South Holland District Council

2022 Annual Status Report

July 2022

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2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: August 2022

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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].

The main source of air pollution in South Holland 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 Southwest Lincolnshire. There are currently no Air Quality Management Areas (AQMAs) declared in South Holland.

In order to observe air pollutant levels within the district, the Council has an established monitoring network consisting of two automatic analysers and 15 non-automatic (passive) samplers. During 2021, 11 passive monitoring locations recorded an increase in annual mean nitrogen dioxide (NO_2) concentrations from 2020. This is likely due to the impacts of the COVID-19 pandemic in 2020, whereby the UK Government enforced national lockdowns and advised home working where possible. As such, traffic levels decreased, as did NO_2 concentrations. 2021 did not experience a full year of government lockdown and was therefore subject to increased levels of traffic volume compared to 2020. Despite the increases, all concentrations within 2021 were below the annual mean NO_2 AQS (Air Quality Strategy) objective of 40µg/m^3 within South Holland. Monitoring sites SH2 and SH6 continue

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[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 2021

[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

to report the highest concentrations within the monitoring network, and both report the highest increases from 2020 – 2021, with an increase of 2.2µg/m^3 at SH2 and 2.9µg/m^3 at SH6.

At both automatic monitoring sites, the annual mean NO_2 and Particulate Matter <10µm (PM_{10}) concentrations are well below the annual mean NO_2 and PM_{10} AQS objectives of 40µg/m^3, with the maximum reported concentration being 8.7µg/m^3 at site CM1 for NO_2, and 12.6µg/m^3 at site CM2 for PM_{10}. For both pollutants, the number of exceedances of the AQS daily mean objectives have been consistently low at both sites for the last 5 years.

Ozone is continuously measured 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 100µg/m^3 should not be exceeded more than 10 times per year. During 2021 the number of exceedances reached 7. There has been a continual increase year on year from 2017 – 2020, however 2021 reports the first decrease in O_3 concentrations since 2013.

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 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.

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. Despite this, South Holland District Council have identified, passed approval,

[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

and secured funding in 2021 to install an extra nine EV (Electric Vehicle) charge points in car parks across the district. There is also levelling up money from central government which is being used to improve roads/road systems on the A16 which is proposed to improve traffic flow, resulting in decreased congestion.

Conclusions and Priorities

In 2021, the annual mean NO_2 concentrations at all monitoring locations in South Holland District continue to report well below the 40µg/m^3 AQS objective, and continues compliance for the last 5 years. Annual mean NO_2 concentrations were recorded below 15µg/m^3 at both automatic monitoring sites and below 35µg/m^3 at all non-automatic monitoring sites. PM_{10} concentrations continue to remain low and show stable consistency over the last 5 years.

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

- Continued use of the current NO_2 diffusion tube monitoring network to identify any exceedances of the annual mean air quality objective and help identify areas of concern.
- Ensure new developments meet the requirements of planning policies and guidance in relation to air quality.
- South Holland District Council will continue to support Lincolnshire County Council as the highways authority, where it can, to make road improvements that have potential to reduce emissions.
- Continue to implement EV charging stations across the District.

Local Engagement and How to get Involved

South Holland District Council continues to promote 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.
- 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 sites and find out more about air pollution.

Local Responsibilities and Commitment

This ASR was prepared by the Public Protection Department of South Holland District Council with the support and agreement of the following officers and departments:

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This ASR has been approved by:

Christian Allen (Assistant Director- Regulatory)

This ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to Sue Armour at:

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1 Local Air Quality Management

This report provides an overview of air quality in South Holland District Council during 2021. 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

2.1 Air Quality Management Areas

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

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:

1. *"The report confirms South Holland District Council continues to enjoy good air quality in 2020, with no exceedances of NO_2 or PM_{10} objectives. The Council should continue their good work monitoring, paying particular attention to locations which have previously seen an increase. SH16 is of note as the cause for an increasing in 2019 is not given. The Council should provide an update in future ASRs.*
2. *Comments from the previous round of appraisal have been included. This is encouraged to continue to ensure improvements in future LAQM reporting.*
3. *Trends in pollutant concentrations are illustrated in graphical form and are accompanied with a good discussion of trends. This is commended and encouraged in future reports*
4. *The report includes a mention of approved planning applications which are likely to be new or changed sources. An update on these should be included in future ASRs.*
5. *QA/QC procedures have been applied appropriately and accurately, with discussion and justification included. The Council reported both the national and local bias adjustment factors for 2020, which is commended and demonstrates good practice. The Council have opted to use the local factor for consistency with the method applied in previous years. The national factor could be considered as a conservative approach, albeit there would be limited change on compliance with objectives.*
6. *The Council should consider including a link to the Public Health Outcomes Framework, and report on indicator D.01 the fraction of mortality attributable to $PM_{2.5}$ emissions. This can be found at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework*
7. *Mapping of monitoring locations is beneficial, although these could be improved with clearer labels."*

South Holland District Council continues to use its monitoring network to review air quality, and to ensure that all residents have access to safe levels of air quality. New monitoring locations are positioned where the Council believes there may be elevated concentrations of NO_2 in areas of relevant public exposure, alongside areas where monitoring has not

previously been undertaken. This proactive nature ensures that the Council can identify areas of potential concern at the nearest possible opportunity so that if required, effective mitigation measures can be implemented. This ensures that compliant levels of air quality are available to all of its residents.

Monitoring point SH16 showed a year-on-year increase up until 2019, with a drop recorded in 2020, followed by a NO_2 increase of 1.3µg/m^3 in 2021. There are no obvious reasons for this increase that can be attributed to any one source, although it is noted that the monitoring point is close to an area used by parents for school parking, as well as anecdotal suggestion of increased heavy goods vehicle movements in the area.

Of the 13 major residential developments identified in the 2021 report, 8 have commenced in 2021 and two of those developments were completed.

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.

South Holland District Council does not monitor for $PM_{2.5}$, but the current Defra background maps for South Holland (2018 reference year) show that all 2021 background concentrations of $PM_{2.5}$ are far below the recommended annual mean AQS target for $PM_{2.5}$ of 20 µg/m^3 (8.8µg/m^3). The highest concentration is predicted to be 9.3µg/m^3 within the 1km x 1km grid square with the centroid grid reference of 523500 308500. This is largely a rural area within South Holland and includes the A16 and Peterborough Road north and south.

The Public Health Outcomes Framework data tool compiled by Public Health England quantifies the mortality burden of $PM_{2.5}$ within England on a county and local authority scale. The 2020 fraction of mortality attributable to $PM_{2.5}$ pollution (indicator D01) across England is 5.6%, and in contrast the fraction within South Holland is slightly below the national average at 5.2%. The regional average for the East Midlands is 5.2%. The 2020 fraction of mortality has been used as opposed to the 2021 fraction as the 2021 data have not been made available at the time of writing.

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

This section sets out the monitoring undertaken within 2021 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 2017 and 2021 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

South Holland District Council undertook automatic (continuous) monitoring at two sites during 2021. Table A.1 in Appendix A shows the details of the automatic monitoring sites[7]. The shollandair.aeat.com page presents automatic monitoring results for South Holland District Council, with automatic monitoring results also available through the UK-Air website.

Maps showing the location of the monitoring sites are provided in Appendix D: Map(s) of Monitoring Locations and AQMAs. Further details on how the monitors are calibrated and how the data have been adjusted are included in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC.

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 2021, with 19 individual passive monitoring tubes. Table A.2 in Appendix A: Monitoring Results presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D: Map(s) of Monitoring Locations and AQMAs. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments

[7] NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem

applied (e.g., annualisation and/or distance correction), are included in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC.

3.2 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: Supporting Technical Information / Air Quality Monitoring Data QA/QC.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A: Monitoring Results compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represent 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 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 include 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.

Both automatic monitoring sites within South Holland recorded continued compliance against the AQS objective, with relatively low, stable concentrations for the past 5 years.

During 2021, all diffusion tube monitoring locations continued to report NO_2 concentrations compliant with the NO_2 AQS objective, with no reported exceedances in the last 5 years.

From 2020 – 2021, 11 sites recorded an increase in NO_2 concentrations. A slight increase may be attributed due to 2020 concentrations being influenced by COVID–19, with traffic gradually returning to pre-pandemic levels throughout 2021. The maximum concentration of 29.8 µg/m^3 is reported at SH2a, b and c, this passive monitoring location continues to report the highest concentration within the network, but remains below the AQS objective.

Location SH2a, b & c is located close to a level crossing, with increasing freight carried on the railway, which has resulted in the crossing being in use for more extended periods. Location SH6 is adjacent to the main A17, one of the busiest roads in the district.

Figure A.1 – Figure A.3 present graphs showing the annual mean NO_2 concentrations from 2017 – 2021. There is a general trend of increase in NO_2 concentrations over the 5-year period of monitoring results for all monitoring sites.

Due to annual mean concentrations well below 60µg/m^3 at all sites, according to Defra guidance, it is unlikely that any exceedances of the 1-hour mean objective has occurred at any sites.

3.2.2 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 40µg/m^3.

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

Compliance of both the annual mean PM_{10} AQS objective (40µg/m^3) and 24-hour PM_{10} AQS objective (no more than 35 24-hourly concentrations greater than 50µg/m^3) has been achieved in 2021 at both automatic monitoring locations.

Over the last 5 years of annual PM_{10} monitoring, PM_{10} concentrations have remained stable at both Spalding Monkhouse and Westmere School urban background sites. Both sites underwent minimal changes from 2020 – 2021, with a slight reduction at the Spalding Monkhouse School site of 1.9 µg/m^3, and 0.3 µg/m^3 at Westmere School.

The 24-hour mean PM_{10} monitoring for 2021 shows no exceedances of the 50 µg/m^3 AQS objective, which continues the same trend over the last 5 years of monitoring.

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, PM_{10}	N/A	Chemiluminescence, TEOM corrected by VCM	1	25	3
CM2	Westmere School	Urban Background	547264	321709	NO_2, O_3, PM_{10}	N/A	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)
SH1	21 Millfield Gardens	Urban Background	524388	310520	NO_2	N/A	6.8	0.3	No	1.9
SH2a, 2b, 2c	Lamp post 20 Winsover Road (triplicate)	Urban Background	524292	322587	NO_2	N/A	0.0	1.3	No	2.6
SH3	Woodfield Close	Urban Background	525694	321999	NO_2	N/A	7.0	1.7	No	2.1
SH4	46 The Hollies	Urban Background	536523	325078	NO_2	N/A	8.4	1.4	No	2.2
SH5	Station Road, Surfleet	Roadside	526585	328726	NO_2	N/A	24.9	1.1	No	2.1
SH6	Boston Rd_A17	Roadside	535525	325589	NO_2	N/A	4.0	1.8	No	2.1
SH7	Gedney_A17	Roadside	541013	324393	NO_2	N/A	9.0	2.1	No	2.1
SH8, 9,10	Westmere (Triplicate)	Urban Background	547264	321709	NO_2	N/A	69.4	61.2	Yes	N/A
SH11	A52 Donington	Roadside	520932	336052	NO_2	N/A	49.0	1.5	No	2.1
SH13	Pinchbeck Road	Kerbside	524595	323793	NO_2	N/A	20.7	2.0	No	2.1
SH19 (Former SH14)	Whaplode	Roadside	532684	324311	NO_2	N/A	7.0	4.0	No	1.9
SH15	Church Street, Pinchbeck	Roadside	524182	325804	NO_2	N/A	12.0	1.7	No	2.0
SH16	Gosberton	Roadside	524203	331510	NO_2	N/A	7.0	1.9	No	2.2
SH17	High Street, Spalding	Roadside	524892	322571	NO_2	N/A	0.0	0.9	No	1.9
SH18	BP Garage	Roadside	524191	321328	NO_2	N/A	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 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	523168	322454	Urban Background	98.7	98.7	10.8	9.4	9.3	8.5	8.7
CM2	547264	321709	Urban Background	99.4	99.4	11.2	9.4	9.3	7.7	7.4

☐ **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 2021 (%) (2)	2017	2018	2019	2020	2021
SH1	524388	310520	Urban Background	100	100.0	10.7	11.1	10.3	8.9	8.8
SH2a, SH2b, SH2c	524292	322587	Urban Background	100	100.0	-	-	32.1	27.6	29.8
SH3	525694	321999	Urban Background	100	100.0	-	-	11.0	9.4	9.7
SH4	536523	325078	Urban Background	100	100.0	12.1	10.6	10.1	8.9	8.7
SH5	526585	328726	Roadside	100	100.0	16.2	13.4	12.8	11.0	11.6
SH6	535525	325589	Roadside	100	100.0	19.9	19.2	27.9	20.9	23.8
SH7	541013	324393	Roadside	100	100.0	19.7	16.5	26.4	20.0	19.5
SH8a, SH8b, SH8c	547264	321709	Urban Background	100	100.0	11.2	9.2	9.6	8.1	7.3
SH11	520932	336052	Roadside	92.6	92.6	-	-	15.5	12.7	14.3
SH13	524595	323793	Kerbside	100	100.0	34.9	27.1	25.7	21.9	24.0
SH19 (Former SH14)	532684	324311	Roadside	100	100.0	-	-	16.3	13.4	14.5
SH15	524182	325804	Roadside	100	100.0	-	-	22.3	17.6	19.9
SH16	524203	331510	Roadside	100	100.0	14.1	16.1	17.0	12.1	13.4
SH17	524892	322571	Roadside	92.4	92.4	24.2	22.8	20.3	18.7	19.0
SH18	524191	321328	Roadside	100	100.0	23.4	20.2	19.8	16.7	17.3

☐ **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 at Automatic Monitoring Locations

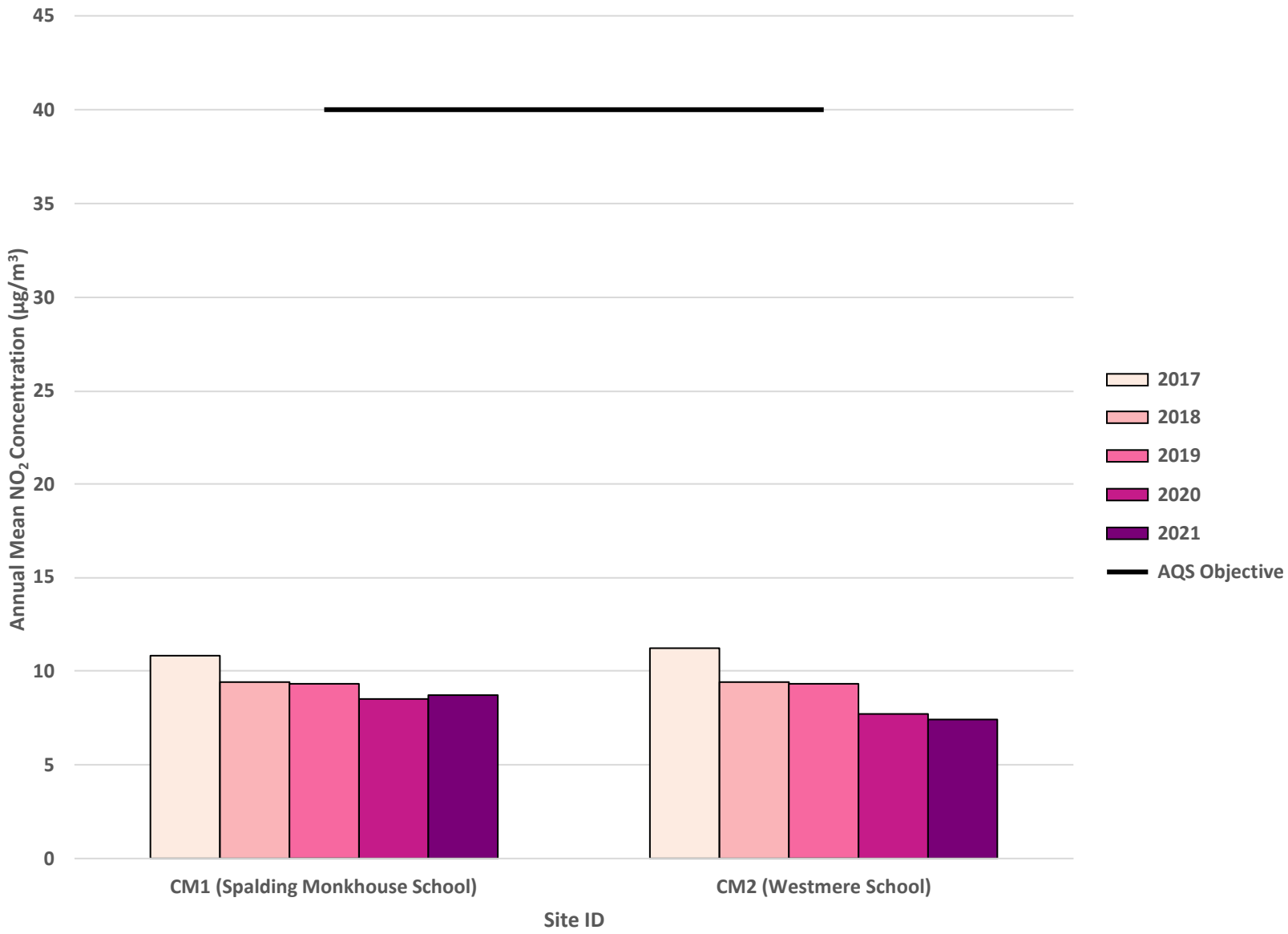


Figure A.2 – Trends in Annual Mean NO_2 Concentrations in Crowland, Gedney, Holbeach, Spalding and Surfleet on Seas

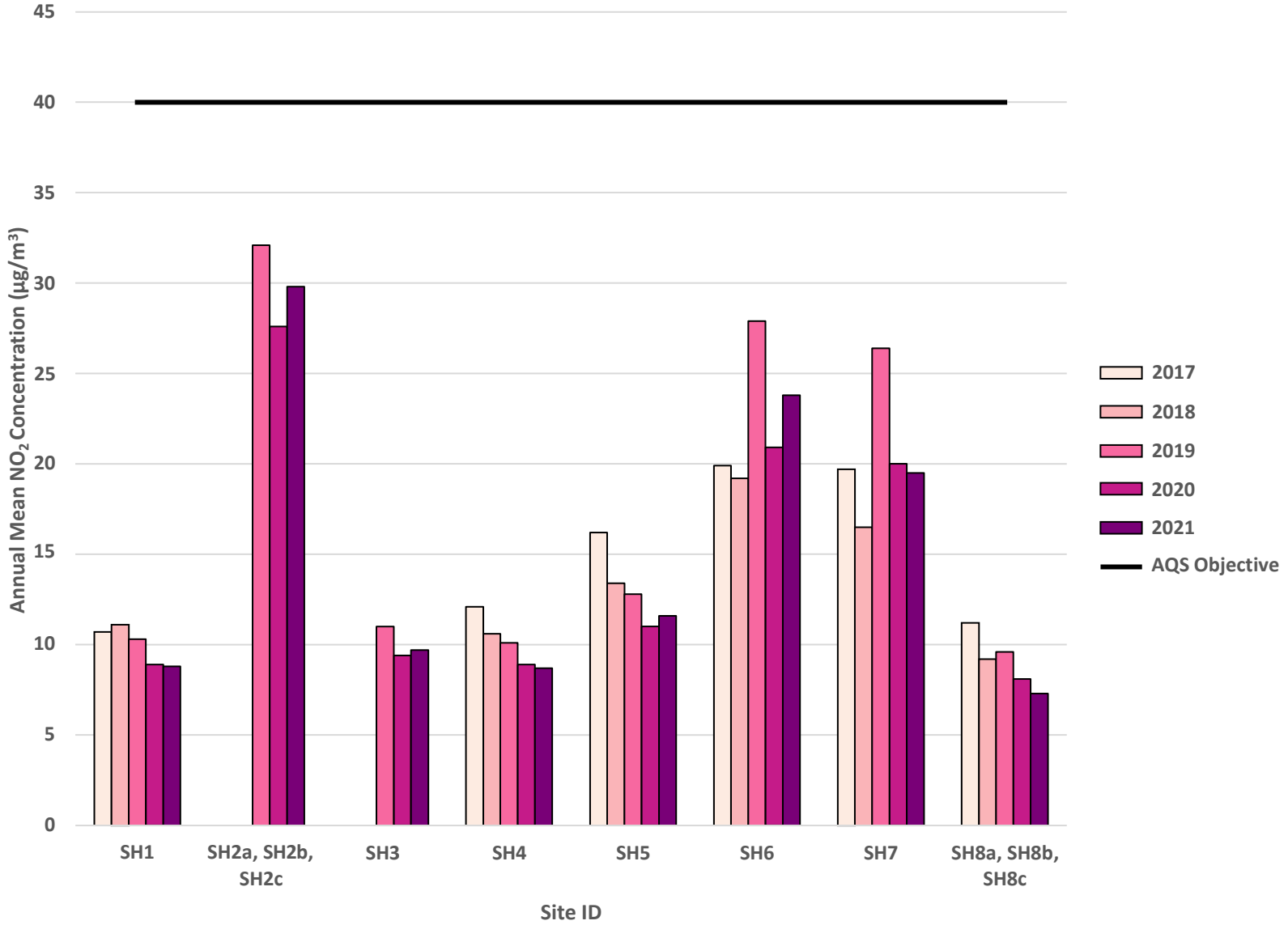


Figure A.3 – Trends in Annual Mean NO_2 Concentrations in Donington, Gosberton, Pinchbeck, Spalding and Whaplode

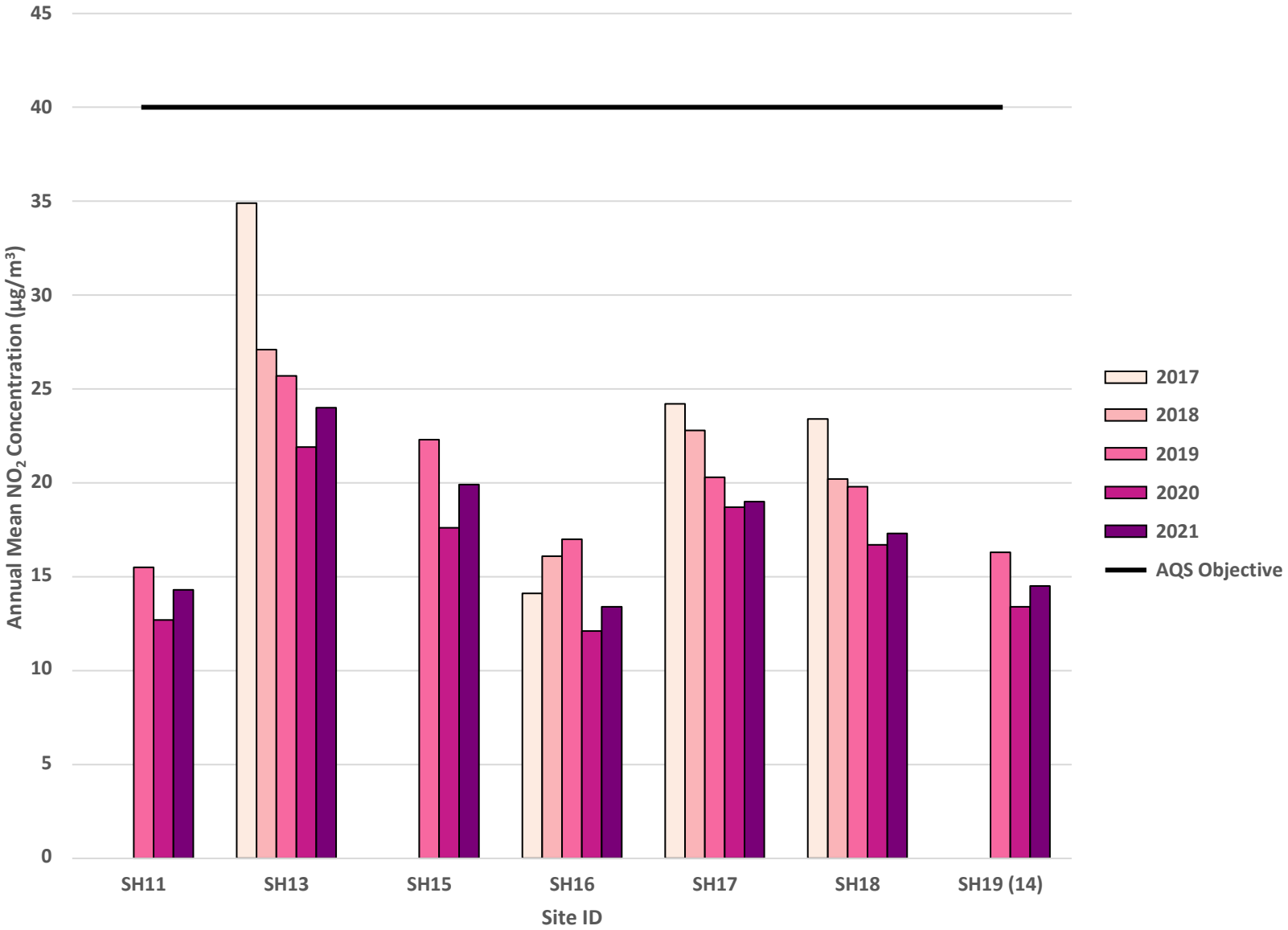


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	523168	322454	Urban Background	98.7	98.7	0	0	0	0	0
CM2	547264	321709	Urban Background	99.4	99.4	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 ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	523168	322454	Urban Background	98.5	98.5	11.8	13.1	13.7	10.9	9.0
CM2	547264	321709	Urban Background	96.9	96.9	14.5	15.5	14.2	12.9	12.6

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

Notes:

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

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

All means have been "annualised" as per LAQM.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.1 – Trends in Annual Mean PM_{10} Concentrations

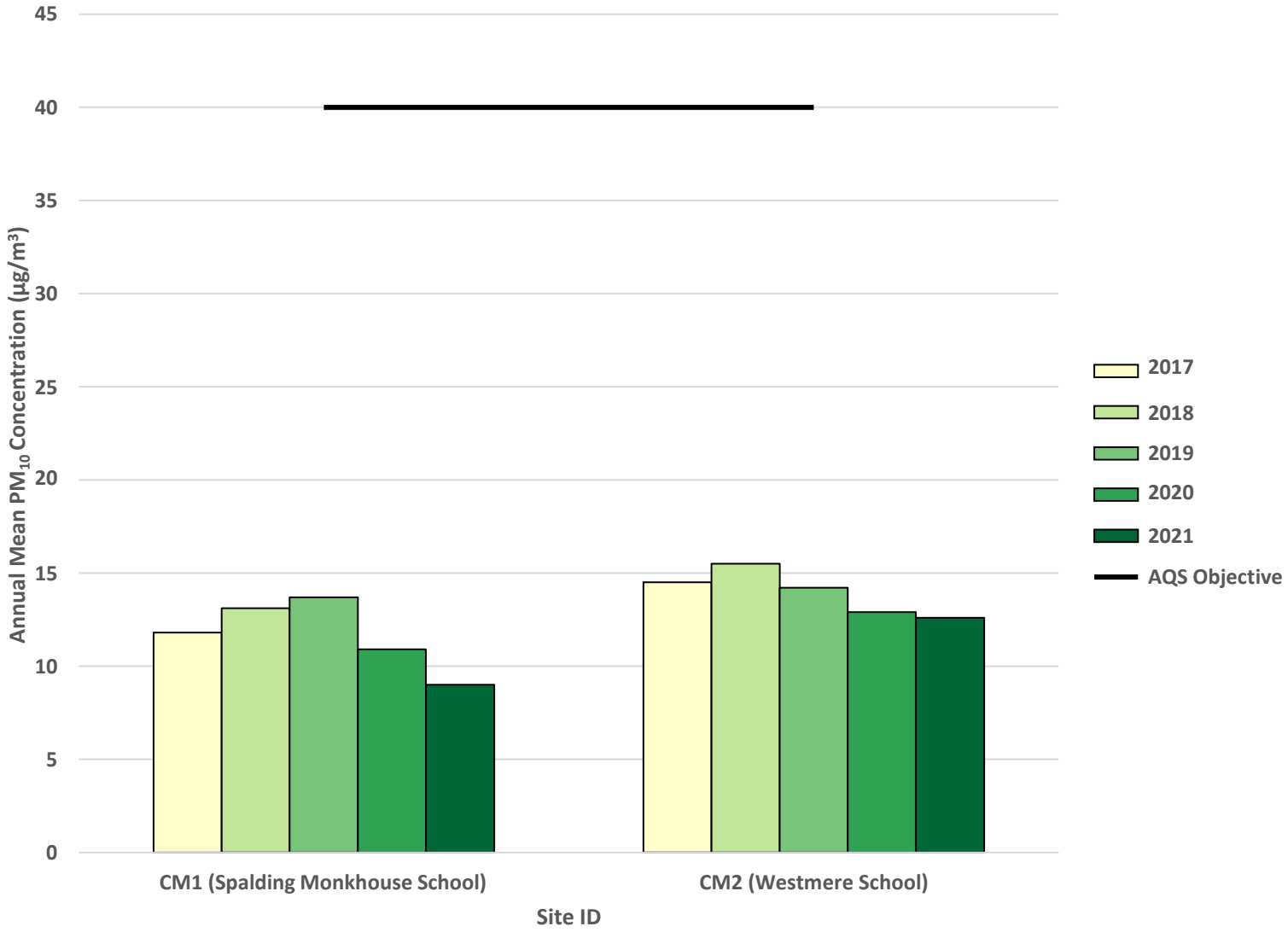


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	523168	322454	Urban Background	98.5	98.5	0	1	0	0	0
CM2	547264	321709	Urban Background	96.9	96.9	1	1	0	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 > 100µg/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 2021 (%) (2)	2017	2018	2019	2020	2021
CM2	547264	321709	Urban Background	96.1	96.1	6	16	17	12	7

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 A.8 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 2021

Table B.1 – NO_2 2021 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 (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SH1	524388	310520	17.0	14.5	10.5	7.7	8.8	7.3	6.5	6.4	10.2	11.7	14.3	15.7	10.9	8.8		
SH2a	524292	322587	42.3	43.2	35.2	36.8	34.1	31.4	33.0	25.6	41.8	34.2	38.8	34.6	-	-		Triplicate Site with SH2a, SH2b and SH2c - Annual data provided for SH2c only
SH2b	524292	322587	41.6	43.2	35.9	33.7	33.9	36.2	32.4	25.8	37.2	33.5	37.2	37.3	-	-		Triplicate Site with SH2a, SH2b and SH2c - Annual data provided for SH2c only
SH2c	524292	322587	41.6	41.1	38.2	35.3	34.3	32.0	30.3	24.9	42.9	35.3	40.0	71.2	36.8	29.8		Triplicate Site with SH2a, SH2b and SH2c - Annual data provided for SH2c only
SH3	525694	321999	17.4	16.0	11.5	10.2	10.2	7.7	7.1	7.1	9.7	12.7	17.4	17.2	12.0	9.7		
SH4	536523	325078	18.4	13.0	11.0	9.2	8.9	5.9	6.4	6.4	9.3	11.5	13.6	14.8	10.7	8.7		
SH5	526585	328726	19.2	13.9	16.3	12.0	13.6	10.5	10.9	11.9	11.8	15.4	19.9	15.9	14.3	11.6		
SH6	535525	325589	30.1	29.2	35.7	34.7	33.2	28.8	28.7	24.6	29.7	19.8	29.9	28.5	29.4	23.8		
SH7	541013	324393	28.6	25.6	20.8	19.8	28.9	20.3	20.0	13.9	29.5	25.7	26.7	28.8	24.0	19.5		
SH8a	547264	321709	15.2	7.4	8.1	7.5	7.0	5.3	4.8	5.1	7.9	9.1	13.0	13.0	-	-		Triplicate Site with SH8a, SH8b and SH8c - Annual data provided for SH8c only
SH8b	547264	321709	15.6	13.0	8.4	7.7	8.4	4.5	5.2	5.1	8.3	10.1	12.7	12.9	-	-		Triplicate Site with SH8a, SH8b and SH8c - Annual data provided for SH8c only
SH8c	547264	321709	15.5	12.4	8.0	7.8	7.5	4.5	4.8	5.0	8.1	9.3	11.6	13.0	9.0	7.3		Triplicate Site with SH8a, SH8b and SH8c - Annual data provided for SH8c only
SH11	520932	336052	21.5	20.4	14.0	14.9	16.8	14.8	15.3		21.6	17.3	17.2	20.0	17.6	14.3		
SH13	524595	323793	36.9	30.8	30.2	23.3	27.6	25.1	22.5	23.2	29.8	31.3	38.8	35.3	29.6	24.0		
SH19 (Former 14)	532684	324311	24.5	17.3	20.3	15.6	16.4	14.1	14.9	15.4	16.8	16.5	23.4	20.3	18.0	14.5		
SH15	524182	325804	31.6	28.4	26.7	23.1	24.4	21.5	19.5	18.7	24.6	22.9	27.2	26.2	24.6	19.9		
SH16	524203	331510	22.6	19.7	15.4	15.9	15.6	14.6	14.3	11.5	16.9	15.8	18.6	17.8	16.6	13.4		
SH17	524892	322571	28.9		22.4	20.7	23.9	18.1	20.4	18.0	24.8	23.6	27.6	29.0	23.4	19.0		
SH18	524191	321328	27.9	24.4	24.2	19.1	21.4	18.1	16.2	16.8	13.2	21.1	27.4	26.5	21.4	17.3		

☒ **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 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

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**.

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 2021

The Council has identified a number of planning applications approved through 2021 which may have an impact on air quality concentrations. These planning applications relate to residential developments, including the following:

Planning Reference	Address	Residential Units
H16-0082-20	Locksmill Farm, Cowbit Road, Spalding	42 dwellings
H13-1215-19	Land north of Roman Road, Moulton Chapel	86 dwellings
H17-0236-20	Land to the west of Coalbeach Lane South, Surfleet	60 dwellings
H04-1029-20	Land west of Malting Lane, Donington	Reserved Matters for 32 dwellings
H04-0268-20	Land west of Malting Lane, Donington	Reserved Matters for 40 dwellings
N/A	Land north of Northons Lane and Oakwood Glade, Holbeach	103 dwellings
H03-0161-17	Home Farm, Deeping St Nicholas	Outline permission of up to 120 dwellings and a village hall

Additional Air Quality Works Undertaken by South Holland District Council During 2021

South Holland District Council has not completed any additional works within the reporting year of 2021.

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.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within South Holland District Council recorded data capture of 75% therefore it was not required to annualise any monitoring data.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 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 0.81 to the 2021 monitoring data. A summary of bias adjustment factors used by South Holland District Council over the past five years is presented in Table C.2.

One triplicate co-location study was used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analyser. Within South Holland the automatic analyser is co-located with diffusion tubes in triplicate:

Site Name	Site Code	Diffusion Tube
Westmere School	CM2	SH8

Historically, South Holland have used local bias adjustment factors, the 2021 local factor remains consistent with previous reporting years and is more representative of the council area. The local factor of 0.81 is slightly lower than the national factor of 0.82.

The co-located diffusion tubes have good precision, and the automatic monitor used for co-location had sufficient data capture of >85%. 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: 06/22

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 September 2022
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:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	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[3] shown in blue at the foot of the final column.
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in acetone	2021		Overall Factor[3] (16 studies)				Use		0.82

Table C.1 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Factor A	0.81 (0.77 - 0.85)
Bias Factor B	24% (18% - 30%)
Diffusion Tube Mean (µg/m³)	8.8
Mean CV (Precision)	4.2%
Automatic Mean (µg/m³)	7.1
Data Capture	100%
Adjusted Tube Mean (µg/m³)	7 (7 - 7)

Notes:

A single local bias adjustment factor of 0.81 has been used to bias adjust the 2021 diffusion tube results.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	**-**	0.81
2020	Local	-	0.79
2019	Local	-	0.80
2018	Local	-	0.83
2017	Local	-	1.02

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been 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 were corrected for distance.

No diffusion tube NO_2 monitoring locations within South Holland District Council required distance correction during 2021.

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 have 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.

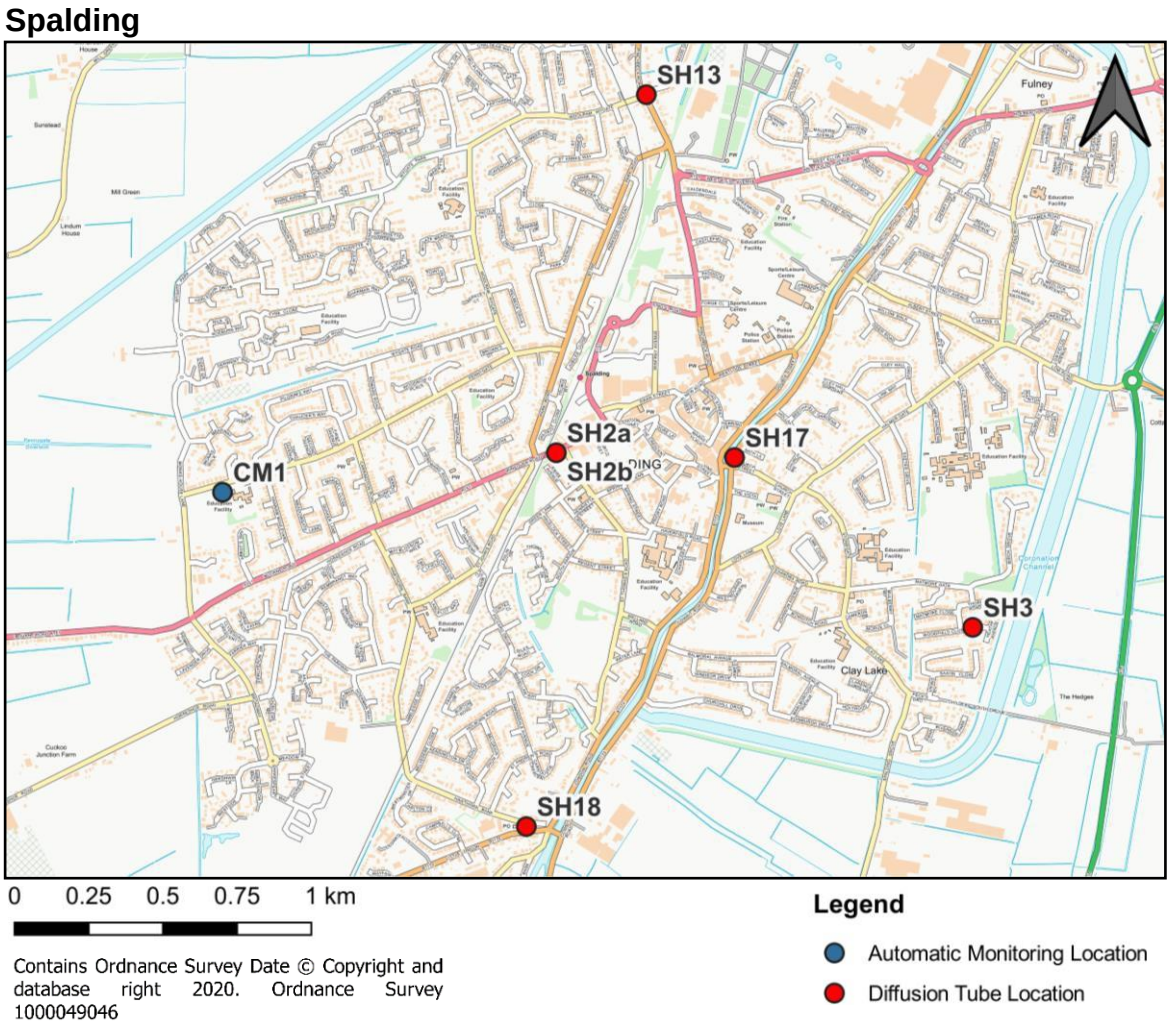
NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been 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 were corrected for distance.

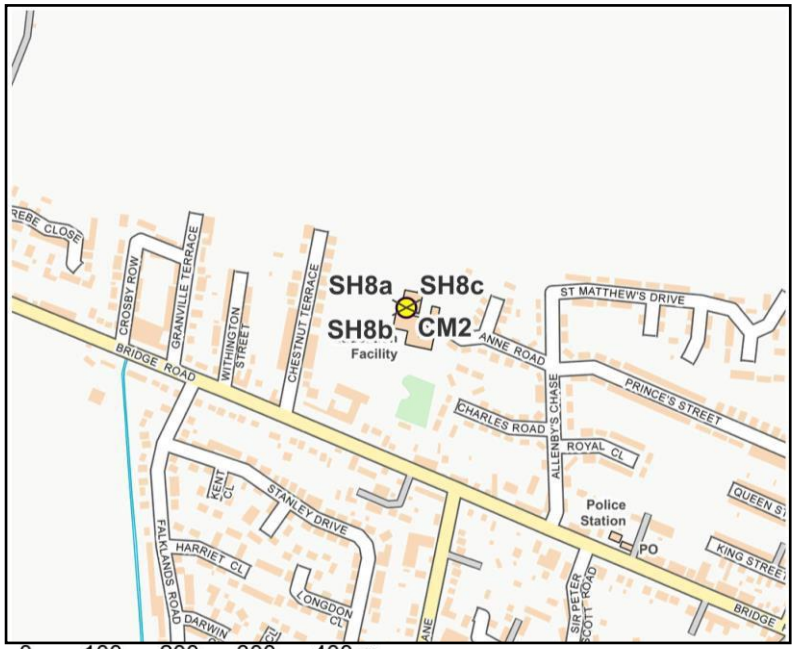
No automatic NO_2 monitoring locations within South Holland District required distance correction during 2021.

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

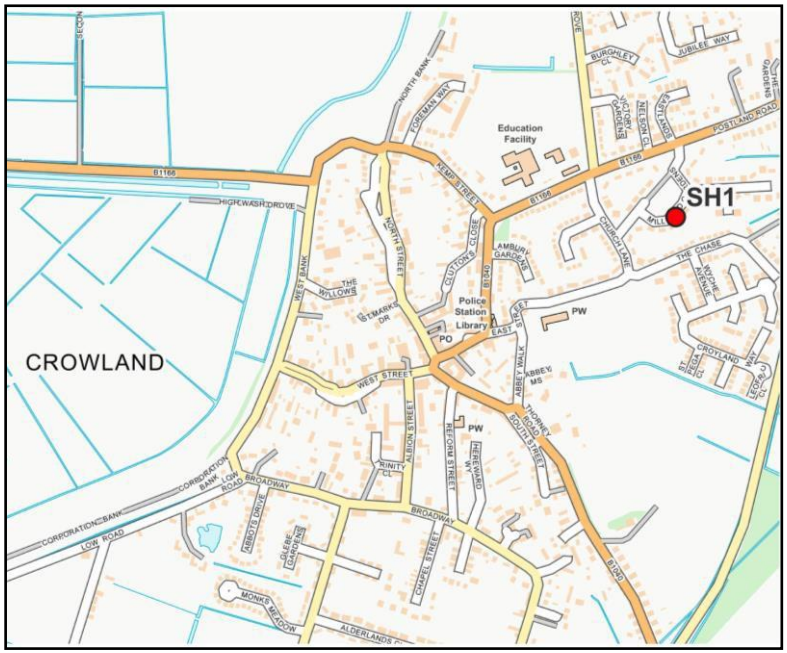
Figure D.1 – Map of Non-Automatic Monitoring Sites



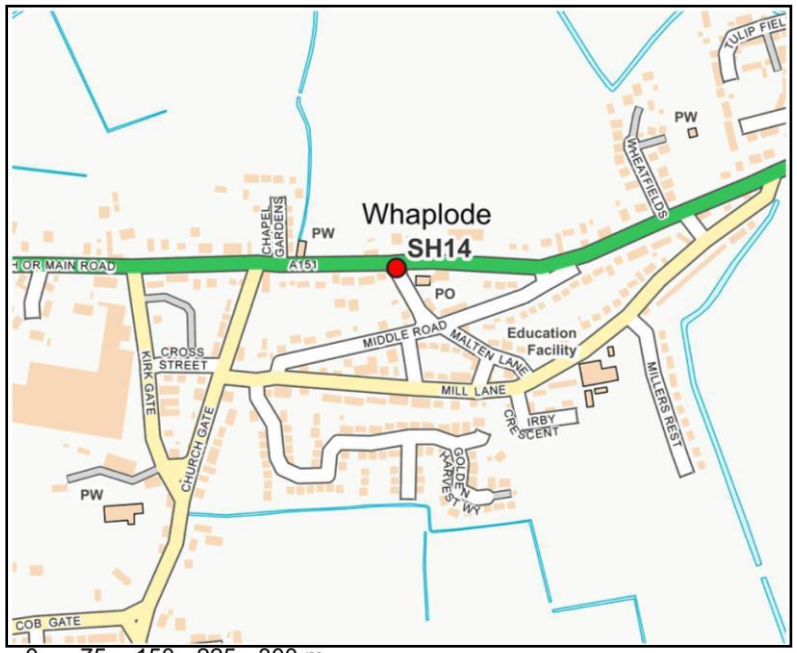
Sutton Bridge



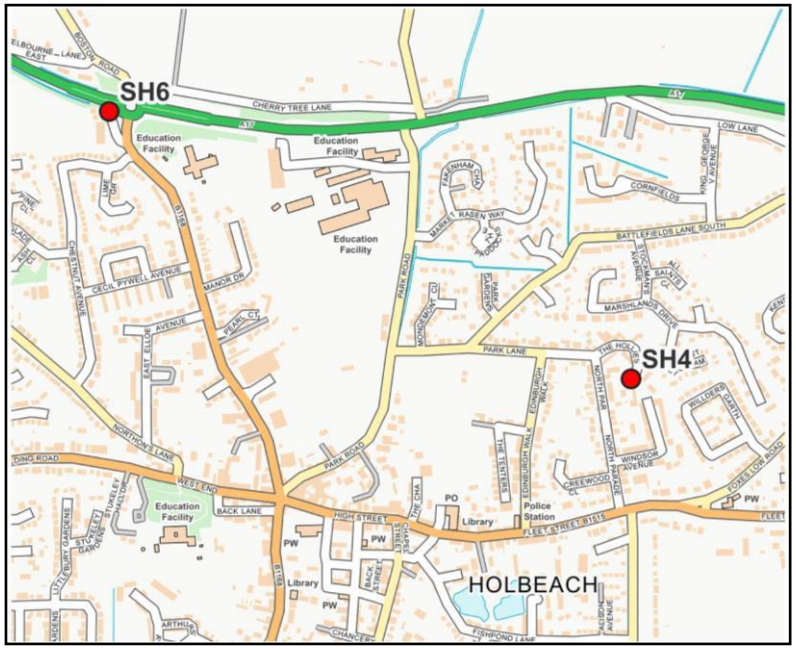
Crowland



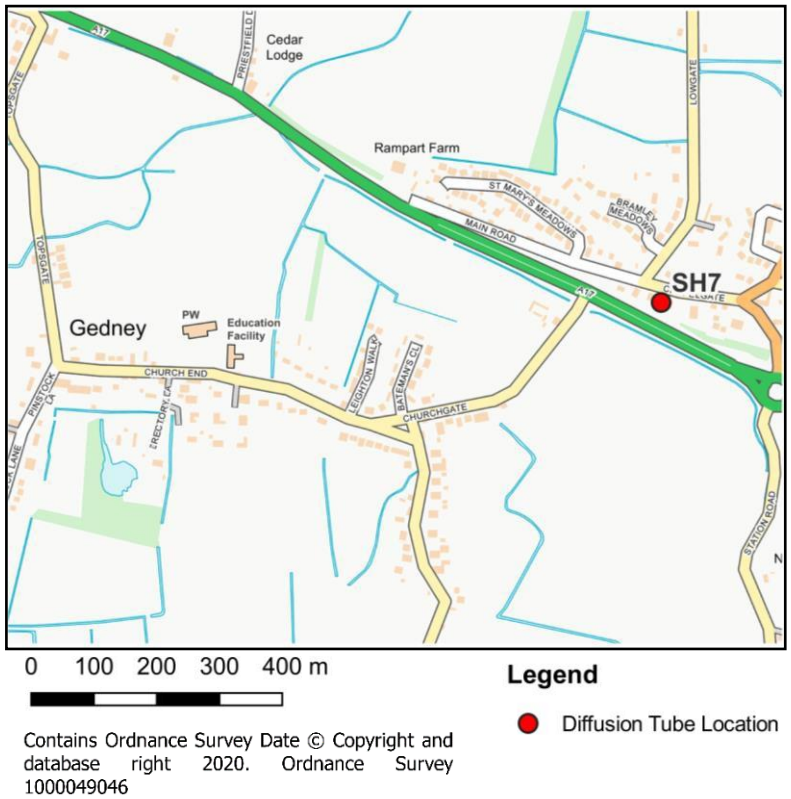
Whaplode



Holbeach

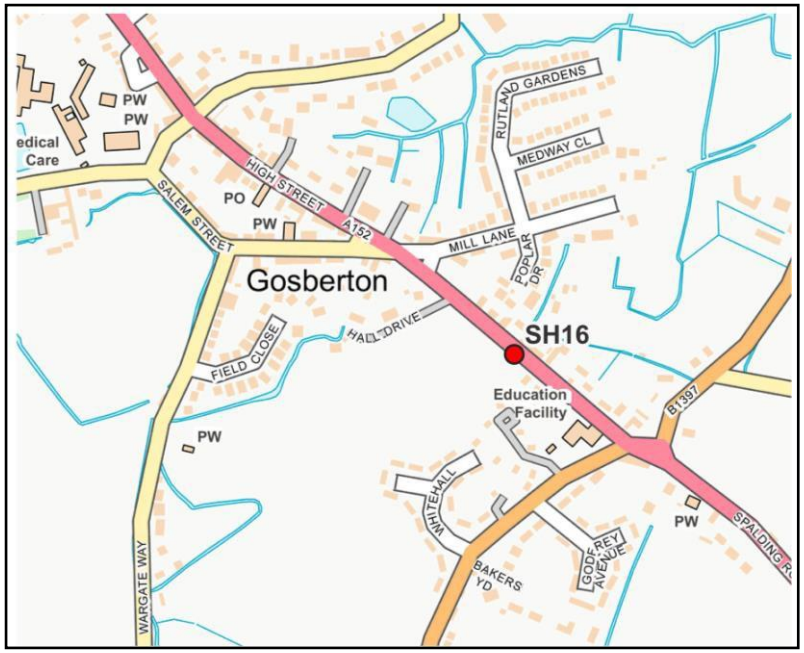


Gedney



Pinchbeck

Gosberton



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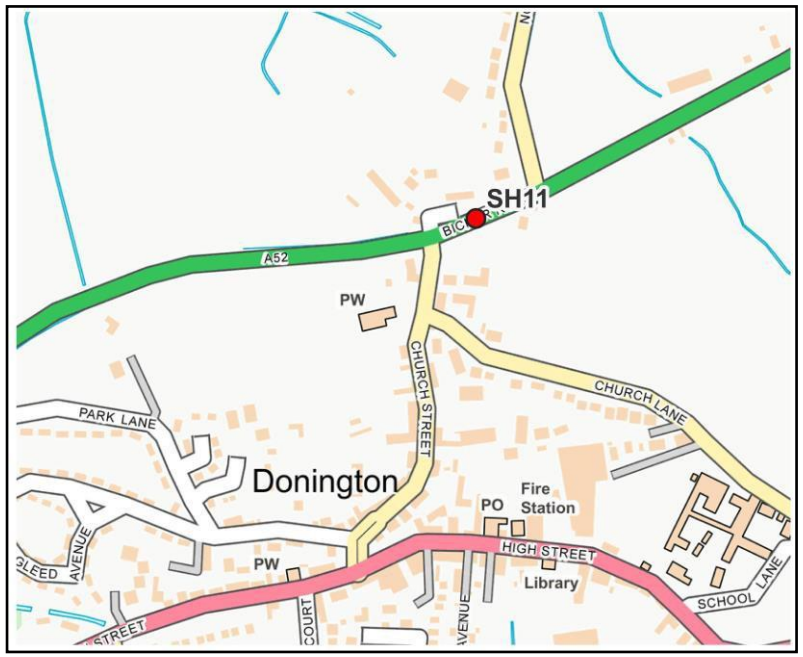
Donington



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Surfleet Seas End

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[8]

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

[8] The units are in micrograms 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	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
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: Air Quality in South Holland
- South Holland District Council: Annual Status Report 2021