South Holland District Council
Annual Status Report 2019

Bureau Veritas

June 2019

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Document Control Sheet

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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

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Executive Summary: Air Quality in Our Area

Air Quality in South Holland 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 equality issues, as evidence has shown that 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].

The main source of air pollution in the district is road traffic emissions from major roads, notably the A16, A17 and A151 which connect South Holland with North Lincolnshire, the Humber estuary and South West Lincolnshire. There are currently no Air Quality Management Areas (AQMAs) declared in South Holland.

During 2018, annual mean NO_2 concentrations have been recorded as under 10µg/m^3 at both automatic monitoring sites, and below 30µg/m^3 at all non-automatic monitoring sites. A decrease in the NO_2 annual mean concentration was observed in 2018 at most monitoring sites (SH1 reported a slight increase on 2017 measurements).

At both automatic monitoring sites, the annual mean PM_{10} concentrations are well below the annual mean PM_{10} AQS objective and the number of exceedances of the daily mean objective is considerably lower than the permitted 35 with one exceedence recorded for each of the sites.

In addition to NO_2 and PM_{10} monitoring performed at Westmere School, Ozone was also measured. The AQS objective for ground level O_3 (to be met by 2005) states that the maximum daily concentration (measured as an 8-hour mean) of 100µg/m^3 should not be exceeded more than 10 times per year. During 2018 the number of

[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

exceedances reached 16 which is the highest reported since 2013; exceptionally warm weather in 2018 may have contributed to the increase in exceedances.

Actions to Improve Air Quality

There are no designated AQMAs within South Holland District Council, therefore the Council has not produced an Air Quality Action Plan (AQAP) and as such the Council has not published any specific measures related to control and mitigation of sources of local air quality issues.

Conclusions and Priorities

In 2018, the annual mean NO_2 concentrations at all monitoring locations in South Holland District were below the 40µg/m^3 air quality objective. Annual mean NO_2 concentrations were recorded below 10µg/m^3 at both automatic monitoring sites and below 30µg/m^3 at all non-automatic monitoring sites.

As the annual mean concentrations at all the sites are well below 60µg/m^3, this indicates that an exceedance of the 1-hour mean objective is unlikely at these sites.

South District Council's priorities for the coming year include:

- Continuing with the current NO_2 diffusion tube monitoring network to identify any exceedances of the annual mean air quality objective;
- Ensure new developments meet the requirements of planning policies and guidance in relation to air quality; and
- Proceed to the 2020 Annual Status Report.

Local Engagement and How to get Involved

A variety of actions can be undertaken by everyone to help keep air pollution low, and protect their health when levels rise:

- Don't light a bonfire when pollution levels are high.
- Try to use your car less often - walk, cycle or use public transport.
- Cycling or walking is healthier for both the environment, and for you.
- Ask your employer, school or college about developing a green travel plan.

- Do not drive your car when there are warnings of high air pollution. You will normally receive pollution warnings on your local regional news and weather forecast.

The South Holland air quality webpages can be found at http://shollandair.aeat.com/.

The website allows users to find out what the latest pollution levels in South Holland area are, find out more about air pollution, and view data for individual automatic monitoring stations in the local authority area.

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1 Local Air Quality Management

This report provides an overview of air quality in South Holland District Council (SHDC) 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 South Holland 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.

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

2.2 Progress and Impact of Measures to address Air Quality in South Holland District Council

Defra's appraisal of last year's ASR concluded the District Council may wish to consider reviewing the current monitoring programme, relocating resources which have historically produced low concentrations to identify "new hotspots" or assist in monitoring areas of concern. Notwithstanding this, and in general, the air quality within the District is good with all pollutants having concentrations far below objective limits. Defra clearly state that the Council should continue to implement their air quality strategy, and continue to maintain their monitoring.

The Council last reviewed their monitoring strategy in 2017 which resulted in the relocation of diffusion tube site SH16 from Donnington to Gosberton; all other monitoring locations have been fixed. Further reviews of the network are scheduled for 2019, responding to the key findings outlined in this report.

The 2018 monitoring data shows there were no exceedances of the NO_2 and PM_{10} AQS objectives.

The SHDC CM1 Urban Background site has been used once again for this year's local bias adjustment due to this site reporting slightly higher values than site CM2.

The 2018 NO_2 annual mean concentrations, reported at all sites, are some of the lowest reported concentrations within the past five years and therefore distance correction was not deemed to be necessary.

Both NO2 and PM10 AQS objectives have been met within South Holland District in the last five years. Notwithstanding this, the Council is committed to improving the local air quality. The South East Lincolnshire Local Plan was formally adopted in March 2019. Policy 30 details the approach required for new developments that have an impact on air quality.

Across South East Lincolnshire, the focus of the Air Quality actions will centre on the understanding that:

- Due to the strong base of scientific evidence that particulates and Nitrogen Dioxide pollution from traffic emissions are a contributor to premature death (29,000 in the UK in 2008, 25,000 of these in England), with Nitrogen Dioxide also strongly linked, there is a requirement to avoid increasing traffic pollution

at locations which currently fall below the threshold for the declaration of an AQMA, but which could potentially reach this threshold in the future if unchecked;

- Councils have a duty to ensure that the national air quality objectives are met in their area;
- National air quality objectives will evolve over time to further reduce negative impacts on human health and the environment.

With the formal adoption of the South East Lincolnshire Local Plan 2011-36, air quality is recognised as a material consideration in the consideration/determining of planning applications. This will enable the Council to require further assessment by developers and apply conditions to permissions. Going forward it may be necessary to agree a threshold for the number of properties being developed, or the scale of non-housing developments, for which further assessment of air quality impacts by the developer will be required and the areas where such further assessment will be relevant. This might be one large scale development, or a number of smaller developments, in a defined location, where there is the potential for a cumulative negative impact on air quality: e.g. where there could be impact on a particular street, or combination of streets, causing a potential exceedance of an air quality objective. Such considerations may vary from time to time to reflect changes in the levels of pollutants and the pollutants themselves, as published as national air quality objectives.

South East Lincolnshire would require an air quality assessment and proposed mitigation to be offered by the developer for a large scale housing development such as the installation of electric vehicle charge points, provision of cycle /safe pedestrian routes, bus interchanges, contributions to road improvement schemes, or combinations of these, to ensure the Council can keep control of air quality in the future.

Transport measures would be addressed County-wide by Lincolnshire County Council, and may include:

- Company Vehicle Procurement -Prioritising uptake of low emission vehicles;
- Priority parking for LEV's;

- Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging;
- Public Vehicle Procurement -Prioritising uptake of low emission vehicles;
- Taxi emission incentives; and
- Taxi Licensing conditions.

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.

The Public Health Outcomes Framework indicator for the fraction of deaths attributable to $PM_{2.5}$ in South Holland District is 4.9% during 2017, which is below the regional average of 5.1% and the national average of 5.1%, and lower than a number of other authorities in the East Midlands region.

There is currently no ongoing monitoring of $PM_{2.5}$ within the District, and no specific measures in place to address $PM_{2.5}$ concentrations, as the air quality across the District is considered good. The current Defra 2018 background maps for South Holland District Council (2017 based[4]) show that all background concentrations of $PM_{2.5}$ are below the 2020 annual mean AQS objective for $PM_{2.5}$. The highest concentration is predicted to be 9.5µg/m^3 within the 1 x 1km grid square with the centroid grid reference of 523500, 308500. This is an area that encompasses a stretch of the A16.

Traffic emissions are the main cause of particulate emissions within the District, and as such, the implementation of the transport measures given in Section 2.2 will continue to contribute to the reduction of $PM_{2.5}$ concentrations experienced across the District.

[4] 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.

South Holland 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 http://shollandair.aeat.com/.

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

South Holland District Council undertook non- automatic (passive) monitoring of NO_2 at 15 sites during 2018. 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. The data capture for all tubes are 75% or more, and as such there was no need to annualise any of the results

3.2 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.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

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_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. For the last five years, the number of exceedances for the hourly mean NO_2 objective has remained at zero.

At both automatic monitoring sites, there have been no exceedances of the hourly mean and the annual mean NO_2 objectives.

Figure A. 1 shows the trends of the annual mean NO_2 concentrations recorded at both automatic and non-automatic monitoring sites during 2014 to 2018. In the last five years, the annual mean NO_2 concentrations have been below 13µg/m^3 at both automatic monitoring sites and below 30µg/m^3 at all non-automatic monitoring sites; the Pinchbeck Road monitoring site (labelled SH13) measured an annual mean of 34.9µg/m^3 in 2017 (distance corrected to 19.3µg/m^3), the highest of all monitoring sites during that year. However currently it is not a concern as the 2018 monitoring result is the lowest recorded since 2013 (27.1µg/m^3 in 2018).

Following concentrations recorded in 2017, 2018 has reported a decrease in concentrations across all sites, with the exception of SH1, which resulted in a slight increase.

Both automatic and non-automatic monitoring results are well below 60µg/m^3, which indicates that an exceedance of the 1-hour mean objective is unlikely at these sites.

3.2.2 Particulate Matter (PM_{10})

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

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

Figure A.2 show the trends of the annual mean PM_{10} concentrations recorded at both automatic monitoring sites during 2014 to 2018. At both automatic monitoring sites, the annual mean PM_{10} concentrations have been well below the annual mean PM_{10} AQS objective in last five years. The peak PM_{10} annual mean concentrations were recorded in 2014. The PM_{10} annual mean concentrations decreased over the subsequent years, until

2017 when there was a slight increase at the Westmere School site (CM2), and an increase at both sites in 2018.

Figure A.3 shows the trends of the number of exceedances of PM_{10} 24-hour mean AQS objective recorded at both automatic monitoring sites during 2014 to 2018. Table A.6 shows the number of exceedances of the daily mean objective is significantly lower than the permitted 35, at both sites.

3.2.3 Other Pollutants

In addition to monitoring NO_2 and PM_{10}, the automatic analyser located at Westmere School also monitors Ozone (O_3) concentrations. There is no requirement to report this data for LAQM purposes; hence however the results presented are for information only and discussed herein for completeness.

O_3 is a trans-boundary pollutant; its sources can be frequently spatially distant from the measured site of the concentration.

The AQS objective for ground level O_3 (to be met by 2005) states that the maximum daily concentration (measured as an 8-hour mean) of 100µg/m^3 should not be exceeded more than 10 times per year.

Table A. 7 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^3 is greater than the permitted 10.

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) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Spalding Monkhouse School	Urban Background	523168	322454	NO2, PM10	N	Chemiluminescence, TEOM corrected by VCM	1	25	3
CM2	Westmere School	Urban Background	547264	321709	NO2, O3, PM10	N	Chemiluminescence, UV Absorption,TEOM corrected by VCM	14	190	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 – 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)
SH 1	21 Millfield Gardens	UB	524388	310520	NO2	N	6.8	2.9	N	2.2
SH 2	Nutten Stoven	UB	535595	325453	NO2	N	5.6	21.8	N	2.2
SH 3	Priory Road	UB	524734	322403	NO2	N	38.4	80	N	2.2
SH 4	46 The Hollies	UB	536523	325078	NO2	N	8.4	0.2	N	2.2
SH 5	Station Road	R	526585	328726	NO2	N	24.9	1.5	N	2.2
SH 6	103 Boston Road	R	535525	325589	NO2	N	25.7	9.5	N	2.2
SH 7	Field End	R	541013	324393	NO2	N	5.9	<2	N	2.2
SH8/9/10	Westmere (Triplicate)	UB	547264	321709	NO2	N	69.4	61.2	Y	3
SH 11	Metalair Site	R	547957	321013	NO2	N	N/A	<2	N	2.2
SH 13	Pinchbeck Road	K	524595	323793	NO2	N	20.7	0.7	N	2.2
SH 14	Springfields Roundabout	K	526309	323820	NO2	N	54.2	0.5	N	2.2
SH 15	Church Street, Pinchbeck	R	524182	325804	NO2	N	0	1.5	N	2.2
SH 16	Gosberton	R	524203	331510	NO2	N	14.0	2.0	N	2.2
SH 17	High Road, Spalding	R	524892	322571	NO2	N	0	1.5	N	2.2
SH 18	BP Garage	R	524191	321328	NO2	N	1.5	3	N	2.2

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.

K – Kerbside, R – Roadside, UB – Urban Background

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
CM1	Urban Background	Automatic	99.8	99.8	10.4	10.5	12.7	10.8	9.4
CM2	Urban Background	Automatic	99.5	99.5	12.1	9	11.3	11.2	9.4
SH 1	Urban Background	Diffusion Tube	100	100	13.13	10.5	12.9	10.7	11.1
SH 2	Urban Background	Diffusion Tube	100	100	12.19	10.5	12.0	10.6	10.5
SH 3	Urban Background	Diffusion Tube	100	100	18.86	16.5	19.4	17.9	15.3
SH 4	Urban Background	Diffusion Tube	100	100	12.22	10.7	14.0	12.1	10.6
SH 5	Roadside	Diffusion Tube	100	100	16.2	14.6	16.2	16.2	13.4
SH 6	Near-Road	Diffusion Tube	100	100	22.77	19.7	25.9	19.9	19.2
SH 7	Roadside	Diffusion Tube	100	100	19.12	17.8	20.3	19.7	16.5
SH8/9/10	Urban Background	Diffusion Tube	91.7	91.7	12.11	10.1	11.0	11.2	9.2
SH 11	Roadside	Diffusion Tube	100	100	20.77	17.7	19.5	20.1	17.8
SH 13	Kerbside	Diffusion Tube	91.7	91.7	30.13	29.8	34.8	34.9	27.1
SH 14	Kerbside	Diffusion Tube	100	100	25.42	21.3	24.9	23.9	22.0
SH 15	Roadside	Diffusion Tube	100	100	28.32	23.6	28.6	25.1	23.7
SH 16	Near-Road	Diffusion Tube	100	100	-	-	-	-	16.1

Table A.3 Continued – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
SH 17	Roadside	Diffusion Tube	100	100	28.21	24.3	27.5	24.2	22.8
SH 18	Roadside	Diffusion Tube	100	100	24.12	22.5	26.5	23.4	20.2

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

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

Notes:

SH16 was relocated in December 2017, hence data is only available for 2018.

Exceedances of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

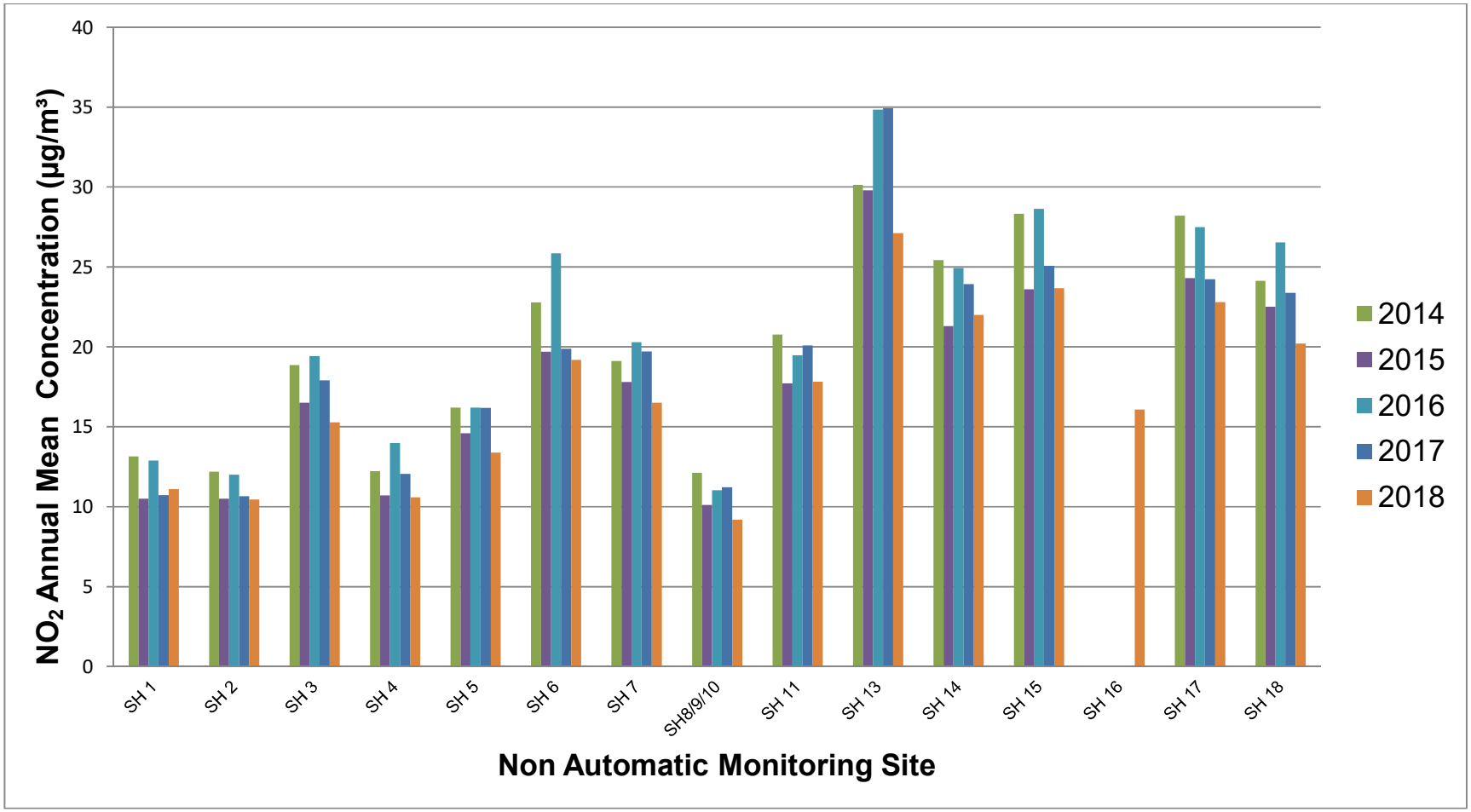
NO_2 annual means exceeding $60\mu g/m^3$, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(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.

Figure A. 1 – Trends in Annual Mean NO_2 Concentrations



Notes:

SH16 was relocated in December 2017, hence data is only available for 2018.

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
CM1	Urban Background	Automatic	99.8	99.8	0	0	0	0	0
CM2	Urban Background	Automatic	99.5	99.5	0	0	0	0	0

Notes:

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

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

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

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

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
CM1	Urban Background	94.6	94.6	17.9	15.4	13.5	11.8	13.1
CM2	Urban Background	98.7	98.7	17.2	14.8	14	14.5	15.5

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

Notes:

Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ 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.2 – Trends in Annual Mean PM_{10} Concentrations

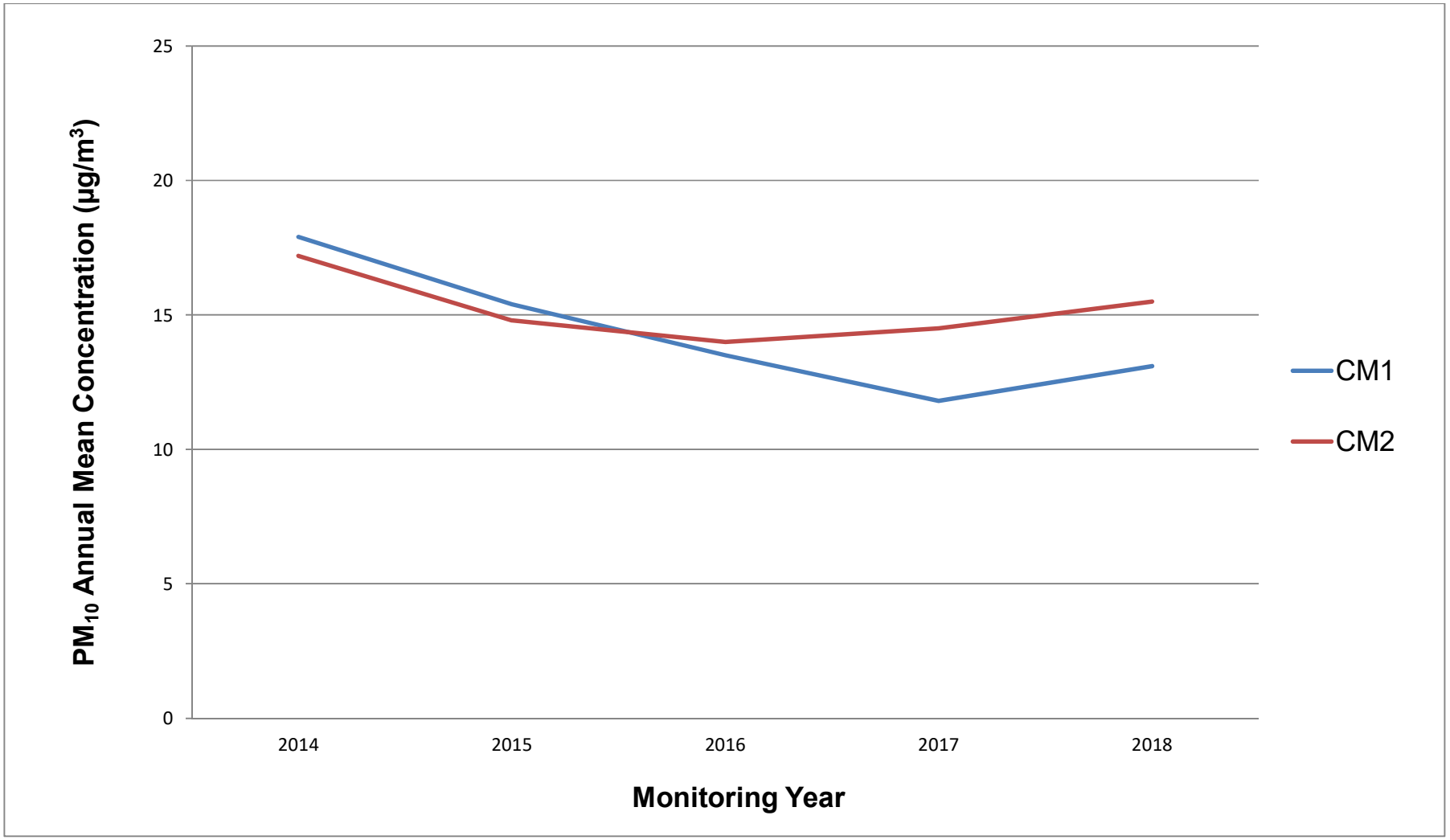


Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2014	2015	2016	2017	2018
CM1	Urban Background	95.9	95.9	4	1	2	0	1
CM2	Urban Background	100	100	4	1	1	1	1

Notes:

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.**

(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 90.4th percentile of 24-hour means is provided in brackets.

Figure A.3 – Trends in Number of 24-Hour Mean PM_{10} Results >50µg/m^3

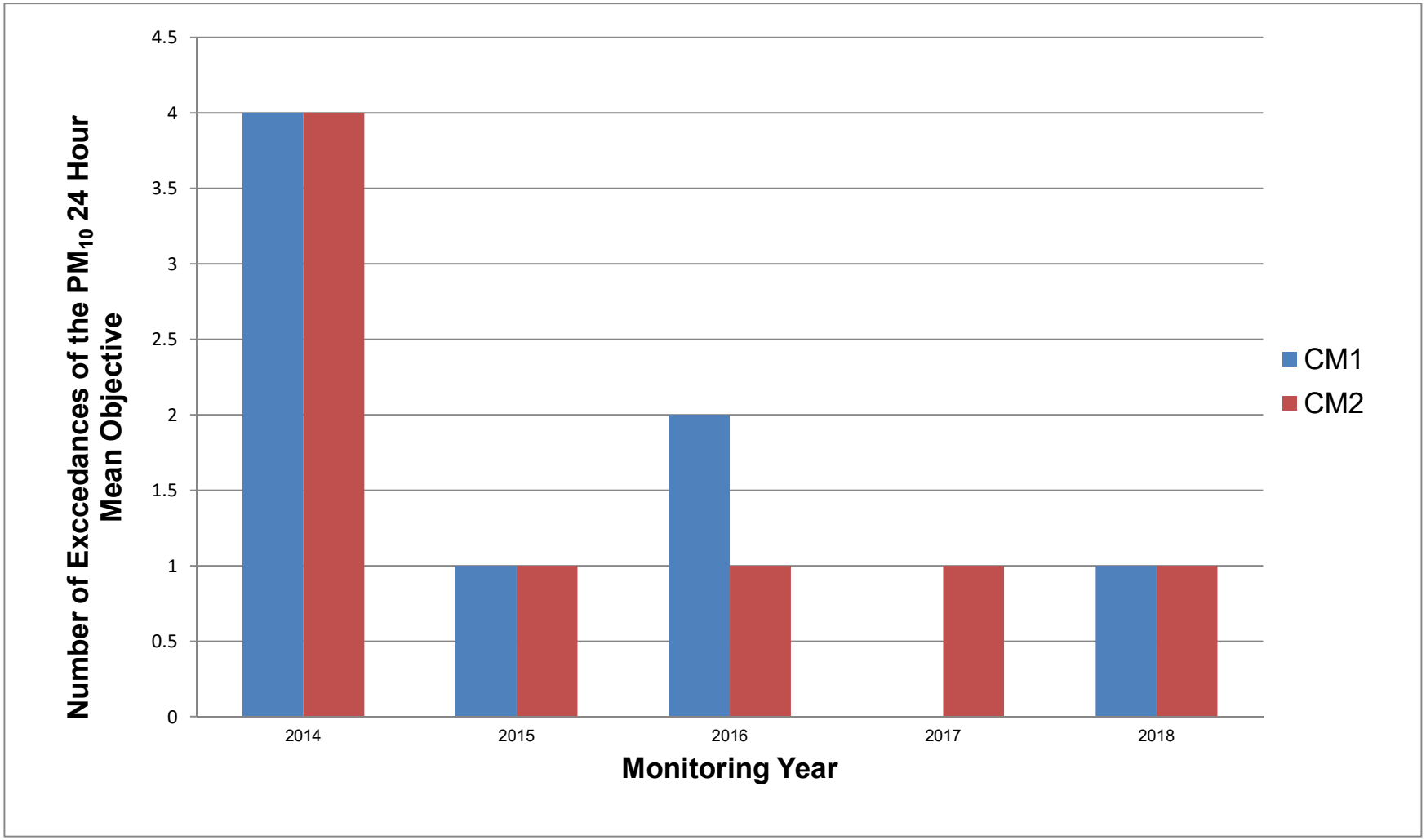


Table A. 7 – Results of Westmere School Automatic Ozone Monitoring

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	O_3 - Number of Exceedances of Maximum Daily Concentration (8-hour running mean)				
				2014	2015	2016	2017	2018
CM2	Urban Background	96.2	96.2	8	10	3	6	16

Notes:

Exceedance of the O_3 objective: 8-hour mean of 100 µg/m^3, 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_2 Monthly Diffusion Tube Results - 2018

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.83) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
SH 1	20.3	17.3	15.6	11.5	7.8	6.1	8.6	9.7	11.0	13.5	19.8	19.1	13.4	11.1	N/A
SH 2	17.0	15.4	14.2	10.4	9.5	8.0	9.8	9.5	10.7	13.6	16.3	16.7	12.6	10.5	N/A
SH 3	26.3	25.1	21.5	18.7	0.5	13.7	14.6	15.7	17.8	20.6	22.8	23.5	18.4	15.3	N/A
SH 4	19.0	17.1	13.7	10.2	9.3	5.4	8.3	10.2	12.0	13.8	16.1	18.0	12.8	10.6	N/A
SH 5	19.7	19.5	16.5	12.6	14.3	11.1	13.1	12.8	17.6	19.1	16.6	20.6	16.1	13.4	N/A
SH 6	25.3	27.7	22.6	21.9	30.3	21.8	22.2	18.2	15.7	23.3	23.9	24.4	23.1	19.2	N/A
SH 7	23.0	20.3	23.7	20.5	12.3	9.9	17.3	20.2	23.0	20.5	25.3	22.8	19.9	16.5	N/A
SH 8	18.4		15.1	11.0	6.2	3.8	6.4	7.6	9.2	10.5	16.6	15.3	10.9	9.1	N/A
SH 9	17.2		15.1	10.6	6.6	3.9	6.5	8.3	9.7	10.6	15.7	17.0	11.0	9.1	N/A
SH 10	18.3		15.4	9.8	6.4	4.0	6.3	7.9	10.2	12.2	16.7	15.7	11.2	9.3	N/A
SH 11	26.4	20.1	28.3	25.0	19.3	14.3	19.6	16.5	15.1	21.8	26.0	25.4	21.5	17.8	N/A
SH 13	43.1	36.6	32.7	32.1	26.5	21.0	30.9	32.6	33.8		29.4	40.9	32.7	27.1	N/A
SH 14	31.2	31.0	27.0	25.6	24.8	20.5	23.3	23.2	23.2	26.3	30.4	31.6	26.5	22.0	N/A
SH 15	32.5	34.9	30.5	23.2	28.6	25.0	24.0	23.7	25.2	30.3	33.0	31.5	28.5	23.7	N/A
SH 16	20.6	26.5	22.1	21.0	18.9	15.3	17.3	16.0	16.4	7.1	25.9	25.4	19.4	16.1	N/A
SH 17	30.7	32.5	30.5	27.5	25.2	21.0	25.9	23.1	23.5	25.8	32.0	31.7	27.5	22.8	N/A
SH 18	31.5	30.0	21.6	20.6	18.7	16.9	18.8	23.9	27.6	25.3	26.4	30.7	24.3	20.2	N/A

☒ **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**

Diffusion Tube missing

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

QA/QC of Automatic Monitoring

South Holland District Council contracts data management for their continuous analysers to Ricardo-AEA. The Quality Assurance/Quality Control (AQ/QC) procedures employed by Ricardo-AEA are equivalent to the UK Automatic Urban and Rural Network (AURN) procedures. The PM_{10} results have been corrected by Ricardo-EE who undertake the data management for the two automatic continuous monitoring sites. TEOM data were VCM corrected.

All monitoring locations recorded data capture of 75% or more, therefore it was not required to annualise any monitoring data.

Diffusion Tube Monitoring Data

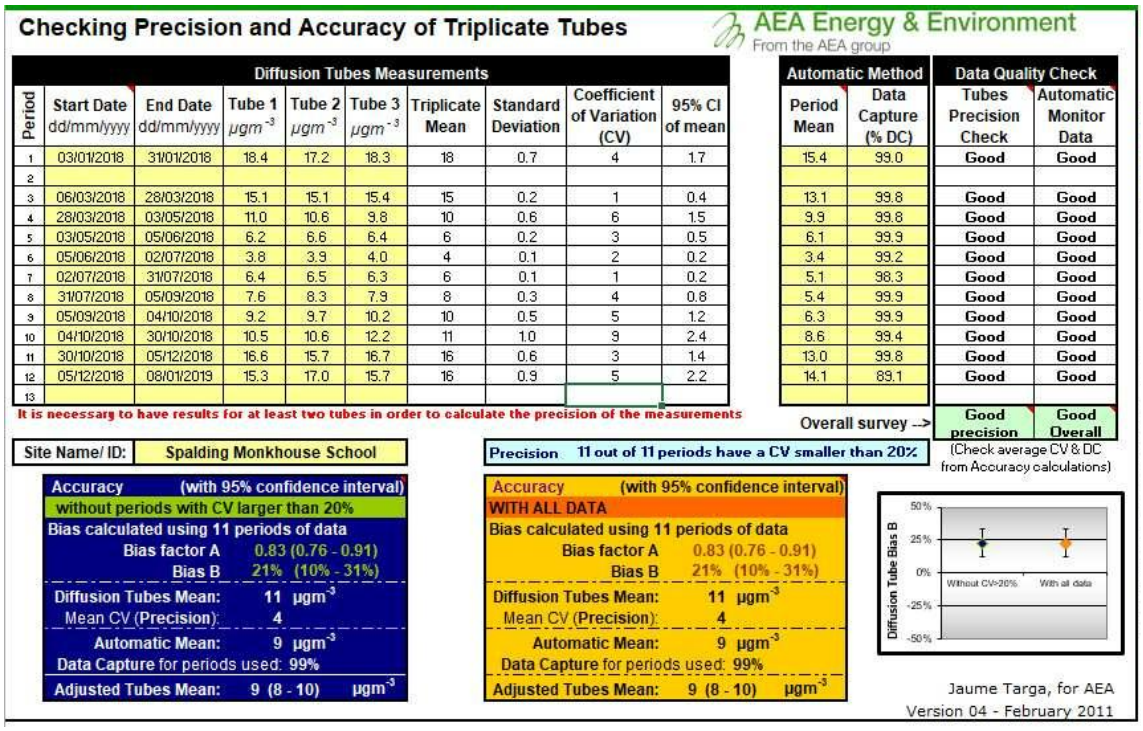
The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 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, the Defra Technical Guidance LAQM.TG(16) and the LAQM Helpdesk recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites.

The national bias adjustment factor is 0.97 (based on 22 studies) as derived from the national bias adjustment calculator (Spreadsheet Version Number: 03/2018).

There is a co-located triplicate diffusion tube monitoring site (SH 8/9/10) installed at the urban background Westmere School automatic monitoring site. The local bias correction factor is calculated to be 0.83 using the Diffusion Tube Bias Adjustment Factor Spreadsheet (AEA_DifTPAB_v04.xlsx (Figure C.1)). As per Defra Technical Guidance LAQM.TG(16) the local bias adjustment factor (0.83) for the reporting year

2018 has been used to correct the data. In addition, both data capture and tube precision are found to be good.

Figure C.1 – Local Diffusion Tube Correction Factor Calculation



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm⁻³	Tube 2 µgm⁻³	Tube 3 µgm⁻³	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	03/01/2018	31/01/2018	18.4	17.2	18.3	18	0.7	4	1.7
2									
3	06/03/2018	28/03/2018	15.1	15.1	15.4	15	0.2	1	0.4
4	28/03/2018	03/05/2018	11.0	10.6	9.8	10	0.6	6	1.5
5	03/05/2018	05/06/2018	6.2	6.6	6.4	6	0.2	3	0.5
6	05/06/2018	02/07/2018	3.8	3.9	4.0	4	0.1	2	0.2
7	02/07/2018	31/07/2018	6.4	6.5	6.3	6	0.1	1	0.2
8	31/07/2018	05/09/2018	7.6	8.3	7.9	8	0.3	4	0.8
9	05/09/2018	04/10/2018	9.2	9.7	10.2	10	0.5	5	1.2
10	04/10/2018	30/10/2018	10.5	10.6	12.2	11	1.0	9	2.4
11	30/10/2018	05/12/2018	16.6	15.7	16.7	16	0.6	3	1.4
12	05/12/2018	08/01/2019	15.3	17.0	15.7	16	0.9	5	2.2
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
15.4	99.0	Good	Good
13.1	99.8	Good	Good
9.9	99.8	Good	Good
6.1	99.9	Good	Good
3.4	99.2	Good	Good
5.1	98.3	Good	Good
5.4	99.9	Good	Good
6.3	99.9	Good	Good
8.6	99.4	Good	Good
13.0	99.8	Good	Good
14.1	89.1	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Spalding Monkhouse School

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

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A 0.83 (0.76 - 0.91)
Bias B 21% (10% - 31%)
Diffusion Tubes Mean: 11 µgm⁻³
Mean CV (Precision): 4
Automatic Mean: 9 µgm⁻³
Data Capture for periods used: 99%
Adjusted Tubes Mean: 9 (8 - 10) µgm⁻³

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.83 (0.76 - 0.91)
Bias B 21% (10% - 31%)
Diffusion Tubes Mean: 11 µgm⁻³
Mean CV (Precision): 4
Automatic Mean: 9 µgm⁻³
Data Capture for periods used: 99%
Adjusted Tubes Mean: 9 (8 - 10) µgm⁻³

Jaume Targa, for AEA
Version 04 - February 2011

QA/QC of Diffusion Tube Monitoring

The diffusion tubes are supplied and analysed by Gradko International Limited utilising the 50% Triethanolamine (TEA) in acetone preparation method.

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_2 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 < ±2.

NO_2 Fall-off with distance from the road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated, using the NO_2 fall-off with distance calculator available on the LAQM Support website.

Fall-off calculation has not been applied to any of the 2018 data as the results were not within 10% of the NO_2 annual mean objective of 40µg/m^3.

Planning Applications in 2018/2019

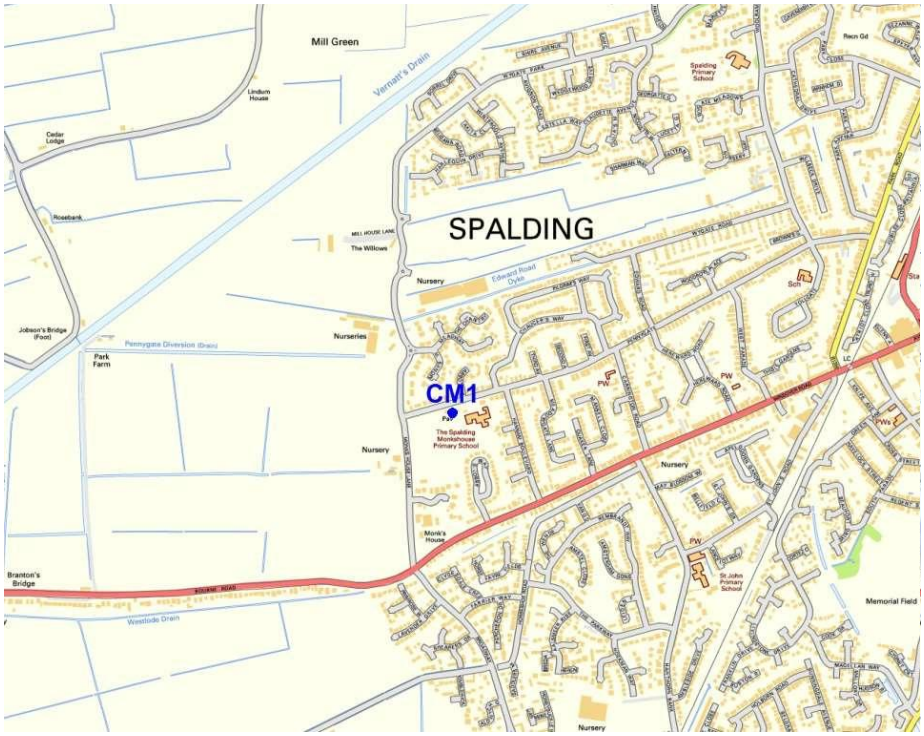
Table A.8 overleaf provides detail on planning applications in relation to Air Quality within the District Council.

Table A.8 – Planning Applications in 2018/19

Date	Planning Reference	Proposed Development	Address	Comments	Status
Jul-18	H02-0640-18	Proposed Biomass (CHP) Plant, Waste Water Farm treatment plant and vertical Production Facility	Decoy Farm Crowland	LCC application. EPR permit to be issued by EA	Approved
Oct-18	H16-0566-18	Retrospective application for installation of Biomass boiler	Tanglewood RCH Spalding	Thermal Input for the boiler is 0.234Mw.	Approved
Oct-18	H10-0915-18	Demolition of existing buildings and erection of a new Raw Materials Warehouse and Ingredient Processing Centre (Use Class B2/B8)	Princes Ltd Bridge Road Long Sutton PE12 9EQ	The potential operational Air Quality impacts from the proposed development associated with the additional vehicle trips that will be generated are considered to be not significant.	Approved
27/03/2019	H16-0327-19	Construct Section 1 of the Spalding Western Relief Road comprising of a new single carriageway route from the B1172 Spalding Common to Holland Park Sustainable Urban Extension (SUE) incorporating a new roundabout junction with the B1172 Spalding Common, a bridge over the Peterborough to Sleaford railway line, and a new roundabout junction for access into Holland Park Sustainable Urban Extension	Land: South Drove Drain (west) and B1172 Spalding Common (east)	LCC application LCC Ref PL/0039/19	-
27/03/2019	H14-0326-19	Construct Section 5 of the Spalding Western Relief Road comprising of a new single carriageway route from the B1356 Spalding Road and Enterprise Way to Vernatt's Sustainable Urban Extension (SUE) incorporating a new roundabout junction with the B1356 Spalding Road, a bridge over the Peterborough to Sleaford railway line, and a priority junction into Vernatt's Sustainable Urban Extension	Land parallel Vernatt's Drain and bound by B1356 Spalding Road to east	LCC application LCC Ref PL/0038/19	-

Appendix D: Map(s) of Monitoring Locations

Figure D.1 – Map of Automatic Monitoring Site: Spalding



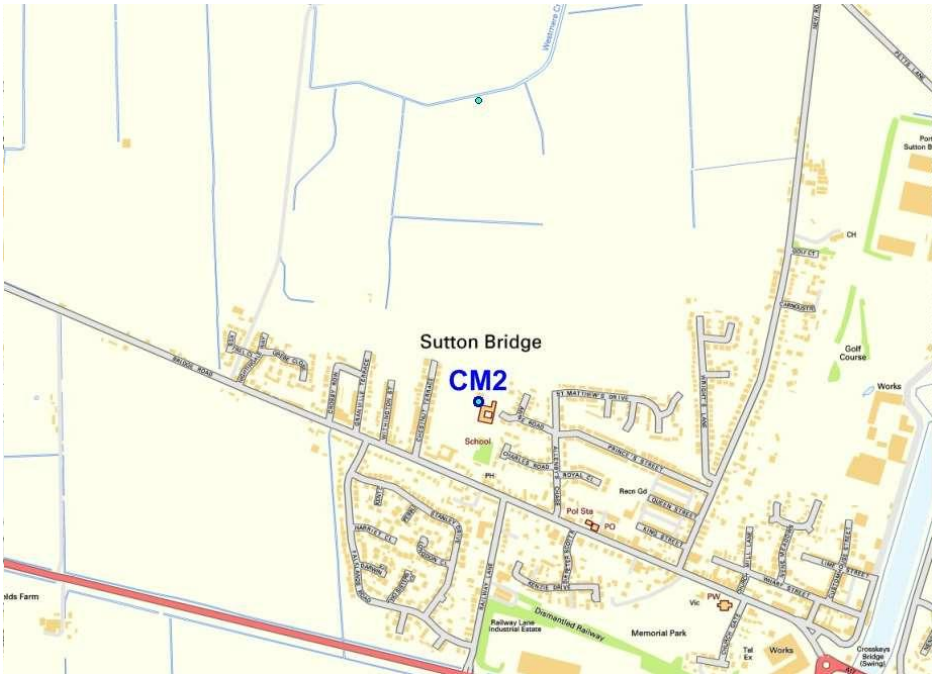
Legend

● Automatic Monitoring Loation

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	Spalding
Title	Map of Automatic Monitoring Site: Spalding
By	TC
Approved	HS
Scale	Not To Scale
Job Ref	6484981
Date	June 2019
Figure No.	D.1

Figure D. 2 – Map of Automatic Monitoring Site: Sutton Bridge



Legend

● Automatic Monitoring Loation

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	Sutton Bridge
Title	Map of Automatic Monitoring Site: Sutton Bridge
By	TC
Approved	HS
Scale	Not To Scale
Job Ref	6484981
Date	June 2019
Figure No.	D.2

Figure D. 3 – Map of Non-Automatic Monitoring Sites: Sutton Bridge

Legend

Diffusion Tube Locations

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	Sutton Bridge
Title	Map of Non-Automatic Monitoring Sites: Sutton Bridge
By	FL
Approved	HS
Scale	Not To Scale
Job Ref	6484981
Date	June 2019
Figure No.	D.3

Figure D. 4– Map of Non-Automatic Monitoring Sites: Holbeach and Gedney

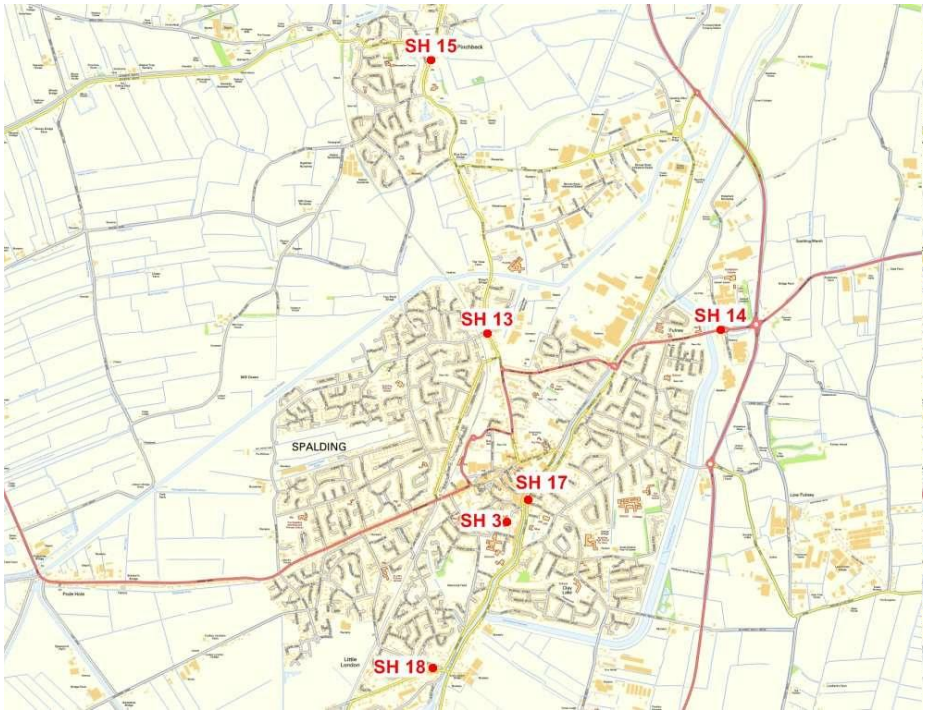
Legend

Diffusion Tube Locations

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	Holbeach and Gedney
Title	Map of Non-Automatic Monitoring Sites: Holbeach and Gedney
By	TC
Approved	HS
Scale	Not To Scale
Job Ref	6484981
Date	June 2019
Figure No.	D.4

Figure D. 5 – Map of Non-Automatic Monitoring Sites: Spalding and Pinchbeck



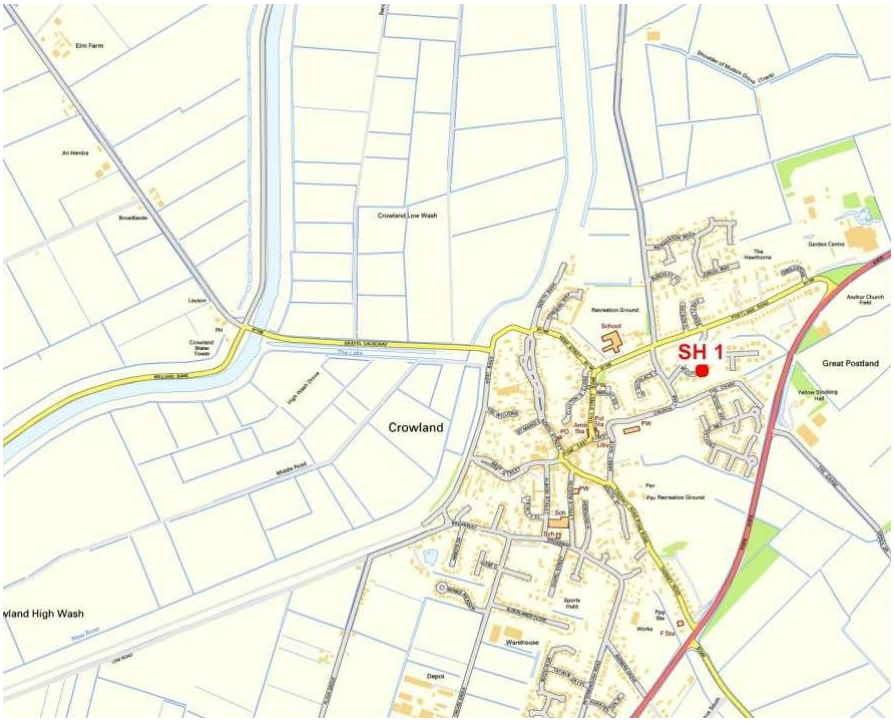
Legend

Diffusion Tube Locations

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	Spalding and Pinchbeck
Title	Map of Non-Automatic Monitoring Sites: Spalding and Pinchbeck
By	TC
Approved	HS
Scale	Not To Scale
Job Ref	6484981
Date	June 2019
Figure No.	D.5

Figure D. 6 – Map of Non-Automatic Monitoring Site: Crowland



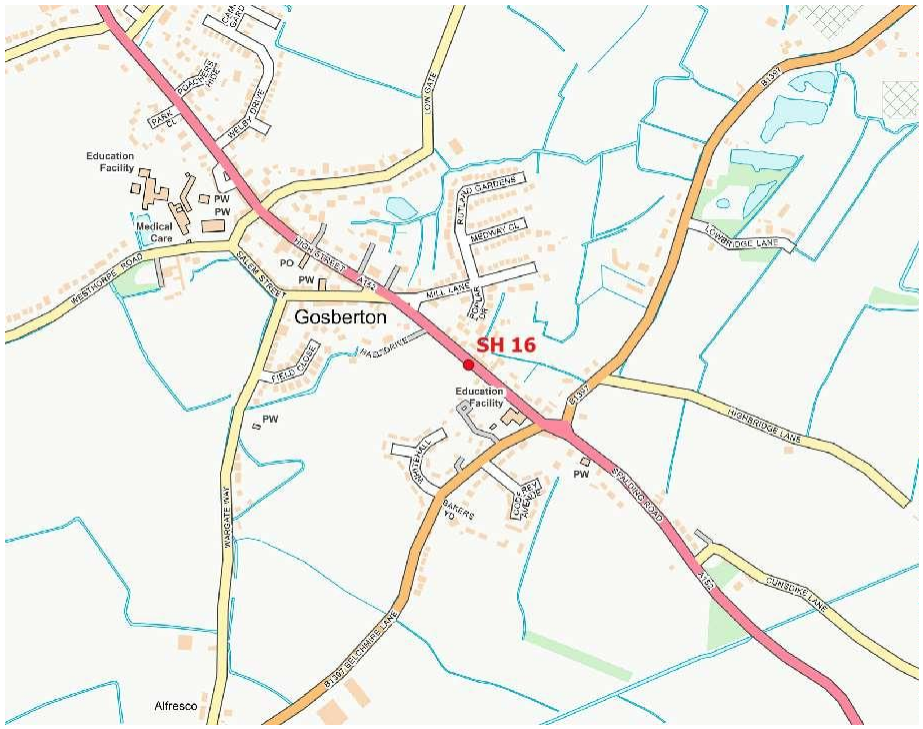
Legend

Diffusion Tube Locations

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	Crowland
Title	Map of Non-Automatic Monitoring Sites: Crowland
By	TC
Approved	HS
Scale	Not To Scale
Job Ref	6484981
Date	June 2019
Figure No.	D.6

Figure D. 7 – Map of Non-Automatic Monitoring Site: Gosberton



Legend

- Diffusion Tube Locations

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	Gosberton
Title	Map of Non-Automatic Monitoring Site: Gosberton
By	TC
Approved	HS
Scale	Not To Scale
Job Ref	6484981
Date	June 2019
Figure No.	D.7

Figure D. 8 – Map of Non-Automatic Monitoring Site: Surfleet

Legend

- Diffusion Tube Locations

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	Surfleet
Title	Map of Non-Automatic Monitoring Site: Surfleet
By	TC
Approved	HS
Scale	Not To Scale
Job Ref	6484981
Date	June 2019
Figure No.	D.8

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[5]	
	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
Ozone (O_3)	100 µg/m^3 not to be exceeded more than 10 times a year	8 hour 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

[5] 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
SHDC	South Holland District Council
SO_2	Sulphur Dioxide
O_2	Ozone

References

- Draft South East Lincolnshire Local Plan 2011-2036
- Local Air Quality Management; Technical Guidance LAQM.TG(16) Available at: http://laqm.defra.gov.uk/technical-guidance/
- AEA Energy and Environment (2011) AEA_DifTPAB_v04.xls, Available at: www.uk-air.com
- http://shollandair.aeat.com/
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/18 published in March 2018
- South Holland District Council 2018 Annual Status Report