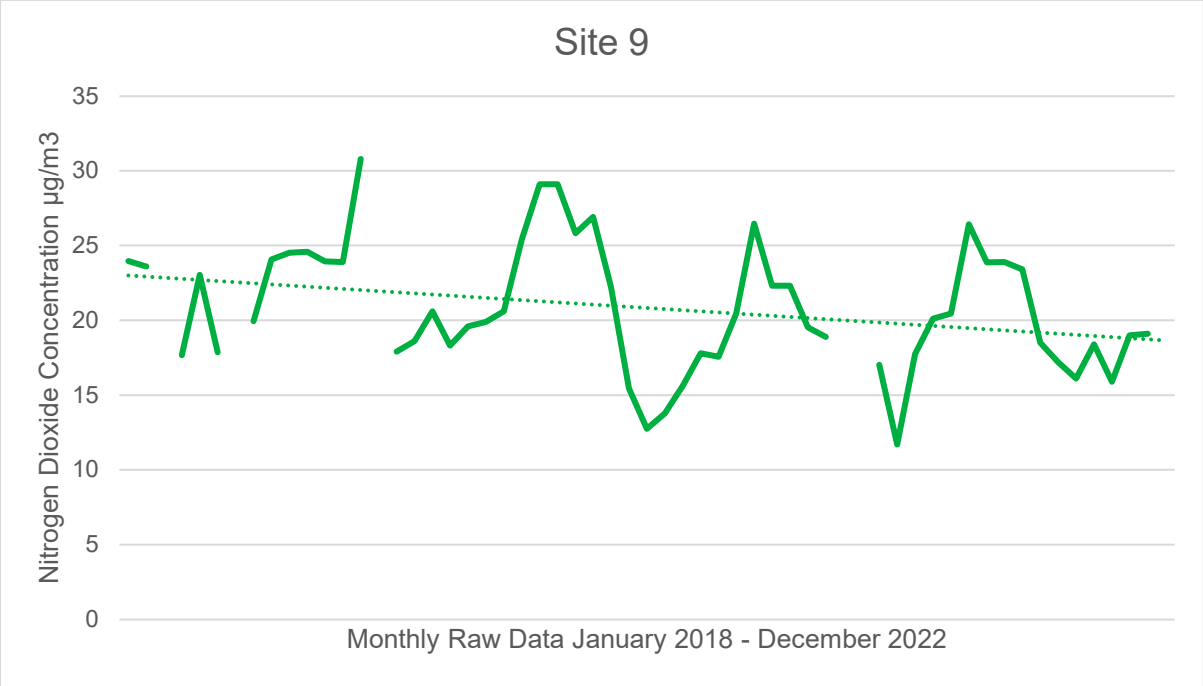

Site 4
Nitrogen Dioxide Concentration µg/m3
35
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022

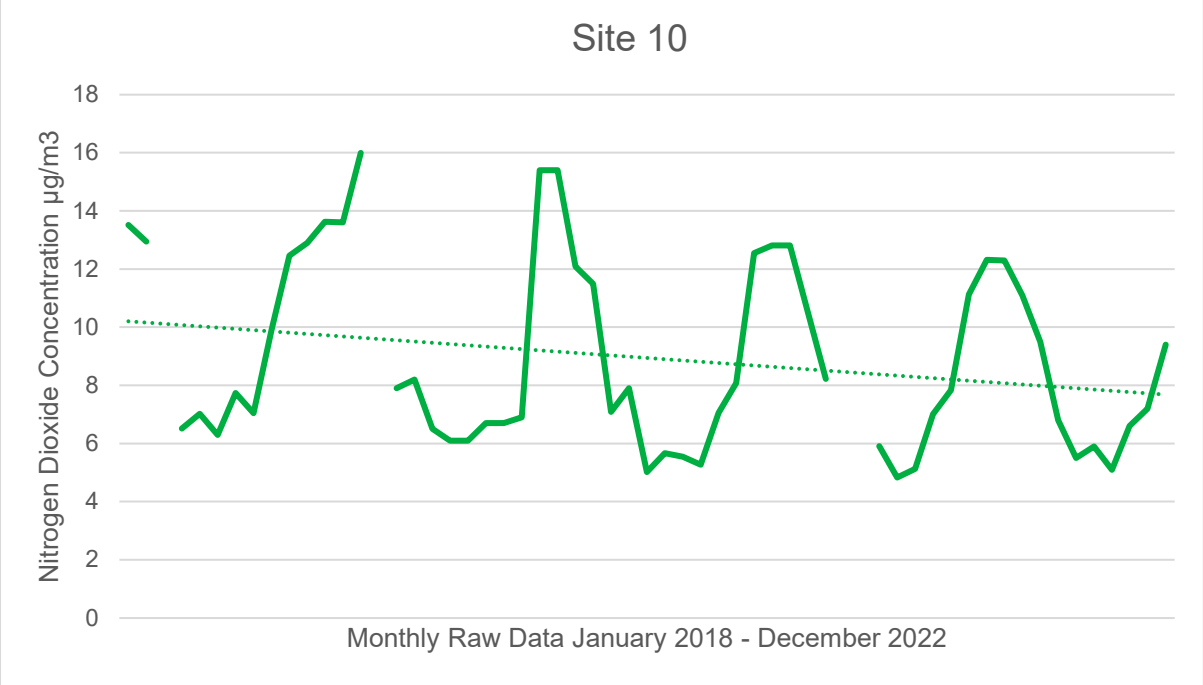

Site 5
Nitrogen Dioxide Concentration µg/m3
20
18
16
14
12
10
8
6
4
2
0
Monthly Raw Data January 2018 - December 2022

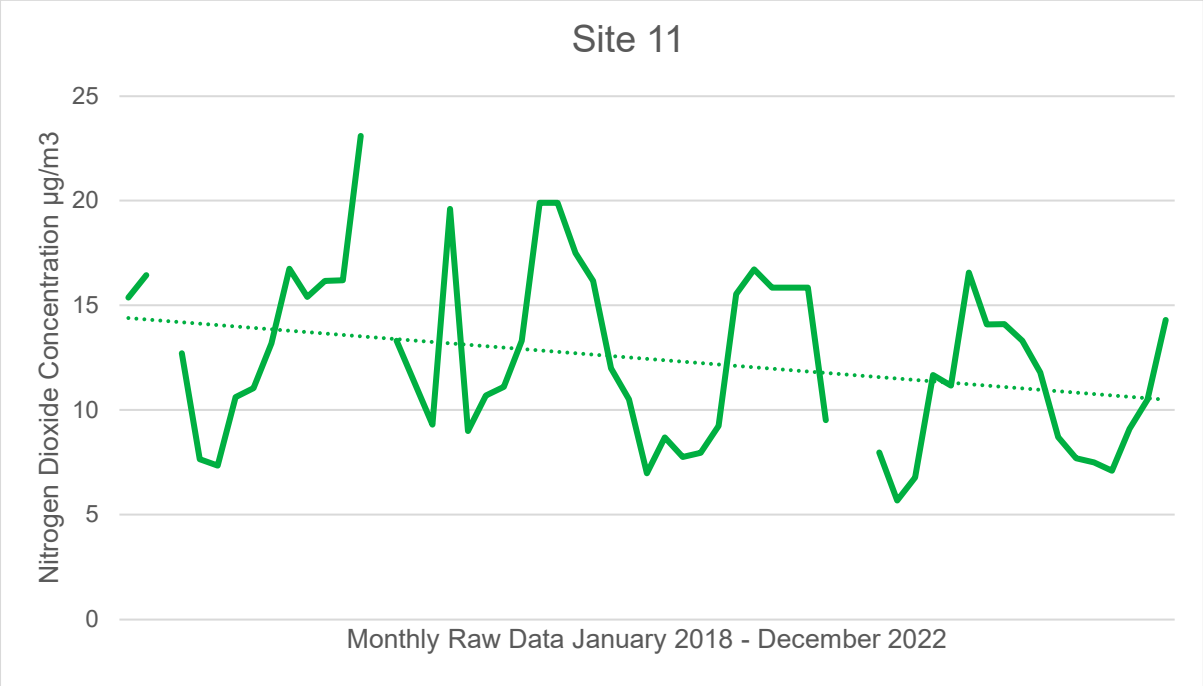

Site 6
Nitrogen Dioxide Concentration µg/m3
35
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022

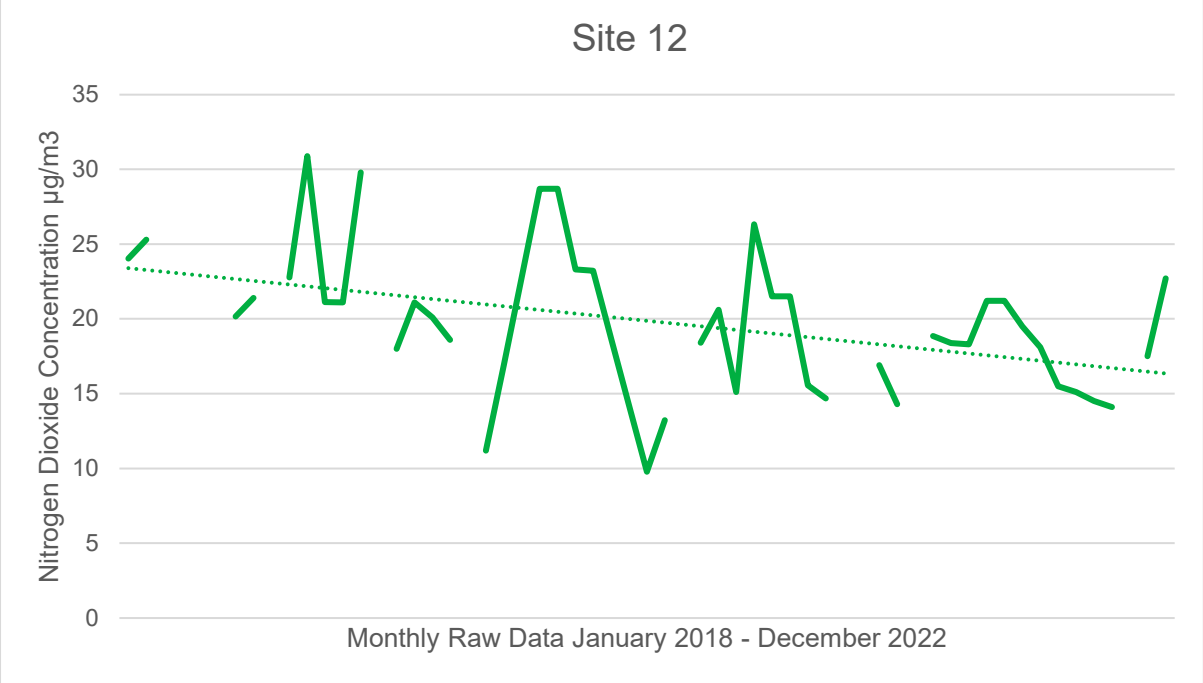

Site 7
Nitrogen Dioxide Concentration µg/m3
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022

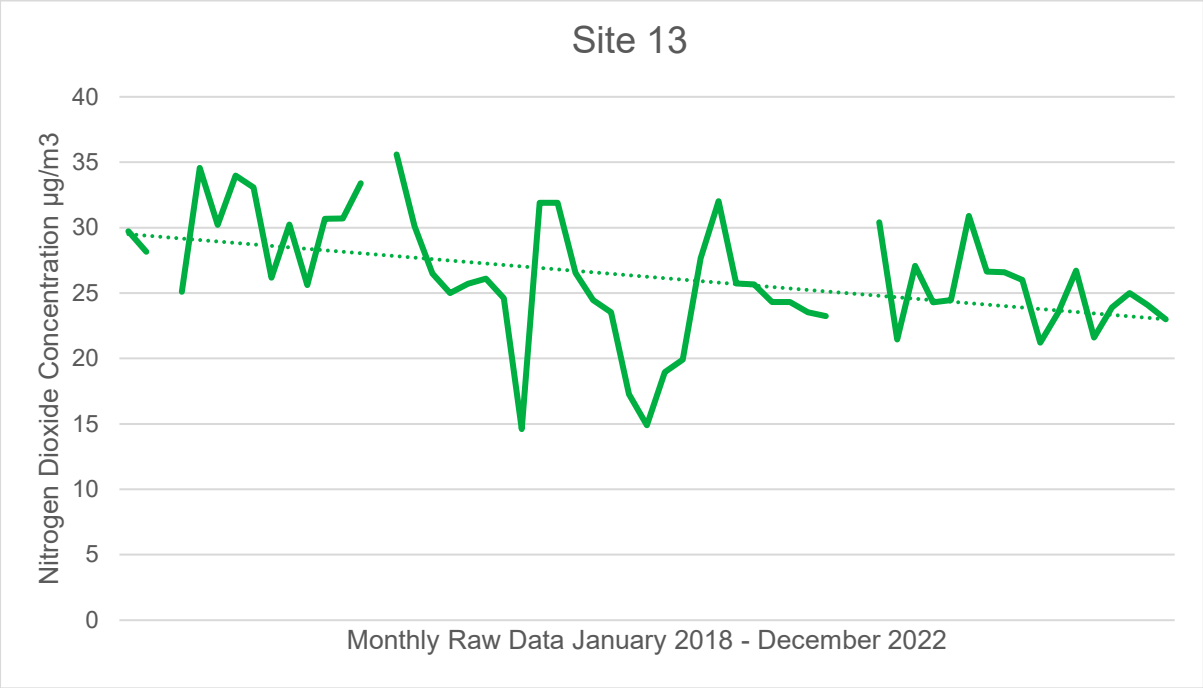

Site 8
Nitrogen Dioxide Concentration µg/m3
18
16
14
12
10
8
6
4
2
0
Monthly Raw Data January 2018 - December 2022

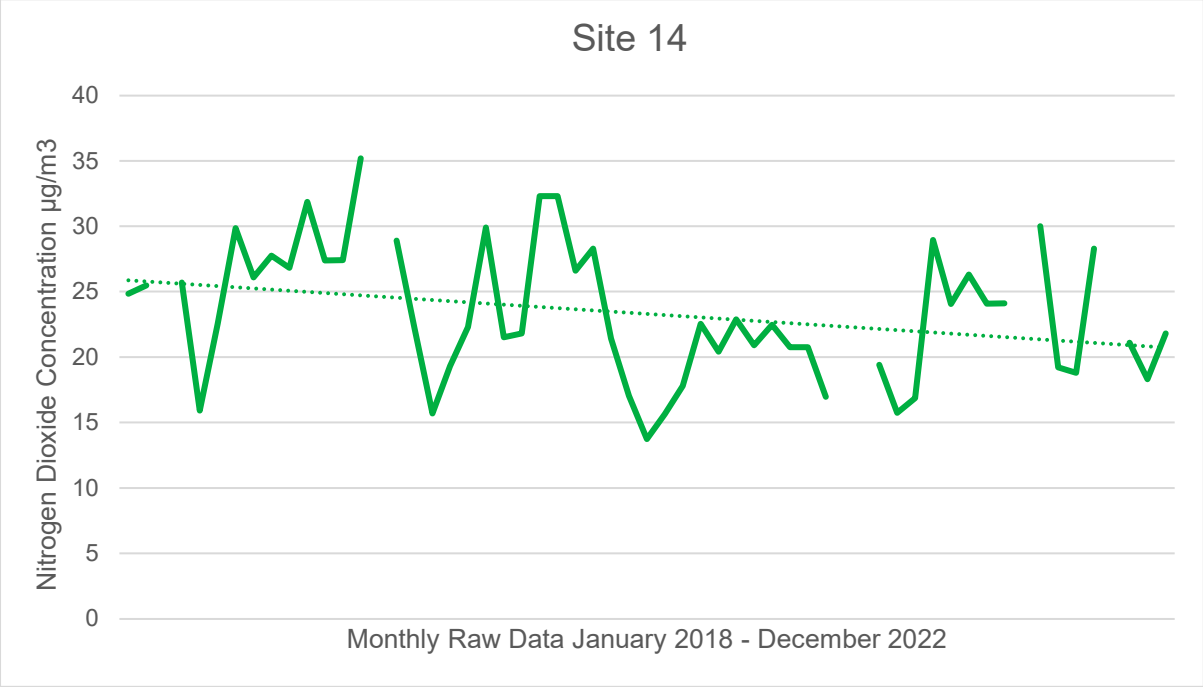

Site 9
Nitrogen Dioxide Concentration µg/m3
35
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022

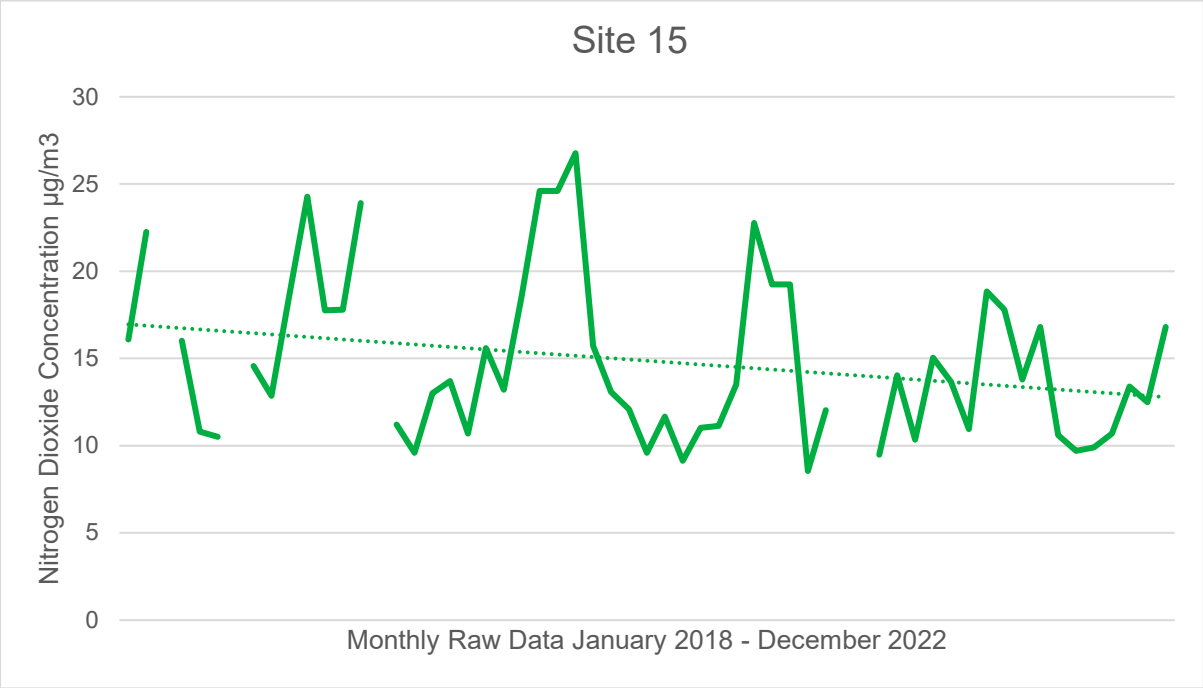

Site 10
Nitrogen Dioxide Concentration µg/m3
18
16
14
12
10
8
6
4
2
0
Monthly Raw Data January 2018 - December 2022

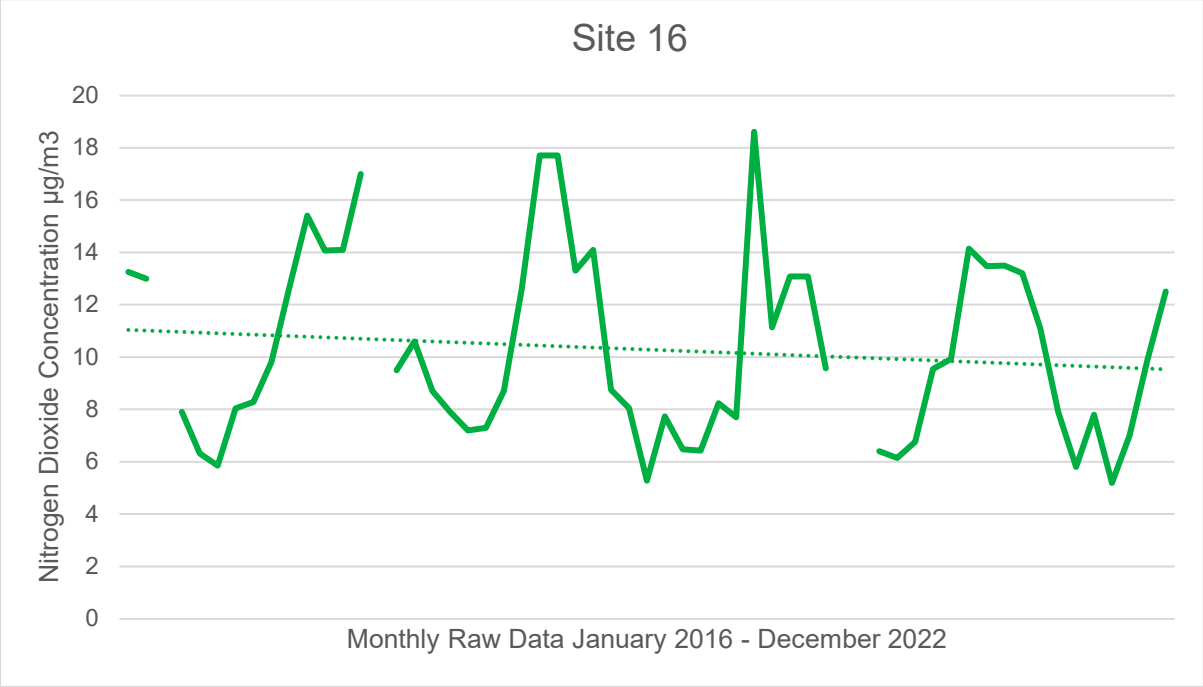

Site 11
Nitrogen Dioxide Concentration µg/m3
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022


Site 12
Nitrogen Dioxide Concentration µg/m3
35
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022


Site 13
Nitrogen Dioxide Concentration µg/m3
40
35
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022


Site 14
Nitrogen Dioxide Concentration µg/m3
40
35
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022


Site 15
Nitrogen Dioxide Concentration µg/m3
30
25
20
15
10
5
0
Monthly Raw Data January 2018 - December 2022


Site 16
Nitrogen Dioxide Concentration µg/m3
20
18
16
14
12
10
8
6
4
2
0
Monthly Raw Data January 2016 - December 2022

]

Figure F2

The chart below illustrates the reduction in mean concentration of Nitrogen Dioxide since 2016. The chart was extracted form the 2023 ASR

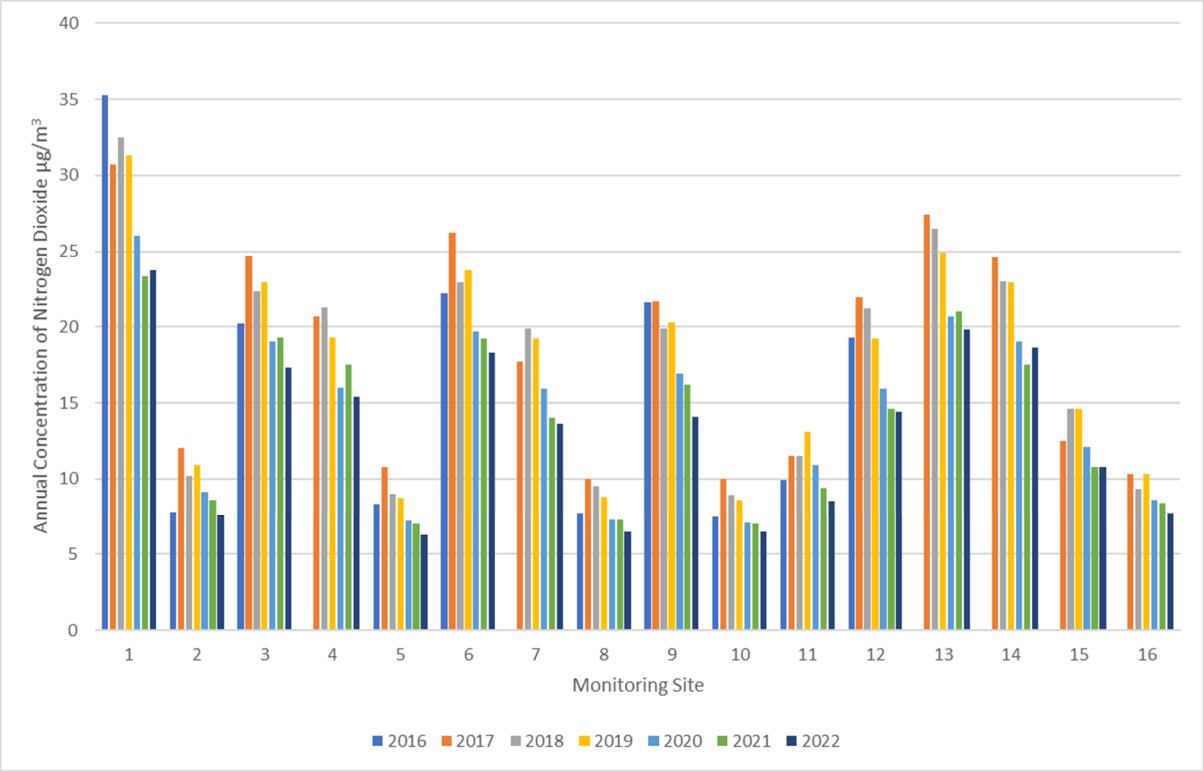
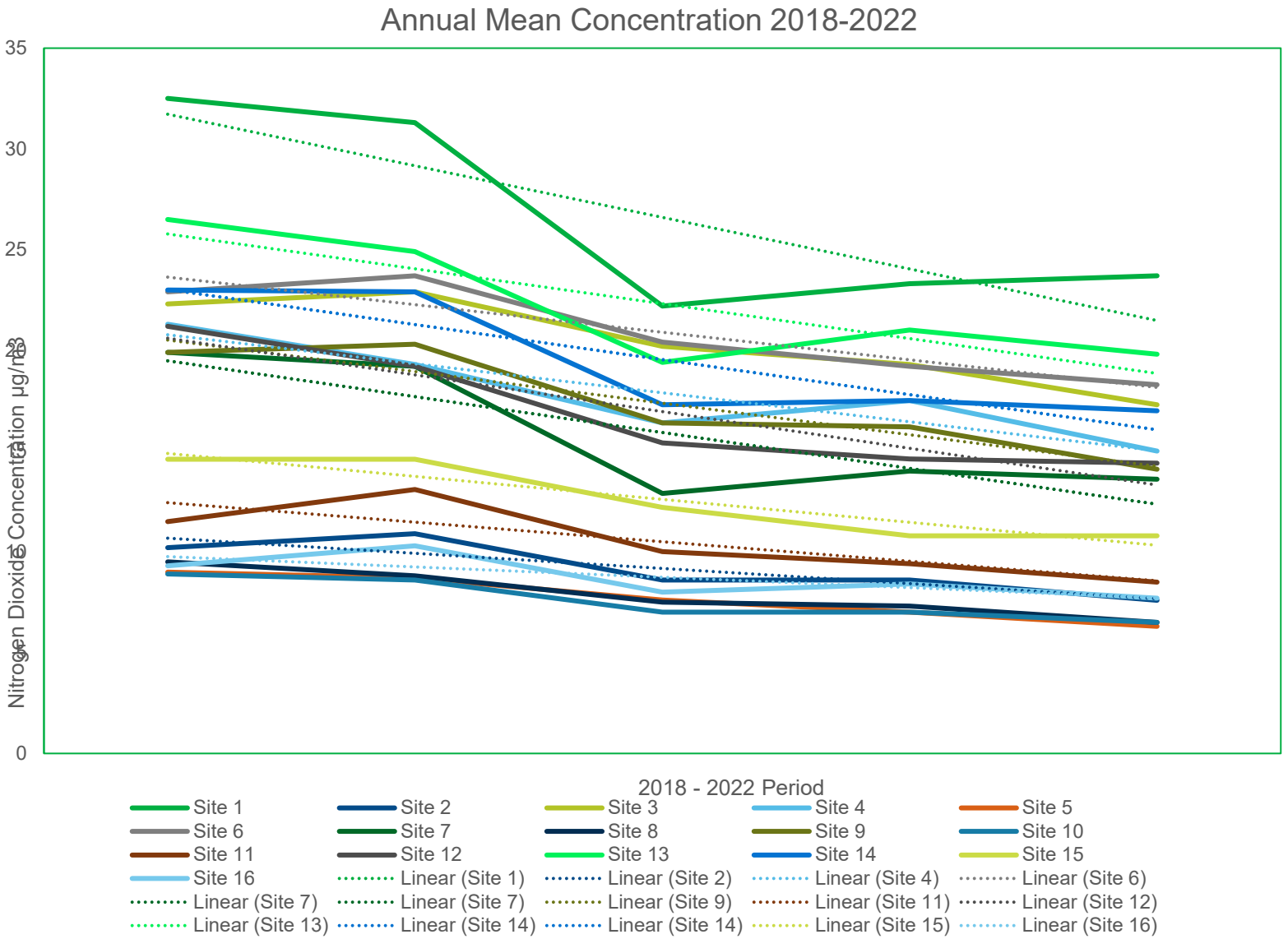


Figure F3

The chart over leaf illustrates the reduction in mean concentration of Nitrogen Dioxide since 2018. In this instance the reducing trend is illustrated in the data for all 16 monitotong sites using bias adjusted and corrected data.


Annual Mean Concentration 2018-2022
Nitrogen Dioxide Concentration µg/m3
35
30
25
20
15
10
5
0
2018 - 2022 Period
Site 1
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
Site 8
Site 9
Site 10
Site 11
Site 12
Site 13
Site 14
Site 15
Site 16
Linear (Site 1)
Linear (Site 2)
Linear (Site 4)
Linear (Site 6)
Linear (Site 7)
Linear (Site 7)
Linear (Site 9)
Linear (Site 11)
Linear (Site 12)
Linear (Site 13)
Linear (Site 14)
Linear (Site 14)
Linear (Site 15)
Linear (Site 16)

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.