Herefordshire Council

2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: September, 2022

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Executive Summary: Air Quality in Our Area

Air Quality in in Herefordshire 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].

Herefordshire is located in the West Midlands of England. It is bordered by five counties; Shropshire, Worcestershire, Gloucestershire, Powys and Monmouthshire. As of mid-2020, Herefordshire's resident population was estimated to be 193,615, which has increased by 1,340 since 2019. Herefordshire is one of the least densely populated areas of the United Kingdom, with residents scattered across 842 square miles.

The main pollutant of concern within Herefordshire is nitrogen dioxide (NO_2). The major source of air pollutants in Herefordshire is vehicle emissions, specifically the emissions from the A49 Road through Hereford and Bargates Road junction in Leominster have been identified as significant.

In Herefordshire, there are two Air Quality Management Areas (AQMA's) due to high levels of nitrogen dioxide, exceeding national standards (40µg/m^3). The AQMA's include A49 Road through Hereford and Bargates Road junction in Leominster.

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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

In 2021, the ratified continuous monitored nitrogen dioxide annual mean was 33µg/m^3 for Hereford AQMA (site HRD1). From 2019 to 2020, the nitrogen dioxide levels at site HRD1 decreased by 7µg/m^3 to their lowest level of 31µg/m^3. The Bargates AQMA is monitored using three diffusion tubes at three various locations within the AQMA. The highest nitrogen dioxide annual mean concentration, of the three sites, for 2021 was 37.8µg/m^3 at site 61b (35 Bargates, Leominster). From 2019 to 2020, the nitrogen dioxide levels at site 61b decreased by 10.63µg/m^3 but has this year seen an increase of 2.4µg/m^3. There is currently no requirements to extend or amend Herefordshire's AQMAs, however these will be reviewed in the near future. Further information related to Herefordshire's declared AQMAs can be found on the following website; *https://uk-air.defra.gov.uk/aqma/list*

Herefordshire Council is a Unitary Authority, which enables close working between the sections and teams, which are involved with air quality, its causes and effects and mitigation measures. These include the Energy and Environmental Management team, Transportation team and Public Health. There is also close working with the Environment Agency through various mechanisms including permit consultations and a formal liaison group.

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.

[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

Bargates Air Quality Action Plan

The Bargates Air Quality Action plan was published in 2014. Action 1 was to improve the traffic light sequencing at the Bargates junction. A report was commissioned in 2015, which identified the need to upgrade the pedestrian crossing and road surfacing and to install a Microprocessor Optimised Vehicle Actuation (MOVA) traffic management system. This system sought to increase the capacity at the junction, help to disperse queues more effectively and therefore could reduce emissions from idling vehicles at the traffic lights. The work commenced in September 2016 and has been completed. Between the years 2017 (45.1µg/m3) and 2018 (43.5µg/m3) monitoring data indicated that nitrogen dioxide levels in Bargates AQMA had fallen. Although we are unable to identify if this reduction is a direct result of this improvement or not. Yet in 2019, nitrogen dioxide levels increased to 46.03µg/m3 in Bargates AQMA.

The Major Infrastructure Projects

Figure 1 shows the geographical scope of the major infrastructure projects (Hereford City Centre Transport Package, South Wye Transport Package and Hereford Transport Package), ongoing and emerging within Hereford.

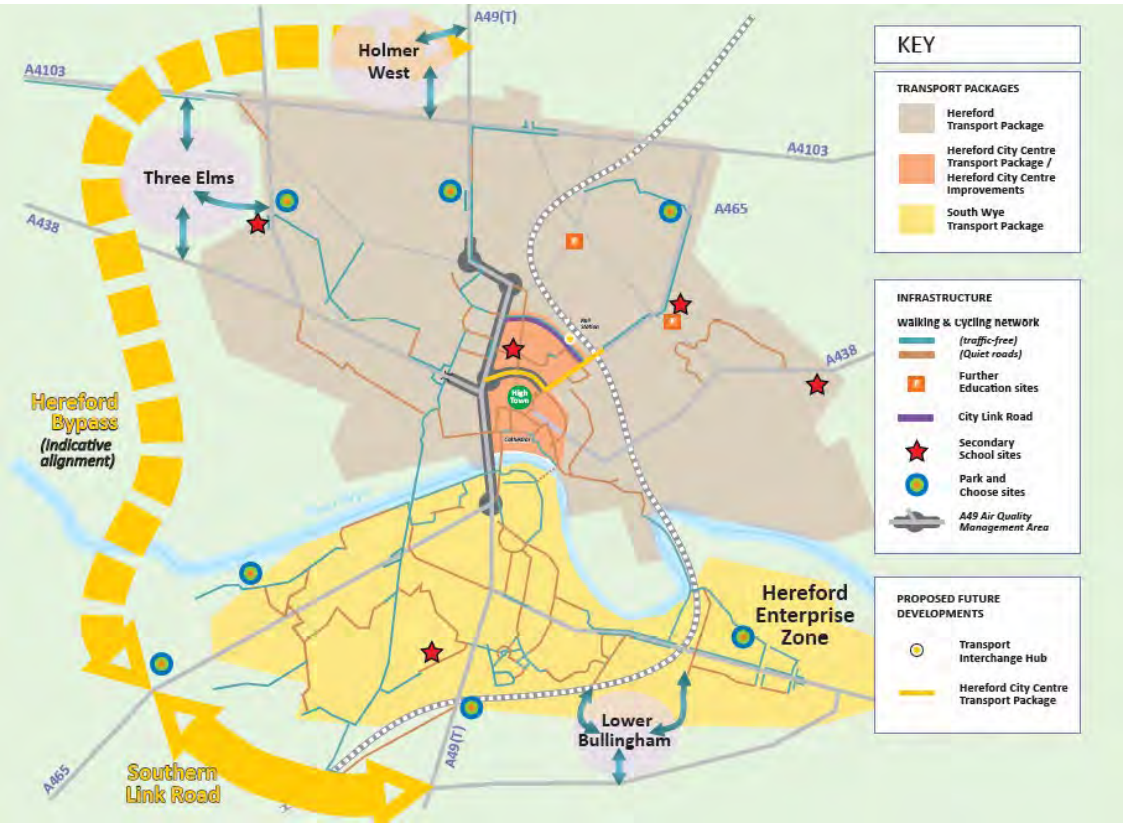

Figure 1: *Major transport projects geographical scope in Hereford*

Hereford City Centre Transport Package

In December 2017, the City Centre Link Road opened. This formed the first part of Hereford City Centre Transport Package and linked the A49 (Edgar Street to Aylestone Hill). The second part of the scheme is a transport hub adjacent to the railway station and active travel improvements to Newmarket Street, Blueschool Street and Commercial Road. These schemes are funded by Herefordshire Council (£24.652 million) and Marches Local Enterprise Partnership (£16 million).

South Wye Transport Package

This package contains a new link road (linking A465 and A49) and active travel measures in South Hereford (South of the river Wye). Current congestion on the road network in the south wye area has sought the introduction of the South Wye Transport Package. The southern link road (from the A49 to the A465 and linking to the B4349 Clehonger Road) looks to reduce congestion on current routes. The construction of the new road will commence when the necessary statutory processes are completed.

As a result of a cabinet member decision in August 2019 the southern link road has been placed on pause in 2020 and is currently under review in 2021.

Hereford Transport Package

This package contains a new road linking the A465 in the south to the A49 in the north. This will provide an additional crossing over the river Wye and provide an alternative route for traffic travelling along the A49, therefore traffic will avoid the city centre. The Western Bypass Road aims to improve air quality within in city.

As a result of a cabinet member decision in August 2019 the southern link road has been placed on pause in 2020 and is currently under review in 2021.

Market Town Studies

Studies are currently being conducted for the market towns in Herefordshire. The aim of the studies is to establish an appraised programme of interventions to improve the transport within the towns.

These studies are at various development stages and include the following towns;

- Bromyard;
- Ross on Wye;
- Leominster; and
- Ledbury.

Local Cycling and Walking Infrastructure Plan (LCWIP)

The LCWIP is a long-term plan to outline required interventions to improve the cycling and walking infrastructure for an area. The Transport Department in Herefordshire Council are in the process of developing a plan for Hereford. The final output will identify a list of prioritised walking and cycling schemes. When these interventions have been prioritised for delivery, the LCWIP will be integrated with key council plans and policies.

Destination Hereford

The Department for Transport has funded a behavioural change project called 'Destination Hereford', which includes targeted interventions. The aim of the project is to encourage people to increase their use of active modes and reduce their car usage.

Sustainable Modes of Travel to School Strategy (SMOTS)

SMOTS aims to promote and facilitate sustainable travel to and from school and thus reduce private car use. This project includes road safety education to pupils, school engagement and infrastructure delivery.

Active Travel measures

Following an active travel measures consultation a preferred package of improvements was selected in 2019.

These include:

- The introduction of a vehicle weight restriction and new and upgraded crossings in Belmont Road
- A 'quiet-way' cycle route from Newton Farm to the Hereford Enterprise Zone
- Further walking and cycling improvements along Holme Lacy Road

There will be further consultation on the proposed active travel measures before they are introduced.

Other Relevant Policies:

- The Health and Well-being strategy- supporting a shift away from private vehicles to active travel;
- Hereford Bus Strategy; and
- Walking and Cycling Strategies - reducing short distance car journeys and model shift to active travel.

Conclusions and Priorities

Herefordshire Council continue to monitor and analyse air quality throughout the Herefordshire district. An annual review of the automatic monitoring site and diffusion tube sites is completed to ensure that an areas of concern can be monitored and to allow any new exposure locations to be introduced.

There is currently no intension to extend, revoke or amend Herefordshire's AQMAs, however these will be reviewed in the near future. Further information related to Herefordshire's declared AQMAs can be found on the following website; https://uk-air.defra.gov.uk/aqma/list.

The 2015 Core strategy provides the strategic planning framework for Herefordshire's future development needs up to 2031. A number of major housing developments were identified to meet Herefordshire's housing need along with the need to ensure appropriate infrastructure such as the Hereford Relief Road and the Leominster Relief Road. The potential impact of these developments on air quality will need to be considered during the planning application stages.

Other Priorities for Herefordshire include:

- Continue to monitor and review both the Hereford and Leominster AQMA's
- Identify and review other locations in Herefordshire that may benefit from additional monitoring considering identified sites in the core strategy
- Review the Air Quality Action Plan for Herefordshire
- Comment on planning applications for major housing road schemes in relation to air quality
- Continue to inspect Local Authority Permitted installations.

Local Engagement and How to get Involved

The major source of air pollution in Herefordshire is from vehicle emissions. Therefore, the best way for members of the public to help improve air quality in Herefordshire is to adjust their normal travel pattern to be more sustainable.

Herefordshire is sparsely populated with over half the population living in the rural areas which presents challenges for sustainable transport. However, over half of all car journeys in Hereford at peak time are less than two miles.[7]

Therefore, there is scope to change the way we travel to help improve air quality, our health and reduce congestion in the City. By 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, are some other examples of ways to reduce traffic congestion.

Other examples include:

- Purchasing low-emission electric and/or hybrid vehicles.
- Upgrading boilers to newest and most efficient gas condensing boilers with lowest NOx (and carbon) emissions.

https://www.herefordshire.gov.uk/info/200136/travel_and_transport/544/choose_how_you_move "choose how you move" webpage is a good place to find information on ways to travel sustainably and help to reduce vehicle emissions.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Herefordshire Council. This ASR has not been signed off by a Director of Public Health. If you have any comments on this ASR please send them to Environmental Health at:

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8 St Owen Street | Hereford | HR1 2PJ

Telephone: 01432 261761

Email: sh_Air&WaterPollution@herefordshire.gov.uk

7 Local Transport Plan 2016 – 2031 Strategy

Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Herefordshire Council during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Herefordshire Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Herefordshire Council can be found in Table 2.1. The table presents a description of the 2 (two) AQMAs that are currently designated within Herefordshire Council Appendix D: Map(s) of Monitoring Locations and AQMAs 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 designations are as follows:

- NO_2 annual mean;
- NO_2 1-hour mean;
- PM_{10} annual mean;
- PM_{10} 24-hour mean.

We currently only monitor NO_2 annual mean at the Bargates AQMA.

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
AQMA Hereford	Declared 23/11/2001	NO2 Annual Mean	The A49(T) corridor in Hereford, extending from Holmer Road in the north to Belmont Road in the south and extending east along New Market/Blue School Street and west along Eign Street as far as Barton Yard.	YES	47 µg/m3	33 µg/m3	Hereford Action Plan 2008	Hereford Action Plan http://aqma.defra.gov.uk/action-plans/HC%20AQAP%202008.pdf
AQMA Bargates	Declared 01/03/2006	NO2 Annual Mean	An area encompassing the junction between the A44 Bargates and B4361 Dishley Street/Cursneh Road in Leominster.	NO	61 µg/m3	37.8 µg/m3 (site 61b)	Bargates Action Plan 2014	Bargates Action Plan https://www.herefordshire.gov.uk/downloads/file/4823/bargates_air_quality_draft_action_plan

☒ **Herefordshire Council confirm the information on UK-Air regarding their AQMAs is up to date.**

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

2.2 Progress and Impact of Measures to address Air Quality in Herefordshire Council

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed, and provides the information specified in the Guidance and that the following comments had been addressed upon resubmission:

1. There is an inconsistency in the 2020 result for Site 87 between Table A.4 which reports 21.6 µg/m3 and in Table B.1. and Table C.2 which report 26.6 µg/m3. This should be amended to the correct result.
2. The Council's 2022 ASR is overdue and should now be submitted without further delay. Defra expects local authorities to upload a copy of ASR for each year to the LAQM portal, no later than the specified deadline, 30 June. The Council may be aware that Defra has recently revised the statutory Local Air Quality Management (LAQM) Policy Guidance. Please be reminded that from 2023 Defra will be applying a more rigorous reminder and warning letter process for submission of Annual Status Reports. The table in page 15 of the statutory LAQM Policy Guidance outlines the reminder and warning process.

Herefordshire 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. Details of all measures completed, in progress or planned are included within Table 2.2, with the type of measure and the progress Herefordshire 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.

More detail on these measures can be found in their respective Action Plans (Hereford Action Plan and Bargates Action Plan). Key completed measures are:

- Review of air monitoring locations, considering the proposed development locations in the Core Strategy and to assist in assessing potential air quality impact of any development
- Review of Poultry sites reference Defra Policy Guidance LAQM.TG16

Herefordshire Council expects the following measures to be completed over the course of the next reporting year:

- Continue to monitor and review both the Hereford and Leominster AQMA's
- Identify and review other locations in Herefordshire that may benefit from additional monitoring considering identified sites in the core strategy.
- Review the Air Quality Action Plans for Herefordshire including setting emission reduction targets and providing more discussion on the progress of each measure.
- Comment on planning applications for major housing, road schemes and industrial installations in relation to air quality.
- Continue to inspect Local Authority Permitted installations.

The principal challenges and barriers to implementation that Herefordshire Council anticipates facing are the potential impact of major housing and infrastructure developments arising from the 2015 Core Strategy; these impacts will need to be considered during the planning application stages. The strategy identified a number of major housing developments required to meet Herefordshire's housing needs along with the need to ensure appropriate infrastructure such as the Hereford Relief Road and the Southern Relief Road.

Herefordshire Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in in Hereford and Leominster AQMAs.

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	Edgar Street Grid Re-development	Traffic Management	Reduction of speed limits, 20mph zones	2009	2025	Herefordshire Council & Advantage West Midlands formed ESG Herefordshire Ltd	Mostly developer funded, along with Herefordshire Council	NO			Completed	NO2 levels at the city centre sites have been gradually reducing since 2007, although this cannot be attributed to the actual re-development,	Trends in diffusion tube results	"Old Market" retail area development completed 2015	
2	Improvement of A4103 road west of Herefordshire	Transport Planning and Infrastructure	Other	2003	2008	Herefordshire Council - Highways and Transportation Service	Herefordshire Council - Highways and Transportation Service	NO			Completed	Since 2007 NO2 levels along the Roman Road have been below the objective. Annual Average Daily Flow trends (AADT) along the Roman Road indicate a continuing increase of traffic since the completion of the improved road and an increase in HGVs until 2008 with a slight reduction in 2009.	Not Applicable	Road completed 2005	
3	Rotherwas Access Road Link	Transport Planning and Infrastructure	Other	2003	2008	Herefordshire Council - Highways and Transportation Service	Herefordshire Council - Highways and Transportation Service and Adventage West Midlands	NO			Completed	Annual Average Daily Flow trends (AADT) show a reduction in HGVs from 1045 in 2008 to 964 in 2009 however total motor vehicles has increased.	Annual Average Daily Flow trends (AADT) and diffusion tubes	Completed June 2008	
4	City Link Road Hereford	Transport Planning and Infrastructure	Other	2008	Construction complete Decemeber 2017.	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO			Completed	NO2 levels at City centre cites have been gradually reducing since 2007	Annual Average Daily Flow trends (AADT) and diffusion tubes	Completed in 2017	
5	New Outer Distributer road (3rd Link) Hereford Relief Road	Transport Planning and Infrastructure	Other	2006	Constructed by 2031	Herefordshire Council – Highways and Transportation Service	Herefordshire Council	NO			Implementation	Not Applicable	Annual Average Daily Flow trends (AADT) and diffusion tubes	Work ongoing	
6	Install and implement a new transport system on A49 and its feeder roads	Transport Planning and Infrastructure	Other	2005	Ongoing	Highway Agency and Herefordshire Council – Highways and Transportation Service	Herefordshire Council	NO			Implementation	Not Applicable	Annual Average Daily Flow trends (AADT) and diffusion tubes	Ongoing	

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
7	Alteration of traffic management at the Belmont Round-about	Traffic Management	Other	2005	Complete	Highway Agency	s.106	NO			Completed	The diffusion tube measurements at this roundabout were showing exceedances of the NO2 objective in 2006 and 2007 although levels were falling. However, a noticeable reduction occurred in 2008 and 2009, to a level well below the objective level.	Diffusion tube at the roundabout	Completed in 2006. New signals are now fully integrated into the Council's SCOOT system and the infrastructure improvements have greatly improved traffic movements	
8	"North & South" Park and ride Scheme in Hereford	Alternatives to private vehicle use	Bus based Park & Ride	2001	Not Applicable	Herefordshire Council – Highways and Transportation Service	Herefordshire Council	NO			Aborted	Not Applicable	Annual Average Daily Flow trends (AADT) and diffusion tubes	No longer being taken forward.	
9	Parking Strategy in Hereford to reduce commuter parking	Traffic Management	Other	2001	Not Applicable	Herefordshire Council – Highways and Transportation Service and Planning Services	Herefordshire Council	NO			Aborted	Not Applicable	Annual Average Daily Flow trends (AADT) and diffusion tubes	No longer being taken forward. Alternative parking strategy in place.	
10	Improve and increase number of cycle routes and facilities in Hereford	Transport Planning and Infrastructure	Cycle network	2004	Rotherwas Cycle Link currently in progress – Completed Dec 2013	Herefordshire Council – Highways and Transportation Service	Herefordshire Council	NO			Completed	NO2 levels at the city centre sites have been gradually reducing since 2007	Diffusion tubes	1.5km of the Great Western Way was completed in 2008 along with a cycle lane along Aylestone Hill. Connect 2 Rotherwas Cycle Link completed.	
11	City Centre Pedestrian Enhancement in Hereford	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2005	Complete	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO			Completed	NO2 levels at Site 6 (Broad Street) and Site 59 (Widemarsh St) have remained at or below 75% of the objective for the last 5 year trend, following the introduction of the scheme. Sites 12, 13 and 14 (Edgar Street) are no longer monitored.	Diffusion tubes at Widemarsh Street, Broad Street and Edgar Street sites	Completed in 2006	

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	Behavioural Change Programme	Promoting Travel Alternatives	Workplace Travel Planning	2004	Ongoing	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO			Implementation	Not Applicable	Diffusion tubes	Ongoing programme of promotions and initiatives. Examples include Bike ability Training and the promotion of TwoShare, Destination Herefordshire. Completed in 2008.	
13	Designation of a Traffic manager for network management Duties along the A49 in Hereford	Traffic Management	Other	2007	Complete	Highway Agency and Herefordshire Council	Herefordshire Council	NO			Completed	NO2 levels at the sites along the A49 have been gradually reducing since 2007	Diffusion tubes along A49 corridor		
14	Continue to implement Vehicle Emission Testing in Hereford	Traffic Management	Testing Vehicle Emissions	2008	This project has been completed. No plans for further testing.	Herefordshire Council - Environmental Health and Trading Standards. Liasion with Vehicle and Operator Services Agency (VOSA)	Herefordshire Council and VOSA	NO			Completed	A continual improvement in exhaust emissions within the Hereford AQMA noted each year since 2006 / 2007.	Review of project dependant upon number of vehicles failing /	Commenced in 2000 and was carried out every year until 2007. A dramatic continual improvement in exhaust emissions within the Hereford AQMA noted each year. No failures / 100% compliance in 2006 and 2007.	.
15	Information and awareness training	Public Information	Via the Internet	2008	Ongoing	Herefordshire Council - Environmnetal Health and Trading Standards. Liaison with Herefordshire PCT	Herefordshire Council	NO			Implementation	Not Applicable	Number of hits on the website.	Ongoing	
1	Improvements to the traffic light sequen-cing at the A44/B4361 junction at Bargates	Transport Planning and Infrastructure	Other	2013	2016	Herefordshire Council - Highways and Transportation Service	Herefordshire Council, s.106	NO			Completed	No improvements	Reduction of NO2 levels at diffusion tubes	Report commissioned reviewing the best options for the junction arrangement.	
2	Improvements to cycle facilities/ routes between Morrisons Store and the Town centre	Transport Planning and Infrastructure	Cycle network	2014	2014-2016	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO			Completed	No improvements	Reduction of NO2 levels at diffusion tubes		
3	Improvements to the public transport facilities between Morrisons Store and the Town centre	Transport Planning and Infrastructure	Other	2014	2016	Herefordshire Council - Highways and Transportation Service	Herefordshire Council, s. 106	NO			Completed	No improvements	Reduction of NO2 levels at diffusion tubes		

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
4	Improve and increase number of pedestrian routes and facilities in Leominster	Transport Planning and Infrastructure	Other	2014	Not Applicable	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO			Implementation	Not Applicable	Reduction of NO2 levels at diffusion tubes	Awaiting S106 monies.	Awaiting S106 monies.
5	Behavioural Change Programme	Promoting Travel Alternatives	Promotion of walking	2014	Ongoing	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO			Implementation	Not Applicable	Reduction of NO2 levels at diffusion tubes	Work ongoing	
6	Behavioural Change Programme	Promoting Travel Alternatives	Promotion of cycling	2014	Ongoing	Herefordshire Council - Environmental Health and Trading Standards. Liasion with Public Health.	Herefordshire Council	NO			Implementation	Not Applicable	Reduction of NO2 levels at diffusion tubes	Work ongoing	
7	Development of the southern Relief Road	Transport Planning and Infrastructure	Other	2011	Not set	Herefordshire Council	Herefordshire Council	NO			Implementation	Not Applicable	Reduction of NO2 levels at diffusion tubes	Ongoing	

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.

Herefordshire Council is taking the following measures to address $PM_{2.5}$:

- Ensure $PM_{2.5}$'s are considered at the planning application stage for relevant development
- Inspection of Local Authority Permitted installations
- Review AQAP's to include additional actions for $PM_{2.5}$
- Updating / commissioning AQMS in both Herefordshire AQMAs with facility to monitor $PM_{2.5}$

NB It should be noted that actions 1-6, 9-11, 13-15 of the Hereford AQAP, and Action points 1-7 of the Leominster AQAP also deal with $PM_{2.5}$ as well as NO_2.

The approach being taken taking in terms of $PM_{2.5}$ assessment and possible monitoring has been considered together with Public Health. Further work is to be undertaken in this area.

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

This section sets out the monitoring undertaken within 2021 by Herefordshire Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Herefordshire Council undertook automatic (continuous) monitoring at HRD1 site (Victoria Street in Hereford city centre) 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. Automatic monitoring results are available through the UK-Air website at https://uk-air.defra.gov.uk/data/

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

Herefordshire Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 46 sites during 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.

Hereford AQMA sites

During 2021, the annual mean NO_2 level at the Hereford automatic monitoring site (HRD1) was 33µg/m^3, which is below the air quality objective (40µg/m^3) but up by 2µg/m^3 from the previous years figure. Data collected in 2017 showed a breach in the annual mean NO_2 objective (42µg/m^3) at site HRD1. Despite data from 2018 to 2020 identifying a reduction of annual mean NO_2 levels, it is concluded that Herefordshire Council will not be revoking Hereford AQMA. Particularly as trends have not demonstrated that NO_2 levels are unlikely to breach the national objective. However, Herefordshire Council will continue to review Hereford AQMA.

There are 16 non-automatic monitoring sites within Hereford AQMA (sites 9, 10, 22, 53, 57, 59, 87, 88, 89, 90, 91, 94, 95, 96, 103 and 104); see figure A.1. All of these site have decreased in annual mean NO_2 levels between 2019 and 2020, but have all increased in 2021 by a couple or so of µg/m^3. None of these sites have exceeded the annual mean NO_2 air quality objective in 2021.

Hereford AQMA boundary sites

The boundaries of the AQMA are monitored through a number of sites which indicate whether the AQMA boundaries need to be extended. These sites include site 54, 65, 88, 89, 97,101 and 102 (see figure A.2).

In 2021, none of the monitoring sites at the boundary of Hereford AQMA exceeded the annual mean NO_2 air quality objective. As such, Herefordshire Council will not be extending the boundary of Hereford AQMA.

Outside Hereford's AQMA

There are 14 monitoring sites which are located outside Hereford's AQMA, these sites include 6, 74, 75, 79, 84, 85, 86, 92, 93, 100, 105, 106, 107 and 108; (see figure A.3). In 2021, all of these locations were below the air quality objective.

Leominster AQMA

The Leominster AQMA includes 3 monitoring sites (site 46, 61a and 61b). In 2021, all sites were below the annual mean NO_2 air quality objective.

From 2017 to 2021 trend data for sites in the Leominster AQMA can be found in figure A.4. Site 61b annual mean NO_2 levels recorded 46.03µg/m^3 in 2019, in comparison to 2020 readings were 35.4µg/m^3 but marginally higher in 2021 at 37.8 35.4µg/m^3.

Outside Leominster AQMA

Outside the Leominster AQMA there are 3 monitoring sites which include sites 109, 110 and 111. In 2021, the annual mean NO_2 levels of the sites outside Leominster's AQMA were below the air quality objective.

A40 corridor

There are two monitoring sites that are located on the A40 corridor, these include sites 32 and 33. In 2021, the annual mean NO_2 recorded levels at site 32 were 21.3µg/m^3 and at site 33 the levels were 20.4µg/m^3. Although still well below the air quality objective in 2021, these sites will continue to be monitored in 2022.

Other Market Towns and Villages

Monitoring is no longer undertaken in Bromyard, Kington, Ledbury, Pembridge and Weobley. However, monitoring re-commenced in Cantilupe Street, Ross-on-Wye in May 2015 at sites 82 and 83 due to concerns regarding vehicle and bus emissions.

Since 2017 the site 83 has no longer be monitored. In 2021, site 82 recorded annual mean NO_2 levels of 17.4µg/m^3, which is below the air quality objective. This site will continue to be monitored in 2022.

Distance correction

The following monitoring sites 57, 65, 89, 90, 91, 94, 95, 97, 102, 104, 105, 106, 107 and 108 are not near a receptor. However, as the annual mean concentrations were below 36µg/m^3 there is no need for distance correction, in line with the guidance in paragraph 7.78 of LAQM.TG (16).

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.Table A.7 in Appendix A 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.

PM_{10} was previously measured at the automatic monitoring station at Edgar Street. The site was decommissioned in 2011 due to redevelopment. The monitor was repositioned in Victoria Street and PM_{10} figures have been subsequently available since 2017.

As shown in table A.6, the monitored PM10 annual mean concentrations at Victoria Street in 2021 was 22µg/m3. This was measured by a BAM using a gravimatric factor of 0.833 for Indicative Gravimetric Equivalent. The annual data capture for this reading was 78.2% compared to the 85% target.
As shown in table A.7, the gravimetric PM_{10} daily mean limit (50 µg/m^3) was exceeded on 2 days in 2021. Although, the annual allowance for this limit value is 35 days, as such this objective was not exceeded.

3.2.3 Particulate Matter ($PM_{2.5}$)

PM2.5 monitoring is not currently undertaken by Herefordshire Council.

3.2.4 Sulphur Dioxide (SO_2)

Sulphur Dioxide has not been monitored by Herefordshire County Council since January 2011. Results of monitoring previously undertaken by the Council are presented in previous annual reports submitted to Defra.

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)
HRD1	Victoria Street	Roadside	350721	239791	NO2; PM10	YES	Chemiluminescent and PM10	10	5	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.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)
6	Broad Street, Hereford	Urban Background	350890	240000	NO2	NO	1.0	0.3	NO	2.8
9	Bus stop, Victoria St, Hereford (A49)	Roadside	350688	239864	NO2	YES	0.0	2.9	NO	2.9
10	7 Victoria St (house façade), Hereford	Roadside	350677	240015	NO2	YES	0.0	2.9	NO	2.5
22	Façade Edgar/Moor St, Hfd (A49)	Roadside	350860	240615	NO2	YES	0.0	2.3	NO	2.3
32	Weir End, Ross. (A40)	Roadside	357717	223736	NO2	NO	0.0	4.5	NO	2
33	House façade, Wilton (A40)	Roadside	358506	224214	NO2	NO	0.0	2.9	NO	1.9
46	Bengry's Lights, Leominster (A44)	Roadside	349409	259010	NO2	YES	0.0	3.4	NO	2.1
53	Facade, Belmont Rd/Asda Junc Hfd	Roadside	350723	239163	NO2	YES	0.0	5.3	NO	2.1
54	House façade, Holmer Rd, Hfd (A49)	Urban Background	350602	241097	NO2	YES	0.0	9.5	NO	1.7
57	Eign Street, Hereford (A438)	Urban Background	350499	240108	NO2	YES	1.0	0.5	NO	2.2
59	Façade,Widemarsh St, Town Hfd	Urban Centre	350987	240108	NO2	YES	0.0	3.0	NO	2.4
61a	29 Bargates, Leominster (A44)	Roadside	349363	259013	NO2	YES	0.0	2.9	NO	2.2

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)
61b	35 Bargates, Leominster (A44)	Roadside	349352	259015	NO2	YES	0.0	2.0	NO	2.2
65	96 Whitecross Road, Hfd (A438)	Urban Background	350086	240296	NO2	NO	4.0	1.3	NO	2.2
74	140 Whitecross Rd, Hfd (A438)	Roadside	349985	240334	NO2	NO	0.0	8.2	NO	2.1
75	22 Barton Road, Hfd	Roadside	350511	239740	NO2	NO	15.0	1.4	NO	2.4
79	76 Belmont Road, Hfd (A465)	Roadside	350472	238999	NO2	NO	7.0	1.0	NO	2.3
82	Cantilupe Road 1 (Flats), Ross-on-Wye	Urban Background	360204	224177	NO2	NO	1.5	1.7	NO	2.3
84	Kings Acre Rd, Hfd (A438)	Suburban	347864	241236	NO2	NO	N/A	6.2	NO	2.55
85	Huntington Lane, Hfd	Rural	348752	241941	NO2	NO	N/A	1.2	NO	2.1
86	Three Elms Rd, Hfd (A4110)	Roadside	349067	241933	NO2	NO	N/A	1.5	NO	1.7
87	Nr Cemetery, Victoria St, Hfd(A49)	Roadside	350694	239819	NO2	YES	N/A	2.7	NO	2.5
88	Adj 34 Victoria St, Hfd (A49)	Roadside	350684	239900	NO2	YES	0.0	2.8	NO	2.32
89	Edgar St/Blackfriars St Junc, Hfd (A49)	Roadside	350800	240441	NO2	YES	6.5	2.2	NO	2.1
90	Cross Street, Asda Traffic Island, Hfd	Roadside	350719	239164	NO2	YES	5.0	2.3	NO	2.12

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)
91	Ross Road/Asda Traffic Island, Hfd (A49)	Roadside	350759	239125	NO2	YES	7.5	1.1	NO	2.23
92	Rotherwas Industrial Estate, Hfd	Urban Background	352919	237840	NO2	NO	N/A	1.9	NO	2.3
93	Rotherwas Relief Road, Hfd (B4399)	Roadside	351881	239984	NO2	NO	N/A	5.5	NO	2.15
94	Edgar St opp Nolan Rd, Hfd (A49)	Roadside	350933	240798	NO2	YES	3.0	2.4	NO	2.35
95	Edgar St. nr Prior St. Hfd (A49)	Roadside	350876	240678	NO2	YES	1.0	1.7	NO	1.65
96	Edgar St. nr Junc Newtown Rd (A49)	Roadside	350941	240858	NO2	YES	N/A	2.2	NO	2.2
97	Newtown Rd, nr Postbox, Hfd	Roadside	351025	240874	NO2	NO	0.5	2.4	NO	2.4
98	Link Road A , Hereford	Urban Background	350992	240652	NO2	NO	N/A	1.8	NO	1.75
99	Link Road B, Hereford	Urban Background	351022	240668	NO2	NO	N/A	2.4	NO	2.36
100	Link Road C, Hereford	Urban Background	351440	240539	NO2	NO	N/A	3.0	NO	3
101	Widemarsh St, opp Garrick CP, Hfd	Roadside	351053	240290	NO2	NO	0.0	1.7	NO	1.7
102	Widemarsh St. nr juct Link Road, Hfd	Roadside	351100	240640	NO2	NO	0.5	1.3	NO	1.25
103	Bus stop, Newmarket Street, Hfd (A438)	Roadside	350898	240223	NO2	YES	N/A	3.4	NO	3.4

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)
104	Wall Street, Hereford	Roadside	350979	240212	NO2	YES	1.0	1.3	NO	1.25
105	Aylestone Hill/Barscourt Rd, Hfd	Roadside	351725	240443	NO2	NO	5.0	1.8	NO	1.8
106	Commercial Road, Hfd	Roadside	351483	240323	NO2	NO	2.5	2.9	NO	2.9
107	St Mary's Church, Grandstand Rd, Hfd (A49)	Roadside	350412	241161	NO2	NO	4.0	1.5	NO	1.47
108	Roman Road, Hereford (A4103)	Urban Background	350166	242175	NO2	NO	N/A	1.7	NO	1.65
109	Bargates, opp Perseverance Rd Leominster	Roadside	349176	259020	NO2	YES	0.0	1.0	NO	0.95
110	56 Bargates, (HR6 8EY), Leominster (A44)	Roadside	349262	259030	NO2	NO	5.0	1.4	NO	1.4
111	Bargates Nursery, Leominster (A44)	Roadside	349228	259031	NO2	NO	5.0	1.2	NO	1.2

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	**2017**	**2018**	**2019**	**2020**	**2021**
HRD1	350721	239791	Roadside		96.1	**42**	**40**	38	31	33

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

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

Notes:

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

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

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

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	**2017**	**2018**	**2019**	**2020**	**2021**
6	350890	240000	Urban Background	98.4	98.4	**22.9**	**22.8**	24.43	18.3	18.5
9	350688	239864	Roadside	98.4	98.4	31.8	32.6	34.46	27.2	30.0
10	350677	240015	Roadside	98.4	98.4	-	**41.33a**	39.28	30.3	34.7
22	350860	240615	Roadside	88.7	88.7	25.3	27.6	27.65	21.5	24.0
32	357717	223736	Roadside	98.4	98.4	31.6	28.3	24.85	17.5	21.3
33	358506	224214	Roadside	98.4	98.4	30.2	28.1	24.98	18.4	20.4
46	349409	259010	Roadside	90.7	90.7	34.5	31.6	33.36	26.6	27.2
53	350723	239163	Roadside	98.4	98.4	29.4	30.7	30.45	24.8	26.5
54	350602	241097	Urban Background	98.4	98.4	20.7	23.7	23.11	17.0	20.4
57	350499	240108	Urban Background	88.5	88.5	26.7	27.7	28.81	21.2	23.7
59	350987	240108	Urban Centre	98.4	98.4	19.9	20.3	19.65	14.1	15.1
61a	349363	259013	Roadside	98.4	98.4	**41.3**	**40.2**	39.75	34.3	35.6
61b	349352	259015	Roadside	98.4	98.4	**45.1**	**43.5**	**46.03**	35.4	37.8
65	350086	240296	Urban Background	98.4	98.4	30.6	32.2	30.91	23.1	26.1

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**
74	349985	240334	Roadside	98.4	98.4	18.6	17.6	17.42	14.1	13.6
75	350511	239740	Roadside	98.4	98.4	21.9	24.3	22.34	18.4	20.5
79	350472	238999	Roadside	98.4	98.4	30	30.1	28.60	23.4	24.0
82	360204	224177	Urban Background	98.4	98.4	20.5	21.3	20.08	16.1	17.4
84	347864	241236	Suburban	98.4	98.4	11.7	13	10.45	8.5	9.2
85	348752	241941	Rural	90.9	90.9	7.9	9.3	8.03	6.2	6.7
86	349067	241933	Roadside	98.4	98.4	13.4	15.6	14.91	11.3	13.0
87	350694	239819	Roadside	98.4	98.4	30.2	30.1	29.78	26.6	27.2
88	350684	239900	Roadside	98.4	98.4	33.3	33.8	31.64	24.5	28.7
89	350800	240441	Roadside	98.4	98.4	**36.57a**	36.2	36.90	29.3	30.3
90	350719	239164	Roadside	98.4	98.4	**26.21a**	26.8	25.29	19.9	21.3
91	350759	239125	Roadside	98.4	98.4	**30.69a**	**40.9**	38.74	27.8	30.7
92	352919	237840	Urban Background	98.4	98.4	11.6	13.9	13.54	9.8	10.6
93	351881	239984	Roadside	98.4	98.4	10.8	11.9	10.46	9.2	9.0

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**
94	350933	240798	Roadside	98.4	98.4	-	30.8	29.38	24.7	24.9
95	350876	240678	Roadside	98.4	98.4	-	**43**	36.98	25.1	26.5
96	350941	240858	Roadside	98.4	98.4	-	31.7	36.85	32.4	35.5
97	351025	240874	Roadside	98.4	98.4	-	26.7	25.60	19.7	21.5
98	350992	240652	Urban Background	98.4	98.4	-	21.7	19.93	15.9	17.2
99	351022	240668	Urban Background	90.7	90.7	-	19.8	19.25	14.5	15.4
100	351440	240539	Urban Background	90.7	90.7	-	22.2	22.51	18.3	18.9
101	351053	240290	Roadside	98.4	98.4	-	32.4	32.40	24.6	25.6
102	351100	240640	Roadside	98.4	98.4	-	27.6	25.87	19.4	21.7
103	350898	240223	Roadside	98.4	98.4	-	**40.1**	33.41	26.2	27.8
104	350979	240212	Roadside	98.4	98.4	-	33.6	31.94	24.3	25.6
105	351725	240443	Roadside	98.4	98.4	-	27.3	27.97	21.5	22.5
106	351483	240323	Roadside	98.4	98.4	-	34.2	31.08	22.7	29.1
107	350412	241161	Roadside	98.4	98.4	-	25.3	24.70	18.4	18.8

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
108	350166	242175	Urban Background	88.7	88.7	-	22.5	22.59	16.9	17.3
109	349176	259020	Roadside	98.4	98.4	-	**41.61a**	32.41	24.7	25.4
110	349262	259030	Roadside	88.7	88.7	-	29.22a	22.90	15.3	17.4
111	349228	259031	Roadside	81.0	81.0	-	**32.01a**	25.86a	16.1	17.3

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

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

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

Notes:

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

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

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

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

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

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

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

Figure A.1 – Trends in Annual Mean NO2 Concentrations in Hereford AQMA

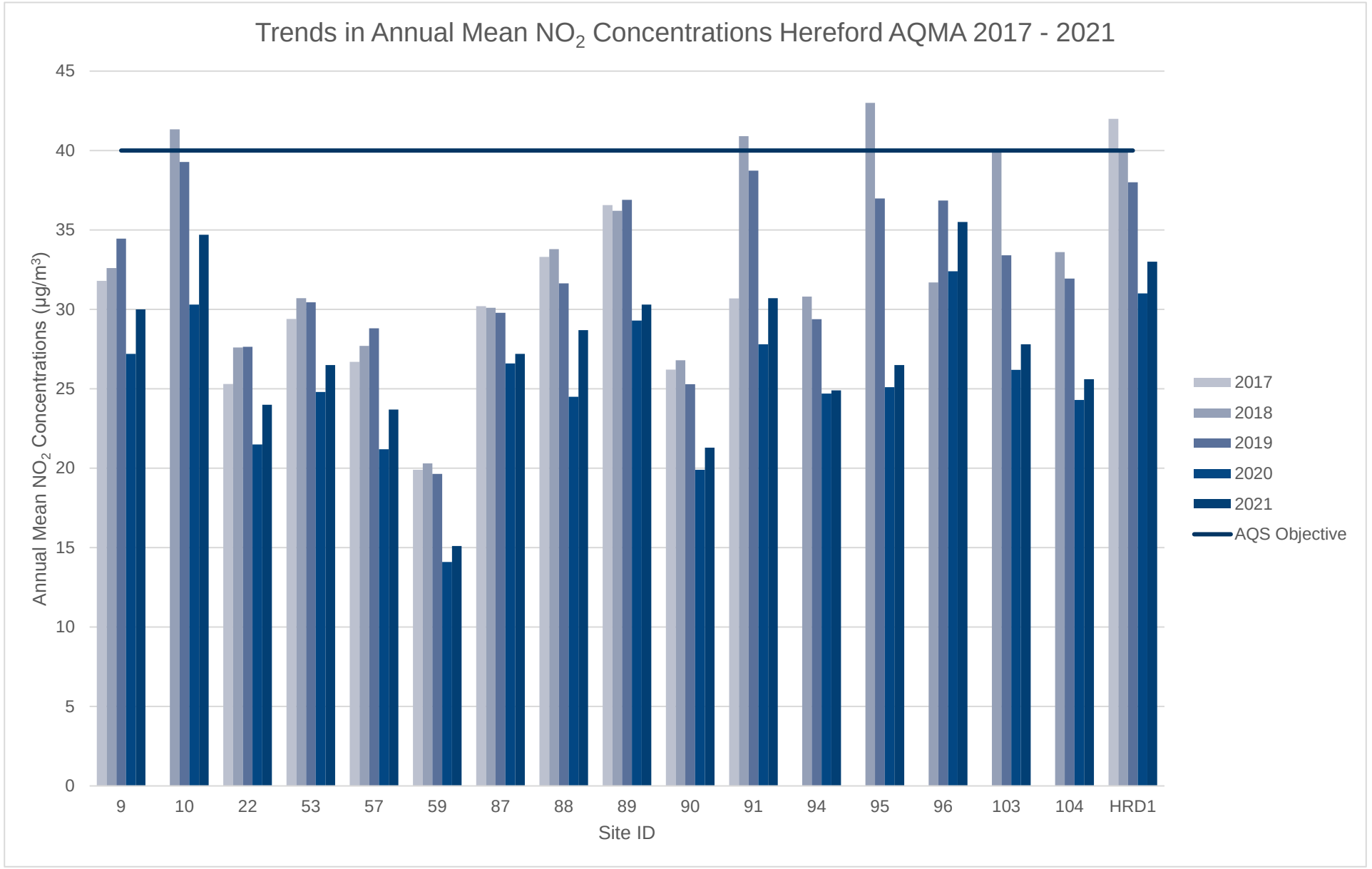


Figure A.2 – Trends in Annual Mean NO2 Concentrations in Hereford AQMA Boundary

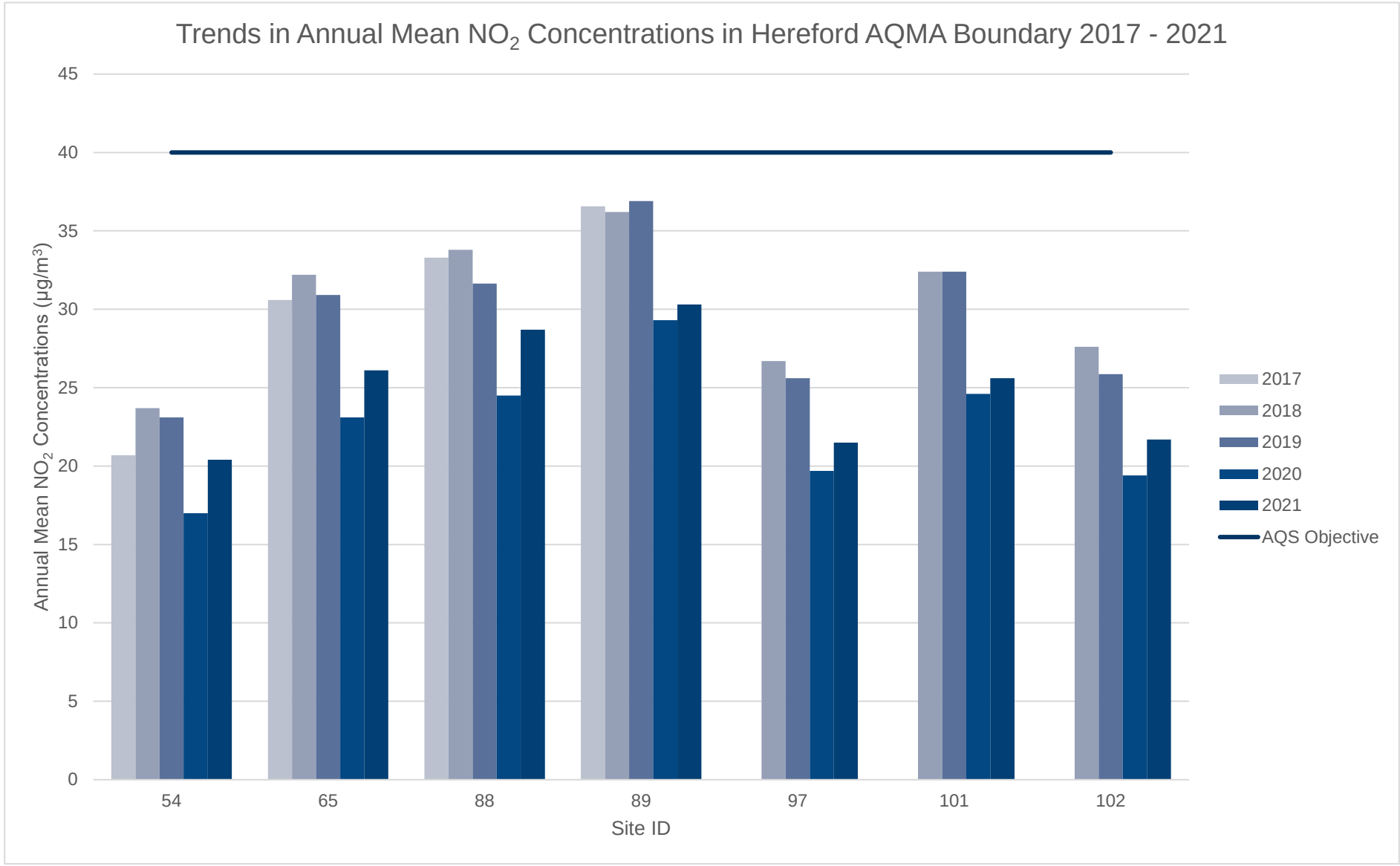


Figure A.3 – Trends in Annual Mean NO2 Concentrations Outside Hereford AQMA

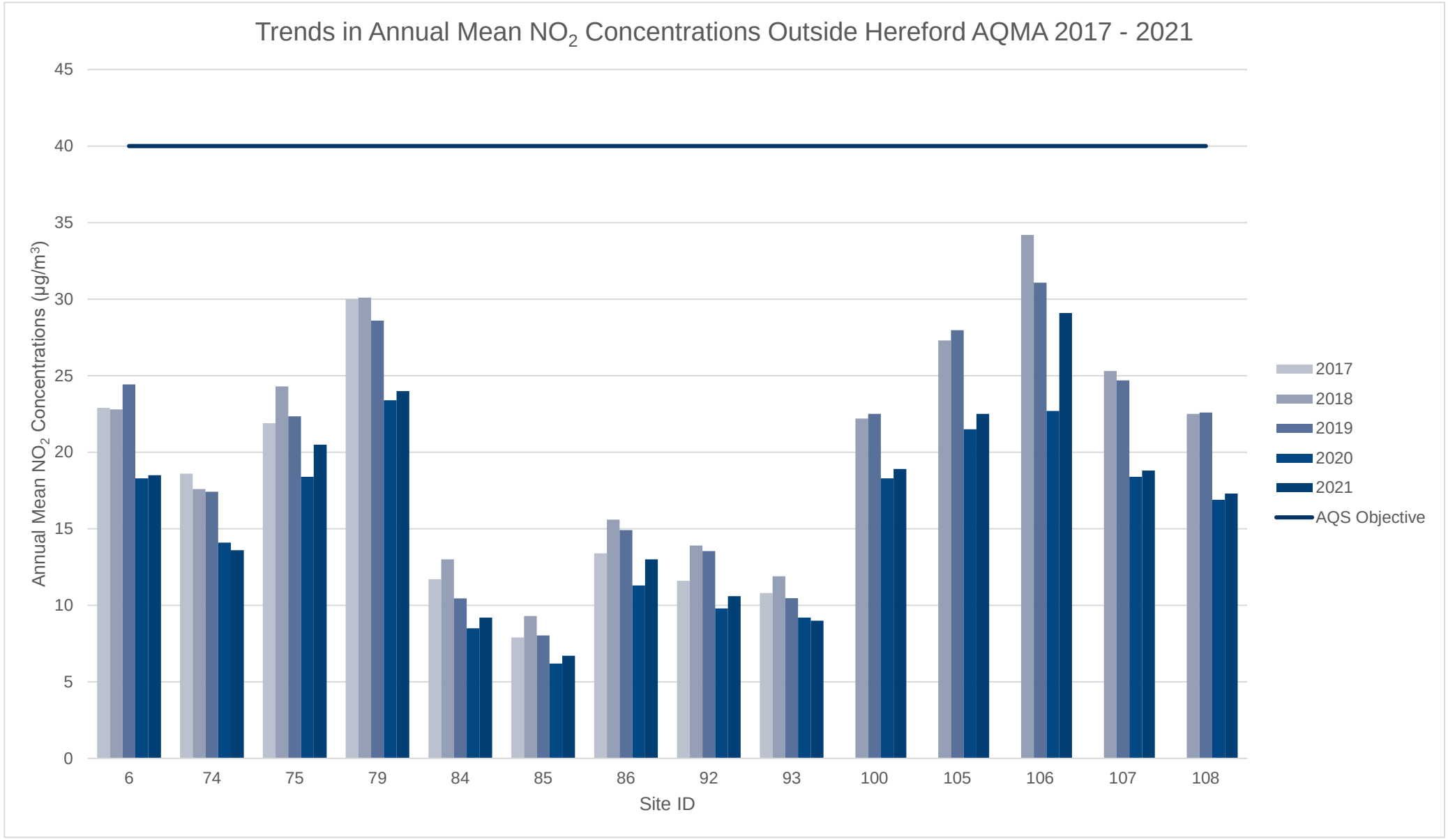


Figure A.4 – Trends in Annual Mean NO2 Concentrations Leominster AQMA

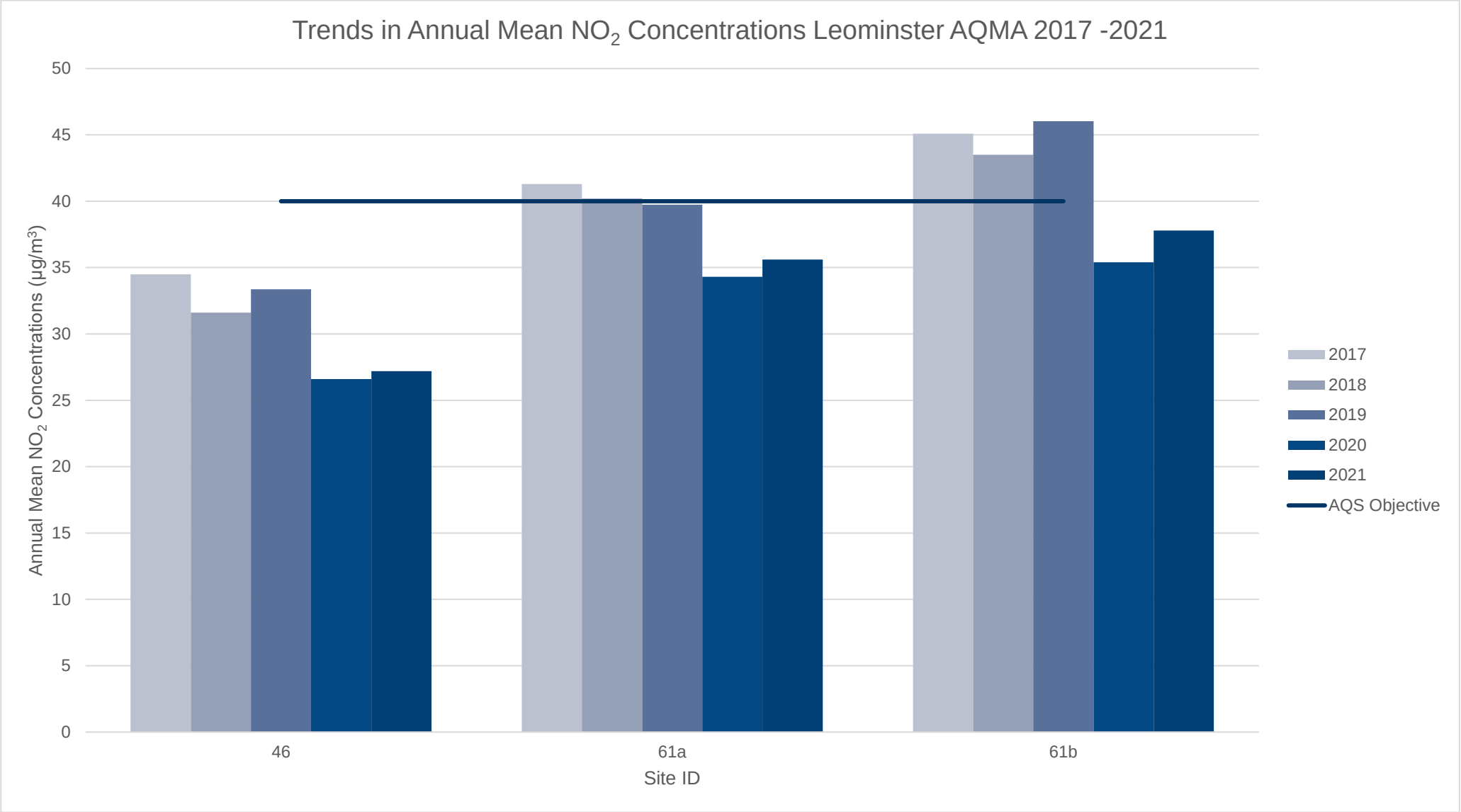


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

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**
HRD1	350721	239791	Roadside	-	96.1	0	0	1	0	0

Notes:

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

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

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

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

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

Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	**2017**	**2018**	**2019**	**2020**	**2021**
HRD1	350721	239791	Roadside		78.2	25	24	21	22	22

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

Notes:

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

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

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

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

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

Figure A.5 – Trends in Annual Mean PM_{10} Concentrations Hereford AQMA

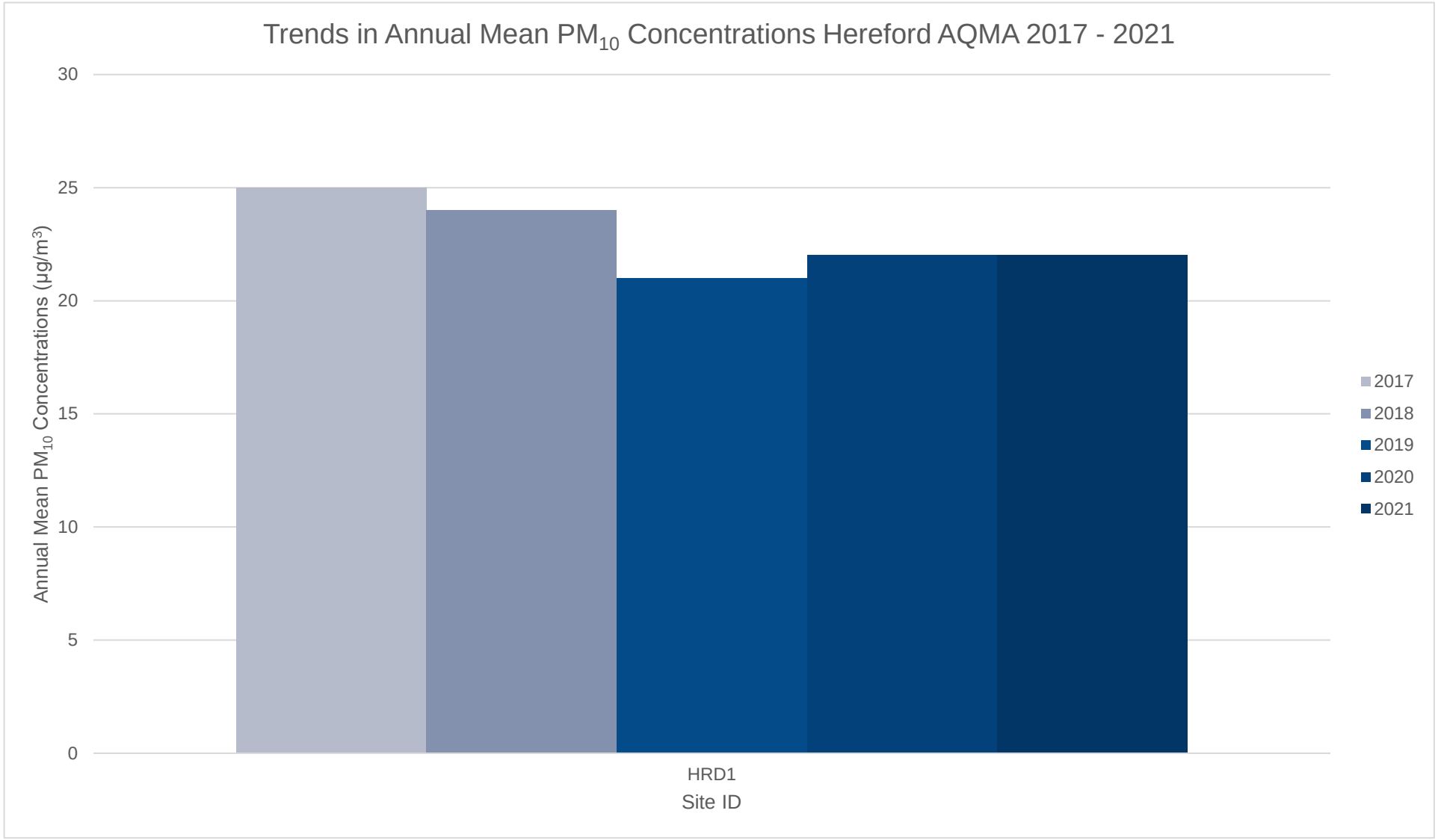


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

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**
HRD1	350721	239791	Roadside		78.2	10	2	7	3	2

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%).

Appendix B: Full Monthly Diffusion Tube Results for 2021

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

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (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
6	350890	240000	26.3	23.2	21.3	18.6	19.3	16.2	17.7	17.3	23.6	24.6	27.7	27.2	22.0	18.5	-	
9	350688	239864	45.4	43.0	39.6	32.3	38.2	27.3	31.7	25.6	38.5	35.0	38.3	35.1	35.7	30.0	-	
10	350677	240015	47.5	44.5	43.9	37.2	45.3	32.3	35.8	38.2	43.3	43.2	44.4	42.1	41.3	34.7	-	
22	350860	240615	33.4	33.9	27.4		29.8	23.2	23.7	25.6	31.8	28.9	28.9	29.3	28.6	24.0	-	
32	357717	223736	30.5	25.1	24.4	22.5	26.1	21.9	21.8	24.4	25.0	26.8	33.2	24.6	25.4	21.3	-	
33	358506	224214	23.1	27.1	20.2	24.8	26.5	22.4	23.2	23.7	26.3	23.0	27.1	25.1	24.3	20.4	-	
46	349409	259010	37.0	31.2	33.0	27.9	33.5	29.6	27.7	29.0		35.6	38.2	34.6	32.4	27.2	-	
53	350723	239163	35.6	33.5	31.7	29.7	33.6	31.7	28.0	27.5	33.5	28.8	35.4	32.1	31.6	26.5	-	
54	350602	241097	24.9	25.3	21.4	24.1	24.4	17.7	23.1	22.4	28.6	24.8	30.7	24.6	24.3	20.4	-	
57	350499	240108	28.1	30.8	29.3	29.0	29.7	24.2		22.7	30.4	26.2	32.3	28.1	28.2	23.7	-	
59	350987	240108	22.9	18.9	17.3	18.0	15.1	14.8	14.1	15.3	18.8	17.4	22.3	21.0	18.0	15.1	-	
61a	349363	259013	47.3	43.2	44.2	35.9	44.2	38.8	40.8	35.8	49.0	42.6	45.9	42.5	42.4	35.6	-	
61b	349352	259015	47.7	44.2	41.6	37.5	50.8	40.4	44.4	40.3	52.1	49.4	48.9	45.0	45.1	37.8	-	
65	350086	240296	34.5	33.9	32.1	32.4	33.6	27.5	28.3	26.0	34.3	27.2	33.8	30.7	31.1	26.1	-	
74	349985	240334	21.4	20.7	17.7	16.6	15.7	12.3	13.4	12.8	18.9	12.4	20.2	14.1	16.2	13.6	-	
75	350511	239740	27.1	29.1	22.9	26.1	23.5	24.3	20.6	23.7	27.2	21.8	23.7	23.7	24.4	20.5	-	
79	350472	238999	35.8	34.7	31.3	27.8	28.8	25.9	23.1	23.6	30.9	25.3	31.2	27.1	28.6	24.0	-	
82	360204	224177	24.4	26.3	19.4	22.0	19.6	15.6	16.1	16.0	21.7	19.5	26.7	21.1	20.7	17.4	-	

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
84	347864	241236	13.6	14.0	11.3	12.3	10.3	8.9	7.9	8.6	10.7	8.4	12.7	12.5	10.9	9.2	-	
85	348752	241941	12.1	12.2	7.3	8.1	5.7		4.7	5.3	7.4	6.8	9.0	9.5	8.0	6.7	-	
86	349067	241933	19.1	21.4	13.3	15.5	14.5	12.3	12.5	11.9	16.6	15.3	17.2	16.8	15.5	13.0	-	
87	350694	239819	38.6	39.1	29.6	32.2	40.1	16.9	26.0	30.8	39.9	31.9	33.7	33.1	32.4	27.2	-	
88	350684	239900	41.2	39.6	34.1	33.4	33.8	31.1	33.1	26.3	36.7	31.4	36.0	34.3	34.2	28.7	-	
89	350800	240441	45.4	39.3	34.5	30.6	38.4	30.5	33.1	30.9	36.1	39.7	39.4	35.9	36.0	30.3	-	
90	350719	239164	28.4	28.0	25.9	26.9	25.0	24.5	20.7	23.0	27.7	22.8	27.2	25.3	25.3	21.3	-	
91	350759	239125	38.2	34.0	41.0	33.5	39.5	33.5	29.6	33.6	38.4	37.7	45.3	37.0	36.5	30.7	-	
92	352919	237840	19.6	16.3	13.2	13.7	5.9	9.3	9.6	9.0	11.0	10.3	18.5	14.6	12.6	10.6	-	
93	351881	239984	14.8	13.6	11.5	12.3	8.9	9.2	8.8	9.2	10.5	7.4	13.1	10.1	10.7	9.0	-	
94	350933	240798	33.2	32.4	30.3	27.6	26.4	27.1	20.9	27.3	31.8	34.6	34.0	31.4	29.7	24.9	-	
95	350876	240678	34.1	35.6	30.8	29.1	34.7	24.8	25.8	25.7	34.7	36.3	34.3	33.5	31.6	26.5	-	
96	350941	240858	50.9	41.3	46.2	40.2	45.0	34.6	34.0	37.6	41.2	42.5	49.8	45.5	42.2	35.5	-	
97	351025	240874	31.2	27.7	25.0	26.3	24.4	21.5	21.8	21.6	26.9	25.4	27.9	27.8	25.6	21.5	-	
98	350992	240652	23.5	24.5	17.9	18.9	16.4	13.8	15.7	17.1	21.0	23.1	26.4	26.2	20.5	17.2	-	
99	351022	240668	23.2	27.0	17.3	17.4	14.8	12.8	12.9	13.0	19.1	20.0		23.0	18.3	15.4	-	
100	351440	240539	30.2	29.6	19.8	20.4	18.3	16.0	17.2	17.6	26.4	23.9		26.9	22.4	18.9	-	
101	351053	240290	34.7	30.8	29.6	26.6	31.6	22.8	26.3	26.3	33.9	33.2	34.4	35.1	30.4	25.6	-	
102	351100	240640	29.5	23.6	24.8	25.3	26.0	21.2	23.7	21.7	29.4	25.2	31.5	28.5	25.9	21.7	-	
103	350898	240223	32.3	31.5	34.5	31.6	33.5	34.3	32.2	29.2	36.4	31.7	41.3	30.5	33.1	27.8	-	
104	350979	240212	31.2	36.2	28.1	26.0	33.6	24.9	26.7	26.1	36.0	32.9	31.1	34.5	30.5	25.6	-	

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
105	351725	240443	32.3	29.4	19.3	24.7	26.6	21.9	25.2	22.4	30.0	26.3	34.1	29.6	26.8	22.5	-	
106	351483	240323	35.8	30.3	31.7	30.1	33.0	61.5	29.8	30.6	35.3	34.2	37.5	30.5	34.7	29.1	-	
107	350412	241161	29.4	25.8	18.1	21.8	22.4	16.6	16.8	18.3	24.8	23.8	25.2	26.1	22.4	18.8	-	
108	350166	242175	26.3	26.9	20.7		19.1	14.6	15.9	15.1	21.3	20.3	25.2	21.5	20.6	17.3	-	
109	349176	259020	31.1	30.9	31.2	26.5	30.6	26.3	28.0	25.8	36.2	32.2	34.8	30.3	30.3	25.4	-	
110	349262	259030	23.6	21.3	19.4	23.9	21.3	16.4	18.7	16.8	22.9	18.8	24.3		20.7	17.4	-	
111	349228	259031	23.8		20.2		18.8	17.6	17.3	20.3	23.9	22.4	23.9	18.6	20.6	17.3	-	

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

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

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **Herefordshire Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Herefordshire Council During 2021

Herefordshire Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by Herefordshire Council During 2021

Herefordshire Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

The following UKAS accredited company provides Herefordshire Council with nitrogen dioxide diffusion tubes and analysis:

Gradko Environmental,
St Martins House,
77 Wales Street,
Winchester,
Hampshire, SO23 0RH
Tel 01962 860331
diffusion@gradko.co.uk

The 20% Triethanolamine (TEA) / De-ionised Water preparation methods is used. Particular attention is given to the correct installation of tubes at site and a reliable exposure duration.

No monitoring results were reported during two months of 2020 (April and May), this was due to the closure of the analysis laboratory. However, where monitoring was conducted, this was carried out in accordance with the 2020 Diffusion Tube Monitoring Calendar.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Herefordshire Council recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 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.

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

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	**Adjustment Factor**
2021	National	06/22	0.84
2020	National	03/21	0.81
2019	National	09/20	0.93
2018	National	06/19	0.93
2017	National	09/18	0.89

NO_2 Fall-off with Distance from the Road

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

has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1. No diffusion tube NO_2 monitoring locations within Herefordshire Council required distance correction during 2021.

QA/QC of Automatic Monitoring

The automatic monitoring station at Victoria Street (site HRD1) has its data managed and ratified by the company Air Quality Data Management. In addition, this company provides notifications to Herefordshire Council Officers informing them of any machinery faults.

Herefordshire Council Officers have received supplier training in relation to the calibration of the monitor. Calibration is conducted on a 2 weekly basis which was extended to 4 weekly basis due to the COVID-19 pandemic. Historic data of the automatic monitoring site is available through Herefordshire Council's website.

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

The type of PM_{10} monitor utilised within Herefordshire Council do not required the application of a correction factor.

Automatic Monitoring Annualisation

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

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. 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 Herefordshire Council required distance correction during 2021.

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

Figure D.1 – Map of Herefordshire Transport Network and Major Settlements

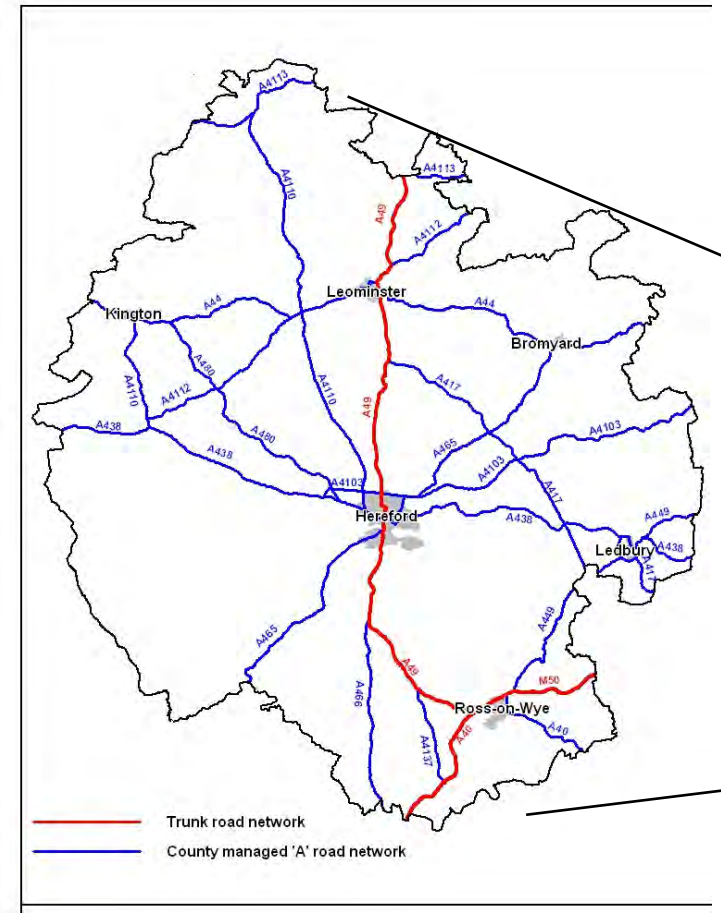


Figure D.2 – Location of Herefordshire

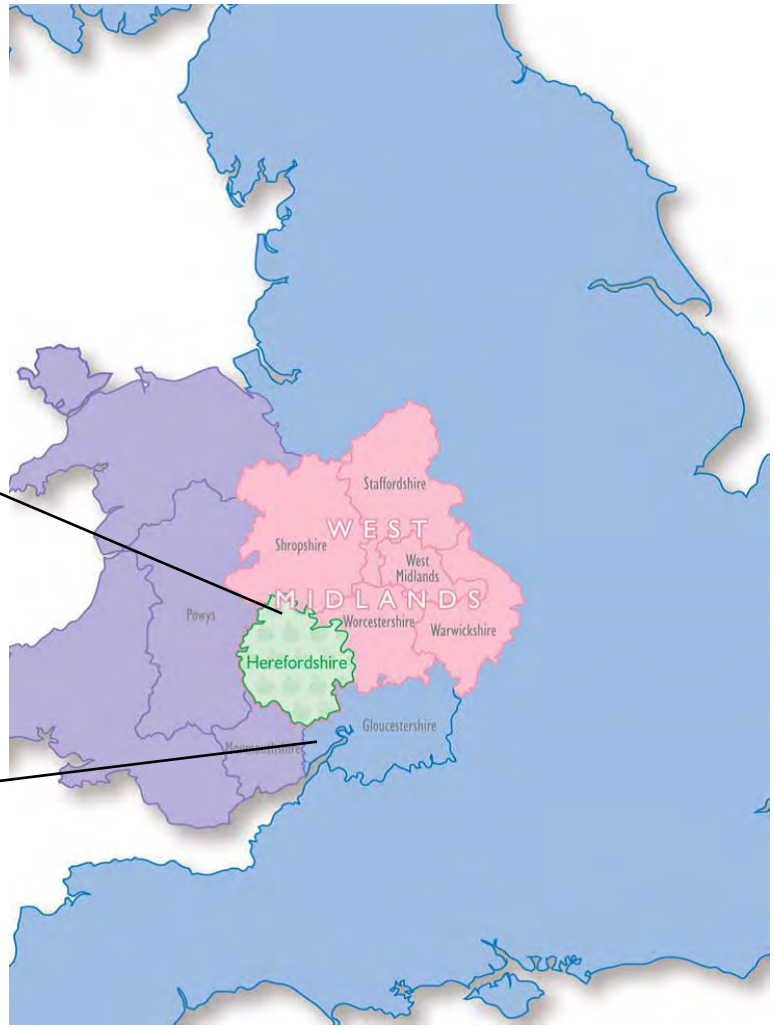


Figure D.3 – Hereford AQMA Boundary

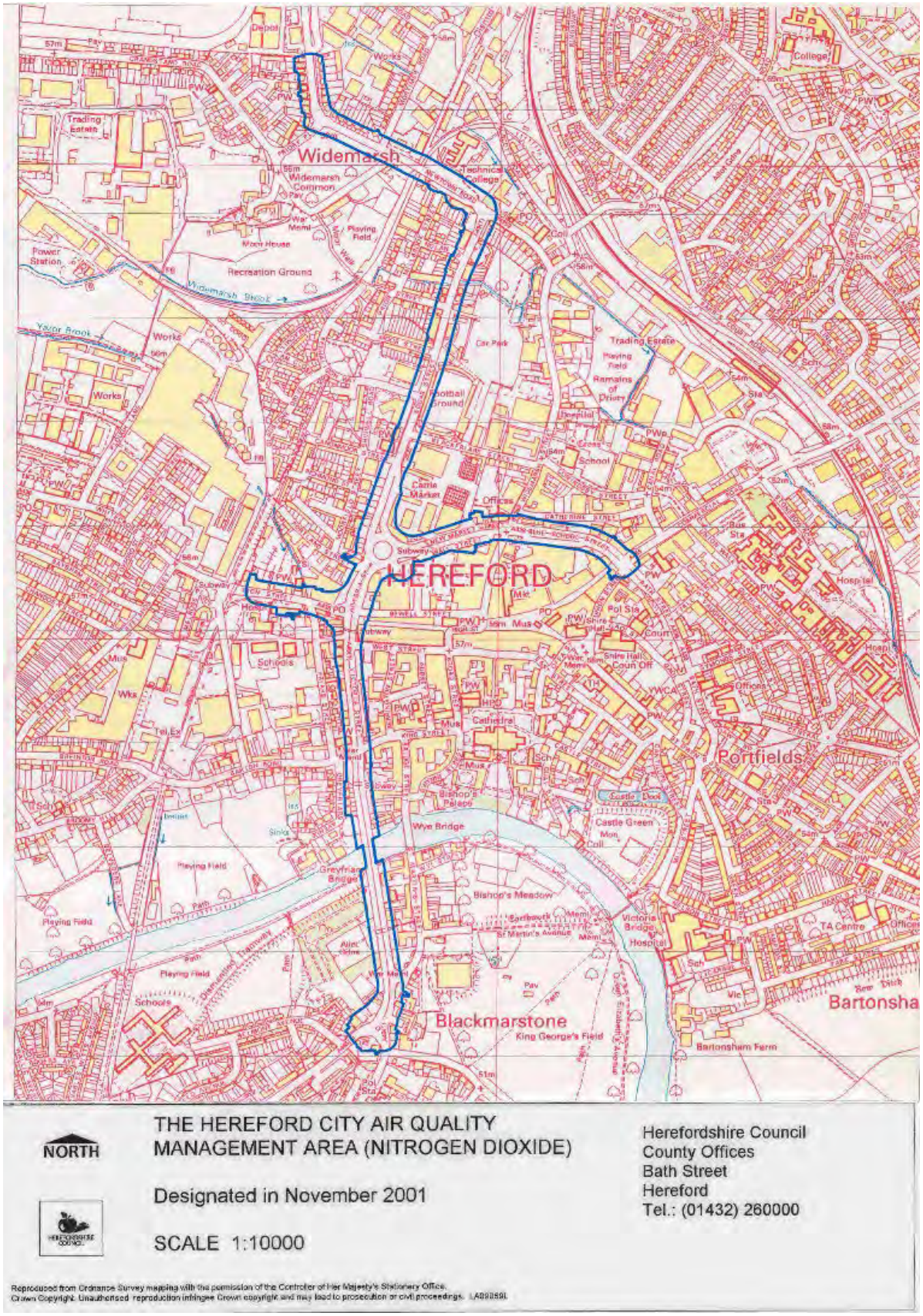


Figure D.4 – Hereford City (North) Monitoring Locations (1)

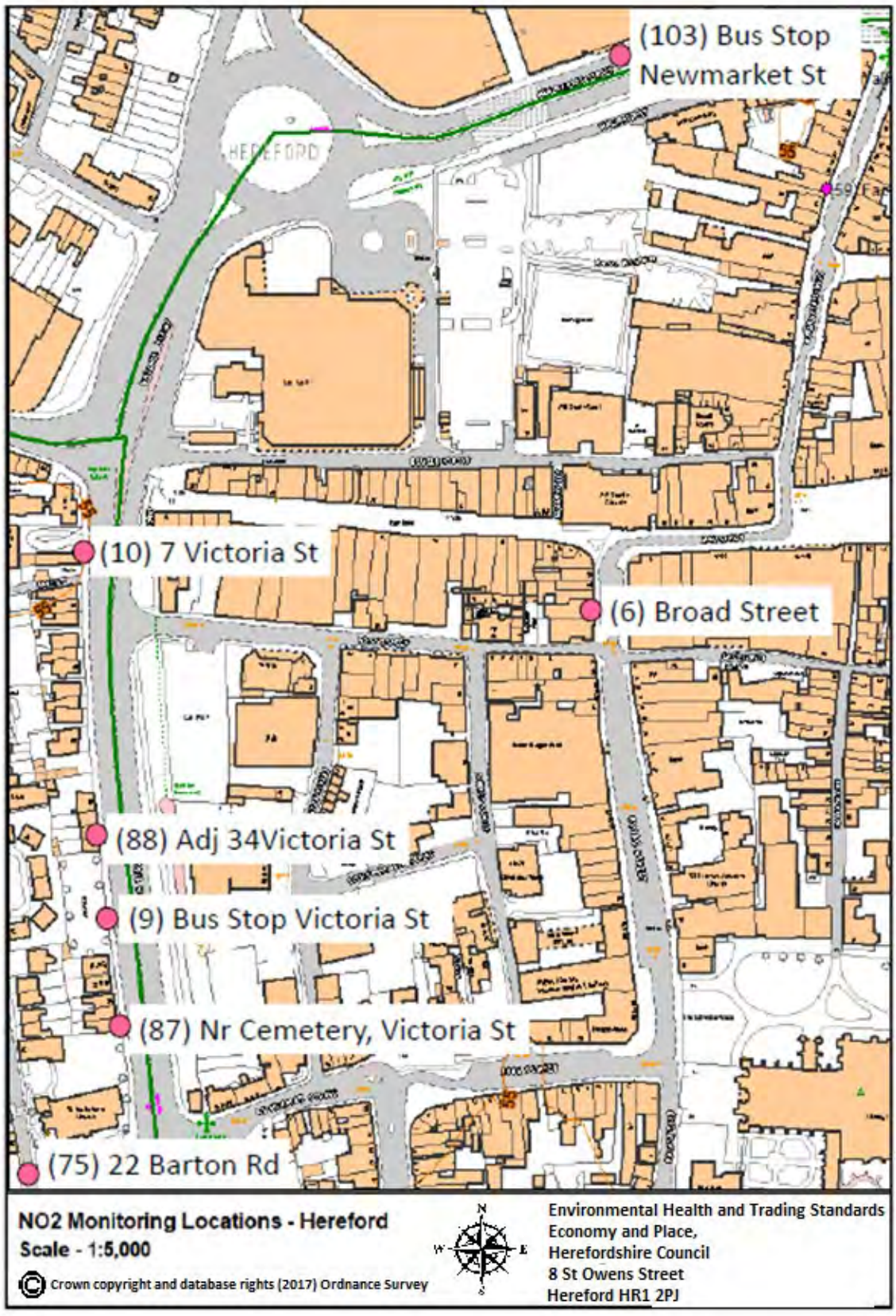


Figure D.5 – Hereford City (North) Monitoring Locations (2)

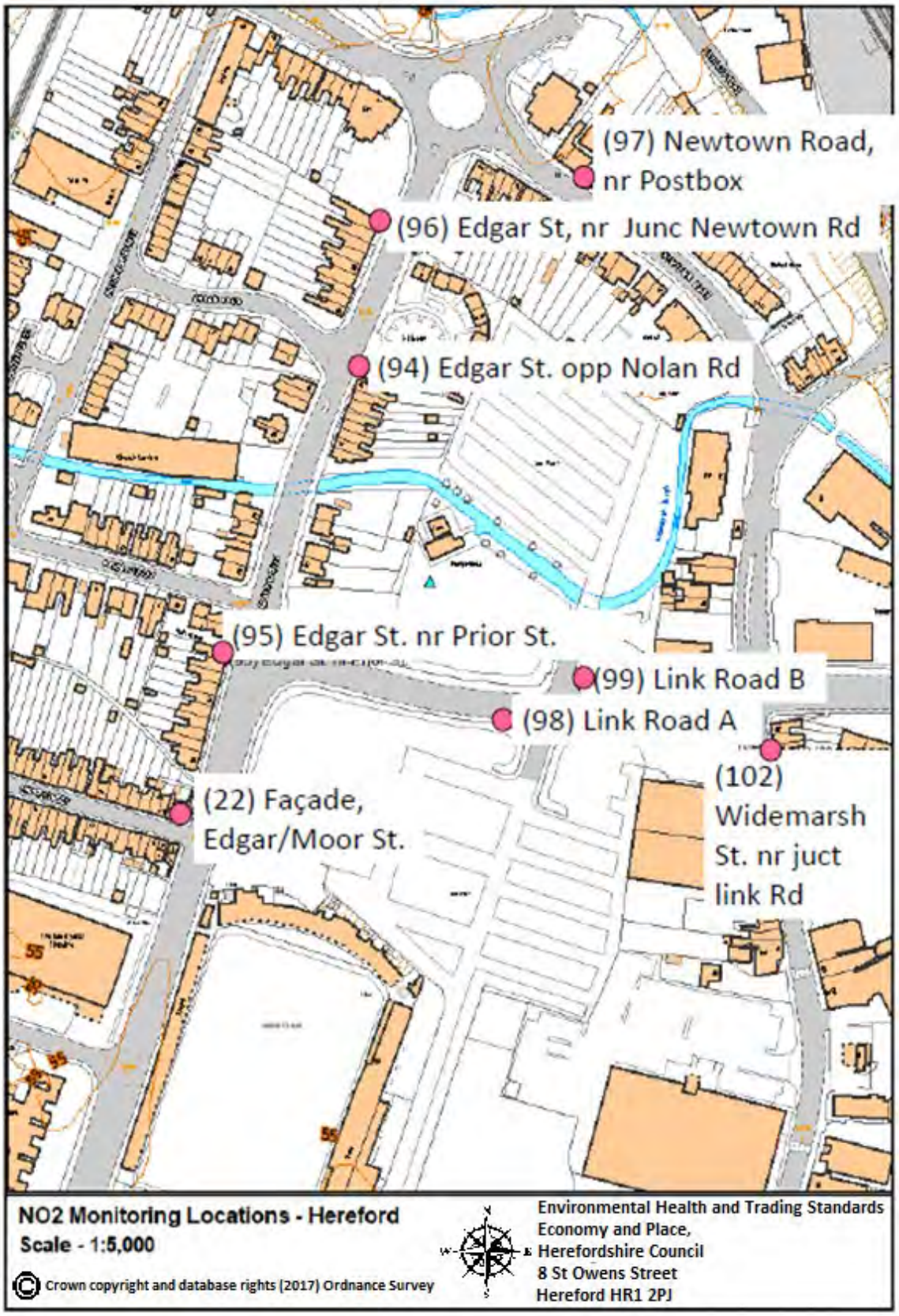


Figure D.6 – Hereford City (North) Monitoring Locations (3)

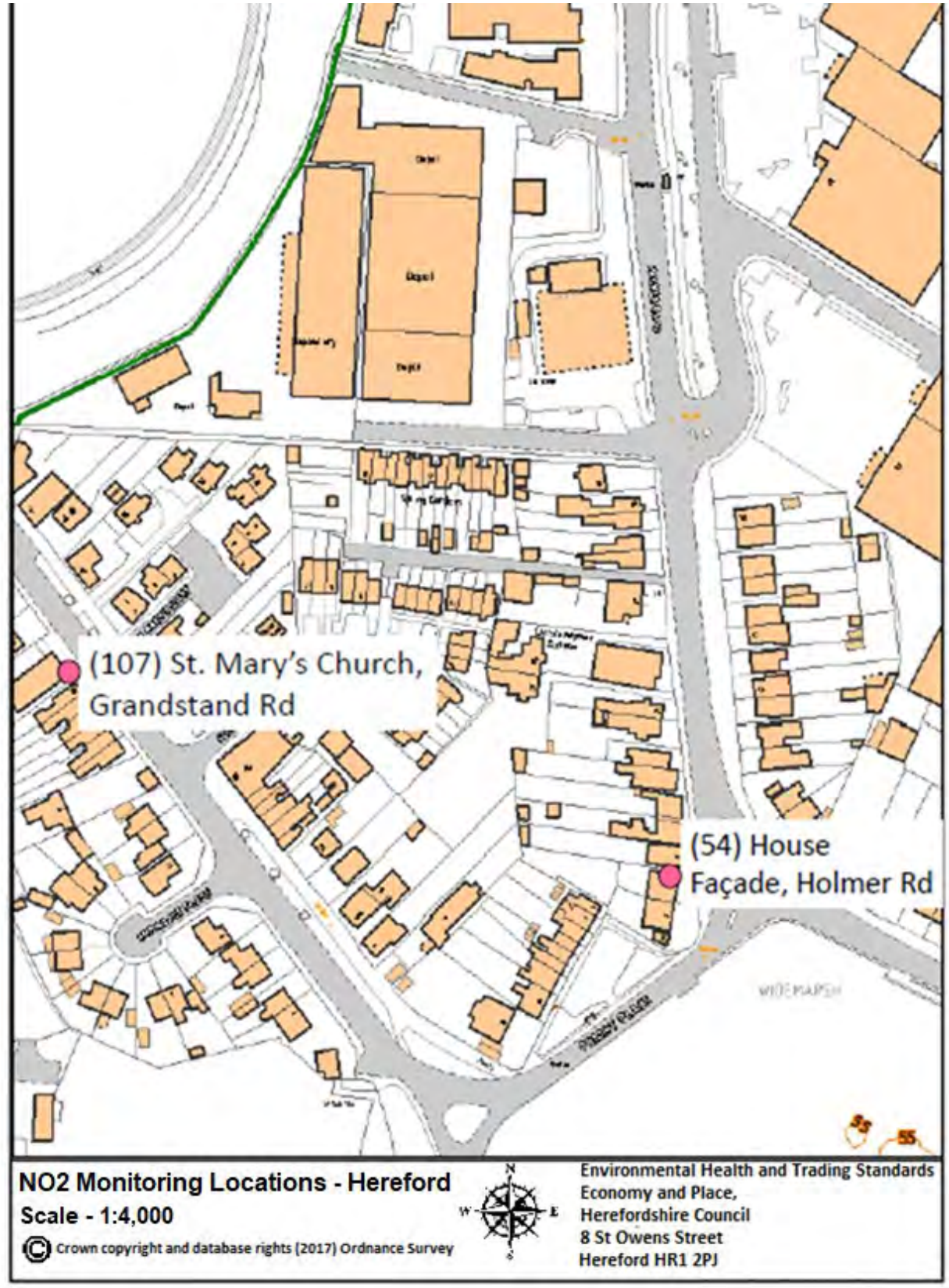


Figure D.7 – Hereford City (North) Monitoring Locations (4)

Figure D.8 – Hereford City (North) Monitoring Locations (5)

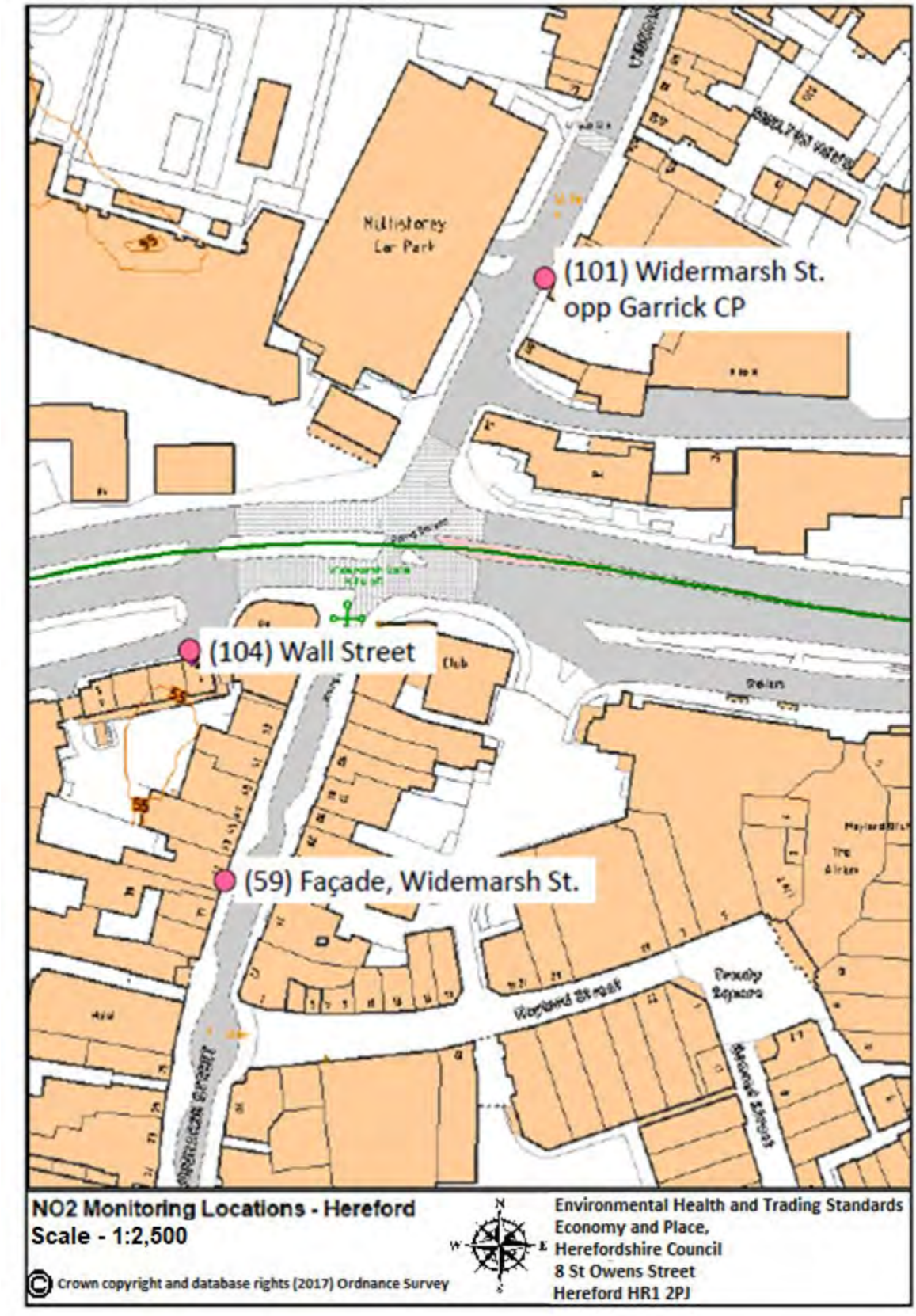


Figure D.9 – Hereford City (North) Monitoring Locations (6)

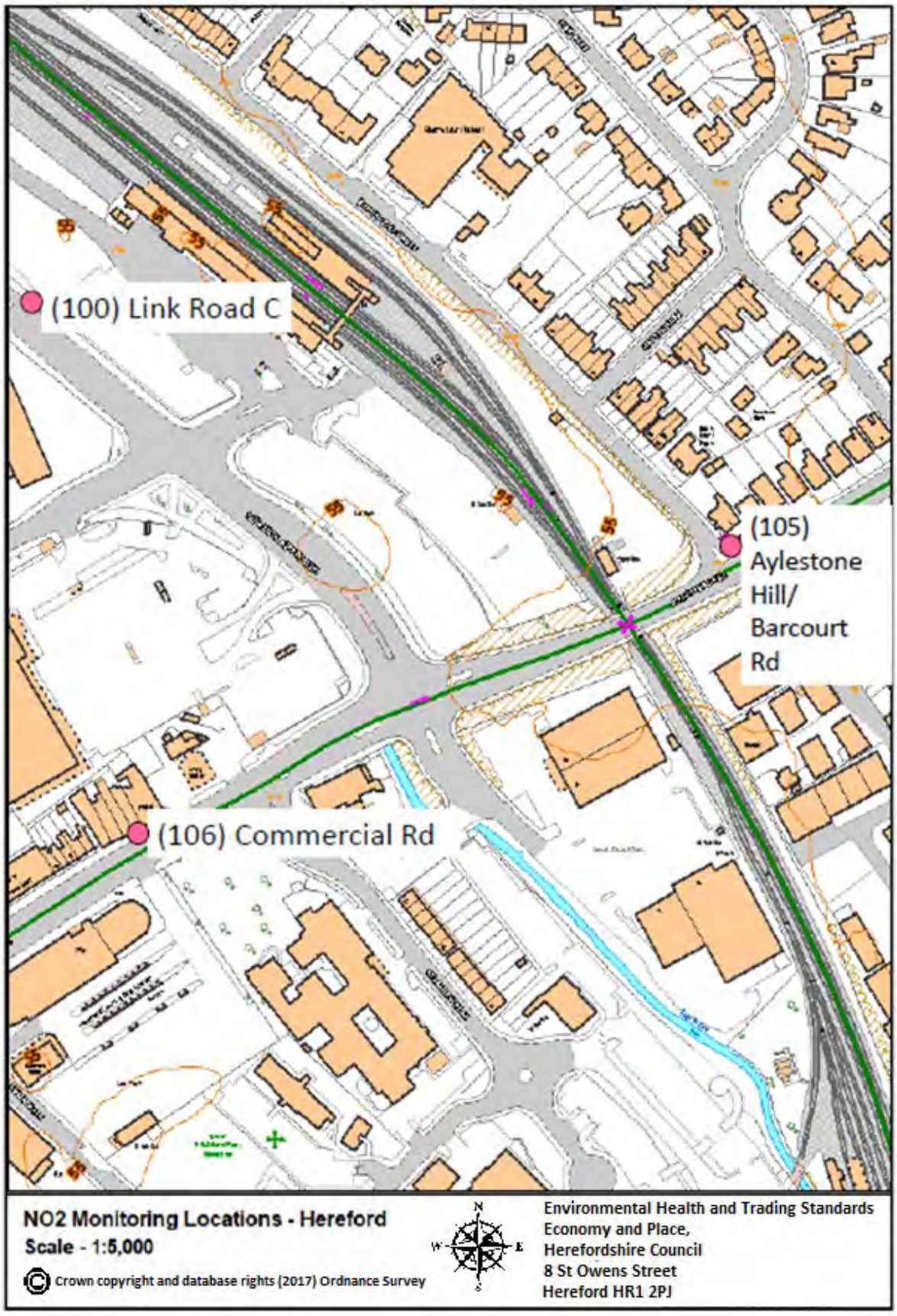


Figure D.10 – Hereford City (South) Monitoring Locations

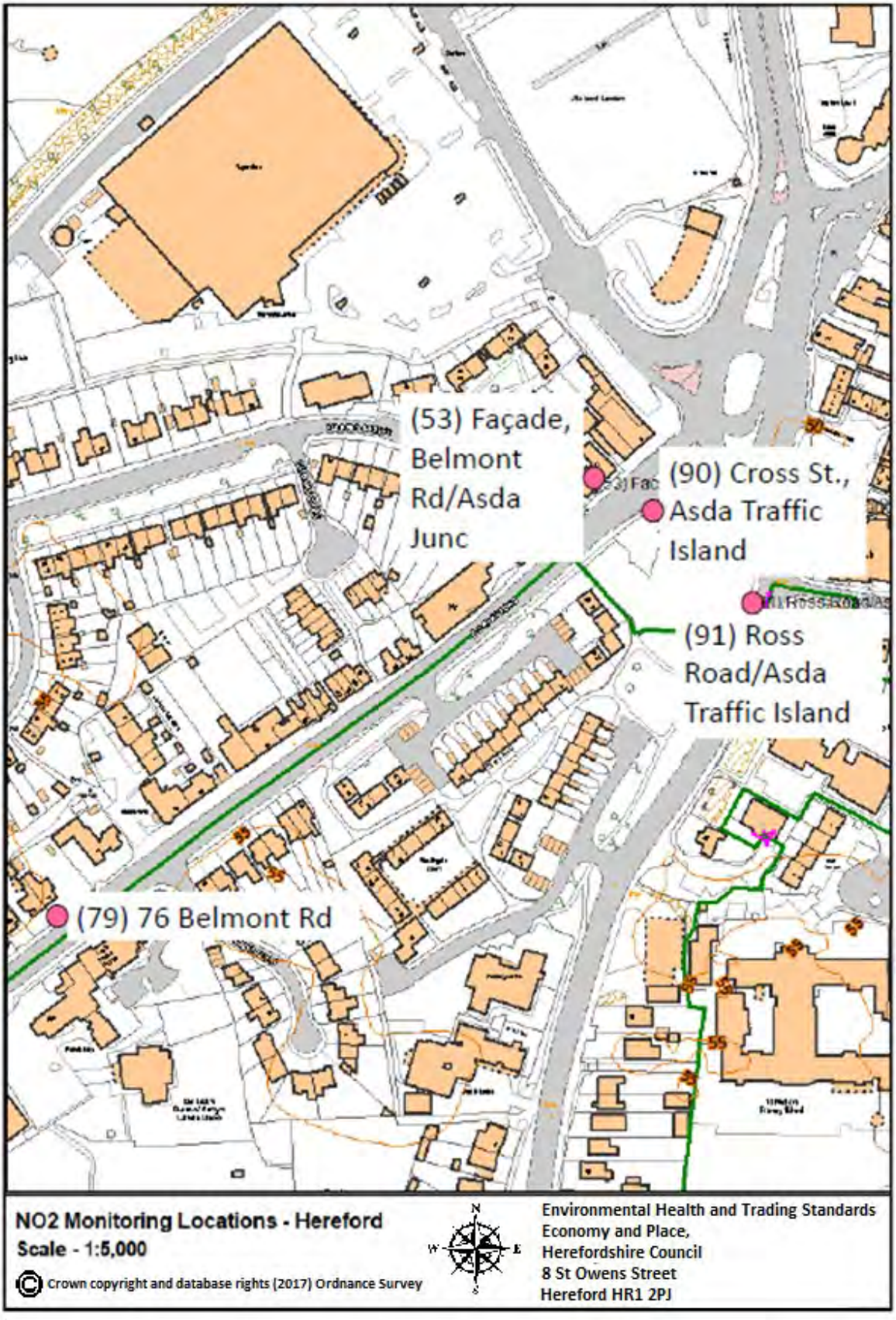


Figure D.11 – Kings Acre Road Monitoring Location

Figure D.12 – Three Elms Road Monitoring Location

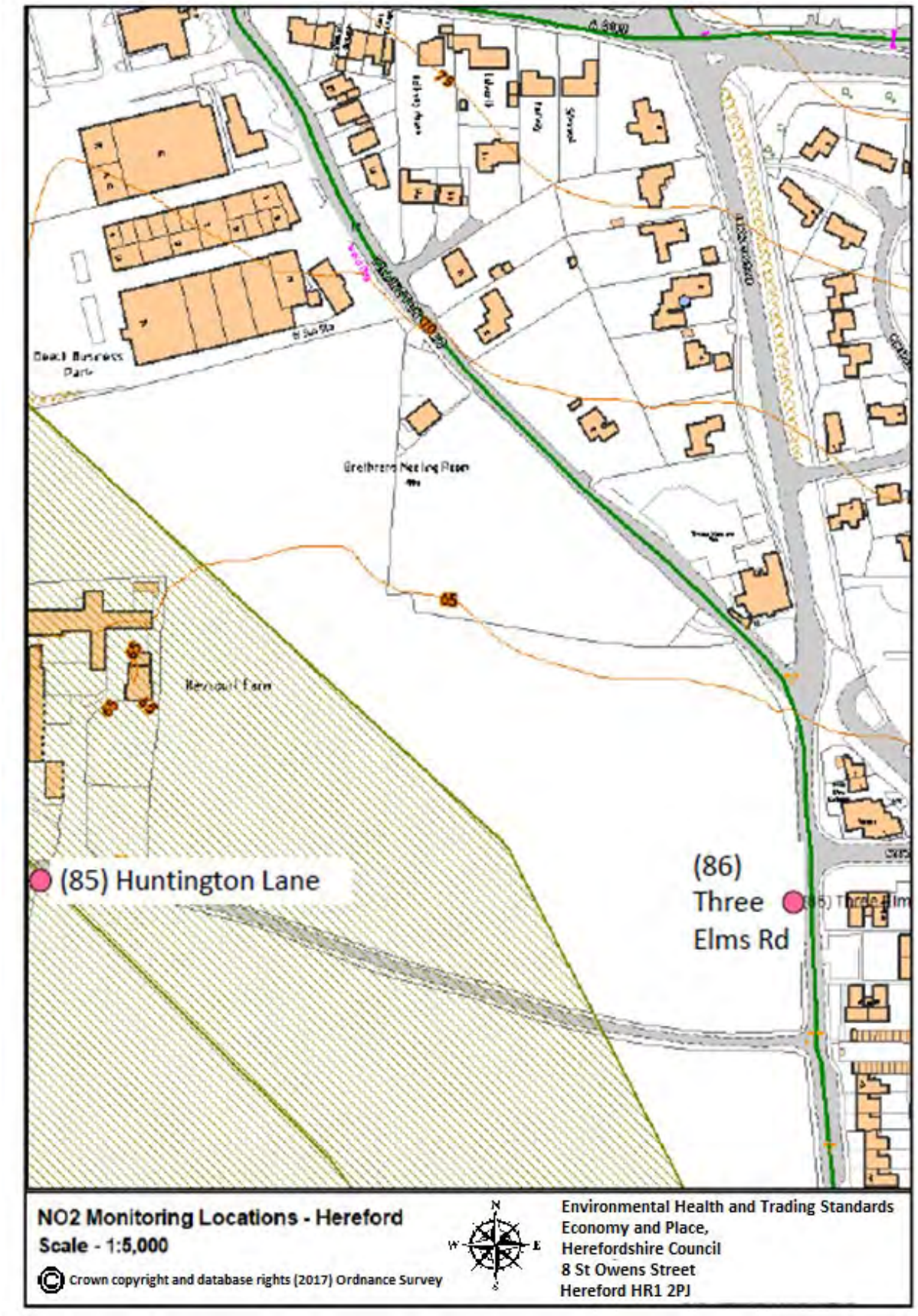


Figure D.13 – Whitecross Road Monitoring Locations

Figure D.14 – Rotherwas Industrial Estate Monitoring Location

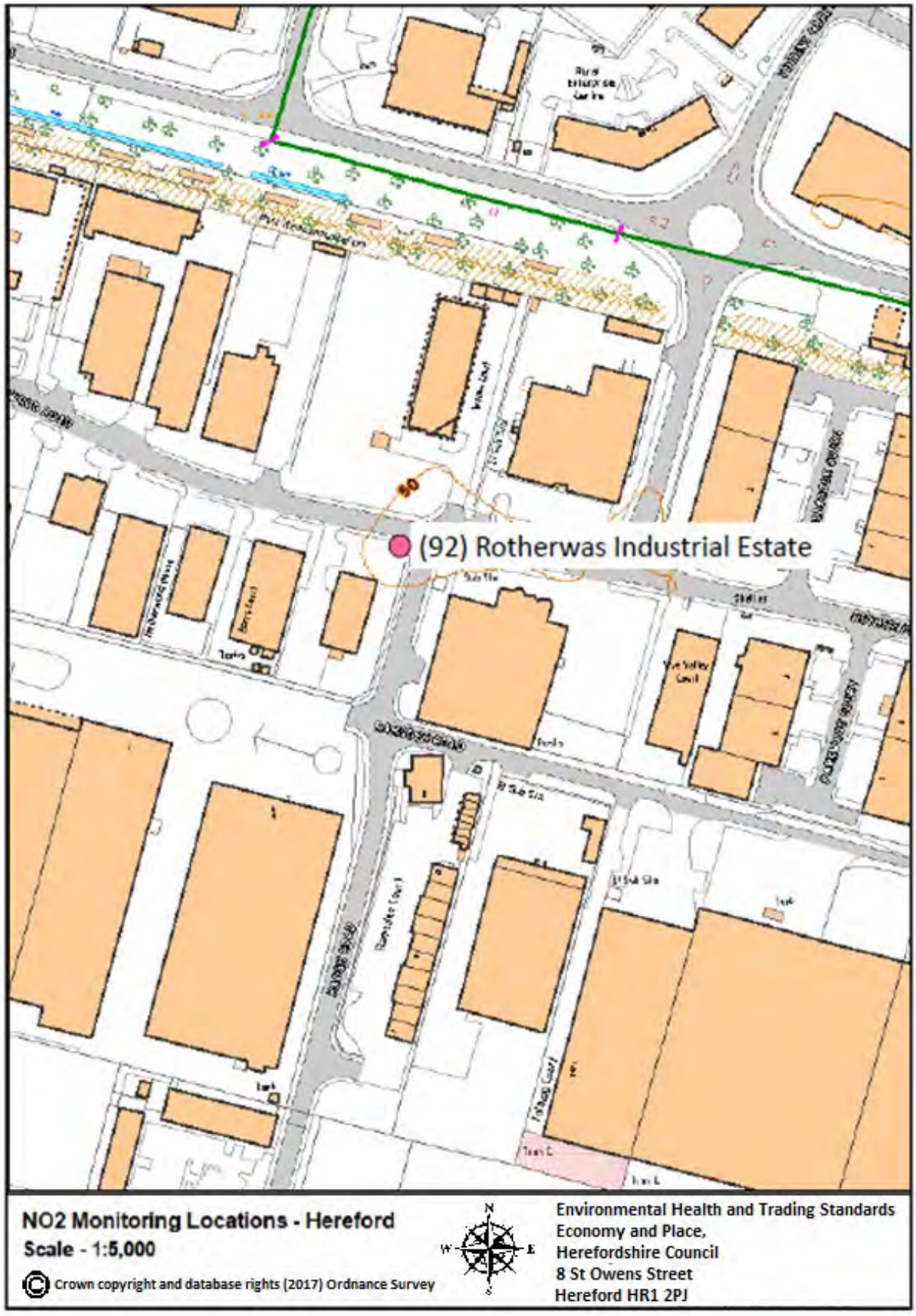


Figure D.15 – Rotherwas Relief Road Hereford Monitoring Location

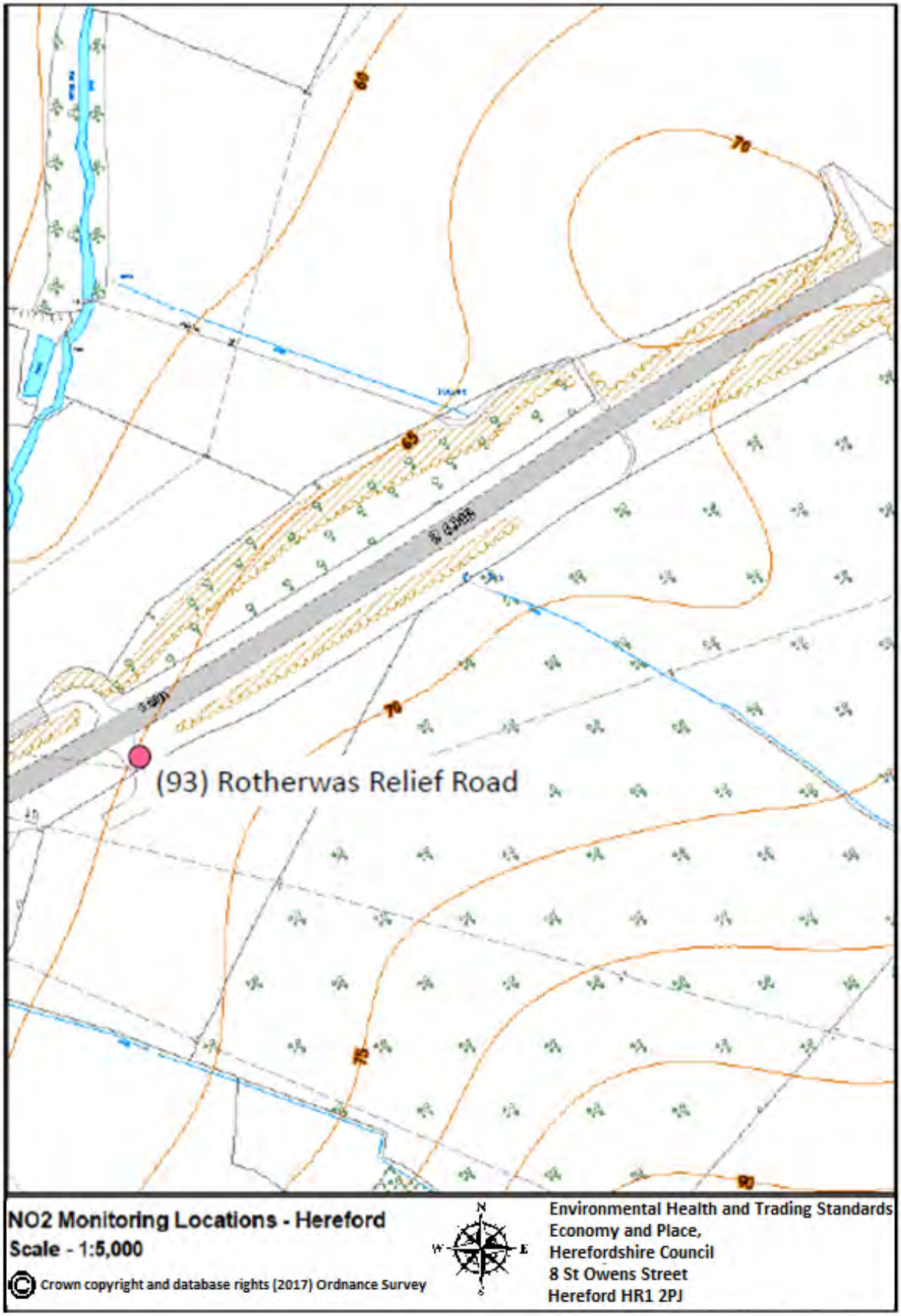


Figure D.16 – Roman Road Monitoring Location

Figure D.17 – Leominster AQMA Boundary

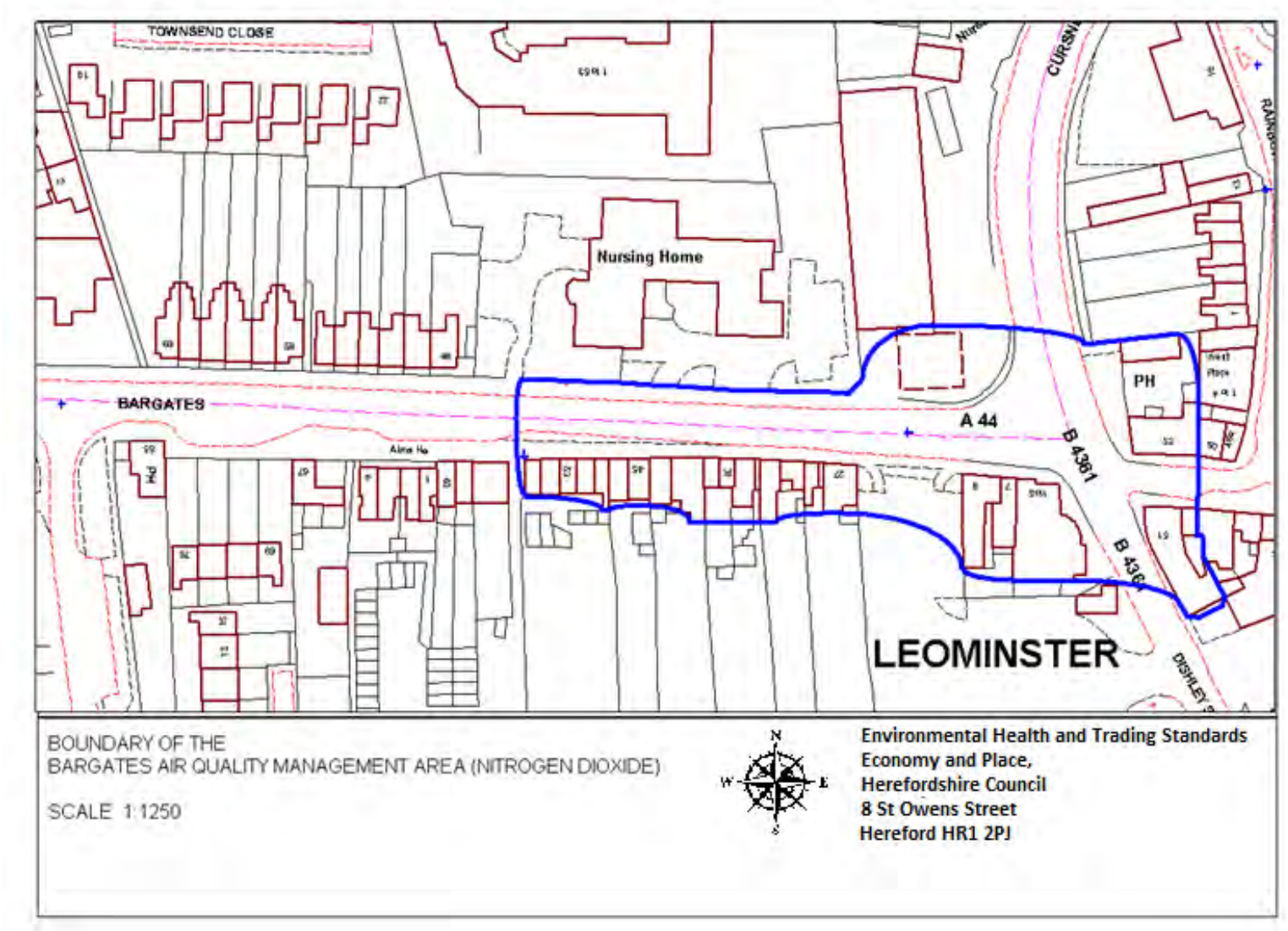


Figure D.18 – Leominster Monitoring Locations

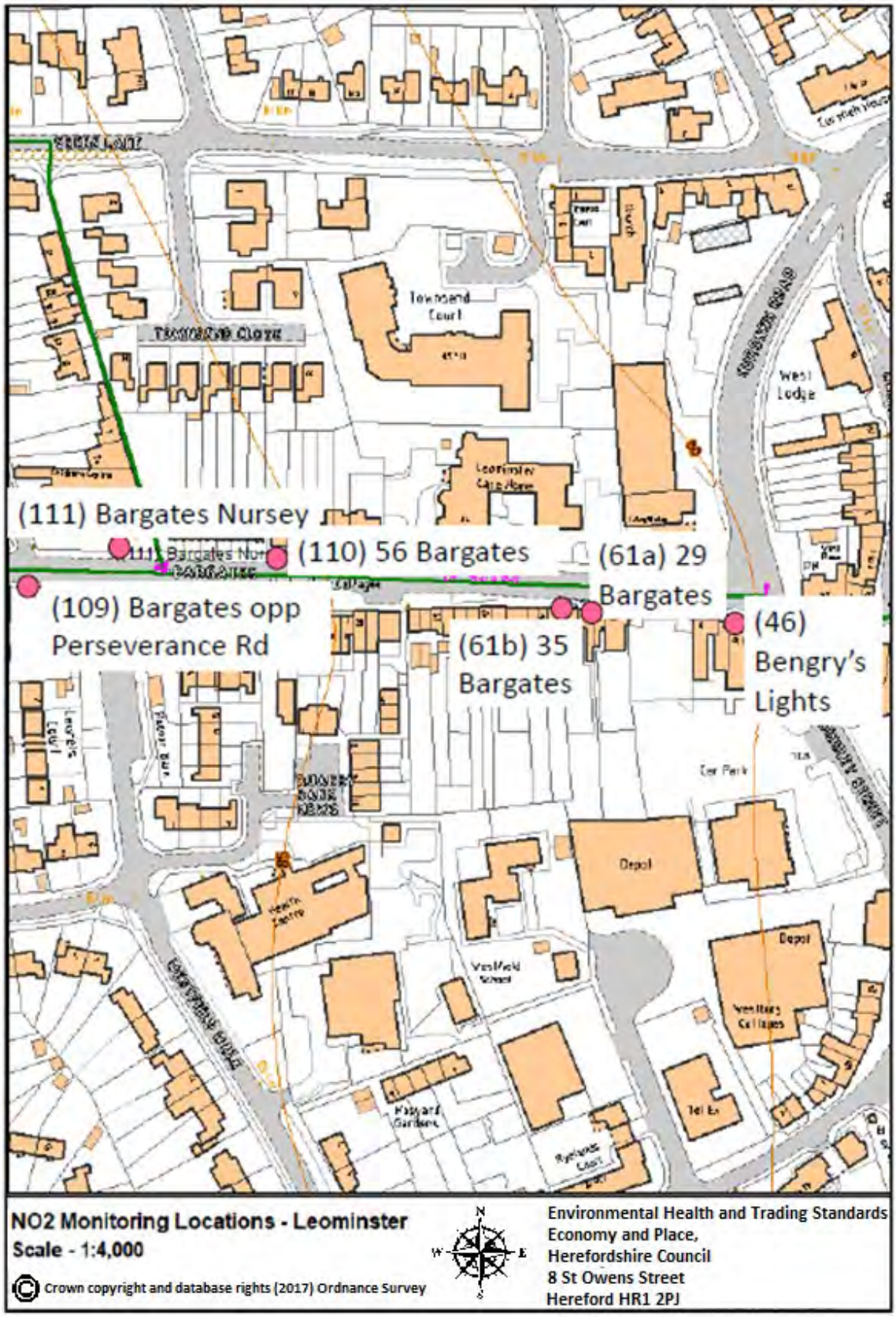


Figure D.19 – A40 Corridor, Ross-on-Wye Monitoring Locations

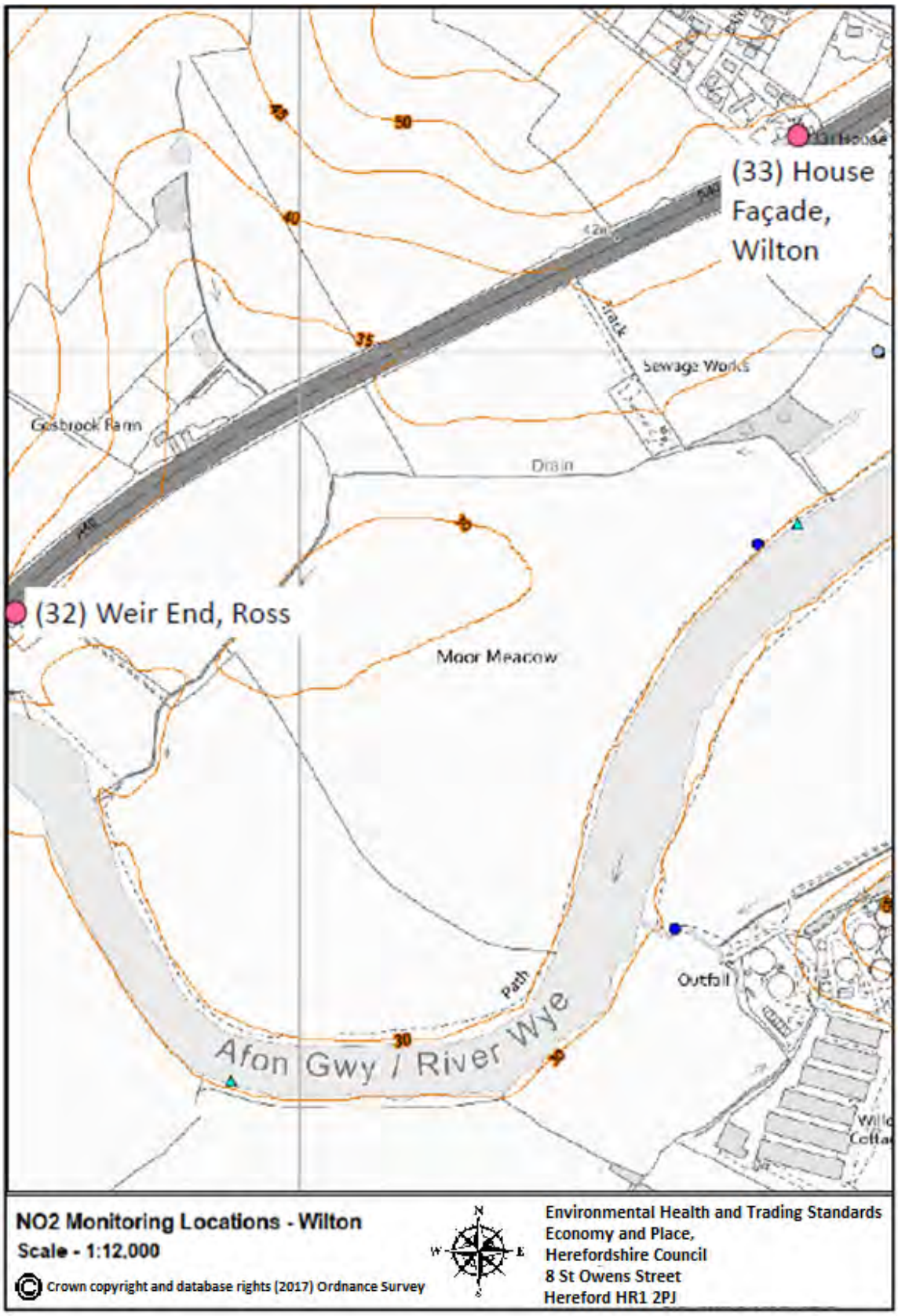


Figure D.20 – Ross-on-Wye Monitoring Locations

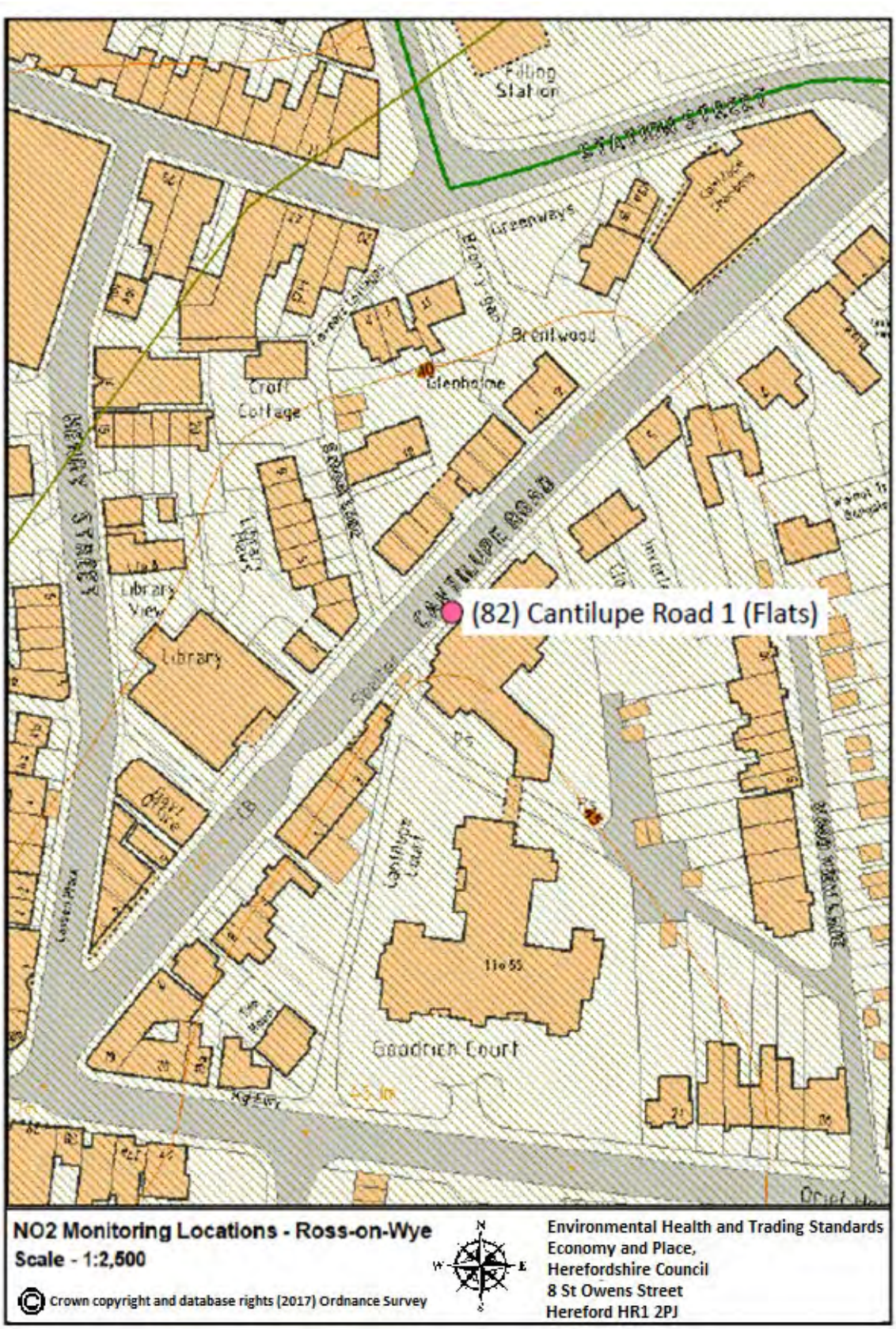
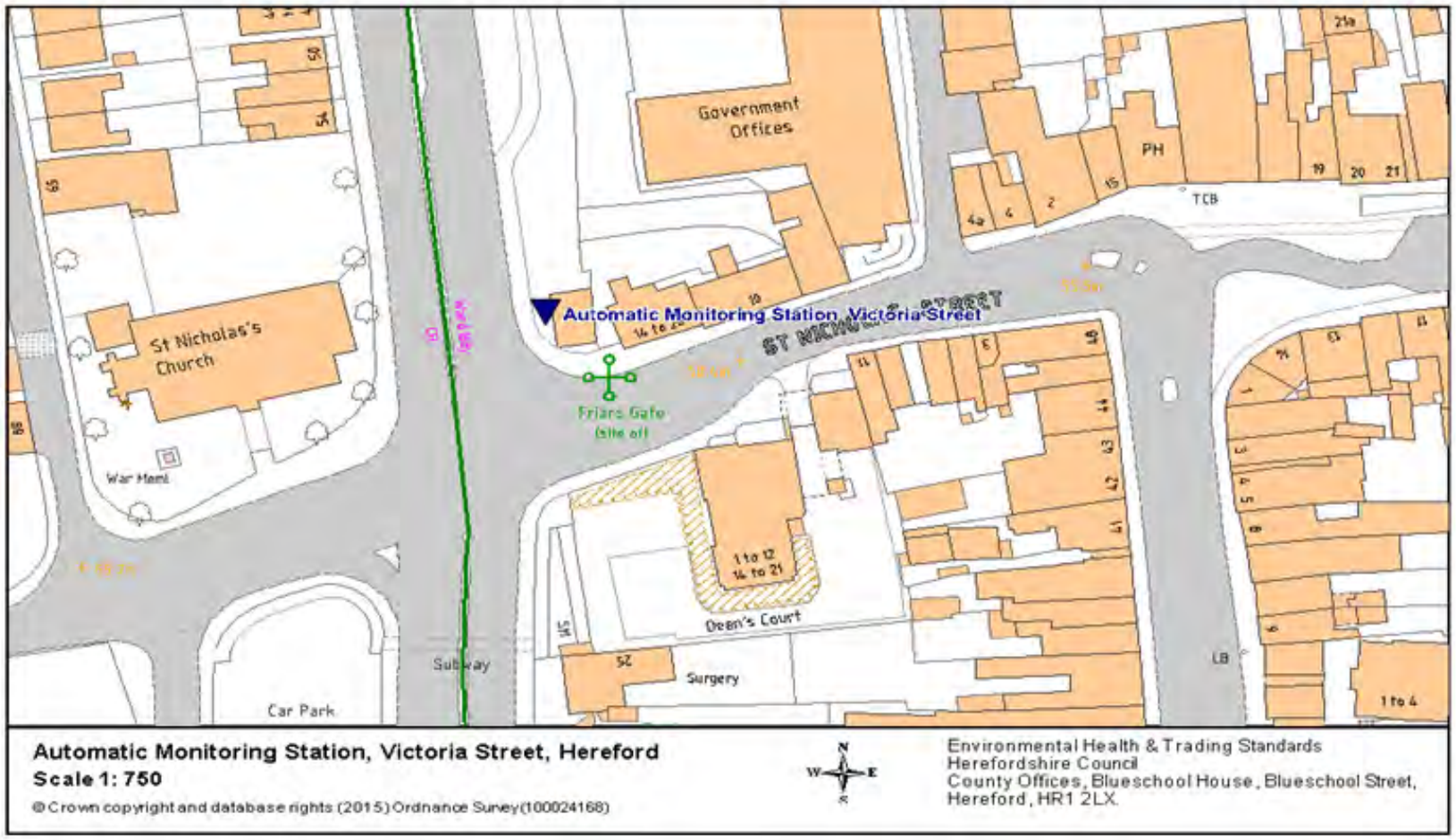


Figure D.21 – Location of Automatic Monitoring Station (site HRD1) Hereford



Appendix E: Summary of Air Quality Objectives in England

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

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

[8] The units are in 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.
- Environmental equity, air quality, socioeconomic status and respiratory health, 2010
- Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
- Defra. Abatement cost guidance for valuing changes in air quality, May 2013
- Local Transport Plan 2016 – 2031 Strategy
- Fine Particulate Matter (PM2.5) in the United Kingdom, AQEG, 2012
- https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
- Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)
- Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017
- Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
- Defra. Air quality appraisal: damage cost guidance, July 2020
- Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018
- Defra. Clean Air Strategy, 2019
- Department for Transport. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018
- Prime Minister's Office, COVID-19 briefing on the 31st of May 2020
- Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020
- https://roadtraffic.dft.gov.uk/local-authorities/155