



***North Kesteven District Council
Annual Status Report 2020***

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June 2020

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Document Control Sheet

Identification	
Client	North Kesteven District Council
Document Title	North Kesteven 2020 Annual Status Report
Bureau Veritas Ref No.	7727595/v1.0

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Configuration				
Version	Date	Author	Reason for Issue/Summary of Changes	Status
1.0	29/06/2020	M Hebblethwaite	Draft for comment	Draft

	Name	Job Title	Signature
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North Kesteven
DISTRICT COUNCIL

2020 Air Quality Annual Status Report (ASR)

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

June 2020

North Kesteven District Council

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Executive Summary: Air Quality in Our Area

Air Quality in North Kesteven District

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 various forms of cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equality and social justice issues because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

The District of North Kesteven is predominantly rural in character and has the town of Sleaford as its administrative centre. The District extends close to the boundary of the city of Lincoln, incorporating the towns of North Hykeham and Waddington.

The main source of air pollution within North Kesteven is road traffic emissions from the expansive road network across the District; notably the A15, A17 and the A46. In addition there are over 40 industrial processes located within the District that are permitted under the Environmental Permitting (England and Wales) Regulations 2010⁴.

Monitoring of air pollution is predominantly undertaken for nitrogen dioxide (NO₂) through the use of low cost diffusion tubes. Following a review of the NO₂ diffusion tube monitoring network changes were made to some sites in 2019: three existing tubes were relocated to locations that were more representative of relevant exposure; Branston (Tube18), Huston Drive (Tube 3) and North Hykeham (Tube 17).

Branston has been moved from its location on B1188 to station road junction, its previous location was on the edge of the village away from the majority of the population. This has now been placed at a site more relevant of exposure near to residential dwellings. Huston Drive was relocated to a roadside location along Dore Avenue due to the tube persistently going missing but still within the same urban area.

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

⁴ <https://www.gov.uk/government/publications/environmental-permitting-guidance-core-guidance--2>

Finally St Nicholas has been relocated to Redwood Drive (Waddington 2) since St Nicholas has long been under air quality objectives and there are no residential receptors nearby. Redwood drive has a new housing development close by and is therefore deemed more pertinent to relocate it here.

In 2019 the NO₂ diffusion tube network consisted of 22 monitoring sites comprising of 24 diffusion tubes, including a triplicate roadside exposure site located on Sleaford Road (BH1, BH2, BH3).

In 2019 there were no recorded exceedances of the Air Quality Strategy (AQS) objectives at any of the monitored sites within the current monitoring network, therefore there continues to be no Air Quality Management Areas (AQMAs) designated within the District.

Actions to Improve Air Quality

Historically, air quality within North Kesteven has consistently complied with the UK AQS objectives. Over the past five years there have been no exceedances of the annual mean NO₂ AQS objective. With continued levels of development being experienced across the District, an emphasis on air quality is important to ensure areas of poor air quality are identified and acted upon. Across the District air quality continues to be assessed through the monitoring network whereby any areas of poor air quality would be identified. Due to the consistent compliance of the AQO across the district, no AQMAs have been declared and therefore the council have not published an Air Quality Action Plan (AQAP). The council continues to review their annual NK-Plan⁵, including introducing the Our Environment corporate priority in 2018, and declaring a climate emergency in 2019 so that greenhouse gas emissions reductions remains one of the key environmental strategies within the district.

Conclusions and Priorities

Currently North Kesteven District Council does not have any AQMAs and monitoring continues to report compliance with the NO₂ annual objective. There remains no need to declare any Air Quality Management Area (AQMA) in the District.

The air quality within North Kesteven is considered good, therefore a priority for the council is to seek opportunities to reduce further the District's pollutant levels and

⁵ <https://www.n-kesteven.gov.uk/your-council/facts-and-figures-about-the-council/council-performance/the-nk-plan/>

ensure that there continues to be no areas of exceedance throughout the District. The Council continues to review the effectiveness of its monitoring and will implement some further changes in 2020 to ensure that it continues to be relevant to the risks of poor air quality. The focus continues to be on NO₂, with no planned particulate monitoring within the district. The Defra Background Maps⁶ for the district, for example, reports concentrations well below the AQO for both PM_{2.5} (25 ug/m³ annual mean AQO 2020 target) and PM₁₀ (annual mean AQO 40 ug/m³) with a maximum 1km grid square annual mean concentration of 10.1ug/m³ and 18.2ug/m³, respectfully.

Local Engagement and How to get Involved

Energy and fuel efficiency, including renewable energy tariffs at a number of council buildings, and telemetrics systems in our refuse and recycling fleet, are amongst a number of projects progressed and which have contributed to the reduction of the council's energy and fuel consumption by over 60% in the last ten years, saving approximately £150,000 per year⁷. This has been part of its long standing understanding of its responsibility to tackle climate change in house and across the district. North Kesteven District Council continued its aim to support others to take action, and provides information on key environmental and sustainability indicators through the annually reviewed NK Plan, the Our Environment corporate priority, and declaration of a climate emergency. Council initiatives provide public information on air pollution sources; reducing energy use, how to reduce vehicle emissions, and on many other sources of pollution linked to the environmental sustainability agenda. Information is provided through the council's website⁸ and by inclusion in general corporate newsletters that provide details on current activities, schemes and initiatives available. The Our Environment priority activities have included developing ways to directly promote reductions in concentrations of air pollutants, primarily through public behavioural shifts.

⁶ Defra Background Mapping data for local authorities (2017-based), available online at <https://uk-air.defra.gov.uk/data/laqm-background-home>

⁷ <https://www.n-kesteven.gov.uk/your-council/how-the-council-works/key-plans-strategies-and-policies/policies/environment/>

⁸ <https://www.n-kesteven.gov.uk/residents/waste-recycling-and-environment/what-can-you-do/>

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1 Local Air Quality Management

This report provides an overview of air quality in the North Kesteven District Council area during 2019. 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 North Kesteven District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Appendix E: Summary of Air Quality Objectives in England. Actions to Improve Air Quality

1.1 Air Quality Management Areas

Air Quality Management Areas (AQMA) are declared when there is an exceedance, or likely exceedance of an AQS objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

Currently North Kesteven District Council does not have any AQMA.

Based upon the NO₂ monitoring data in 2019, and in previous years being consistently below the relevant AQS objectives (see monitoring section, Appendix A), there remains no need for the Council to declare an AQMA.

1.2 Progress and Impact of Measures to address Air Quality in North Kesteven

Defra's appraisal of the 2019 ASR concluded that the 2018 monitoring results demonstrated compliance with the national AQS objectives for NO₂ at all sites across the District. Defra notes that North Kesteven may wish to consider the development of measures for the reduction of PM_{2.5}, recognising that all local authorities should contribute to endeavours to reduce levels of this pollutant, but in England, have no statutory duty to do so.

DEFRA's review of the 2019 ASR mentioned several developments which may impact air quality within the District, including a mixed-use development of the former Advanta Seeds site, and four free range poultry units. The North Kesteven Planning Department concluded that no screening assessment was required in relation to the development of the Advanta Seeds Site, a decision which was supported by the local Environmental Health Officer.

Notwithstanding the fact that air quality in the District complies with the relevant standards, North Kesteven District Council has continued to take forward a number of measures during the current reporting year of 2019. Smoke Control Areas have remained in force within North Hykeham⁹. In addition, the range of activities and projects under the Our Environment priority, delivered continued reductions greenhouse gas emissions. Advice on using wood and coal for home heating while preventing smoke pollution can also be found at <https://www.n-kesteven.gov.uk/residents/living-in-your-area/environmental-protection/pollution-and-nuisance/air-quality/>.

The current monitoring network is to remain at 22 after the previous year's increase of 6 tubes. North Kesteven recognises that the new monitoring sites will play an important part in informing Central Lincolnshire's Local Plan¹⁰, whereby air quality improvement areas may be examined and acted upon where necessary.

Air quality measures are inextricably linked to measures contained in the councils Our Environment priority low carbon and sustainability activities and adopted CO₂ district

⁹ North Hykeham Smoke Control Areas, available online at <https://www.n-kesteven.gov.uk/residents/living-in-your-area/environmental-protection/air-quality/>

¹⁰ <https://www.n-kesteven.gov.uk/residents/planning-and-building/planning/planning-policy/central-lincolnshire-local-plan/>

emissions reduction target, along with its aim to tackle all greenhouse gas emissions.

Key completed measures are:

- **Smoke Control Areas:**
 - Regulation of an area where smoke cannot be emitted from a chimney unless an authorised fuel is being burnt or an exempt appliance is being used.
- **Transport:**
 - Purchasing telematics monitoring system to monitor emissions from refuse and recycling fleet vehicles
 - The installation of public electric car charging points
 - Promotion of alternatives to using private vehicles and low emissions vehicles
 - Working to ensure new developments become more integrated with public transport networks
- **The Built Environment**
 - Introduced the NK Heritage Fund to support improvements to heritage properties including energy efficiency measures
 - Council buildings switched to renewable energy tariffs
 - Low energy and carbon building standards investigated to inform review of council new build standards
 - Supporting businesses to access resource efficiency support and funding
- **Low Carbon Energy Generation**
 - Investigated and pursuing energy generation development for site based decentralised or renewable energy infrastructure

The priorities for North Kesteven for the coming year are to continue to review the current NO₂ diffusion tube monitoring network to allow the identification of any potential exceedances of the AQS objectives and, work to review the NK Plan and Our Environment priority, and develop a Climate Emergency Strategy and Action Plan. The

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approach on the latter is primarily focussed on measuring, monitoring and tackling CO₂ emissions, but also investigating the means to reduce other greenhouse gas emissions such as NO₂.

North Kesteven is also looking to undertake some air quality monitoring within the district as they have just purchased 2 hand held air quality monitors. These are going to be deployed at 2 schools within the district along with some NO₂ diffusion tubes. This will coincide with an education initiative called Clean Air Day which is planned for later in 2020 when the schools are back from the summer break. Depending on its initial success it is envisioned that this will be rolled out across several schools in the region.

1.3 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.

There is currently no ongoing monitoring of PM₁₀ or PM_{2.5} within the District, and currently no specific measures in place to address PM_{2.5} concentrations. Background concentrations within the District assessed using the Defra background maps continue to be low; the highest concentration of PM_{2.5} within the 2019 dataset was recorded as 10.1µg/m³, which is well below the 2020 annual mean objective target of 25 ug/m³, and is located within the 1km grid square x491500, y370500; which is an area encompassing Doddington and the A46.

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 2018 fraction of mortality attributable to PM_{2.5} pollution across England is 5.2%, with North Kesteven region reporting 5.0%. As is seen for NO₂ emissions, traffic emissions are the main cause of anthropogenic particulate (both PM₁₀ and PM_{2.5}) emissions within the District, and as such, the implementation of the transport measures given in Section 2.2 should help reduce PM_{2.5} concentrations experienced across the District.

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

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

North Kesteven District Council did not carry out any automatic monitoring for any pollutants in 2019.

2.1.2 Non-Automatic Monitoring Sites

North Kesteven District Council undertook non-automatic (passive) monitoring of NO₂ at 22 sites during 2019, Appendix A: Monitoring Results provides details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

In 2019 the NO₂ diffusion tube network consisted of 22 monitoring sites comprising of 24 diffusion tubes, including a triplicate site.

Following a review of the NO₂ diffusion tube monitoring network changes were made to some sites in 2019: three existing tubes were relocated to locations that were more representative of relevant exposure; Branston (Tube 18), Huston Drive (Tube 3) and North Hykeham (Tube 17).

Branston has been moved from its location on B1188 to station road junction, its previous location was on the edge of the village away from the majority of the population. This has now been placed at a site more relevant of exposure near to residential dwellings. Huston Drive was relocated to a roadside location along Dore Avenue due to the tube persistently going missing but still within the same urban area. Finally St Nicholas has been relocated to Redwood Drive (Waddington 2) since St Nicholas has long been under air quality objectives and there are no residential receptors nearby. Redwood drive has a new housing development close by and is therefore deemed more pertinent to relocate it here.

In 2019 there were no recorded exceedances of the NO₂ AQS objectives at any of the monitored sites within the current monitoring network, therefore distance correction

was not required at any of the sites, as per the Defra Technical Guidance¹¹, and there continues to be no Air Quality Management Areas (AQMAs) designated within the District.

There are no scheduled increases planned in the diffusion tube network for 2020 after the three tube relocations this year.

2.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

2.2.1 Nitrogen Dioxide (NO₂)

Table A 2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³. Note that the concentration data presented in Table A.2 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 2019 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.

As the data from all the diffusion tubes installed in 2019 is well below the annual mean AQS objective of 40µg/m³, distance correction was not required to any sites not located at locations of relevant exposure. One diffusion tube (Sites Navenby) had a data capture for 2019 that was less than 75%, therefore annualisation was completed for this monitoring site. Full details of the annualisation process is presented in Appendix C, and the site used in the annualisation calculation for Site Navenby are presented in Table C 1.

¹¹ <https://laqm.defra.gov.uk/technical-guidance/>

There are no sites where the NO₂ annual mean is greater than 60µg/m³, therefore in accordance with Defra LAQM.TG(16) there are no sites likely to be at risk of exceeding the 1-hour mean AQS objective.

The results of NO₂ diffusion tube data (2015 – 2019) are presented in Table A 2 in Appendix A and a chart displaying the trends in annual mean NO₂ concentrations over the past five years is presented in Figure A 1.

For the three relocated monitoring sites; Branston (Tube 18), Huston Drive (Tube 3) and North Hykeham (Tube 17), the data for previous years (<2018) has been considered in this report for Huston Drive and North Hykeham since they have been only slightly relocated. The monitoring data for the previous monitoring locations can also be found within the 2019 ASR¹².

¹² <https://www.n-kesteven.gov.uk/resources/assets/attachment/full/0/74947.pdf>

Appendix A: Monitoring Results

Table A 1– Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
A	Newark Road / Station Road, North Hykeham	Roadside	493845	366567	NO ₂	NO	7.5	4	NO	2.5
B	Asda/ Newark Road, North Hykeham	Kerbside	495050	367421	NO ₂	NO	14.9	0.6	NO	2.1
C	9 Dore Avenue, North Hykeham	Urban Background	494829	366698	NO ₂	NO	7.8	2.7	NO	2.2
D	St Hughs Drive, North Hykeham	Urban Background	494159	367115	NO ₂	NO	6.3	22.6	NO	2.3
Sleaford	Southgate, Sleaford	Roadside	506835	345684	NO ₂	NO	1.4	1.4	NO	2.3
Holdingham 1	Walnut Cottage	Urban Background	505704	347269	NO ₂	NO	64.4	1.48	NO	1.9
Holdingham 2	A15 (south) Junction	Urban Background	505985	347343	NO ₂	NO	1.8	6.1	NO	1.8
Sleaford-1	Pedestrian Area of Town	Urban Background	506753	345719	NO ₂	NO	0	48.2	NO	2

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
Branston	251/253 Lincoln Road	Rural	499012	369017	NO ₂	NO	0	2.9	NO	2.6
Canwick	Heighington Road	Roadside	498561	369494	NO ₂	NO	39	0	NO	2.5
Grantham Road	12-14 Grantham Road, Sleaford	Roadside	506601	345300	NO ₂	NO	0	1	NO	2.2
Ruskington	Winchelsea Road	Roadside	508316	350447	NO ₂	NO	0	1	NO	2.5
BH (1,2,3)	Bracebridge Heath, Sleaford Road	Roadside	498000	367544	NO ₂	NO	7	1	NO	2.5
Waddington	A607 Grantham Road	Roadside	497718	363898	NO ₂	NO	7.5	1	NO	2.5
Westbanks	Westbanks, Sleaford	Roadside	506507	345744	NO ₂	NO	0	1	NO	2.5
Waddington 2	Waddington 2	Kerbside	496425	365685	NO ₂	NO	4.4	1.6	NO	1.8
Aubourn	Aubourn	Kerbside	492630	362640	NO ₂	NO	4.2	1.8	NO	1.8
Witham St Hughs	Witham St Hughs	Kerbside	489199	361790	NO ₂	NO			NO	1.8
Harmston	Harmston	Kerbside	497006	362368	NO ₂	NO	6.2	1.2	NO	1.8
Metheringham	Metheringham	Urban Background	506126	361636	NO ₂	NO	66.5	1.2	NO	1.8
Navenby	Navenby	Kerbside	498841	357758	NO ₂	NO	7	1.6	NO	1.8

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
Heckington	Heckington	Kerbside	514514	343906	NO ₂	NO	2.9	1.5	NO	1.8

Notes:

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

(2) N/A if not applicable.

Table A 2– Annual Mean NO₂ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2019 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
							2015	2016	2017	2018	2019
A	493845	366567	Roadside	Diffusion Tube	92	92	33.8	36.6	33.4	33.0	32.2
B	495050	367421	Kerbside	Diffusion Tube	92	92	27.5	25.9	21.7	25.0	22.1
C	494829	366698	Urban Background	Diffusion Tube	100	100	14.9	14.1	14.7	15.3	15.4
D	494159	367115	Urban Background	Diffusion Tube	83	83	14.0	16.6	11.9	16.1	13.9
Sleaford	506835	345684	Roadside	Diffusion Tube	75	75	25.3	25.6	24.0	27.3	24.2
Holdingham 1	505704	347269	Urban Background	Diffusion Tube	100	100	-	-	-	22.0	19.0
Holdingham 2	505985	347343	Urban Background	Diffusion Tube	100	100	-	-	-	19.0	18.0
Sleaford-1	506753	345719	Urban Background	Diffusion Tube	100	100	13.6	14.0	13.4	14.5	13.3
Branston	499012	369017	Rural	Diffusion Tube	100	100	16.5	17.9	15.1	18.8	20.6
Canwick	498561	369494	Roadside	Diffusion Tube	100	100	-	-	34.4	34.0	19.8
Grantham Road	506601	345300	Roadside	Diffusion Tube	75	75	-	-	-	17.7	17.5
Ruskington	508316	350447	Roadside	Diffusion Tube	100	100	-	-	10.6	14.7	13.3
BH (1,2,3)	498000	367544	Roadside	Diffusion Tube	100	100	-	-	27.2	32.0	27.9

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Waddington	497718	363898	Roadside	Diffusion Tube	100	100	-	-	10.6	15.2	11.9
Westbanks	506507	345744	Roadside	Diffusion Tube	92	92	-	-	-	18.6	17.0
Waddington 2	496425	365685	Kerbside	Diffusion Tube	100	100	-	-	-	-	14.6
Aubourn	492630	362640	Kerbside	Diffusion Tube	100	75	-	-	-	-	13.9
Witham St Hughs	489199	361790	Kerbside	Diffusion Tube	100	75	-	-	-	-	11.2
Harmston	497006	362368	Kerbside	Diffusion Tube	100	75	-	-	-	-	15.0
Metheringham	506126	361636	Urban Background	Diffusion Tube	100	75	-	-	-	-	11.3
Navenby	498841	357758	Kerbside	Diffusion Tube	88	67	-	-	-	-	22.0
Heckington	514514	343906	Kerbside	Diffusion Tube	88	75	-	-	-	-	17.3

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

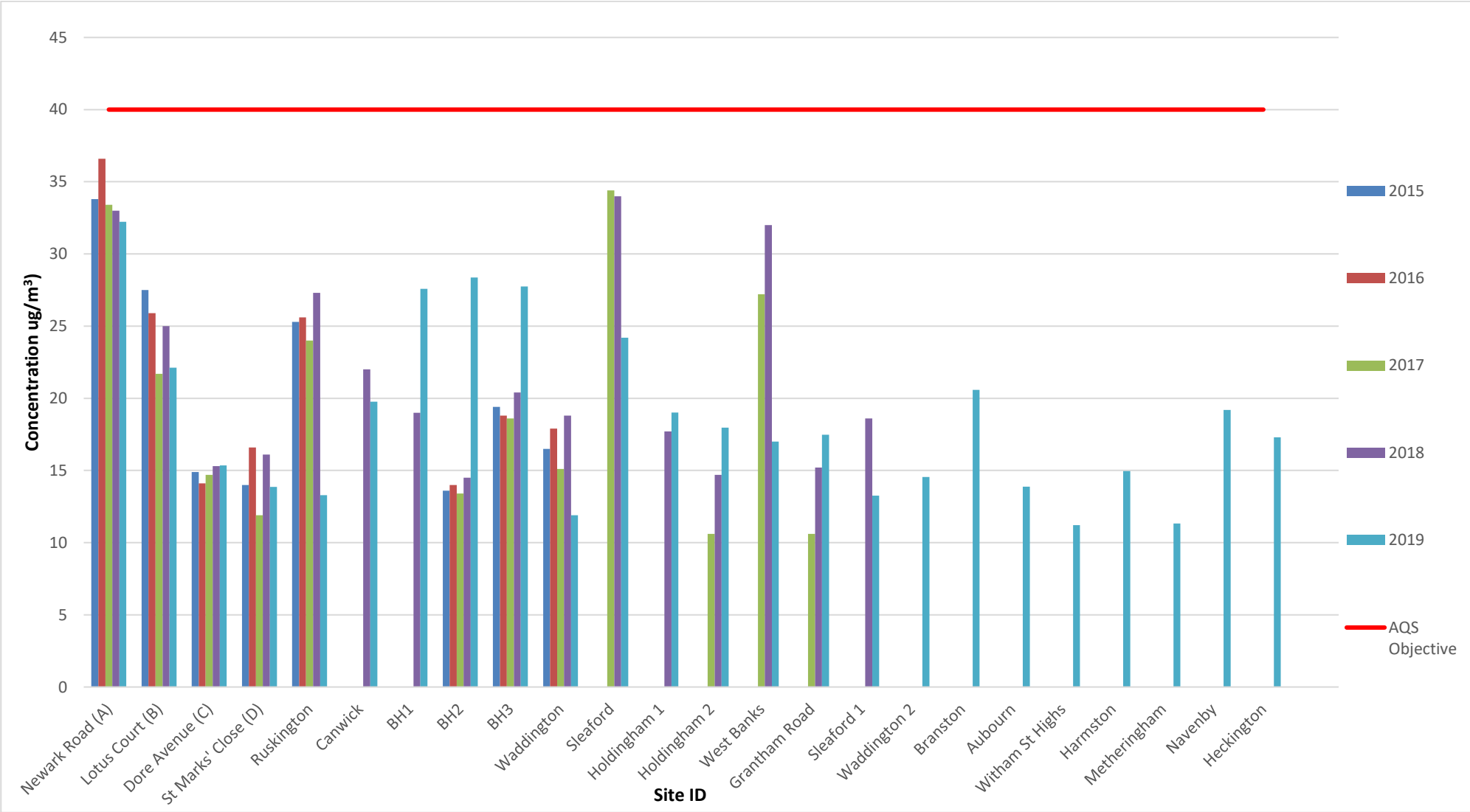
NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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

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

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

Figure A 1-Trends in Annual Mean NO₂ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 – NO₂ Monthly Diffusion Tube Results – 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO ₂ Mean Concentrations (µg/m ³)															Annual Mean		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.87) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾			
A	493845	366567	41.2	47.0	36.6	38.6		29.4	33.8	32.4	33.1	41.1	39.2	35.0	37.0	32.2	-			
B	495050	367421	32.0	28.6	22.1	25.8	22.8	22.1	18.0	22.7	23.9	29.9	31.7		25.4	22.1	-			
C	494829	366698	28.1	22.8	17.6	12.5	13.4	11.0	11.4	10.6	16.0	20.2	27.2	20.9	17.6	15.4	-			
D	494159	367115	26.0	22.8	14.7	12.4		9.1	9.4	10.2	13.6	17.3	23.9		15.9	13.9	-			
Sleaford	506835	345684	32.3	35.3	23.9	31.4		24.0		20.5	26.8	31.3		24.8	27.8	24.2	-			
Holdingham 1	505704	347269	26.9	23.1	19.0	30.9	23.8	20.4	17.6	14.1	20.8	20.6	29.3	15.9	21.9	19.0	-			
Holdingham 2	505985	347343	24.9	22.0	20.6	24.1	20.4	15.4	14.2	13.5	20.8	21.6	30.1	20.0	20.6	18.0	-			
Sleaford-1	506753	345719	19.4	20.3	12.4	14.6	11.7	11.5	10.4	9.5	11.9	18.2	25.5	17.4	15.2	13.3	-			
Branston	499012	369017	25.3	22.4	17.9	24.9	21.5	21.5	21.9	21.8	16.9	30.1	32.3	27.5	23.7	20.6	-			
Canwick	498561	369494	28.1	26.6	27.1	16.0	21.1	17.6	18.9	22.1	22.1	24.1	23.3	25.8	22.7	19.8	-			
Grantham Road	506601	345300	28.3	27.9		19.3	15.9		14.1		15.7	9.5	29.0	21.0	20.1	17.5	-			
Ruskington	508316	350447	20.6	19.8	15.2	15.6	11.0	8.8	11.0	10.5	14.2	17.1	23.2	16.5	15.3	13.3	-			
BH 1	498000	367544	35.4	35.1	30.0	36.9	33.5	31.2	35.2	23.1	29.4	23.4	40.9	26.6	31.7	27.6	-			
BH 2	498000	367544	36.6	34.5	31.1	36.1	33.5	29.1	30.7	25.7	30.8	33.3	41.4	28.5	32.6	28.4	-			
BH 3	498000	367544	36.2	35.0	30.8	34.0	33.2	31.2	30.1	25.2	28.7	31.9	39.2	27.2	31.9	27.8	-			

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Waddington	497718	363898	20.4	22.8	12.2	14.8	12.0	11.6	10.9	9.0	15.7	16.1	0.8	17.9	13.7	11.9	-
Westbanks	506507	345744	27.1	25.1	18.7	16.3	14.1	14.4		13.4	16.8	21.2	27.3	20.6	19.5	17.0	-
Waddington 2	496425	365685	25.2	28.9	19.6	9.5	9.9	7.9	8.3	8.2	28.8	15.0	25.1	14.4	16.7	14.6	-
Aubourn	492630	362640				16.7	15.3	12.3	13.1	11.4	12.3	18.8	25.9	17.8	16	13.9	-
Witham St Hughs	489199	361790				11.1	10.0	6.1	9.1	8.9	17.3	14.4	20.7	18.2	12.9	11.2	-
Harmston	497006	362368				19.1	15.1	15.0	14.0	13.1	14.5	21.8	26.4	15.7	17.2	15.0	-
Metheringham	506126	361636				9.6	10.1	7.8	5.6	9.7	18.6	16.2	20.5	19.2	13.0	11.3	-
Navenby	498841	357758				21.0	17.3	16.1	14.5	12.8	18.0		29.9	25.3	19.4	19.2	-
Heckington	514514	343906				20.5	17.4	15.6	17.6	15.3	18.0	22.3	29.9	22.1	19.8	17.3	-

National bias adjustment factor used

Annualisation has been conducted where data capture is <75%

Key:

Tube Missing, **Tube contained insect**, **Cap missing**, **Contained water**, **Not installed yet**

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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

(2) Distance corrected to nearest relevant public exposure.

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

Sources of Pollution

Two Part B applications have been received in 2019 in North Kesteven these are F Troop & Son Ltd, The New Forge, Lincoln Road, Leadenham, LN5 0PE under reference IPPC/2019/60 and Creasey Crushing Screening Ltd, 13 High Street, Branston, Lincoln, LN4 1NB under reference IPPC/2019/61. These included a crusher and a vehicle resprayer relocation respectively. Waste oil burners became Industrial Emissions Directive (IED)¹³ regulated process since April 2017 and all are now burning fuel oil with waste oil being collected.

The existing housing developments planned for the District are steadily being completed with the economic climate controlling the rate of development and delaying the start of sites which have received planning approval. Where appropriate, the Environmental Team provide comments upon developments that potentially could have an impact upon air quality within the District. Such comments are further detailed within this reporting section.

The NK Plan 2018 – 2021¹⁴ was approved on 6th March 2018 and pledged the construction of at least 19 new council properties in addition to working with developers to assist with the delivery of more affordable housing. In the NK Plan (18-21) a new priority entitled ‘Our Environment’ was established. Under ‘Our Environment’, an air pollution working group has been formed which is led by the Sustainability Policy and Programme Manager. The working group has analysed NKDC’s annual Air Quality report and DEFRA’s recommendations. DEFRA has suggested NKDC voluntarily monitor particulate matter for a number of years. The group has analysed current air pollution data and identified two pollution ‘hot spots’ near primary schools (traffic congestion being the main source) - A15/A607 junction in Bracebridge Heath and Eastgate¹⁵, Sleaford. The group have met with the sustainable transport charity, Sustrans, to consider best practice in community led campaigns. Particulate monitoring equipment has been investigated and the council are looking at recommending the

¹³ <https://www.gov.uk/government/publications/environmental-permitting-regulations-guidance-on-part-a-installations>

¹⁴ <https://www.n-kesteven.gov.uk/your-council/facts-and-figures-about-the-council/council-performance/the-nk-plan/>

purchase of hand held monitors to enable NKDC to identify the sources and appropriate actions to reduce air pollution and improve health.

The council reviews the plan on an annual basis, with the consecutive release of the NK Plan 2019 – 2022 that will be discussed in next year's ASR.

North Kesteven approved development 15/1347/OUT for the proposed erection of up to 1,100 dwellings and 150 care/retirement units (C2/C3), the formation of a roundabout to Camp Road, A46 junction improvement works, public open spaces and associated service infrastructure (outline with means of access) – Phase 3 Witham St Hughs.

As well as this North Kesteven also approved a commercial development of 4 no. units comprising of B1, B2 and B8 uses with associated access and car parking – Network 46 Witham St Hughs. This has the planning reference number of 19/1565/FUL.

No further new or existing sources of air pollution with significant changes, as described in Chapter 7, Section 1 of LAQM.TG(16), have been identified within the District.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. The Defra LAQM.TG(16) provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

With regard to the application of a bias adjustment factor for diffusion tubes, the Defra Technical Guidance LAQM.TG(16) and the LAQM Helpdesk¹⁶ recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites.

¹⁶ Laqm.defra.gov.uk

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North Kesteven District Council does not operate any continuous monitors within the District, therefore a co-location study is not available to derive a local bias factor, thus the national bias adjustment factor spreadsheet¹⁷ has been used and provided in Figure A 2.

Figure A 2 – 2019 Bias Adjustment Factor for North Kesteven District Council

National Diffusion Tube Bias Adjustment Factor Spreadsheet						Spreadsheet Version Number: 03/20				
Follow the steps below in the correct order to show the results of relevant co-location studies						This spreadsheet will be updated at the end of June 2020				
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 spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.						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 shown in blue at the foot of the final column.				
If a laboratory is not chosen, we have no data for this laboratory.		If a preparation method is not chosen, we have no data for this method at this laboratory.		If you did not choose a year, we have no data.		If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953				
Analysed By ¹	Method ²	Year ³	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ⁴	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in acetone	2019	R	City of London	12	74	71	4.1%	G	0.96
Gradko	50% TEA in acetone	2019	UB	City of London	12	37	33	14.3%	G	0.88
Gradko	50% TEA in acetone	2019	KS	Marylebone Road Intercomparison	12	83	85	28.3%	G	0.79
Gradko	50% TEA in acetone	2019	R	London Borough of Richmond upon Thames	12	46	35	30.4%	G	0.77
Gradko	50% TEA in acetone	2019	R	London Borough of Richmond upon Thames	12	29	27	7.1%	G	0.93
Gradko	50% TEA in acetone	2019	B	London Borough of Richmond upon Thames	11	21	21	1.0%	G	0.99
Gradko	50% TEA in acetone	2019	UB	Falkirk Council	9	18	15	18.1%	G	0.85
Gradko	50% TEA in acetone	2019	R	LB Newham	12	35	30	16.2%	G	0.86
Overall Factor⁵ (8 studies)									Use	0.87

Short-term to Long-term Data Adjustment

Annualisation is completed in line with Defra LAQM.TG(16) Box 7.10 where the data capture for a monitoring site is below 75%. For the 2019 diffusion tubes, annualisation was required at one site, Navenby. The results of which are shown in table C.1 below.

Table C.1 – Annualisation for Navenby

Site	Uncorrected Diffusion Tube Mean (µg/m ³)	Chesterfield AF	Immingham AF	Nottingham AF	Average AF	Annualised Bias Adjusted (0.87) µg/m ³
Navenby	19.4	1.20	1.09	1.12	1.14	19.2

¹⁷ National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/20 published in March 2020

QA/QC of Diffusion Tube Monitoring

Diffusion tube data for North Kesteven District Council is supplied and analysed by Gradko International Ltd. The tubes were prepared using the 50% TEA in acetone preparation method. The national bias adjustment factor for Gradko 50% TEA in acetone is 0.87 for the year 2019 (based on eight studies, version 03/20) as derived from the national bias adjustment factor spreadsheet.

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 NO₂ 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. Previously to the AIR-PT scheme, Gradko participated in the Workplace Analysis Scheme for Proficiency (WASP) for NO₂ diffusion tube analysis.

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 carried out at for Gradko at Marylebone Road, central London. A laboratory is assessed and given a 'z' score, a score of ± 2 or less indicates satisfactory laboratory performance.

In the 2019 AIR-PT results, AIR-PT AR0030 (January to February 2019) scored 75% and in, AIR-PT AR031 (April to May 2019), AR033 (July to August 2019) and AR034 (September to October 2019), Gradko scored 100%. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$. In 2019, the tube precision for NO₂ Annual Field Inter-Comparison for Gradko International using the 50% TEA in acetone method was 'good' for the results of 8 participating local authorities.

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Diffusion Tube Monitoring Sites: North Sleaford

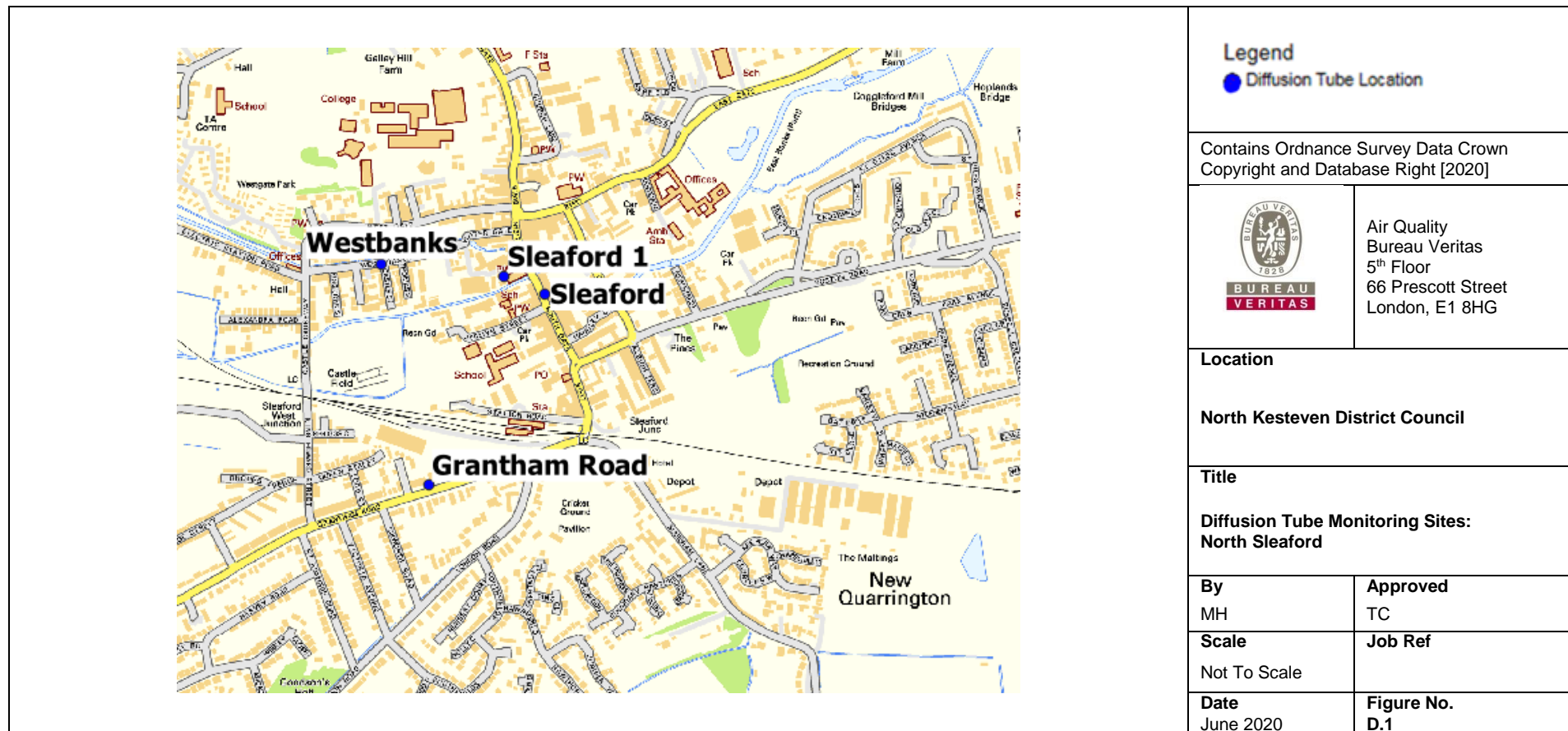


Figure D.2 – Diffusion Tube Monitoring Sites: North of the District

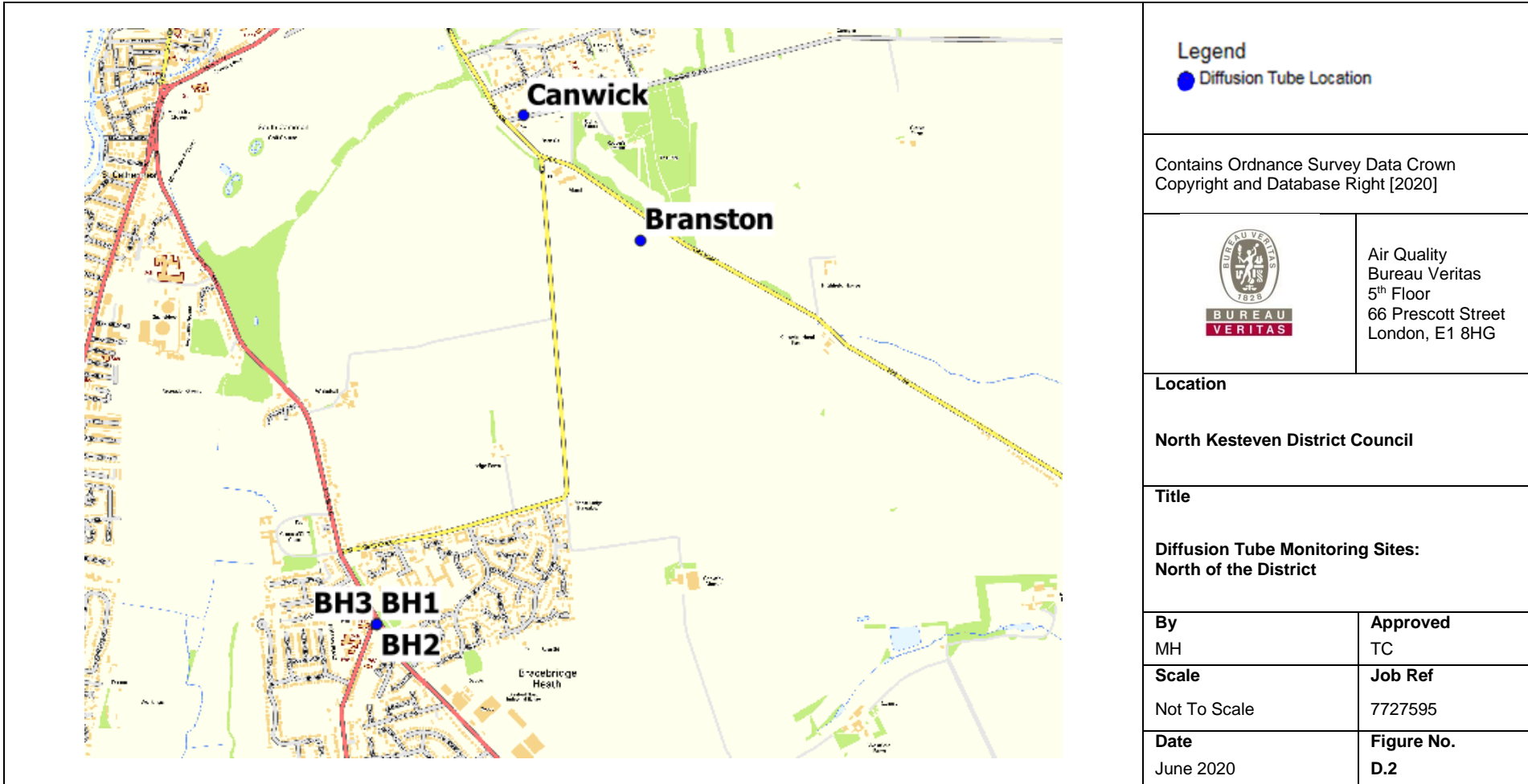


Figure D.3 - Diffusion Tube Monitoring Sites: North of the District

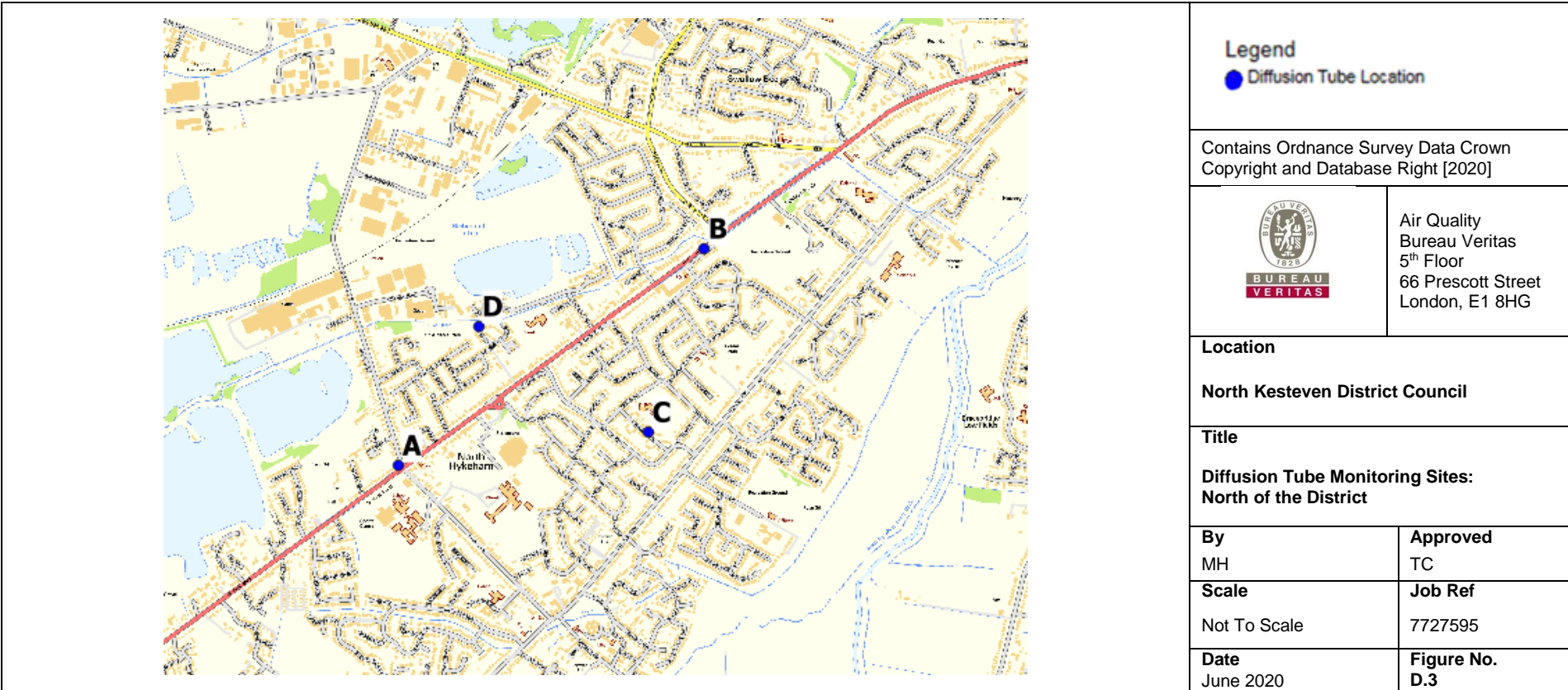


Figure D.4 - Diffusion Tube Monitoring Sites: North of the District



Figure D.5 – Diffusion Tube Monitoring Sites: North Sleaford



Figure D.6 - Diffusion Tube Monitoring Sites: North Sleaford

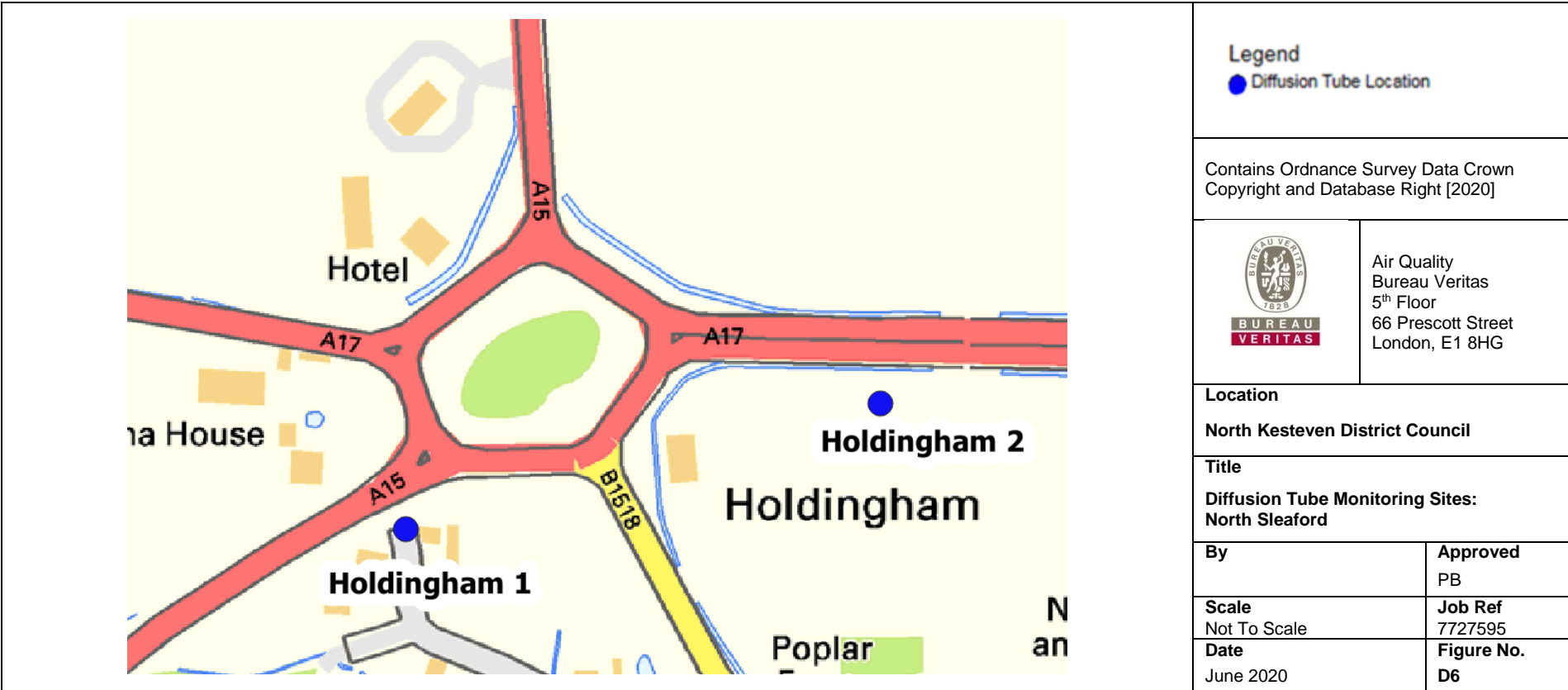


Figure D.7 - Diffusion Tube Monitoring Sites: Harmston

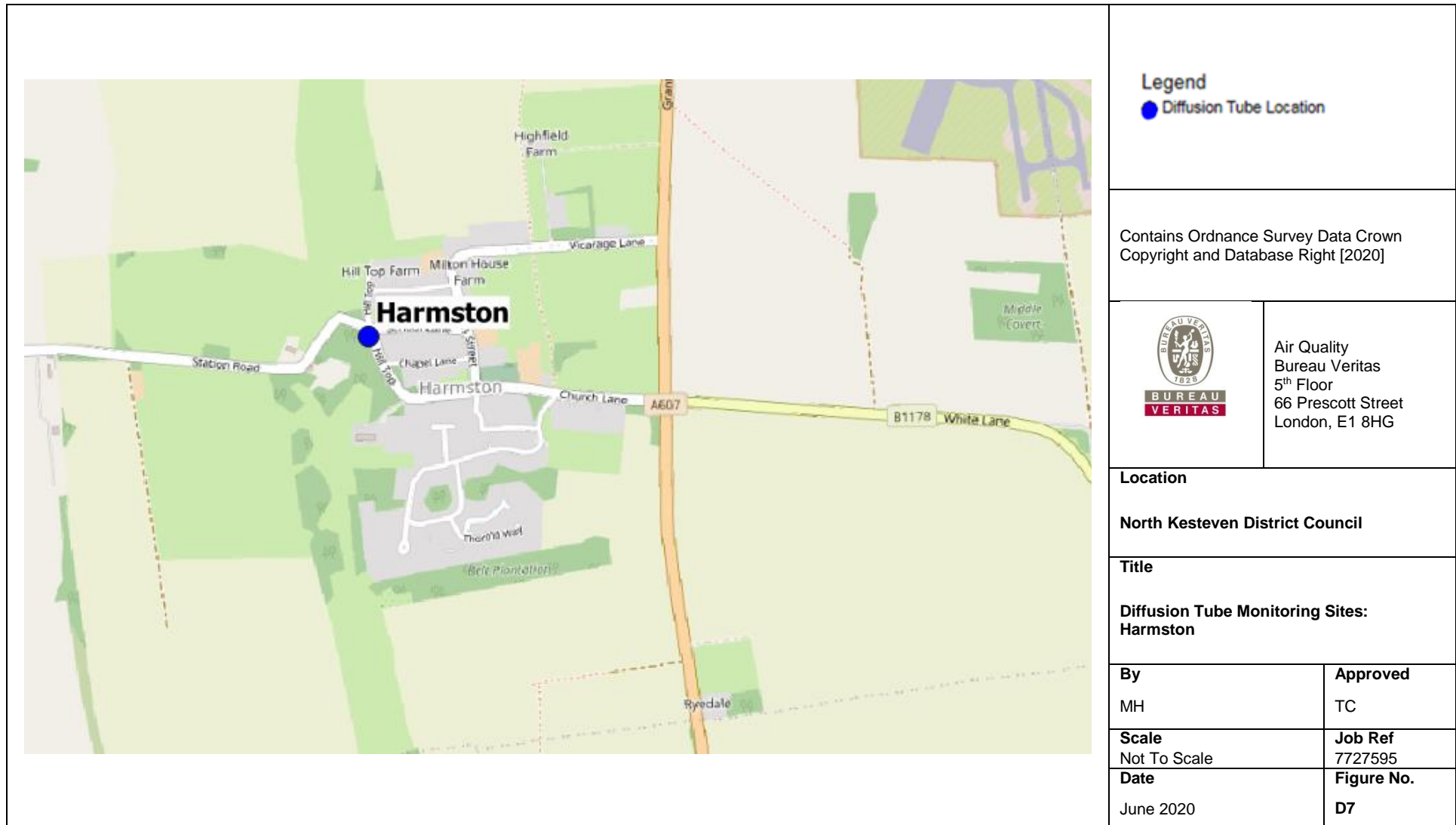


Figure D.8 - Diffusion Tube Monitoring Sites: Metherringham

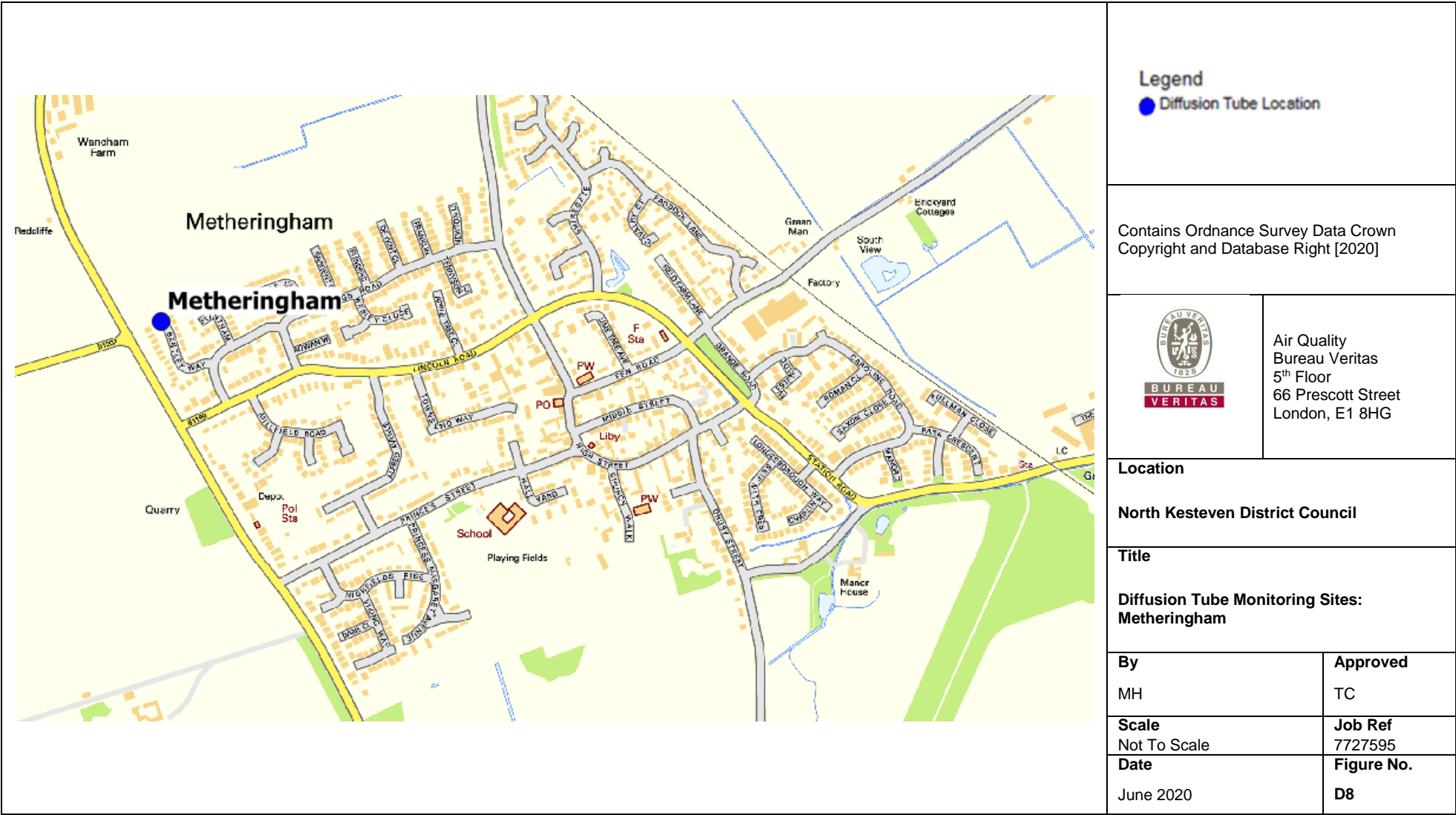


Figure D.9 - Diffusion Tube Monitoring Sites: Witham St Hughs and Aubourn

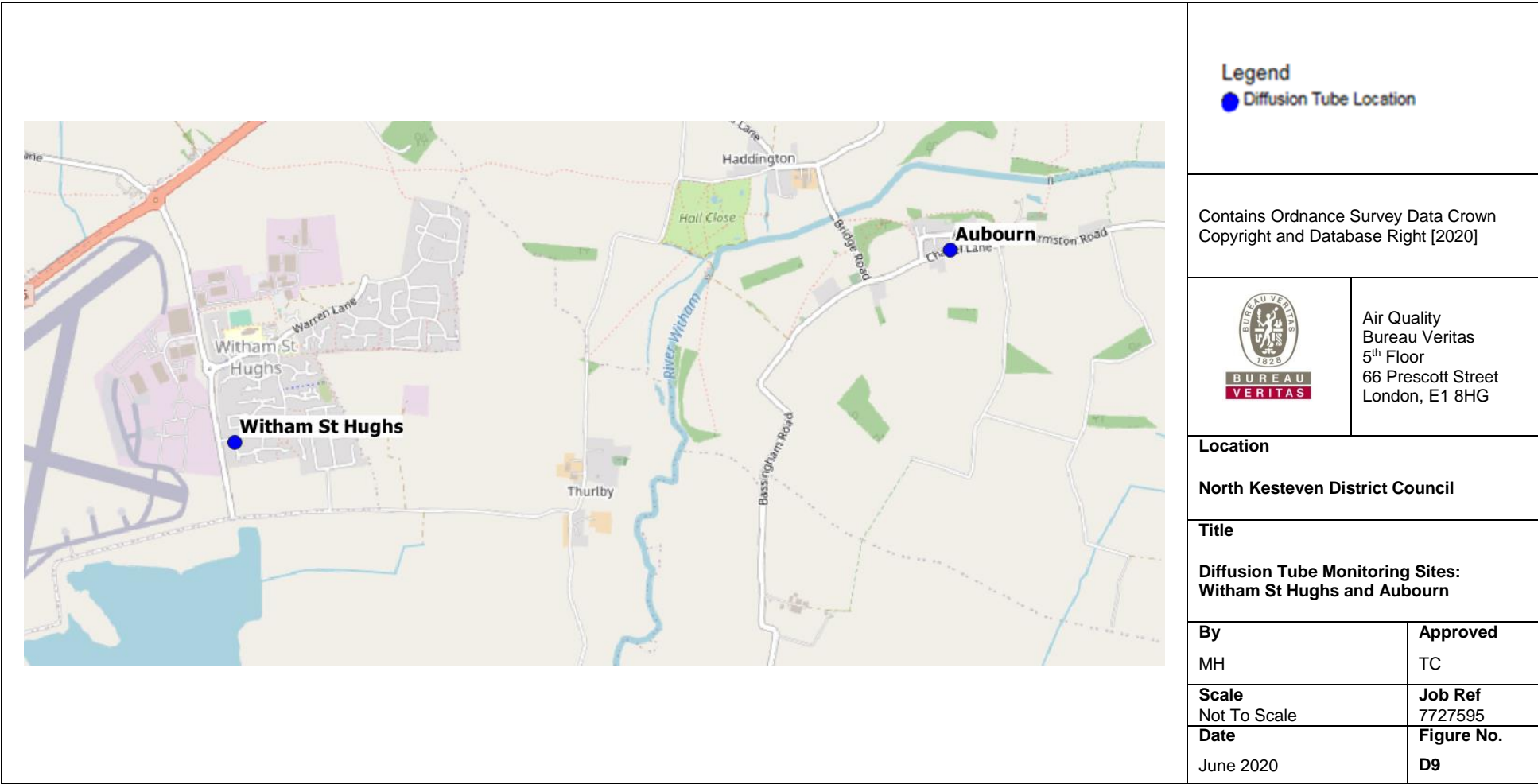
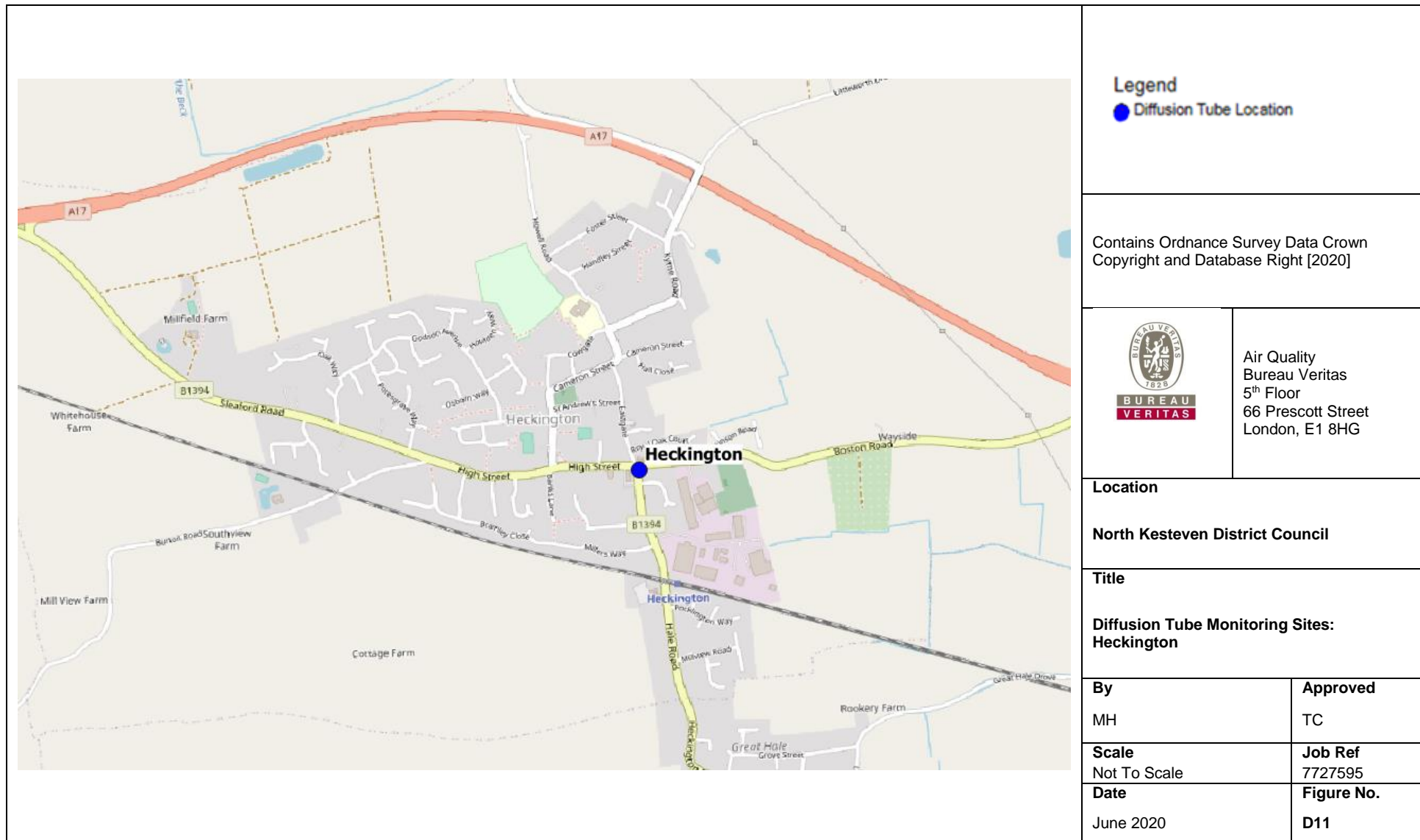


Figure D.10 - Diffusion Tube Monitoring Sites: Heckington



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ¹⁸	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

¹⁸ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air Quality Annual Status Report
AQS	Air Quality Strategy
CO₂	Carbon Dioxide
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO₂	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM_{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control

References

- Local Air Quality Management Technical Guidance LAQM.TG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- North Kesteven District Council 2017 Annual Progress Report.
- North Kesteven District Council 2018 Annual Progress Report.
- North Kesteven District Council 2019 Annual Progress Report.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/20 published in March 2020