
# 2017 Air Quality Annual Status Report (ASR)

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

Date June, 2017

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# Executive Summary: Air Quality in Our Area

## Air Quality in North Norfolk

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[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].

Overall North Norfolk does not suffer from significant air quality impacts; previous $NO^2$ monitoring undertaken between 1997 and 2013 in local urban towns successfully demonstrated that Nitrogen dioxide levels were well below the national objective. Particulate matter (PM) was not previously deemed to be a problem due to the absence of locations that meet the emission scenarios publicised in technical guidance.

No monitoring has been undertaken since 2011/12; however as from April 2016 diffusion tube monitoring has been re-established following a review. The purpose of this monitoring is to detect and determine any changes in Nitrogen Dioxide that have occurred since 2011/12.

Data collected from the latest period April 2016 until Dec 2016 continues to indicate that levels of Nitrogen dioxide have been consistent with those areas that were previously monitored before 2011/12. Annual average concentrations of Nitrogen Dioxide in the latest period did not exceed the national objective. The only exception to this was a single peak in September at Hoveton Toy Store (ID site 1), however, this was only a single month and the concentration gradually declined into the winter period.

[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

To date no AQMAs have been declared, as such, the need for action planning or strategy development has been unwarranted. The Councils proposal to manage local air quality will be to continue monitoring the district for the foreseeable future.

North Norfolk District Council currently works closely with its cross partner authorities and meets on a quarterly basis to discuss Air quality issues.

## Actions to Improve Air Quality

Although there are no AQMAs situated in North Norfolk, the Council is conscious that it cannot be complacent, and as such, continues to work to minimise and mitigate pressures from developments that erode air quality within the district.

As part of this work the Councils Air Quality Planning strategy was finally submitted for consultation in April and has been circulated for comment. This process has not been concluded, but has been well received within the Planning Department.
The aim of this strategy is to introduce more robust controls on development of all sizes to minimise the aggregate effects on air quality.

Air quality monitoring using Nox diffusion tubes has also been reviewed slightly to expand monitoring to areas in and around allocated housing land and areas where large development is either occurring or is planned. One such example relates to an outline planning application for approximately 1000 homes in Fakenham.

The first Crematoria in North Norfolk has recently become operational. This became active in January of this year. The site is now currently included and regulated under LAPPC and operates under an Environmental Permit. The first 6 monthly emission report has been submitted by the operator and the operation currently complies with the permit.

## Conclusions and Priorities

The Conclusions for the 2017 ASR indicates no significant increase or changes in air quality at those areas currently monitored. Other than a single exceedance at site 1 (Hoveton) of 41.4 $\mu gm^2$ the annual mean concentration has not exceeded the national objective at any site. In conclusion there is no justification for further detailed assessment or the designation of any air quality management areas at this time.

The priority for the coming year is to continue monitoring in those areas where concentrations of Nitrogen dioxide is greatest, while expanding monitoring to areas designated for housing allocation. At present the Council will concentrate its efforts focussing upon the 1000 home development at Fakenham.

## Local Engagement and How to get Involved

Members of the public are encouraged to contact the Air Quality Officer for further information regarding the Councils monitoring programme. Previous reports are available on request

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# 1 Local Air Quality Management

This report provides an overview of air quality in North Norfolk during 2017. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

North Norfolk District Council currently does not have any AQMAs. For reference, a map of North Norfolk's monitoring locations is available in Appendix D.

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

Defra's appraisal of last year's ASR concluded that on the basis of the evidence provided by the local authority the conclusions that were reached were acceptable for all sources and pollutants. However the appraisal did request an outline of how the Council would work together with Public Health to address the health issues associated with $Pm^{2.5}$ and indicated that it would be very useful to develop key performance indicators to show how measures in air pollution are being addressed.

In response to the above North Norfolk District Council recognises that although $PM^{2.5}$ monitoring is not currently a statutory requirement, given the weight of health evidence there is a strong likelihood that it will be some time in the future, as such, North Norfolk District Council proposes the following measures to be completed over the course of the next reporting year:

- Procure monitoring equipment and initiate indicative PM monitoring to determine concentrations of $PM^{2.5}$ in areas highlighted by the 1km/1km background concentration data specified in section 2.3.
- Analyse $PM^{2.5}$ data to determine source apportionment in each of those areas monitored.
- Liaise and work with the regional air quality group to discuss a joint way forward with Public Health regarding the measurement of $PM^{2.5}$ across the region and to pool resources.

In respect to the comments regarding KPI, without a detailed analysis of the Council's activities in regard to air quality and the absence of AQAPs or AQMAs, the Council would struggle in developing an effective or meaningful performance indicator at this time. At present rather than devoting resources into developing a KPI it may be more prudent to meet the commitments made within each ASR cycle.

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

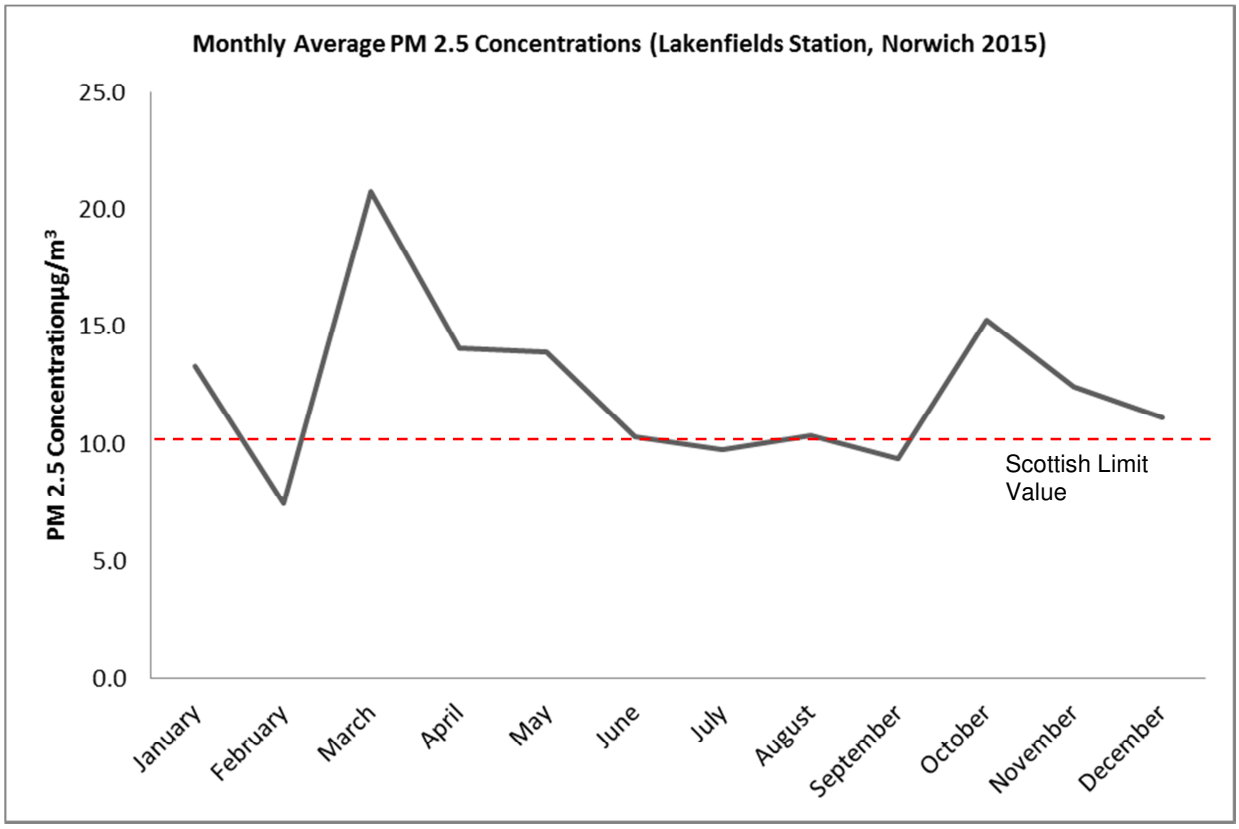
As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM^{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM^{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.
There is currently no limit value set for $PM^{2.5}$ in England, however given the scientific evidence it is deemed prudent that local authorities must work towards and report on minimising concentrations of $PM^{2.5}$.

Previously there has been no provision for North Norfolk District Council to undertake an assessment of $PM^{2.5}$; consequently there is no infrastructure or existing data currently available to accurately determine concentrations of $PM^{2.5}$ in the district.
North Norfolk District Council recognises that this shortage of data is problematic, however in accordance with Technical Guidance, 2016 the Council has assessed $PM^{2.5}$ using regional data provided by the AURN network (specifically the Norwich, Lakefield's site) and the Air pollution background concentration maps provided by Defra.

Figure 1 illustrates the monthly variation of $PM^{2.5}$ during 2015 at the Lakefield's AURN site. The graph clearly shows that the 10µg/$m^3$ (Scottish limit value) was breached on frequent occasions. Technical guidance suggests using AURN data; unfortunately the nearest station is situated in Norwich. This location is an urban environment and due to its remote position outside of the North Norfolk District, the results are unlikely to be representative of the district. It can be assumed that the yearly average concentration of 12µg/$m^3$ is likely to be a lower figure in the North Norfolk District due to the rural nature of the area and absence of significant point sources.

The map in Figure 2 provides the 1km/1km background concentration of $PM^{2.5}$ in the north Norfolk area. Although there is a degree of uncertainty inherent in the data, it does provide an indication of $Pm^{2.5}$ levels across the district. Levels within the

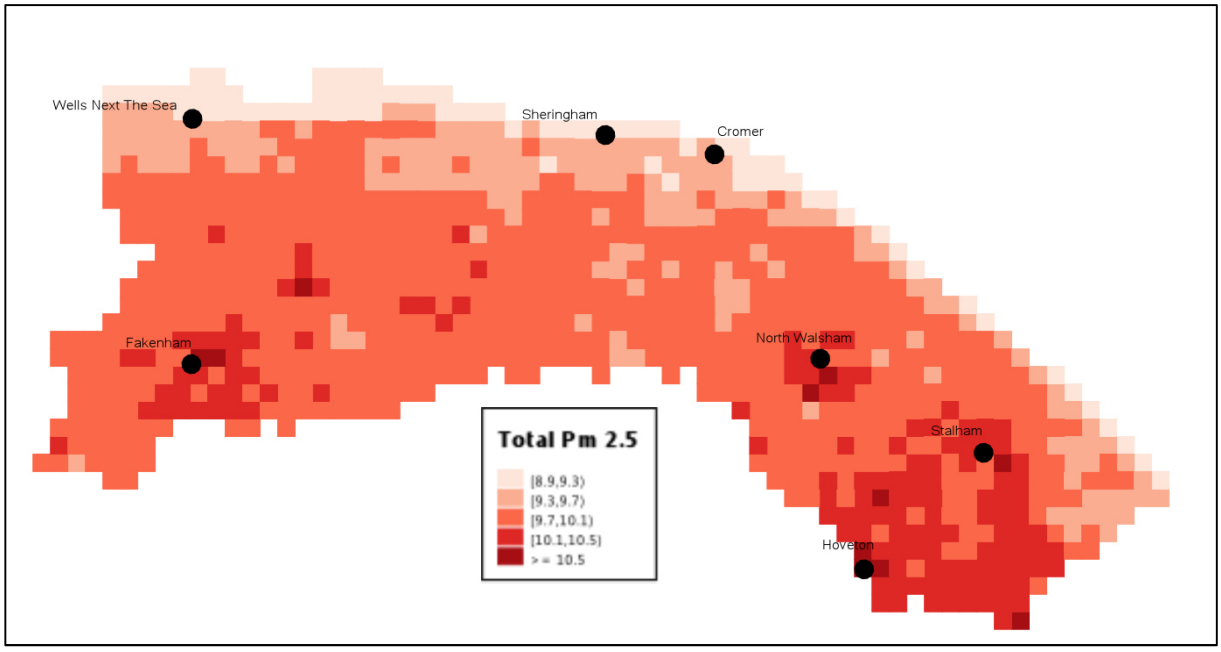
## Figure 1 Monthly Average PM2.5 Concentrations




district appear to exceed the Scottish limit value, and as expected these areas are associated with the urban centres of Fakenham, North Walsham, Stalham and Hoveton. In any given situation the primary sources of $PM^{2.5}$ are road vehicles and industrial, however given the low level of industrial activity in north Norfolk, the principle source is likely to be road traffic, hence the greater concentrations found in the inland towns. Cromer and Sheringham, although urbanised show the lowest levels of $Pm^{2.5}$ in the district, however this is likely to be attributed to the dilution effects found on coastal areas. Figure also illustrates exceedance levels of 10 $\mu g/m^3$ and above in the south east area of the district. The degree of urbanisation in these areas is insufficient to account for these elevated levels; however $Pm^{2.5}$ is known to travel a significant distance from its point of origin, as such, the high levels may be attributed to the proximity of the Norwich area or emissions from Northern Europe.

Although the data illustrates that at various locations $Pm^{2.5}$ does indeed exceed the Scottish limit value, the degree of exceedance is not significant, especially given the conservative nature of the data.

**Figure 2. 1km/1km background concentration of PM2.5**




### 2.3.1 Pm 2.5 Mitigation

Defra suggests that UK emissions contribute around 50-55% of total annual average $PM^{2.5}$ in the UK . This limits the extent to which long-term average concentrations can be reduced by UK action alone and demonstrates that action by neighboring countries is important in reducing annual UK $PM^{2.5}$ concentrations. These external contributions cannot be managed on a district level, and are likely to remain a national prerogative. The same principle generally applies on a local government level, with cross boundary sources being a significant contribution to overall levels. In view of this the problem of $PM^{2.5}$ cannot be dealt with in isolation.

In reality practicalities and resources necessary to tackle the problem are difficult to quantify, and given that $PM^{2.5}$ concentrations are not significantly elevated across the district; justification for a Council budgetary commitment is difficult to argue.

In the first instance the most prudent response for the Council will be to meet its obligations under LAQM, which this section has initially achieved by reporting the monitoring data. In the second instance, given the low level of exceedance the most effective response without committing significant resources would be to tackle the problem through planning and development, essentially implementing and using a local emissions strategy, which is detailed in later sections of the report.

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

## 2.4 Summary of Monitoring Undertaken

### 2.4.1 Automatic Monitoring Sites

North Norfolk District Council currently has no Automatic Monitoring sites.

### 2.4.2 Non-Automatic Monitoring Sites

North Norfolk District Council undertook non- automatic (passive) monitoring of $NO_2$ at 15 sites during 2016. Table A.1 in Appendix A shows the details of the sites.

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

## 2.5 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

### 2.5.1 Nitrogen Dioxide ($NO_2$)

Table A.2 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/$m^3$.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

There was no exceedance of the annual limit objective.

### 2.5.2 Particulate Matter ($PM_{10}$)

North Norfolk District Council Does not currently monitor for PM10

### 2.5.3 Particulate Matter ($PM_{2.5}$)

North Norfolk District Council Does not currently monitor for PM2.5

### 2.5.4 Sulphur Dioxide ($SO_2$)

North Norfolk District Council Does not currently monitor for $SO_2$

## Table A.1 – Details of Non-Automatic Monitoring Sites

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube collocated with a Continuous Analyser? | Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Hoveton (OppositeToy Store) | Roadside | TG3038118148 | N/A | $NO_2$ | NO | 0 | 1.5 | NO | 2.5 |
| 2 | Waveny Close Hovelton | Roadside | TG3112018634 | N/A | $NO_2$ | NO | 0 | 1 | NO | 2.5 |
| 3 | Grammar School Rd, North Walsham | Roadside | TG2840230213 | N/A | $NO_2$ | NO | 0 | 1 | NO | 2.5 |
| 4 | Angel Court, North Walsham | Roadside | TG2813130317 | N/A | $NO_2$ | NO | 0 | 1.5 | NO | 2.5 |
| 5 | Cliff Drive, Cromer | Roadside | TG2236542031 | N/A | $NO_2$ | NO | 0 | 2 | NO | 2.5 |
| 6 | Hamilton Road, Cromer | Roadside | TG2183742188 | N/A | $NO_2$ | NO | 0 | 2 | NO | 2.5 |
| 7 | Riverside Road, Letheringsett | Roadside | TG0629538642 | N/A | $NO_2$ | NO | 0 | 1 | NO | 2.5 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | **Woodfield Road, Holt** | Roadside | TG0829839370 | N/A | $NO_2$ | NO | 0 | 1.5 | NO | 2.5 |
| 9 | **Queens Rd, Fakenham** | Roadside | TF9206630268 | N/A | $NO_2$ | NO | 0 | 2 | NO | 2.5 |
| 10 | **Barons Hall Rd, Fakenham** | Roadside | TF9260129666 | N/A | $NO_2$ | NO | 0 | 1.5 | NO | 2.5 |
| 11 | **Corbett Road, North Walsham** | Roadside | TG2826930910 | N/A | $NO_2$ | NO | 0 | 1 | NO | 2.5 |
| 12 | **High Street, Holt** | Roadside | TG0778038744 | N/A | $NO_2$ | NO | 0 | 1.5 | NO | 2.5 |
| 13 | **Hoveton, Bus StopCorner** | Roadside | TG3041918181 | N/A | $NO_2$ | NO | 0 | 1.2 | NO | 2.5 |
| 14 | **Hoveton, Roys Car Park** | Roadside | TG3047618241 | N/A | $NO_2$ | NO | 0 | 2 | NO | 2.5 |
| 15 | **Holt Road, Letheringsett** | Roadside | TG6620138842 | N/A | $NO_2$ | NO | 0 | 1 | NO | 2.5 |

**Notes:**

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

(2) N/A if not applicable.

## Table A.2 – Annual Mean $NO_2$ Monitoring Results

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) [1] | Valid Data Capture 2016 (%) [2] | $NO_2$ Annual Mean Concentration ($\mu g/m^3$) [3] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2016 | | | | |
| 1 | Roadside | Diffusion Tube | 66.64 | 66.64 | 35.33 | | | | |
| 2 | Roadside | Diffusion Tube | 75 | 75 | 7.79 | | | | |
| 3 | Roadside | Diffusion Tube | 58.31 | 58.31 | 20.15 | | | | |
| 4 | Roadside | Diffusion Tube | 75 | 75 | 17.61 | | | | |
| 5 | Roadside | Diffusion Tube | 75 | 75 | 8.30 | | | | |
| 6 | Roadside | Diffusion Tube | 75 | 75 | 22.15 | | | | |
| 7 | Roadside | Diffusion Tube | 75 | 75 | 6.51 | | | | |
| 8 | Roadside | Diffusion Tube | 75 | 75 | 7.69 | | | | |
| 9 | Roadside | Diffusion Tube | 66.64 | 66.64 | 21.60 | | | | |
| 10 | Roadside | Diffusion Tube | 75 | 75 | 7.49 | | | | |
| 11 | Roadside | Diffusion Tube | 75 | 75 | 9.84 | | | | |
| 12 | Roadside | Diffusion Tube | 75 | 75 | 19.30 | | | | |
| 13 | Roadside | Diffusion Tube | 75 | 75 | 24.68 | | | | |
| 14 | Roadside | Diffusion Tube | 66.64 | 66.64 | 20.04 | | | | |
| 15 | Roadside | Diffusion Tube | 66.64 | 66.64 | 17.11 | | | | |

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

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

☒ **If applicable, all data has been distance corrected for relevant exposure**

**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.

# Appendix B: Full Monthly Diffusion Tube Results for 2016

## Table B.1 – $NO_2$ Monthly Diffusion Tube Results - 2016

| Site ID | $NO_2$ Mean Concentrations ($\mu g/m^3$) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
| | | | | | | | | | | | | | Raw Data | Bias Adjusted (factor) and Annualised (1) | Distance Corrected to Nearest Exposure (2) |
| 1 | | | | 27.77 | | 37.07 | 36.40 | 35.41 | **41.42** | 38.22 | 36.67 | 36.09 | 36.13 | 35.33 | 35.33 |
| 2 | | | | 6.14 | 8.25 | 5.87 | 6.15 | 6.43 | 9.97 | 9.93 | 13.72 | 8.90 | 8.37 | 7.79 | 7.79 |
| 3 | | | | 16.59 | 25.00 | 17.47 | 20.76 | 17.31 | 27.03 | | | 31.91 | 22.29 | 20.15 | 20.15 |
| 4 | | | | 11.03 | 19.76 | 12.56 | 13.87 | 13.36 | 19.00 | 16.41 | 21.14 | 34.94 | 18.01 | 17.61 | 17.61 |
| 5 | | | | 7.17 | 10.39 | 6.14 | 5.28 | 6.07 | 9.30 | 7.51 | 10.03 | 18.37 | 8.92 | 8.30 | 8.30 |
| 6 | | | | 16.72 | 24.18 | 20.48 | 23.33 | 25.22 | 27.91 | 20.76 | 23.55 | 32.08 | 23.80 | 22.15 | 22.15 |
| 7 | | | | 6.37 | 6.73 | 3.50 | 4.24 | 4.03 | 7.37 | 6.87 | 9.15 | 14.75 | 7.00 | 6.51 | 6.51 |
| 8 | | | | 4.58 | 7.78 | 4.50 | 5.75 | 5.51 | 8.60 | 7.71 | 10.66 | 19.34 | 8.27 | 7.69 | 7.69 |
| 9 | | | | 19.15 | 17.51 | 17.60 | | 17.90 | 23.86 | 20.90 | 26.67 | 27.87 | 21.43 | 21.60 | 21.60 |
| 10 | | | | 5.28 | 7.21 | 5.41 | 5.68 | 5.08 | 6.72 | 8.59 | 12.95 | 15.51 | 8.05 | 7.49 | 7.49 |
| 11 | | | | 10.15 | 10.15 | 6.66 | 6.83 | 7.16 | 10.53 | 9.69 | 13.87 | 20.17 | 10.58 | 9.84 | 9.84 |
| 12 | | | | 16.14 | 20.12 | 16.29 | 16.82 | 20.80 | 23.92 | 19.75 | 24.10 | 28.78 | 20.75 | 19.30 | 19.30 |
| 13 | | | | 23.54 | 23.83 | 23.77 | 24.11 | 26.65 | 31.40 | 27.40 | 26.98 | 31.06 | 26.53 | 24.68 | 24.68 |
| 14 | | | | 19.36 | 32.89 | 19.43 | 22.83 | 25.38 | 27.22 | 21.56 | 30.45 | | 24.89 | 20.04 | 20.04 |
| 15 | | | | | 19.31 | 15.57 | 16.49 | 16.95 | 22.23 | 19.39 | 21.98 | 15.19 | 18.39 | 17.11 | 17.11 |

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

**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

## Annualisation

An Annualisation calculation need to be performed on all sites due to an annual coverage of <75%. This was attributed to the sampling being absence from the first 3 months (monitoring only began in April 2016) and missing tubes at other sites.
Annualisation calculations were performed using data from the Wicken Fen and Norwich Lakefield's monitoring sites. Details are provided in the box below:

| Site | WF(Pm) | LF(Pm) | WF(Am/Pm) | (LF)R | Ra |
|---|---|---|---|---|---|
| **1** | 9.94 | 14.40 | 0.96 | 0.98 | *0.97* |
| **2** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **3** | 10.26 | 16.34 | 0.93 | 0.86 | *0.89* |
| **4** | 9.96 | 14.37 | 0.95 | 0.98 | *0.97* |
| **5** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **6** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **7** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **8** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **9** | 9.91 | 13.62 | 0.96 | 1.04 | *1.00* |
| **10** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **11** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **12** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **13** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| **14** | 12.03 | 17.55 | 0.79 | 0.80 | *0.80* |
| **15** | 10.23 | 15.44 | 0.93 | 0.91 | *0.92* |
| Am | **9.5029** | **14.11** | | | |

## QA/QC Analysis

Diffusion tube analysis is currently contracted to Gradko International. According to the latest round (R0007/18) of WASP performance, Gradko attained a 100% rating.

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR $NO_2$ PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of ≤ ± 2 as defined above.

| AIR PT Round | AIR PT AR007 | AIR PT AR009 | AIR PT AR010 | AIR PT AR012 | AIR PT AR013 | AIR PT AR015 | AIR PT AR016 | AIR PT AR018 |
|---|---|---|---|---|---|---|---|---|
| **Round conducted in the period** | April – May 2015 | July – August 2015 | October – November 2015 | January – February 2016 | April – May 2016 | July – August 2016 | September – October 2016 | January – February 2017 |
| Aberdeen Scientific Services | 100 % | 75 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % |
| Cardiff Scientific Services | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] |
| Edinburgh Scientific Services | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % |
| Environmental Services Group, Didcot [1] | 100 % | 100 % | 100 % | 100 % | 75 % | 75 % | 100 % | 100 % |
| Exova (formerly Clyde Analytical) | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] |
| Glasgow Scientific Services | 100 % | 100 % | 100 % | 75 % | 100 % | 0 % | 100 % | 100 % |
| Gradko International [1] | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % |
| Kent Scientific Services | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] | NR [3] |
| Kirklees MBC | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | NR [2] | NR [2] |
| Lambeth Scientific Services | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 75 % | 100 % |
| Milton Keynes Council | 100 % | 100 % | 100 % | 50 % | 100 % | 100 % | 75 % | 100 % |
| Northampton Borough Council | 100 % | 100 % | 100 % | 50 % | 100 % | NR [2] | 75 % | 0 % |
| Somerset Scientific Services | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % |
| South Yorkshire Air Quality Samplers | 100 % | 100 % | 75 % | 100 % | 100 % | 75 % | 100 % | 100 % |
| Staffordshire County Council | 100 % | 75 % | 75 % | 75 % | 75 % | 100 % | NR [2] | 100 % |
| Tayside Scientific Services (formerly Dundee CC) | NR [2] | NR [2] | NR [2] | 100 % | NR [2] | 100 % | NR [2] | 100 % |
| West Yorkshire Analytical Services | 75 % | 75 % | 75 % | 75 % | 100 % | NR [2] | 50 % | 100 % |

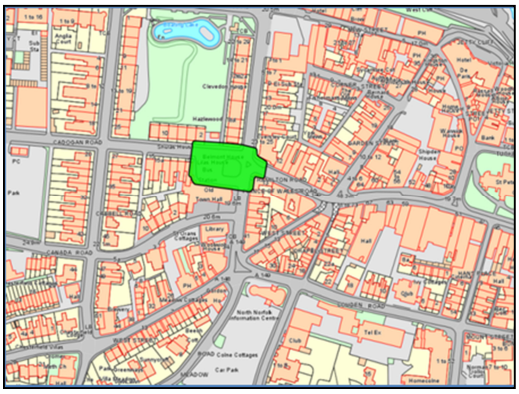
[1] Participant subscribed to two sets of test samples (2 x 4 test samples) in each AIR PT round.
[2] NR No results reported
[3] Kent Scientific Services, Cardiff Scientific Services and Exova (formerly Clyde Analytical) no longer carry out $NO_2$ diffusion tube monitoring and therefore did not submit results.

The bias adjustment factors have been provided below.

| | | | | | |
|---|---|---|---|---|---|
| Bias | Gradko | 50% TEA in acetone | 2016 | **Overall Factor[3] (18 studies)** | **1.01** |

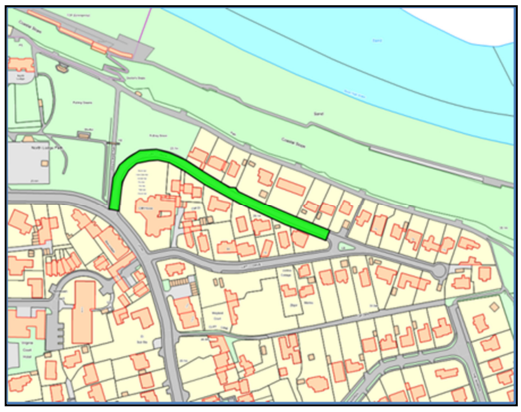
The bias factor selected for this assessment is 1.01.

# Appendix D: Map(s) of Monitoring Locations



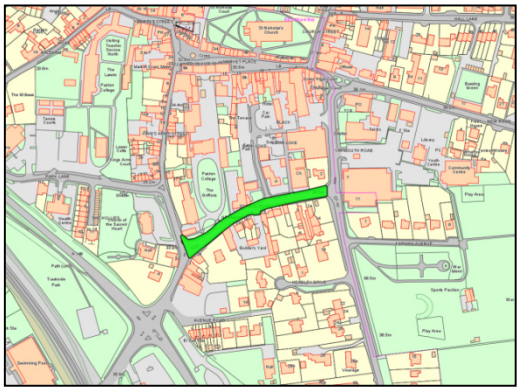
Hamilton Road, Cromer

Site 6



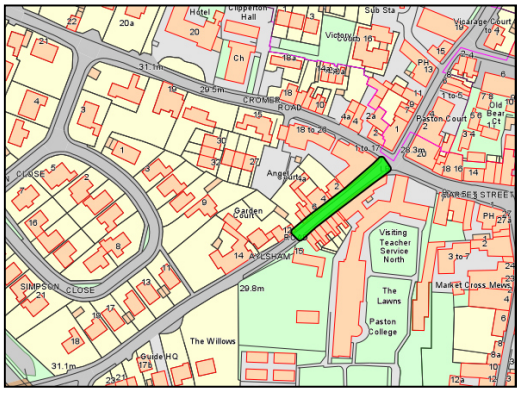
Cliff Drive, Cromer

Site 5



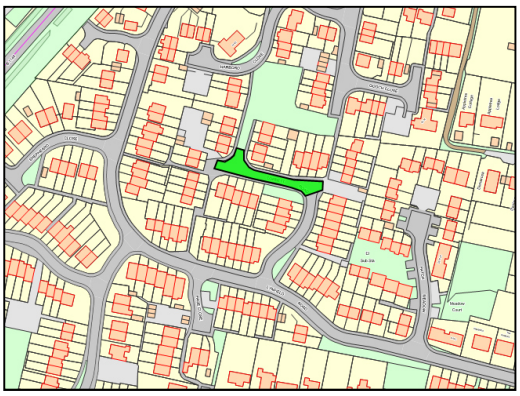
Grammar School Road, North Walsham

Site 3



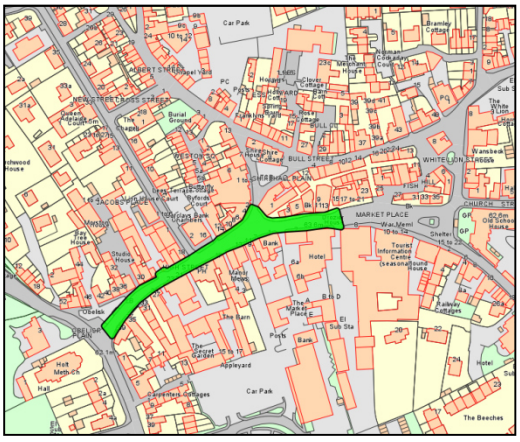

Angel Court, North Walsham

Site 4



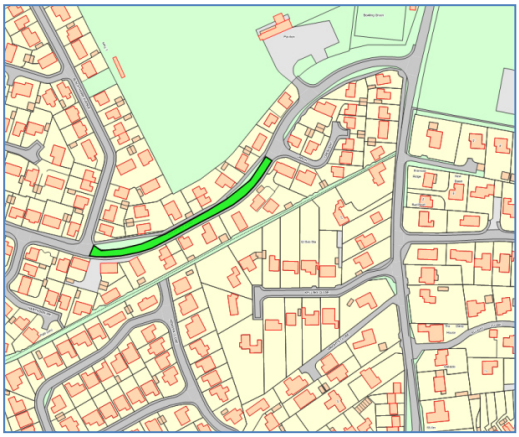
Corbett Road, Cromer

Site 11



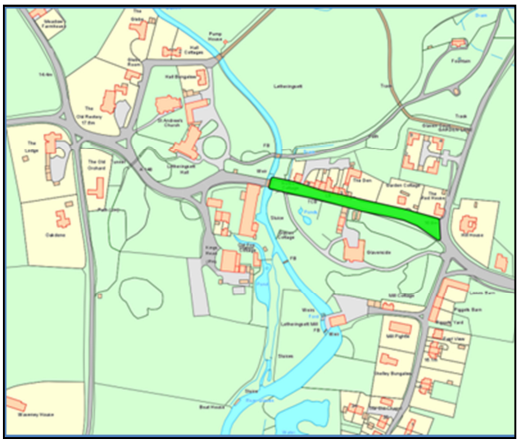
High Street, Holt

Site 12



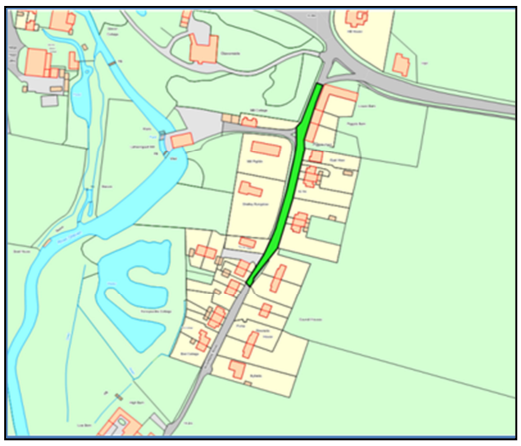
Woodfield Road, Cromer

Site 8



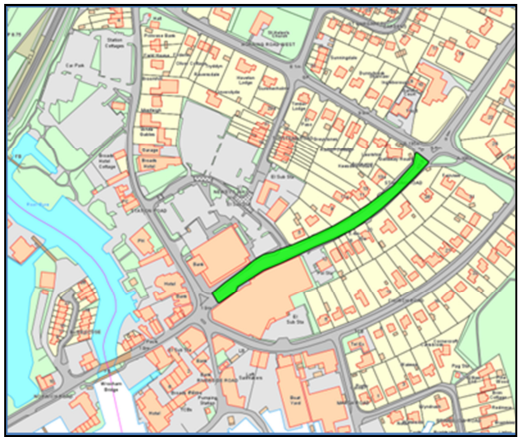
Holt Road, Letheringsett

Site 15



Riverside Road, Letheringsett

Site 7



Stalham Road, Hoveton

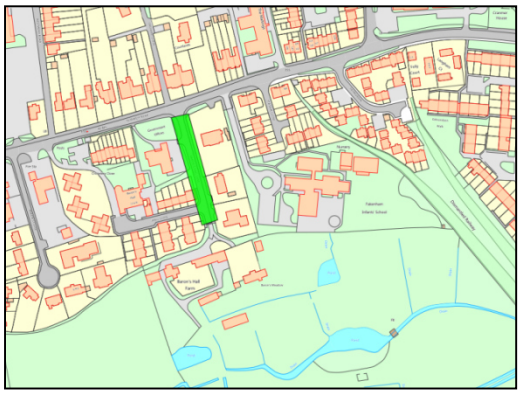
Site 1, 13, 14

Waveney Close, Hoveton

Site 2

Queens Road, Fakenham

Site 9



Barons Hall Lane, Fakenham

Site 10

# Appendix E: Summary of Air Quality Objectives in England

## Table E.1 – Air Quality Objectives in England

| Pollutant | Air Quality Objective[4] | |
|---|---|---|
| | 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 |

[4] 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 |
| LAQM | Local Air Quality Management |
| $NO_2$ | 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 |
| $SO_2$ | Sulphur Dioxide |
| … | … |

# References

None