South Holland District Council
2023 Annual Status Report

Bureau Veritas

June 2023

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Document Control Sheet

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2023 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, as amended by the Environment Act 2021

Date: June 2023

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Executive Summary: Air Quality in Our Area

Air Quality in South Holland

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 29,000 to 43,000 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 2022, 14 passive monitoring locations recorded an increase in annual mean nitrogen dioxide (NO_2) concentrations from 2021. Despite the increases, all concentrations within 2022 were below the annual mean NO_2 AQS (Air Quality Strategy) objective of 40 µg/m^3 within South Holland. Monitoring site SH2 continues to report the highest concentrations within the monitoring network and reports the highest increase from 2021 to 2022, with an increase of 3.8 µg/m^3.

At both automatic monitoring sites, concentrations of NO_2 and Particulate Matter <10µm (PM_{10}) are well below the AQS objectives annual mean of 40 µg/m^3. The maximum reported

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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, January 2023

[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

concentration of NO_2 was 8.9 µg/m^3 at site CM1, and the maximum PM_{10} 14.5 µg/m^3 at site CM2. 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 (O_3) is continuously measured at the Westmere School automatic monitoring site. During 2022 the number of exceedances reached 20, there is no LAQM air quality objective for O_3, however this does exceed the UK National air quality objective of 100 µg/m^3 not to be exceeded more than 10 times a year. There has been a continual increase year on year from 2018 – 2022, with only 2021 reporting a decrease in O_3 concentrations since 2013.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] details 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.

Twelve publicly accessible electric vehicle charging points were installed across the district in 2022, and the Council supported the Lincolnshire Clear Air Project bid.

[5] Defra. Environmental Improvement Plan 2023, January 2023

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

Conclusions and Priorities

In 2022, annual mean NO_2 concentrations at all monitoring locations in South Holland District continue to report well below the 40 µg/m^3 AQS objective, and continues compliance for the last 5 years. Annual mean NO_2 concentrations were recorded below 15 µg/m^3 at both automatic monitoring sites and below 36 µg/m^3 at all non-automatic monitoring sites. PM_{10} concentrations continue to remain low and show 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.
- The 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 support the Lincolnshire Clean Air Project.

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 Bureau Veritas on behalf of South Holland District Council with the support and agreement of the following officers and departments:

Oliver Abrams	Environmental Protection Officer
Sue Armour	Team Leader Environmental Protection
Richard Boole	Public Protection Manager
Mark Simonds	Development Manager (Interim) Planning
Ed Watkinson	Senior Planning Systems Officer

This ASR has been approved by:

Christian Allen

Assistant Director, Regulatory Services

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 Oliver Abrams at:

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Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in South Holland District Council during 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. 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 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

South Holland District Council currently does not have any declared AQMAs. A local Air Quality Strategy is under development to prevent and reduce polluting activities.

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

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

1. *"SHDC have presented NO_2 trends for all monitoring locations. This is extremely useful as it allows the reader to easily understand trends relating to NO_2 within the borough. This approach to data/trend presentation is encouraged for future reports.*
2. *SHDC has provided a good, detailed discussion on NO_2 trends within the borough.*
3. *SHDC has presented a list of planning applications approved through 2021 which may have an impact on air quality. This is beneficial to the reader as it allows the reader to see how air quality within the borough may change into the future. This list could be improved by including predicted impacts on air quality by each individual application so it can give the reader more certainty on how air quality within the borough will change in the future.*
4. *Appendix D contains maps showing the locations of each monitoring site which is useful as it allows the reader to see where each monitoring location is and to help make sure that the monitoring network is still fit for purpose. The maps could be made clearer by having only 1 map per page so that each figure can be zoomed in, helping the reader can see more precisely where each monitoring location is.*
5. *Figures A.1 to A.3 should have the AQS objective line going all the way across the graph to make the graph easier to read, understand and interpret.*
6. *There are 2 figures titled 'Figure A.1'. This can cause confusion for the reader and should be corrected for future reports.*
7. *A figure should be produced for the results contained in Table A.8 to show the trends in ozone monitoring in the borough."*

The above comments have been addressed in the 2023 ASR.

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.

During 2022, the Council delivered 12 additional publicly accessible electric vehicle charge points serving 24 spaces, at sites across the District. These were funded primarily through grant funding under the On-Street Residential Charge Point Scheme.

The Council are also supporting the Lincolnshire Clean Air Project, which comprises a bid through the DEFRA Air Quality Grant Scheme alongside the County Council and 6 other Local Authorities. The aim is to produce a public awareness campaign and to work with schools using air quality monitoring equipment to educate students, staff and parents on the causes of air pollution and how we can take action to reduce air pollution around our schools.

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), 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 2022 background concentrations of $PM_{2.5}$ are far below the recommended annual mean AQS target for $PM_{2.5}$ of 20 µg/m^3 (8.6 µg/m^3). The highest concentration is predicted to be 9.1 µg/m^3 within the 1km x 1km grid square with the centroid grid reference of 523500 308500. This is a largely rural area south of Crowland which includes the A16 and Peterborough Road South/ James Road roundabout.

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 2021 fraction of mortality attributable to $PM_{2.5}$ pollution (indicator D01) within South Holland is 5.0%. This is lower than the regional average for the East Midlands (5.6%) and for England as a whole (5.5%). The 2021 fraction of mortality has been used as opposed to the 2022 fraction as the 2022 data is not available at the time of writing.

The South East Lincolnshire Local Plan (2011 - 2036) adopted in March 2019 states:

Policy 30: Pollution

"Development proposals will not be permitted where, taking account of any proposed mitigation measures, they would lead to unacceptable adverse impacts upon:

1. health and safety of the public;
2. the amenities of the area; or
3. the natural, historic and built environment; by way of:
4. **air quality, including fumes and odour;**
5. noise including vibration;
6. light levels;
7. land quality and condition; or
8. surface and groundwater quality.

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

This section sets out the monitoring undertaken within 2022 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 2018 and 2022 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 2022. Table A.1 in Appendix A shows the details of the automatic monitoring sites. 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. 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 2022, 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 Figure D.1 – Figure D.10. 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 40µg/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 2022 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 200 µg/m^3, not to be exceeded more than 18 times per year.

Both automatic monitors report compliance to the NO_2 AQS objective.

During 2022, all diffusion tube monitoring locations continued to report NO_2 concentrations compliant with the NO2 AQS objective, with no reported exceedances in the last 5 years.

From 2021 – 2022, 14 sites recorded an increase in NO_2 concentrations, with an average increase of 1.2 µg/m^3. Figure A.1 – Figure A.3 present graphs showing the annual mean NO2 concentrations from 2018 to 2022. There is a general trend of increase in NO_2 concentrations of monitoring results over the 5-year period for all monitoring sites

The maximum concentration of 32.2 µg/m^3 is reported at triplicate site SH2a, SH2b and SH2c; this passive monitoring location on Winsover Road, Spalding, continues to report the highest concentration within the network, but remains below the AQS objective. The 2022 concentration at this site has returned back to pre-pandemic levels, that align with 2019 concentrations.

Location SH2a, SH2b & SH2c is located close to a level crossing. There is increasing freight traffic being carried on the railway, which has resulted in the crossing being in use for more

extended periods. Location SH6 which displays higher concentrations is adjacent to the main A17, one of the busiest roads in the district.

In accordance with Defra guidance, as annual mean concentrations are well below 60 µg/m^3 at all sites, it is unlikely that any exceedances of the 1-hour mean objective has occurred at any site.

3.1.4 Particulate Matter (PM_{10})

Table A. 6 in Appendix A 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 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 (40 µg/m^3) and 24-hour PM_{10} AQS objective (no more than 35 24-hourly concentrations greater than 50 µg/m^3) has been achieved in 2022 at both automatic monitoring locations.

Over the last 5 years of annual PM_{10} monitoring, PM_{10} concentrations have remained consistent at both Spalding Monkhouse and Westmere School urban background sites. Both sites recorded small changes between 2021 and 2022, with a slight increase at the Spalding Monkhouse School site of 2.5 µg/m^3, and 1.9 µg/m^3 at Westmere School.

The 24-hour mean PM_{10} monitoring for 2022 shows no exceedances of the 50 µg/m^3 AQS objective, which continues the same trend over the last 5 years of monitoring.

3.1.5 Ozone (O_3)

Table A.8 in Appendix A compares the ratified continuous monitored O_3 concentrations in 2022 for O_3.

The number of 8-hour mean O_3 concentrations greater than 100 µg/m^3 reported at the Westmere School automatic monitoring location in 2022 was 20. There is no LAQM air quality objective for O_3, however this does exceed the UK National air quality objective of 100 µg/m^3 not to be exceeded more than 10 times a year.

There are no major emission sources of ozone in the UK. Ozone is formed due to chemical reactions in the presence of sunlight, and is generally higher in rural areas that have less pollutants in the air than urban areas. Ozone levels nationally have been increasing in rural

areas since 2017, and although the levels do fluctuate, the hot dry summer weather of 2022 may have contributed to the increase.

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
SH8a, 8b,8c	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 2022 (%) (2)	2018	2019	2020	2021	2022
CM1	523168	322454	Urban Background	97.4%	97.4%	9.4	9.3	8.5	8.7	8.9
CM2	547264	321709	Urban Background	98.3%	98.3%	9.4	9.3	7.7	7.4	7.8

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☒ **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.TG22 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 2022 (%) (2)	2018	2019	2020	2021	2022
SH1	524388	310520	Urban Background	99.2	99.2	11.1	10.3	8.9	8.8	9.7
SH2a, SH2b, SH2c	524292	322587	Urban Background	99.2	99.2	-	32.1	27.6	29.8	32.2
SH3	525694	321999	Urban Background	99.2	99.2	-	11.0	9.4	9.7	10.7
SH4	536523	325078	Urban Background	99.2	99.2	10.6	10.1	8.9	8.7	9.6
SH5	526585	328726	Roadside	99.2	99.2	13.4	12.8	11.0	11.6	12.1
SH6	535525	325589	Roadside	91.6	91.6	19.2	27.9	20.9	23.8	27.6
SH7	541013	324393	Roadside	99.2	99.2	16.5	26.4	20.0	19.5	21.6
SH8a, SH8b, SH8c	547264	321709	Urban Background	89.6	89.6	9.2	9.6	8.1	7.3	7.9
SH11	520932	336052	Roadside	99.2	99.2	-	15.5	12.7	14.3	14.4
SH13	524595	323793	Kerbside	89.6	89.6	27.1	25.7	21.9	24.0	25.9
SH19 (Former 14)	532684	324311	Roadside	99.2	99.2	-	16.3	13.4	14.5	14.5
SH15	524182	325804	Roadside	91.6	91.6	-	22.3	17.6	19.9	19.6
SH16	524203	331510	Roadside	99.2	99.2	16.1	17.0	12.1	13.4	13.6
SH17	524892	322571	Roadside	91.6	91.6	22.8	20.3	18.7	19.0	22.2
SH18	524191	321328	Roadside	99.2	99.2	20.2	19.8	16.7	17.3	18.7

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☒ **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.TG22 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

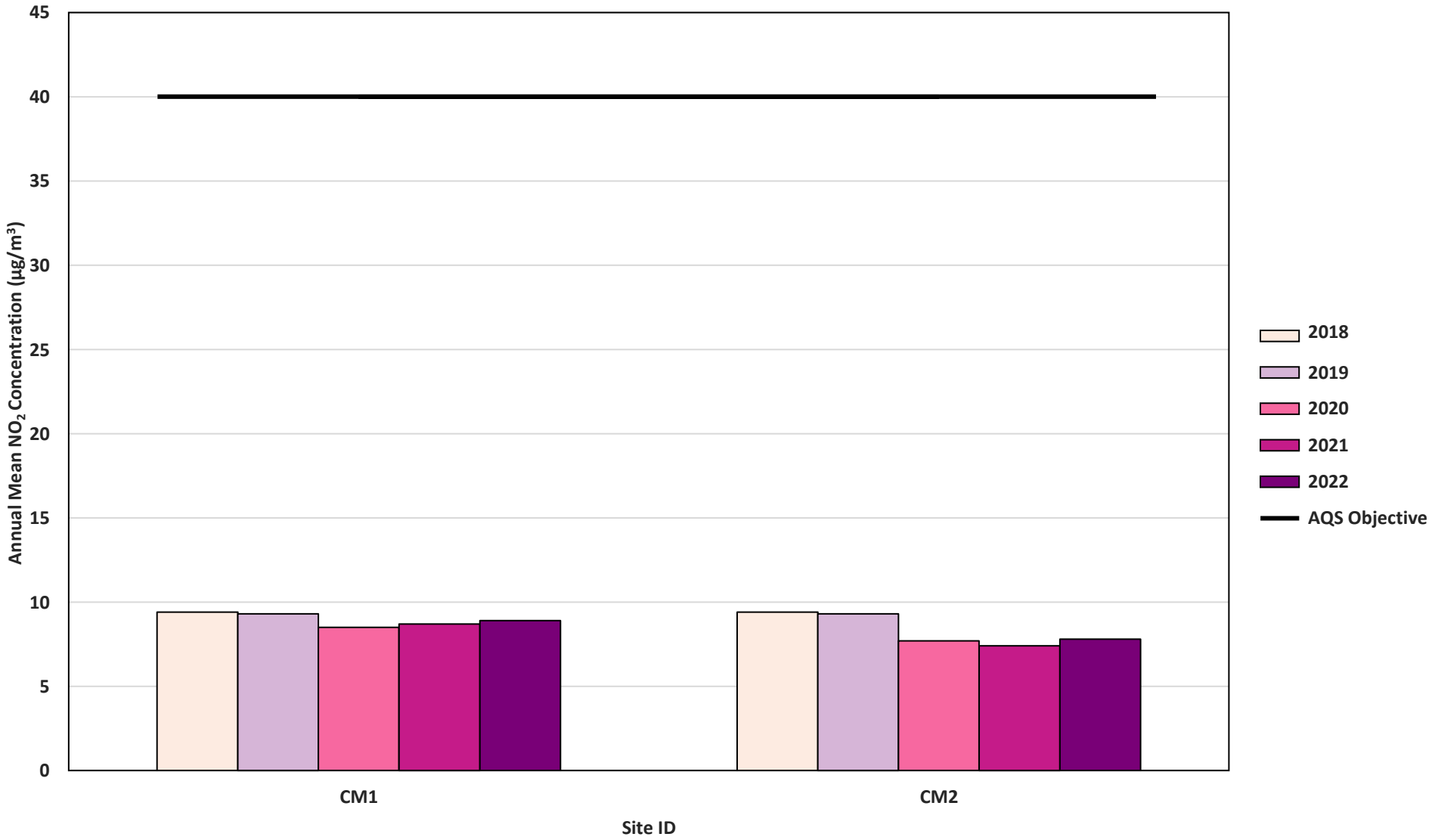


Figure A.2 – Trends in Annual Mean NO_2 Concentrations in Crowland, Gedney, Holbeach, Spalding and Surfleet Seas End

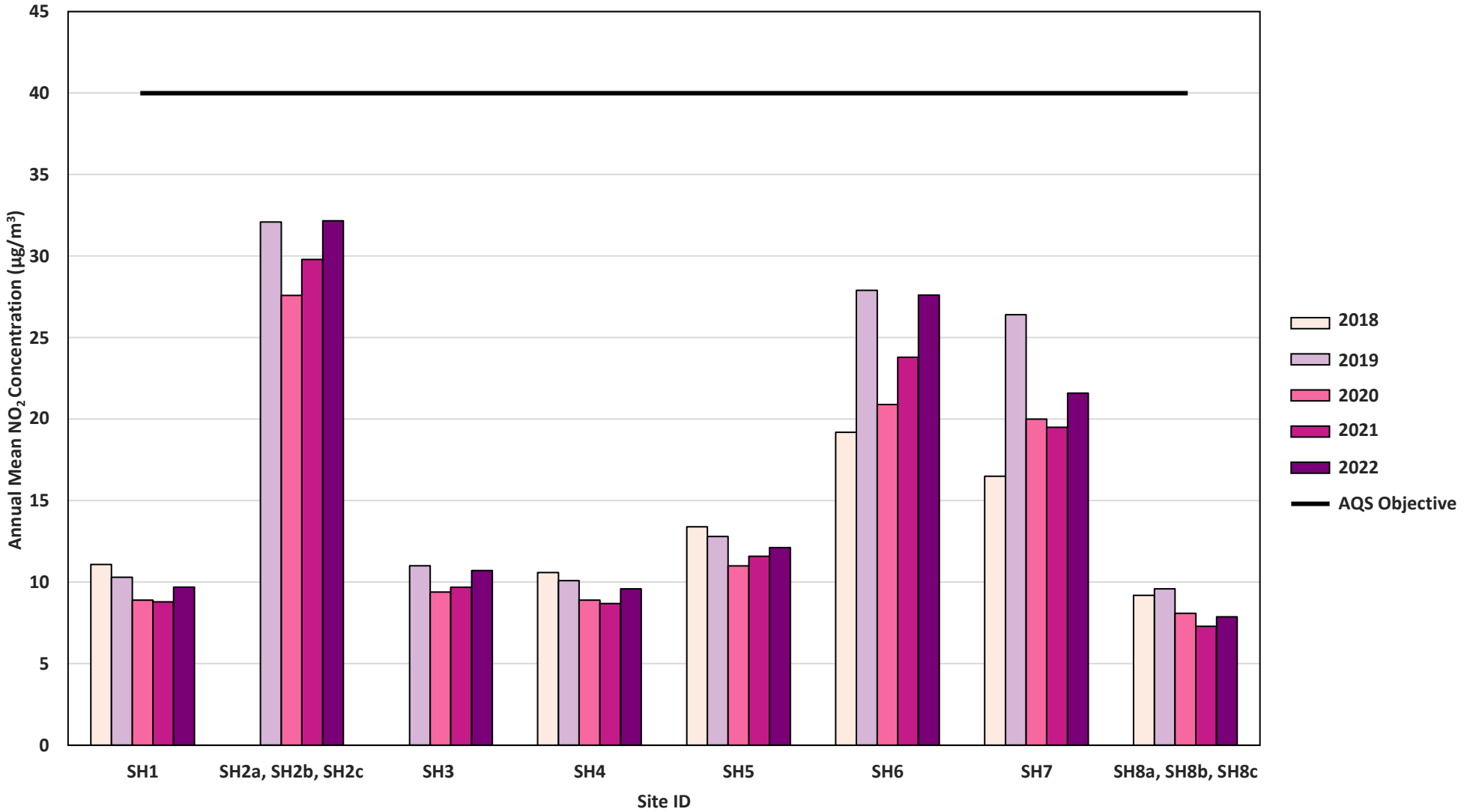


Figure A.3 – Trends in Annual Mean NO_2 Concentrations in Donington, Gosberton, Pinchbeck, Spalding and Whaplode

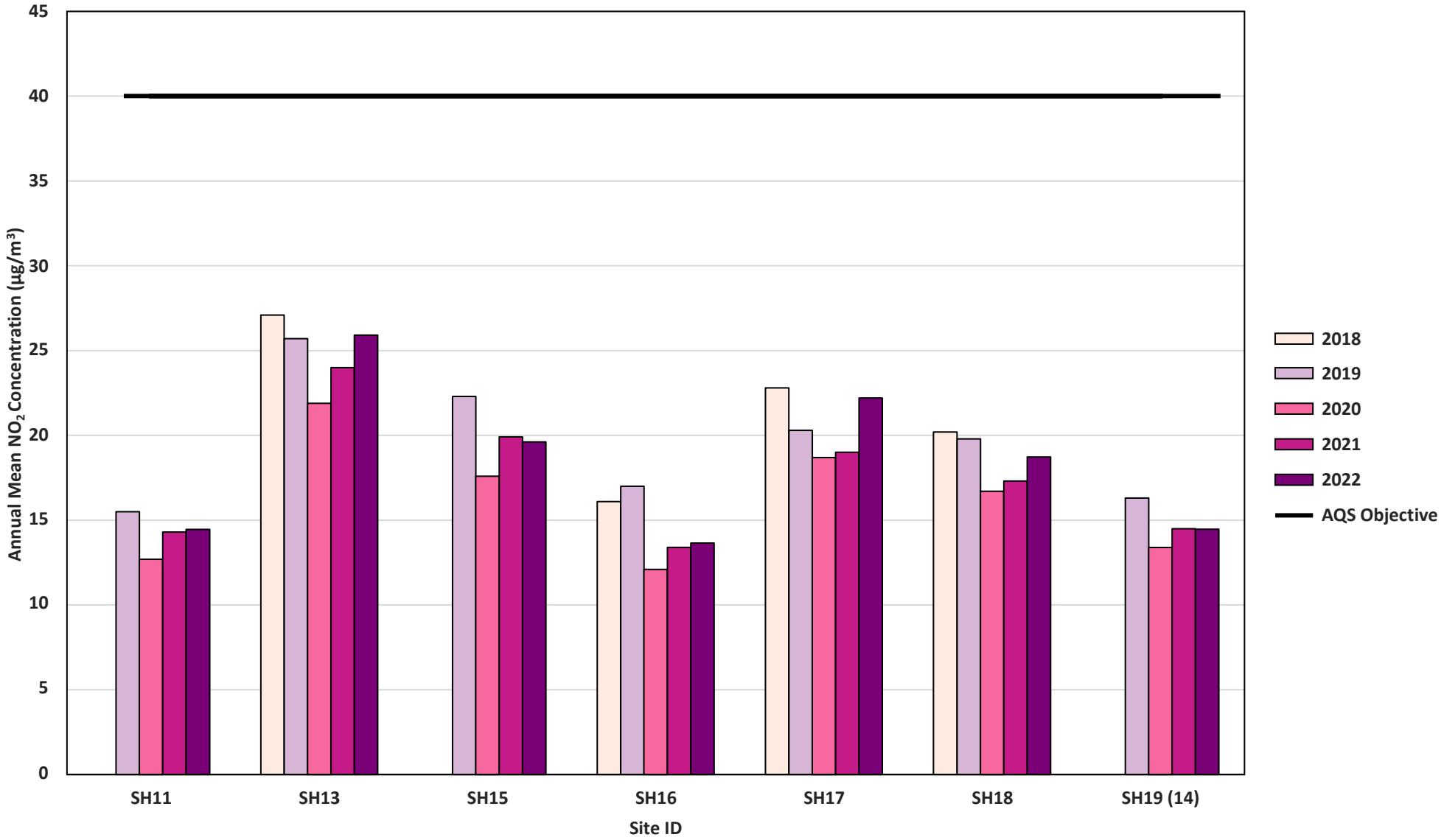


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
CM1	523168	322454	Urban Background	97.4%	97.4%	0	0	0	0	0
CM2	547264	321709	Urban Background	98.3%	98.3%	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 2022 (%) (2)	2018	2019	2020	2021	2022
CM1	523168	322454	Urban Background	95.1	95.1	13.1	13.7	10.9	9	11.5
CM2	547264	321709	Urban Background	96.4	96.4	15.5	14.2	12.9	12.6	14.5

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

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.TG22 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.4 – Trends in Annual Mean PM_{10} Concentrations

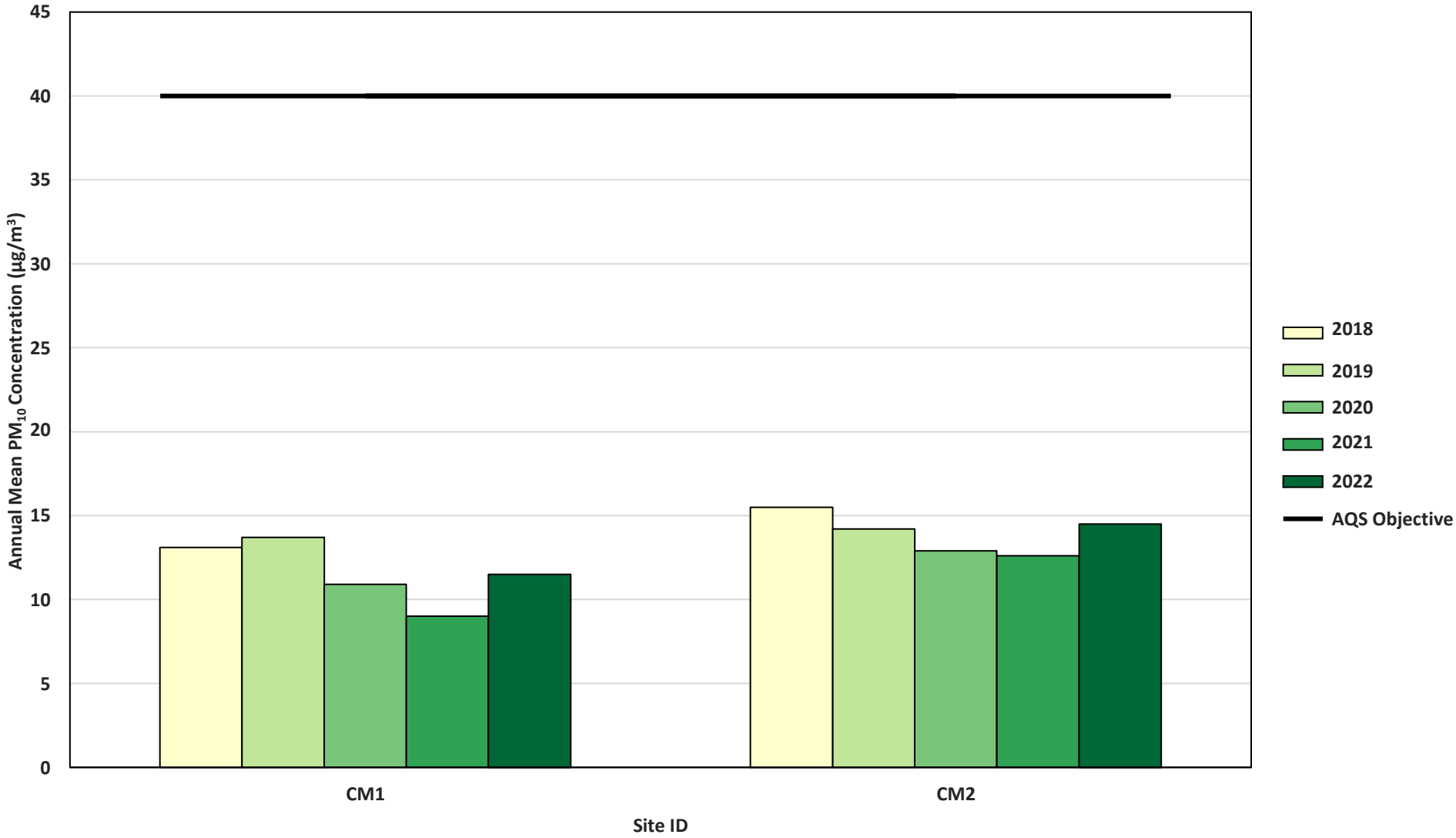


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
CM1	523168	322454	Urban Background	95.1	95.1	1	0	0	0	0
CM2	547264	321709	Urban Background	96.4	96.4	1	0	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 – O_3 Monitoring Results, number of 8-hour mean O_3 concentrations greater than 100 µg/m^3

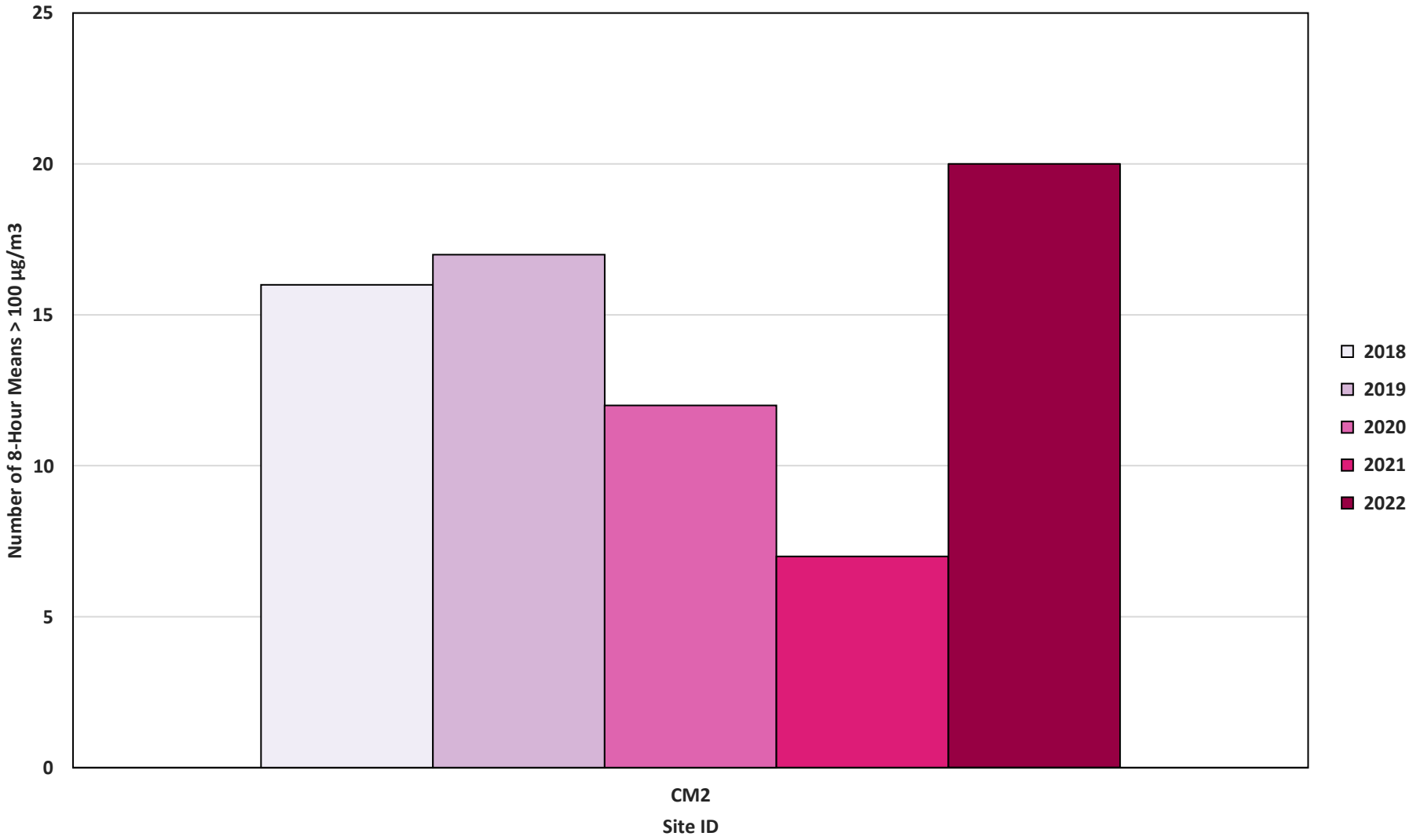
Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
CM2	547264	321709	Urban Background	95.9	95.9	16	17	12	7	20

Notes:

(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.5 – Trends in Number of Relevant Instances for O_3



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.94)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SH1	524388	310520	21.1	11.0	15.1	7.9	7.2	6.8	6.1	7.1	9.4	9.3	14.4	8.2	10.3	9.7	-	
SH2a	524292	322587	46.1	33.4	41.4	30.8	31.6	33.7	29.2	30.0	36.1	39.7	42.4	18.3	-	-	-	Triplicate Site with SH2a, SH2b and SH2c - Annual data provided for SH2c only
SH2b	524292	322587	47.8	36.1	43.6	31.8	31.4	32.2	32.0	29.4	33.7	37.9	39.4	19.7	-	-	-	Triplicate Site with SH2a, SH2b and SH2c - Annual data provided for SH2c only
SH2c	524292	322587	45.6	33.3	40.1	30.8	33.2	31.4	33.1	30.5	35.3	34.5	35.2	21.1	34.2	32.2	-	Triplicate Site with SH2a, SH2b and SH2c - Annual data provided for SH2c only
SH3	525694	321999	21.0	12.6	15.2	8.8	8.6	6.9	6.7	8.0	10.8	13.6	15.3	9.1	11.4	10.7	-	
SH4	536523	325078	20.3	11.3	15.7	8.1	6.7	5.5	6.4	7.3	8.9	10.7	13.5	8.0	10.2	9.6	-	
SH5	526585	328726	21.1	12.8	11.3	12.3	12.5	11.0	9.5	11.5	13.5	14.9	15.0	9.5	12.9	12.1	-	
SH6	535525	325589		56.2	38.0	32.2	26.3	23.7	25.8	33.9	32.2	18.8	22.4	13.7	29.4	27.6	-	
SH7	541013	324393	33.8	21.2	29.0	18.7	21.9	23.4	23.4	14.6	25.7	24.3	26.8	13.0	23.0	21.6	-	
SH8a	547264	321709	17.1	10.0	12.7	6.3	6.6	5.5	4.9	4.9	7.0		11.1	7.1	-	-	-	Triplicate Site with SH8a, SH8b and SH8c - Annual data provided for SH8c only
SH8b	547264	321709	16.9	9.4	13.9	6.7	6.5	5.2	4.9	5.0	6.7		11.2	6.8	-	-	-	Triplicate Site with SH8a, SH8b and SH8c - Annual data provided for SH8c only
SH8c	547264	321709	15.3	9.2	12.3	6.9	6.8	5.6	4.8	4.8	6.6		11.0	6.4	8.4	7.9	-	Triplicate Site with SH8a, SH8b and SH8c - Annual data provided for SH8c only
SH11	520932	336052	25.0	13.5	22.9	13.1	14.7	13.1	13.6	14.9	15.8	19.1	9.3	9.5	15.4	14.4	-	
SH13	524595	323793	43.1	30.7	27.0	22.9	26.4	26.7	22.9	20.9	28.8		34.5	19.3	27.6	25.9	-	
SH19 (Former 14)	532684	324311	24.5	17.5	19.3	12.9	16.0	12.0	12.1	15.8	15.8	13.8	14.6	10.4	15.4	14.5	-	
SH15	524182	325804	32.7	18.7	25.5	17.7	17.4	16.5	17.7	22.1	23.8	23.8		13.5	20.9	19.6	-	
SH16	524203	331510	23.6	12.4	21.0	11.4	12.0	10.5	13.0	10.2	15.1	16.8	18.1	10.3	14.5	13.6	-	
SH17	524892	322571	33.5	23.5		23.2	19.7	22.4	21.5	19.6	24.8	25.9	30.3	15.4	23.6	22.2	-	
SH18	524191	321328	33.4	21.1	25.0	17.4	14.1	19.1	16.8	16.1	18.2	23.1	21.7	13.1	19.9	18.7	-	

☒ **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.TG22.**

☒ **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 2022 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 During 2022

The Council has identified a number of planning applications approved through 2022 which may have an impact on air quality concentrations. These planning applications relate to residential developments, including the following:

Planning Reference	Address	Residential Units
H23-0827-22	Stockwell Gate Whaplode	Major Small Dwelling
H09-0845-22	Land to West of Fen Road & Tudor Way	100 Dwellings
H14-0420-22	Pinchbeck Fields Off Wardentree Lane	96 Dwellings
H11-0552-22	Land Adjacent 36 Lime Walk Long Sutton	70 Dwellings
H16-0116-22	Site to South West of Spalding with access from Broadway to the North & B1172	150 Dwellings
H09-0879-22	Land East of Chaffinch Way Holbeach	81 Dwellings
H09-0251-22	Land off Northon's Lane Holbeach	103 one, two, three & four bed 2 storey traditional residential homes
H18-0005-22	Land Adj. Nightingale Way, Granville Terrace, Withington Street & Chestnut Terrace	123 Dwellings
H11-1346-21	Land between Seagate Road & Wisbech Road Long Sutton	171 Dwellings
H11-0076-22	Land between Seagate Road & Wisbech Road Long Sutton	215 Dwellings

Additional Air Quality Works Undertaken by South Holland During 2022

South Holland District Council has not completed any additional works within the reporting year of 2022.

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. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 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.TG22 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 0.94 to the 2022 monitoring data due to locality rather than the national bias adjustment. A summary of bias adjustment factors used by South Holland District Council over the past five years is presented in Table C.1.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	Local	-	0.94
2021	Local	-	0.79
2020	Local	-	0.80
2019	Local	-	0.83
2018	Local	-	1.02

Table C.2 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Factor A	0.94 (0.84 - 1.06)
Bias Factor B	6% (-6% - 18%)
Diffusion Tube Mean (µg/m^3)	8.4
Mean CV (Precision)	3.5%
Automatic Mean (µg/m^3)	7.9
Data Capture	98%
Adjusted Tube Mean (µg/m^3)	8 (7 - 9)

Notes:

A single local bias adjustment factor has been used to bias adjust the 2022 diffusion tube results.

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.

No diffusion tube NO_2 monitoring locations within South Holland District Council required distance correction during 2022.

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. 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, 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.

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: Spalding

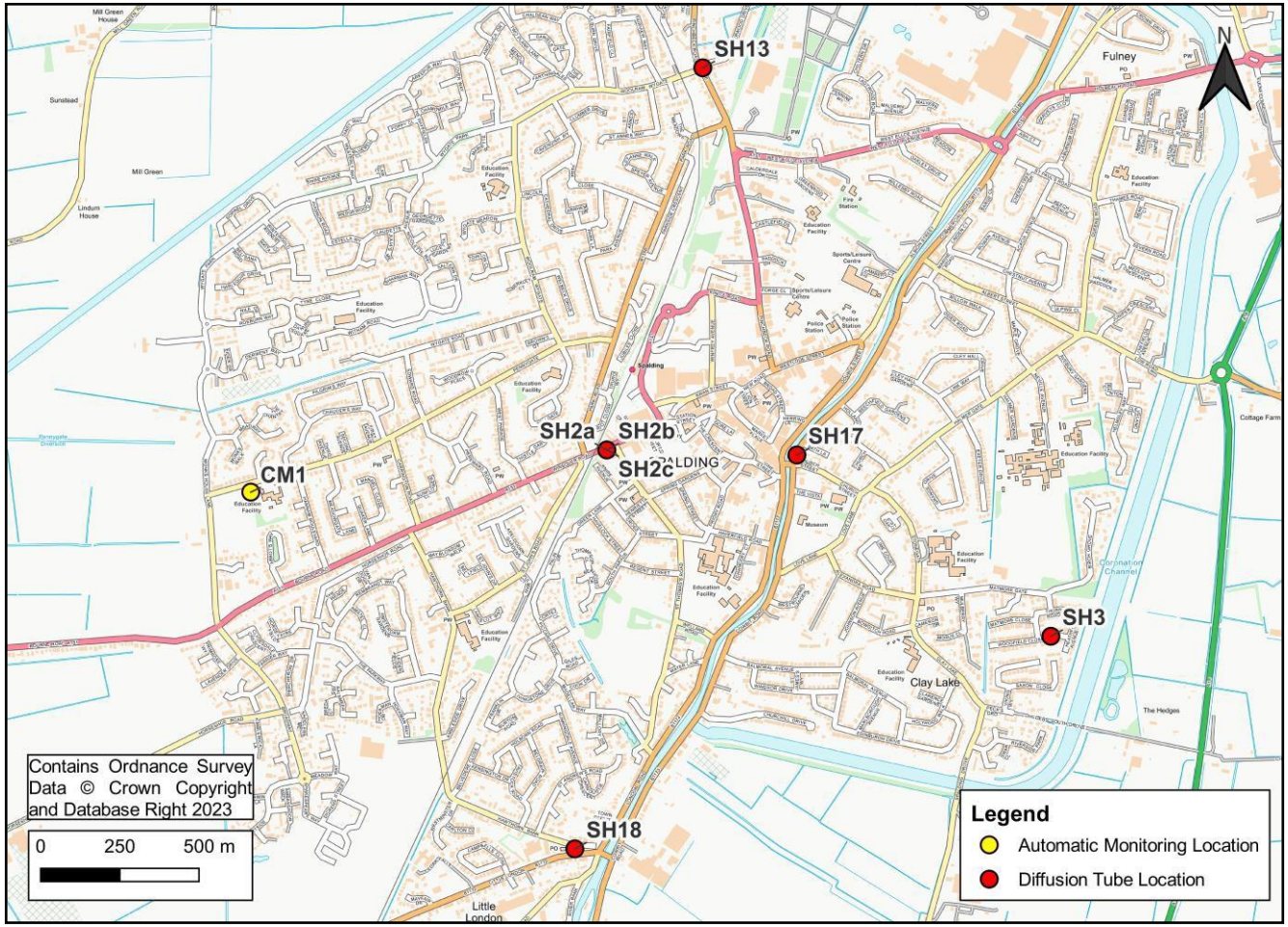


Figure D.2 – Map of Non-Automatic Monitoring Sites: Sutton Bridge

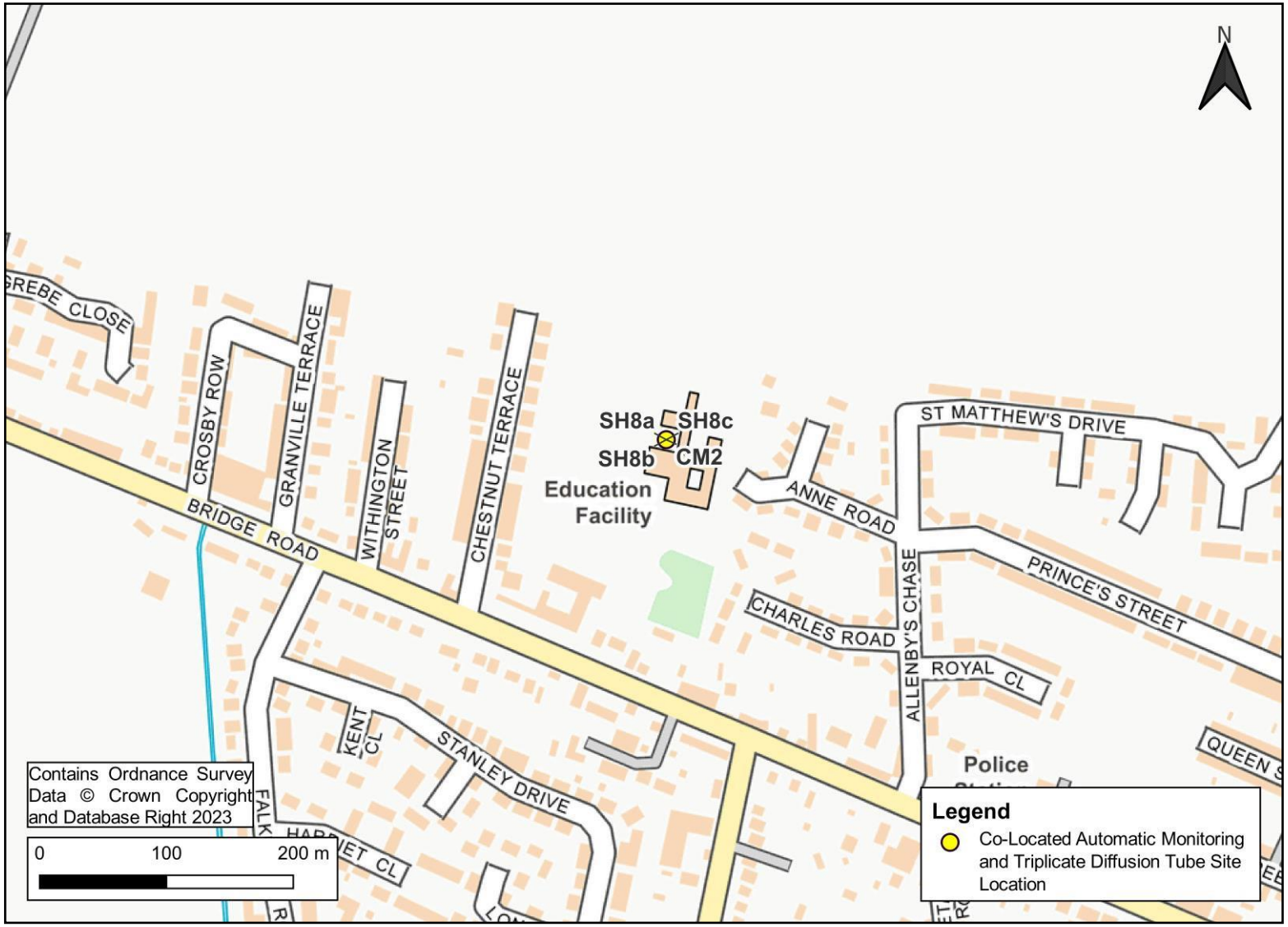


Figure D.3 – Map of Non-Automatic Monitoring Sites: Crowland

Figure D.4 – Map of Non-Automatic Monitoring Sites: Whaplode

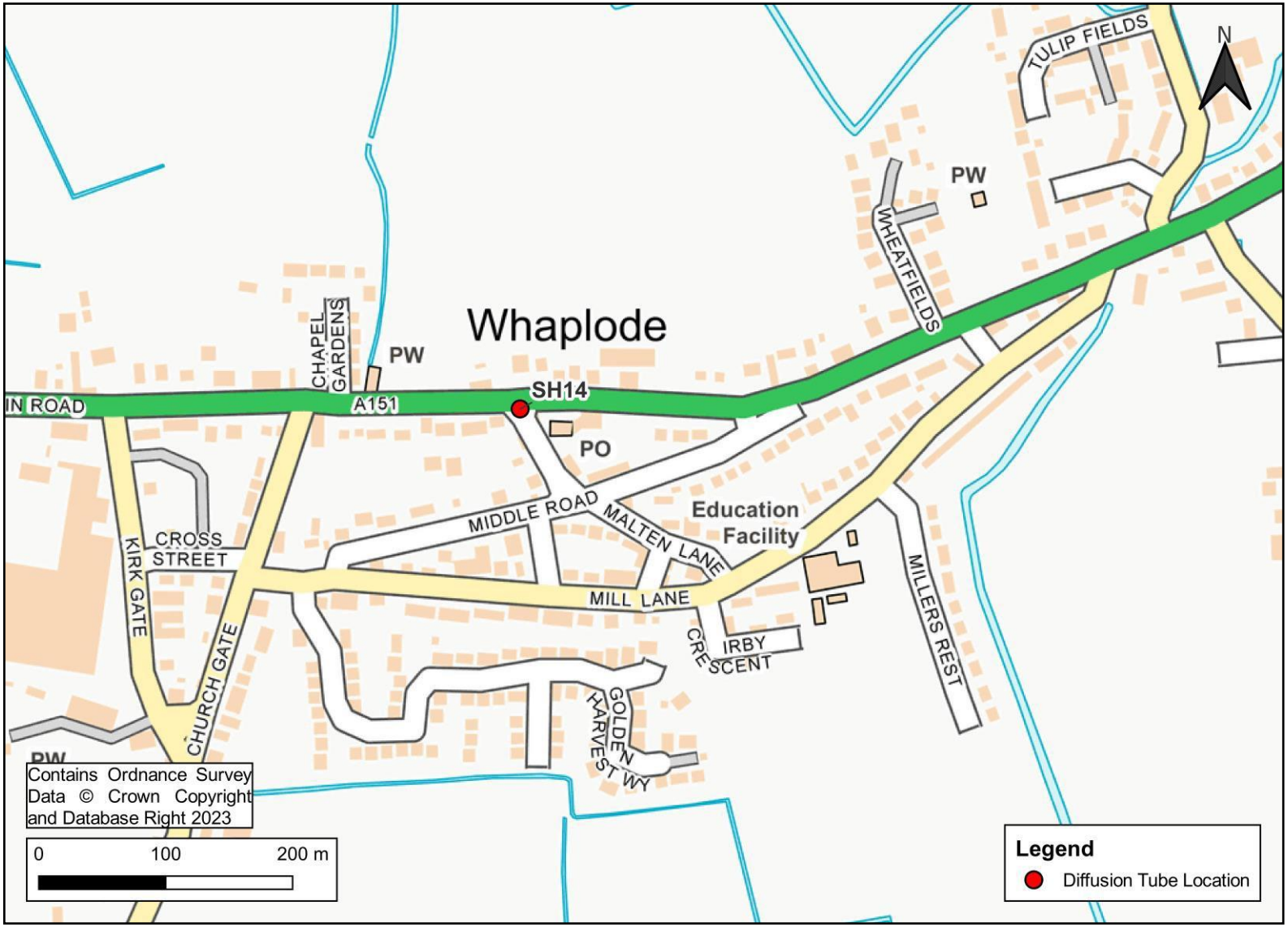


Figure D.5 – Map of Non-Automatic Monitoring Sites: Holbeach

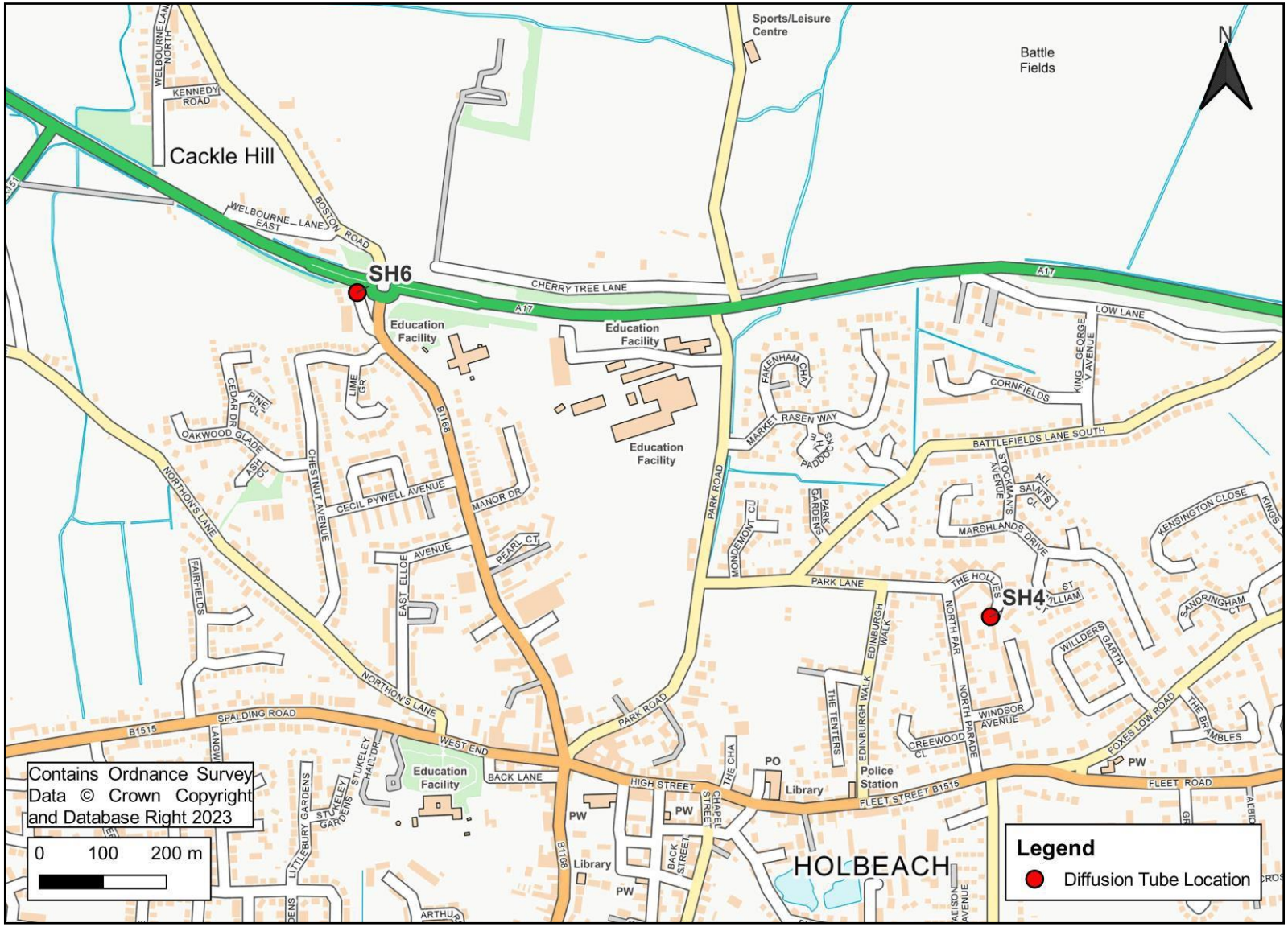


Figure D.6 – Map of Non-Automatic Monitoring Sites: Gedney

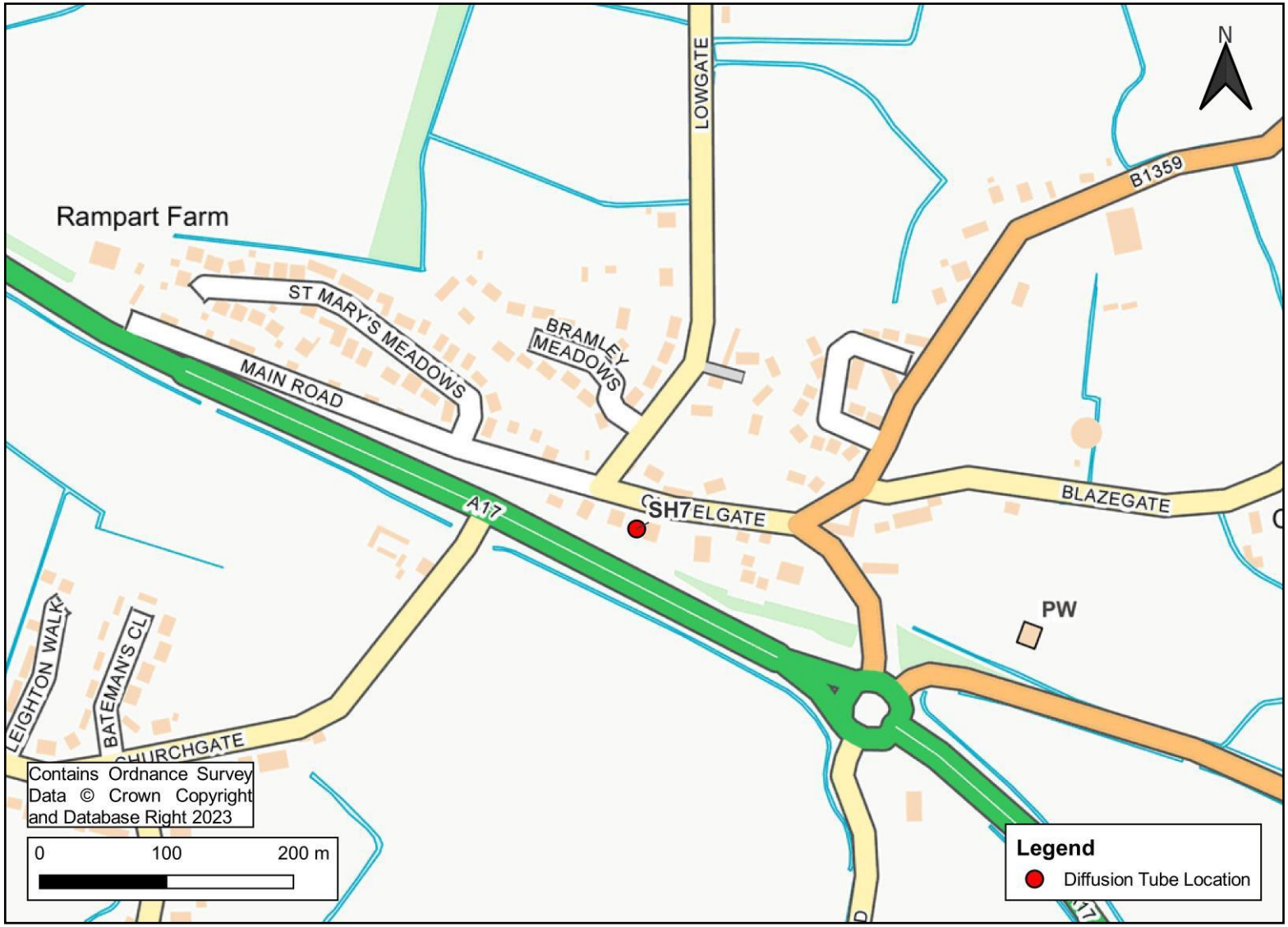


Figure D.7 – Map of Non-Automatic Monitoring Sites: Pinchbeck

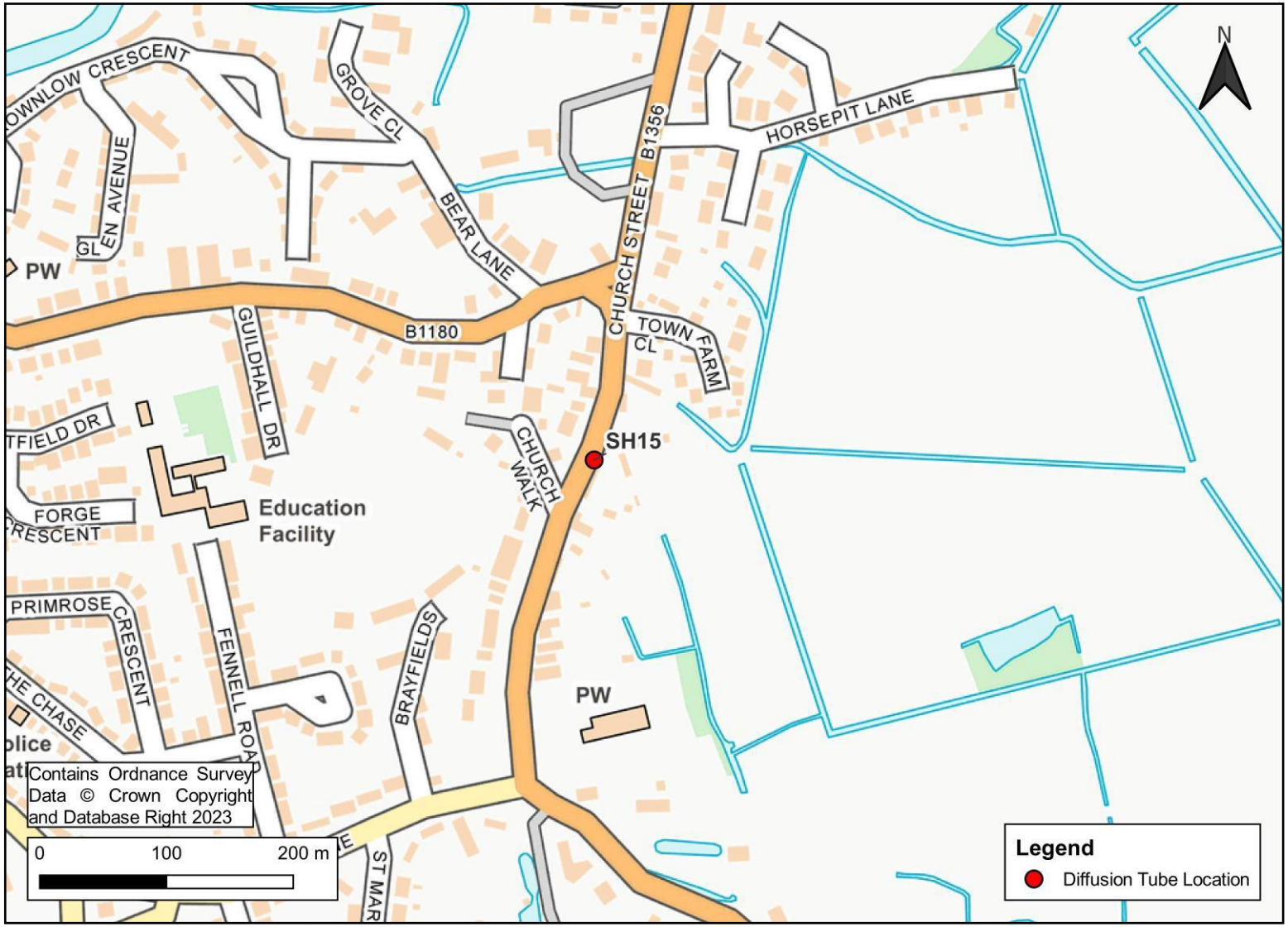


Figure D.8 – Map of Non-Automatic Monitoring Sites: Gosberton

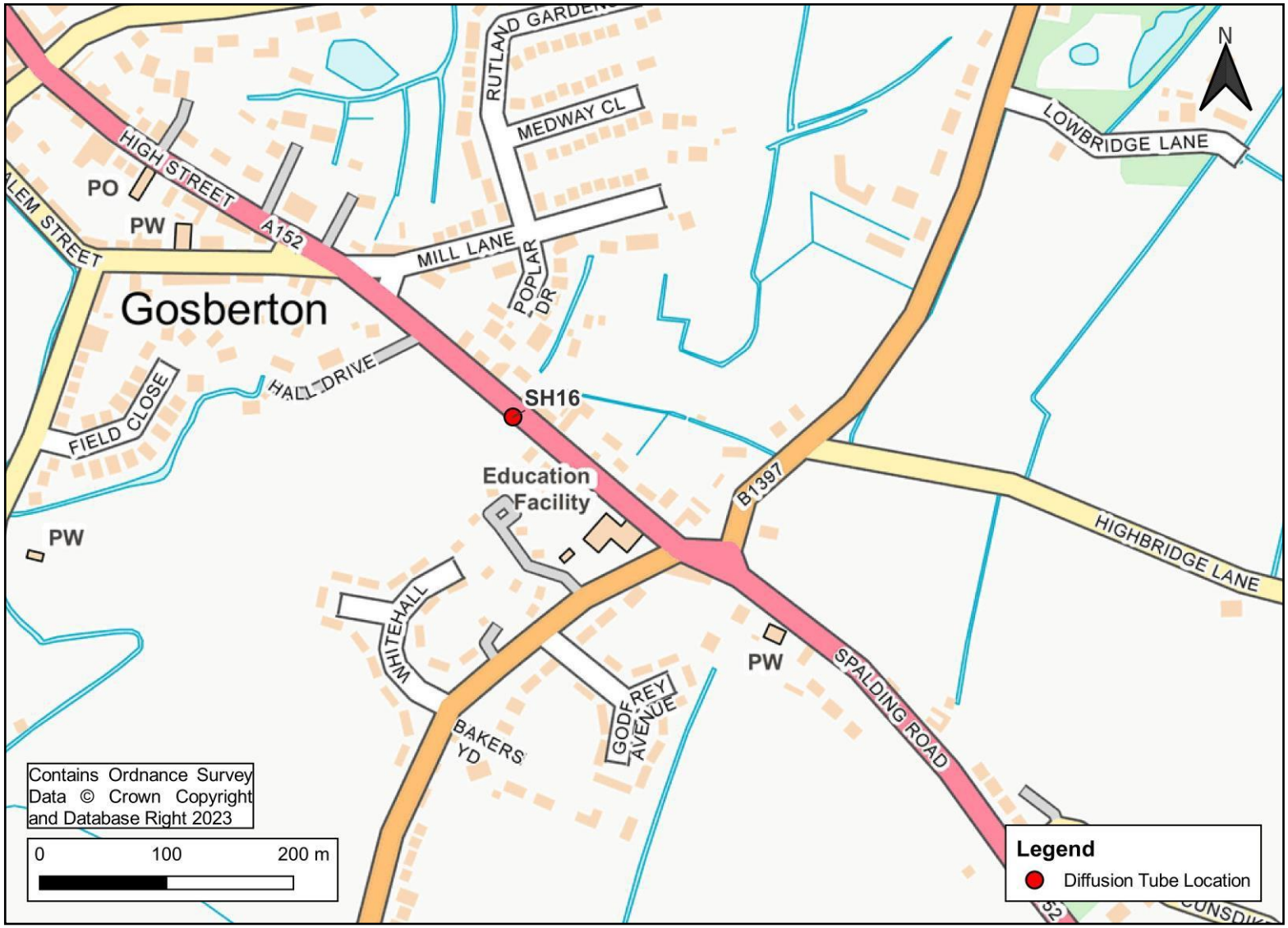


Figure D.9 – Map of Non-Automatic Monitoring Sites: Donington

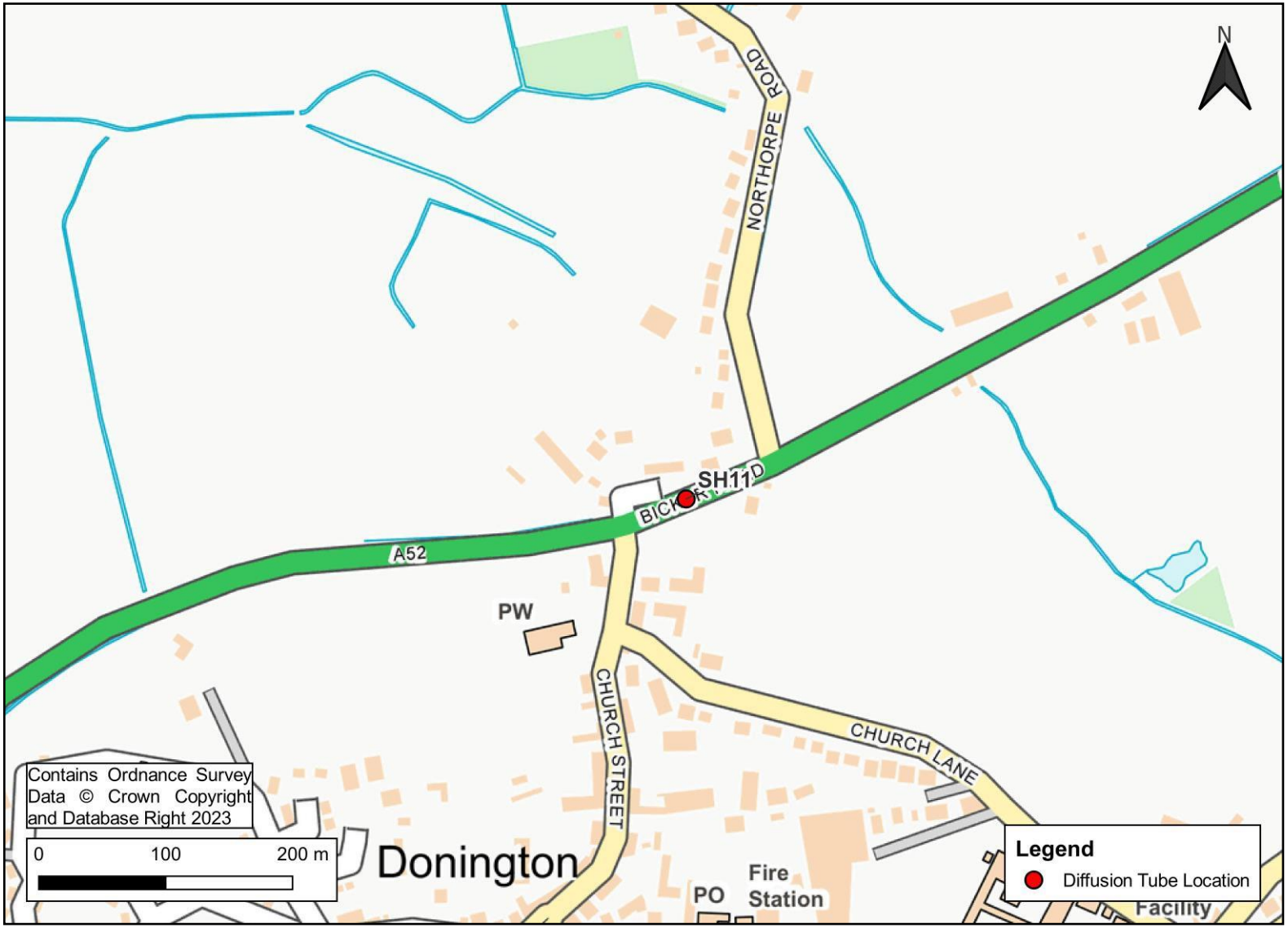


Figure D.10 – Map of Non-Automatic Monitoring Sites: Surfleet Seas End

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 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
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
O_3	Ozone
AQS	Air Quality Standard

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. 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.PG22. August 2022. 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 2022.
- South Holland District Council Annual Status Report Appraisal Report. September 2022.