2022 Air Quality Annual Status Report (ASR)

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

Date: December 2022

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Executive Summary: Air Quality in Our Area

Air Quality in Hertsmere Borough 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].

Hertsmere Borough Council is located in South East England, within the County of Hertfordshire. To the south lie the London Boroughs of Harrow and Barnet, to the east the London Borough of Enfield, to the northeast Welwyn Hatfield District, to the north St Albans District and to the west Watford District and Three Rivers District. The M25, M1 and A1 either border or run through Hertsmere. The main air quality issues are related to emissions from traffic, particularly within the town of Potters Bar and the village of Elstree, and close to major roads of the M25 and M1.

Historically the main Air Quality pollutant of concern within Hertsmere has been nitrogen dioxide (NO2) (Annual Mean).

There are currently six AQMAs of varying size, which have all been declared for nitrogen dioxide:

- Two AQMAs have been declared in the town of Potters Bar, one in the High Street and one on the periphery close to the M25;
- One AQMA has been declared within the village of Elstree;

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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

- Three AQMAs have been declared in the vicinity of motorways, one close to junction 1 of the M1, and two in proximity of junction 23 of the M25.

Annual Mean Concentrations decreased at all monitoring locations within Hertsmere Borough Council during 2020, which coincided with a decrease in vehicles using the highway network in the wake of the Covid 19 epidemic. However despite the lifting of lockdown restrictions during 2021 and a reopening of the economy, a sustained decrease in all monitoring locations was observed at all monitoring locations.

Hertsmere Borough Council previously proposed the declaration of two further AQMA's, one within the village of Radlett, Watling Street (AQMA 7) and one along the Shenley Road in Borehamwood (AQMA 8) and to alter three of the existing AQMAs 4, 5 and 6.

Hertsmere Borough Council will review whether it will be necessary to proceed with the declarations and amendments referred to above, following review and ratification of its 2022 monitoring data within its 2023 Annual Status Report (ASR).

In the event compliance with the Annual Mean Air Quality Objectives are again achieved at all monitoring locations within the existing AQMAs, then the Council will also review whether any of these areas should be revoked, prior to updating its Air Quality Action Plan.

See https://uk-air.defra.gov.uk/aqma/list for further information on the six declared AQMAs.

Hertsmere Borough Council has actively worked to improve air quality in its area through the implementation of the Air Quality Action Plan. Hertsmere Borough Council is also working in partnership with Hertfordshire County Council on their Air Quality Strategy and Implementation Plan 2019 and through the Hertfordshire Local Transport Plan (LTP4 2018 - 2031), which was developed in partnership with Transport, Planning and Public Health colleagues.

Hertsmere Borough Council belongs to the Herts and Beds Air Quality Group; which involves other local authorities in Hertfordshire and Bedfordshire. The group meets and discusses air quality, which allows continuity in the Counties, also in close connection with the County Councils.

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.

Actions to improve Air Quality are summarised within Section 2 below and Table 2.2.

Conclusions and Priorities

The 2019, 2020 and 2021 Air Quality monitoring Excel data monitoring sets, have been submitted separately to this report. The 2020 monitoring year saw a significant decrease in nitrogen dioxide concentrations throughout all monitoring locations within Hertsmere, likely due to the impact of Covid 19 and the subsequent Government lockdowns which saw a decrease in local and strategic traffic. There were further decreases at all monitoring locations during 2021 despite an easing of restrictions. The continued decrease in nitrogen dioxide concentrations may be attributed to several factors including but not limited to an uptake in working from home, an increased modal shift from Petrol/Diesel to fully Electric Vehicles and the general role out of hybrid and Euro 6 Petrol/Diesel vehicles.

It is currently not possible to state with certainty whether the decreases in nitrogen dioxide concentrations will be sustained within 2022, as the 2022 monitoring round is ongoing up to 4th January 2023 and the Bias Adjustment factors will not be available until later in the year. Following ratification of the 2022 Air Quality Monitoring data, Hertsmere Borough Council will then be in a stronger position to review whether or not any of its current six Air Quality Management Areas (AQMAs) should be revoked and whether to proceed with the declaration of AQMAs 7 & 8, referred to within the previous ASR.

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[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

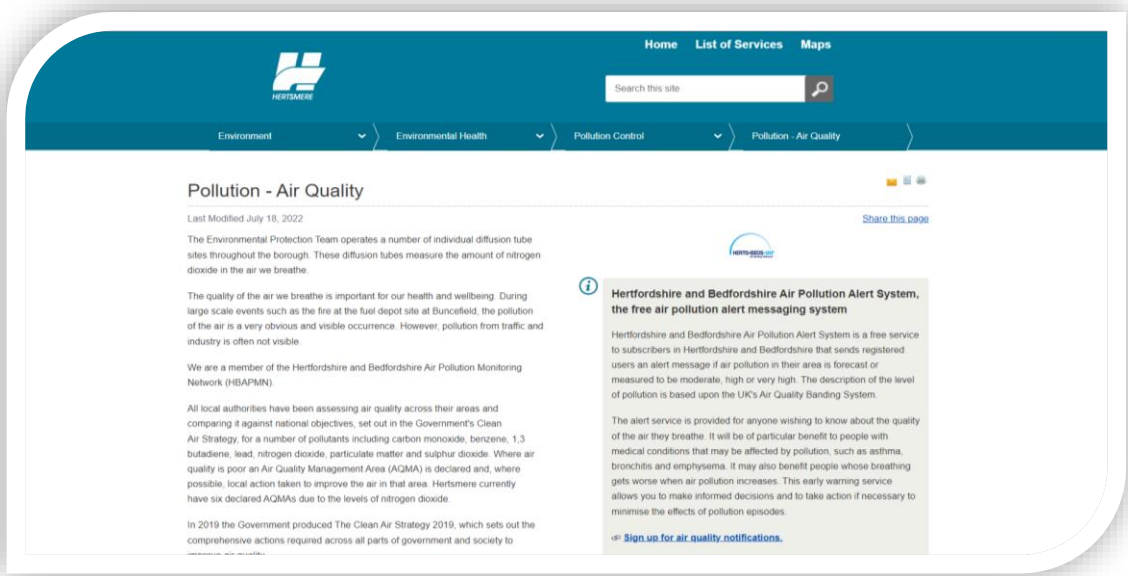
Hertsmere Borough Council will then be in a position to determine whether it should proceed with updating our Air Quality Action Plan, or whether to draft an Air Quality Strategy in the event all AQMAs are revoked.

Local Engagement and How to get Involved

Members of the public can help improve air quality in Hertsmere by reducing travel where possible and travelling using sustainable transport options such as walking, cycling and using public transport. Further information regarding Hertsmere's air quality and past reports can be found on the website www.hertsmere.gov.uk/Home.aspx

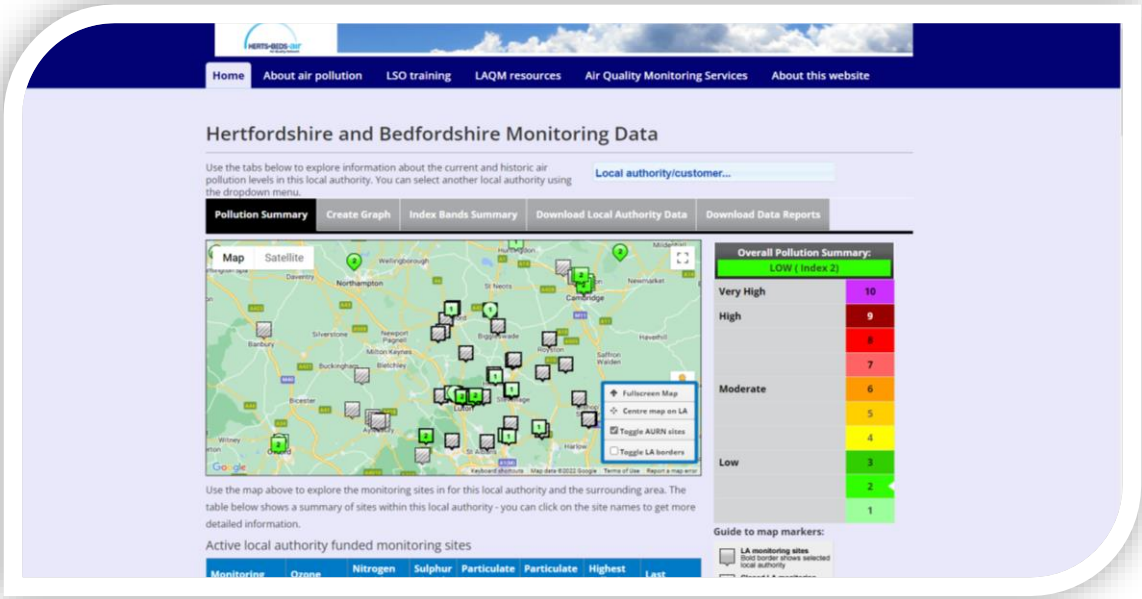
Hertsmere Borough Council's Air Quality Webpage

https://www.hertsmere.gov.uk/Environment-Refuse-and-Recycling/Environmental-Health/Pollution-Control/Pollution---Air-Quality.aspx



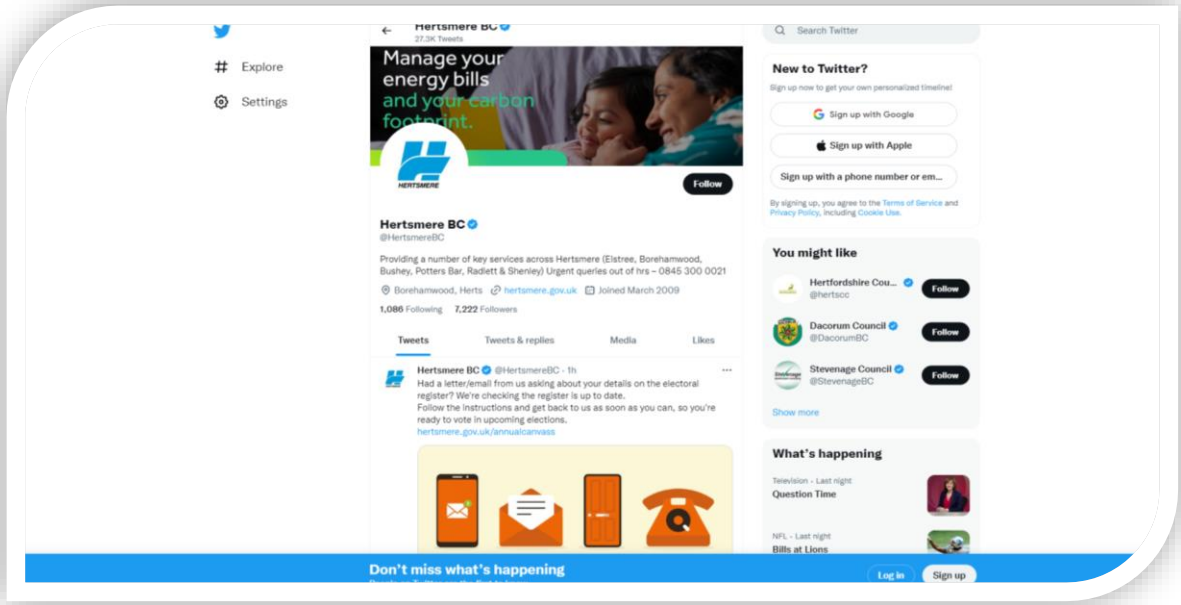
HERTS + BEDS Air Quality Network

https://www.airqualityengland.co.uk/local-authority/?la_id=408



Twitter

https://twitter.com/HertsmereBC



There are numerous simple measures which the public may adopt in order to improve the Air Quality around them. Such measures include,

- Making short trips and journeys on foot or by bike instead of by car, or using public transport.
- Car sharing with colleagues, or with other parents on the school run.
- Avoid Idling whilst your vehicle is stationary, particularly near schools, hospitals and care homes.
- Purchasing low-emission electric and/or hybrid vehicles, with government funding and grants available. Please see,

  https://www.gov.uk/plug-in-vehicle-grants
- Conserving fuel efficiency of vehicles through ensuring correct tyre pressure is maintained.
- Upgrading boilers to newest and most efficient gas condensing boilers with lowest NOx (and carbon) emissions.
- Ensuring your home is sufficiently insulated.
- Installing sources of renewable energy such as solar panel electricity systems, also known as solar photovoltaics, wind turbines or Air Source Heat Pumps.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Hertsmere Borough Council with the support and agreement of the following officers and departments:

Craig Gent (Senior Scientific Officer) – Environmental Health

This ASR has been approved by:

Paul Sawyer: Chief Environmental Health Officer

If you have any comments on this ASR please send them to Craig Gent at:

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Table of Contents

Executive Summary: Air Quality in Our Area i

Actions to Improve Air Quality iii

Conclusions and Priorities iii

Local Engagement and How to get Involved iv

Hertsmere Borough Council's Air Quality Webpage iv

HERTS + BEDS Air Quality Network v

Local Responsibilities and Commitment vii

1 Local Air Quality Management 1

2 Actions to Improve Air Quality 2

2.1 Air Quality Management Areas 3

2.2 Progress and future Measures to address Air Quality in Hertsmere Borough Council 8

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations 13

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance 14

Summary of Monitoring Undertaken 14

3.1.1 Automatic Monitoring Sites 14

3.1.2 Non-Automatic Monitoring Sites 14

3.2 Individual Pollutants 15

3.2.1 Nitrogen Dioxide (NO_2) 15

3.1.2 Particulate Matter (PM_{10}) 15

3.2.3 Particulate Matter ($PM_{2.5}$) 16

3.2.4 Sulphur Dioxide (SO_2) 16

Appendix A: Monitoring Results 17

Appendix B: Full Monthly Diffusion Tube Results for 2021 42

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC 44

New or Changed Sources Identified Within Hertsmere Borough Council During 2021 44

Additional Air Quality Works Undertaken by Hertsmere Borough Council During 2021 44

QA/QC of Diffusion Tube Monitoring 44

Diffusion Tube Annualisation 45

Diffusion Tube Bias Adjustment Factors 45

NO_2 Fall-off with Distance from the Road 47

QA/QC of Automatic Monitoring 47

PM_{10} and $PM_{2.5}$ Monitoring Adjustment 48

Automatic Monitoring Annualisation 49

NO_2 Fall-off with Distance from the Road 49

Appendix D: Maps of Monitoring Locations 53

Appendix E: Summary of Air Quality Objectives in England 68

Glossary of Terms 69
References 70

Figures

Figures 2.1-2.6 – Maps of Air Quality Management Areas within Hertsmere……..…4-6

Figures A.1 A – A.1 D Trends in Annual Mean NO_2 Concentrations.....30

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3 35

Figure A.3 – Trends in Annual Mean PM_{10} Concentrations (µg/m3) 37

Figure A.4 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3.....39

Figure A.5 – Trends in Annual Mean $PM_{2.5}$ Concentrations (µg/m3).....41

Figure D.1 – Map of Non-Automatic Monitoring Site.....53

Tables

Table 2.1 – Declared Air Quality Management Areas 7

Table 2.2 – Progress on Measures to Improve Air Quality.....10

Table A.1 – Details of Automatic Monitoring Sites 17

Table A.2 – Details of Non-Automatic Monitoring Sites 18

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3).....23

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3) 24

Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3 34

Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3) 36

Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3 38

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3).....40

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3) 42

Table C.1 – Bias Adjustment Factor 47

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3).....50

Table C.3 – Local Bias Adjustment Calculation 52

Table E.1 – Air Quality Objectives in England 68

1 Local Air Quality Management

This report provides an overview of air quality in Hertsmere Borough Council during 2019, 2020 and 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 Hertsmere Borough 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

Hertsmere Borough Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 12 measures are included within Table 2.2, with the type of measure and the progress Hertsmere Borough Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2. The number of measures commenced and completed in order to improve Air Quality within Hertsmere, were significantly restricted within the 2020 and 2021 monitoring years as a direct impact of the Covid-19 epidemic, which placed exceptional pressures placed upon its Environmental Health service.

Hertsmere Borough Council worked to implement these measures in partnership with the following stakeholders during 2021:

- Hertfordshire & Bedfordshire & Neighbouring Authorities Air Quality Forum The Highways Authority
- Hertfordshire County Council, Sustainable Growth and Public Health

The principal challenges and barriers to implementation in which Hertsmere Borough Council anticipates facing, include those arising from limited resources/staff available for implementation and funding for specific measures. These challenges, in conjunction with the additional service pressures experienced during the Covid 19 epidemic have meant that progress on updating the Air Quality Action Plan has been slower than expected.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Hertsmere Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of AQMAs 1, 2, 3, 4, 5 & 6.

Hertsmere intends to implement further measures to improve air quality within the borough in the future. These include actions to promote sustainable travel alternatives and manage traffic levels from new development, raise public awareness about poor air quality and continue to promote air quality in schools.

Hertsmere previously secured grant funding from Defra in 2018 to implement a Cleaner Air 4 Hertsmere Schools project at 24 schools in Hertsmere, involving a mixture of primary and secondary schools, all of which border an area of poor air quality. Hertsmere Borough

Council intends to carry out a full review of the project, before providing a comprehensive update within the 2023 ASR.

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.

A summary of AQMAs declared by Hertsmere Borough Council can be found in Table 2.1. The table presents a description of the six designated AQMAs which that are currently designated within Hertsmere Borough Council. Appendix D: Maps of Monitoring Locatio provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designation(s) are as follows:

- NO_2 annual mean

Figure 2.1: Hertsmere AQMA No.1 23-27 Dove Lane and caravan site off A1000 Barnet Road

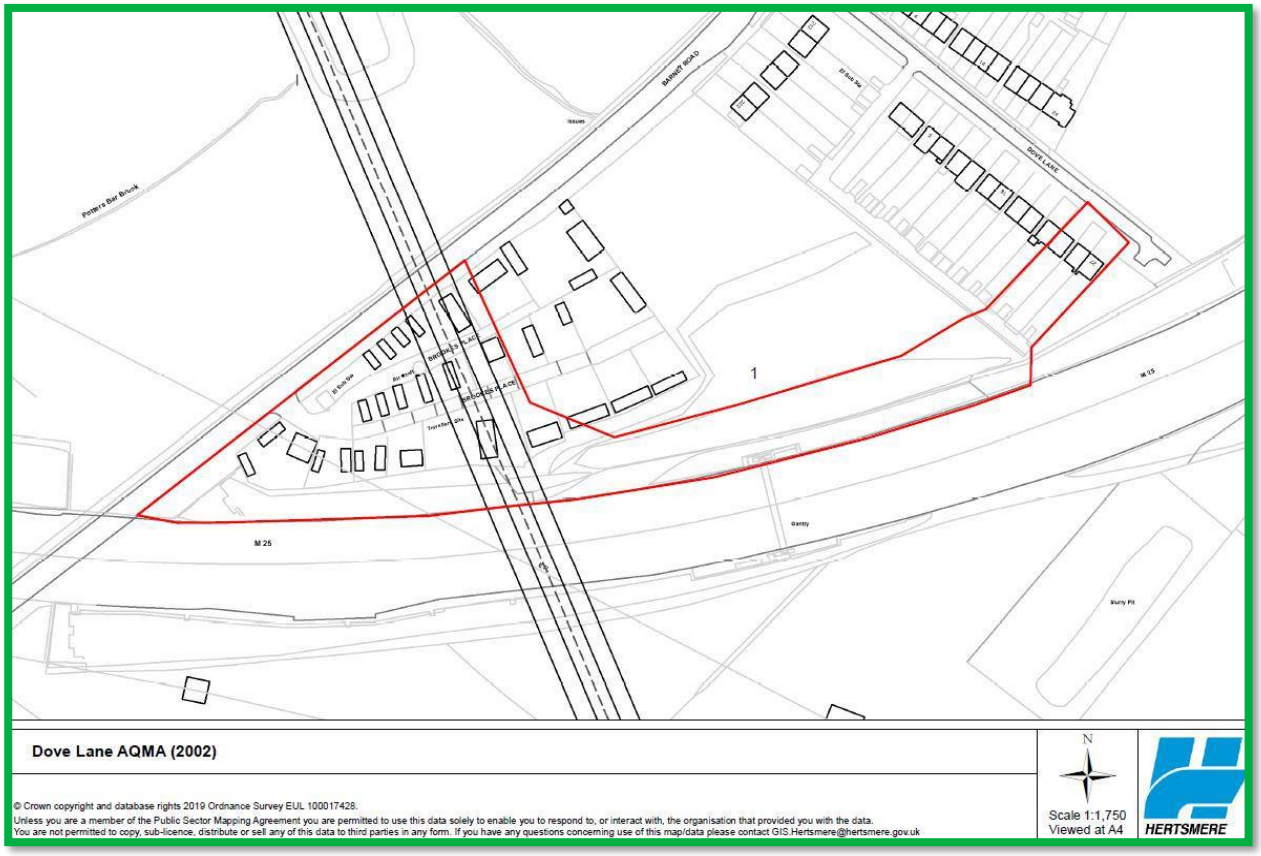


Figure 2.2: Hertsmere AQMA No. 2 Charleston Paddocks, St Albans Road

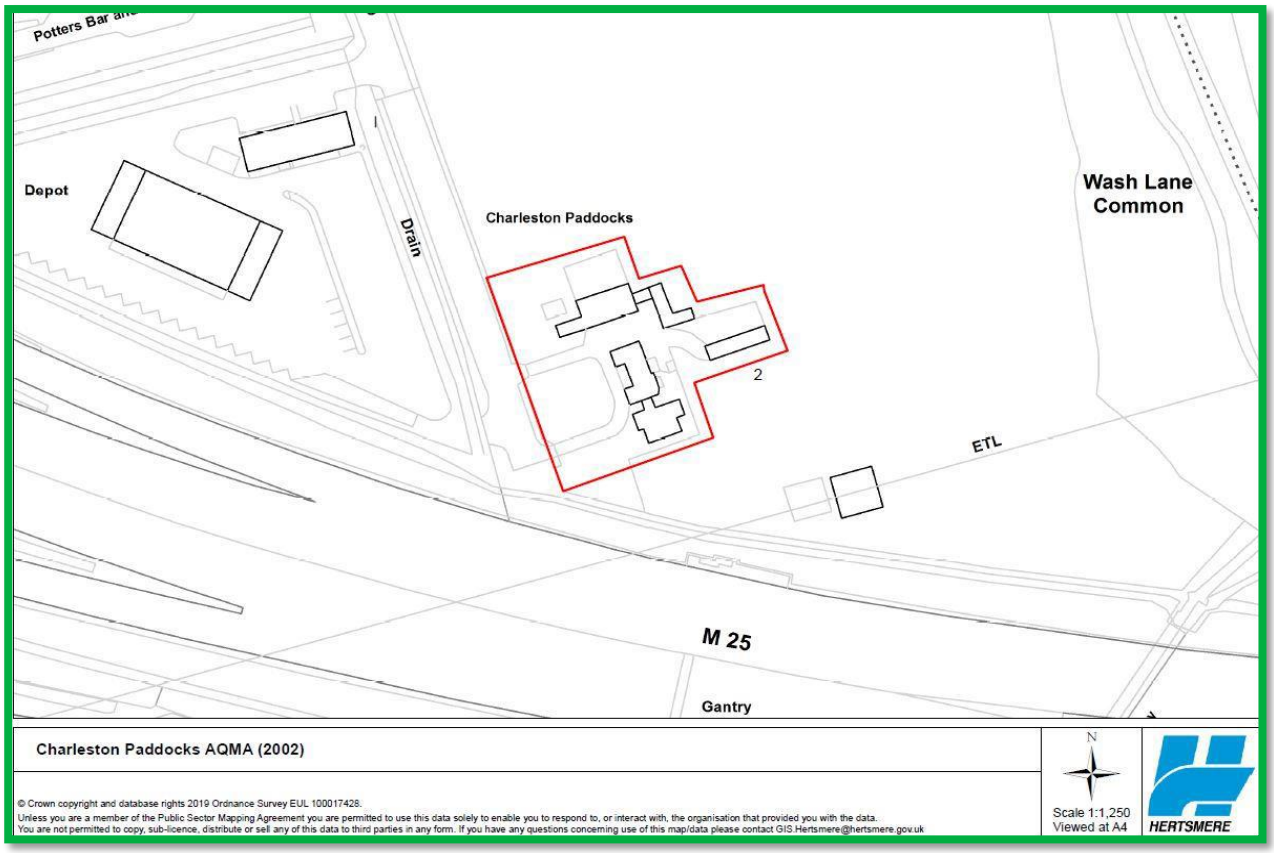


Figure 2.3: Hertsmere AQMA No. 3 31-39 Blanche Lane, South Mimms

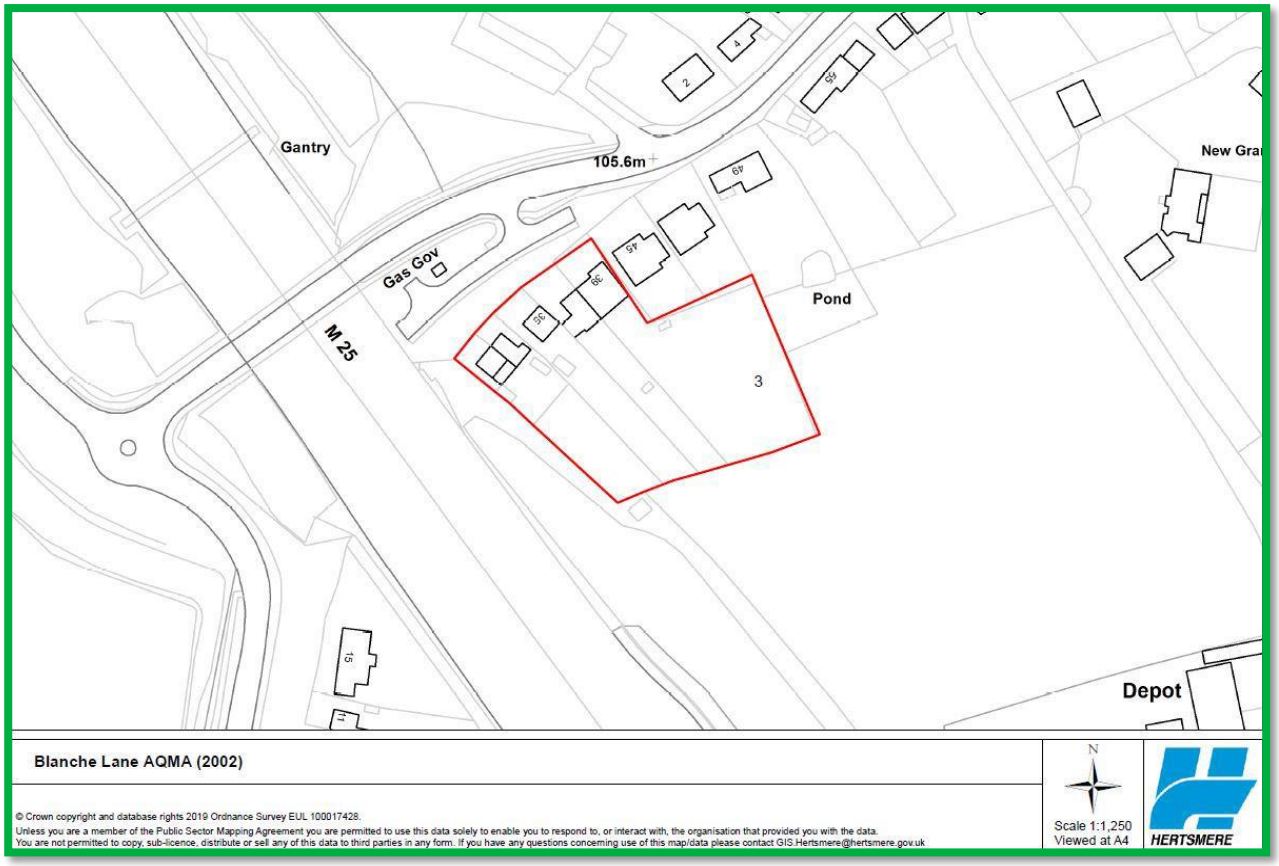


Figure 2.4: Hertsmere AQMA No. 4 Hartspring Lane

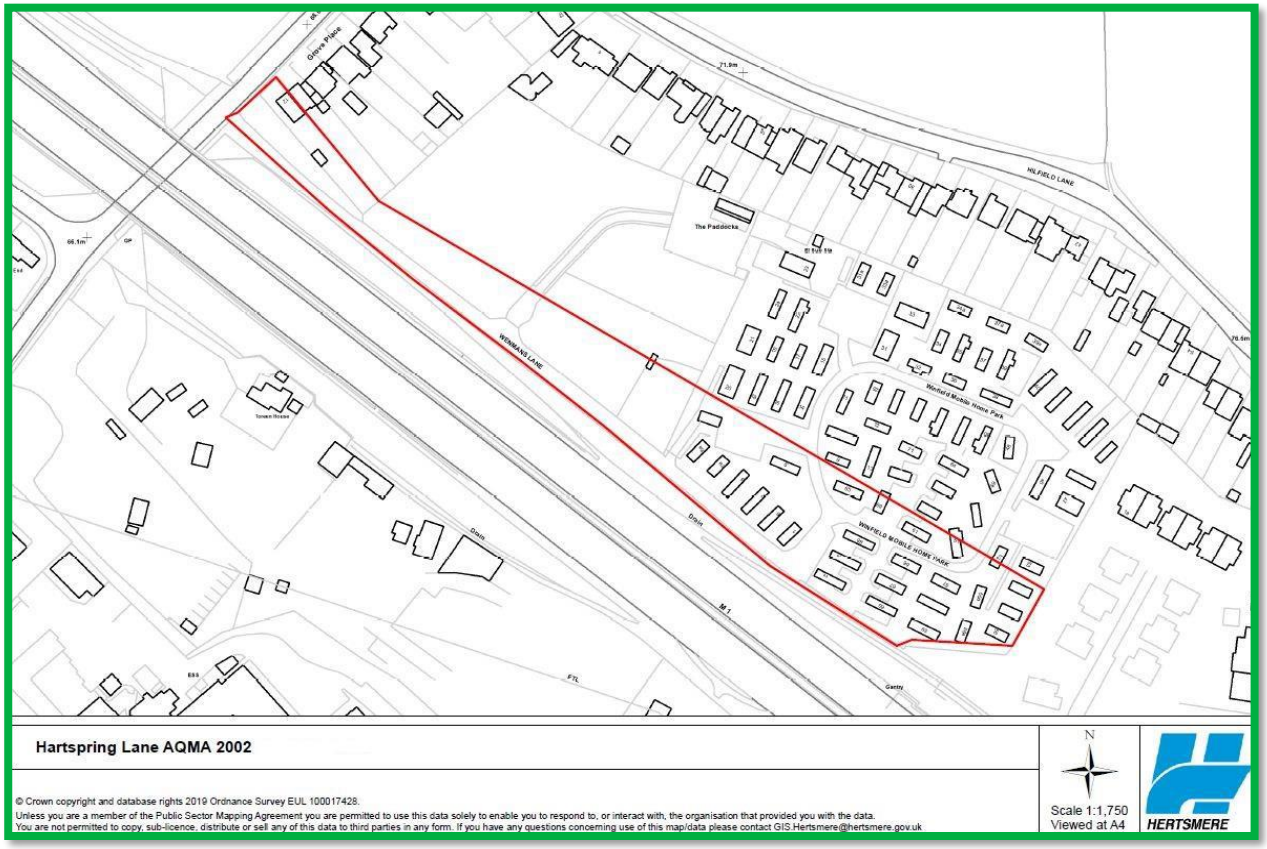


Figure 2.5: Hertsmere AQMA No. 5 Elstree Crossroads

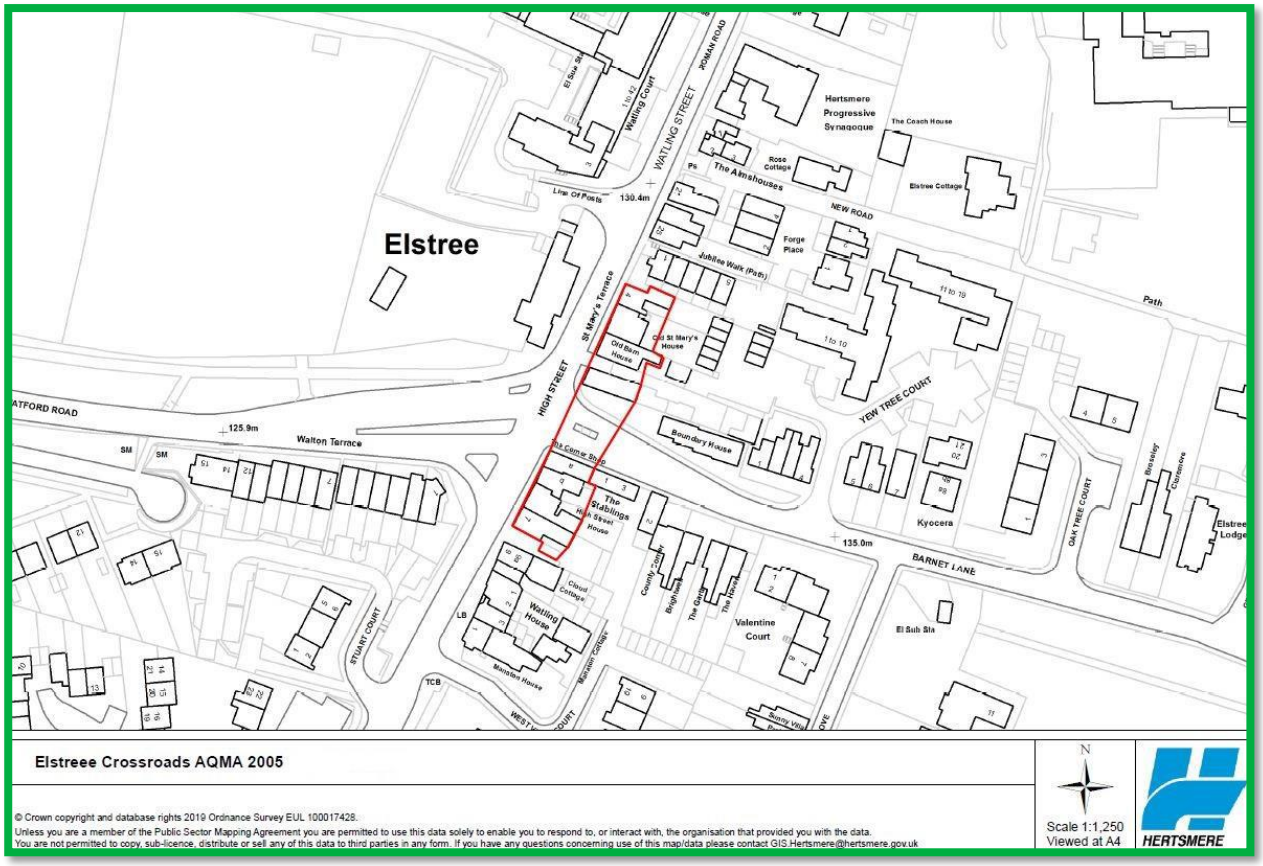


Figure 2.6: Hertsmere AQMA No. 6 133 to 167 High Street, Potters Bar

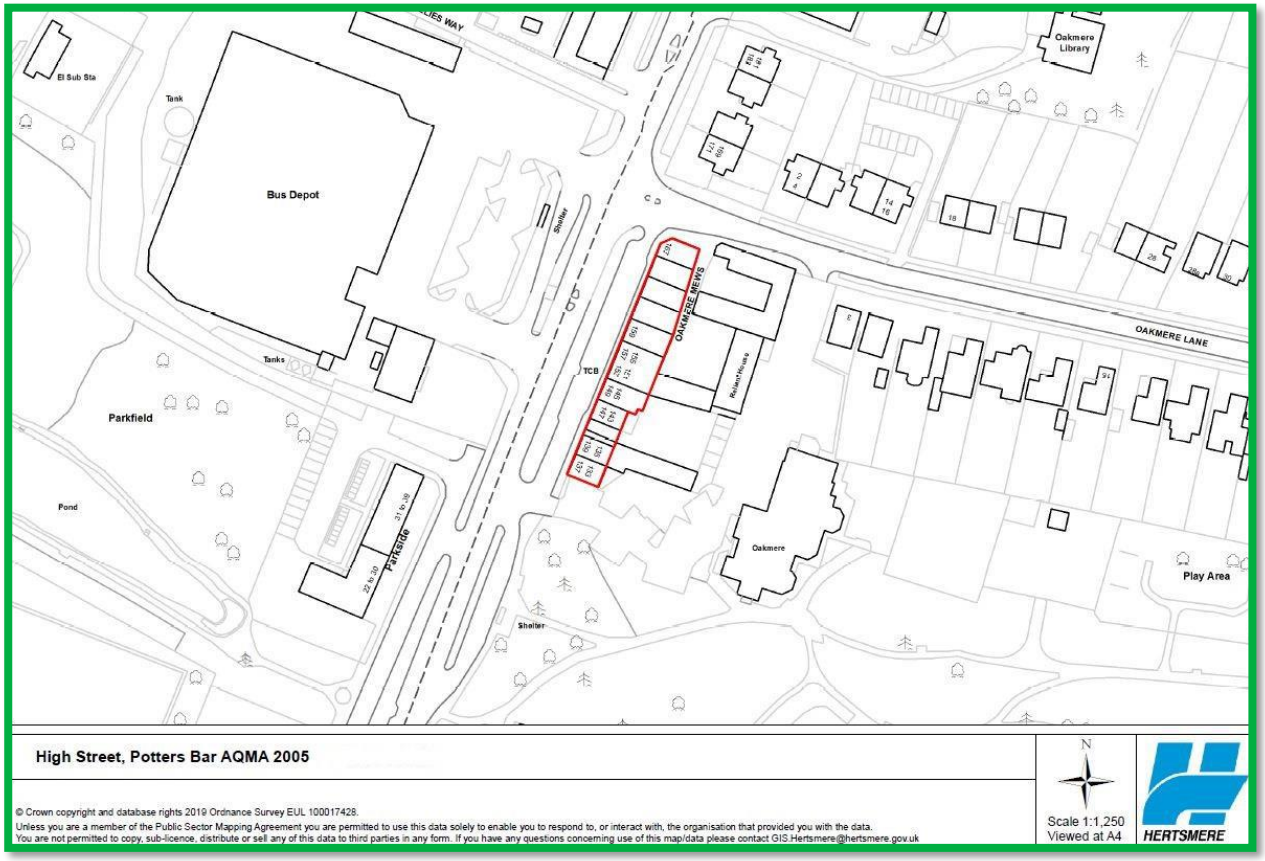


Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Hertsmere AQMA 1	2003	NO2 Annual Mean	Domestic properties 23-27 Dove Lane and caravan site off A1000 Barnet Road	YES	46 µg/m3	22 µg/m3	Hertsmere Air Quality Action Plan	2003
Hertsmere AQMA 2	2003	NO2 Annual Mean	One domestic property known as Charleston Paddocks, St Albans Road	YES	48 µg/m3	21.9 µg/m3	Hertsmere Air Quality Action Plan	2003
Hertsmere AQMA 3	2003	NO2 Annual Mean	Domestic properties 31-39 Blanch Lane, South Mimms	YES	80 µg/m3	29.2 µg/m3	Hertsmere Air Quality Action Plan	2003
Hertsmere AQMA 4	2003	NO2 Annual Mean	Area comprising the domestic properties 12 Grove Pace, Hartspring Lane, Aldenham and caravans numbered 1,2,3,4,7,8,55,56,57,58,59 & 60 within Winfield Caravan site, Hartspring Lane	YES	42 µg/m3	29.6 µg/m3	Hertsmere Air Quality Action Plan	2003
Hertsmere AQMA 5	2005	NO2 Annual Mean	Comprising domestic dwellings within eight properties on the east side of the A5183 High Street, Elstree either side of the junction with the A411	NO	No concentrations available	35.6 µg/m3	Hertsmere Air Quality Action Plan	TBC
Hertsmere AQMA 6	2005	NO2 Annual Mean	Properties 133-167 High Street consisting of commercial and residential	NO	No concentrations available	27 µg/m3	Hertsmere Air Quality Action Plan	TBC

☒ **Hertsmere Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Hertsmere Borough Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and future Measures to address Air Quality in Hertsmere Borough Council

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

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports.

1. Sufficient QA/QC procedures were applied. Distance-correction factors were outlined in detail. For bias adjustment, only the national factor was calculated despite the availability of a co-location study to facilitate the calculation of a local bias adjustment factor. Annualisation was not required as data capture was good across all locations.

2. Comments from last year's ASR have not been mentioned and addressed. It should be included future ASRs.

3. The Council is encouraged to adopt a revised AQAP in the next reporting year.

4. The Council has an extensive NO2 monitoring strategy including a co-located triplicate site. It would be useful for the council to calculate a local bias adjustment factor and providing a discussion on choice of factor.

5. The Public Health Outcomes Frameworks was not mentioned. The Council can refer to indicator D01, which is the fraction of mortality attributable to particulate air pollution for future reports.

6. Council have provided a clear, but separate, map of the diffusion tube monitoring network and of the AQMAs; however, it makes it difficult in identifying which tubes are located in and out AQMAs.

7. Trends are displayed but they are very briefly discussed in the report. The council are encouraged to expand on this in future reports.

8. Overall the report is satisfies the minimum criteria of relevant standards. The Council should aim to take on board the comments from above in the next ASR.

Hertsmere Borough Council expects the following measures/actions to be completed over the course of the next reporting year (2022):

- Review and update the contents within the Council's Air Quality webpage
- Continue with the participation of the Hertfordshire and Bedfordshire Air Pollution Alert System
- Participate with the Hertfordshire & Bedfordshire & Neighbouring Authorities Air Quality Forum Meetings
- Continue to promote working from home/flexible working arrangements
- Continue to promote alternative modes of transport for Hertsmere Borough Council employees via the Cycle to work scheme
- Install additional Anti Idling signage within the Council owned Car Parks
- Environmental Health will review and or amend its model Air Quality Planning Conditions
- Respond to any Air Quality related consultations/surveys raised by Defra
- The Council will invite further comments from the public before its draft Local Plan is submitted to a Government appointed Inspector. The draft Local Plan, includes Policies related to Climate Change, Air Quality, Sustainable Travel including the requirement for all new homes with their own curtilage parking to include individual provision for electric vehicle charging points
- Consider installing an additional Air Quality monitor in conjunction with Hertfordshire County Council, Sustainable Growth and Public Health

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Installation of Twin 7kw Fast Electric Car (EV) Charing points within the Civic Offices, High Road Bushey Heath and Salisbury Close Car Parks	Other	Other	2018	2018	Hertsmere Borough Council	Hertsmere Borough Council	NO	Subject to review	Subject to review	Subject to review	Subject to review	Number of annual vehicle charges	To date 2 twin EV (4 parking spaces) have been installed at the Civic Offices Car Park. Whereas 1 twin EV (2 parking spaces) have been installed at High Road Bushey Heath and Salisbury Close Car Parks	Funding
2	Installation of Anti-Idling signage throughout Hertsmere Borough Council's Civic Offices Car Park	Public Information	Other	2021	2021	Hertsmere Borough Council	Defra	YES	Funded	<£1,000	Completed	Subject to review	N.A.	Six Anti Idling signs were installed in 2021	N.A.
3	Identify major fleets in the Borough to encourage cleaner vehicle technology	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2019	2019	Hertsmere Borough Council	Hertsmere Borough Council	NO	Subject to review	Subject to review	Subject to review	Subject to review		Implementation on-going	
4	Support Hertfordshire County Council with its aim to encourage alternative modes of transport through various initiatives and through Travel Wise events	Promoting Low Emission Transport	Other	2018	2018 - 2019	Hertsmere Borough Council and Hertfordshire County Council	Hertsmere Borough Council		Subject to review	Subject to review	Subject to review	Subject to review		Hertsmere Borough Council previously collaborated with Hertfordshire County Council to work with Living Streets to encourage schools to promote a walking programme. With Air Quality included	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
5	Hertsmere Borough Council continues to support the Watling Chase Community Forest: The Greenways Project	Promoting Travel Alternatives	Promotion of walking	1999	Ongoing	Hertsmere Borough Council, Natural England and Hertfordshire County Council	Hertsmere Borough Council	NO	Subject to review	Subject to review	Subject to review	Subject to review		Several cycle, pedestrian and horse routes (Greenways) are open in Hertsmere	The Watling Chase Greenways Strategy is currently being reviewed to determine whether the routes still meet the Greenways standard of improved width and surface.
6	Air Quality to be taken into account when considering all Planning applications particularly near and around AQMAs	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2018	Ongoing	Hertsmere Borough Council	Hertsmere Borough Council	NO	N.A.	N.A.	Ongoing	Subject to review		Dealt with in the Core Strategy Development Plan Document 2009 Planning Officers to take into consideration AQMAs	N.A.
7	Require developers to submit construction management plans (CMPs), for the control of dust associated with large scale excavation, demolition and construction.	Promoting Low Emission Transport	Other	2019	Ongoing	Hertsmere Borough Council	Hertsmere Borough Council	NO	Funded	<£10,000	Ongoing	Subject to review	Number of Planning decisions stipulating CMP Conditions	Planning produce supplementary planning guides which contain guidance on odour smoke and dust	N.A.
8	During 2021 the Council offered a £50 reduction for Private Hire and Hackney Carriage vehicle license fees for using alternative fuels	Promoting Low Emission Transport	Taxi emission incentives	2018	2022	Hertsmere Borough Council	Hertsmere Borough Council	NO	Subject to review	<£1,000	Subject to review	Subject to review	Number of £50 reductions offered		N.A.
10	The Council continues to inspect all of its authorised processes to ensure compliance. Authorisations will be updated as and when appropriate so that operation conditions are up to date.	Environmental Permits	Measures to reduce pollution through IPPC Permits going beyond BAT	2010	Ongoing	Hertsmere Borough Council	Hertsmere Borough Council	NO	Funded	<£15,000	Ongoing	Subject to review	Number of Environmental Permits issued	All inspections have been carried out with a satisfactory outcome	N.A.
11	Review and update the information and advice within Council's Website, for residents and companies re: problems caused by bonfires. Encourage residents to compost waste	Public Information	Via other mechanisms	2018	Ongoing	Hertsmere Borough Council	Hertsmere Borough Council	NO	Funded	<£1,000	Ongoing	N.A.		In the last year Hertsmere have dealt with 88 complaints regarding bonfires/smoke .	N.A.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
12	The Council continues to monitor Air Quality and manages two Automatic Monitoring Stations located at Manor Way, (Roadside) and Borehamwood Bowling Club (Background)	Public Information	Other policy	2017	Ongoing	Hertsmere Borough Council	Hertsmere Borough Council	YES	Funded	£10,000 - £50,000k	Ongoing	N.A.	Annual & Hourly Mean concentrations	Hertsmere also use diffusion tubes for data and they are reviewed every year	Funding and maintenance
13	Purchase of 300 + laptops in order to facilitate working from home	Alternatives to private vehicle use	Other	2020	Ongoing	Hertsmere Borough Council	Hertsmere Borough Council	YES	Funded	£10,000 - £50,000k	Implementation	N.A.	Number of staff working from home	Staff may work from home up to two days per week	N.A.
14	Cycle to Work Scheme	Alternatives to private vehicle use	Other	2019	Ongoing	Hertsmere Borough Council	Hertsmere Borough Council	YES	Funded via salary sacrifice	N.A.	Implementation	N.A.	Number of staff purchasing a bicycle	Ongoing	N.A.

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The main traffic sources of PM 2.5 are exhaust emissions from diesel vehicles (cars, light goods vehicles and heavy goods vehicles), together with tyre wear, brake wear and road surface abrasion from all vehicles.

Hertsmere Borough Council is a member of the Herts and Beds Air Quality group, which work closely with Hertfordshire County Council Public Health. Public Health monitors PM 2.5 as a health outcome and has previously funded monitors for the local authorities in the Hertfordshire area. Hertsmere Borough Council currently monitors PM 2.5 at two Air Quality Monitoring Stations, situated within roadside and background locations, with the latter site being incorporated on the Automatic Urban and Rural Network (AURN). Results from monitoring show that PM2.5 is not a significant issue within Hertsmere.

Contained within the AQAP and the Hertfordshire Local Transport Plan (LTP4 2018- 2031) is a variety of measures aimed at managing emissions from road traffic on local roads and motorways. Measures intended to tackle road traffic pollutant emissions (including PM2.5 emissions) include a variety of traffic management actions (strategic highway improvements to improve traffic flow and measures intended to reduce idling) and the promotion of low emission travel alternatives (e.g. cycling, walking, electric vehicles) See Table 2.2 for further information.

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

This section sets out the monitoring undertaken within 2021 by Hertsmere Borough 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.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Hertsmere Borough Council undertook automatic (continuous) monitoring at two sites during 2021. Table A.1 in Appendix A shows the details of the automatic monitoring sites. 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. The Hertfordshire and Bedfordshire Monitoring Data webpage https://www.airqualityengland.co.uk/local-authority/?la_id=408 presents automatic monitoring results for Hertsmere Borough 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

Hertsmere Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 56 sites during 2019, 2020 & 2021. Table A.2 in Appendix A presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

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.

3.2.1 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 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

None of the Diffusion Tube or Automatic Monitoring Locations saw any exceedances of the annual mean or 1-hour mean air quality objectives during 2021 and were all below 36 µg/m^3, therefore fall off with diastance calculations were not required. Hertsmere Borough Council intends to review its current Diffusion Tube monitoring locations in 2022, which will be discussed in detail within the 2023 ASR.

3.1.2 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 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.

The measured concentrations at both the roadside and background automatic monitoring sites during 2021, were below the annual and daily mean air quality objectives.

Measured annual mean concentrations for the past five years are presented in Figure A2. There are no clear trends in the monitoring results for the past five years.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

The measured concentrations are below the annual mean air quality objective of 20 µg/m^3 at both the roadside and the background automatic monitoring sites in 2021.

Measured annual mean concentrations for the past five years are presented in Figure A3. There are no clear trends in the monitoring results for the past five years.

3.2.4 Sulphur Dioxide (SO_2)

Hertsmere Borough Council does not undertake Sulphur Dioxide 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)
H1	Hertsmere Borehamwood Manor Way	Roadside	520317	197099	NO2; PM10, PM2.5	No	Chemiluminescent; FDMS	8.6	6	2.5
H2	Hertsmere Borehamwood Hertswood School (closed 23/05/17)	Urban Background	520156	197364	NO2; PM10, PM2.5	No	Chemiluminescent; FDMS	40	N/A	4
H3	Hertsmere Borehamwood Bowling Club (open 24/05/17)	Urban Background	519716	197250	NO2; PM10, PM2.5	No	Chemiluminescent; FIDAS	13	N/A	2.5

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)
HM39	117 Shenley Road, Borehamwood	Roadside	519418	196681	NO2	No	7.0	1.3	NO	2.1
HM40	17 Essex Road, Borehamwood	Urban Background	519281	196779	NO2	No	5.3	2.1	NO	2.1
HM41	39 Theobald Street, Borehamwood	Roadside	519022	196612	NO2	No	6.4	1.9	NO	2.3
HM45/HM46/HM47	Hertsmere Background AQMS	Urban Background	520156	197364	NO2	No	13.0	N/A	YES	2.0
HM48	Elstree Crossroads 1 (Nursery High Street)	Roadside	517846	195346	NO2	No	4.4	1.9	NO	2.0
HM49	Elstree Crossroads 2 (The Haven Barnet Lane)	Roadside	517861	195226	NO2	No	5.9	1.1	NO	2.0
HM50	Elstree Crossroads 3 (High Street/Barnet Lane)	Roadside	517802	195249	NO2	Yes (AQMA 5)	9.5	1.2	NO	2.0
HM52	Elstree Crossroads 5 (6 Walton Terrace)	Roadside	517744	195247	NO2	No	1.8	1.8	NO	2.0
HM53	Caldecote Lane, Bushey Heath	Suburban	515581	195094	NO2	No	0.2	0.0	NO	2.1

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)
HM54	19 High Road, Bushey	Kerbside	514596	194396	NO2	No	4.5	0.5	NO	2.1
HM55	Highwood Avenue Garages, Bushey	Urban Background	512770	197834	NO2	No	29.0	0.0	NO	2.0
HM57	Hartspring Lane (11 Grove Place) Bushey	Roadside	513517	197819	NO2	Yes (AQMA 4)*	9.2	1.8	NO	2.0
HM58	Pegmire Lane, Bushey	Kerbside	513966	197615	NO2	No	2.5	0.5	NO	2.0
HM59	7 Aldenham Grove Radlett	Urban Background	516570	200159	NO2	No	6.8	0.0	NO	2.0
HM60	Bell Lane, London Colney (1 Council Cottages)	Roadside	518586	202939	NO2	No	13.6	8.8	NO	1.9
HM61	31 Blanche Lane, South Mimms	Other	522037	200670	NO2	Yes (AQMA 3)*	14.6	14.6	NO	1.9
HM62	24 The Broadway,Potters Bar	Roadside	524943	201153	NO2	No	12.5	3.1	NO	1.9
HM63	27 Dove Lane, Potters Bar	Other	526079	200026	NO2	Yes (AQMA 1)	19.2	29.1	NO	2.0
HM64	Bus Garage 1 (outside Holly House)	Roadside	526208	201454	NO2	No	23.3	2.1	NO	2.0
HM65	Hatfield Road, Potters Bar High Street	Roadside	526252	201597	NO2	No	7.7	2.8	NO	2.1
HM66	Bus Garage 2 Potters Bar (Oakmere Lane)	Roadside	526245	201458	NO2	No	5.9	3.0	NO	2.1

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)
HM67	Bus Garage 3 Potters Bar (147 High Street)	Roadside	526211	201402	NO2	Yes (AQMA 6)	0.5	11.3	NO	2.0
HM69	Southgate Road Potters Bar (Abbey House)	Roadside	526034	200832	NO2	No	15.0	3.1	NO	2.0
HM70	9 Park Avenue, Potters Bar	Roadside	526402	200457	NO2	No	9.2	1.5	NO	2.0
HM71	2 Park Road, Radlett	Roadside	516291	200035	NO2	No	4.3	1.5	NO	2.1
HM74	301 Watling Street, Radlett	Roadside	516456	199624	NO2	No	9.2	6.6	NO	2.0
HM79/HM80/HM81	7 The Broadway, Potters Bar	Roadside	524988	201118	NO2	No	12.2	1.7	NO	2.0
HM82/HM83/HM84	10 Baker Street, Potters Bar	Kerbside	524922	201088	NO2	No	9.6	0.6	NO	2.0
HM85	16 Andrew Close, Shenley	Suburban	518592	200948	NO2	No	2.3	0.0	NO	2.1
HM86	Charleston Paddocks South Mimms	Other	522970	199959	NO2	Yes (AQMA 2)	32.8	10.5	NO	1.8
HM93	103 Baker Street, Potters Bar	Roadside	524573	200633	NO2	No	12.9	1.4	NO	2.2
HM99/HM100/HM101	84 High Street, Bushey	Roadside	513209	195257	NO2	No	1.9	2.4	NO	2.1
HM102	Aldenham Road, Radlett (Red Lion)	Kerbside	516385	199761	NO2	No	4.0	0.5	NO	1.9
HM105	Elstree Park, Borehamwood	Urban Background	520738	195271	NO2	No	10.7	36.1	NO	2.0

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)
HM108/HM109/HM110	Hartspring Lane, Bushey (Hazetta House)	Kerbside	513419	197727	NO2	No	11.1	0.5	NO	1.8
HM111	9 Blanche Lane, South Mimms	Roadside	521980	200567	NO2	No	21.1	1.2	NO	1.9
HM114	Parkside, Potters Bar	Roadside	526164	201363	NO2	No	16.3	9.5	NO	1.9
HM117/HM118/HM119	44 High Street, Bushey	Roadside	513101	195286	NO2	No	4.3	2.3	NO	2.0
HM120/HM121/HM122	Todd Close, Borehamwood	Urban Background	520181	197150	NO2	No	33.1	36.4	NO	1.9
HM123/HM124/HM125	Elstree Way, Borehamwood	Roadside	520263	197130	NO2	No	34.5	3.6	NO	1.9
HM126	63 Elstree Hill North	Roadside	517903	195552	NO2	No	13.8	2.4	NO	2.1
HM129	Allum Lane, Elstree	Roadside	517907	195864	NO2	No	6.3	1.5	NO	2.1
HM132	Watling Mansions, Radlett	Roadside	516520	199450	NO2	No	13.8	8.3	NO	2.0
HM135	Winfield Park, Bushey	Other	513755	197599	NO2	Yes (AQMA 4)	4.7	20.8	NO	2.0
HM136	Baker Court Police Station, Borehamwood	Roadside	519802	197597	NO2	No	7.3	2.0	NO	1.9
HM137	Baker Court, Brook Road, Borehamwood	Roadside	519706	197041	NO2	No	10.7	2.2	NO	2.0
HM138	209 Shenley Road, Borehamwood	Kerbside	519644	196865	NO2	No	3.1	0.8	NO	2.0

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)
HM139	142 Shenley Road, Borehamwood	Roadside	519589	196794	NO2	No	4.0	2.0	NO	1.9
HM140	Shenley Road/Furzefill Road, Borehamwood	Kerbside	519308	196574	NO2	No	2.5	0.9	NO	1.9
HM141	42 Shenley Road, Borehamwood	Kerbside	519213	196495	NO2	No	4.5	0.8	NO	1.9
HM142	2a Hilfield Lane, Bushey	Roadside	513587	197872	NO2	No	13.0	5.7	NO	1.8
HM143	12 Watling Street, Radlett	Roadside	516229	200201	NO2	No	8.2	1.4	NO	2.0
HM144	Hatfield Road 2, Potters Bar	Roadside	526210	201753	NO2	No	7.5	3.4	NO	1.9
HM145	The Causeway	Roadside	526409	201715	NO2	No	17.0	1.4	NO	1.9
HM146	Shenley School 1	Roadside	518991	200401	NO2	No	10.0	3.0	NO	1.9
HM147	Shenley School 2	Roadside	518991	200401	NO2	No	10.0	3.0	NO	1.9

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/m³)

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
Hertsmere Borehamwood Manor Way (H1)	520317	197099	Roadside		99.38	35	29	30	23	23
Hertsmere Borehamwood Hertswood School (H2) (closed 23/05/17)	520156	197364	Urban Background	N/A - Closed	N/A - Closed	27	N/A - Closed	N/A - Closed	N/A - Closed	N/A - Closed
Hertsmere Borehamwood Bowling Club (H3) (open 24/05/17)	519716	197250	Urban Background		74.55	18	21	21	15	14

☒ **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/m³.

Exceedances of the NO_2 annual mean objective of 40µg/m³ 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/m³)

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
HM39	519418	196681	Roadside		100.0	**46.6**	39.2	**47.0**	38.3	35.5
HM40	519281	196779	Urban Background		100.0	23.2	24.3	25.9	18.1	16.3
HM41	519022	196612	Roadside		90.4	34.2	31.1	35.8	27.3	24.3
HM45/HM46/HM47	520156	197364	Urban Background		100.0	21.2	18.8	21.6	14.6	13.2
HM48	517846	195346	Roadside		100.0	38.8	37.2	**40.3**	29.6	28.5
HM49	517861	195226	Roadside		90.4	**51.6**	**46.6**	**49.8**	35.5	31.8
HM50	517802	195249	Roadside		100.0	**54.4**	**52.1**	**52.6**	40.0	35.6
HM52	517744	195247	Roadside		100.0	39.6	35.2	39.3	28.5	26.0
HM53	515581	195094	Suburban		82.7	20.4	18.6	21.8	15.4	14.4
HM54	514596	194396	Kerbside		100.0	25.9	24.1	28.7	19.6	19.3
HM55	512770	197834	Urban Background		100.0	22.5	22.4	23.8	16.2	15.1
HM57	513517	197819	Roadside		100.0	**46.6**	**43.0**	**48.1**	33.5	29.6

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
HM58	513966	197615	Kerbside		100.0	29.6	27.1	28.2	20.8	17.4
HM59	516570	200159	Urban Background		91.8	18.3	16.6	19.3	13.8	11.8
HM60	518586	202939	Roadside		65.1	29.9	28.2	28.6	20.2	19.0
HM61	522037	200670	Other		82.4	**48.4**	**40.7**	**45.4**	32.2	29.2
HM62	524943	201153	Roadside		100.0	**40.4**	39.6	**42.8**	29.1	26.8
HM63	526079	200026	Other		73.9	38.6	36.8	39.8	26.7	22.0
HM64	526208	201454	Roadside		100.0	**53.1**	**49.7**	**52.4**	36.2	31.0
HM65	526252	201597	Roadside		100.0	**50.0**	**47.5**	**50.1**	36.8	33.9
HM66	526245	201458	Roadside		100.0	**40.7**	36.9	**44.2**	31.3	28.4
HM67	526211	201402	Roadside		100.0	35.2	34.7	37.0	29.5	27.0
HM69	526034	200832	Roadside		100.0	**46.7**	**43.1**	**54.9**	**40.7**	34.0
HM70	526402	200457	Roadside		100.0	34.5	30.0	34.6	23.8	22.3

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
HM71	516291	200035	Roadside		90.4	**46.6**	**43.1**	**47.3**	32.5	29.3
HM74	516456	199624	Roadside		100.0	33.0	31.2	33.2	24.6	22.2
HM79/HM80/HM81	524988	201118	Roadside		100.0	37.8	38.0	**41.1**	27.3	23.1
HM82/HM83/HM84	524922	201088	Kerbside		100.0	38.9	36.1	36.8	25.8	23.4
HM85	518592	200948	Suburban		100.0	23.9	22.5	24.5	17.4	15.4
HM86	522970	199959	Other		34.3	**46.4**	**45.1**	**46.2**	**-**	21.9
HM93	524573	200633	Roadside		100.0	28.8	26.9	28.8	21.3	20.0
HM99/HM100/HM101	513209	195257	Roadside		100.0	**40.2**	38.3	**40.4**	30.6	28.6
HM102	516385	199761	Kerbside		100.0	**49.5**	**43.1**	**48.8**	35.3	29.2
HM105	520738	195271	Urban Background		100.0	28.3	26.9	27.4	21.6	18.9
HM108/HM109/HM110	513419	197727	Kerbside		100.0	**58.8**	**54.5**	**54.0**	39.9	34.8
HM111	521980	200567	Roadside		100.0	25.8	27.3	28.7	19.0	18.0

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
HM114	526164	201363	Roadside		90.4	34.2	33.7	36.5	27.2	26.6
HM117/HM118/HM119	513101	195286	Roadside		100.0	39.8	37.3	37.8	27.5	26.6
HM120/HM121/HM122	520181	197150	Urban Background		100.0	26.9	26.6	29.6	22.7	18.7
HM123/HM124/HM125	520263	197130	Roadside		100.0	39.1	38.8	**43.5**	31.5	28.6
HM126	517903	195552	Roadside		90.1	36.4	33.1	36.1	26.6	24.1
HM129	517907	195864	Roadside		91.8	32.7	32.0	36.4	26.6	24.7
HM132	516520	199450	Roadside		100.0	28.8	30.5	29.4	20.6	20.4
HM135	513755	197599	Other		100.0	36.3	31.8	35.3	25.5	22.2
HM136	519802	197597	Roadside		100.0	28.9	28.1	32.8	22.8	21.5
HM137	519706	197041	Roadside		83.0	32.4	27.7	32.6	23.3	21.3
HM138	519644	196865	Kerbside		92.0	32.0	32.5	36.2	27.4	26.4
HM139	519589	196794	Roadside		100.0	37.9	35.7	**40.2**	31.5	29.8

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
HM140	519308	196574	Kerbside		90.4	**44.1**	**45.6**	**48.6**	36.8	33.3
HM141	519213	196495	Kerbside		83.0	**42.7**	**42.3**	**45.1**	33.9	28.9
HM142	513587	197872	Roadside		100.0	34.1	32.2	35.2	24.0	21.3
HM143	516229	200201	Roadside		100.0	**54.5**	**50.0**	**52.3**	35.6	32.3
HM144	526210	201753	Roadside		100.0	33.4	30.6	34.9	23.1	21.0
HM145	526409	201715	Roadside		75.0	39.3	37.8	**41.7**	27.9	24.3
HM146	518991	200401	Roadside		100.0		28.7	31.0	22.5	18.6
HM147	518991	200401	Roadside		100.0		28.5	30.6	21.9	19.2

☒ **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%).

Figures A.1 A – A.1 D Trends in Annual Mean NO_2 Concentrations

Figure A.1.A presents NO2 annual mean concentrations for sites HM39 to HM58 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2021 and there is a general trend of reduction experienced across the sites.

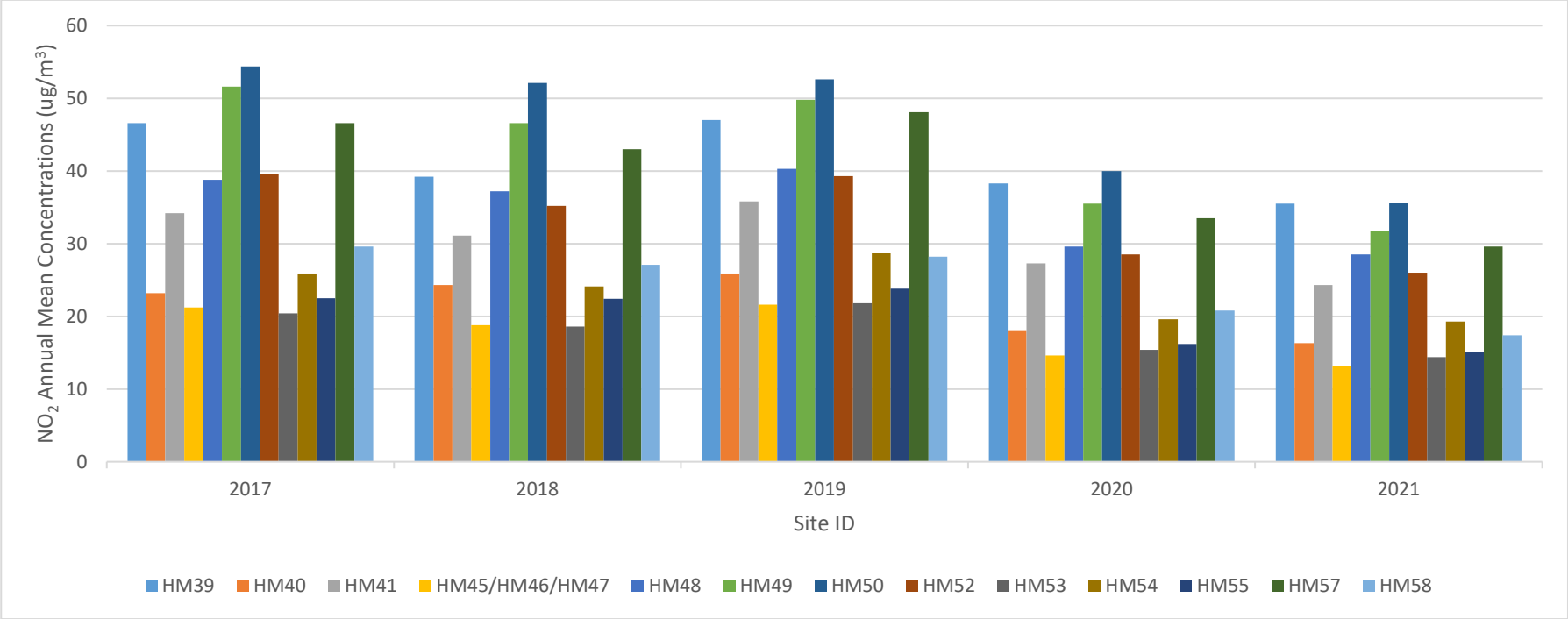


Figure A.1 B presents NO2 annual mean concentrations for sites HM59 to HM81 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2021 and there is a general trend of reduction experienced across the sites.

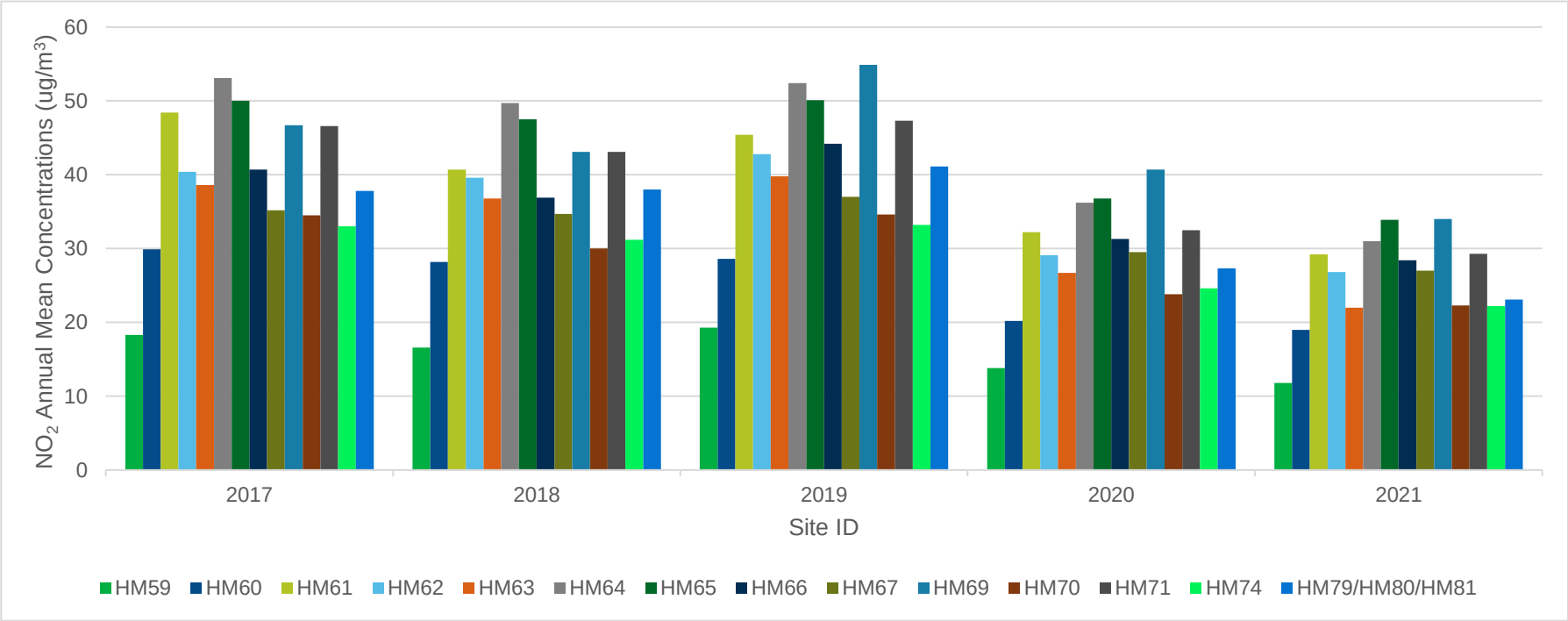


Figure A.1 C presents NO2 annual mean concentrations for sites HM82 to HM125 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2021 and there is a general trend of reduction experienced across the sites.

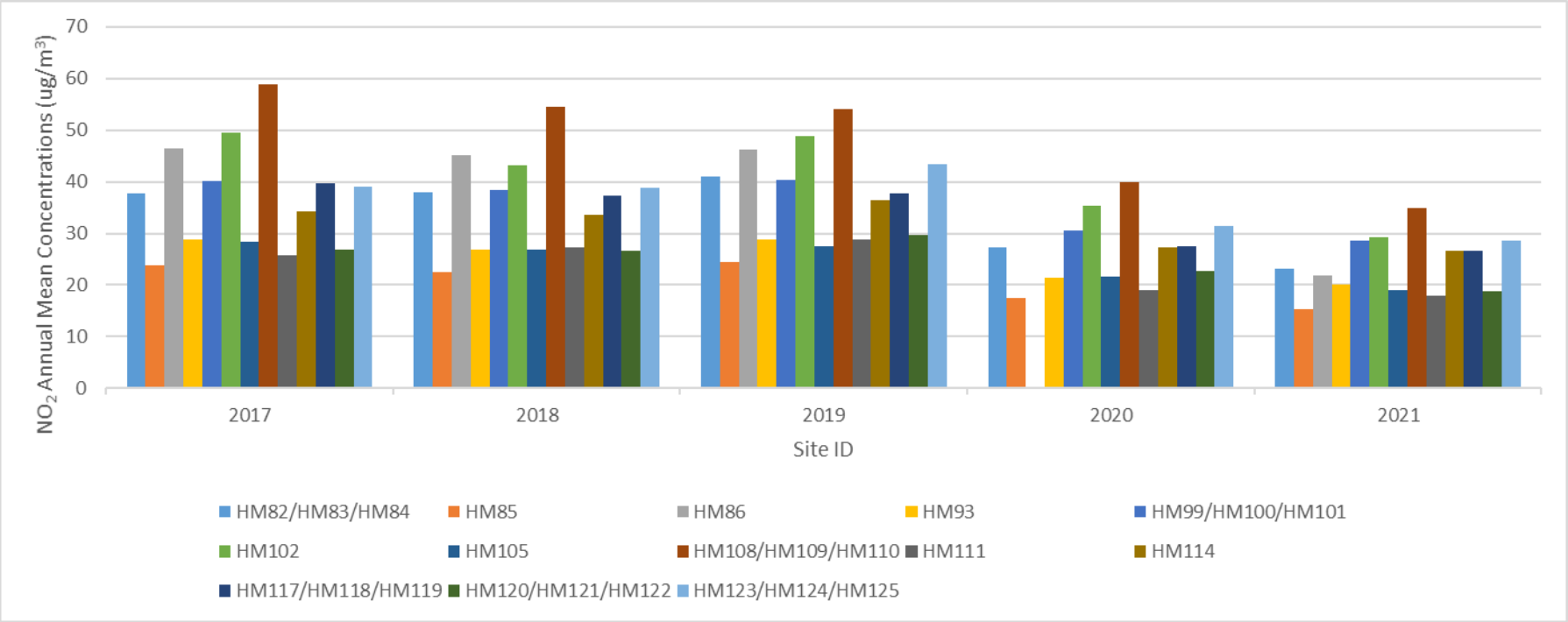


Figure A.1 D presents NO2 annual mean concentrations for sites HM126 to HM147 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2021 and there is a general trend of reduction experienced across the sites.

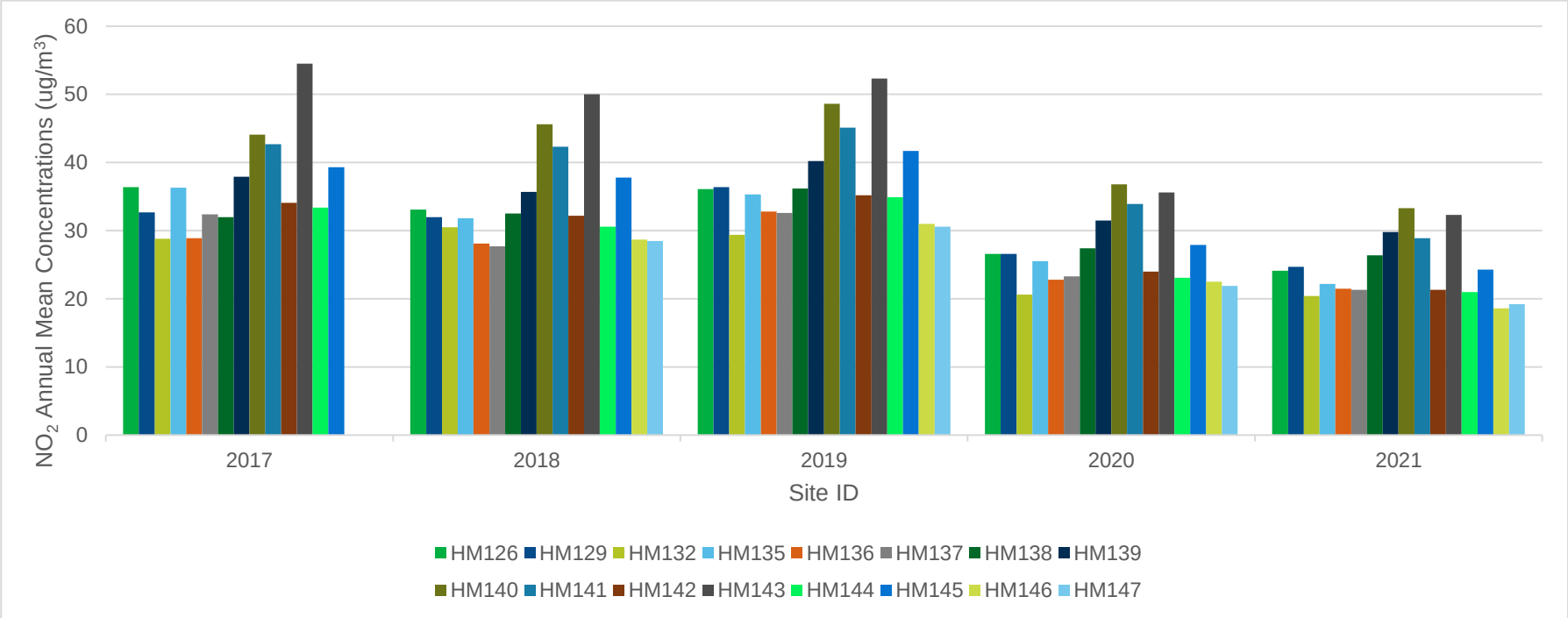


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

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
Hertsmere Borehamwood Manor Way (H1)	520317	197099	Roadside		99.38	**1 (150)**	0	1	0	0
Hertsmere Borehamwood Hertswood School (H2) (closed 23/05/2017	520156	197364	Urban Background	N/A Closed	N/A Closed	0	**N/A Closed**	**N/A Closed**	**N/A Closed**	**N/A Closed**
Hertsmere Borehamwood Bowling Club (H3) (open 24/05/2017)	519716	197250	Urban Background		74.55	0	0	0	0	**0 (57)**

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%).

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

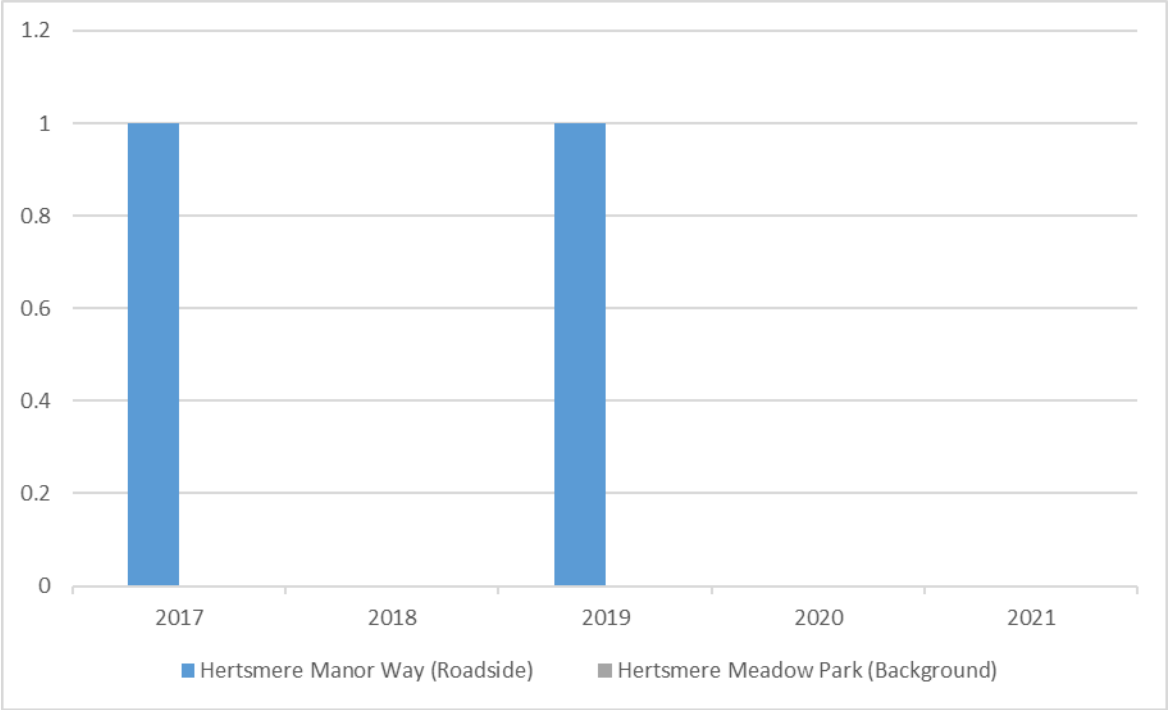


Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m³)

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
Hertsmere Borehamwood Manor Way (H1)	520317	197099	Roadside		72.53	20	17	16	15	16
Hertsmere Borehamwood Hertswood School (H2) (closed 23/05/2017	520156	197364	Urban Background	N/A Closed	N/A Closed	18	N/A Closed	N/A Closed	N/A Closed	N/A Closed
Hertsmere Borehamwood Meadow Park (H3) (open 24/05/2017)	519716	197250	Urban Background		94.66	13	16	14	14	13

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

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the PM_{10} annual mean objective of 40µg/m³ 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.3 – Trends in Annual Mean PM_{10} Concentrations (µg/m3)

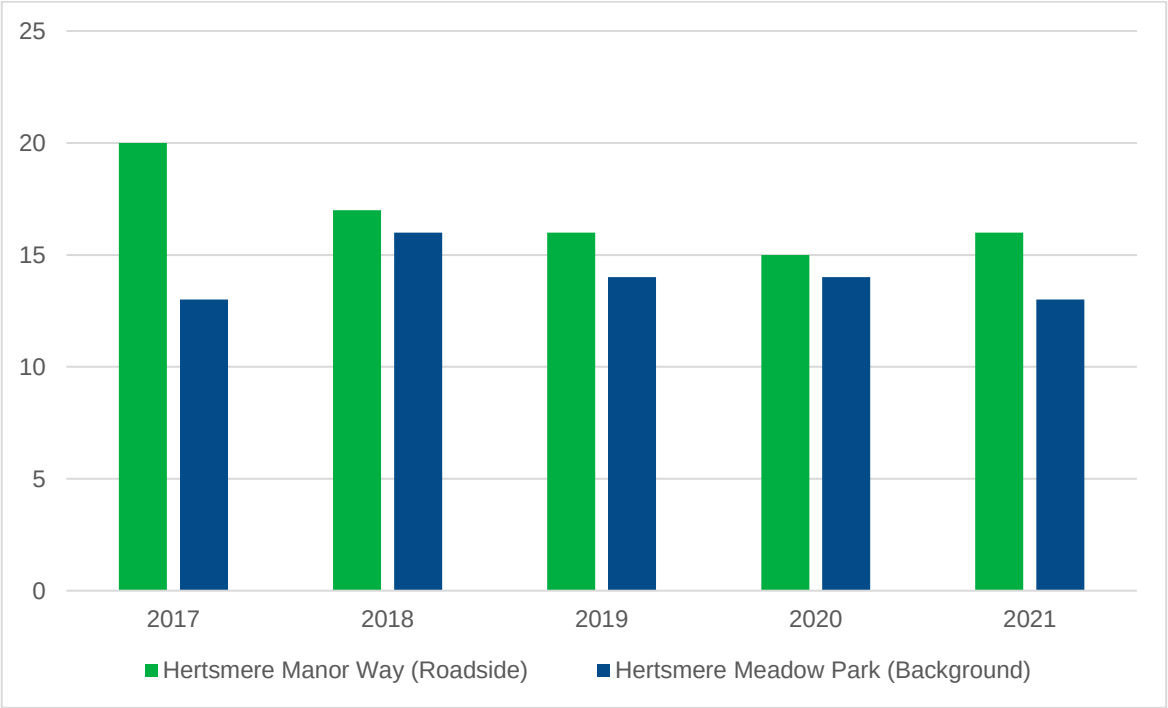


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

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
Hertsmere Borehamwood Manor Way (H1)	520317	197099	Roadside		72.53	4	1	2	0	0 (25)
Hertsmere Borehamwood Hertswood School (H2) (closed 23/05/2017	520156	197364	Urban Background	N/A Closed	N/A Closed	3	N/A Closed	N/A Closed	N/A Closed	N/A Closed
Hertsmere Borehamwood Bowling Club (H3) (open 24/05/2017)	519716	197250	Urban Background		94.66	0	1	1	0	0

Notes:

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

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

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

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

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

Figure A.4 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

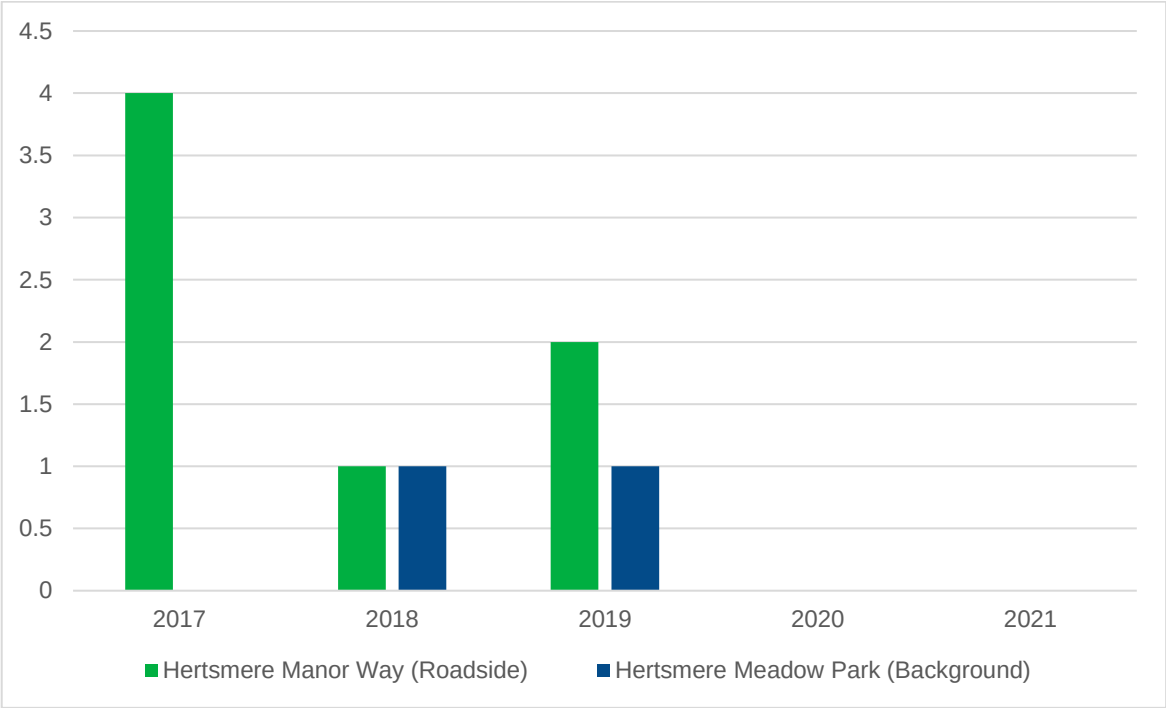


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m³)

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
Hertsmere Borehamwood Manor Way (H1)	520317	197099	Roadside		94.25	15	10	10	9	9
Hertsmere Borehamwood Hertswood School (H2) (closed 23/05/2017	520156	197364	Urban Background	N/A Closed	N/A Closed	12	N/A Closed	N/A Closed	N/A Closed	N/A Closed
Hertsmere Borehamwood Bowling Club (H3) (open 24/05/2017)	519716	197250	Urban Background		89.83	8	10	8.5	7.5	8.5

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

Notes:

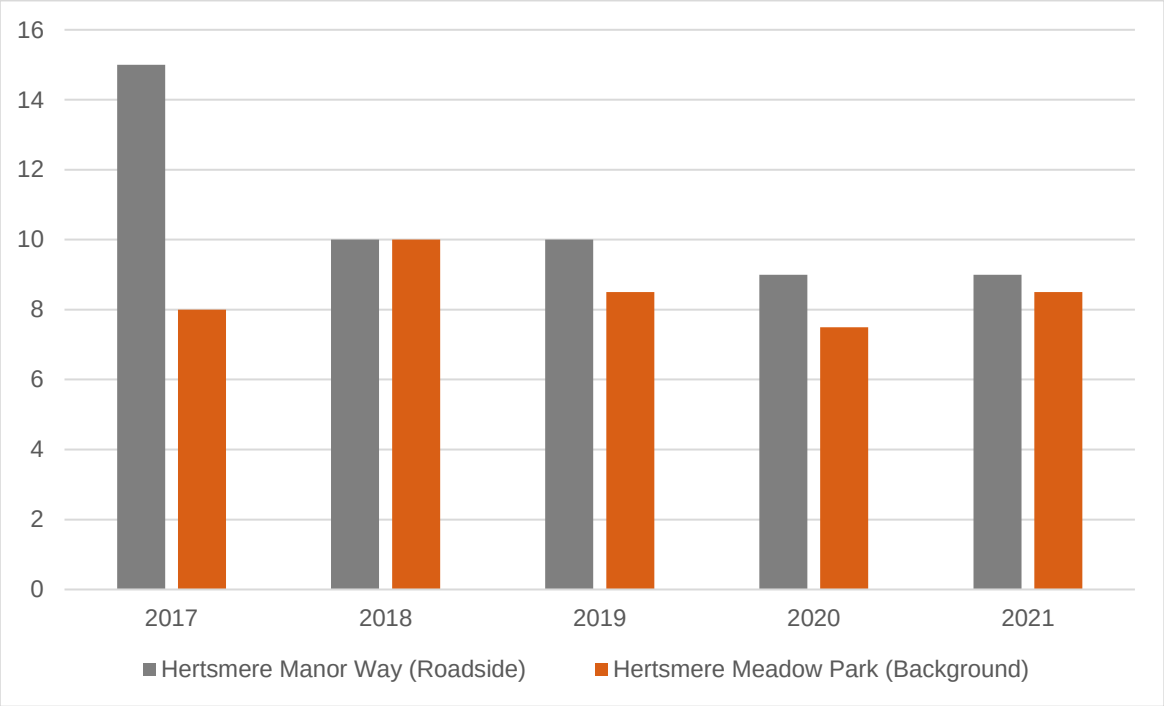
The annual mean concentrations are presented as µg/m³.

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.5 – Trends in Annual Mean $PM_{2.5}$ Concentrations (µg/m3)



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m³)

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 (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
HM39	519418	196681	51.9	43.8	47.1	36.7	39.1	36.6	35.7	35.7	48.1	36.5	53.6	42.2	**42.3**	35.5	N.A.	
HM40	519281	196779	24.2	26.8	19.3	17.9	15.0	11.2	13.9	12.2	19.9	22.6	22.0	28.6	19.5	16.3	N.A.	
HM41	519022	196612	34.0	33.1	28.2	N/A	26.2	25.6	25.6	22.0	35.0	32.2	33.4	22.6	28.9	24.3	N.A.	
HM45/HM46/HM47	520156	197364	19.6	19.8	16.1	12.8	11.8	10.9	11.8	9.8	16.8	19.2	20.7	18.9	15.7	13.2	N.A.	
HM48	517846	195346	31.3	38.5	33.1	34.8	29.3	31.2	30.3	26.1	44.4	36.3	41.3	30.2	33.9	28.5	N.A.	
HM49	517861	195226	33.9	36.7	37.9	N/A	37.8	36.4	33.3	31.6	48.2	42.4	45.2	32.9	37.8	31.8	N.A.	
HM50	517802	195249	45.3	42.3	45.7	33.1	41.1	39.1	36.3	36.3	53.9	48.0	47.7	39.3	**42.3**	35.6	N.A.	
HM52	517744	195247	27.2	35.2	31.1	26.9	29.2	27.2	27.6	22.8	38.7	37.9	37.6	30.0	30.9	26.0	N.A.	
HM53	515581	195094	19.7	21.5	16.0	N/A	11.1	N/A	13.9	10.9	19.4	18.4	22.1	18.9	17.2	14.4	N.A.	
HM54	514596	194396	25.5	28.8	24.0	23.3	18.7	19.3	19.1	14.4	26.0	22.6	27.7	25.9	22.9	19.3	N.A.	
HM55	512770	197834	20.9	20.3	19.3	19.2	12.9	14.7	15.4	12.4	20.8	17.4	24.0	18.2	18.0	15.1	N.A.	
HM57	513517	197819	39.8	36.8	37.0	28.1	34.0	31.8	28.1	29.2	39.9	40.8	42.8	34.1	35.2	29.6	N.A.	
HM58	513966	197615	24.0	22.8	20.6	17.4	18.2	16.7	15.5	16.3	22.9	23.9	28.0	21.7	20.7	17.4	N.A.	
HM59	516570	200159	20.3	18.4	15.8	12.7	11.8	9.9	10.1	8.7	15.2	16.2	N/A	15.5	14.0	11.8	N.A.	
HM60	518586	202939	29.1	23.3	27.3	22.5	N/A	19.1	15.9	N/A	20.2	N/A	28.1	N/A	23.2	19.0	N.A.	
HM61	522037	200670	38.8	44.1	37.8	24.7	33.6	25.8	N/A	N/A	33.8	37.8	36.1	34.9	34.7	29.2	N.A.	
HM62	524943	201153	37.5	37.2	37.1	32.7	29.9	29.4	25.3	25.9	33.9	31.4	35.9	27.2	31.9	26.8	N.A.	
HM63	526079	200026	26.6	38.3	29.5	23.7	29.2	19.2	21.2	19.8	N/A	N/A	28.1	N/A	26.2	22.0	N.A.	
HM64	526208	201454	35.5	36.6	50.6	27.7	39.5	29.3	28.7	29.3	32.7	41.1	53.0	38.7	36.9	31.0	N.A.	
HM65	526252	201597	46.6	47.9	53.3	31.8	41.8	40.8	31.3	29.0	28.3	41.7	48.3	44.1	**40.4**	33.9	N.A.	
HM66	526245	201458	41.2	35.2	40.5	31.7	34.7	33.2	21.0	23.7	32.6	32.2	43.3	36.6	33.8	28.4	N.A.	
HM67	526211	201402	42.6	39.4	35.0	25.9	29.0	26.8	24.1	20.4	42.5	32.1	38.3	30.3	32.2	27.0	N.A.	
HM69	526034	200832	50.8	44.1	46.5	39.3	39.2	38.7	30.4	32.9	34.7	38.8	52.8	38.1	**40.5**	34.0	N.A.	
HM70	526402	200457	31.7	32.0	26.6	21.5	25.5	19.6	18.0	18.1	31.0	31.2	34.6	29.2	26.6	22.3	N.A.	
HM71	516291	200035	31.7	35.8	36.6	N/A	34.1	34.6	30.9	28.2	45.1	33.0	41.4	32.2	34.9	29.3	N.A.	
HM74	516456	199624	30.1	31.8	28.1	28.7	23.5	24.7	23.4	17.5	29.4	23.1	30.8	26.4	26.5	22.2	N.A.	
HM79/HM80/HM81	524988	201118	31.2	30.9	34.0	30.5	23.7	22.3	20.4	19.2	28.5	28.1	31.0	29.4	27.4	23.1	N.A.	
HM82/HM83/HM84	524922	201088	31.0	31.0	30.0	25.6	27.4	24.6	21.9	21.8	33.0	26.5	35.2	26.1	27.8	23.4	N.A.	
HM85	518592	200948	21.9	23.3	21.2	15.9	13.5	12.5	13.5	11.8	18.8	20.2	25.7	21.9	18.3	15.4	N.A.	
HM86	522970	199959	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30.0	17.4	38.7	33.6	29.9	21.9	N.A.	
HM93	524573	200633	30.0	28.9	23.5	19.5	20.1	16.6	16.7	12.4	43.6	23.8	26.9	24.6	23.9	20.0	N.A.	
HM99/HM100/HM101	513209	195257	36.2	34.1	37.4	35.9	32.4	32.1	28.3	28.0	41.3	32.6	38.9	30.9	34.0	28.6	N.A.	
HM102	516385	199761	37.6	38.5	37.6	37.4	33.0	30.9	28.0	24.7	40.2	35.9	41.6	32.4	34.8	29.2	N.A.	
HM105	520738	195271	26.0	30.3	23.6	23.6	17.6	15.3	18.8	13.4	25.6	25.6	23.2	27.0	22.5	18.9	N.A.	
HM108/HM109/HM110	513419	197727	45.0	44.0	45.2	42.6	39.6	39.6	32.9	34.3	49.3	39.9	47.2	37.4	**41.4**	34.8	N.A.	
HM111	521980	200567	22.1	28.2	21.8	25.0	19.9	16.6	17.3	14.7	25.4	20.9	23.4	21.3	21.4	18.0	N.A.	
HM114	526164	201363	30.8	35.2	36.8	31.9	28.0	28.6	N/A	25.9	33.6	29.1	38.0	30.7	31.7	26.6	N.A.	
HM117/HM118/HM119	513101	195286	37.3	32.4	32.1	32.1	30.1	27.3	26.0	23.6	37.9	30.0	40.5	30.5	31.6	26.6	N.A.	

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 (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
HM120/HM121 /HM122	520181	197150	28.8	39.3	22.0	18.1	18.1	13.7	15.9	13.3	22.4	25.2	24.3	26.3	22.3	18.7	N.A.	
HM123/HM124 /HM125	520263	197130	34.7	28.4	34.8	33.2	31.8	29.7	30.8	30.0	44.9	38.7	40.3	31.8	34.1	28.6	N.A.	
HM126	517903	195552	29.1	30.0	32.6	24.9	26.5	26.3	26.2	22.9	33.7	N/A	37.3	26.0	28.7	24.1	N.A.	
HM129	517907	195864	30.3	33.5	27.5	24.0	30.4	25.5	27.2	26.3	38.1	34.6	N/A	25.4	29.3	24.7	N.A.	
HM132	516520	199450	29.4	27.9	26.0	25.7	21.4	21.9	19.9	16.7	26.4	21.7	29.7	24.3	24.3	20.4	N.A.	
HM135	513755	197599	34.1	29.2	29.1	19.4	24.7	21.2	19.8	20.8	28.9	30.6	33.8	25.0	26.4	22.2	N.A.	
HM136	519802	197597	28.4	35.2	27.7	23.2	21.7	19.7	21.5	18.7	28.0	28.3	28.8	25.4	25.6	21.5	N.A.	
HM137	519706	197041	29.4	32.3	24.7	23.1	22.6	17.7	20.3	N/A	28.0	26.6	28.7	N/A	25.3	21.3	N.A.	
HM138	519644	196865	39.2	34.3	33.6	27.2	N/A	25.5	25.6	23.1	35.5	36.6	36.1	28.6	31.4	26.4	N.A.	
HM139	519589	196794	39.6	44.8	34.9	37.8	35.2	31.8	31.4	24.9	44.9	32.8	38.6	28.6	35.4	29.8	N.A.	
HM140	519308	196574	40.6	47.2	42.6	N/A	36.3	37.7	35.5	33.1	49.9	39.2	40.7	33.6	39.7	33.3	N.A.	
HM141	519213	196495	36.5	42.4	36.4	33.7	N/A	28.1	28.0	25.6	42.4	38.7	31.8	N/A	34.4	28.9	N.A.	
HM142	513587	197872	29.3	26.7	27.1	20.5	24.2	20.3	20.0	20.5	26.2	28.0	34.4	27.9	25.4	21.3	N.A.	
HM143	516229	200201	35.9	41.3	41.7	34.0	38.9	37.8	31.6	27.0	41.1	43.7	50.3	38.9	38.5	32.3	N.A.	
HM144	526210	201753	29.0	30.4	25.2	20.3	24.7	19.4	19.0	17.4	28.1	27.4	32.2	27.4	25.0	21.0	N.A.	
HM145	526409	201715	N/A	N/A	34.2	30.4	30.1	25.7	N/A	19.4	32.6	24.3	34.9	29.3	29.0	24.3	N.A.	
HM146	518991	200401	21.1	26.2	25.2	18.0	20.0	18.2	18.3	17.1	26.8	22.5	28.6	23.2	22.1	18.6	N.A.	
HM147	518991	200401	26.8	25.6	24.5	18.2	20.5	18.6	18.0	16.9	27.8	25.4	28.1	23.1	22.8	19.2	N.A.	

☒ **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.**

☒ **Hertsmere Borough Council confirm that all 2019, 2020 & 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 Hertsmere Borough Council During 2021

One new major source relating to air quality has been identified within Hertsmere Borough Council during the 2021 reporting year, following the granting of Planning Permission for the Demolition of existing buildings and erection of a new discount food store (Class A1) and employment unit (Class B2/B8) with associated car parking and new pedestrian access off Elstree Way, under Application No. 20/0316/FUL.

Additional Air Quality Works Undertaken by Hertsmere Borough Council During 2021

Hertsmere Borough Council has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

Nitrogen dioxide analysis procedures are compliant with the Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance for users and laboratories (February 2008). The diffusion tubes are supplied and analysed by Gradko utilising the 20% TEA in water preparation method. Gradko maintains a UKAS accredited quality system with fully documented in house methods for all analysis procedures. The concentration of nitrogen dioxide is determined for exposed diffusion tubes using method GLM7. Gradko was assessed as part of the Workplace Analysis Scheme for Proficiency (WASP). In WASP AIR-PT-Rounds AR043 to AR046 (May 2021 to October 2021) Gradko was 100% satisfactory in all WASP trials.

A majority of Diffusion Tube monitoring during 2021 was completed in adherence with the 2021 Diffusion Tube Monitoring Calendar, with the exception of several divergences which are outlined below.

Month		
Jan	06/01/2021	02/02/2021
Feb	02/02/2021	03/03/2021
Mar	03/03/2021	30/03/2021
Apr	30/03/2021	04/05/2021
May	04/05/2021	02/06/2021
Jun	02/06/2021	30/06/2021
Jul	30/06/2021	04/08/2021
Aug	04/08/2021	02/09/2021
Sep	02/09/2021	28/09/2021
Oct	28/09/2021	03/11/2021
Nov	03/11/2021	03/12/2021
Dec	03/12/2021	05/01/2022

Diffusion Tube Annualisation

Non-automatic monitoring sites requiring annualisation are clearly defined along with details of the calculation method undertaken provided in Table C.2. Annualisation is required for any site with data capture less than 75% but greater than 25%.

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.

Hertsmere Borough Council have applied a national bias adjustment factor of 0.84 to the 2021 monitoring data. A summary of bias adjustment factors used by Hertsmere Borough Council over the past five years is presented in Table C.1.

A good overall Diffusion Tube Precision was determined when calculating a Local Bias Adjustment Factor within the Diffusion Tube Data Processing Tool. However there is a Poor

Overall Data Capture, with respect to the Continuous Monitoring Data and therefore the Local Bias Adjustment Factor should be treated with caution. Subsequently a National Bias Adjustment Factor was used for the 2021 Diffusion Tube monitoring data.

The 09/22 National Diffusion Tube Bias Adjustment Spreadsheet was used in determining the 2021 Bias Adjustment Factor, which is based upon 34 studies.

2021 National Bias Adjustment Factor

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 09/22

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 March 2023
LAQM Helpdesk Website

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

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

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List — If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List — If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List — If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

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	Year[5]	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[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2021	R	Gedling Borough Council	12	32	26	23.1%	G	**0.81**
Gradko	20% TEA in water	2021	UB	West Northamptonshire Council	11	14	10	32.1%	G	**0.76**
Gradko	20% TEA in water	2021	R	Ards and North Down Borough Council	10	30	22	38.4%	G	**0.72**
Gradko	20% TEA in water	2021	R	Birmingham City Council	10	33	25	35.2%	G	**0.74**
Gradko	20% TEA in water	2021	R	Cheshire West and Chester	12	34	29	14.1%	G	**0.88**
Gradko	20% TEA in water	2021	R	Cheshire West and Chester	12	33	29	12.6%	G	**0.89**
Gradko	20% TEA in water	2021	R	Lisburn & Castlereagh City Council	12	25	19	31.9%	G	**0.76**
Gradko	20% TEA in water	2021	R	Nottingham City Council	12	32	35	-8.1%	G	**1.09**
Gradko	20% TEA in water	2021	R	SOUTHAMPTON CITY COUNCIL	12	34	32	5.2%	G	**0.95**
Gradko	20% TEA in water	2021	R	SOUTHAMPTON CITY COUNCIL	12	34	27	28.6%	G	**0.78**
Gradko	20% TEA in water	2021	R	Bath & North East Somerset	12	31	27	15.1%	G	**0.87**
Gradko	20% TEA in water	2021	R	Bedford Borough Council	11	34	31	7.6%	G	**0.93**
Gradko	20% TEA in water	2021	R	Bedford Borough Council	11	19	17	11.7%	G	**0.90**
Gradko	20% TEA in water	2021	R	Blackburn with Darwen Borough Council	12	27	20	32.3%	G	**0.76**
Gradko	20% TEA in water	2021	R	Brent Council	12	51	46	9.9%	G	**0.91**
Gradko	20% TEA in water	2021	R	Gateshead Council	10	23	19	23.8%	G	**0.81**
Gradko	20% TEA in water	2021	R	Gateshead Council	12	25	22	13.7%	G	**0.88**
Gradko	20% TEA in water	2021	R	Gateshead Council	11	27	25	9.8%	G	**0.91**
Gradko	20% TEA in water	2021	R	Gateshead Council	12	31	25	26.6%	G	**0.79**
Gradko	20% TEA in water	2021	R	Gateshead Council	12	32	34	-4.1%	G	**1.04**
Gradko	20% TEA in water	2021	KS	Marylebone Road Intercomparison	11	53	42	25.0%	G	**0.80**
Gradko	20% TEA in Water	2021	R	Monmouthshire County Concil	11	35	29	21.8%	G	**0.82**
Gradko	20% TEA in water	2021	R	Belfast City Council	12	25	21	20.9%	G	**0.83**
Gradko	20% TEA in water	2021	UC	Belfast City Council	11	26	21	25.4%	G	**0.80**
Gradko	20% TEA in water	2021	R	Belfast City Council	12	42	36	17.7%	G	**0.85**
Gradko	20% TEA in water	2021	R	Belfast City Council	12	38	27	39.4%	G	**0.72**
Gradko	20% TEA in water	2021	UB	Dudley MBC	12	20	15	36.0%	G	**0.74**
Gradko	20% TEA in water	2021	R	Dudley MBC	12	30	29	4.2%	G	**0.96**
Gradko	20% TEA in water	2021	R	Dudley MBC	12	42	40	5.5%	G	**0.95**
Gradko	20% TEA in Water	2021	R	Lambeth	10	91	62	46.6%	G	**0.68**
Gradko	20% TEA in water	2021	R	Lancaster City Council	13	38	32	18.4%	G	**0.84**
Gradko	20% TEA in water	2021	R	Lancaster City Council	13	28	27	4.9%	G	**0.95**
Gradko	20% TEA in water	2021	R	Cheltenham Borough Council	12	29	25	13.4%	G	**0.88**
Gradko	20% TEA in water	2021	R	Preston City Council	12	24	21	12.2%	G	**0.89**
Gradko	20% TEA in water	2021		**Overall Factor[3] (34 studies)**				**Use**		**0.84**

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	09/22	0.84
2020	Local	N.A.	0.92
2019	Local	N.A.	1.04
2018	National	09/20	0.92
2017	National	03/18	0.89

NO_2 Fall-off with Distance from the Road

Distance correction should be considered at any monitoring site where the annual mean concentration is greater than 36µg/m^3 and the monitoring site is not located at a point of relevant exposure (taking the limitations of the calculator into account).

No diffusion tube NO_2 monitoring locations within Hertsmere Borough Council required distance correction during 2021.

QA/QC of Automatic Monitoring

- During the 2021 monitoring year Karl Riahi (Principal Environmental Health Officer) completed the data management and undertook the Local Site Operator (LSO) duties for the two automatic monitoring sites within Hertsmere Borough Council's district.
- The Hertsmere Borehamwood Manor Way, Roadside Automatic Monitoring Site (H1) is calibrated every two weeks, whereas the Hertsmere Borehamwood Bowling Club, Background Automatic Monitoring Site (H3) is calibrated monthly.
- Hertsmere Borough Council has an annual Service Contract with acoem for both Background and Roadside Automatic Monitoring Sites, inclusive of 2 x 6 Monthly Routine Service Visits Per Annum.

- At the time of writing the Borehamwood, Manor Way (Roadside) Air Quality Monitoring Station (AQMS) is not audited. The Borehamwood Bowling Club/Meadow Park, (Background) AQMS is part of the AURN network and was audited on the 2nd February 2021 and the 3rd August 2021. Certificates of Calibration were issued on the 9th November 2021 (Certificate No: 05433) and 29th November 2021 (Certificate No: 05632).
- The monitoring data presented within the ASR has been ratified.
- Live/historic data is available on the HERTS + BEDS Air Quality Network's webpage via https://www.airqualityengland.co.uk/local-authority/?la_id=408

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

PM_{10} and $PM_{2.5}$ monitoring is carried out by Hertsmere Borough Council at two locations. The Borehamwood, Manor Way (Roadside) Air Quality Monitoring Station (AQMS), uses a 1405-DF TEOM/FDMS, which has been declared equivalent to the reference method and in accordance with LAQM.TG (22) 7.164, Local Authorities can use this type of FDMS variant, without the need for correction for slope and/or intercept.

The Borehamwood Bowling Club/Meadow Park, (Background) AQMS, uses a Fidas 200, which processes both PM_{10} and $PM_{2.5}$ monitoring data via an inbuilt algorithm known as Method 11. In accordance with LAQM.TG (22) 7.174, Method 11 PM_{10} data can be used by Local Authorities without the need for correction. Method 11 $PM_{2.5}$ data can be used after correction for slope by dividing by 1.06.

The $PM_{2.5}$ Annual Mean raw data for the Borehamwood Bowling Club/Meadow Park, (Background) AQMS is 9 µg/m^3 ÷ 1.06 = 8.5 µg/m^3.

The above correction factor was also applied to the PM2.5 Annual Mean raw data for the Borehamwood Bowling Club/Meadow Park (Background) for the 2019 and 2020 monitoring years with respective Annual Mean concentrations of 8.5 µg/m^3 and 7.5 µg/m^3.

Automatic Monitoring Annualisation

Annualisation was required for both of Hertsmere Borough Council's automatic monitoring sites, as Hertsmere Borehamwood Bowling Club (Meadow Park) (H3) had an annual data capture of 74.55 % with respect to Annual Mean NO_2. Hertsmere Borehamwood Manor Way (H1) had an annual data capture of 72.53% with respect to Annual Mean PM10. The annualisation data for both automatic monitoring sites is summarised within Table C.2.

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 corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within Hertsmere Borough Council required distance correction during 2021.

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

Site ID	Annualisation Factor Hertsmere Borehamwood Manor Way (H1)	Annualisation Factor Bedford Prebend Street (HB011)	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
HM60	0.9771	0.9768	0.9769	23.2	22.7	*Annual Mean NO2 µg/m3*
HM86	0.8501	0.8935	0.8718	29.9	26.1	*Annual Mean NO2 µg/m3*

Table C.2 A – Annualisation: Background Automatic Monitoring Site (H3) - Annual Mean NO2 µg/m3

Site	Site Type	Annual Mean (µg/m3)	Period Mean (µg/m3)	Ratio Annual Mean / Period Mean
Borehamwood Manor Way	Roadside	23	23	1
Bedford Prebend Street	Urban Traffic	32	31.6	1.0132
Watford Town Hall	Suburban Background	21.2	21.2	1.0018
Barnet Tally Ho	Urban Traffic	32	32.1	0.9965
	Average Ratio			1.0029

Table C.2 B – Annualisation: Roadside Automatic Monitoring Site (H1) - Annual Mean PM10 µg/m3

Site	Site Type	Annual Mean (µg/m3)	Period Mean (µg/m3)	Ratio Annual Mean / Period Mean
Borehamwood Meadow Park	Urban Background	13	13.2	0.9848
Dacorum Northchurch High Street	Urban Traffic	15	14.6	1.0266
Watford Town Hall	Suburban Background	13.3	13.3	0.9992
Barnet Tally Ho	Urban Traffic	17	16.9	1.0065
	Average Ratio			1.0043

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4
Periods used to calculate bias	8			
Bias Factor A	0.89 (0.84 - 0.95)			
Bias Factor B	12% (5% - 19%)			
Diffusion Tube Mean (µg/m^3)	15.0			
Mean CV (Precision)	3.0%			
Automatic Mean (µg/m^3)	13.4			
Data Capture	98%			
Adjusted Tube Mean (µg/m^3)	13 (13 - 14)			

Notes:

A National Bias Adjustment Factor was subsequently used for the 2021 monitoring data. Please refer to page 46 above.

Appendix D: Maps of Monitoring Locations

Figure D.1 – Map of Automatic Monitoring Sites

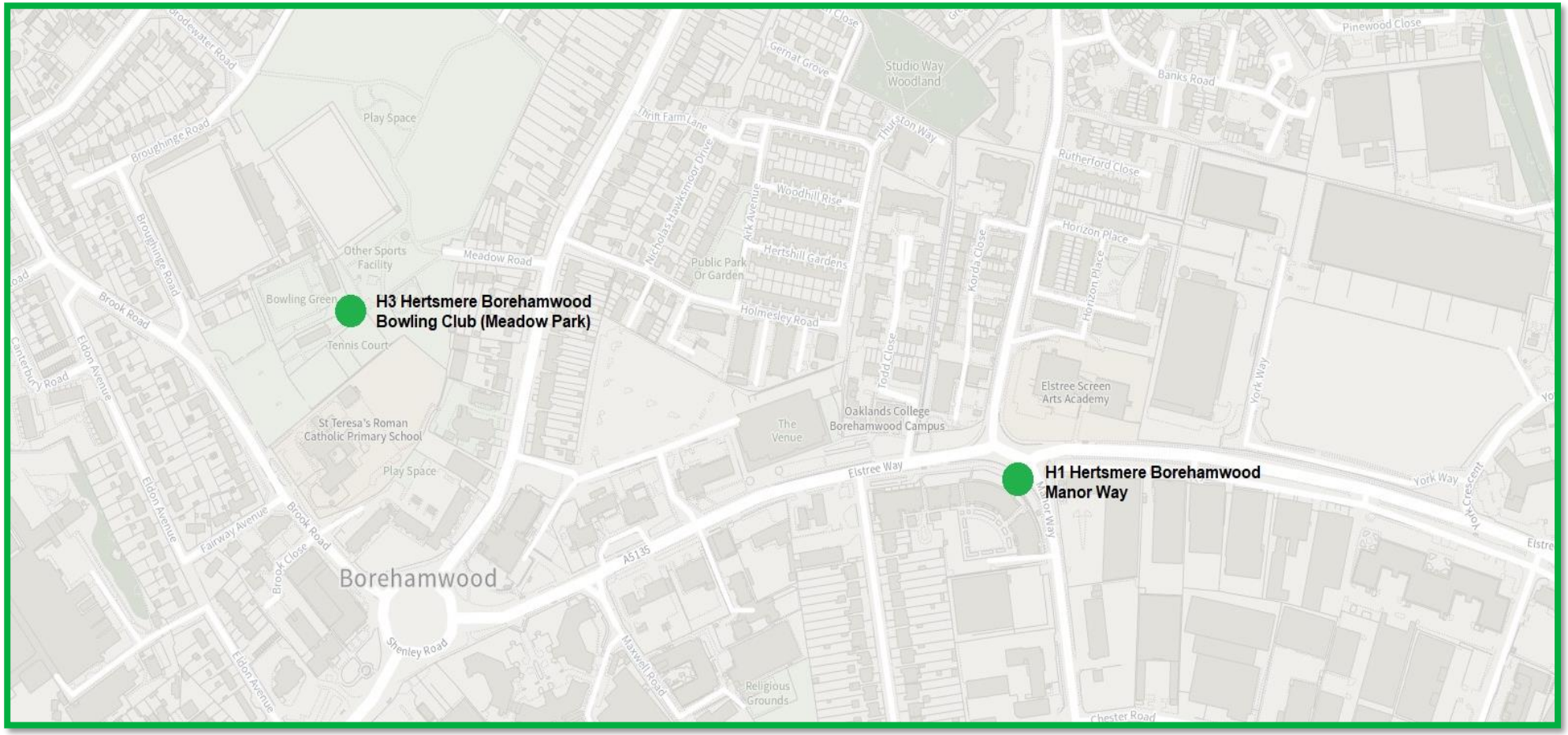


Figure D.1: Hertsmere Automatic Monitoring Station Locations.

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

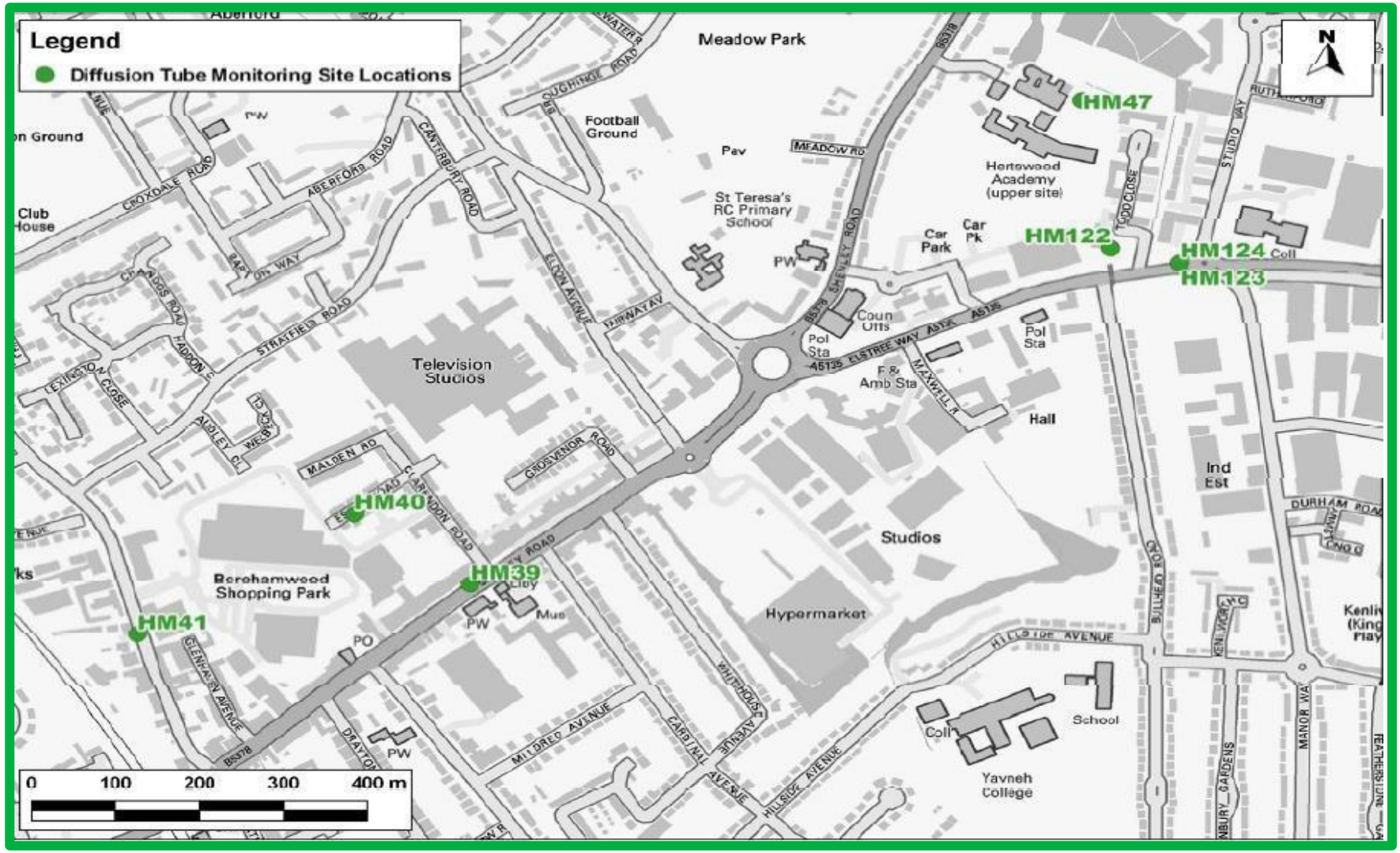

Figure D.2.A: Hertsmere Diffusion Tube Monitoring Site Location, Borehamwood Centre.

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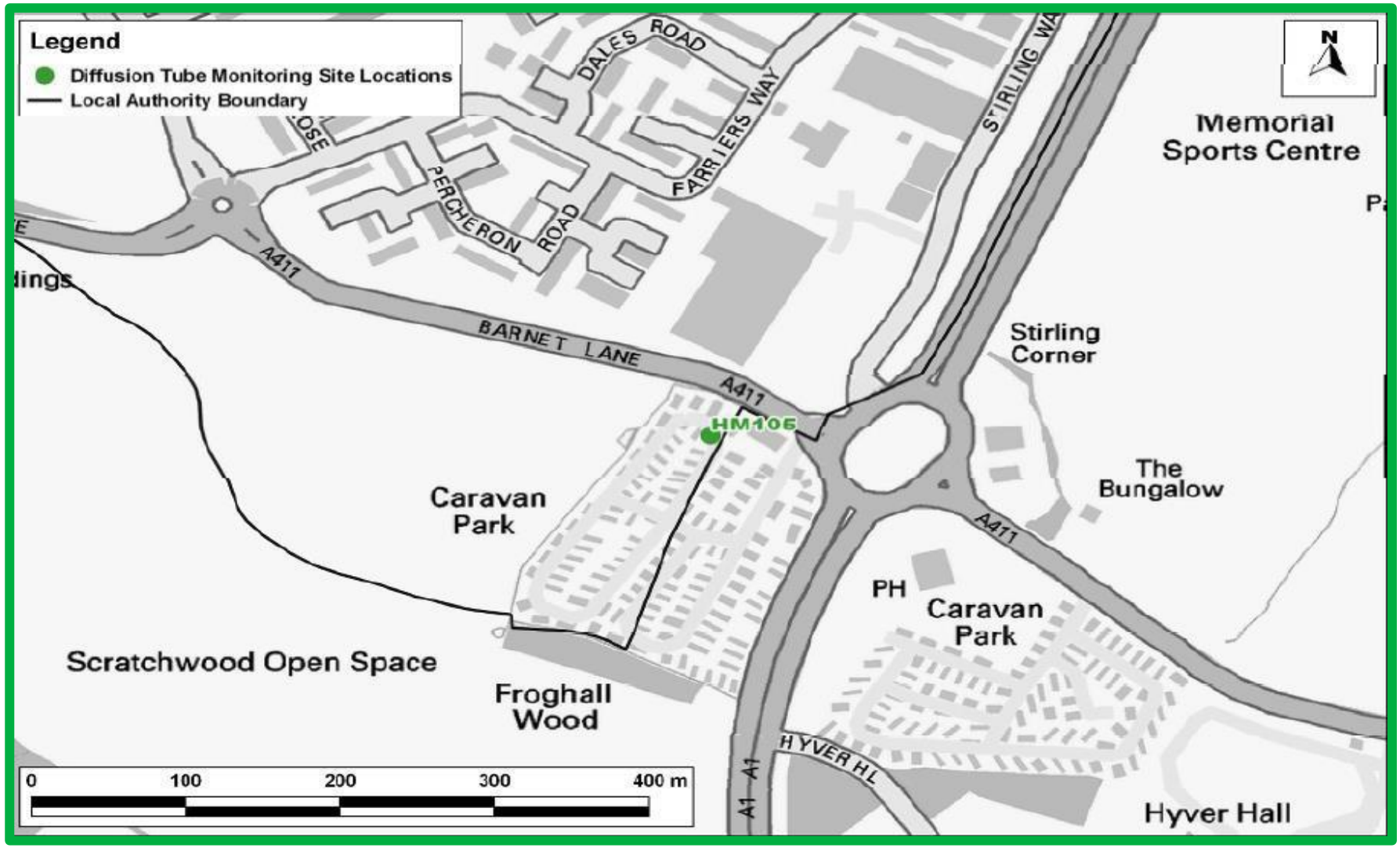

Figure D.2.B: Hertsmere Diffusion Tube Monitoring Site Location, Borehamwood South.

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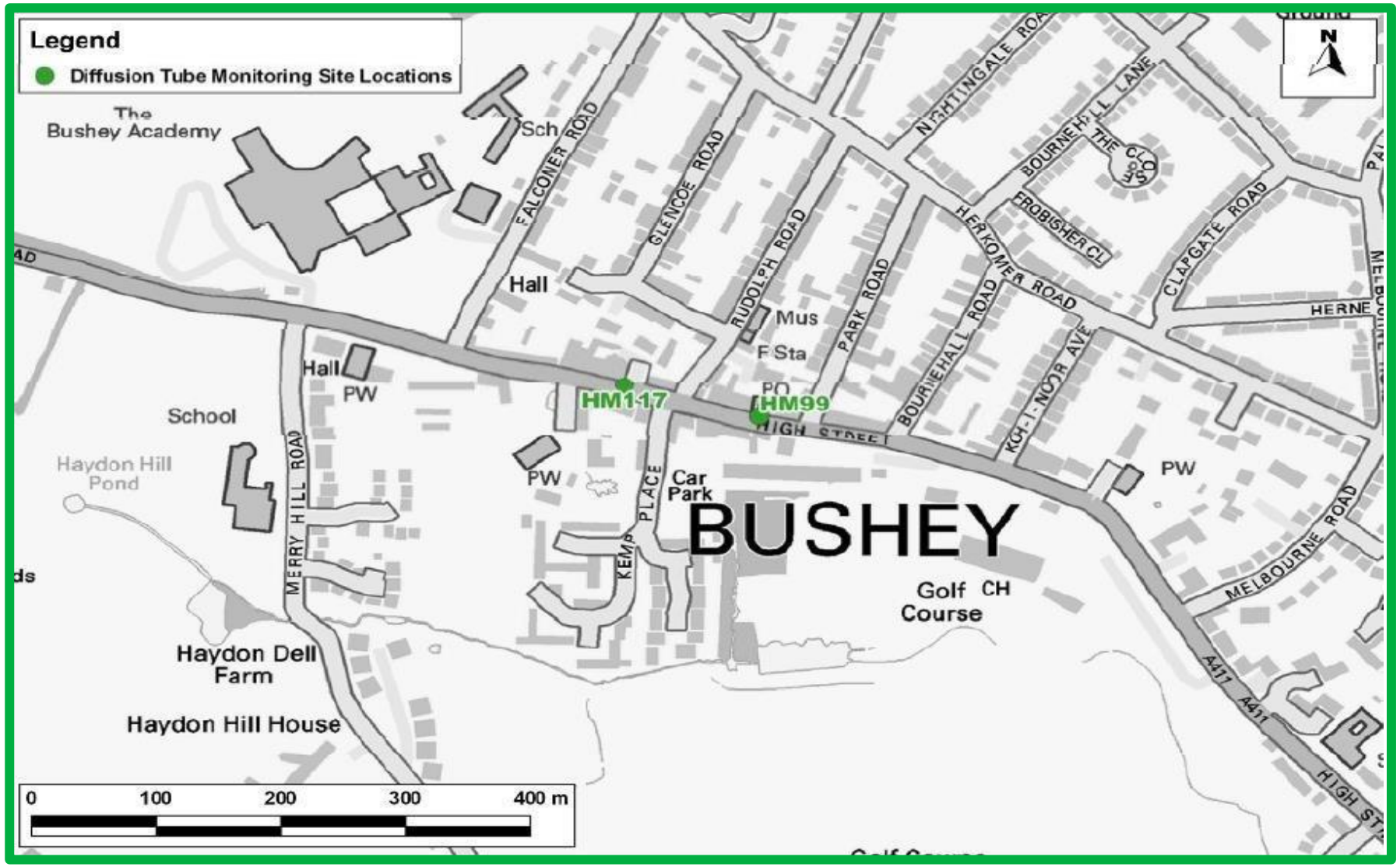

Figure D.2.C: Hertsmere Diffusion Tube Monitoring Site Locations, Northwest Bushey

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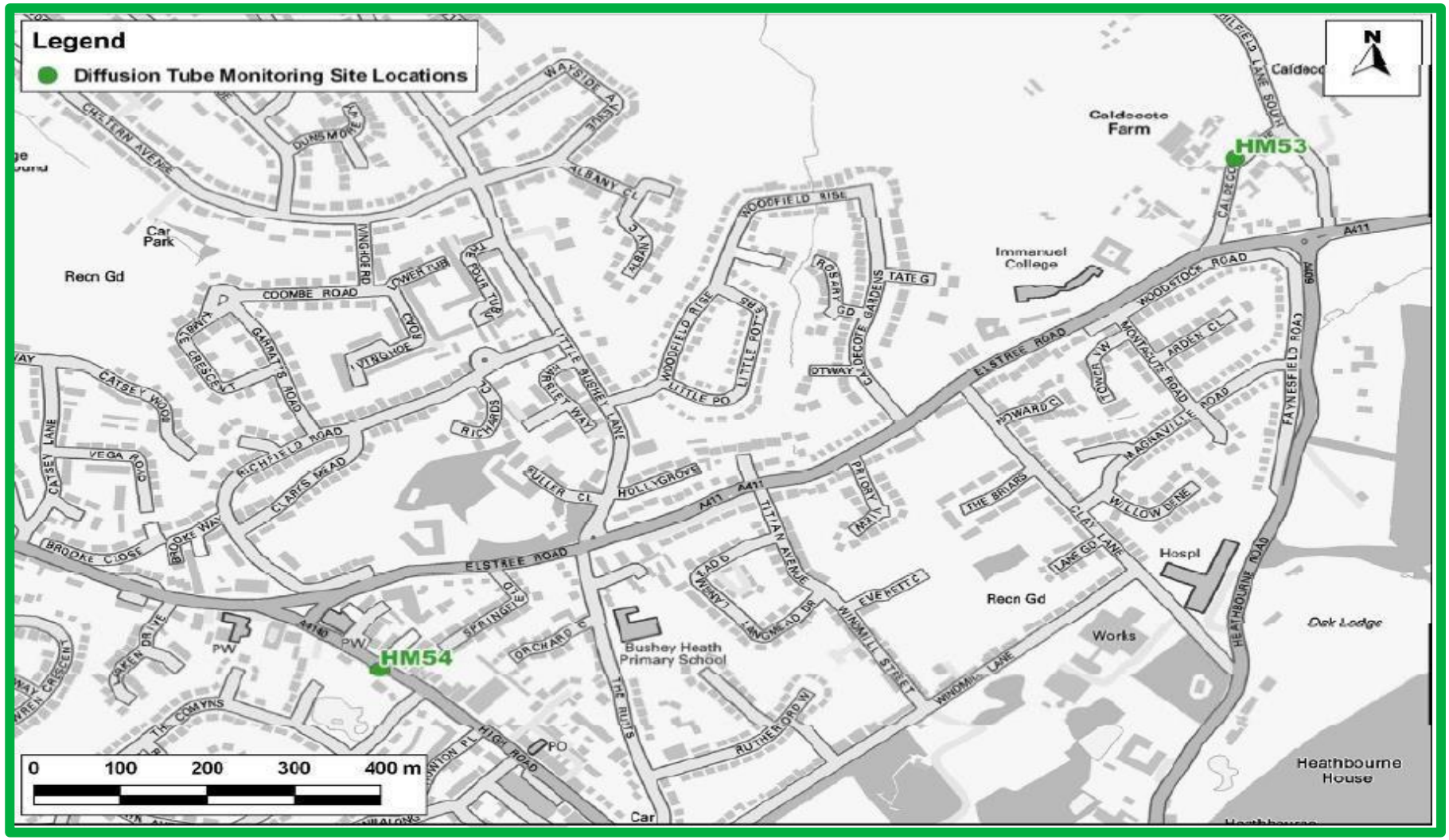

Figure D.2.D: Hertsmere Diffusion Tube Monitoring Site Locations, Southeast Bushey

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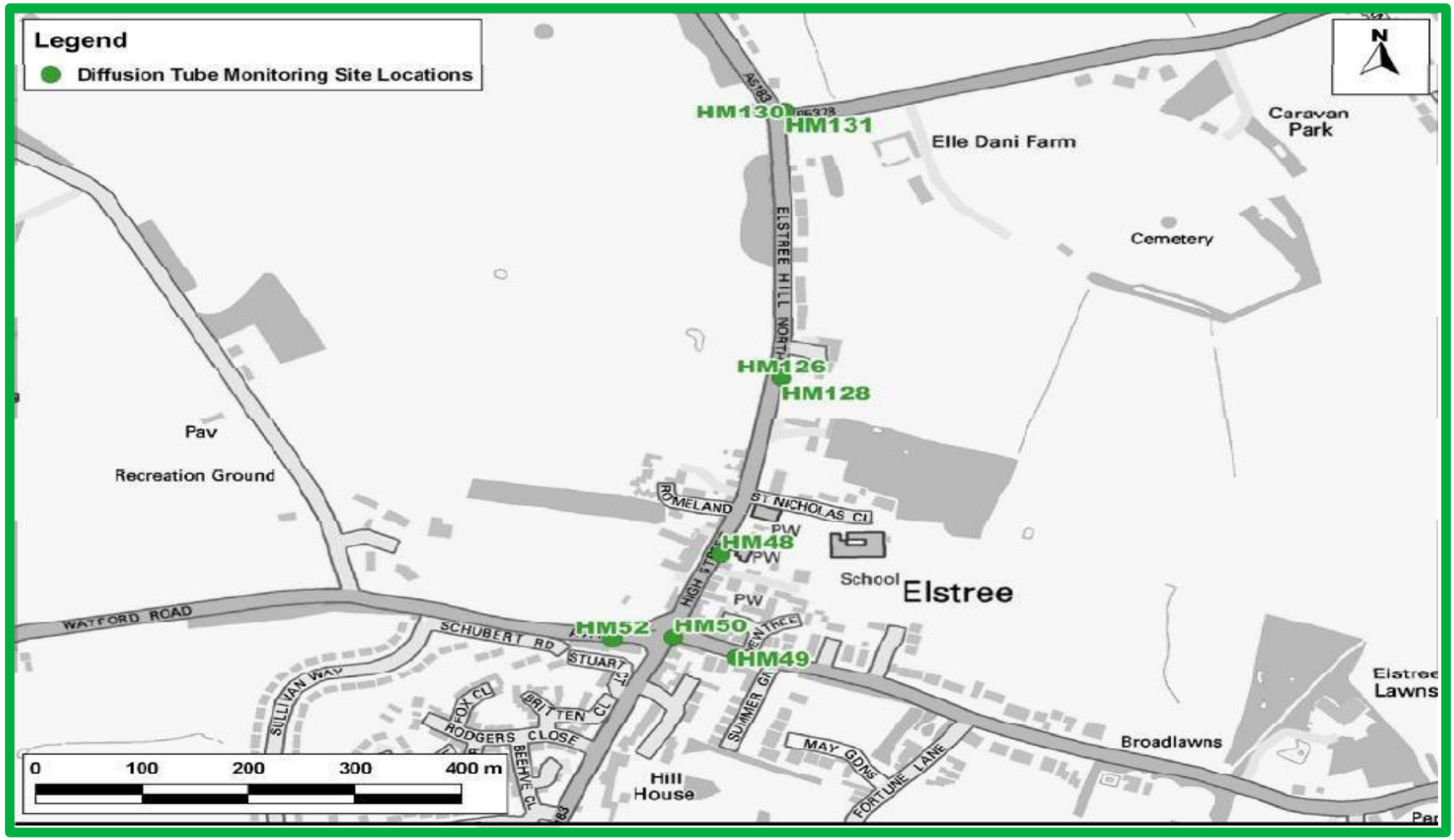

Figure D.2.E: Hertsmere Diffusion Tube Monitoring Site Locations, Elstree

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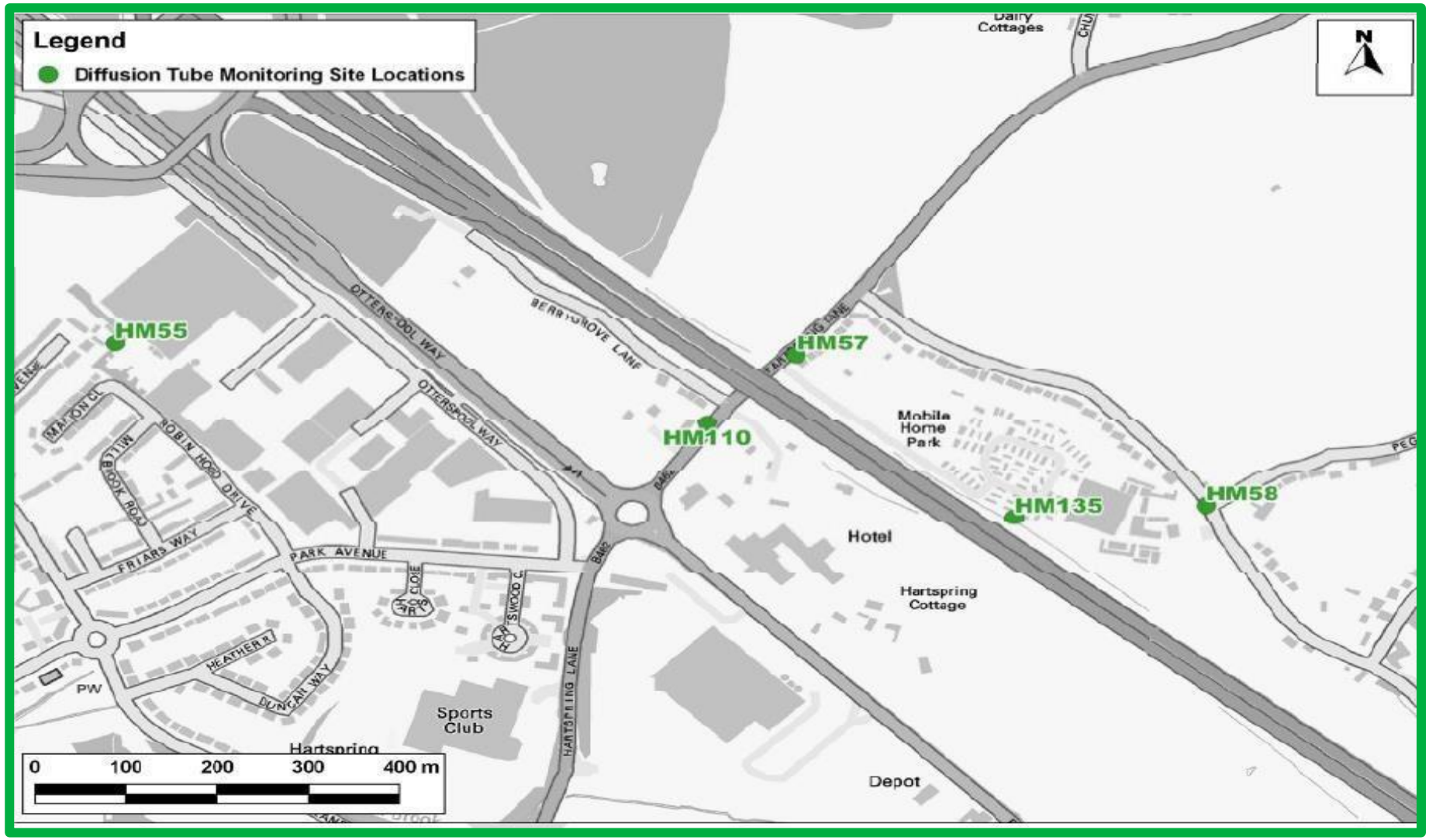

Figure D.2.F: Hertsmere Diffusion Tube Monitoring Site Locations, M1 near Aldenham

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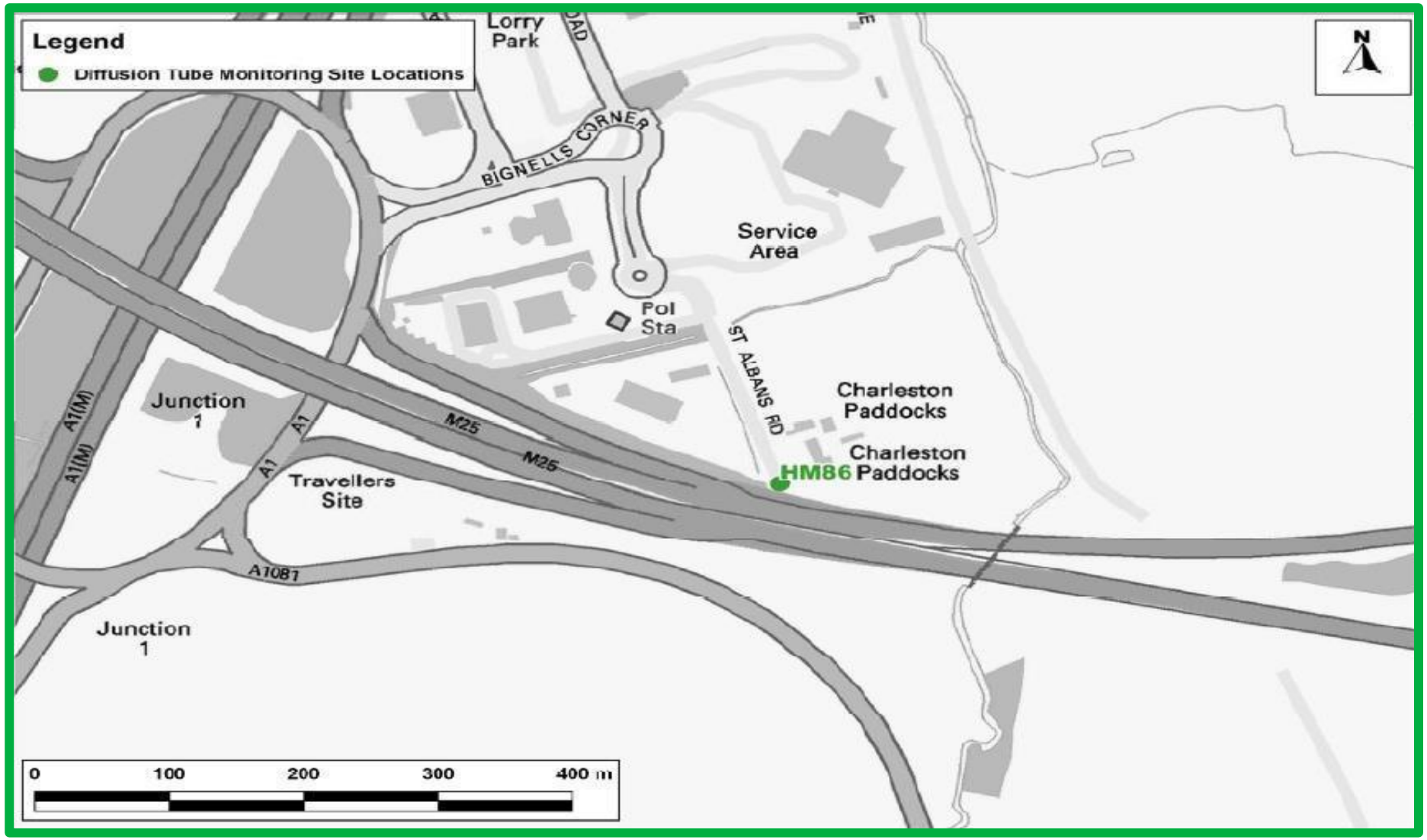

Figure D.2.G: Hertsmere Diffusion Tube Monitoring Site Location, M25 near junction 1 A1, South Mimms.

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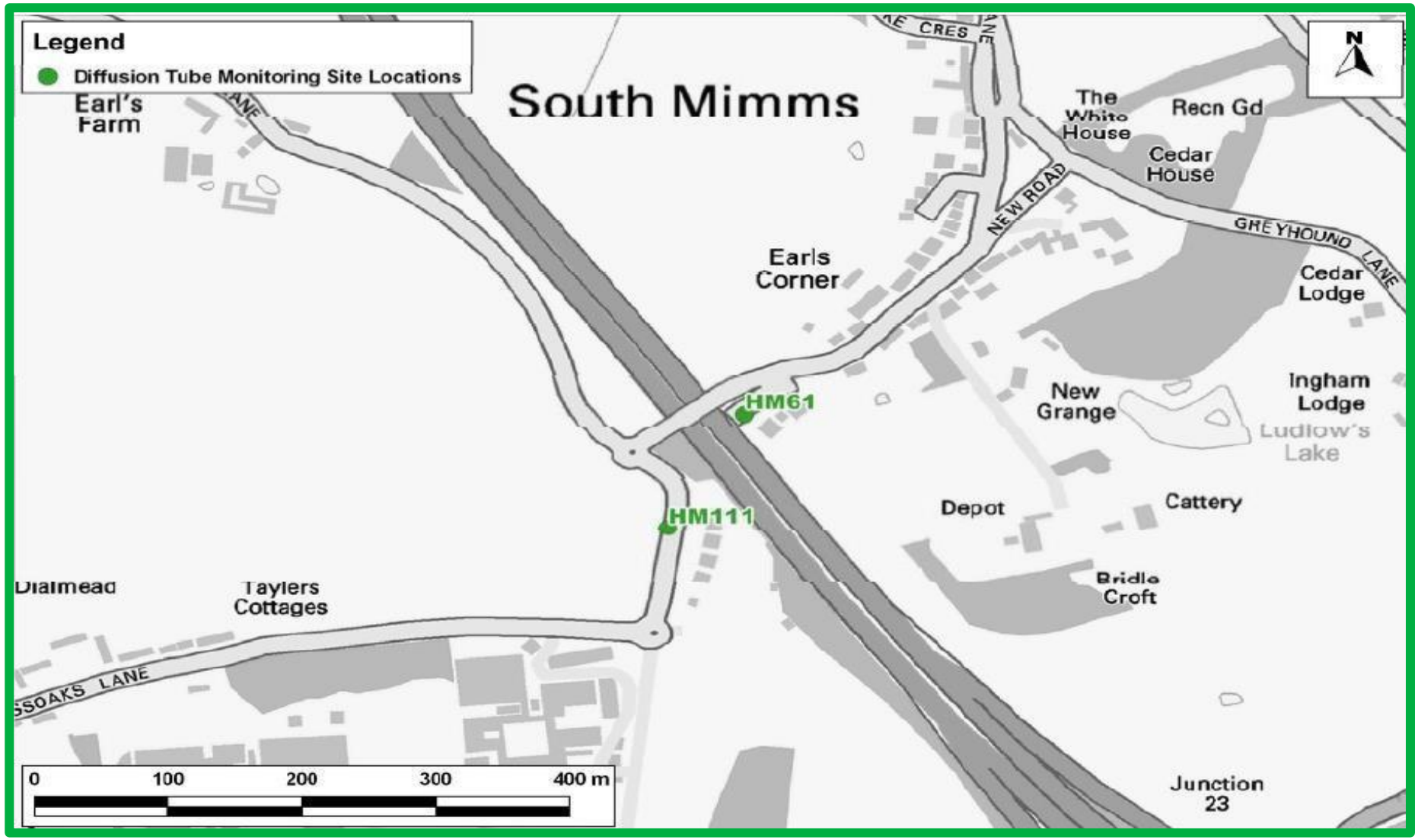

Figure D.2.H: Hertsmere Diffusion Tube Monitoring Site Locations, M25 near Junction 23 South Mimms.

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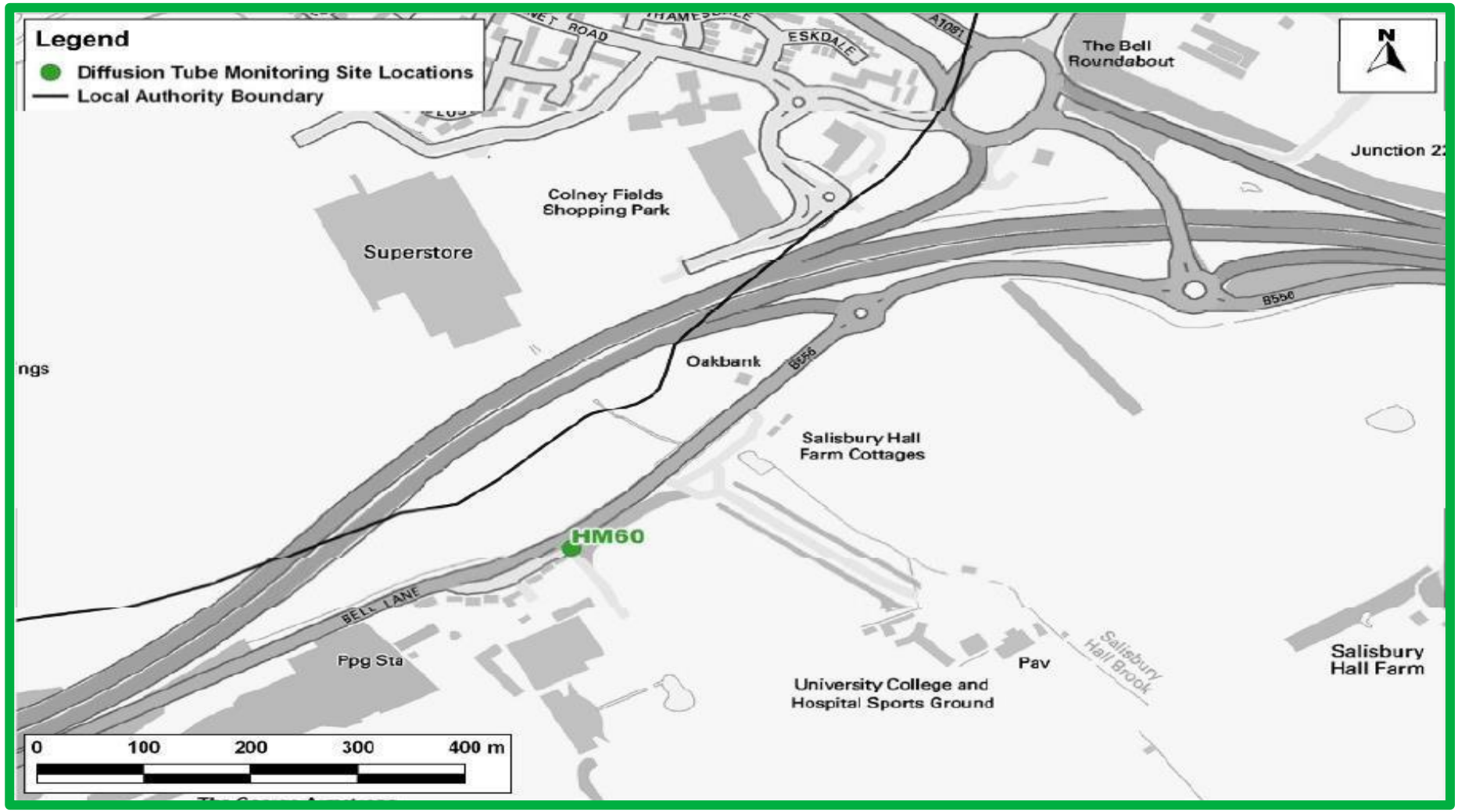

Figure D.2.I: Hertsmere Diffusion Tube Monitoring Site Location, M25 near Junction 22

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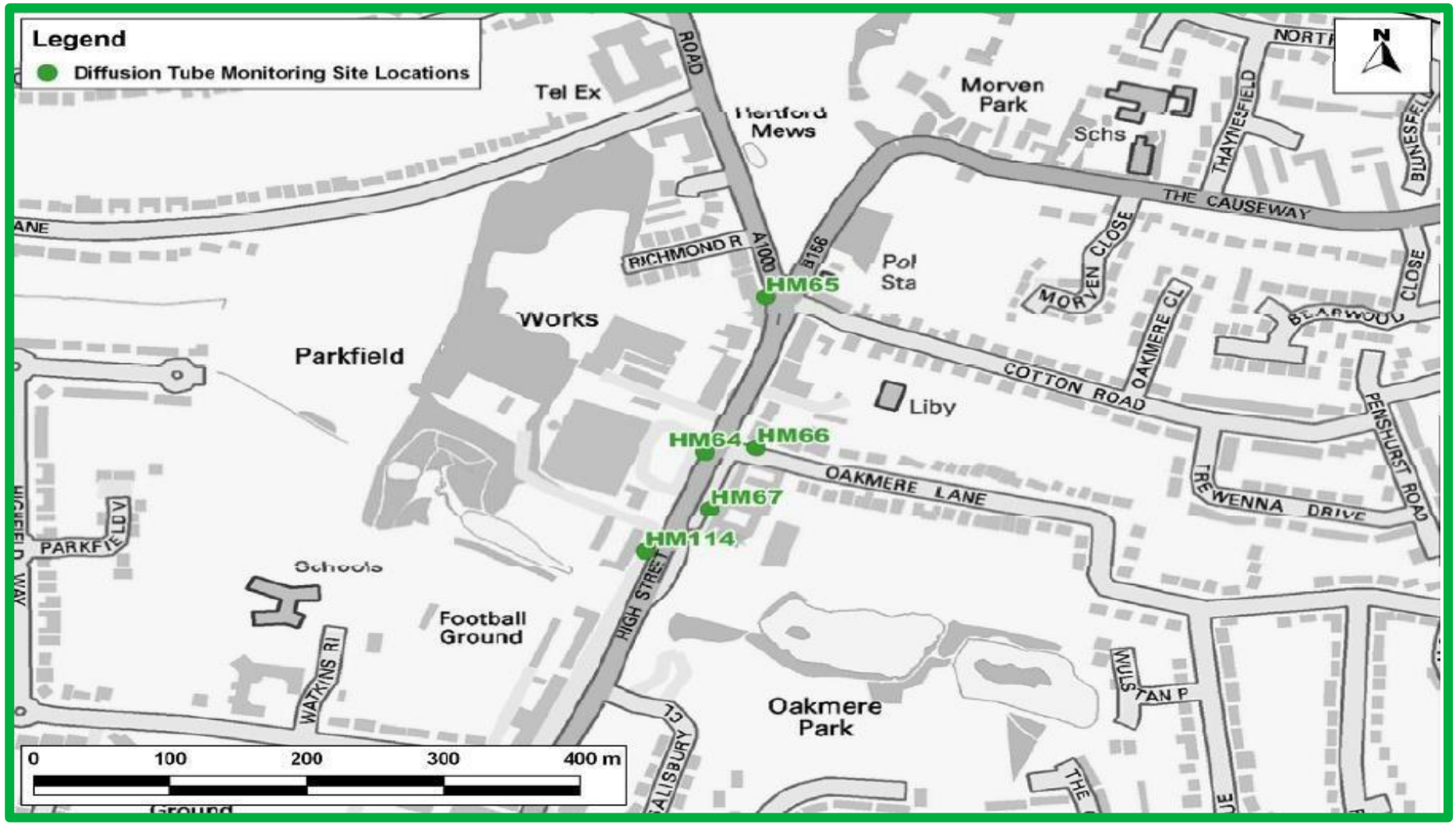

Figure D.2.J: Hertsmere Diffusion Tube Monitoring Site Locations, Potters Bar Centre

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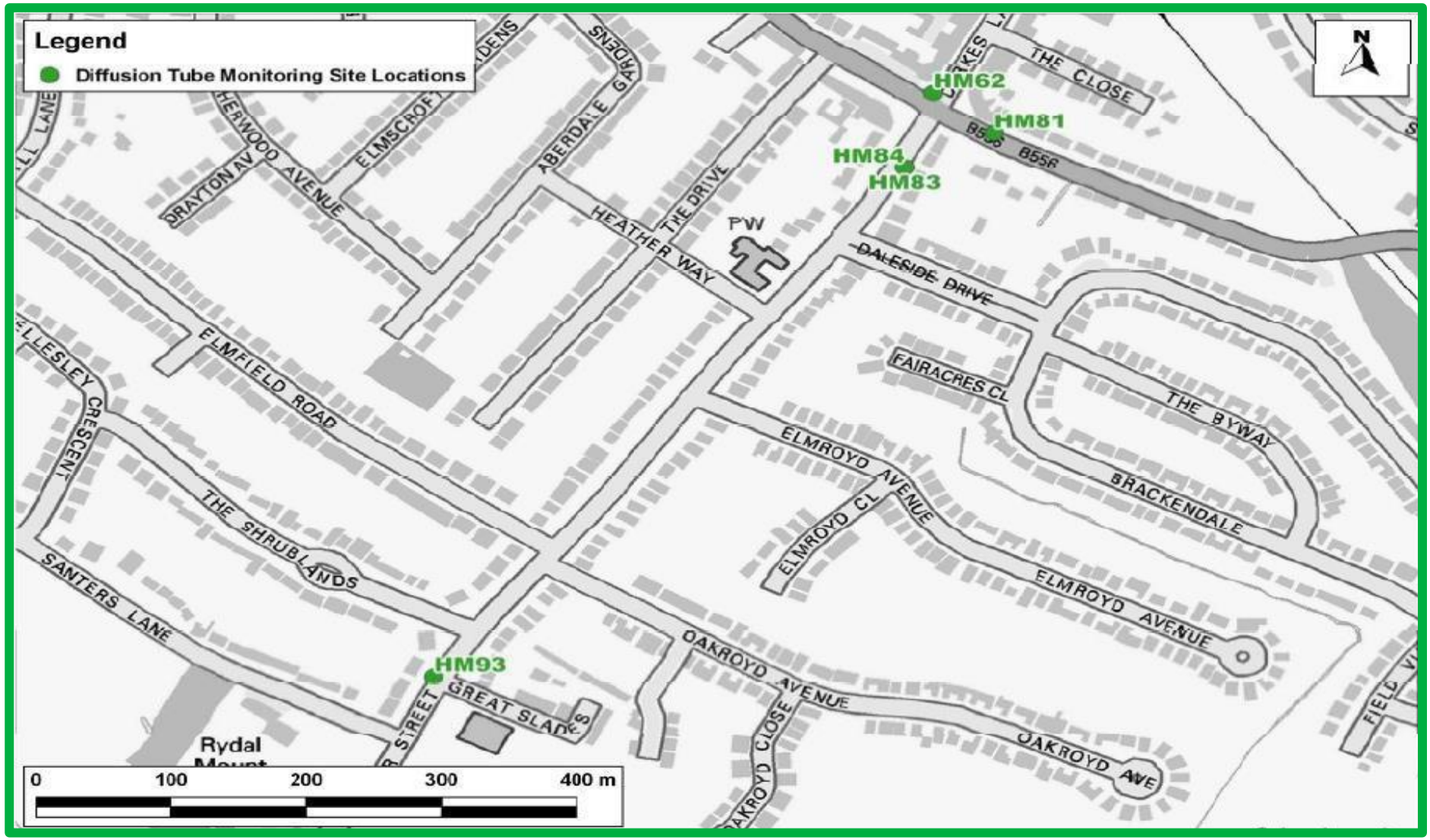

Figure D.2.K: Hertsmere Diffusion Tube Monitoring Site Locations, Potters Bar South west.

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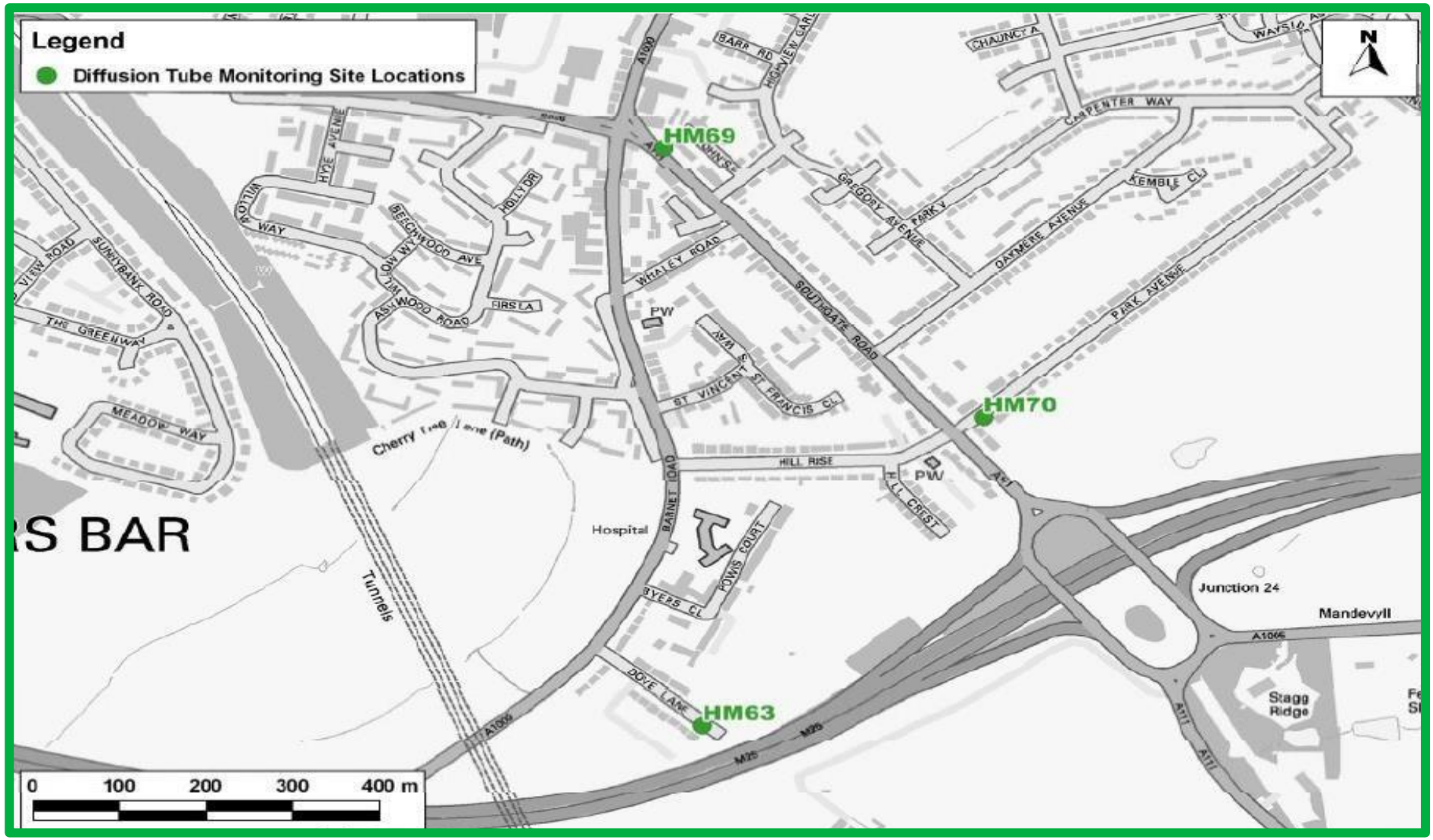

Figure D.2.L: Hertsmere Diffusion Tube Monitoring Site Locations, Potters Bar South, near M25

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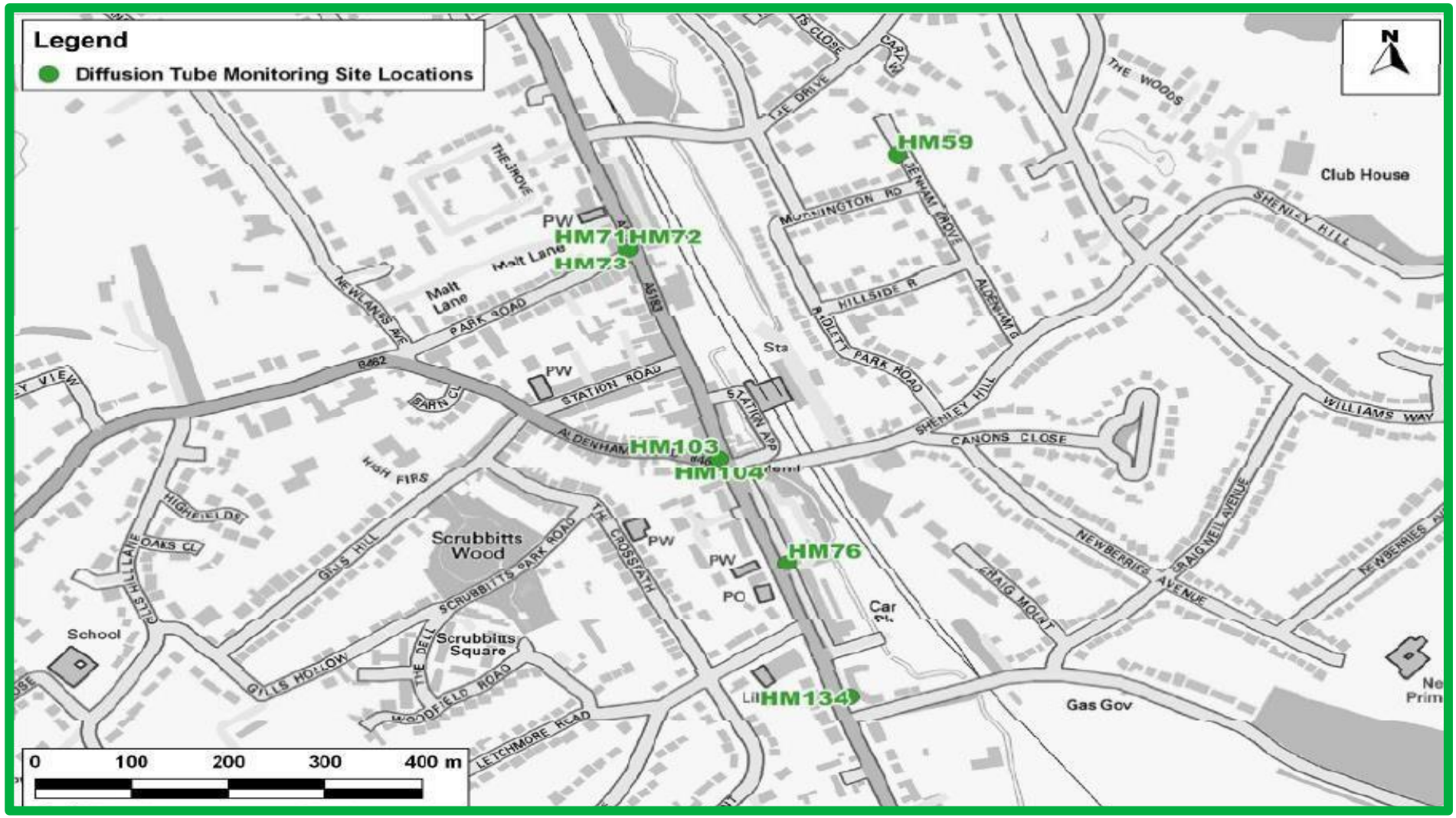

Figure D.2.M: Hertsmere Diffusion Tube Monitoring Site Locations, Radlett

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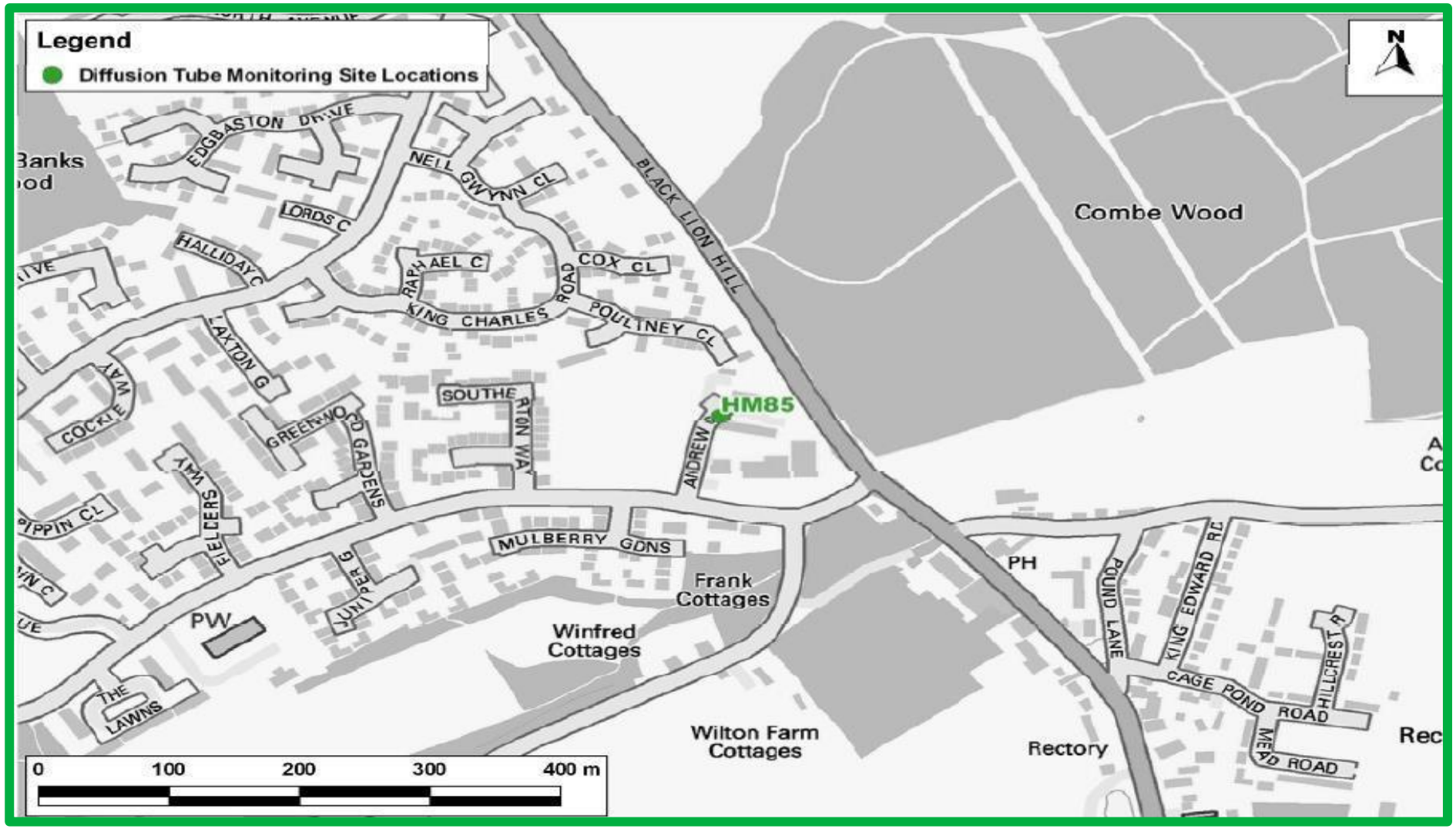

Figure D.2.N: Hertsmere Diffusion Tube Monitoring Site Location, Shenley

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Appendix E: Summary of Air Quality Objectives in England

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

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

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

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.