South Holland District Council
Annual Status Report 2021

Bureau Veritas

July 2021

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Document Control Sheet

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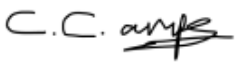
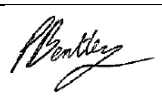
Prepared By	Chante Darien-Campbell	Graduate Consultant	
Approved By	Paul Bentley	Senior Consultant	

2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: July 2021

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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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

Within South Holland District, the main source of air pollution is road traffic emissions from major roads such as 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 the South Holland District.

During 2020, NO_2 annual mean concentrations decreased at all monitoring sites across the District. At the two automatic sites in operation, annual mean NO_2 concentrations have remained below 10 µg/m^3 for the third successive year. The annual mean NO_2 concentrations at all non-automatic sites across the District remain significantly below the NO_2 annual mean air quality objective (AQO) of 40 µg/m^3. In 2020 the highest NO_2 concentration was recorded at the Winsover Road triplicate site (SH 2), which had an annual mean of 27.6 µg/m^3.

The NO_2 annual mean concentration had been increasing year on year at SH 16 but during 2020 has seen a significant decrease to 12.1 µg/m^3, the lowest annual mean concentration at SH 16 since 2014. Concentrations at SH 6 and SH 7 were also increasing as a result of the tubes being repositioned closer to the A17, a main traffic source. During 2020, the annual

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

mean concentrations at SH 6 and SH 7 have decreased by around 25% compared to 2019 concentrations. This is likely a consequence of decrease road traffic during 2020, due to Covid-19 restrictions.

At both automatic monitoring sites, the annual mean PM_{10} concentrations are well below the annual mean PM_{10} AQO of 40 µg/m^3, with the maximum reported concentration being 12.9 µg/m^3 and there was not an exceedance of the 24-hour mean objective recorded.

South Holland District Council also additionally monitors Ozone at the Westmere School automatic monitoring site. 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 100 µg/m^3, should not be exceeded more than 10 times per year. During 2020, the number of exceedances of the Ozone AQS objective was 12. This is almost 30% lower than the 17 exceedances of the objective which were recorded in 2019.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

South Holland District Council currently have no designated AQMAs and therefore there is no requirement for the completion of an Air Quality Action Plan. Despite this, South Holland District Council have passed approval, secured funding and are looking to increase the number of EV charging points across the District.

[5] Defra. Clean Air Strategy, 2019

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

Conclusions and Priorities

During 2020, there has been improvement in air quality across the District, with reductions in NO_2, PM_{10} and Ozone concentrations. No exceedances of any air quality objectives were recorded during 2020. The reduction in NO_2 and PM_{10} should be taken in context of the impacts of Covid-19 and the restrictions imposed during 2020 upon transport and travel across the District, and the wider area.

During the reporting year the Council have approved 13 non-domestic planning applications of up to 108 dwellings, all of which are considered major developments.

Local Engagement and How to get Involved

South Holland District Council have a variety of actions that 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 and walking are healthier for both the environment and you;
- Ask your employer, school, or college about developing a green travel plan; and
- 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 the latest pollution levels in South Holland, view data for individual automatic monitoring and find out more about air pollution.

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Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in South Holland District Council during 2020. 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 are presented in Table E.1.

2 Actions to Improve Air Quality

Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 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: Maps of Monitoring Locations.

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

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

- *"South Holland District Council undertook automatic (continuous) monitoring of NO_2 and PM_{10} at 2 urban background sites during 2019. O_3 was also monitored at one of these sites. Data capture for 2019 was good, exceeding 95% for all pollutants."* During 2020, the Council continued automatic monitoring of all pollutants and the Council had data capture of 93% and above for all pollutants.
- *"During 2019, non-automatic (passive) monitoring NO_2 was undertaken via diffusion tubes at 15 sites, representing both roadside and urban background exposure types. SHDC did not record any exceedances of the annual mean objective for NO_2, with a maximum concentration of 27.9 µg/m^3 was recorded at SH6, Boston Road A17. Data capture across the monitoring network was good, with annualisation not required for any site."* Non-automatic monitoring was carried out at 15 sites during 2020 and no exceedances of the annual mean objective were recorded.
- *"In the absence of any AQMAs and associated AQAPs, the Council have identified a number of priorities for the coming year, including:*
    - *Continue monitoring across the current NO_2 diffusion tube monitoring network to identify any exceedances of the AQO;*
    - *Progress with the installation and commissioning of 6 EV charging points across the district;*
    - *Continue monitoring at new locations installed for 2019 to determine the trends in NO_2 concentrations; and*
    - *Ensure new developments meet the requirements of planning policies and AQ guidance."*

  The Council have continued diffusion tube monitoring across the network and have continued monitoring at the new locations installed during 2019. The Council are continuing to progress with the installation of six EV charging points across the District.

$PM_{2.5}$ – 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 2.5 µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

There is currently no 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 2020 background maps for South Holland District Council (2018 based) show that all background concentrations of $PM_{2.5}$ are still below the 2020 annual mean AQS objective for $PM_{2.5}$. The highest concentration is predicted to be 9.4 µg/m^3 within the 1km x 1km grid square with the centroid grid reference of 523500, 308500. This is the same grid reference that was predicted to record the highest concentration of $PM_{2.5}$ during 2019, which 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 will continue to contribute to the reduction of $PM_{2.5}$ concentrations experienced across the District.

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

This section sets out the monitoring undertaken within 2020 by South Holland District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

South Holland District Council undertook automatic (continuous) monitoring at two sites during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The shollandair.aeat.com page presents real-time and historic automatic monitoring results for South Holland District Council.

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 (i.e. passive) monitoring of NO_2 at 15 sites during 2020. Table A.2 in Appendix A presents the details of the non-automatic 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.

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater

than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.1.3 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. Over the past 5 years there have been no exceedances in the 1-hour mean objective for either site.

During 2020, there were no exceedances of either the annual mean or 1-hour mean NO_2 AQO. As such there were no reported diffusion tube annual mean concentrations greater than 60 µg/m^3, suggesting there were also no exceedances of the 1-hour objective at any diffusion tube monitoring location.

Throughout the District, NO_2 annual mean concentrations at all monitoring sites decreased when compared to 2019 concentrations. At SH 16 where concentrations had been identified to be rising for a period of five years, concentrations are the lowest they have been in six years. At sites SH 6 and SH 7, where concentrations rose from 2018 to 2019, the concentrations have reported a decreased compared to 2019.

3.1.4 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40 µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50 µg/m^3, not to be exceeded more than 35 times per year.

There have been no exceedances in the PM_{10} annual mean during 2020, which is consistent with previous years. PM_{10} annual mean concentrations at CM 1 and CM 2 have decreased by 23% and 9% in 2020 when compared to 2019 concentrations. The PM_{10} 24-hour mean objective continues to be below the permitted 35 exceedances with no 24-hour concentrations greater than 50 µg/m^3 reported at either of the automatic monitoring sites.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Spalding Monkhouse School	Urban Background	523168	322454	NO_2, PM10	N	Chemiluminescence, TEOM corrected by VCM	1	25	3
CM2	Westmere School	Urban Background	547264	321709	NO_2, O_3, PM_{10}	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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
SH 1	21 Millfield Gardens	Urban Background	524388	310520	NO_2	N	6.8	0.3	No	1.9
SH 2a, 2b, 2c	Lamp post 20 Winsover Road (triplicate)	Urban Background	524292	322587	NO_2	N	0.0	1.3	No	2.6
SH 3	Woodfield Close	Urban Background	525694	321999	NO_2	N	7.0	1.7	No	2.1
SH 4	46 The Hollies	Urban Background	536523	325078	NO_2	N	8.4	1.4	No	2.2
SH 5	Station Road, Surfleet	Roadside	526585	328726	NO_2	N	24.9	1.1	No	2.1
SH 6	Boston Rd_A17	Roadside	535525	325589	NO_2	N	4.0	1.8	No	2.1
SH 7	Gedney_A17	Roadside	541013	324393	NO_2	N	9.0	2.1	No	2.1
SH 8, 9,10	Westmere (Triplicate)	Urban Background	547264	321709	NO_2	N	69.4	61.2	Yes	N/A
SH 11	A52 Donington	Roadside	520932	336052	NO_2	N	49.0	1.5	No	2.1
SH 13	Pinchbeck Road	Kerbside	524595	323793	NO_2	N	20.7	2.0	No	2.1
SH 19 (14)	Whaplode	Roadside	532684	324311	NO_2	N	7.0	4.0	No	1.9
SH 15	Church Street, Pinchbeck	Roadside	524182	325804	NO_2	N	12.0	1.7	No	2.0
SH 16	Gosberton	Roadside	524203	331510	NO_2	N	7.0	1.9	No	2.2
SH 17	High Street, Spalding	Roadside	524892	322571	NO_2	N	0.0	0.9	No	1.9
SH 18	BP Garage	Roadside	524191	321328	NO_2	N	1.5	3.9	No	2.1

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM1	523168	322454	Urban Background	99.6	99.6	12.7	10.8	9.4	9.3	8.5
CM2	547264	321709	Urban Background	99.7	99.7	11.3	11.2	9.4	9.3	7.7

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

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

Notes:

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

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
SH 1	524388	310520	Urban Background	100	75.0	12.9	10.7	11.1	10.3	8.9
SH 2a, 2b, 2c	524292	322587	Urban Background	100	75.0				32.1	27.6
SH 3	525694	321999	Urban Background	100	75.0				11.0	9.4
SH 4	536523	325078	Urban Background	91.7	67.3	14.0	12.1	10.6	10.1	8.9
SH 5	526585	328726	Roadside	100	75.0	16.2	16.2	13.4	12.8	11.0
SH 6	535525	325589	Roadside	100	75.0	25.9	19.9	19.2	27.9	20.9
SH 7	541013	324393	Roadside	100	75.0	20.3	19.7	16.5	26.4	20.0
SH 8, 9, 10	547264	321709	Urban Background	100	75.0	11.0	11.2	9.2	9.6	8.1
SH 11	520932	336052	Roadside	100	75.0				15.5	12.7
SH 13	524595	323793	Kerbside	100	75.0	34.8	34.9	27.1	25.7	21.9
SH 19 (formerly SH 14)	532684	324311	Roadside	100	75.0				16.3	13.4
SH 15	524182	325804	Roadside	100	75.0				22.3	17.6
SH 16	524203	331510	Roadside	100	75.0	13.9	14.1	16.1	17.0	12.1
SH 17	524892	322571	Roadside	100	75.0	27.5	24.2	22.8	20.3	18.7
SH 18	524191	321328	Roadside	91.7	67.3	26.5	23.4	20.2	19.8	16.7

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Diffusion tube data has been bias adjusted.**

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

Notes:

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

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**.

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

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations in Holbeach, Gedney, Spalding and Crowland

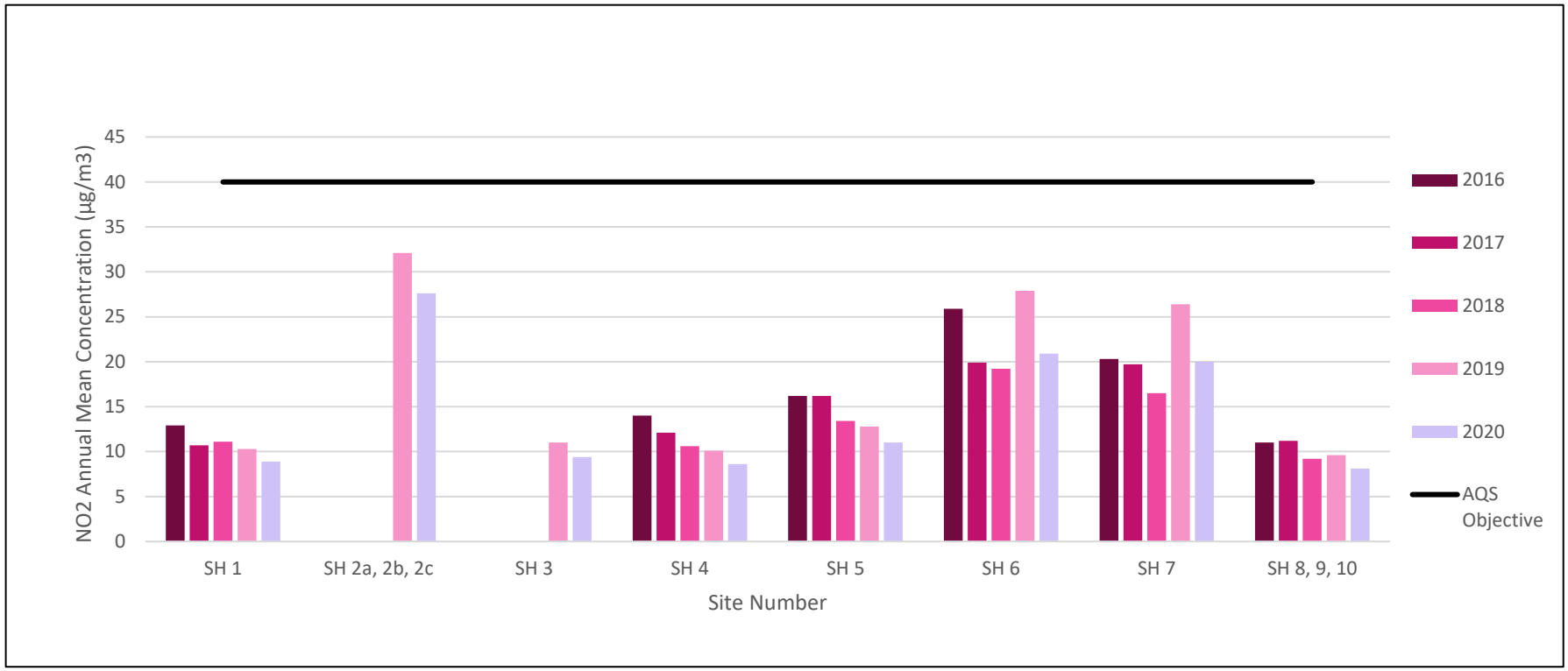


Figure A.2 – Trends in Annual Mean NO_2 Concentrations in Waplode, Spalding and Pinchbeck

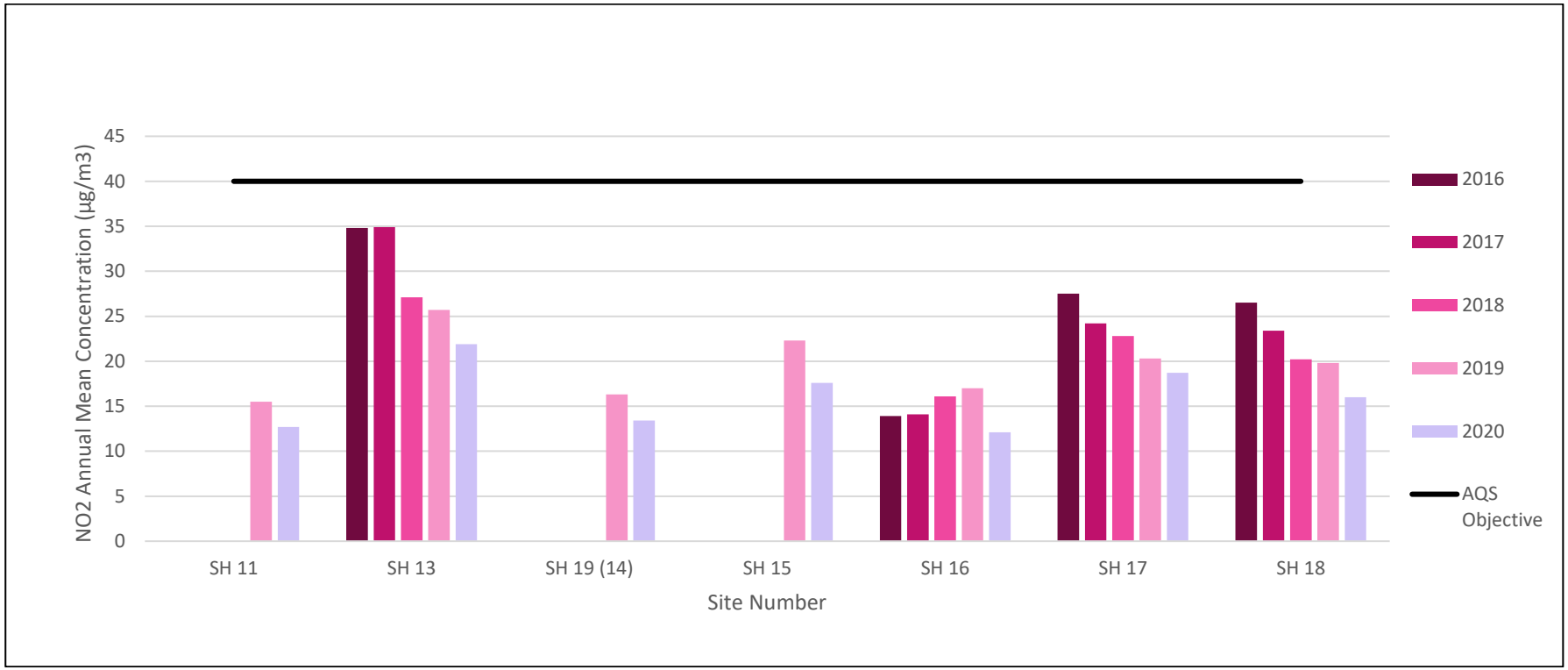


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM1	523168	322454	Urban Background	99.6	99.6	0	0	0	0	0
CM2	547264	321709	Urban Background	99.7	99.7	0	0	0	0	0

Notes:

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

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

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

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

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

Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM1	523168	322454	Urban Background	97.8	97.8	13.5	11.8	13.1	13.7	10.9
CM2	547264	321709	Urban Background	94.8	94.8	14	14.5	15.5	14.2	12.9

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

Notes:

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

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

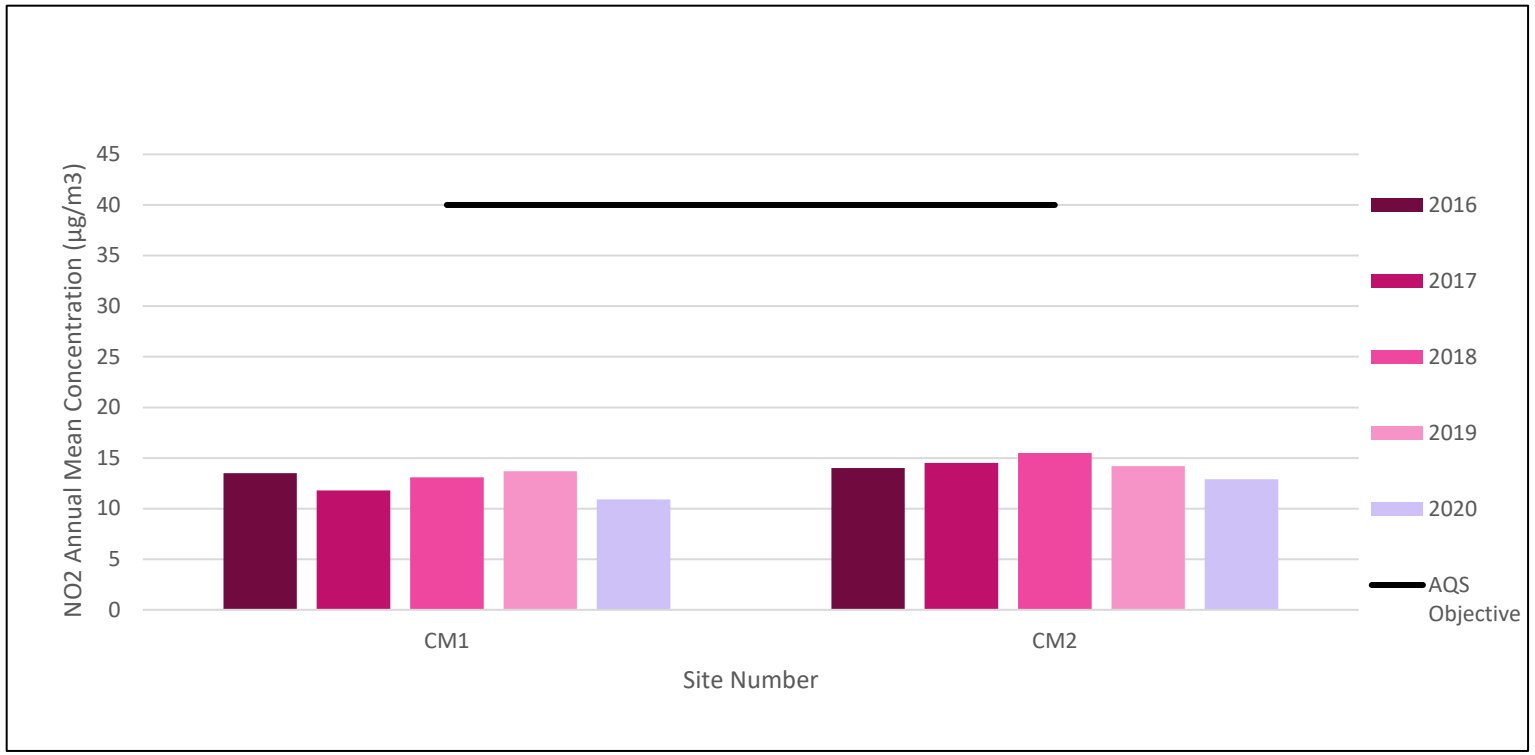


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM1	523168	322454	Urban Background	97.8	97.8	2	0	1	0	0
CM2	547264	321709	Urban Background	94.8	94.8	1	1	1	0	0

Notes:

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

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

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

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

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

Table A.8 – Results of Westmere School Automatic Ozone Monitoring, Number of 8-Hour Means > 100 µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM2	547264	321709	Urban Background	93	93	3	6	**16**	**17**	**12**

Notes:

Reporting Ozone results is not a requirement for LAQM.

Exceedance of the O_3 objective as per National Air Quality Objectives, Air Quality Strategy (2007), Table 2 are shown in **bold**: 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 2020

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.79)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SH 1	524388	310520	8.5	13.8				7.8	6.3	7.1	9.0	11.6	20.8	16.7	11.3	8.9	-	
SH 2a	524292	322587	43.0	44.7				22.4	25.3	31.8	34.8	34.5	42.0	37.6	-	-	-	Triplicate Site with SH 2a, SH 2b and SH 2c - Annual data provided for SH 2c only
SH 2b	524292	322587	41.1	44.5				24.3	23.5	31.3	34.1	34.5	40.6	38.8	-	-	-	Triplicate Site with SH 2a, SH 2b and SH 2c - Annual data provided for SH 2c only
SH 2c	524292	322587	51.6	40.8				24.2	24.7	29.1	32.7	32.4	39.5	37.7	34.9	27.6	-	Triplicate Site with SH 2a, SH 2b and SH 2c - Annual data provided for SH 2c only
SH 3	525694	321999	12.0	13.0				8.4	7.0	7.9	9.3	11.0	19.8	18.7	11.9	9.4	-	
SH 4	536523	325078	16.6	12.1				8.3	6.8	6.8		9.3	19.1	17.1	12.0	8.9	-	
SH 5	526585	328726	19.9	13.1				10.5	12.1	11.2	13.4	9.2	19.2	16.6	13.9	11.0	-	
SH 6	535525	325589	23.0	34.5				19.9	29.4	28.3	29.0	22.3	26.0	26.1	26.5	20.9	-	
SH 7	541013	324393	30.0	29.0				14.8	23.8	21.8	25.3	22.8	32.9	27.2	25.3	20.0	-	
SH 8	547264	321709	15.0	11.8				6.9	6.8	5.4	7.3	8.8	17.8	13.3	-	-	-	Triplicate Site with SH 8, SH 9 and SH 10 - Annual data provided for SH 10 only
SH 9	547264	321709	14.3	12.2				7.2	6.5	5.4	6.9	8.3	16.2	14.8	-	-	-	Triplicate Site with SH 8, SH 9 and SH 10 - Annual data provided for SH 10 only
SH 10	547264	321709	15.1	11.4				6.3	6.7	5.7	7.3	7.5	16.3	15.4	10.2	8.1	-	Triplicate Site with SH 8, SH 9 and SH 10 - Annual data provided for SH 10 only
SH 11	520932	336052	21.2	15.2				12.8	11.3	12.7	14.9	15.1	23.7	17.2	16.0	12.7	-	
SH 13	524595	323793	39.0	32.3				16.9	22.1	22.2	29.0	20.8	36.9	30.4	27.7	21.9	-	
SH 19 (14)	532684	324311	20.2	17.4				11.7	15.0	12.2	16.3	17.1	23.4	20.1	17.0	13.4	-	
SH 15	524182	325804	29.0	20.3				16.3	16.3	17.8	22.5	22.2	30.1	26.1	22.3	17.6	-	
SH 16	524203	331510	22.2	11.9				11.6	10.4	11.9	14.1	14.1	22.0	19.5	15.3	12.1	-	
SH 17	524892	322571	32.4	26.3				14.1	13.5	19.2	21.7	22.2	32.8	30.8	23.7	18.7	-	
SH 18	524191	321328	23.0	26.2				13.1	17.3	16.5	20.2	20.4		25.1	20.2	16.7	-	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Local bias adjustment factor used.**

☐ **National bias adjustment factor used.**

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

☒ **South Holland District Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

March-May diffusion tubes were exposed for three months therefore this data has been extracted from the above table.

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**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within South Holland District Council During 2020

South Holland District Council have approved 13 non-domestic planning applications of up to 108 dwellings, all of which are considered major developments. A number of developments are situated in Crowland, Pinchbeck, Spalding and Sutton Bridge, where South Holland District Council carry out air quality monitoring. The developments include but are not limited to: boiler installations, agricultural facilities, warehouses, residential and mixed use developments. None of South Holland's major developments have undergone air quality assessments.

The power station at Sutton Bridge ceased operating in August 2020, though monitoring remained in place for the whole year.

Additional Air Quality Works Undertaken by South Holland District Council During 2020

South Holland District Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

South Holland District Council's 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.

During 2020, diffusion tube monitoring took place for nine months of the year. March-May diffusion tubes were overexposed due to disruptions caused by Covid-19, thus this data has been extracted from the above table.

Diffusion Tube Annualisation

Only two non-automatic monitoring sites recorded data capture less than 75% in 2020, therefore these sites were annualised. The sites requiring annualisation were SH4 and SH18. Annualisation was conducted using background data from the four closest background monitoring stations to South Holland District and calculating an average annualisation factor in order to generate annualised mean values. The Defra Diffusion Tube Data Processing Tool was used to process all diffusion tube results in 2020, therefore the annualisation has been completed in line with LAQM.TG16. Annualisation data can be found in Table C.2.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 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_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.

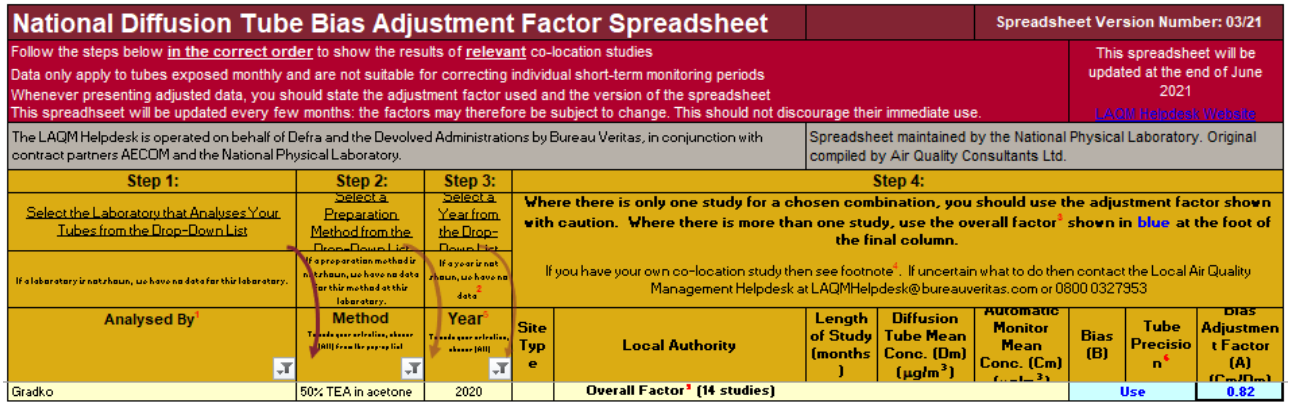
South Holland District Council have applied a local bias adjustment factor of 0.79 to the 2020 monitoring data. A summary of bias adjustment factors used by South Holland District Council over the past five years is presented in Table C.1.

South Holland District Council's 2020 data has been adjusted using a local bias adjustment factor. The local bias adjustment factor has been calculated using data from the Westmere co-located site. Historically, the Council have used local bias adjustment

factors and the 2020 local factor remains consistent with previous reporting years. The local factor of 0.79 is slightly lower than the national factor of 0.82.

The co-located diffusion tubes have good precision and the automatic monitor has good overall data capture above 90%. It should be noted however, that the co-location site is an urban background location and therefore NO_2 concentrations and emission sources may not be directly representative of all of the diffusion tubes deployed within the Council's boundary.

Figure C.1 – National Diffusion Tube Bias Adjustment Factor Spreadsheet



National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/21

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2021
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.

If you have your own co-location study then see footnote. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in acetone	2020		Overall Factor (14 studies)				Use		0.82

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	Local	-	0.79
2019	Local	-	0.80
2018	Local	-	0.83
2017	Local	-	1.02
2016	Local	-	1.19

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 Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO_2 monitoring locations within South Holland District Council required distance correction during 2020.

QA/QC of Automatic Monitoring

South Holland District Council contracts data management for their continuous analysers to Ricardo-AEA. The QA/QC procedures employed by Ricardo-AEA are equivalent to the

UK Automatic Urban and Rural Network (AURN) procedures. All data has been ratified and TEOM data have been VCM corrected.

PM_{10} Monitoring Adjustment

The PM_{10} results have been corrected by Ricardo-AEA who undertake the data management for the two automatic continuous monitoring sites. TEOM data have been Volatile Correction Model (VCM) corrected.

Automatic Monitoring Annualisation

All automatic monitoring locations within South Holland District Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

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. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within South Holland District Council required distance correction during 2020.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Spalding Monkhouse School	Annualisation Factor Westmere School	Annualisation Factor Norwich Lakenfields	Annualisation Factor Sibton	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
SH 4	0.9268	0.9010	0.9485	0.9770	0.9383	12.0	11.3	
SH 18	1.0513	1.0263	1.0417	1.0509	1.0426	20.2	21.1	

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	9				
Bias Factor A	0.79 (0.72 - 0.88)				
Bias Factor B	26% (14% - 38%)				
Diffusion Tube Mean (µg/m^3)	10.2				
Mean CV (Precision)	4.7%				
Automatic Mean (µg/m^3)	8.1				
Data Capture	99%				
Adjusted Tube Mean (µg/m^3)	8 (7 - 9)				

Notes:

A single local bias adjustment factor has been used to bias adjust the 2020 diffusion tube results.

Appendix D: Maps of Monitoring Locations

Figure D.1 – Map of Monitoring Sites: Spalding and Pinchbeck

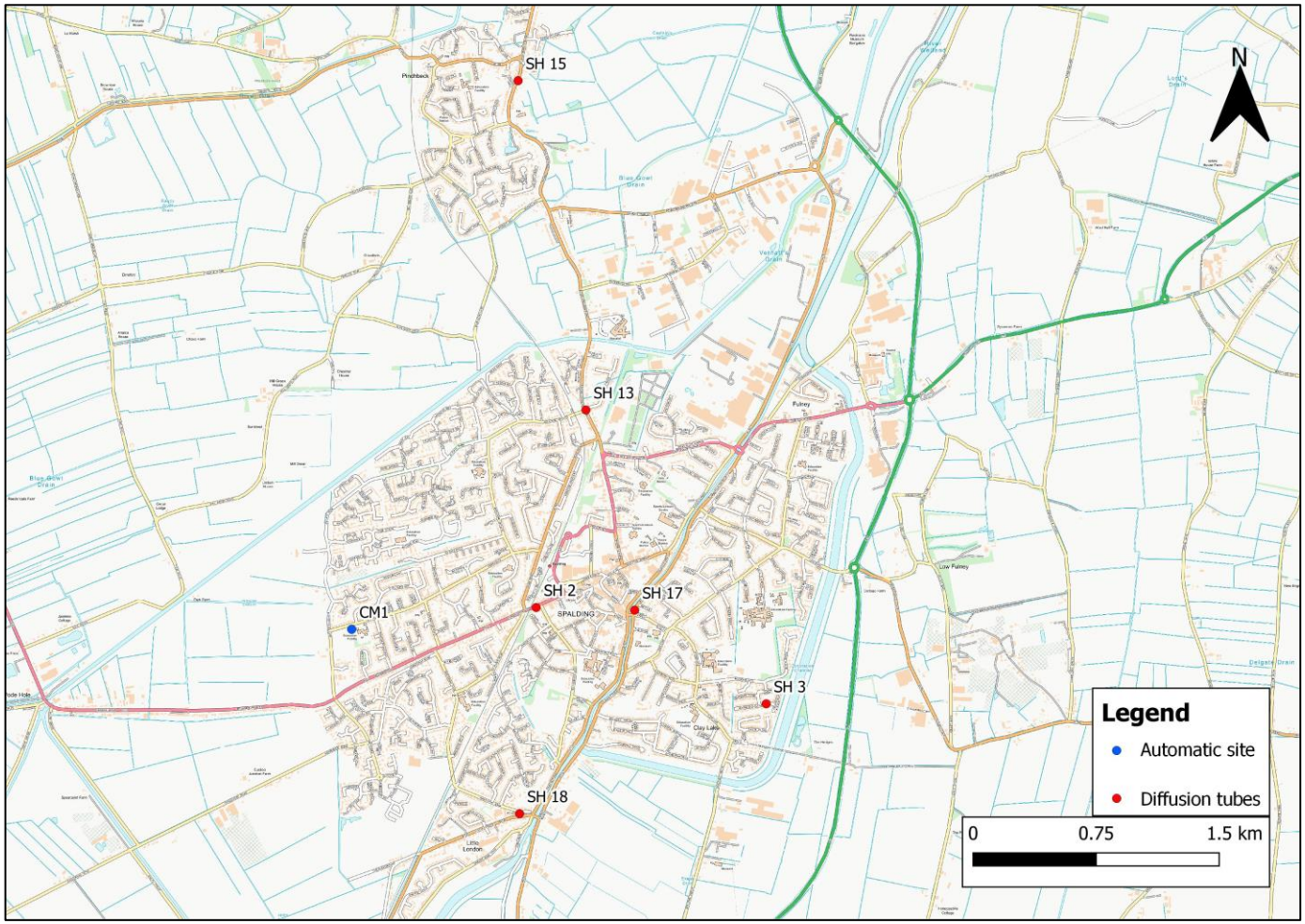


Figure D.2 – Map of Monitoring Sites: Sutton Bridge

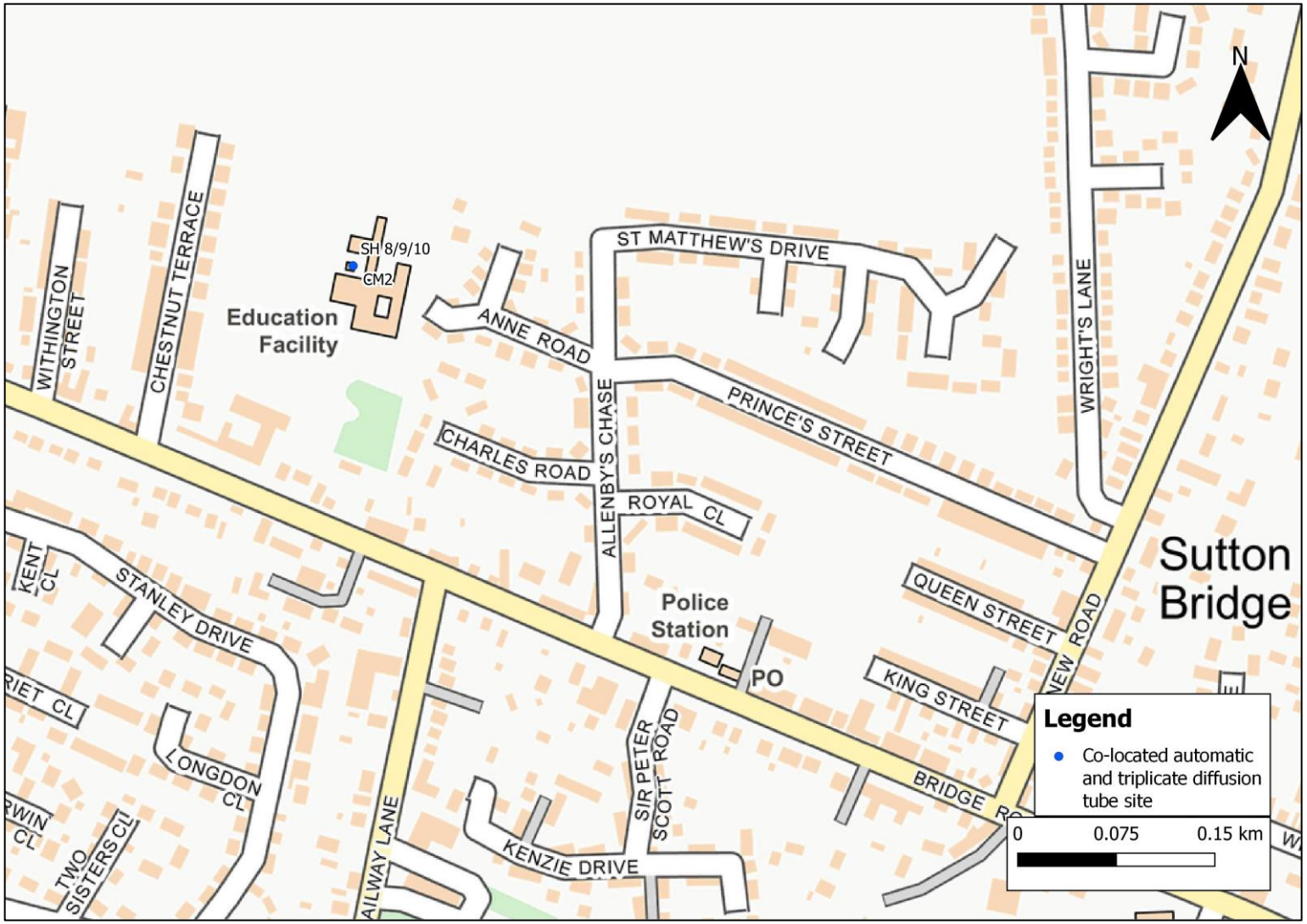


Figure D.3 – Map of Monitoring Sites: Crowland

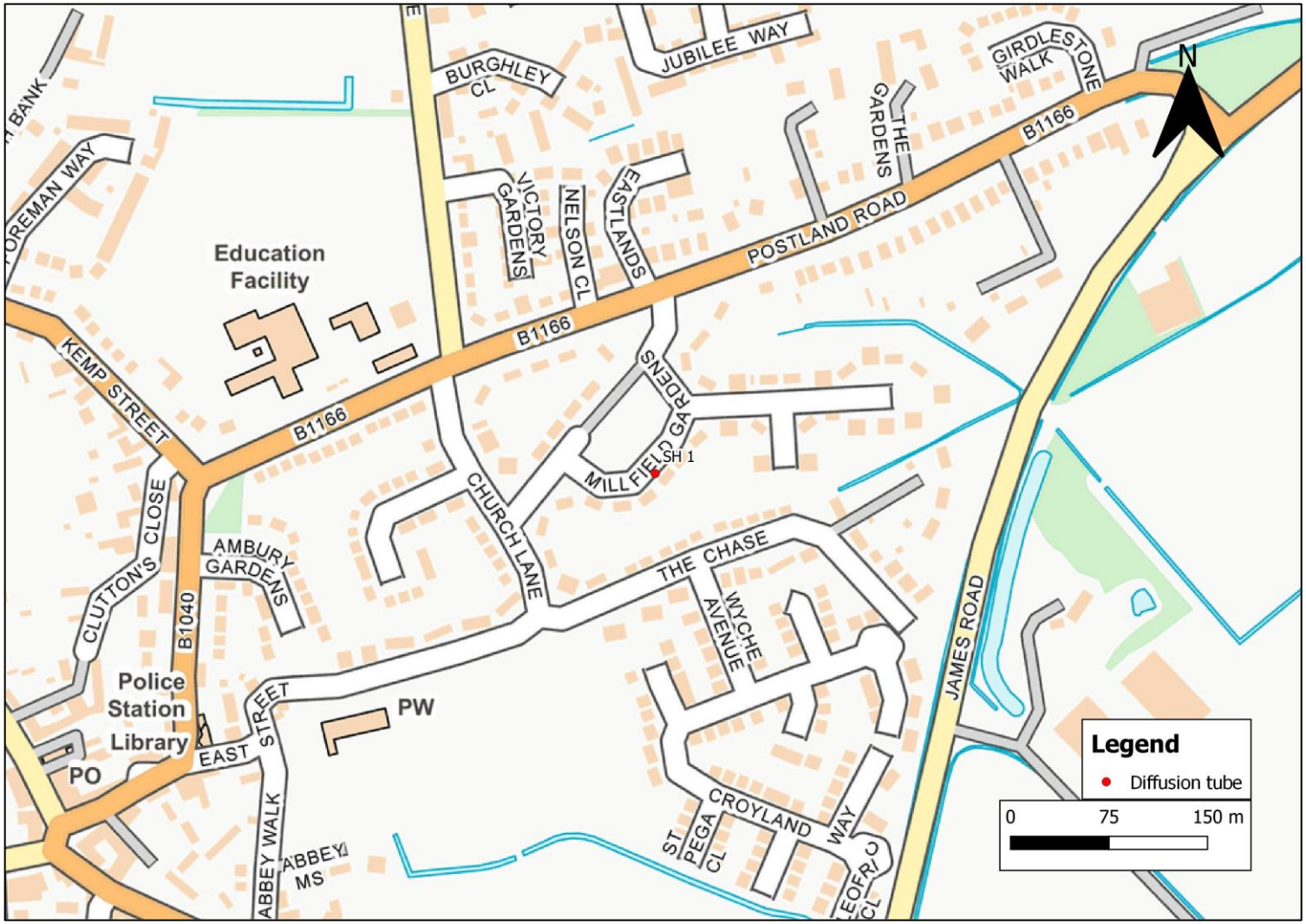
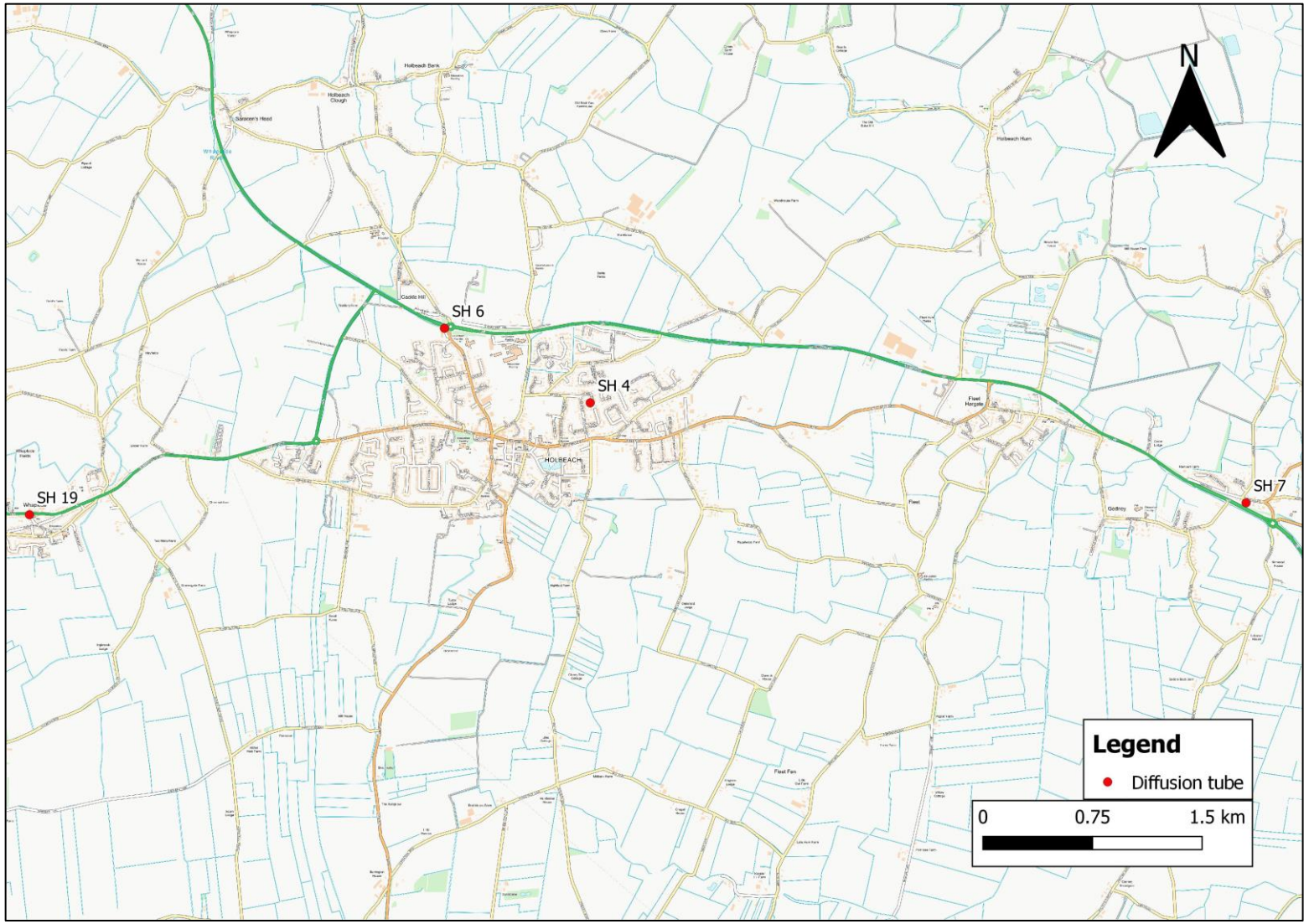


Figure D.4 – Map of Monitoring Sites: Waplode, Holbeach and Gedney



Appendix E: Summary of Air Quality Objectives in England

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

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[8] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[9] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[8] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[9] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20 µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5 µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within South Holland District Council

Small reductions in NO_2 concentrations were experienced at diffusion tube monitoring sites within the District during 2020. Between June and October 2020, the most significant impacts can be seen, however, NO_2 concentrations reduced between these months during 2019 too. Therefore, it is unclear whether this is an impact of Covid-19 or due to a change in road traffic throughout the Summer and Autumn months.

Opportunities Presented by COVID-19 upon LAQM within South Holland District Council

No LAQM related opportunities have arisen as a consequence of COVID-19 within South Holland District Council.

Challenges and Constraints Imposed by COVID-19 upon LAQM within South Holland District Council

Throughout March, April and May of 2020, there were disruptions to non-automatic (diffusion tube) monitoring. Covid-19 restrictions were in place during these months and as a result, South Holland District Council were unable to carry out diffusion tube monitoring. Data capture was good for the rest of 2020 with only two out of the 19 diffusion tube monitoring sites requiring annualisation. **Small Impact**

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

Glossary of Terms

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

References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. 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.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- South Holland District Council Annual Status Report. August 2020.
- South Holland District Council Annual Status Report. June 2019.
- South Holland District Council Annual Status Report. June 2018.
- South Holland District Council Annual Status Report. November 2017.
- South Holland District Council Annual Status Report Appraisal Report. September 2020.