



***Breckland District Council  
Annual Status Report 2019***

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*June 2019*

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## Breckland District Council

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## 2019 Air Quality Annual Status Report (ASR)

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

June 2019

**Breckland District Council**

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## Executive Summary: Air Quality in Our Area

### Air Quality in Breckland District Council

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

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

The District of Breckland is approximately 500 square miles of mostly rural areas and comprises the principal market towns of Attleborough, Dereham, Swaffham, Thetford and Watton. The district has a fairly low population density with 130,000 residents recorded in the 2011 census<sup>4</sup>. The main source of air pollution within the District is found in Swaffham, where the A1065 runs through the centre of the town and is the main route for both local traffic and for traffic travelling to North Norfolk. The layout of the town leads to frequent traffic congestion and this leads to elevated concentrations of NO<sub>2</sub>. Over the past few years these concentrations have hovered mostly above, but occasionally below, the Annual Objective of 40µg/m<sup>3</sup>. Previous AQ reports with full details of all monitoring and results can be found on the Council website with this link <http://www.breckland.gov.uk/article/3244/Air-Pollution>.

There is currently one Air Quality Management Area (AQMA) designated within Breckland District Council (BDC); AQMA No.2 within Swaffham spans the main vehicular route in the town centre, around the A1065. The current AQMA has been declared due to exceedances of the NO<sub>2</sub> annual mean, the boundaries of the AQMA can be seen in Appendix D and online at [https://uk-air.defra.gov.uk/aqma/local-authorities?la\\_id=32](https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=32).

During 2018, BDC monitored NO<sub>2</sub> using 30 passive NO<sub>2</sub> diffusion tubes and two automatic monitoring locations at twenty six separate locations. There were two co-

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

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

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

<sup>4</sup> [https://www.breckland.gov.uk/media/7891/Authorities-Monitoring.../AMR\\_2017.pdf](https://www.breckland.gov.uk/media/7891/Authorities-Monitoring.../AMR_2017.pdf)

located triplicate tubes at each of the automatic sites. The NO<sub>2</sub> diffusion tube network is in place to monitor NO<sub>2</sub> concentrations across the District, monitoring at known hotspot areas and also being used to identify any new sensitive areas. Across the entire diffusion tube network, over the last five years, NO<sub>2</sub> concentrations have decreased and no exceedances were reported in 2018. NO<sub>2</sub> concentrations slightly increased at 10 of the 30 diffusion tubes reported when comparing 2018 with 2017 values.

## **Actions to Improve Air Quality**

With regard to the National Planning Policy Framework, air quality considerations have been adopted across the district when dealing with planning applications and the provision of pre-application advice. In 2017, an Air Quality Development Management Policy was implemented as part of the Air Quality Planning and Policy Guidance classification.

Following the declaration of the AQMA in 2017 in Swaffham, a draft Air Quality Action Plan (AQAP) was produced and expected to be published in 2018. Improvements in traffic queueing and delays are a strong focus in the AQAP, with proposed removal of the traffic lights on the Station Street/Mangate Street junction, encouragement of public transport use and review of car parking enforcement and the town centre one-way system.

## **Conclusions and Priorities**

This year's ASR is an update of the monitoring carried out last year and illustrates that there is a general improvement across the district, including at the majority of the sites within Swaffham following the May 2017 AQMA declaration. The Draft AQAP published in May 2018 is currently under consultation, and will assist in the continuation of NO<sub>2</sub> reduction across Breckland.

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

As part of the ongoing AQMA process, ahead of the publication of the AQAP and from the 2017 public forums discussing the improvements of the district's air quality, we welcome the continuous suggestions from residents, local business and interest groups in order to improve air quality in the area. We have further met with local and

regional organisations and Councils to ensure that we are in touch with local concerns and are better placed to explore potential solutions.

Find out more about your local air quality by;

- Contacting the Air Quality officer at Breckland (details at the beginning of this report) or email [envprotect@breckland.gov.uk](mailto:envprotect@breckland.gov.uk)
- Contact your local councillor with any concerns <http://democracy.breckland.gov.uk/mgMemberIndex.aspx?FN=ALPHA&VW=L&IST&PIC=0>
- Consider how and when you use your car, especially at peak times. Consider using public transport where possible for trips into towns and walking or cycling for a non-polluting and healthy alternative.

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## 1 Local Air Quality Management

This report provides an overview of air quality in Breckland District Council during 2018. 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 Breckland 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 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 the AQMAs declared by the Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at [https://uk-air.defra.gov.uk/aqma/local-authorities?la\\_id=32](https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=32) (see full list at <http://uk-air.defra.gov.uk/aqma/list>). Alternatively, see Appendix D: Maps of Monitoring Locations and AQMAs, which provides a map of the air quality monitoring locations in relation to the AQMA.

**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
Breckland District Council Air Quality Management Area number 2 Order 2017	Declared 1 May 2017	NO <sub>2</sub> Annual Mean	Swaffham	An area encompassing a number of residential properties in Station Street and London Road, Swaffham	No	41.0	µg/m <sup>3</sup>	30.5	µg/m <sup>3</sup>	AP01/18	Draft 15/05/18	Expected to be published in 2019

Breckland District Council confirm the information on UK-Air regarding their AQMA is up to date

## 2.2 Progress and Impact of Measures to address Air Quality in Breckland District Council

Defra's appraisal of last year's ASR concluded that significant transport interventions need to be interlinked with evidence pertaining to continued pollution hotspots. Furthermore, it is advised that the assessment of local air quality should be continued in order to demonstrate compliance and, that ongoing compliance, may result in the AQMA being removed however this is under the proviso that air pollution levels are maintained at a level of more than 10% below objective levels. It was also requested that the ASR clearly defined which measures are being taken forward within costed programmes, and a distinction made between proposed measures, and those that remain under consideration, or have been rejected. This has been taken on-board by BDC, recognising that there is a need to meet with partners, in particular county council, to understand how many of the actions are feasible and cost effective based on the comments made by Defra earlier this year, and especially in relation to specific consideration given that the NO<sub>2</sub> levels have, overall, seen a reduction since the AQMA was declared.

BDC has taken forward a number of direct measures during the reporting year of 2018 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 their respective Action Plan which is currently drafted and expected to be published in 2019. A key completed measure thus far concerns the inclusion of air quality considerations in local planning policy together with the adoption of an air quality development management policy.

BDC expects the following ongoing measures to be completed over the course of the next reporting year:

- The inclusion of air quality considerations when determining planning applications;
- The inclusion of air quality as a topic in the Neighbourhood Plan and future Local Plan documents;
- Progress on improvements in the bus network for Breckland and implementation of a public cycle schemes.

BDC's priorities for the coming year are to review the current town centre parking arrangements to minimise traffic flow in sensitive areas, review and prevent any habitual illegal or bad parking on Station Street that hinders the traffic flow, promote road safety and eco-driving awareness, investigate Green Space initiatives and promote low emission transport such as bicycles together with improvements to emission standards across bus fleet operators.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, BDC anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of the Swaffham AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Consideration of Air Quality Impacts when providing comments on planning applications within an AQMA or where an AQMA could be impacted or created.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	District Council (LPA &	Ongoing	Ongoing	Number of pre application discussions and planning applications	1µg/m3	Ongoing consultations - requiring review of AQ impacts of proposals and recommending mitigation including active travel and measure to encourage form of low or non-polluting travel	Ongoing task	Dependent upon type and status of planning applications
2	With regard to National Planning Policy Framework, include air quality considerations in the Local Plans and adopt an air quality Development Management Policy.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Env Protection Team)	Completed	2017	Production of documents	1µg/m3	Complete	Complete	Not Confirmed
2	With regard to National Planning Policy Framework,	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	District Council (LPA &	Completed	2017	Production of documents	1µg/m3	Complete	Complete	policy recommended for inclusion in

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	include air quality considerations in the Local Plans and adopt an air quality Development Management Policy.										developing local plan
4	Include air quality considerations with the scoping and determination of planning applications	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Env Protection Team)	2018	2018	Production of documents	1µg/m3	Ongoing	2018	Not Confirmed
3	With regard to National Planning Policy Framework, adopt Norfolk Technical Guidance on Air Quality and provide pre-application advice on planning applications	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	District Council (LPA &	2018	2020	Production of documents	1µg/m3	Ongoing	2020	Not Confirmed
6	Review car parking policy arrangements and consider the implementation of control measures, enforcement and the likely benefits. This will need to be compatible with the proposed	Traffic Management	Other	Env Protection Team)	2018	2020	Production of documents	1µg/m3	Ongoing	2020	Not Confirmed

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	countywide review of Civil Parking Enforcement (CPE)										
4	Include air quality considerations with the scoping and determination of planning applications	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	District Council (LPA &	2018	2018	Production of documents	1µg/m3	Ongoing	2018	Not Confirmed
8	Review town centre one-way system to create a better circulation of traffic around the town and, if appropriate, devise a revised layout	Transport Planning and Infrastructure	Other	Env Protection Team)	2018	2020	Production of documents	1µg/m3	Ongoing	2020	Not Confirmed
5	Include air quality as a topic in the Neighbourhood Plan and future Local Plan documents	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	District Council (LPA &	2018	2018	Production of documents	1µg/m3	Ongoing	2018	Not Confirmed
10	Consider options for new car parks on the edge of the town to keep vehicles from entering the town centre	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	Env Protection Team)	2018	2019	Production of documents	1µg/m3	Ongoing	2019	Not Confirmed
6	Review car parking policy arrangements and consider the implementation	Traffic Management	Other	County Council	2018	2020	Production of documents	1µg/m3	Ongoing	2020	This matter crosses a number of different organisational

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	of control measures, enforcement and the likely benefits. This will need to be compatible with the proposed countywide review of Civil Parking Enforcement (CPE)										controls so a review of this will need to include officers / councils responsible for car parking at County/ District and town levels. Initial meetings to be set up in Autumn 2019
12	Investigate the possibility of an HGV ban on the A1065 through the town centre and, if appropriate, devise a scheme for implementation	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	District Council Town Council	2018	2020	Production of documents	1µg/m <sup>3</sup>	Ongoing	2020	Not Confirmed
7	Further investigate an improvement at the Station Street/Mangate Street junction to reduce queuing and delays particularly on Station Street and, if appropriate, devise a scheme for implementation. This may result in removing the traffic lights.	Transport Planning and Infrastructure	Strategic highway improvement , Re-prioritising road space away from cars, inc Access management , Selective vehicle priority, bus priority, high vehicle occupancy lane	County Council	2018	2020	Production of documents	1µg/m <sup>3</sup>	Ongoing	2020	Not Confirmed

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14	Encourage greater use of public transport for journeys into the town centre	Transport Planning and Infrastructure	Public transport improvement - interchanges stations and services	District Council Town Council	2018	2019	Production of documents	1µg/m <sup>3</sup>	Ongoing	2019	Not Confirmed
8	Review town centre one-way system to create a better circulation of traffic around the town and, if appropriate, devise a revised layout	Transport Planning and Infrastructure	Other	County Council	2018	2020	Production of documents	1µg/m <sup>3</sup>	Ongoing	2020	Not Confirmed
16	Review existing travel arrangements to schools and any existing Travel Plans including the role of car sharing	Promoting Travel Alternatives	Cycle network	District Council Town Council	2018	2018	Production of documents	1µg/m <sup>3</sup>	Ongoing	2018	Not Confirmed
9	Review town centre car parking arrangements to minimise vehicular traffic in sensitive areas and, if appropriate, devise a revised strategy	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	County Council	2018	2019	Production of documents	1µg/m <sup>3</sup>	Ongoing	2020	Norfolk County Council Highways draft report produced considering traffic and car parking
18	Investigate the provision of electric vehicle (EV) charging points to encourage	Promoting Low Emission Transport	Bus route improvement	District Council Town Council	2018	2018	Production of documents	1µg/m <sup>3</sup>	Ongoing	2018	Not Confirmed

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	greater use of EV										
10	Consider options for new car parks on the edge of the town to keep vehicles from entering the town centre	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	County Council	2018	2019	Production of documents	1µg/m <sup>3</sup>	Ongoing	2019	Norfolk County Council Highways draft report produced considering traffic and signage improvements
20	Encourage greater use of public transport for journeys into the town centre	Promoting Travel Alternatives	Public cycle hire scheme	District Council Town Council	2018	2018	Production of documents	1µg/m <sup>3</sup>	Ongoing	2018	Not Confirmed
11	Review illegal and habitual bad parking on Station Street that hinders traffic flow and devise restrictions to prevent it happening	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	County Council	2018	2019	Production of documents	1µg/m <sup>3</sup>	Ongoing	2020	This matter crosses a number of different organisational controls so a review of this will need to include officers / councils responsible for car parking at County/ District and town levels and the police. Initial meetings to be set up in Autumn 2019
22	Investigate Green Space Initiatives	Other	Other	District Council Town Council	2018/19	2019	Designation of spaces	1µg/m <sup>3</sup>	Ongoing	2019	Not Confirmed

## 2.3 PM<sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations

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

The Public Health Outcomes Framework indicator<sup>5</sup> for the fraction of deaths attributable to PM<sub>2.5</sub> in Breckland is 4.9% during 2017, which is below the regional average of 5.5% and the national average of 5.1%, and one of the lowest across the other authorities in the East of England region.

There is currently no ongoing monitoring of PM<sub>2.5</sub> within the District. The current Defra 2018 background maps for Breckland District Council (2017 based<sup>6</sup>) show that all background concentrations of PM<sub>2.5</sub> are below the 2020 annual mean AQS objective for PM<sub>2.5</sub>. The highest concentration is predicted to be 10.4µg/m<sup>3</sup> within the 1 x 1km grid square with the centroid grid reference of 578500, 287500. This is an area that encompasses a stretch of the A1065 Trunk Road on the outskirts of Brandon, closely located to a several distribution hubs and light industry.

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<sup>5</sup> <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/3/gid/1000043/pat/6/par/E12000006/ati/101/are/E07000143/iid/30101/age/230/sex/4>

<sup>6</sup> Defra Background Mapping data for local authorities (2017-based), available online at <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

## **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.

Breckland District Council undertook automatic (continuous) monitoring at 2 sites during 2018. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at [https://www.airqualityengland.co.uk/local-authority/?la\\_id=38](https://www.airqualityengland.co.uk/local-authority/?la_id=38).

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**

Breckland District Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 26 sites during 2018, including 2 triplicate sites. Table A.2 in Appendix A shows the details of the sites.

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

### **3.2 Individual Pollutants**

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation”. Distance correction is not required as all monitoring locations are reported as being at relevant exposure. Further details on adjustments are provided in Appendix C.

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

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

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

Following the application of bias adjustment and annualisation to the raw data, no sites were reported to exceed the NO<sub>2</sub> annual mean objective in 2018. In 2016 the monitoring location S8 was reported at 41µg/m<sup>3</sup>, prompting the declaration of the 2017 AQMA. By subsequent comparison, S8 reported a significantly lower annual mean of 34.7µg/m<sup>3</sup> in 2017 and 30.5µg/m<sup>3</sup> in 2018.

Annualisation was completed for diffusion tube location S12 as data capture was reported at 66.7% in 2018. The minimum required data capture for an annual mean is 75% across the year. Table 3 – S12 Annualisation 2018 illustrates the monitoring stations and associated ratios used for the annualisation of S12. The average ratio is applied against the bias adjusted result within Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results – 2018.

**Table 3 – S12 Annualisation 2018**

<b>S12</b>				
<b>Site</b>	<b>Site Type</b>	<b>Annual Mean (µg/m<sup>3</sup>)</b>	<b>Period Mean (µg/m<sup>3</sup>)</b>	<b>Ratio Annual Mean / Period Mean</b>
Continuous Site 1 Breckland East Wretham	Urban Background	10.03	9.83	1.020
Continuous Site 2 Breckland Swaffham	Roadside	25.66	25.35	1.012
Continuous Site 3 Wicken Fen AURN	Rural Background	7.99	7.43	1.074
<b>Average Ratio</b>				<b>1.035</b>

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

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

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

The monitoring site S20 is significantly below both PM<sub>10</sub> objectives for annual mean and daily mean concentrations and has been as such for the last 5 years.

### **3.2.1 Other Pollutants**

In addition to monitoring NO<sub>2</sub> and PM<sub>10</sub>, the automatic analyser located at East Wretham also monitors Ozone (O<sub>3</sub>) concentrations. There is no requirement to report this data for LAQM purposes; however, the results are discussed herein for completeness.

O<sub>3</sub> is a trans-boundary pollutant; its sources can be frequently spatially distant from the measured site of the concentration. This pollutant is not prescribed an air quality objective for the purposes of LAQM and therefore the results presented are for information only.

The AQS objective for ground level O<sub>3</sub> (to be met by 2005) states that the maximum daily concentration (measured as an 8-hour mean) of 100µg/m<sup>3</sup> should not be exceeded more than 10 times per year.

Table A.7 – Results of East Wretham Automatic Ozone Monitoring in Appendix A summarises the number of exceedances over the last 5 years. The number of exceedances of maximum daily concentration (measured as an 8-hour mean) of 100µg/m<sup>3</sup> is greater than the permitted 10, reporting 16 exceedances for 2018.

## Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
S20	East Wretham	Urban background	591315	288704	NO <sub>2</sub> , PM <sub>10</sub>	Y	Chemiluminescence, TEOM corrected by VCM	0	10	2.5
S3	Swaffham	Roadside	582093	308469	NO <sub>2</sub>	N	Chemiluminescent	0	2	1.5

**Notes:**

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

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
A1	High Street Attleborough	Urban Centre	604550	295125	NO <sub>2</sub>	N	0	6	N	2
A2	Croft Green Attleborough	Urban Background	603843	294085	NO <sub>2</sub>	N	0	7	N	2
D1	High Street Dereham	Urban Centre	598920	313267	NO <sub>2</sub>	N	0	2	N	2
D2	Station Road Dereham	Urban Background	599283	313599	NO <sub>2</sub>	N	0	8	N	2
D3	Wellington Street Dereham	Urban Centre	599319	313197	NO <sub>2</sub>	N	0	5	N	2
S1	Impsons Butchers Swaffham	Urban Centre	581986	309031	NO <sub>2</sub>	Y	0	5	N	2.5
S2	Ceres Books Swaffham	Urban Centre	582008	308764	NO <sub>2</sub>	N	0	3	N	2
S3	London Street	Roadside	582182	308434	NO <sub>2</sub>	N	0	4	Y	2
S3a	London Street	Roadside	582182	308434	NO <sub>2</sub>	N	0	4	Y	2
S3b	London Street	Roadside	582182	308434	NO <sub>2</sub>	N	0	4	Y	2
S4	Bridewell Place Swaffham	Roadside	582058	308625	NO <sub>2</sub>	N	0	4	N	2
S5	London Street Zebra Crossing	Roadside	582075	308496	NO <sub>2</sub>	N	0	7	N	2
S6	London Street N Roundabout	Roadside	582048	308609	NO <sub>2</sub>	N	0	5	N	2
S7	Station Road Swaffham	Roadside	581999	309099	NO <sub>2</sub>	Y	0	7	N	2

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
S8	Station Road Swaffham	Roadside	581979	309162	NO <sub>2</sub>	Y	0	5	N	2
S9	Anglia Computer Solutions Swaffham	Roadside	581959	309057	NO <sub>2</sub>	Y	0	4	N	2
S10	Kev's Tackle Swaffham	Roadside	582670	309058	NO <sub>2</sub>	N	0	3	N	2
S11	13 Station Road Swaffham	Roadside	581990	309145	NO <sub>2</sub>	Y	0	3	N	2
S12	Glazedale Lamp post Swaffham	Roadside	581986	309213	NO <sub>2</sub>	Y	0	3	N	2
S13	33 Station Road Swaffham	Roadside	581978	309312	NO <sub>2</sub>	N	0	3	N	1
S14	Corner Whitecross	Roadside	582082	309856	NO <sub>2</sub>	N	0	3	N	2
T1	London Street Fire Station	Roadside	587126	283336	NO <sub>2</sub>	N	0	3	N	2
T2	55 Bury Road Thetford	Roadside	586846	282721	NO <sub>2</sub>	N	0	3	N	2
T3	41 E. Cavell Close Thetford	Suburban	587036	284579	NO <sub>2</sub>	N	0	101	N	2
W1	High Street Corals Watton	Urban Centre	591747	300796	NO <sub>2</sub>	N	0	2.5	N	2
W2	Charles Avenue Watton	Urban Background	591885	300622	NO <sub>2</sub>	N	0	2	N	2
20	Wretham SSSI	Rural	591315	288704	NO <sub>2</sub>	N	0	55	Y	3

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
20a	Wretham SSSI	Rural	591315	288704	NO <sub>2</sub>	N	0	55	Y	3
20b	Wretham SSSI	Rural	591315	288704	NO <sub>2</sub>	N	0	55	Y	3
30	East Harling	Rural	599403	286353	NO <sub>2</sub>	N	0	2.5	N	2

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2014	2015	2016	2017	2018
S20	Urban Background	Automatic	99.1	99.1	22.0	27.0	25.0	12.1	10.1
S3	Roadside	Automatic	99.6	99.6	33.0	29.0	28.0	24.9	25.6
A1	Urban Centre	Diffusion Tube	100	100	27.2	27.0	28.6	23.6	23.8
A2	Urban Background	Diffusion Tube	100	100	10.9	10.9	11.5	10.2	9.7
D1	Urban Centre	Diffusion Tube	100	100	35.4	33.9	34.3	30.9	27.3
D2	Urban Centre	Diffusion Tube	100	100	28.6	27.8	28.6	25.0	22.5
D3	Urban Centre	Diffusion Tube	100	100	14.7		11.2	13.7	20.0
S1	Urban Centre	Diffusion Tube	100	100	25.3	22.6	24.2	20.2	20.0
S2	Urban Centre	Diffusion Tube	91.7	91.7	38.5	37.3	38.4	33.5	28.6
S3	Roadside	Diffusion Tube	100	100	33.7	28.9	31.4	25.2	25.8
S3a	Roadside	Diffusion Tube	100	100	32.6	29.5	30.0	26.1	25.1
S3b	Roadside	Diffusion Tube	100	100	32.7	29.0	30.2	26.0	26.2
S4	Roadside	Diffusion Tube	100	100	28.7	25.2	26.9	20.9	21.4
S5	Roadside	Diffusion Tube	100	100	28.6	25.9	25.7	22.7	21.8
S6	Roadside	Diffusion Tube	100	100	34.3	31.1	33.2	29.1	26.9
S7	Roadside	Diffusion Tube	83.3	83.3	34.9	34.8	38.4	29.7	30.2
S8	Roadside	Diffusion Tube	100	100	40.4	37.7	41.0	34.3	30.5
S9	Roadside	Diffusion Tube	91.7	91.7	28.2	26.4	26.7	21.9	21.8
S10	Roadside	Diffusion Tube	100	100	25.9	24.7	24.9	22.7	20.3
S11	Roadside	Diffusion Tube	100	100	35.6	34.0	37.0	30.6	30.9
S12	Roadside	Diffusion Tube	66.7	66.7	34.4	31.4	32.0	29.2	31.5
S13	Roadside	Diffusion Tube	75.0	75.0	25.7	25.0	26.4	21.7	14.9

S14	Roadside	Diffusion Tube	91.7	91.7	27.5	22.9	24.2	21.2	17.2
T1	Roadside	Diffusion Tube	100	100	28.5	26.9	27.2	25.8	24.8
T2	Roadside	Diffusion Tube	100	100	28.7	25.2	25.7	22.0	21.9
T3	Suburban	Diffusion Tube	100	100	15.1	13.7	14.9	14.1	12.0
W1	Urban Centre	Diffusion Tube	91.7	91.7	23.9	23.4	26.7	24.1	24.0
W2	Urban Background	Diffusion Tube	100	100	13.2	12.2	13.1	12.4	11.8
20	Rural	Diffusion Tube	100	100	11.2	10.2	11.1	10.4	9.2
20a	Rural	Diffusion Tube	100	100	11.3	10.1	11.2	11.3	14.0
20b	Rural	Diffusion Tube	100	100	11.4	9.9	11.0	10.7	9.3
30	Rural	Diffusion Tube	100	100	25.9	17.5	15.8	13.7	10.2

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

**Results not available**

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

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

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

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

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

Figure A.1 - Trends in Annual Mean Diffusion Tube NO<sub>2</sub> Concentrations – Within Declared AQMA

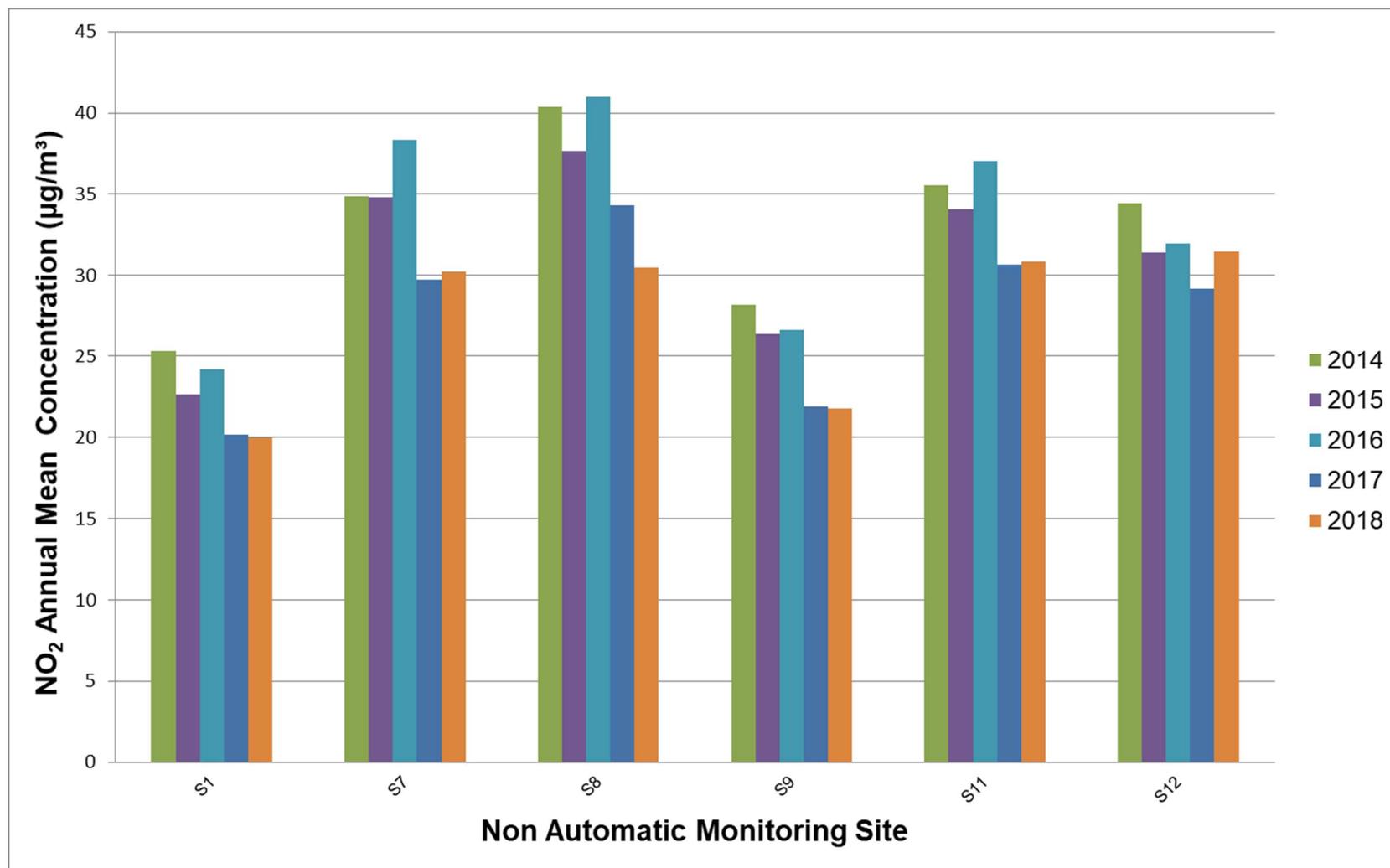


Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations

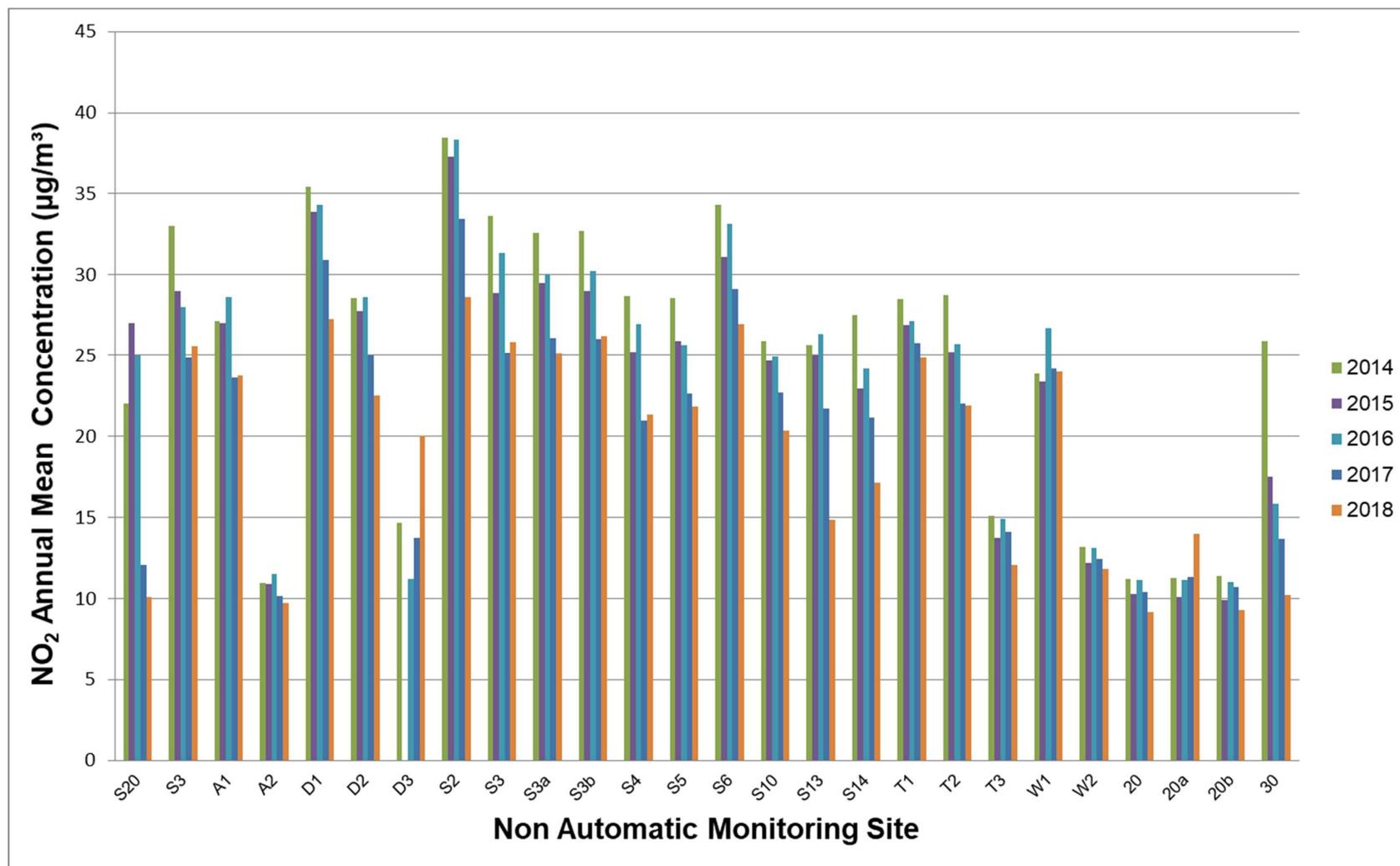


Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	NO <sub>2</sub> 1 Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
					2014	2015	2016	2017	2018
20	East Wretham	Urban background	99.1	99.1	0	0	0	0	0
S3	Swaffham	Roadside	99.6	99.6	1	0	0	0	0

**Notes:**

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

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2014	2015	2016	2017	2018
S20	East Wretham	97.6	97.6	18	16	15	16	17

Annualisation has been conducted where data capture is <75%

**Notes:**

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

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

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

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

Figure A.3 – Trends in Annual Mean PM<sub>10</sub> Concentrations

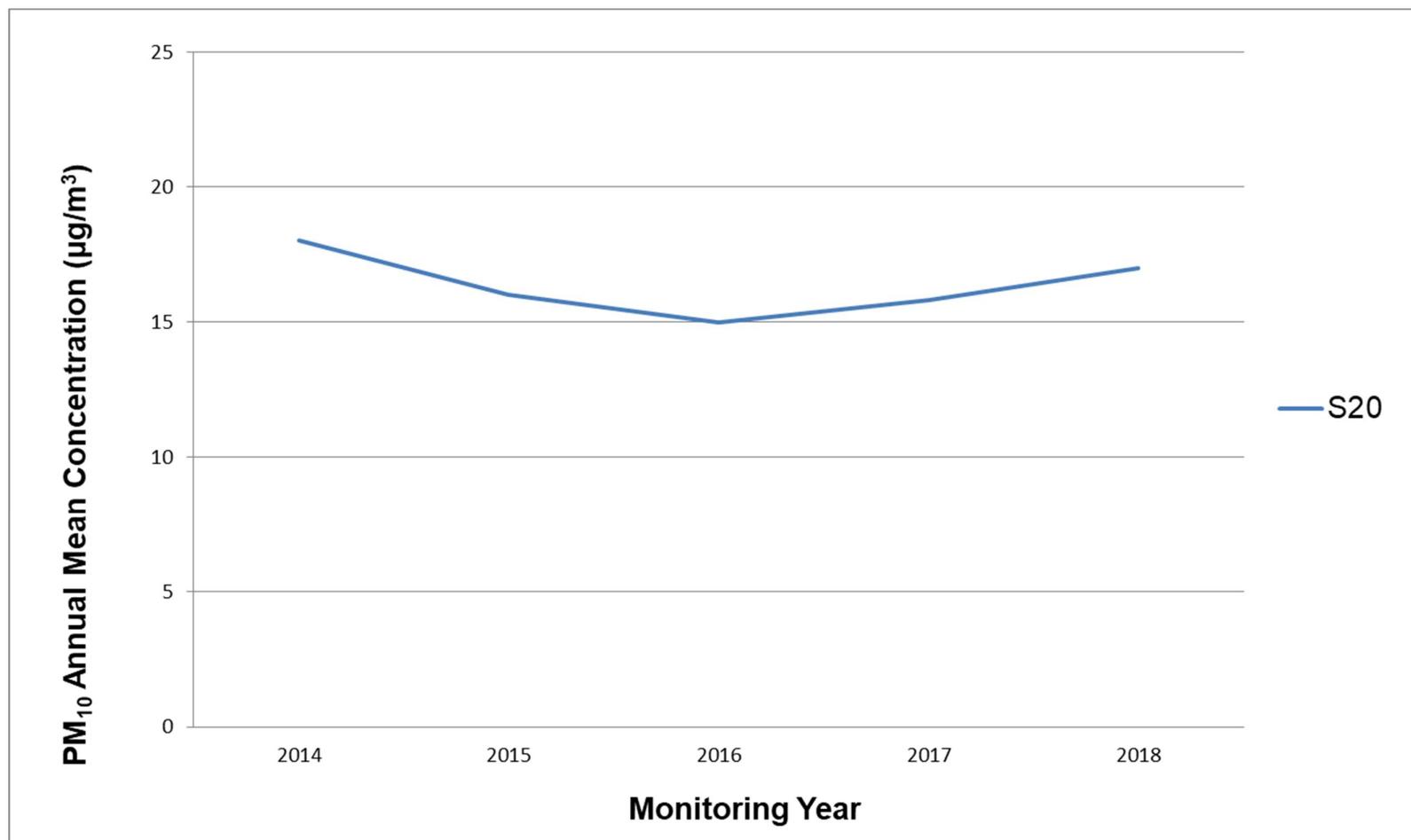


Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	PM <sub>10</sub> 24 Hour Means > 50µg/m <sup>3</sup> <sup>(3)</sup>				
				2014	2015	2016	2017	2018
S20	East Wretham	100	100	7	2	1	4	4

**Notes:**

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

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

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

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

Figure A.4 – Trends in Number of 24-Hour Mean PM<sub>10</sub> Results >50µg/m<sup>3</sup>

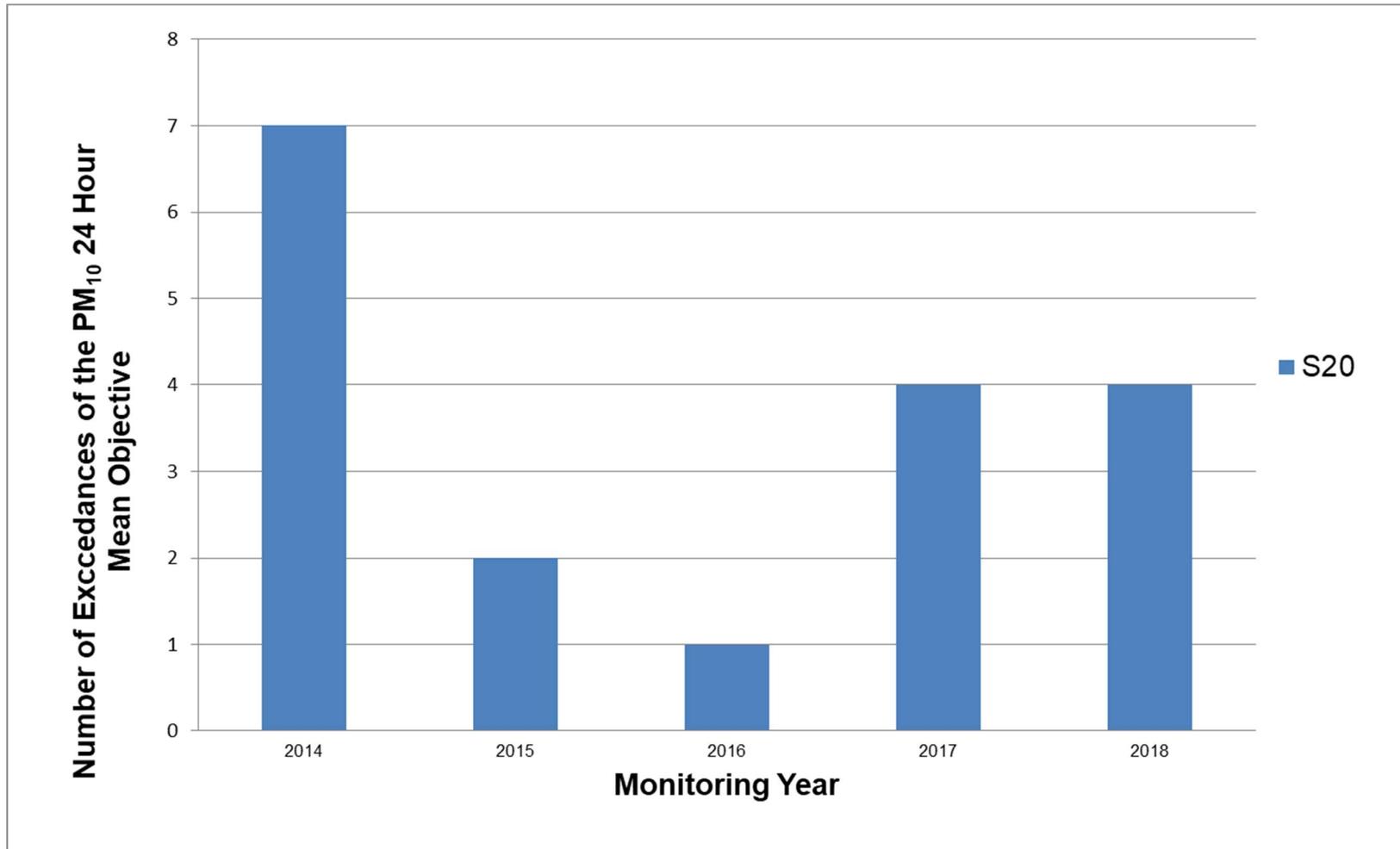


Table A.7 – Results of East Wretham Automatic Ozone Monitoring

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	O <sub>3</sub> Number of Exceedances of Maximum Daily Concentration (8 hour running mean)				
				2014	2015	2016	2017	2018
CM2	Rural	96.7	96.7	8	10	3	6	16

**Notes:**

Exceedance of the O<sub>3</sub> objective: 8-hour mean of 100 µg/m<sup>3</sup>, 10 exceedances allowed per year.

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

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

## Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2018

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.89) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
A1	28.2	30.8	34.2	30.2	23.2	17.3	26.2	23.1	20.1	27.9	29.0	30.1	26.7	23.8	-
A2	14.7	13.9	15.6	10.7	7.1	5.7	7.1	9.3	8.5	12.2	13.0	12.9	10.9	9.7	-
D1	34.3	40.3	30.9	28.4	0.4	26.4	30.0	38.3	31.2	35.7	37.1	34.5	30.6	27.3	-
D2	30.1	24.7	25.2	25.5	16.6	20.0	21.5	27.2	23.4	28.0	29.8	31.7	25.3	22.5	-
D3	24.5	23.1	28.3	22.6	21.5	17.8	16.7	21.5	17.0	23.5	26.3	27.5	22.5	20.0	-
S1	22.9	29.2	25.1	22.8	20.8	18.5	22.8	19.4	17.6	22.1	24.3	23.6	22.4	20.0	-
S2	38.3	34.9	33.7	34.2	27.1	20.2	34.4	35.5		30.9	35.5	28.8	32.1	28.6	-
S3	27.3	29.9	31.9	33.6	32.1	22.7	32.9	26.0	22.2	26.2	32.8	30.6	29.0	25.8	-
S3a	26.4	30.0	32.9	31.6	28.3	21.9	33.4	26.1	20.8	25.7	32.3	29.4	28.2	25.1	-
S3b	28.0	34.3	32.7	30.7	30.7	22.1	33.1	25.0	21.9	29.8	33.3	32.0	29.5	26.2	-
S4	22.8	26.2	25.8	24.3	27.1	20.2	25.9	20.6	19.4	24.0	26.9	24.7	24.0	21.4	-
S5	22.5	28.1	26.2	24.2	26.2	20.2	26.6	23.2	19.6	25.2	23.1	28.9	24.5	21.8	-
S6	28.0	33.6	27.9	31.4	27.4	20.3	34.5	31.8	25.1	32.7	36.6	34.0	30.3	26.9	-
S7	31.6	37.3	37.7	37.4	40.2	29.5	40.2	32.1	25.2	28.2			33.9	30.2	-
S8	39.9	31.1	33.3	31.9	32.5	24.0	41.1	38.3	32.0	36.0	35.9	34.8	34.2	30.5	-

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Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.89) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
S9		22.0	26.0	24.3	26.9	20.9	27.7	23.2	21.5	26.5	23.8	26.5	24.5	21.8	-
S10	27.5	22.8	22.2	19.7	19.2	15.2	23.7	23.1	22.2	24.1	25.7	28.6	22.8	20.3	-
S11	33.0	32.9	38.9	41.7	39.0	27.8	40.2	33.0	25.4	30.7	39.3	34.4	34.7	30.9	-
S12			34.5	31.5		26.5	42.5	33.9	30.0		40.4	34.2	34.2	31.5	-
S13	13.1	7.8	11.1	9.3	5.3			20.7	22.9		33.8	26.4	16.7	14.9	-
S14	22.6	24.4		0.5	18.2	13.6	22.7	21.7	18.7	23.0	25.1	21.3	19.3	17.2	-
T1	31.6	27.2	33.9	28.3	19.0	22.3	29.1	26.8	22.9	29.5	33.6	30.8	27.9	24.8	-
T2	26.7	26.6	30.5	26.4	23.2	19.8	24.8	19.8	18.4	24.1	28.5	26.2	24.6	21.9	-
T3	9.7	16.6	19.7	13.5	8.3	7.1	9.4	13.9	12.6	15.6	18.5	17.6	13.5	12.0	-
W1	24.9	29.4	32.7	26.9	26.3	23.0	28.2	24.7		26.9	25.0	28.8	27.0	24.0	-
W2	19.8	16.4	17.6	12.0	8.2	6.4	8.4	9.9	10.7	14.4	18.5	17.0	13.3	11.8	-
20	14.1	10.3	12.5	9.9	7.1	5.2	7.9	11.0	8.9	11.2	12.8	12.7	10.3	9.2	-
20a	13.4	10.9	14.5	9.9	6.6	0.7	78.3	10.8	8.2	11.5	12.3	11.6	15.7	14.0	-
20b	13.6	11.2	13.7	10.5	7.6	5.2	8.0	10.7	8.8	11.6	12.2	11.6	10.4	9.3	-
30	15.0	18.2	15.4	10.1	9.3	7.6	9.7	8.5	9.7	12.4	16.2	5.7	11.5	10.2	-

- Local bias adjustment factor used
- National bias adjustment factor used
- Annualisation has been conducted where data capture is <75%
- Where applicable, data has been distance corrected for relevant exposure

**Tube Missing**

**Notes:**

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

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

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

(2) Distance corrected to nearest relevant public exposure.

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

### Diffusion Tube Bias Adjustment Factors

The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between the diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. The Defra LAQM.TG(16) provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO<sub>x</sub>/NO<sub>2</sub> continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

With regard to the application of a bias adjustment factor for diffusion tubes, Defra LAQM.TG(16) and the LAQM Helpdesk<sup>7</sup> recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites. The Council expressed concerns in last year's report that the continuous monitoring site S3 in Swaffham, which has been previously used for the local bias calculation, has experienced condensation in the line, producing unusually low bias factor results. This was resolved in 2017 and the triplicate site's data calculated a factor for 2018 of 0.89, which is close to the national bias for 2018 (0.93)<sup>8</sup>. Table C.1 illustrates the local bias adjustment data.

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<sup>7</sup> Laqm.defra.gov.uk

<sup>8</sup> National Diffusion Tube Bias Adjustment Factor Spreadsheet version 03/18 available at <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

**Table C.1 - Local Bias Adjustment Factor 2018, S3 Triplicate Location**

Checking Precision and Accuracy of Triplicate Tubes											Automatic Method		Data Quality Check	
Diffusion Tubes Measurements											Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{g m}^{-3}$	Tube 2 $\mu\text{g m}^{-3}$	Tube 3 $\mu\text{g m}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean					
1	04/01/2018	01/02/2018	27.3	26.4	28.0	27	0.8	3	2.0	26.4	100.0	Good	Good	
2	01/02/2018	26/02/2018	29.9	30.0	34.3	31	2.5	8.1	6.3	31.3	100.0	Good	Good	
3	26/02/2018	29/03/2018	31.9	32.9	32.7	33	0.5	2	1.3	32.8	99.9	Good	Good	
4	29/03/2018	03/05/2018	33.6	31.6	30.7	32	1.5	5	3.7	28.6	100.0	Good	Good	
5	03/05/2018	11/06/2018	32.1	28.3	30.7	30	1.9	6	4.8	26.6	100.0	Good	Good	
6	08/06/2018	04/07/2018	22.7	21.9	22.1	22	0.5	2	1.1	21.1	98.7	Good	Good	
7	04/07/2018	30/07/2018	32.9	33.4	33.1	33	0.3	1	0.7	26.1	100.0	Good	Good	
8	30/07/2018	03/09/2018	26.0	26.1	25.0	26	0.6	2	1.5	19.6	99.4	Good	Good	
9	03/09/2018	03/10/2018	22.2	20.8	21.9	22	0.8	4	1.9	17.7	98.5	Good	Good	
10	02/10/2018	05/11/2018	26.2	25.7	29.8	27	2.2	8	5.5	22.9	99.8	Good	Good	
11	06/11/2018	03/12/2018	32.8	32.3	33.3	33	0.5	2	1.3	30.2	99.4	Good	Good	
12	03/12/2018	03/01/2019	30.6	29.4	32.0	31	1.3	4	3.3	24.4	94.6	Good	Good	
13														

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

Site Name/ ID:	S3 Swaffham
Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.89 (0.83 - 0.95)
Bias B	13% (6% - 20%)
Diffusion Tubes Mean:	29 $\mu\text{g m}^{-3}$
Mean CV (Precision):	4
Automatic Mean:	26 $\mu\text{g m}^{-3}$
Data Capture for periods used:	99%
Adjusted Tubes Mean:	26 (24 - 27) $\mu\text{g m}^{-3}$

Precision	12 out of 12 periods have a CV smaller than 20%
Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.89 (0.83 - 0.95)
Bias B	13% (6% - 20%)
Diffusion Tubes Mean:	29 $\mu\text{g m}^{-3}$
Mean CV (Precision):	4
Automatic Mean:	26 $\mu\text{g m}^{-3}$
Data Capture for periods used:	99%
Adjusted Tubes Mean:	26 (24 - 27) $\mu\text{g m}^{-3}$

Overall survey --> **Good precision** **Good Overall**

(Check average CV & DC from Accuracy calculations)

Jaume Targa, for AEA  
Version 04 - February 2011

The local bias adjustment factor has been used in this year’s ASR to ensure best practice in line with LAQM.TG(16) whilst maintaining consistency with previous years’ results.

The diffusion tube data for Breckland District Council is supplied and analysed by Gradko International Ltd. The tubes were prepared using the 20% TEA in water preparation method. As stated, the national bias adjustment factor for Gradko 20% TEA in water is 0.93 for the year 2018 (based on 30 studies, version 03/19) as derived from the national bias adjustment factor spreadsheet.

For previous years data (2014 to 2017) the bias adjustment factors have been taken from previous LAQM reports completed by Breckland District Council, with 2016 based on the national bias figure and previous years’ taking adjustment data from the local bias. There is a 0.04 difference between 2018 local and national bias adjustment calculations.

**QA/QC of Diffusion Tube Monitoring**

The diffusion tubes for the year 2018 were supplied and analysed by Gradko International Ltd, the tubes were prepared using the 20% TEA in water method. All

results have been bias adjusted and annualised where required before being presented in Table B.2 – NO<sub>2</sub> Monthly Diffusion Tube Results – 2018.

Gradko International Ltd is a UKAS accredited laboratory and participates in laboratory performance and proficiency testing schemes. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO<sub>2</sub> concentrations reported are of a high calibre. The laboratory follows the procedures set out in the Harmonisation Practical Guidance and participates in the AIR proficiency-testing (AIR-PT) scheme. Defra and the Devolved Administrations advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the AIR-PT scheme. Laboratory performance in the AIR-PT is also assessed by the National Physical Laboratory (NPL), alongside laboratory data from the monthly NPL Field Inter-Comparison Exercise.

In the 2018 AIR-PT results, AIR-PT AR024 (January to February 2018), AIR-PT AR025 (April to May 2018), AR027 (July to August 2018) and AR028 (September to October 2018), Gradko scored 100% for all periods. The percentage score reflects the results deemed to be satisfactory based upon the z-score of  $< \pm 2$ .

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

For the 2018 diffusion tubes, annualisation was required at one of the monitoring sites as data capture was below 75%. Site S12 was active for only eight months in 2018 which was considered an invalid data capture and Following the application of bias adjustment and annualisation to the raw data, no sites were reported to exceed the NO<sub>2</sub> annual mean objective in 2018. In 2016 the monitoring location S8 was reported at 41µg/m<sup>3</sup>, prompting the declaration of the 2017 AQMA. By subsequent comparison, S8 reported a significantly lower annual mean of 34.7µg/m<sup>3</sup> in 2017 and 30.5µg/m<sup>3</sup> in 2018.

Annualisation was completed for diffusion tube location S12 as data capture was reported at 66.7% in 2018. The minimum required data capture for an annual mean is 75% across the year. Table 3 – S12 Annualisation 2018 illustrates the monitoring stations and associated ratios used for the annualisation of S12. The average ratio is applied against the bias adjusted result within Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results – 2018.

Table 3

## Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – S20 Continuous Monitoring Station Location



Figure D.2 – S3 Continuous Monitoring Station Location

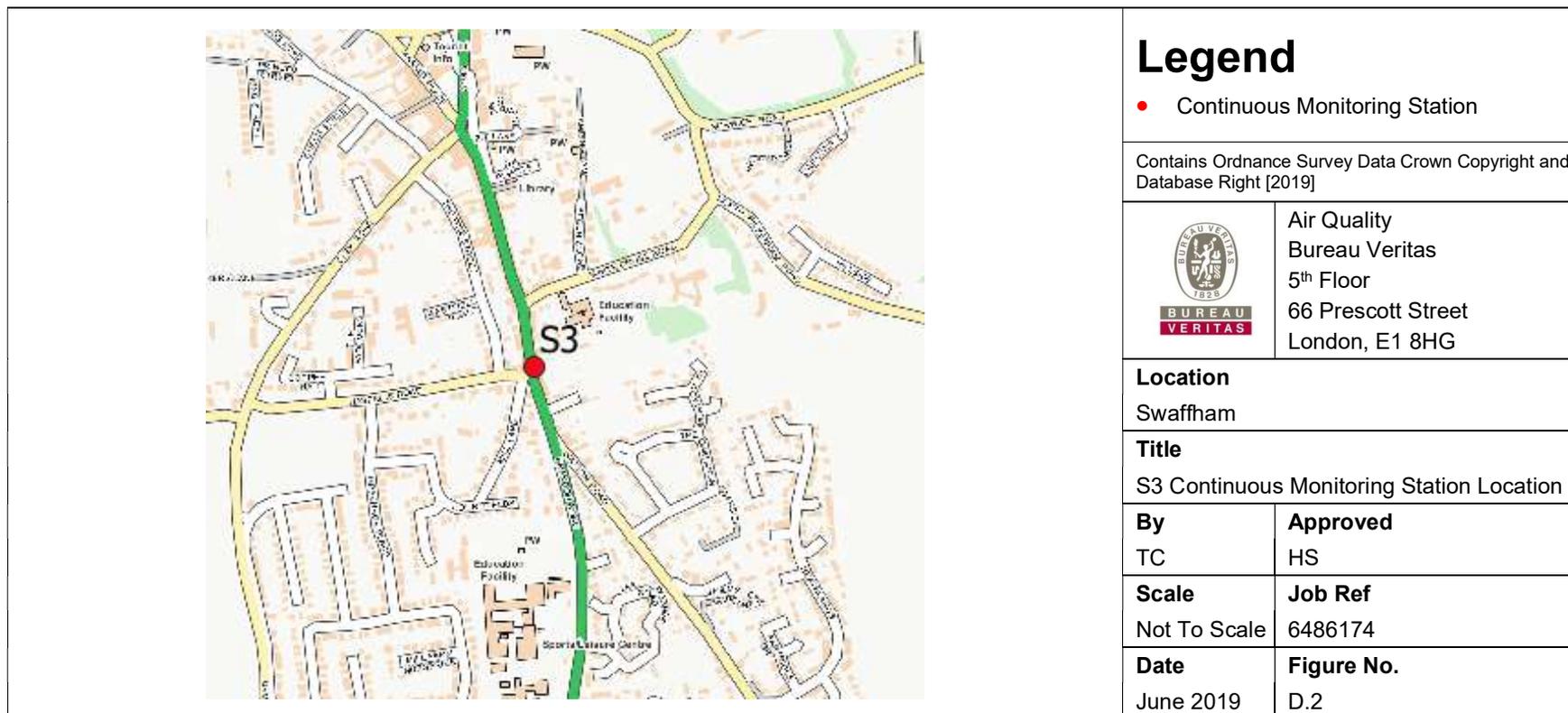


Figure D.3 – Swaffham AQMA & Diffusion Tube Locations

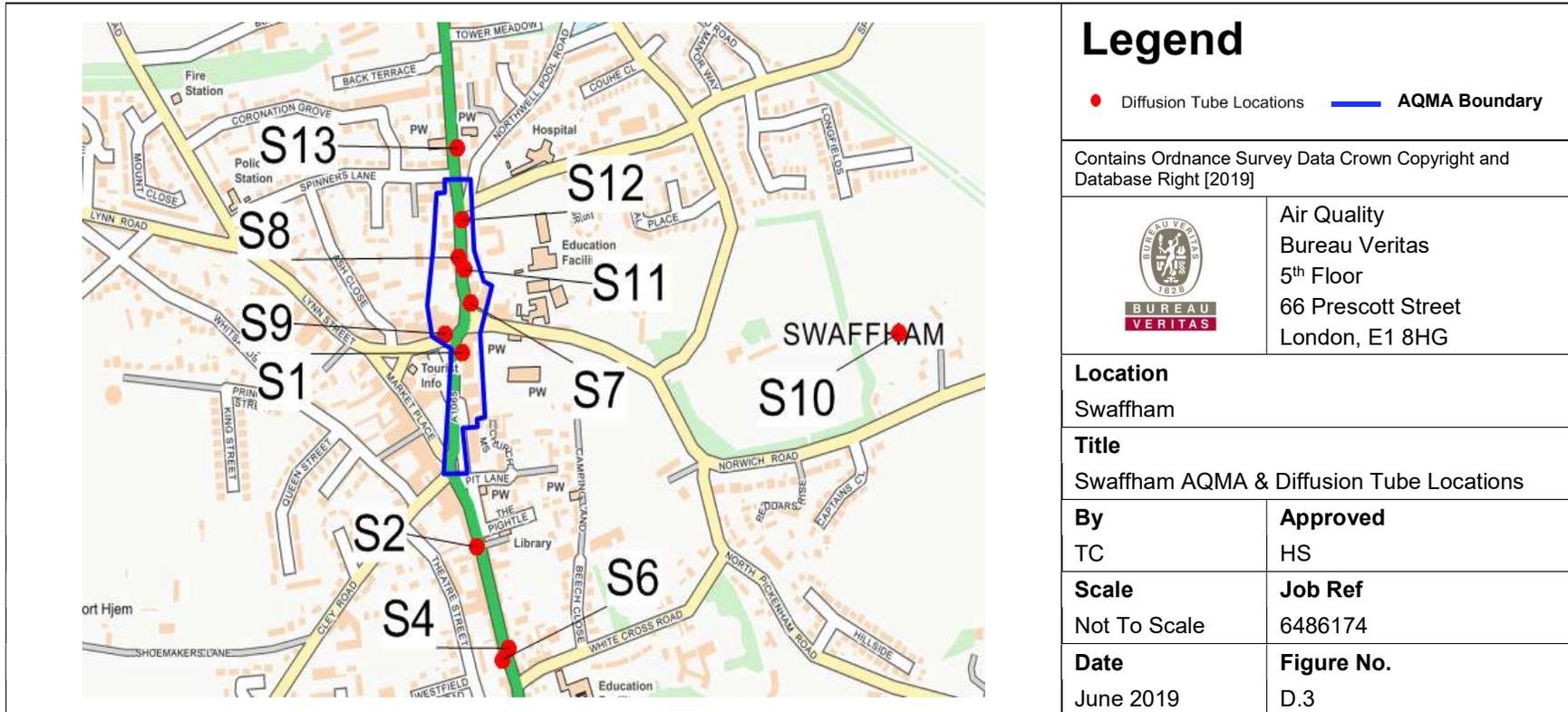


Figure D.4 – Attleborough Diffusion Tube Locations

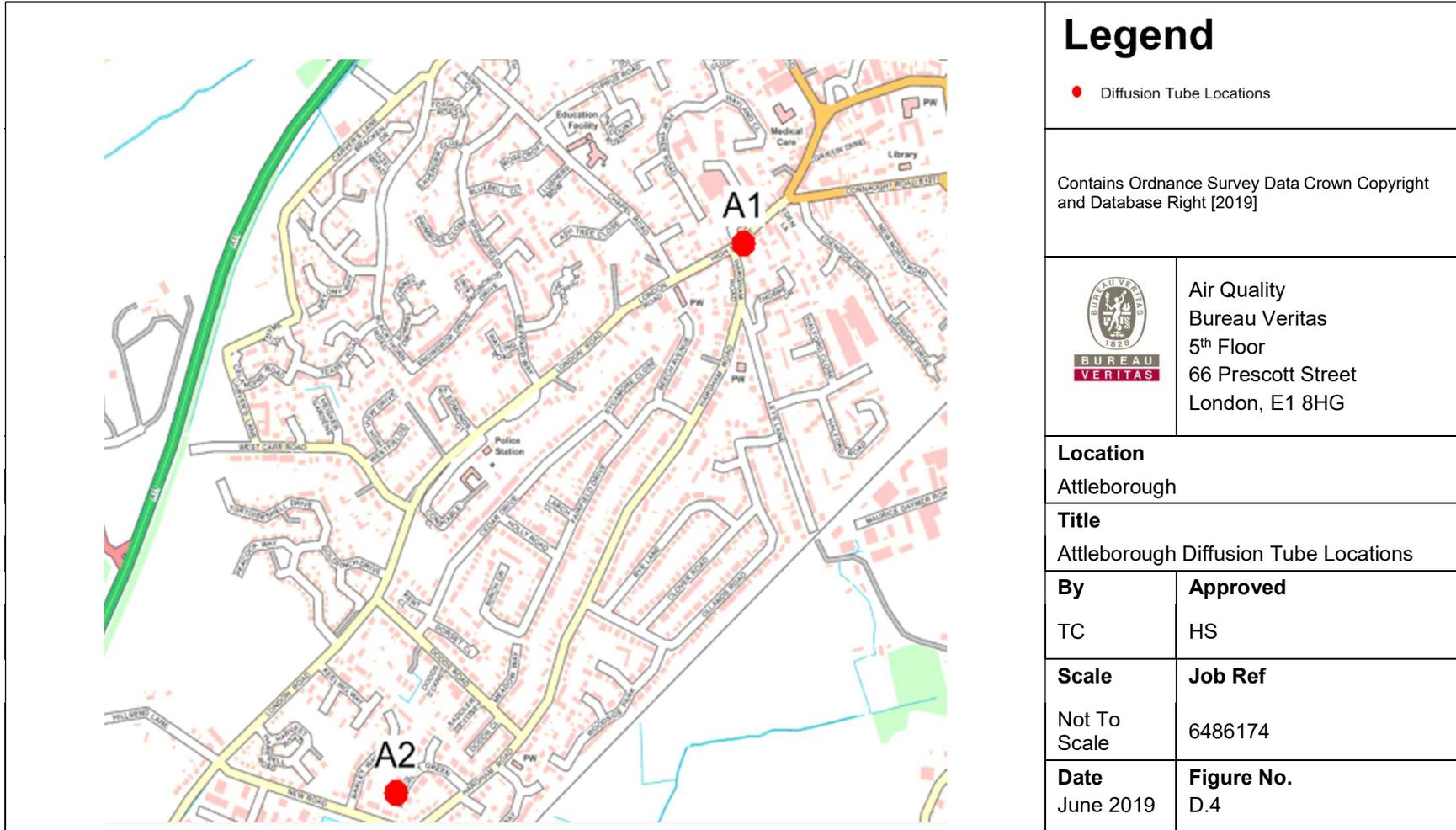
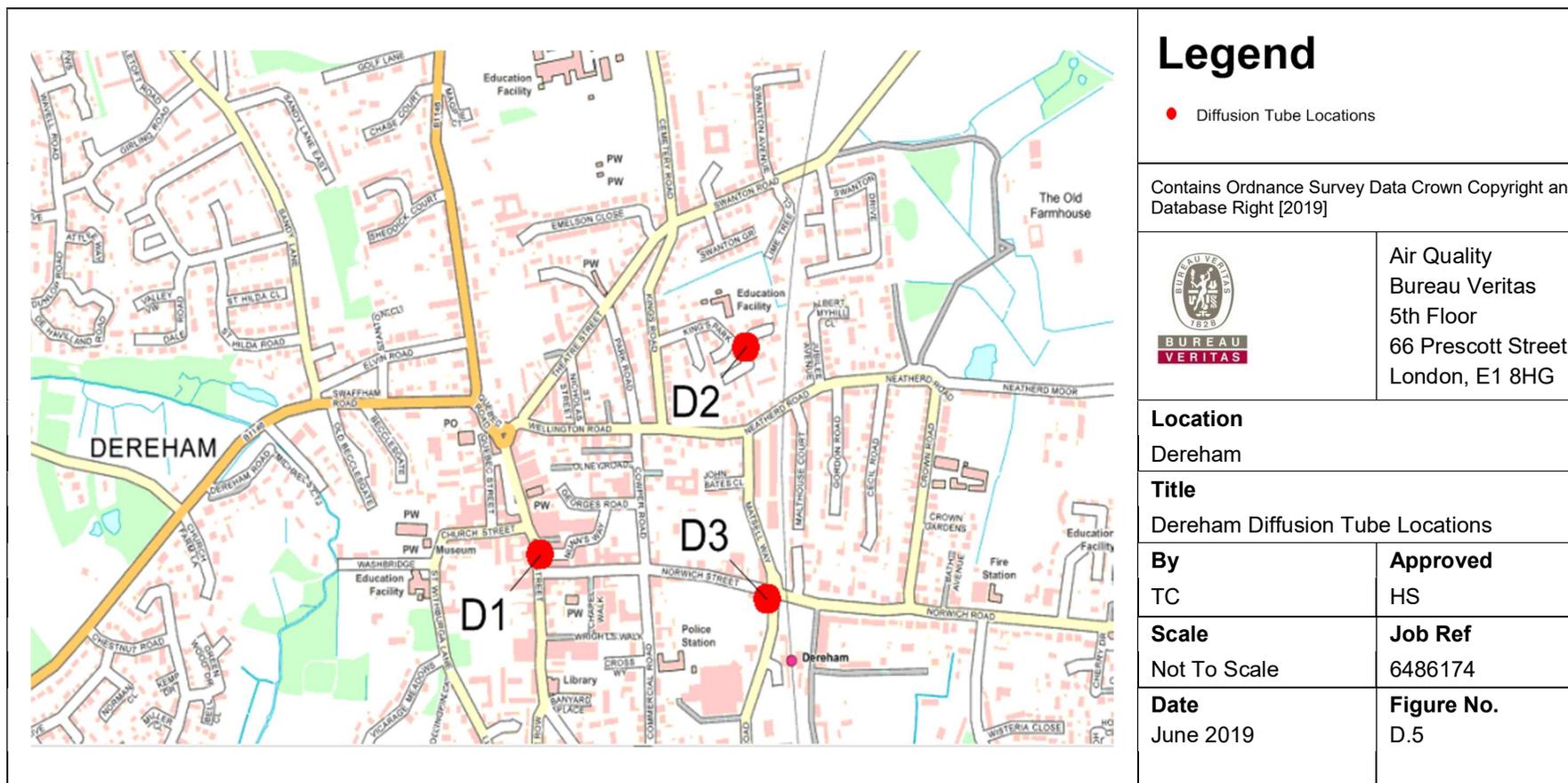


Figure D.5 – Dereham Diffusion Tube Locations



<h2>Legend</h2> <ul style="list-style-type: none"> <li>● Diffusion Tube Locations</li> </ul>	
<p>Contains Ordnance Survey Data Crown Copyright and Database Right [2019]</p>	
	<p>Air Quality Bureau Veritas 5th Floor 66 Prescott Street London, E1 8HG</p>
<p><b>Location</b> Dereham</p>	
<p><b>Title</b> Dereham Diffusion Tube Locations</p>	
<p><b>By</b> TC</p>	<p><b>Approved</b> HS</p>
<p><b>Scale</b> Not To Scale</p>	<p><b>Job Ref</b> 6486174</p>
<p><b>Date</b> June 2019</p>	<p><b>Figure No.</b> D.5</p>

Figure D.6 – Swaffham Diffusion Tube Locations

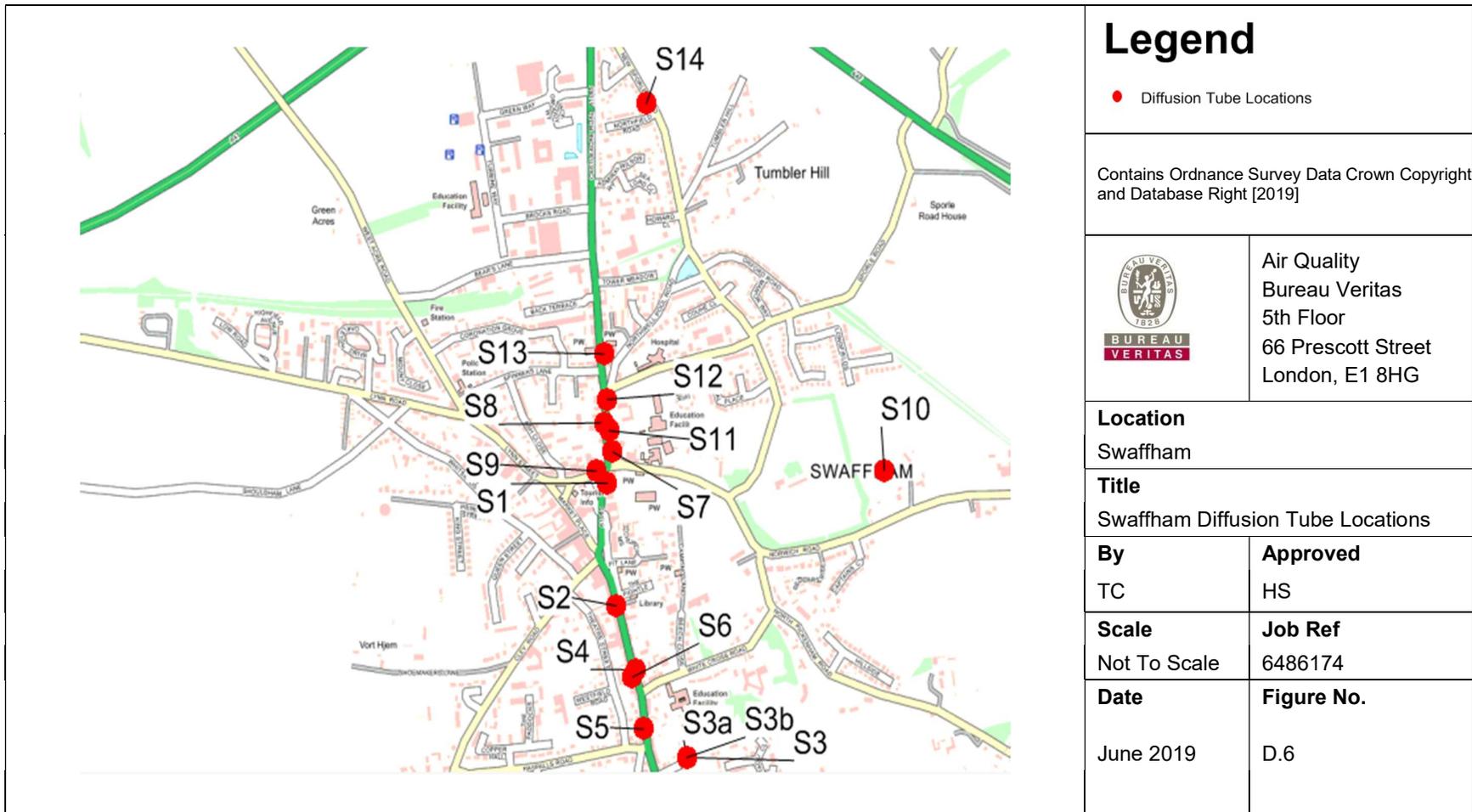


Figure D.7 – Thetford Diffusion Tube Locations

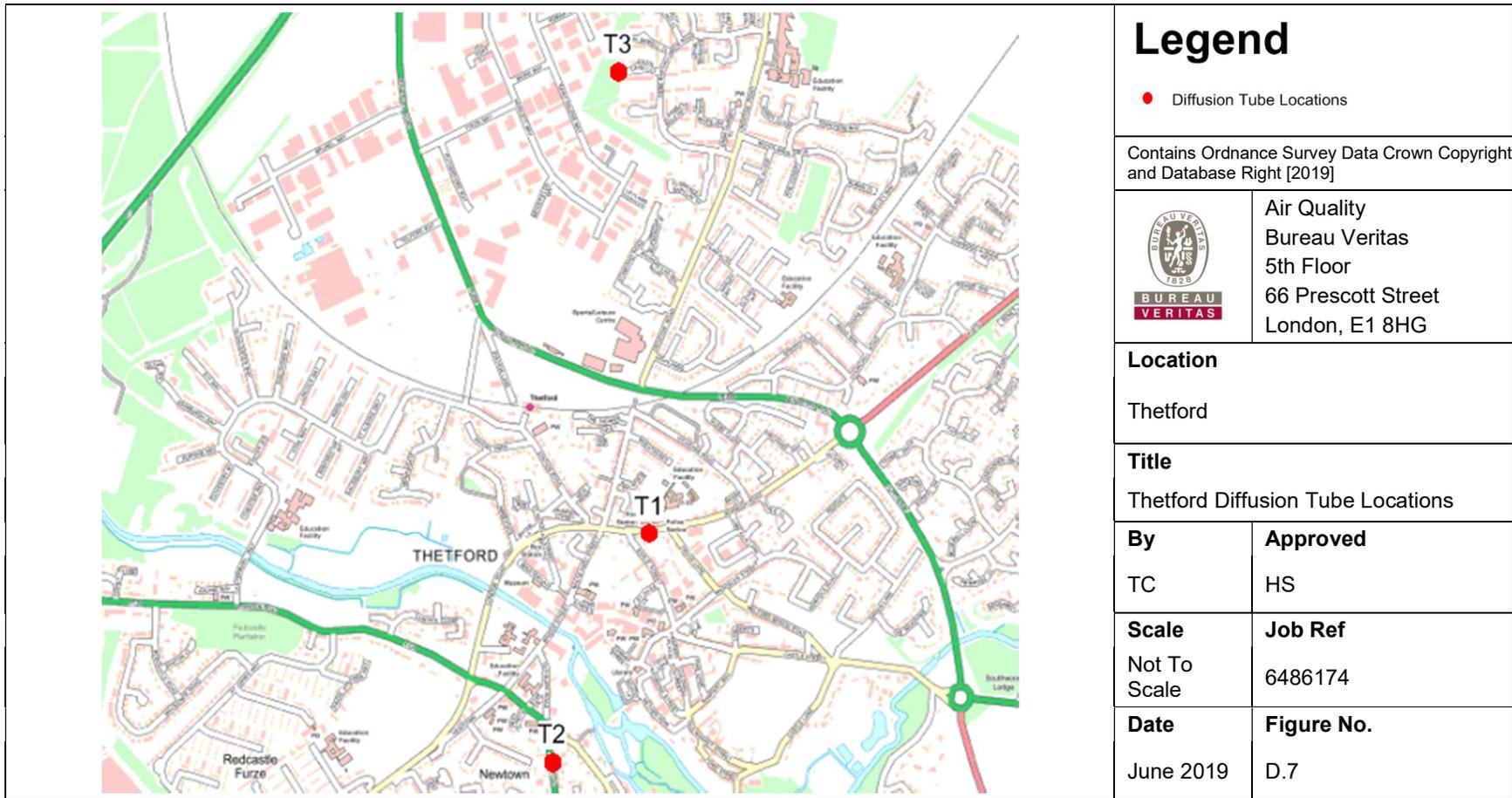


Figure D.8 – Watton Diffusion Tube Locations

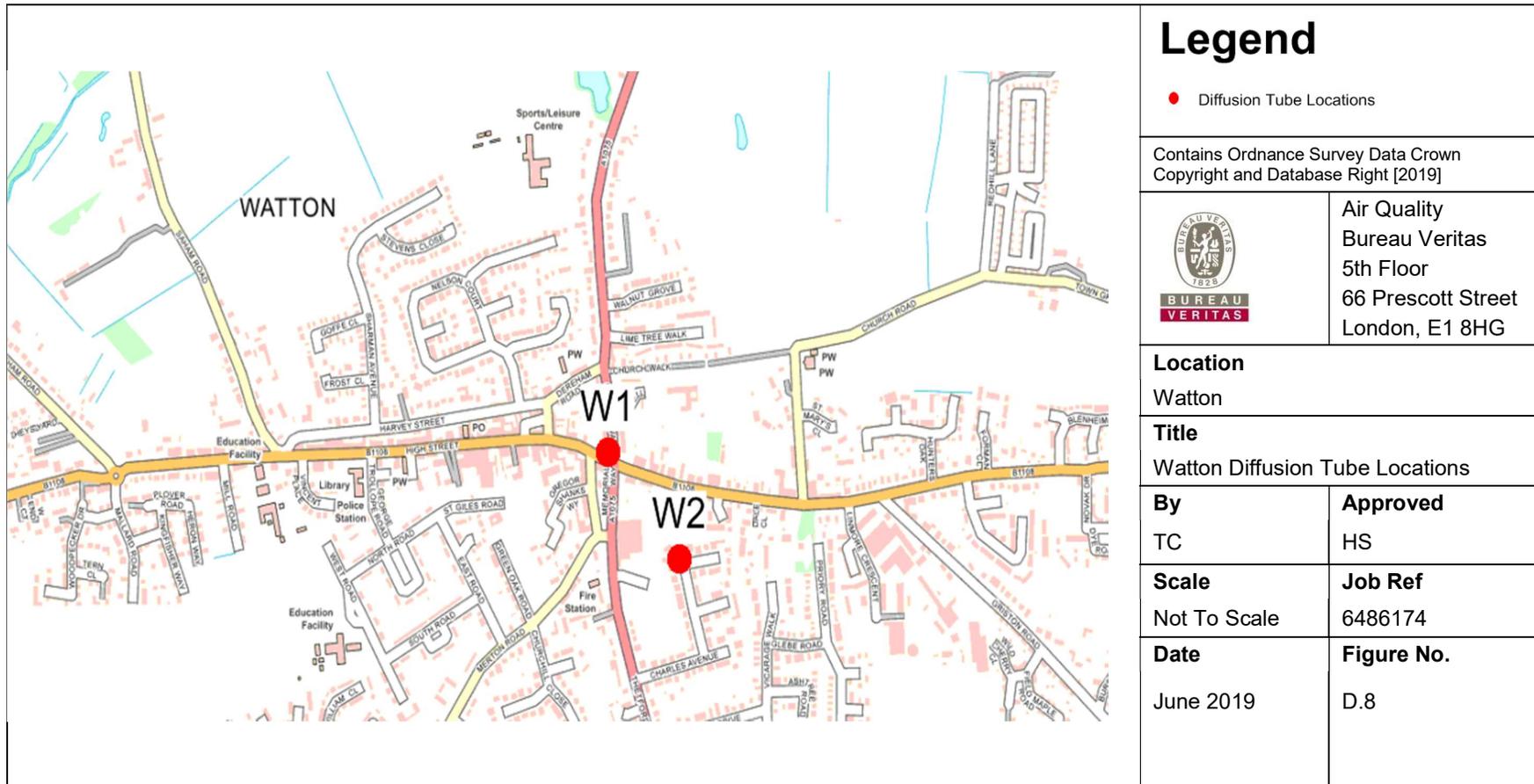


Figure D.9 – East Harling Diffusion Tube Locations

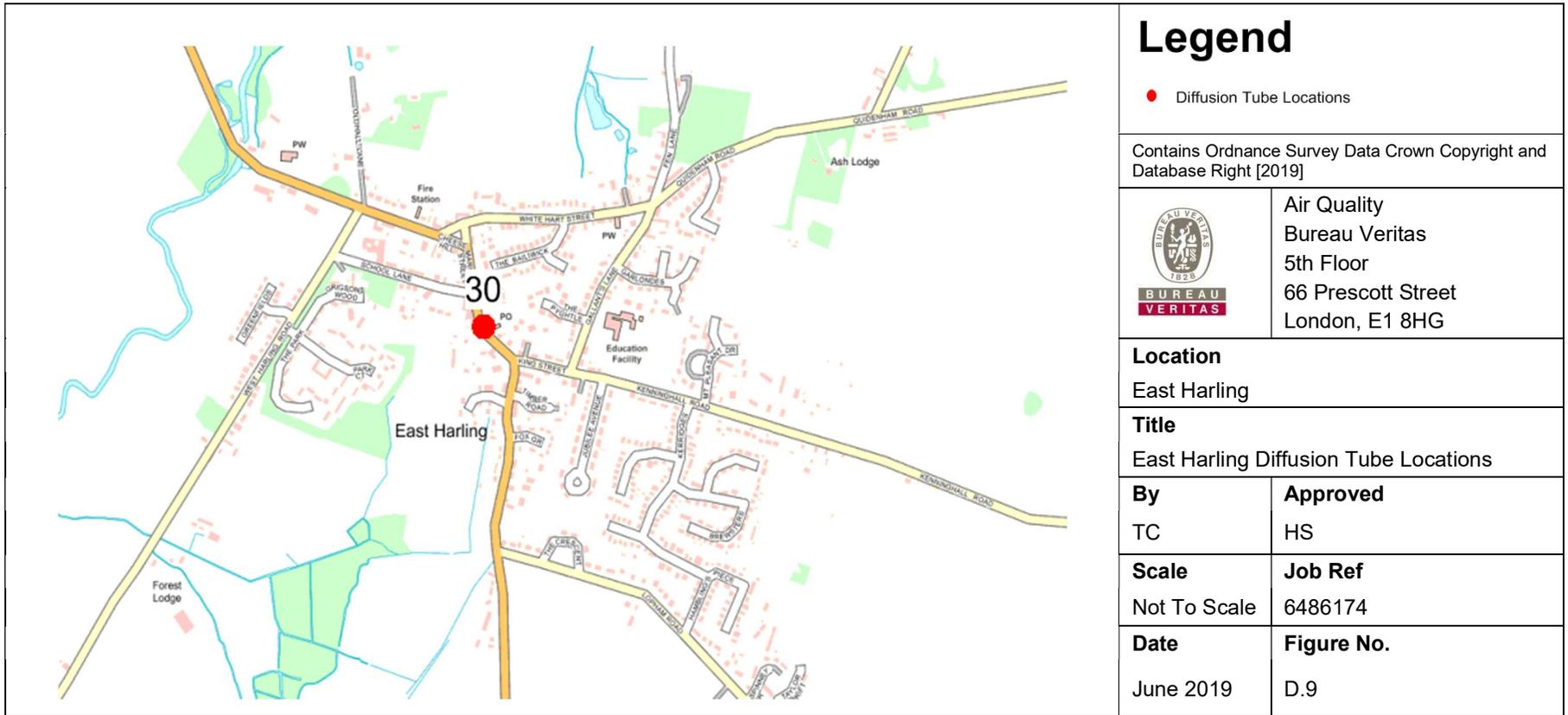
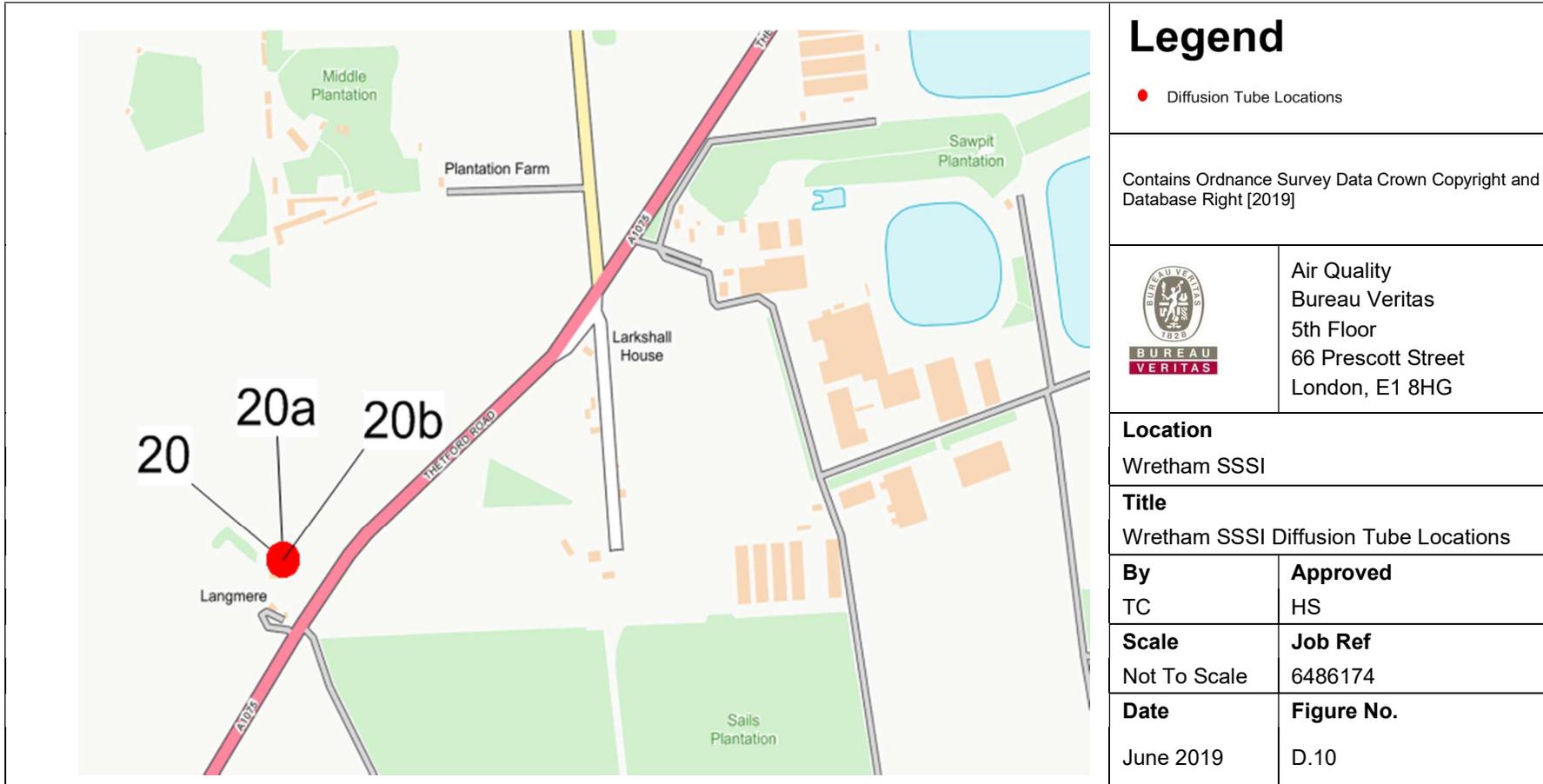


Figure D.10 – Wretham SSSI Diffusion Tube Locations



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

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>9</sup>	
	Concentration	Measured as
	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
	100 µg/m <sup>3</sup> not to be exceeded more than 10 times a year	8 hour mean
	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>9</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## 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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
O <sub>3</sub>	Ozone

## **References**

- Local Air Quality Management Technical Guidance LAQM.TG(16). February 2018. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Breckland District Council Draft Air Quality Action Plan 2018.
- Breckland District Council 2014 - 2018 Annual Status Reports.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/19 published in March 2019.
- <https://www.breckland.gov.uk/planningapplicationweeklylists>