



**Herefordshire  
Council**

## 2020 Air Quality Annual Status Report (ASR)

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

February 2021

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## Executive Summary: Air Quality in Our Area

### Air Quality 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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas<sup>1,2</sup>.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

Herefordshire is located in the West Midlands of England. It is bordered by five counties; Shropshire, Worcestershire, Gloucestershire, Powys and Monmouthshire. As of mid-2019, Herefordshire's resident population was estimated to be 192, 275, which has increased by 175 since 2018. 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<sub>2</sub>). 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<sup>3</sup>). The AQMA's include A49 Road through Hereford and Bargates Road junction in Leominster.

In 2019, the ratified continuous monitored nitrogen dioxide annual mean was 38µg/m<sup>3</sup> for Hereford AQMA (site HRD1). From 2018 to 2019, the nitrogen dioxide levels at site HRD1 have decreased by 2µg/m<sup>3</sup>. 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 2019 was 46.03µg/m<sup>3</sup> at site 61b (35 Bargates, Leominster), identifying an exceedance of the Air Quality Objective by

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<sup>1</sup> Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013

6.03µg/m<sup>3</sup>. From 2018 to 2019, the nitrogen dioxide levels at site 61b have increased by 2.56µg/m<sup>3</sup>.

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>.

Eleven of the forty-seven monitored sites during 2018 and 2019 have shown an increased level in NO<sub>2</sub>. The remaining thirty-five monitoring sites showed a reduction in levels of NO<sub>2</sub> during 2018 and 2019.

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**

### **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/m<sup>3</sup>) and 2018 (43.5µg/m<sup>3</sup>) 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 have increased to 46.03µg/m<sup>3</sup> 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.

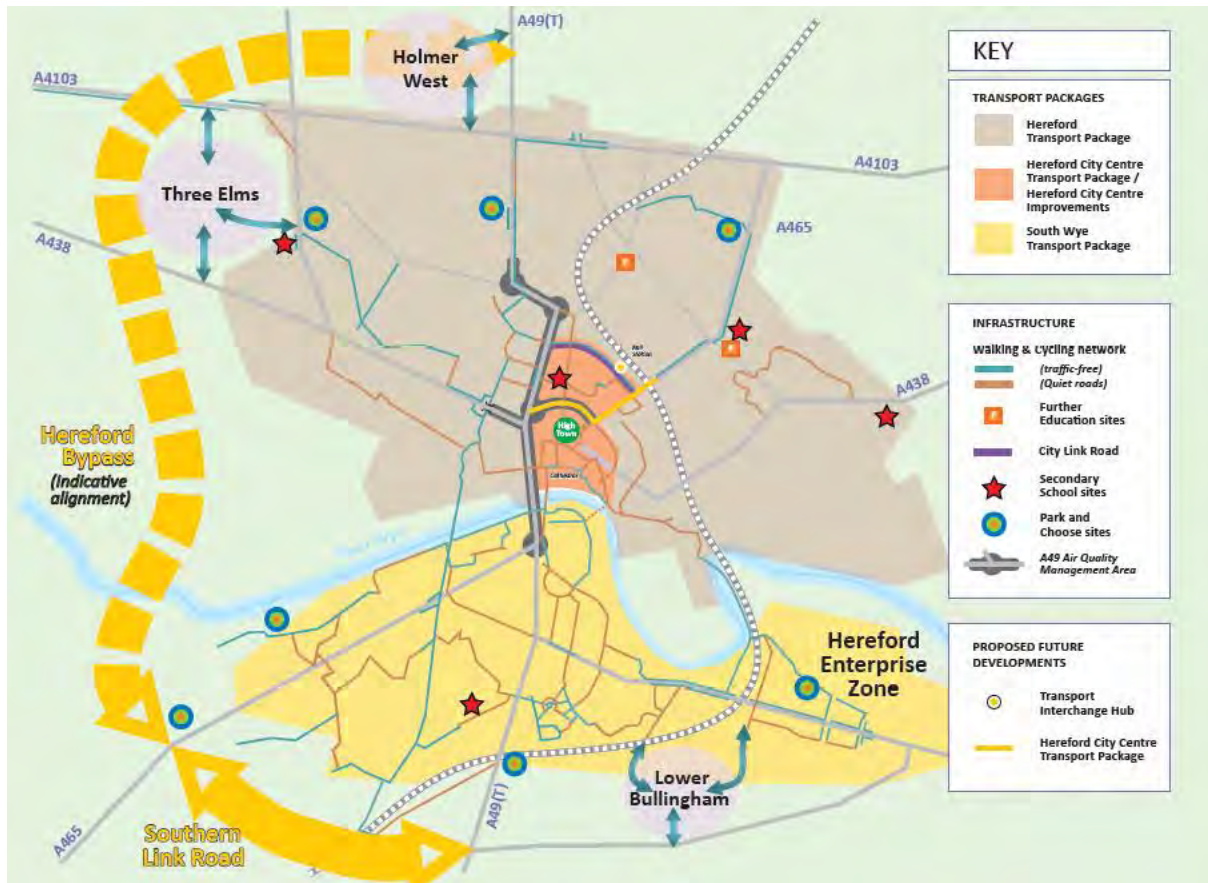


Figure 1: Major transport projects geographical scope in Hereford

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. Herefordshire Council and Marches Local Enterprise Partnership funded these schemes.

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 and review.

### 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 Western Bypass Road has been placed on pause and review.

### 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.

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

Monitoring of pollutants within the Herefordshire district in 2019 has shown an exceedance of the NO<sub>2</sub> Air Quality Objectives at Bargates AQMA's (46.03µg/m<sup>3</sup>). There is currently no intention 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.<sup>4</sup>

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.

The Choose how you move webpage

[https://www.herefordshire.gov.uk/info/200136/travel\\_and\\_transport/544/choose\\_how\\_you\\_move](https://www.herefordshire.gov.uk/info/200136/travel_and_transport/544/choose_how_you_move) is a good place to find information on ways to travel sustainably and help to reduce vehicle emissions.

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<sup>4</sup> Local Transport Plan 2016 – 2031 Strategy



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## 1 Local Air Quality Management

This report provides an overview of air quality in Herefordshire Council during 2019. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

## 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 must prepare an Air Quality Action Plan (AQAP) within 12-18 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. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at [https://uk-air.defra.gov.uk/aqma/local-authorities?la\\_id=126](https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=126). Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
AQMA Hereford	Declared 23/11/2001	NO2 Annual Mean	Hereford	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	38	µg/m3	Hereford Action Plan	2008	<a href="http://aqma.defra.gov.uk/action-plans/HC%20AQAP%202008.pdf">http://aqma.defra.gov.uk/action-plans/HC%20AQAP%202008.pdf</a>
AQMA Bargates	Declared 01/03/2006	NO2 Annual Mean	Leominster	An area encompassing the junction between the A44 Bargates and B4361 Dishley Street/Cursneah Road in Leominster.	NO	61	µg/m3	46.03	µg/m3	Bargates Action Plan	2014	<a href="https://www.herefordshire.gov.uk/download/downloads/id/4823/bargates_air_quality_draft_action_plan.pdf">https://www.herefordshire.gov.uk/download/downloads/id/4823/bargates_air_quality_draft_action_plan.pdf</a>

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

## 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 next steps for Herefordshire Council are to:

- Revise and update both Hereford and Bargates AQAP. This service is currently awaiting a decision in relation to the Southern Link Road and Western Bypass Road until we review the air quality actions.
- DEFRA put forward Herefordshire Council could look into co-locating diffusion tubes at the Victoria Street automatic monitoring site to derive a local bias adjustment factor. This Service currently has not looked into this prospect but we will review this next year.
- DEFRA suggested the ozone data for the AURN site at Leominster should be included in the ASR 2020. This information has been included in this report in Section 3.1.1.

Herefordshire Council has taken forward a number of direct measures during the current reporting year of 2020 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in their respective 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.
- Short Term Operating Reserve (STOR) Planning Applications.
- Comment on planning applications for major housing road schemes 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 need 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 Hereford and Leominster AQMAs.

**Table 2.2 – Progress on Measures to Improve Air Quality**  
**Hereford Action Plan**

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Edgar Street Grid Re-development	Traffic Management	Reduction of speed limits, 20mph zones	2009	Herefordshire Council & Advantage West Midlands formed ESG Herefordshire Ltd	Mostly developer funded, along with Herefordshire Council	Trends in diffusion tube results	Not Specified	"Old Market" retail area development completed 2015.	2025	NO2 levels at the city centre sites have been gradually reducing since 2007, although this cannot be attributed to the actual re-development, as works have not yet been completed. NO2 data to be reviewed once action is complete.
2	Improvement of A4103 road west of Herefordshire	Transport Planning and Infrastructure	Other	2003	Herefordshire Council - Highways and Transportation Service	Herefordshire Council - Highways and Transportation Service	Not Applicable	Not Specified	Road completed 2005 however signage still to be installed to indicate northern east-west bypass.	2008	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. Traffic data to be reviewed in future report.
3	Rotherwas Access Road Link	Transport Planning and Infrastructure	Other	2003	Herefordshire Council - Highways and Transportation Service	Herefordshire Council - Highways and Transportation Service and Advantage West Midlands	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Specified	Completed June 2008	2008	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. Updated traffic data to be reviewed in future reports.
4	City Link Road Hereford	Transport Planning and Infrastructure	Other	2008	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Specified	Consultation and preparatory work is progressing on the link road 2015.	Construction complete December 2017.	NO2 levels will be reviewed in 2018.
5	New Outer Distributer road (3rd Link)	Transport Planning and Infrastructure	Other	2006	Herefordshire Council – Highways and	Herefordshire Council	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Applicable	The potential corridor for the road has been proposed in the Councils	Constructed by 2031	Not applicable until road is constructed.



	Hereford Relief Road				Transportation Service				Draft Core Strategy.		
6	Install and implement a new transport system on A49 and its feeder roads	Transport Planning and Infrastructure	Other	2005	Highway Agency and Herefordshire Council – Highways and Transportation Service	Herefordshire Council	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Specified	On going	On going	Not applicable
7	Alteration of traffic management at the Belmont Roundabout	Traffic Management	Other	2005	Highway Agency	s.106	Diffusion tube at the roundabout	Not Specified	Completed in 2006. New signals are now fully integrated into the Council's SCOOT system and the infrastructure improvements have greatly improved traffic movements	Complete	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.
8	"North & South" Park and ride Scheme in Hereford	Alternatives to private vehicle use	Bus based Park & Ride	2001	Herefordshire Council – Highways and Transportation Service	Herefordshire Council	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Applicable	No longer being taken forward.	Not Applicable	Not Applicable
9	Parking Strategy in Hereford to reduce commuter parking	Traffic Management	Other	2001	Herefordshire Council – Highways and Transportation Service and Planning Services	Herefordshire Council	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Applicable	No longer being taken forward. Alternative parking strategy in place.	Not Applicable	Not Applicable
10	Improve and increase number of cycle routes and facilities in Hereford	Transport Planning and Infrastructure	Cycle network	2004	Herefordshire Council – Highways and Transportation Service	Herefordshire Council	Diffusion tubes	Not Specified	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.	Rotherwas Cycle Link currently in progress – Completed Dec 2013	NO2 levels at the city centre sites have been gradually reducing since 2007
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	2005	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	Diffusion tubes at Wide-marsh Street, Broad Street and Edgar Street sites	Not Specified	Completed in 2006.	Complete	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.

			occupancy lane								
12	Behavioural Change Programme	Promoting Travel Alternatives	Workplace Travel Planning	2004	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	Diffusion tubes	Not Specified	Ongoing programme of promotions and initiatives. Examples include Bike ability Training and the promotion of TwoShare, Destination Herefordshire.	Ongoing	NO2 levels throughout the county have fallen in 2009 and the majority of AADT flows are less in 2009 than in 2008. Recent air quality & traffic data to be reviewed in future reports.
13	Designation of a Traffic manager for network management Duties along the A49 in Hereford	Traffic Management	Other	2007	Highway Agency and Herefordshire Council	Herefordshire Council	Diffusion tubes along A49 corridor	Not Specified	Completed in 2008.	Complete	NO2 levels at the sites along the A49 have been gradually reducing since 2007. Recent air quality data to be reviewed.
14	Continue to implement Vehicle Emission Testing in Hereford	Traffic Management	Testing Vehicle Emissions	2008	Herefordshire Council - Environmental Health and Trading Standards. Liaison with Vehicle and Operator Services Agency (VOSA)	Herefordshire Council and VOSA	Review of project dependent upon number of vehicles failing.	Not Specified	Commenced in 2000 and was carried out every year until 2007. A dramatic continual improvement in exhaust emissions with the Hereford AQMA noted each year. No failures in 2006 and 2007.	This project has been completed. No plans for further testing.	100% compliance in 2006 and 2007.
15	Information and awareness raising	Public Information	Via the Internet	2008	Herefordshire Council - Environmental Health and Trading Standards. Liaison with Herefordshire PCT	Herefordshire Council	Number of hits on the website.	Not Specified	Ongoing	Ongoing	Currently investigating whether the hits on the website can be calculated.

## Bargates Action Plan

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Improvements to the traffic light sequencing at the A44/B4361 junction at Bargates	Transport Planning and Infrastructure	Other	2013	Herefordshire Council - Highways and Transportation Service	Herefordshire Council, s.106	Reduction of NO2 levels at diffusion tubes	Not Specified	Report commissioned reviewing the best options for the junction arrangement.	2016	Not Applicable
2	Improvements to cycle facilities/ routes between Morrisons Store and the Town centre	Transport Planning and Infrastructure	Cycle network	2014	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	Reduction of NO2 levels at diffusion tubes	Not Specified	Awaiting S106 monies.	2014-2016	Not Applicable
3	Improvements to the public transport facilities between Morrisons Store and the Town centre	Transport Planning and Infrastructure	Other	2014	Herefordshire Council - Highways and Transportation Service	Herefordshire Council, s. 106	Reduction of NO2 levels at diffusion tubes	Not Specified	Awaiting S106 monies.	2016	Not Applicable
4	Improve and increase number of pedestrian routes and facilities in Leominster	Transport Planning and Infrastructure	Other	2014	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	Reduction of NO2 levels at diffusion tubes	Not Specified	Awaiting S106 monies.	Not Applicable	Not Applicable
5	Behavioural Change Programme	Promoting Travel Alternatives	Promotion of walking	2014	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	Reduction of NO2 levels at diffusion tubes	Not Specified	Work ongoing. Bid submitted for funding in 2016.	Ongoing	Not Applicable
6	Behavioural Change Programme	Promoting Travel Alternatives	Promotion of cycling	2014	Herefordshire Council - Environmental Health and Trading Standards. Liaison with Public Health.	Herefordshire Council	Reduction of NO2 levels at diffusion tubes	Not Specified	Work ongoing. Bid submitted for funding in 2016.	Ongoing	Not Applicable
7	Development of the southern Relief Road	Transport Planning and Infrastructure	Other	2011	Herefordshire Council	Herefordshire Council	Reduction of NO2 levels at diffusion tubes	Not Specified	Ongoing	Not set	Not Applicable

## 2.3 PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

There are many different sources of PM<sub>2.5</sub>, these can be from natural or anthropogenic (manmade) sources. Anthropogenic sources include industrial sources, road transport, off road transport, residential sources (such as non-smokeless fuels and bonfires) and polluted air traveling from the continent.<sup>5</sup>

Health based objective levels for PM<sub>2.5</sub>'s have not yet been set for local authorities. The EU limit value for PM<sub>2.5</sub> is 25µg/m<sup>3</sup> as an annual average with an additional requirement to reduce average urban background concentrations by 15% by 2020 (against a 2010 baseline).

Public health framework indicator for 2018 (the most up to date figures) states that the fraction of mortality in Herefordshire attributable to anthropogenic (man-made) PM<sub>2.5</sub> particulate air pollution is 3% of all deaths. The average for this indicator in the West Midlands is 5.0% and in England is 5.2%.

Policy Guidance LAQM.TG(16) acknowledges that many local authorities will consider how to address PM<sub>2.5</sub> alongside other pollutants such as Nitrogen Dioxide and PM<sub>10</sub>'s when determining appropriate actions and that a few standalone PM<sub>2.5</sub> measures will be chosen (unless in order to address a very specific local problem).

The Automatic Urban and Rural Network (AURN) is the UK's largest automatic monitoring network and is the main network used for compliance reporting against the Ambient Air Quality Directives. PM<sub>2.5</sub>'s are measured at some of the network of AURN sites. The closest AURN monitoring site to Herefordshire that measures PM<sub>2.5</sub> is Chepstow on the A48, this is an urban traffic site. Therefore, it is difficult to draw direct comparisons to Herefordshire

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<sup>5</sup> Fine Particulate Matter (PM 2.5 in the United Kingdom, AQEG, 2012

It has been recognised that the cost of monitoring for PM<sub>2.5</sub>'s can be prohibitive. Therefore, other methods of estimating the likely PM<sub>2.5</sub> levels in Herefordshire have been considered to establish an overview of the possible levels.

Background mapping of PM<sub>2.5</sub> published by Defra has been reviewed <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html> and the background levels in 2019 were found to be between 6.11µg/m<sup>3</sup> and 9.82µg/m<sup>3</sup>.

Calculations can be undertaken to estimate the PM<sub>2.5</sub> fraction from PM<sub>10</sub> monitoring data. The monitoring data for PM<sub>10</sub>'s at the Victoria Street location in 2019 was 21µg/m<sup>3</sup> (as measured by a BAM using a gravimetric factor of 0.833 for Indicative Gravimetric Equivalent). The data capture for PM<sub>10</sub> in 2019 was 84.1%. Further, PM<sub>2.5</sub> was estimated based on the recorded PM<sub>10</sub> measurements, using the calculation method detailed in TG16. As such, the estimated annual mean of PM<sub>2.5</sub> in 2019 was 14.7µg/m<sup>3</sup>. It should be noted that this estimation would only give an indication of PM<sub>2.5</sub>'s at the roadside location in the Hereford AQMA (a worst-case scenario). For further information on the calculation used to estimate PM<sub>2.5</sub> from PM<sub>10</sub> measurements please refer to Appendix C.

Herefordshire Council is taking the following measures to address PM<sub>2.5</sub>:

- Ensure PM<sub>2.5</sub>'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<sub>2.5</sub>
- Consider the need for background monitoring of PM<sub>2.5</sub>

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<sub>2.5</sub> as well as NO<sub>2</sub>.

The approach being taken taking in terms of PM<sub>2.5</sub> 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

### 3.1 Summary of Monitoring Undertaken

#### 3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Herefordshire Council undertook automatic (continuous) monitoring at Victoria Street in Hereford city centre sites during 2019. Table A.1 in Appendix A shows the details of the 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. National monitoring results are available 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.

In addition, Defra has an Automatic Urban and Rural Network (AURN) site that is located opposite to the Minster school in Leominster. This suburban background site continuously monitors Nitrogen Dioxide and Ozone. During 2019, the annual mean Nitrogen Dioxide levels were  $9\mu\text{g}/\text{m}^3$  (data capture 99%) and the annual mean Ozone levels were  $49\mu\text{g}/\text{m}^3$  (data capture 99%). Maps showing the location of the monitoring site can be found in Appendix D.

#### 3.1.2 Non-Automatic Monitoring Sites

Herefordshire Council undertook non-automatic (passive) monitoring of  $\text{NO}_2$  at 46 sites during 2019. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) 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<sup>6</sup>, “annualisation” (where the data capture falls below 75%), and distance correction<sup>7</sup>. Further details on adjustments are provided in Appendix C.

### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>. Note that the concentration data presented in Table A.3 represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 include distance corrected values, only where relevant.

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year. The maximum hourly mean in 2019 was 212 µg/m<sup>3</sup> so there was 1 exceedence of the hourly limit of 200µg/m<sup>3</sup>.

#### Hereford AQMA sites

The NO<sub>2</sub> annual mean data in Hereford AQMA (table A.3) shows automatic monitoring site, HRD1, in 2019 showed levels of 38µg/m<sup>3</sup>, which is below the air quality objective (40µg/m<sup>3</sup>).

5 non-automatic monitoring sites within Hereford AQMA have increased in NO<sub>2</sub> levels from 2018 to 2019, these include sites 9, 22, 57, 89 and 96. The other 11 sites within Hereford AQMA have decreased in NO<sub>2</sub> levels between 2018 and 2019 (sites 10, 53, 59, 87, 88, 90, 91, 94, 95, 103 and 104). None of the sites within Hereford AQMA have exceeded the air quality objectives in 2019.

The following monitoring sites 57, 89, 90, 91, 94, 95 and 104 are not near a receptor, as shown these have been back calculated to the nearest receptors as shown in Table C1.

Data collected in 2017 showed a breach in the national air quality NO<sub>2</sub> objective of 2µg/m<sup>3</sup> at site HRD1. Despite 2018 and 2019 identifying a reduction of levels, it is concluded that Herefordshire Council will not be revoking Hereford AQMA.

Particularly as trends have not demonstrated that NO<sub>2</sub> levels are unlikely to breach the national objective. However, Herefordshire Council will continue to review Hereford AQMA.

### **Hereford AQMA boundary sites**

The boundaries of the AQMA are monitored through several sites which indicate whether these boundaries need to be extended. These sites include site 54, 65, 88, 89, 97, 101 and 102 (please refer to figure A.2.1).

Sites 65, 97 and 102 were calculated to the nearest receptor, as shown in Table C1. In 2019, all of the monitoring sites on the boundary of Hereford AQMA have not exceeded the 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. All of these locations were below the air quality objective. The following sites have been back calculated to the nearest receptor 105, 106, 107 and 108 as shown in Table C1.

### **Leominster AQMA**

From 2015 to 2019 trend data for sites in the Leominster AQMA can be found in the graph of figure A3. The Leominster AQMA includes 3 monitoring sites (site 46, 61a and 61b). In 2019 site 46 was below the air quality objective recording NO<sub>2</sub> levels of 33.36 µg/m<sup>3</sup>. Similarly, site 61a recorded NO<sub>2</sub> levels below the air quality objective in 2019 (39.75 µg/m<sup>3</sup>). The annual mean NO<sub>2</sub> levels recorded in 2019 at site 61b were 46.03 µg/m<sup>3</sup> which is above the air quality objective.

### **Outside Leominster AQMA**

Outside the Leominster AQMA there are 3 monitoring sites which include sites 109, 110 and 111. The data capture for site 111 was below 75%, as such annualisation was conducted on this site. The calculations of the annualisation can be found in Appendix C. In 2019, the NO<sub>2</sub> levels of all the sites outside Leominster's AQMA were below the air quality objectives.



### A40 corridor

There are two monitoring sites that are located on the A40 corridor, these includes site 32 and 33. In 2019, the NO<sub>2</sub> recorded levels at site 32 were 24.85µg/m<sup>3</sup> and at site 33 the levels were 24.98µg/m<sup>3</sup>. Both of these sites will continue to be monitored in 2020.

### Other Market Towns and Villages

Monitoring is no longer undertaken in Bromyard, Kington, Ledbury, Pembridge and Wedobley. 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 2019, site 83 recorded NO<sub>2</sub> levels of 20.08µg/m<sup>3</sup>, which is below the air quality objective. This site will continue to be monitored in 2020.

### 3.2.2 Particulate Matter (PM<sub>10</sub>)

PM<sub>10</sub> was previously measured by the Council at the automatic monitoring station at Edgar Street. The site was decommissioned in 2011 due to redevelopment of the site where it was located. The monitor was repositioned in Victoria Street and PM<sub>10</sub> figures have been subsequently available since 2017.

Table A.5 in Appendix A compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>. As shown in table A.5 the monitored PM<sub>10</sub> annual mean concentrations at Victoria Street in 2019 was 21µg/m<sup>3</sup>. This was measured by a BAM using a gravimetric factor of 0.833 for Indicative Gravimetric Equivalent. The annual data capture for this reading was 84.1% compared to the 85% target.

Table A.6 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> daily mean concentrations for the past 5 years with the air quality objective of 50µg/m<sup>3</sup>, not to be exceeded more than 35 times per year. The maximum daily mean for PM<sub>10</sub> monitored at Victoria Street was 68µg/m<sup>3</sup>. The daily mean limit value of 50µg/m<sup>3</sup> was exceeded on 7 days. Although, the annual allowance for this limit value is 35 days so this objective was not exceeded.

### **3.2.3 Particulate Matter (PM<sub>2.5</sub>)**

PM<sub>2.5</sub> monitoring is not currently undertaken by Herefordshire Council.

### **3.2.4 Sulphur Dioxide (SO<sub>2</sub>)**

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?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
HRD1	Victoria Street	Roadside	350721	239791	NO <sub>2</sub> ; PM <sub>10</sub>	YES	Chemiluminescent and PM <sub>10</sub>	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).

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

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
6	Broad Street, Hereford	Urban Background	350890	240000	NO2	NO	1	0.3	NO	2.8
9	Bus Stop, Victoria Street, Hereford (A49)	Roadside	350688	239864	NO2	YES	N/A	2.9	NO	2.9
10	7 Victoria Street, Hereford (A49)	Roadside	350677	240015	NO2	YES	0	2.9	NO	2.5
22	Façade Edgar/ Mor St, Hfd (A49)	Roadside	350860	240615	NO2	YES	0	2.3	NO	2.3
32	Weir End, Ross (A40)	Roadside	357717	223736	NO2	NO	0	4.5	NO	2
33	House façade, Wilton (A40)	Roadside	358506	224214	NO2	NO	0	2.9	NO	1.9
46	Bengry's Lights, Leominster (A44)	Roadside	349409	259010	NO2	YES	0	3.4	NO	2.1
53	Façade, Belmont Rd/Asda Junc Hfd	Roadside	350723	239163	NO2	YES	0	5.3	NO	2.1
54	House façade, Holmer Rd Hfd (A49)	Urban Background	350602	241097	NO2	NO	0	9.5	NO	1.7
57	Eign Street, Hereford (A438)	Urban Background	350499	240108	NO2	YES	1	0.5	NO	2.2

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59	Façade, Widemarsh St, Town Hfd	Urban Centre	350987	240108	NO2	YES	0	3	NO	2.4
61a	29 Bargates, Leominster (A44)	Roadside	349363	259013	NO2	YES	0	2.85	NO	2.2
61b	35 Bargates, Leominster (A44)	Roadside	349352	259015	NO2	YES	0	2	NO	2.2
65	96 Whitecross Road, Hfd (A438)	Urban Background	350086	240296	NO2	NO	4	1.3	NO	2.2
74	140 Whitecross Rd, Hfd (A438)	Roadside	349985	240334	NO2	NO	0	8.2	NO	2.1
75	22 Barton Road, Hfd	Roadside	350511	239740	NO2	NO	15	1.4	NO	2.4
79	76 Belmont Road, Hfd (A465)	Roadside	350472	238999	NO2	NO	7	1	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	2.8	NO	2.32
89	Edgar St/Prior St, Hfd (A49)	Roadside	350800	240441	NO2	YES	6.5	2.2	NO	2.1

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90	Cross Street, Asda Traffic Island, Hfd	Roadside	350719	239164	NO2	YES	5	2.25	NO	2.12
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, Hereford (B4399)	Suburban	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	9.35	NO	2.35
95	Edgar St. nr Prior St. Hfd (A49)	Roadside	350876	240678	NO2	YES	1	3.65	NO	1.65
96	Edgar St. nr Junc Newtown Rd (A49)	Roadside	350941	240858	NO2	YES	N/A	7.7	NO	2.2
97	Newtown Rd, nr Postbox, Hfd	Roadside	351025	240874	NO2	NO	0.5	2.9	NO	2.4
98	Link Road A , Hereford	Urban Background	350992	240652	NO2	NO	N/A	n/a	NO	1.75
99	Link Road B, Hereford	Urban Background	351022	240668	NO2	NO	N/A	n/a	NO	2.36
100	Link Road C, Hereford	Urban Background	351440	240539	NO2	NO	N/A	n/a	NO	3
101	Widemarsh St, opp Garrick CP, Hfd	Roadside	351053	240290	NO2	NO	0	1.7	NO	1.7
102	Widemarsh St. nr juct Link Road, Hfd	Roadside	351100	240640	NO2	NO	0.5	2.25	NO	1.25

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103	Bus stop, Newmarket Street, Hfd (A438)	Roadside	350898	240223	NO2	YES	N/A	3.7	NO	3.4
104	Wall Street, Hereford	Roadside	350979	240212	NO2	YES	1	3.25	NO	1.25
105	Aylestone Hill/Barcourt Rd, Hfd	Roadside	351725	240443	NO2	NO	5	6.8	NO	1.8
106	Commercial Road, Hfd	Roadside	351483	240323	NO2	NO	2.5	5.4	NO	2.9
107	St Mary's Church, Grandstand Rd, Hfd (A49)	Roadside	350412	241161	NO2	NO	4	5.47	NO	1.47
108	Roman Road, Hereford (A4103)	Urban Background	350166	242175	NO2	NO	N/A	n/a	NO	1.65
109	Bargates, opp Perseverance Rd Leominster	Roadside	349176	259020	NO2	YES	0	7.45	NO	0.95
110	Terrace 1 Eastbound Bargates, Leominster (A44)	Roadside	349262	259030	NO2	NO	5	6.4	NO	1.4
111	Terrace 2, Eastbound, Bargates Leominster (A44)	Roadside	349228	259031	NO2	NO	5	6.2	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<sub>2</sub> Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
6	350889	239993	Urban Background	Diffusion Tube	-	100	25.53	25.92	22.9	22.8	24.43
9	350688	239864	Roadside	Diffusion Tube	-	100	35.94	37.96	31.8	32.6	34.46
10	350677	240015	Roadside	Diffusion Tube	-	91.7	38.54	39.71	-	<b>41.33a</b>	39.28
22	350860	240615	Roadside	Diffusion Tube	-	100	24.68	28.82	25.3	27.6	27.65
32	357717	223736	Roadside	Diffusion Tube	-	100	34.25	33.74	31.6	28.3	24.85
33	358494	224211	Roadside	Diffusion Tube	-	100	33.93	33.63	30.2	28.1	24.98
46	349409	259010	Roadside	Diffusion Tube	-	100	32.7	32.81	34.5	31.6	33.36
53	350695	239174	Roadside	Diffusion Tube	-	100	31.39	31.2	29.4	30.7	30.45
54	350602	241097	Urban Background	Diffusion Tube	-	100	22.42	24.42	20.7	23.7	23.11
57	350499	240108	Urban Background	Diffusion Tube	-	91.7	28.27	31.07	26.7	27.7	28.81
59	350983	240166	Urban Centre	Diffusion Tube	-	100	23.42	23.92	19.9	20.3	19.65
61a	349363	259013	Roadside	Diffusion Tube	-	100	<b>42.9</b>	<b>44.15</b>	<b>41.3</b>	<b>40.2</b>	39.75
61b	349352	259015	Roadside	Diffusion Tube	-	100	-	-	<b>45.1</b>	<b>43.5</b>	<b>46.03</b>
65	350086	240296	Urban Background	Diffusion Tube	-	100	36.35	36.04	30.6	32.2	30.91



74	349985	240334	Roadside	Diffusion Tube	-	100	19.59	18.82	18.6	17.6	17.42
75	350655	239760	Roadside	Diffusion Tube	-	100	30.33	29.6	21.9	24.3	22.34
79	350476	238996	Roadside	Diffusion Tube	-	100	32.76	31.46	30	30.1	28.60
82	360204	224177	Urban Background	Diffusion Tube	-	100	-	22.3	20.5	21.3	20.08
84	347864	241236	Suburban	Diffusion Tube	-	100	-	12.6	11.7	13	10.45
85	348752	241941	Rural	Diffusion Tube	-	100	-	8.8	7.9	9.3	8.03
86	349067	241933	Roadside	Diffusion Tube	-	100	-	16.8	13.4	15.6	14.91
87	350694	239819	Roadside	Diffusion Tube	-	91.7	-	-	30.2	30.1	29.78
88	350684	239900	Roadside	Diffusion Tube	-	100	-	-	33.3	33.8	31.64
89	350800	240441	Roadside	Diffusion Tube	-	100	-	-	36.57a	36.2	36.90
90	350719	239164	Roadside	Diffusion Tube	-	100	-	-	26.21a	26.8	25.29
91	350759	239125	Roadside	Diffusion Tube	-	100	-	-	30.69a	<b>40.9</b>	38.74
92	352919	237840	Urban Background	Diffusion Tube	-	100	-	-	11.6	13.9	13.54
93	351890	236970	Roadside	Diffusion Tube	-	100	-	-	10.8	11.9	10.46
94	350933	240798	Roadside	Diffusion Tube	-	91.7	-	-	-	30.8	29.38
95	350876	240678	Roadside	Diffusion Tube	-	100	-	-	-	43	36.98
96	350941	240858	Roadside	Diffusion Tube	-	100	-	-	-	31.7	36.85
97	351025	240874	Roadside	Diffusion Tube	-	91.7	-	-	-	26.7	25.60

98	350992	240652	Urban Background	Diffusion Tube	-	100	-	-	-	21.7	19.93
99	351022	240668	Urban Background	Diffusion Tube	-	100	-	-	-	19.8	19.25
100	351440	240539	Urban Background	Diffusion Tube	-	100	-	-	-	22.2	22.51
101	351053	240290	Roadside	Diffusion Tube	-	100	-	-	-	32.4	32.40
102	351100	240640	Roadside	Diffusion Tube	-	100	-	-	-	27.6	25.87
103	350898	240223	Roadside	Diffusion Tube	-	100	-	-	-	<b>40.1</b>	33.41
104	350979	240212	Roadside	Diffusion Tube	-	100	-	-	-	33.6	31.94
105	351725	240443	Roadside	Diffusion Tube	-	100	-	-	-	27.3	27.97
106	351483	240323	Roadside	Diffusion Tube	-	83.3	-	-	-	34.2	31.08
107	350412	241161	Roadside	Diffusion Tube	-	100	-	-	-	25.3	24.70
108	350166	242175	Urban Background	Diffusion Tube	-	91.7	-	-	-	22.5	22.59
109	349176	259020	Roadside	Diffusion Tube	-	100	-	-	-	<b>41.61a</b>	32.41
110	349262	259030	Roadside	Diffusion Tube	-	91.7	-	-	-	29.22a	22.90
111	349228	259031	Roadside	Diffusion Tube	-	66.7	-	-	-	32.01a	25.86a
HRD1	350721	239791	Roadside	Automatic	-	95.5	-	-	<b>42</b>	<b>40</b>	38

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75% (a)

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 adjustment

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

- (1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
- (2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
- (3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.
- (4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

Figure 1 Trends in Annual Mean NO<sub>2</sub> Concentrations Hereford AQMA (1)

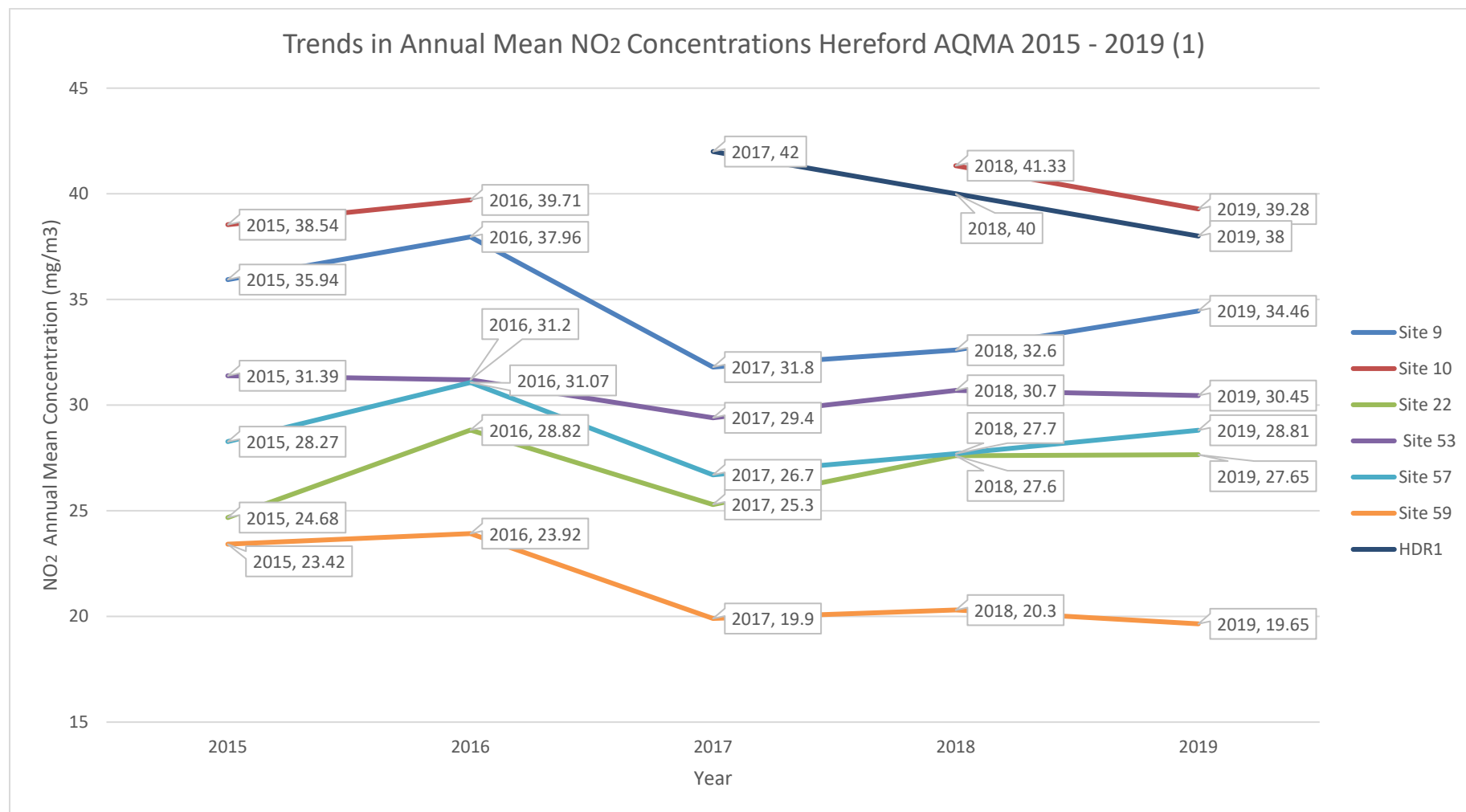


Figure 2 – Trends in Annual Mean NO<sub>2</sub> Concentrations Hereford AQMA (2)

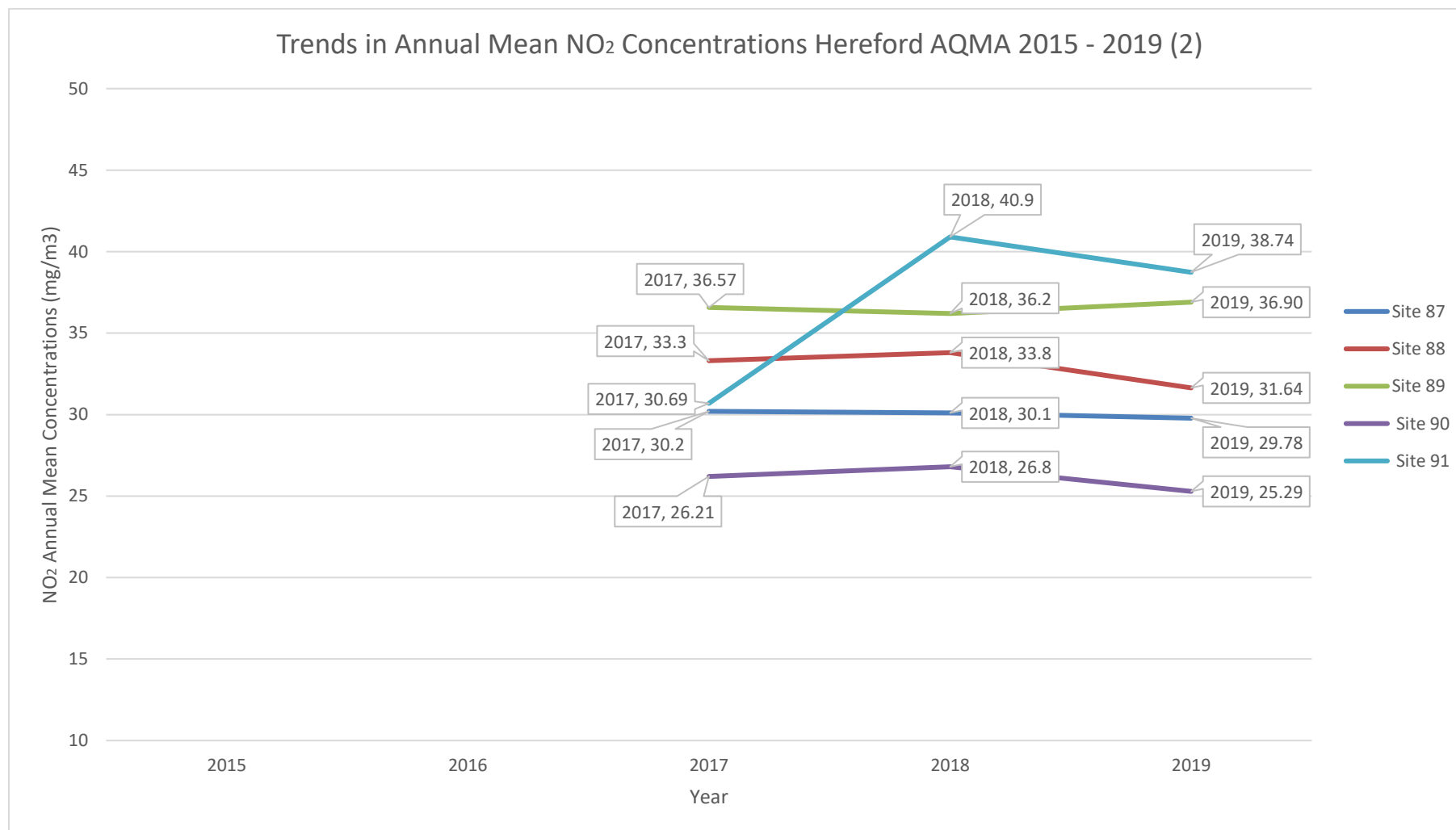


Figure 3 Trends in Annual Mean NO<sub>2</sub> Concentrations Hereford AQMA (3)

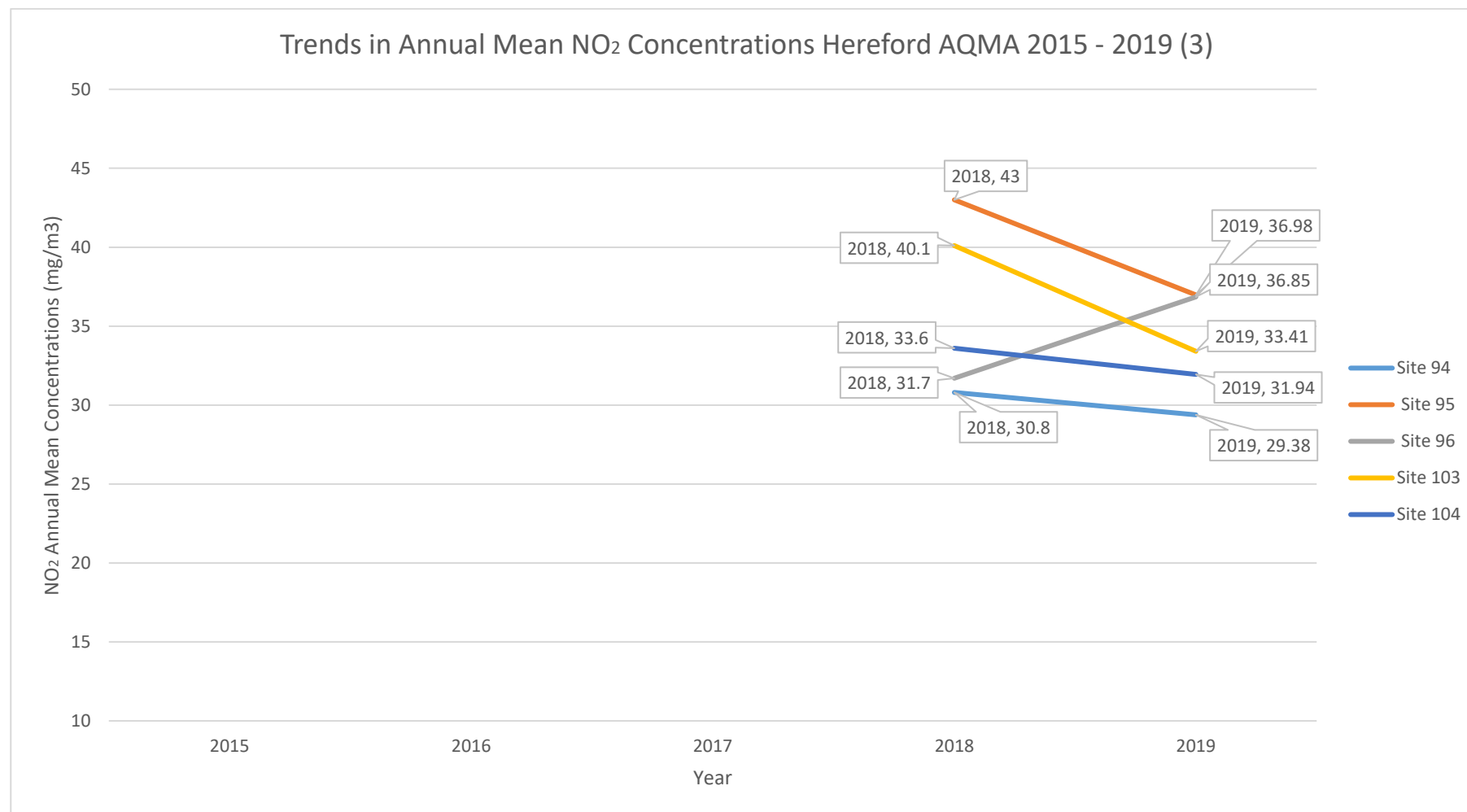


Figure 4 Tends in Annual Mean NO<sub>2</sub> Concentrations in Hereford's AQMA Boundary

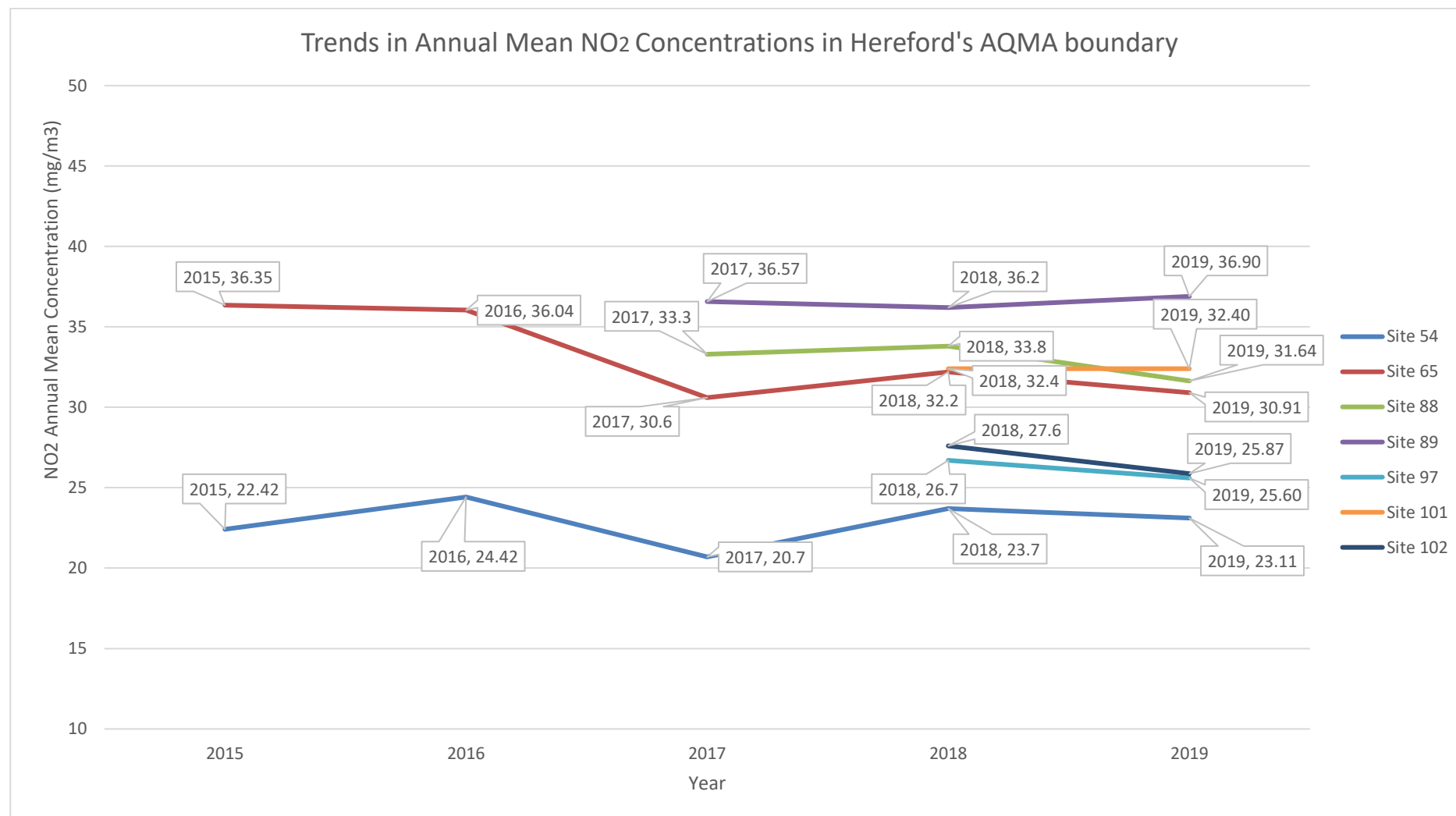


Figure 5 Trends in Annual Mean NO<sub>2</sub> Concentrations in Hereford, outside AQMA (1)

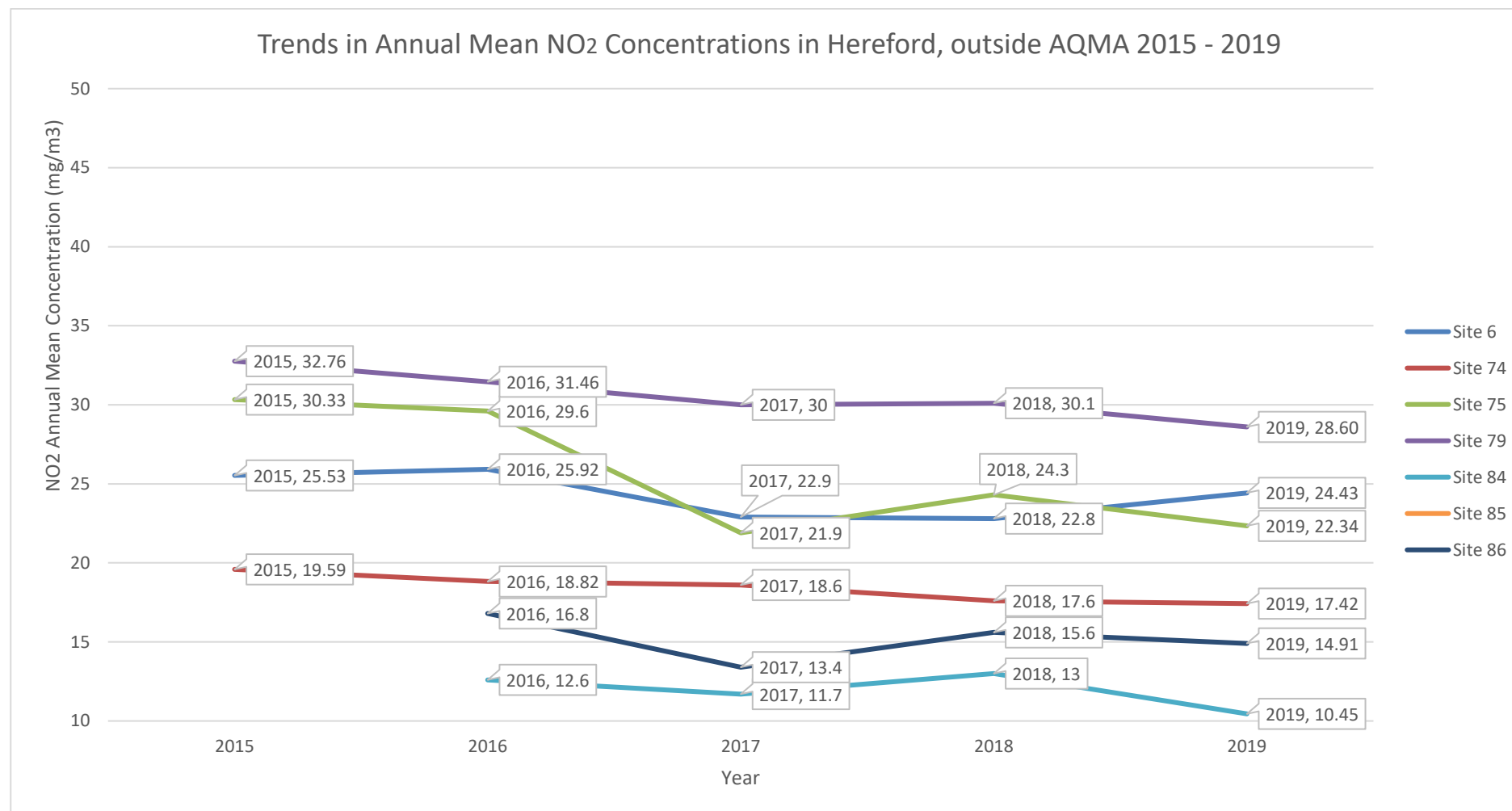




Figure 6 Trends in Annual Mean NO2 Concentrations Hereford, outside AQMA (2)

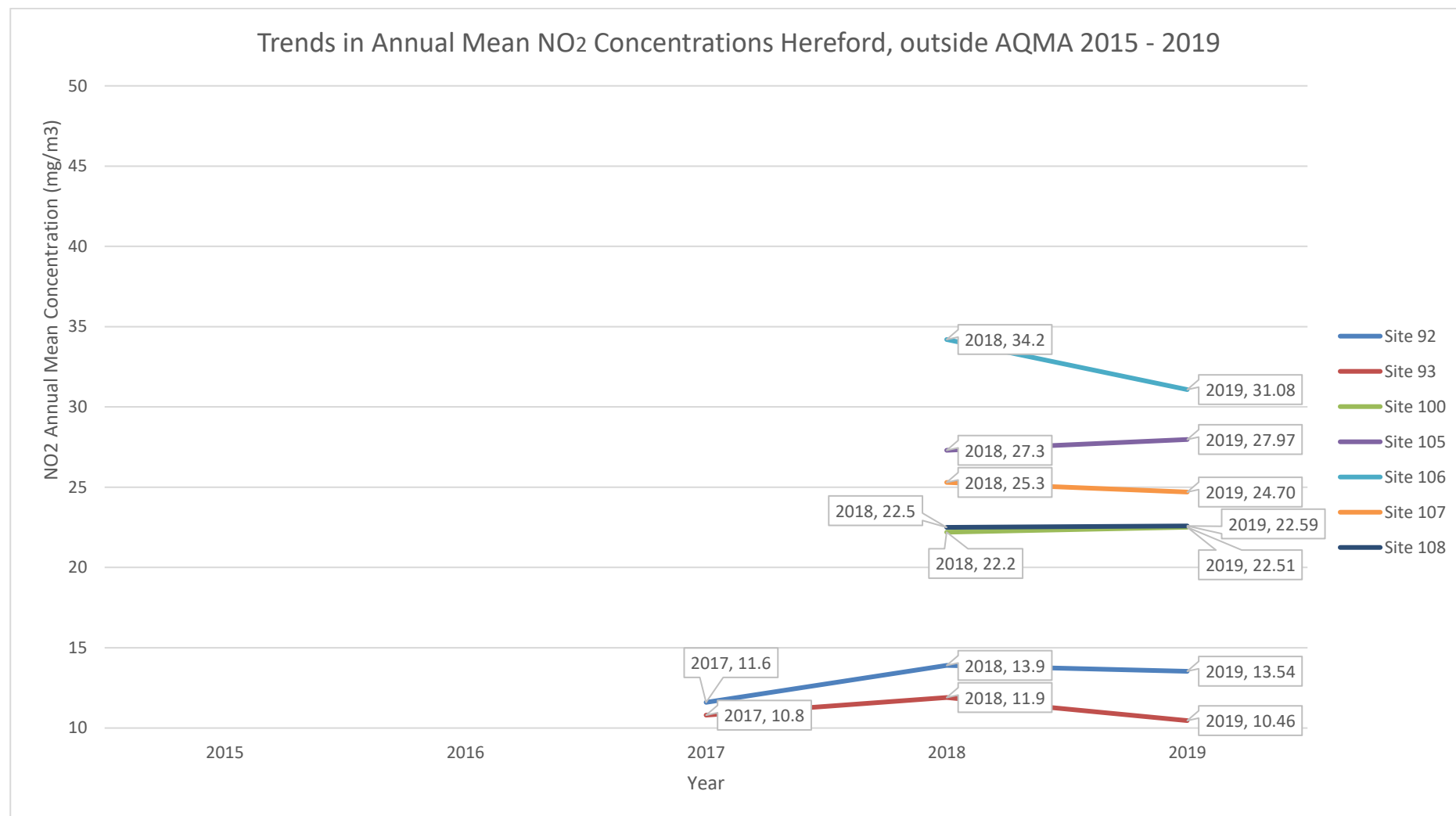


Figure 7 Trends in Annual Mean NO<sub>2</sub> Concentrations Leominster AQMA

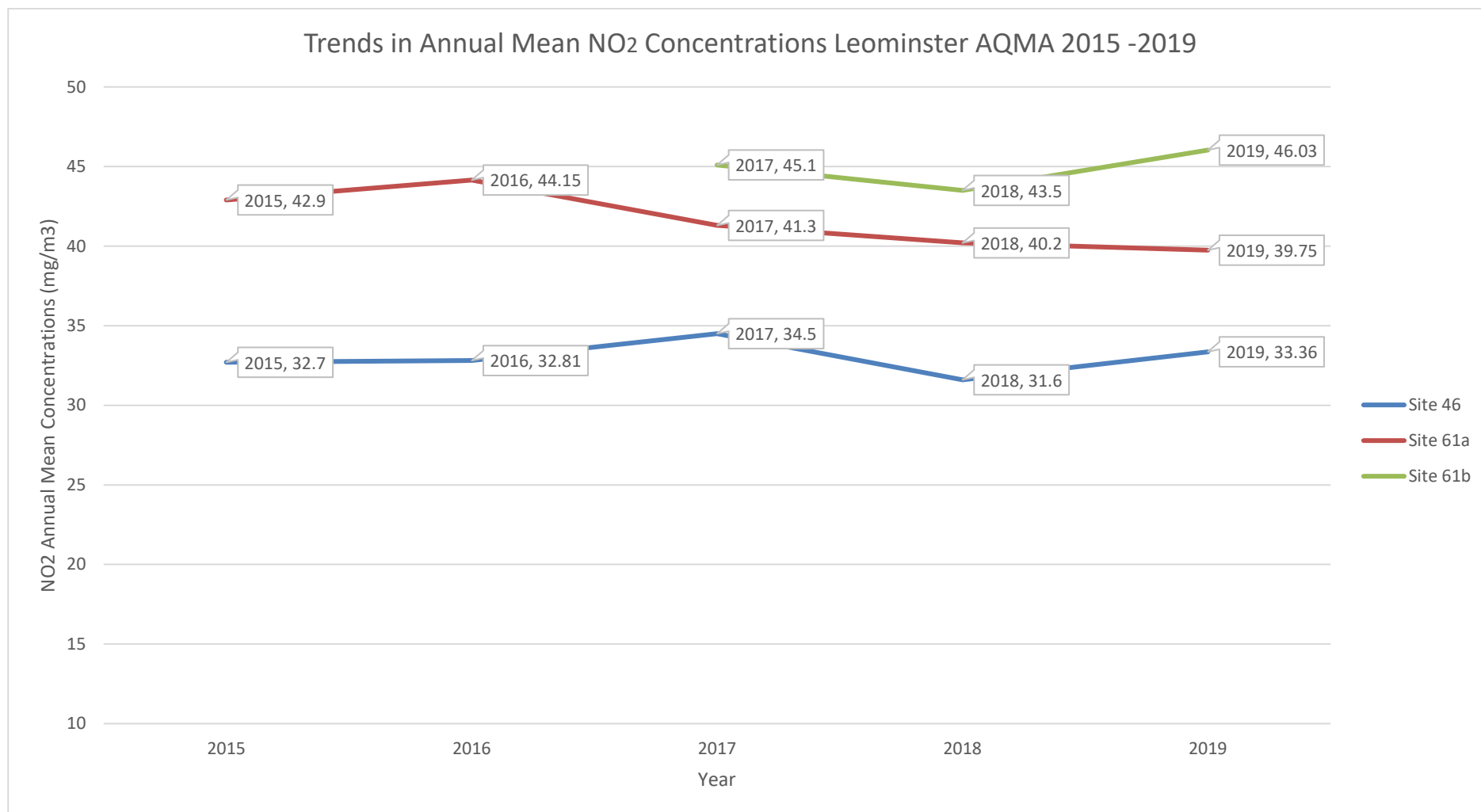


Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
							2015	2016	2017	2018	2019
HRD1	350721	239791	Roadside	Automatic	-	95.5	-	-	<b>0</b>	<b>0</b>	<b>1</b>

**Notes:**

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

(3) If the period of valid data is less than 85%, the 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM<sub>10</sub> Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
						2015	2016	2017	2018	2019
HRD1	350721	239791	Roadside	-	84.1	-	-	25	24	21

Annualisation has been conducted where data capture is <75%

**Notes:**

Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

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

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

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

Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	PM <sub>10</sub> 24-Hour Means > 50µg/m <sup>3</sup> <sup>(3)</sup>				
						2015	2016	2017	2018	2019
HRD1	350721	239791	Roadside	-	84.1	-	-	10	2	(7)

**Notes:**

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

(3) If the period of valid data is less than 85%, the 90.4<sup>th</sup> percentile of 24-hour means is provided in brackets.

## Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO<sub>2</sub> Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )															Annual Mean		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.93) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>			
6	350889	239993	35.5	36.1	25.4	23.3	22.7	21.7	19.5	22.6	23.6	27.7	30.2	27.0	26.3	24.43	20.7			
9	350688	239864	<b>44.2</b>	<b>57.1</b>	34.3	39.1	35.7	32.7	31.7	28.3	26.5	35.0	<b>40.0</b>	39.8	37.1	34.46	n/a			
10	350677	240015	<b>51.0</b>	<b>49.4</b>	38.3	<b>47.3</b>	37.7	0.0	34.0	35.9	38.2	<b>46.5</b>	<b>44.3</b>	<b>42.1</b>	<b>42.2</b>	39.28	n/a			
22	350860	240615	35.8	<b>42.8</b>	27.7	33.7	25.4	25.9	23.4	21.2	26.1	29.5	34.9	30.3	29.7	27.65	n/a			
32	357717	223736	33.3	33.3	29.6	24.0	26.6	24.7	23.0	23.5	17.3	27.3	31.3	26.7	26.7	24.85	n/a			
33	358494	224211	32.4	34.3	23.5	30.6	26.3	24.6	23.8	22.7	24.9	26.7	28.1	24.5	26.9	24.98	n/a			
46	349409	259010	<b>44.8</b>	<b>48.0</b>	34.3	32.7	33.4	31.9	31.0	35.5	34.6	31.5	32.7	<b>40.1</b>	35.9	33.36	n/a			
53	350695	239174	38.3	42.8	31.7	30.5	27.8	32.1	27.8	27.3	31.6	32.5	38.9	31.5	32.7	30.45	n/a			
54	350602	241097	34.2	25.3	23.2	25.5	24.3	23.1	21.4	18.8	22.6	24.6	31.7	23.5	24.9	23.11	n/a			
57	350499	240108	<b>40.0</b>	36.9	29.9	31.9	29.6	27.5	26.1	0.0	27.7	26.8	36.3	28.1	31.0	28.81	26.4			
59	350983	240166	30.7	28.4	19.9	21.2	17.1	16.7	15.2	14.5	18.9	23.7	25.1	22.2	21.1	19.65	n/a			
61a	349363	259013	<b>44.6</b>	<b>55.4</b>	<b>47.4</b>	<b>42.6</b>	<b>44.3</b>	38.5	35.4	<b>42.6</b>	39.7	<b>46.6</b>	37.9	37.9	<b>42.7</b>	39.75	n/a			
61b	349352	259015	<b>59.3</b>	<b>64.9</b>	<b>49.0</b>	<b>46.2</b>	<b>48.6</b>	<b>45.9</b>	<b>43.0</b>	<b>46.2</b>	<b>47.0</b>	<b>44.5</b>	<b>49.2</b>	<b>50.1</b>	<b>49.5</b>	<b>46.03</b>	n/a			
65	350086	240296	<b>42.3</b>	37.3	30.5	39.7	32.1	32.1	26.0	22.1	32.2	34.7	<b>40.3</b>	29.3	33.2	30.91	25.9			
74	349985	240334	27.9	26.3	18.9	16.8	14.4	15.1	14.2	13.2	16.8	21.5	18.4	21.3	18.7	17.42	n/a			

75	350655	239760	33.2	30.9	22.0	29.2	22.1	22.4	19.6	19.5	20.0	12.9	32.6	23.8	24.0	22.34	18.3
79	350476	238996	32.8	37.7	26.0	33.6	28.8	32.1	24.7	30.2	23.9	35.5	33.3	30.4	30.8	28.60	22.8
82	360204	224177	29.2	27.2	20.9	23.8	19.5	17.6	16.8	15.3	18.3	20.4	26.9	23.1	21.6	20.08	17.5
84	347864	241236	16.7	12.5	11.2	13.6	10.2	10.1	7.5	7.5	8.7	8.2	14.7	13.8	11.2	10.45	n/a
85	348752	241941	13.6	13.3	5.8	9.5	5.5	5.7	5.0	4.9	6.9	8.3	12.6	12.5	8.6	8.03	n/a
86	349067	241933	20.0	21.2	11.7	19.2	12.6	11.5	11.2	9.5	11.7	18.5	23.7	21.4	16.0	14.91	n/a
87	350694	239819	<b>40.3</b>	<b>43.7</b>	20.3	39.8	25.3	0.0	29.6	28.8	31.4	23.0	<b>40.5</b>	29.6	32.0	29.78	n/a
88	350684	239900	<b>44.9</b>	<b>42.5</b>	34.6	36.7	35.9	31.6	27.6	25.7	23.8	31.8	<b>41.5</b>	31.7	34.0	31.64	n/a
89	350800	240441	<b>47.0</b>	<b>53.3</b>	36.3	<b>42.2</b>	33.3	34.1	34.2	34.3	36.0	<b>43.5</b>	<b>42.4</b>	39.4	39.7	36.90	30.8
90	350719	239164	33.4	32.2	26.9	30.1	27.0	28.4	20.4	19.4	25.1	29.1	30.0	24.3	27.2	25.29	22
91	350759	239125	<b>52.3</b>	<b>48.7</b>	<b>52.0</b>	33.9	<b>41.3</b>	36.6	39.1	37.9	38.6	<b>44.4</b>	<b>40.0</b>	35.2	<b>41.7</b>	38.74	31.9
92	352919	237840	24.4	17.8	14.4	14.5	12.1	10.4	10.2	8.0	11.2	15.4	21.2	15.1	14.6	13.54	n/a
93	351890	236970	17.0	10.1	10.3	13.1	9.4	11.1	9.2	6.5	8.9	12.4	16.7	10.3	11.3	10.46	n/a
94	350933	240798	<b>45.7</b>	<b>43.3</b>	31.8	30.8	28.2	28.5	25.2	0.0	18.3	29.8	35.2	30.8	31.6	29.38	27
95	350876	240678	<b>63.2</b>	<b>57.4</b>	<b>46.5</b>	<b>40.8</b>	<b>44.3</b>	28.7	25.0	33.1	31.6	35.4	35.9	35.4	39.8	36.98	33.5
96	350941	240858	<b>42.7</b>	<b>50.3</b>	29.8	38.2	26.7	36.2	31.4	<b>42.8</b>	<b>44.2</b>	<b>47.7</b>	38.7	<b>47.0</b>	39.6	36.85	n/a
97	351025	240874	32.6	32.7	26.9	24.8	25.7	21.9	20.1	0.0	23.2	30.9	35.7	28.2	27.5	25.60	25.2
98	350992	240652	31.2	24.4	19.2	20.3	16.0	16.7	15.1	13.7	19.2	26.5	30.5	24.4	21.4	19.93	n/a
99	351022	240668	29.2	29.5	19.1	20.5	15.9	16.3	13.9	14.5	16.7	23.8	26.5	22.3	20.7	19.25	n/a
100	351440	240539	33.9	32.3	20.7	24.1	17.7	19.0	17.2	16.9	21.5	27.0	31.9	28.0	24.2	22.51	n/a
101	351053	240290	<b>44.9</b>	<b>45.4</b>	33.6	35.2	29.2	30.3	25.6	30.7	32.1	34.1	39.2	37.6	34.8	32.40	n/a
102	351100	240640	35.2	34.1	23.8	30.7	23.9	22.5	21.9	19.2	24.7	30.4	37.5	30.0	27.8	25.87	25.2
103	350898	240223	<b>49.8</b>	<b>41.5</b>	36.5	35.3	34.7	33.4	26.1	30.2	32.9	35.1	<b>42.3</b>	33.2	35.9	33.41	n/a
104	350979	240212	<b>40.4</b>	<b>41.9</b>	29.6	38.6	31.3	30.0	23.6	28.6	32.4	38.8	36.5	<b>40.4</b>	34.3	31.94	n/a
105	351725	240443	38.2	31.0	26.5	29.8	32.4	27.1	26.7	26.9	27.2	29.9	34.0	31.2	30.1	27.97	26.6
106	351483	240323	<b>41.8</b>	36.6	33.7	35.1	26.6	33.0	27.5	0.0	31.3	34.2	0.0	34.3	33.4	31.08	28

107	350412	241161	35.4	34.6	23.5	28.1	22.4	21.1	20.1	19.1	24.0	26.9	33.9	29.6	26.6	24.70	23.7
108	350166	242175	34.6	0.0	20.0	23.9	19.6	18.9	20.2	17.2	21.9	27.2	32.3	31.3	24.3	22.59	n/a
109	349176	259020	<b>41.4</b>	<b>43.7</b>	34.9	34.2	30.9	32.0	28.7	36.9	31.4	32.1	35.9	36.1	34.9	32.41	n/a
110	349262	259030	36.4	32.7	0.0	31.5	18.9	21.4	20.4	14.9	22.4	23.7	28.2	20.5	24.6	22.90	17.4
111	349228	259031	39.8	30.5	0.0	37.8	0.0	27.3	0.0	0.0	21.5	23.9	25.0	25.9	29.0	25.86a	n/a

National bias adjustment factor used

Annualisation has been conducted where data capture is <75% (a)

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

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

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

(2) Distance corrected to nearest relevant public exposure.



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

### Factor from Local Co-location Studies (if available)

No local co-location studies for nitrogen dioxide have been undertaken in 2019.

### Diffusion Tube Bias Adjustment Factors

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](mailto:diffusion@gradko.co.uk)

The 20% Triethanolamine (TEA) / De-ionised Water preparation methods is used.

The bias adjustment factor applied to the results in 2019 was 0.93 (spreadsheet 03/19) which were derived from the national studies. All sites are shown in Appendix B.

### QA/QC of Diffusion Tube Monitoring

Under the WASP Scheme Gradko performed 100% satisfactory for all periods during 2018. Tube precision was generally 'Good' throughout 2018.

### Calculation for estimating PM<sub>2.5</sub> from PM<sub>10</sub> measurements

Step 1: Multiply PM<sub>10</sub> recorded concentrations by nationally derived correction ratio

$$21\mu\text{g}/\text{m}^3 \times 0.7 = 14.7\mu\text{g}/\text{m}^3$$

Step 2: Estimated annual mean PM<sub>2.5</sub> = 14.7µg/m<sup>3</sup>

Table C.1 – Annualisation calculations

Site ID	Unadjusted diffusion tube mean ( $\mu\text{g}/\text{m}^3$ )	Annualisation factor: Victoria Street	Annualisation factor: Leominster	Average Annualisation factor	Annualisation & bias adjusted (0.92) concentration ( $\mu\text{g}/\text{m}^3$ )
111	26.92	1.00	0.86	0.93	25.86

Annualisation calculations for site 111

Victoria St site 111				LEO site 111			
Jan	47.9	39.84	47.9	Jan	13.2414	39.84	13.2414
Feb	47.7	30.46	47.7	Feb	11.4444	30.46	11.4444
Mar	35.7			Mar	6.14815		
April	44.3	37.83	44.3	April	11.8148	37.83	11.8148
May	35.3			May	5.68571		
June	33.2	27.33	33.2	June	4.62069	27.33	4.62069
July	30.4			July	3.94286		
Aug	30.8			Aug	3.6		
Sept	34.4	21.55	34.4	Sept	5.80769	21.55	5.80769
Oct	38	23.87	38	Oct	10.973	23.87	10.973
Nov	40.4	25.03	40.4	Nov	17.5769	25.03	17.5769
Dec	37.3	25.91	37.3	Dec	11.5714	25.91	11.5714
	37.95	26.9207	37.9333		8.86892	26.9207	10.3941
Annual Mean B1		38		Annual Mean B1		8.9	
Period Mean of B1		37.9		Period Mean of B1		10.4	
Ratio of annual mean to period mean is			1.00264	Ratio of annual mean to period mean is			0.85577
annualisation factor		0.9292		annualisation factor		0.9292	
Measured concentration M =		29.92		Measured concentration M =		29.92	
Annualised average of D1 = M xRa				Annualised average of D1 = M xRa			
Annualised average of D1 =		27.8018		Annualised average of D1 =		27.8018	
Then correct for Bias adjustment		0.93 correction factor		Then correct for Bias adjustment		0.93 correction factor	
		25.8557				25.8557	

Table C.2 – Estimation of NO<sub>2</sub> concentrations at the nearest receptor

Site Name/ID	Distance (m)		NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> )		
	Monitoring Site to Kerb	Receptor to Kerb	Background*	Monitored at Site	Predicted at Receptor
6	0.2	2.0	13.8	24.4	20.7
57	0.3	0.8	13.8	28.8	26.4
65	1.4	5.2	13.8	30.9	25.9
75	1.3	12.0	13.8	22.3	18.3
79	1.0	7.0	13.8	28.6	22.8
82	1.3	3.4	7.4	20.1	17.5
89	2.2	6.6	13.8	36.9	30.8
90	2.1	7.1	13.8	25.3	22.0
91	1.1	4.2	13.8	38.7	31.9
94	3.0	5.4	13.8	29.4	27.0
95	1.6	3.2	13.8	37.0	33.5
97	2.4	2.8	13.8	25.6	25.2
102	1.3	1.7	13.8	25.9	25.2
104	1.2	1.5	13.8	31.9	31.1
105	1.5	2.3	13.8	28.0	26.6
106	2.9	5.8	13.8	31.1	28.0
107	4.0	5.5	13.8	24.7	23.7
110	1.0	4.8	5.5	22.9	17.4

**Notes:**

The background NO<sub>2</sub> levels were identified using Defra background maps with the following grid references 350500, 240500 (Herefordshire sites), 360500, 224500 (Ross-on-Wye site) and 349500, 259500 (Leominster site).

## 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

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

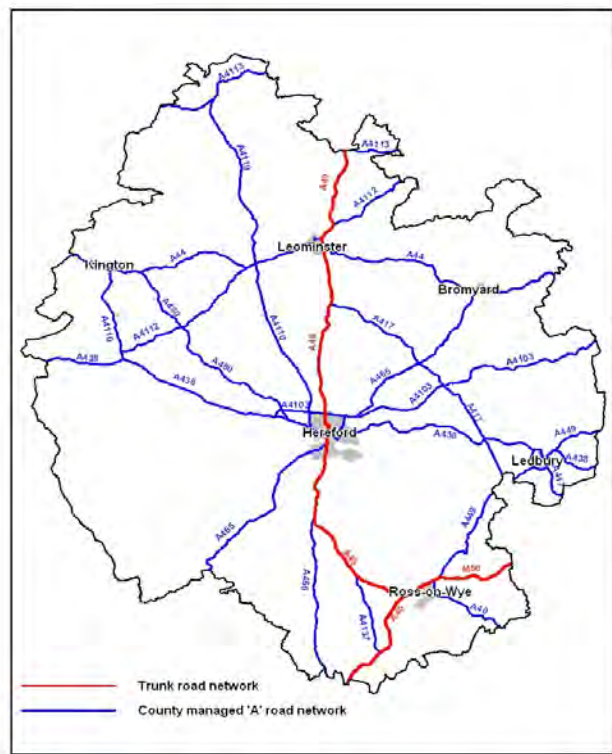


Figure D.2 – Location of Herefordshire

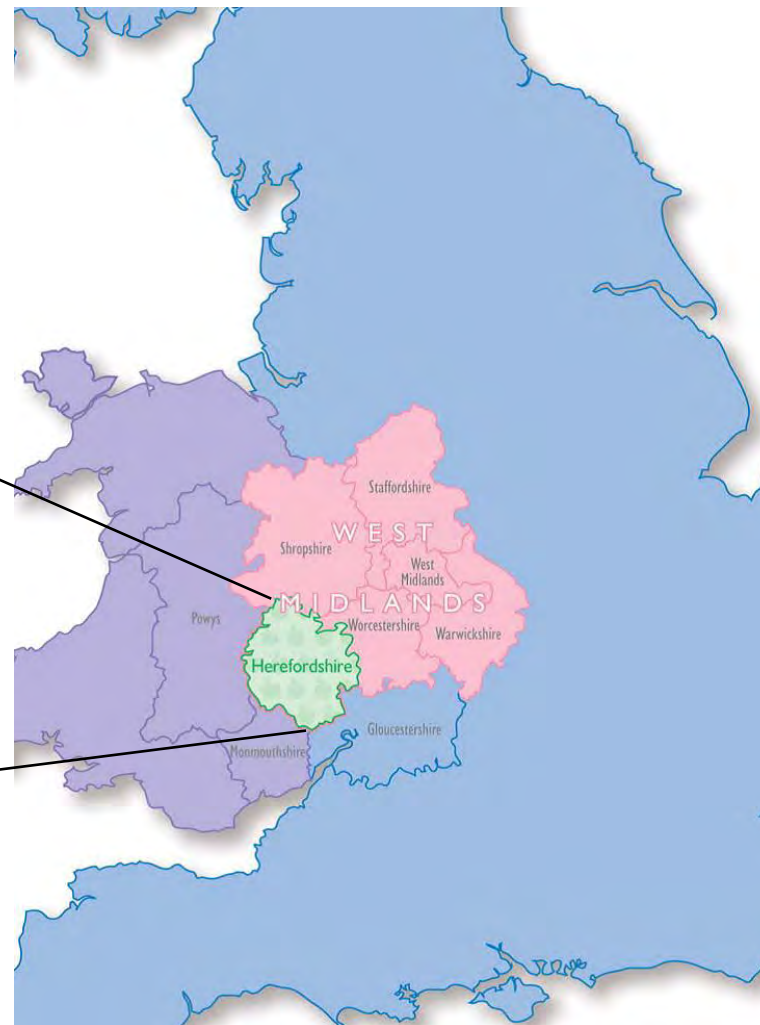


Figure D.3 – Hereford AQMA Boundary

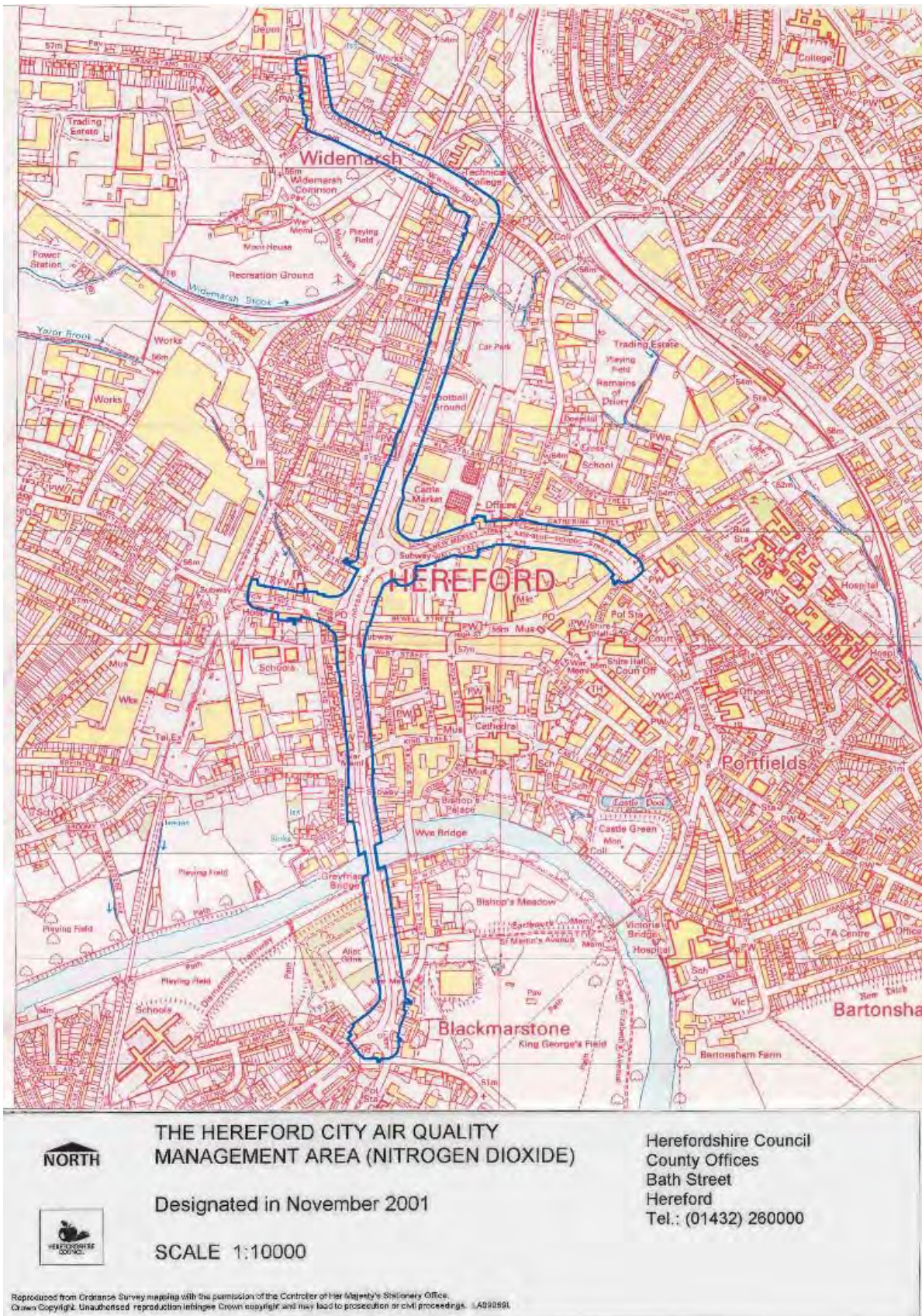


Figure D.4 – Hereford City (North) Monitoring Locations (1)

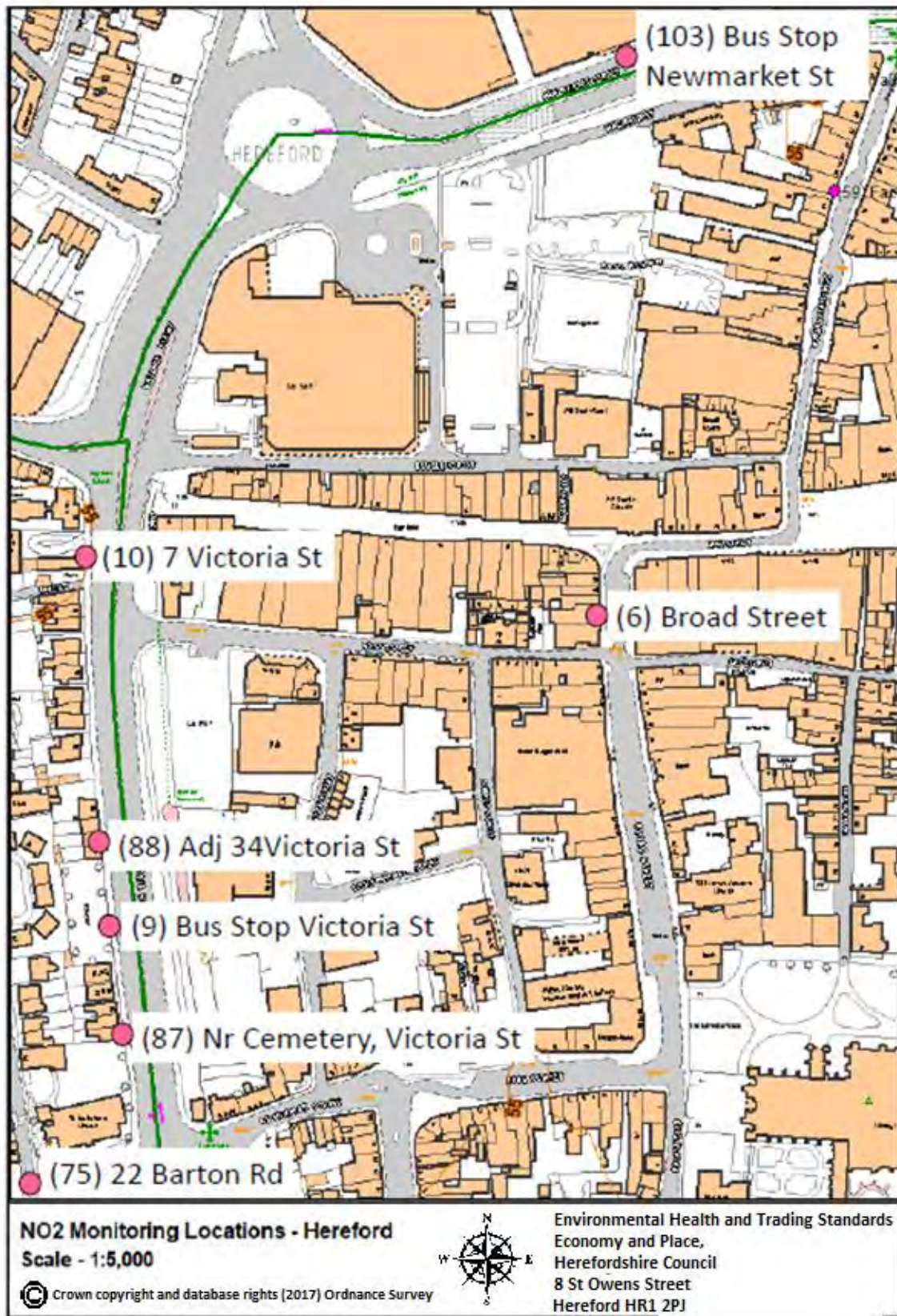




Figure D.5 – Hereford City (North) Monitoring Locations (2)

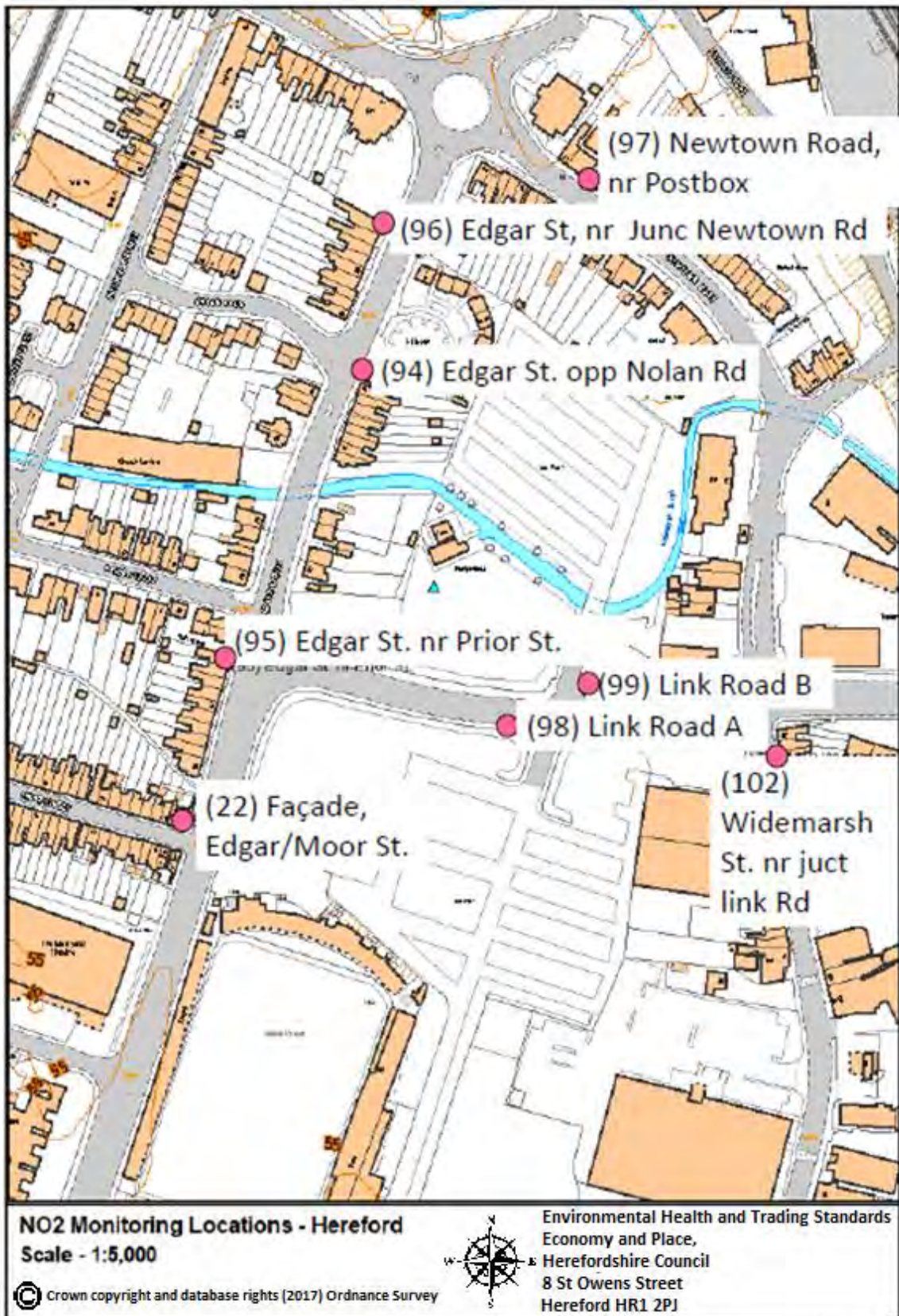


Figure D.6 – Hereford City (North) Monitoring Locations (3)

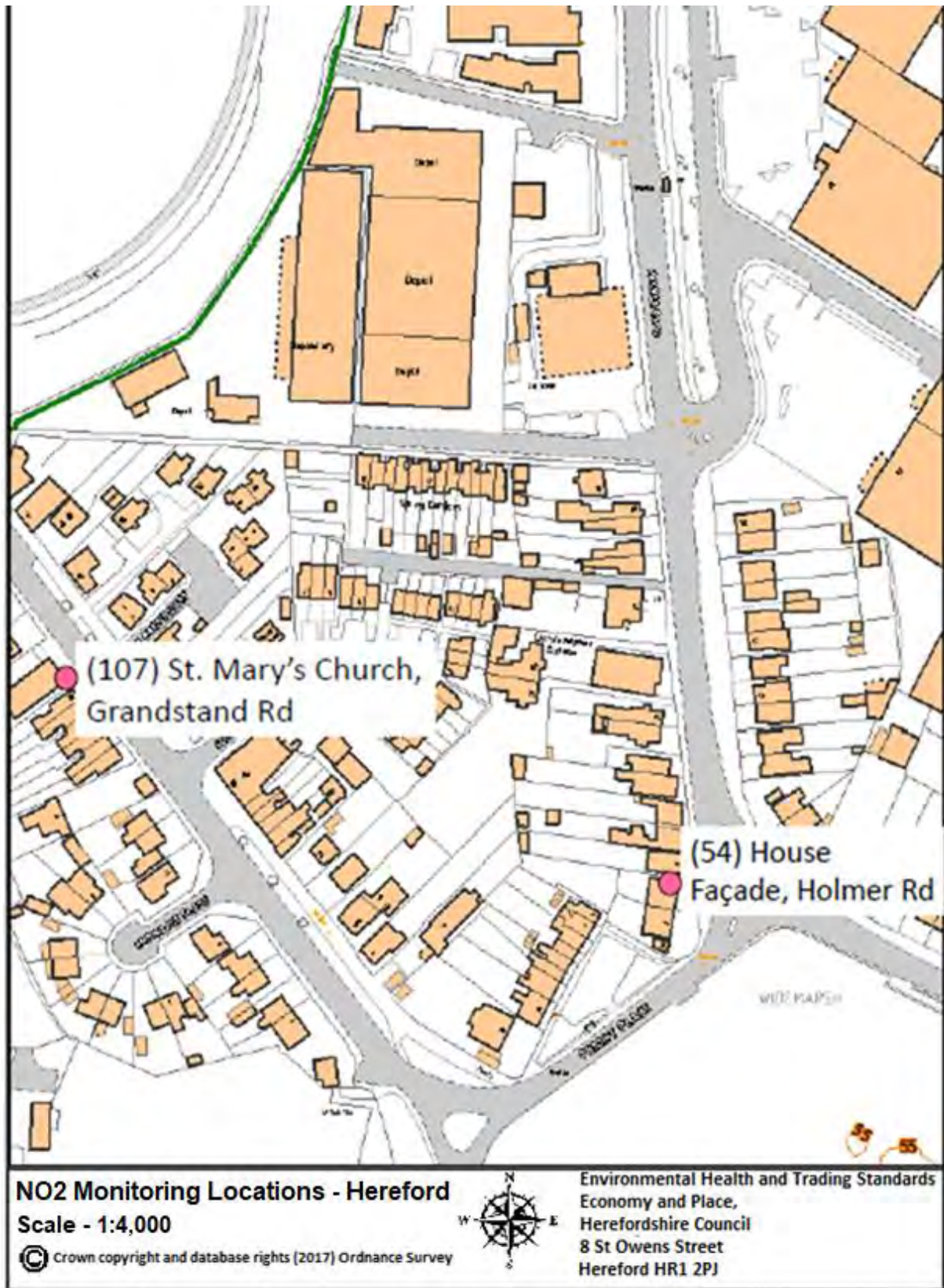


Figure D.7 – Hereford City (North) Monitoring Locations (4)



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

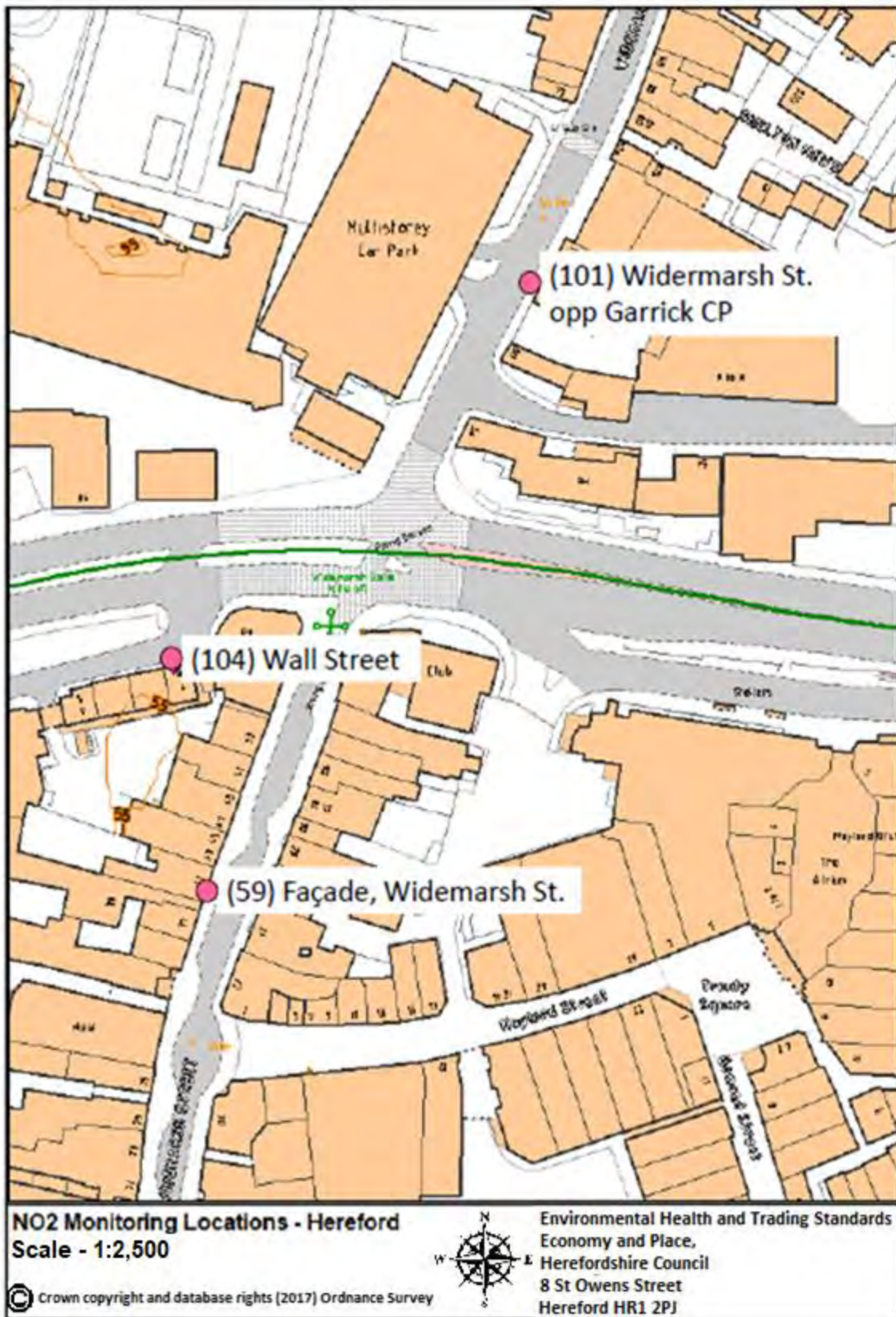


Figure D.9 – Hereford City (North) Monitoring Locations (6)

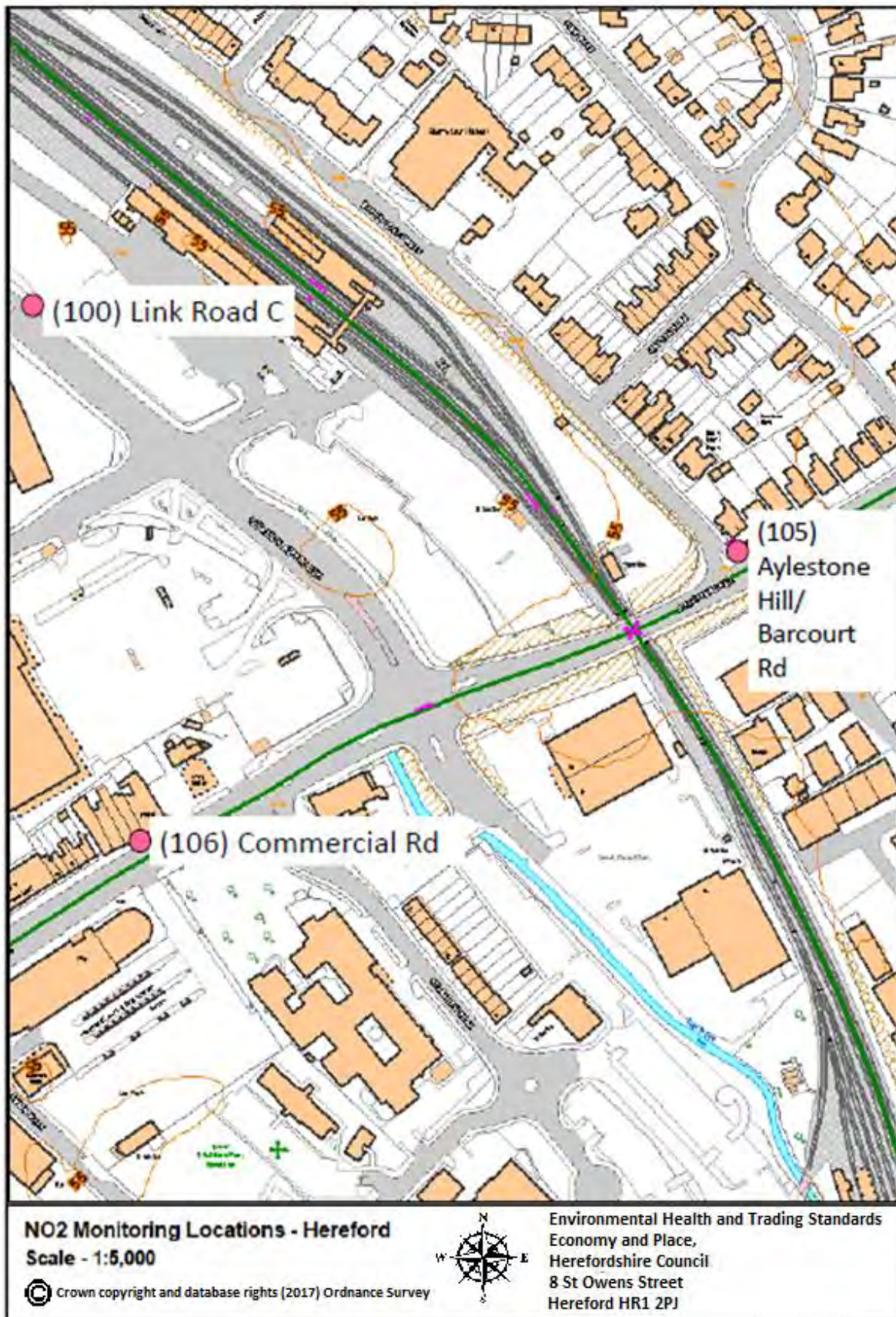


Figure D.10 – Hereford City (South) Monitoring Locations

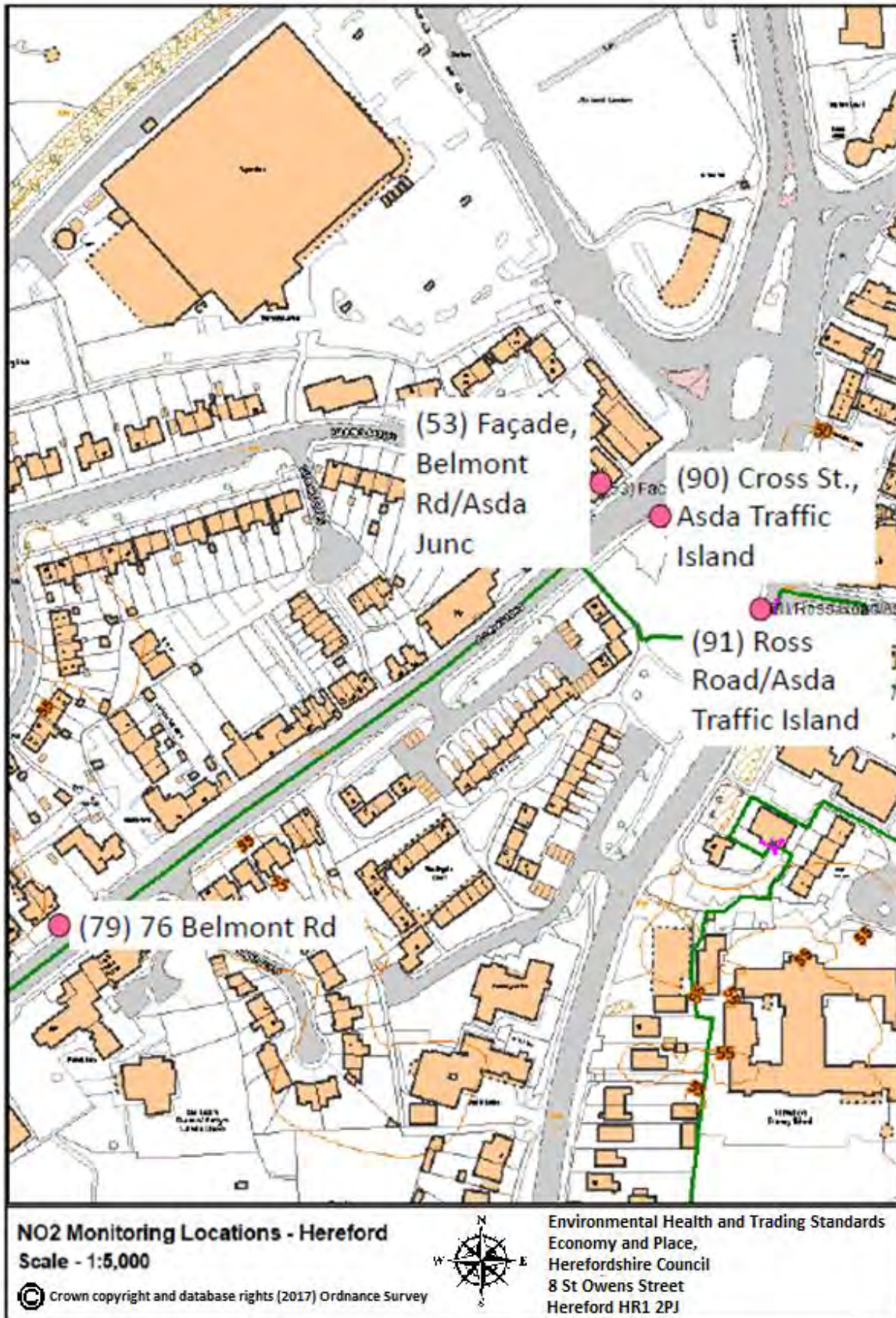


Figure D.11 - Kings Acre Road Monitoring Location



Figure D.12 - Three Elms Road Monitoring Location

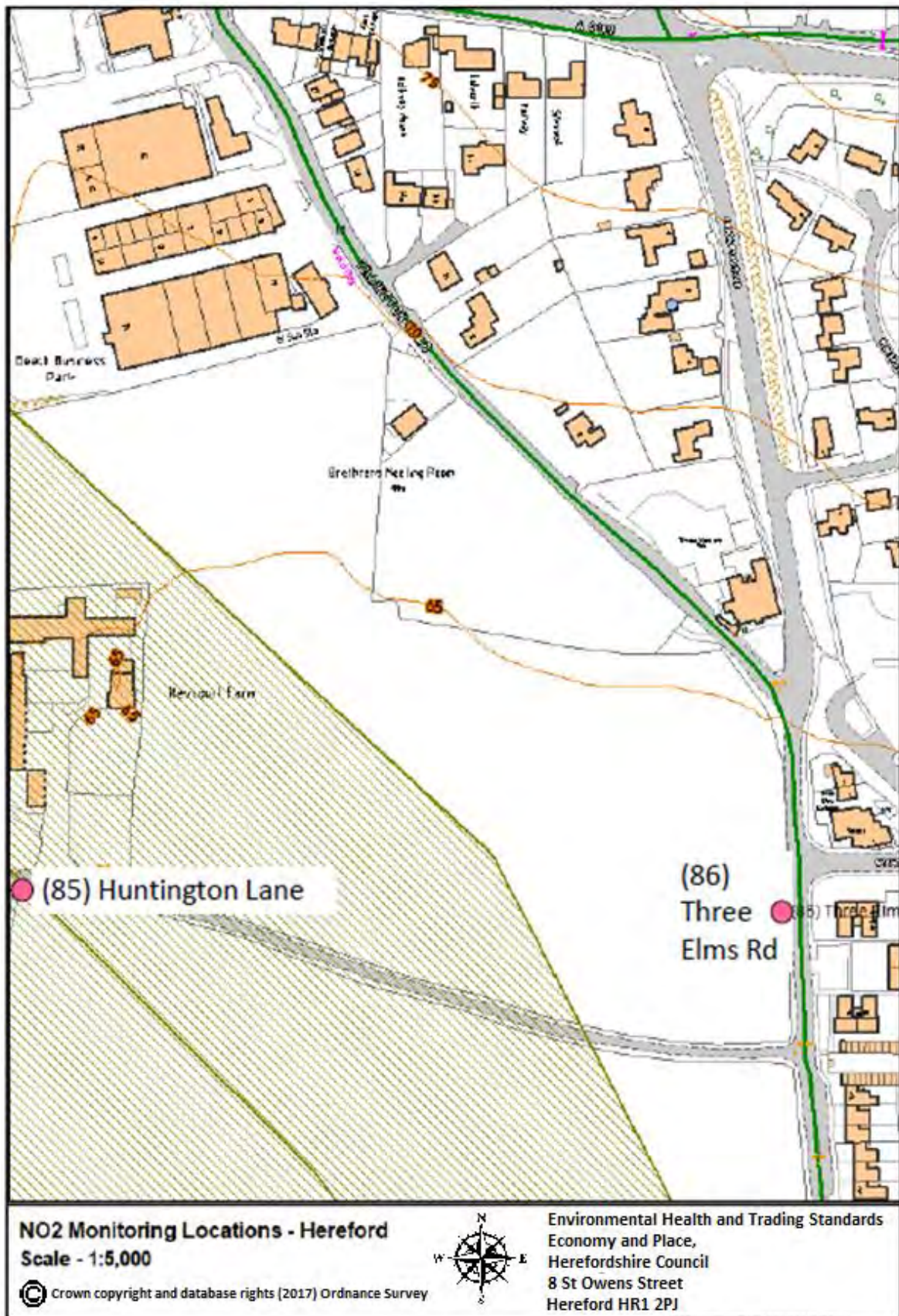




Figure D.13 – Whitecross Road Monitoring Locations



Figure D.14 – Rotherwas Industrial Estate Monitoring Location

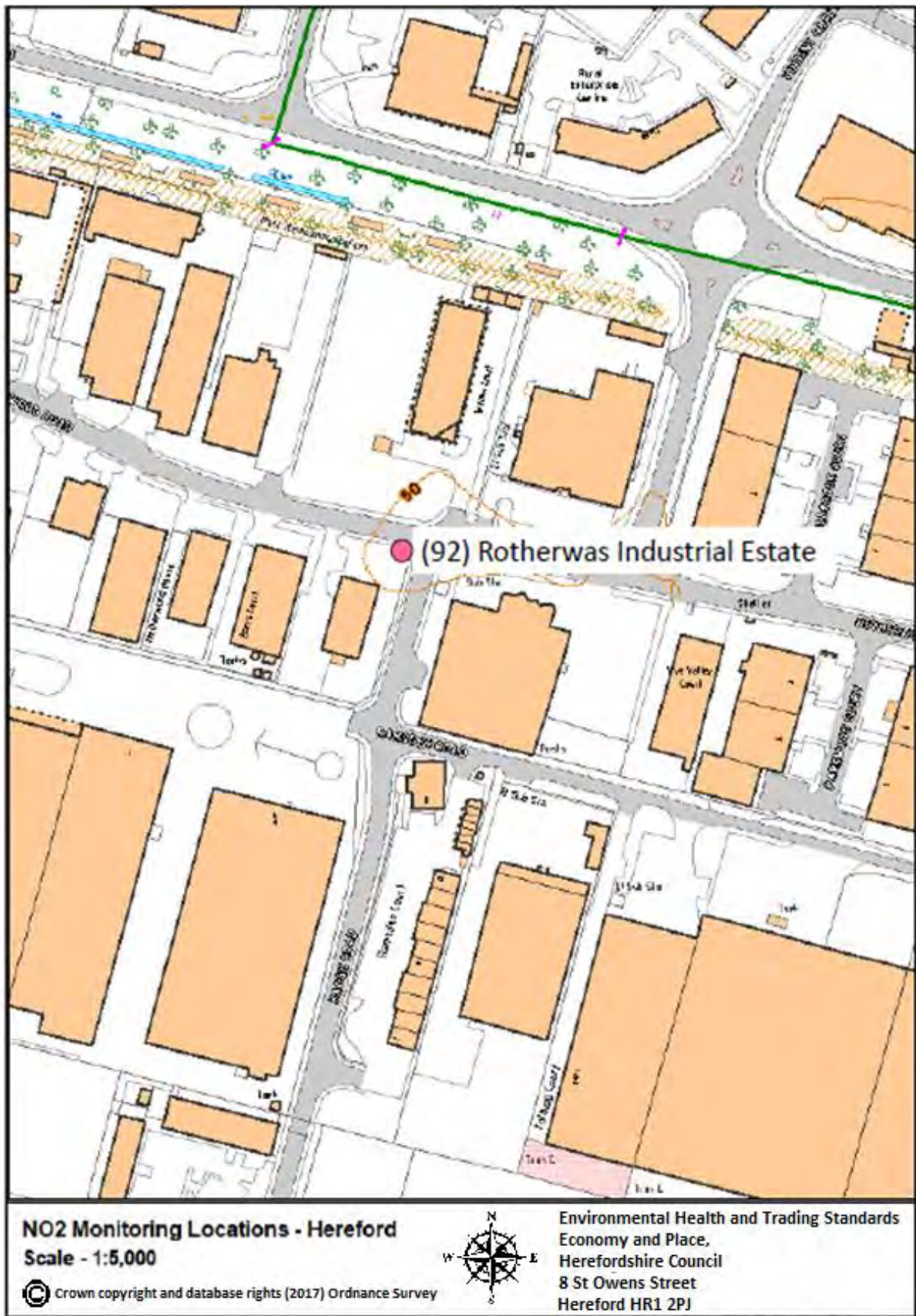


Figure D.15 – Rotherwas Relief Road Monitoring Location

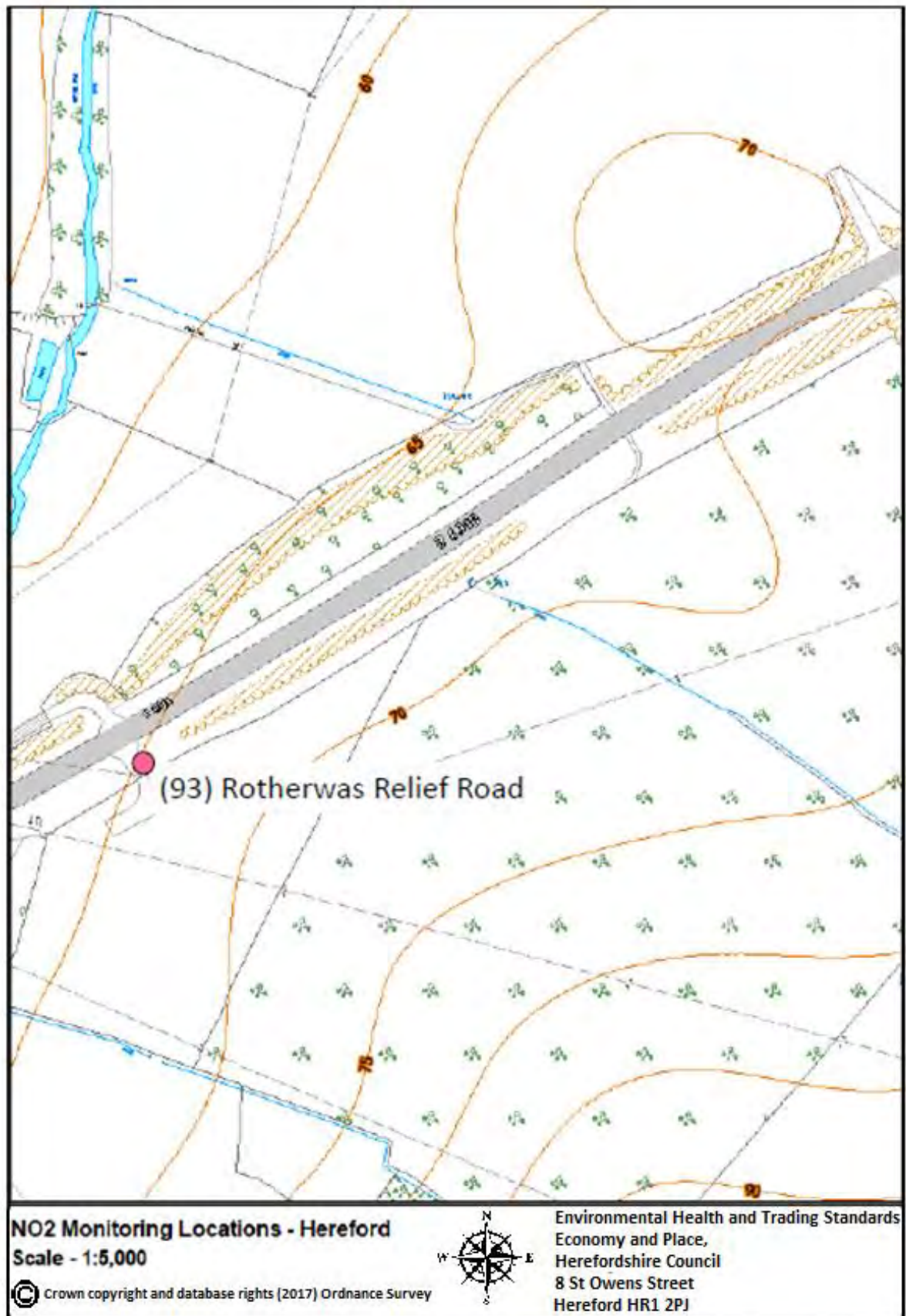


Figure D.16 – Roman Road Monitoring Location



Figure D.17 – Leominster AQMA Boundary

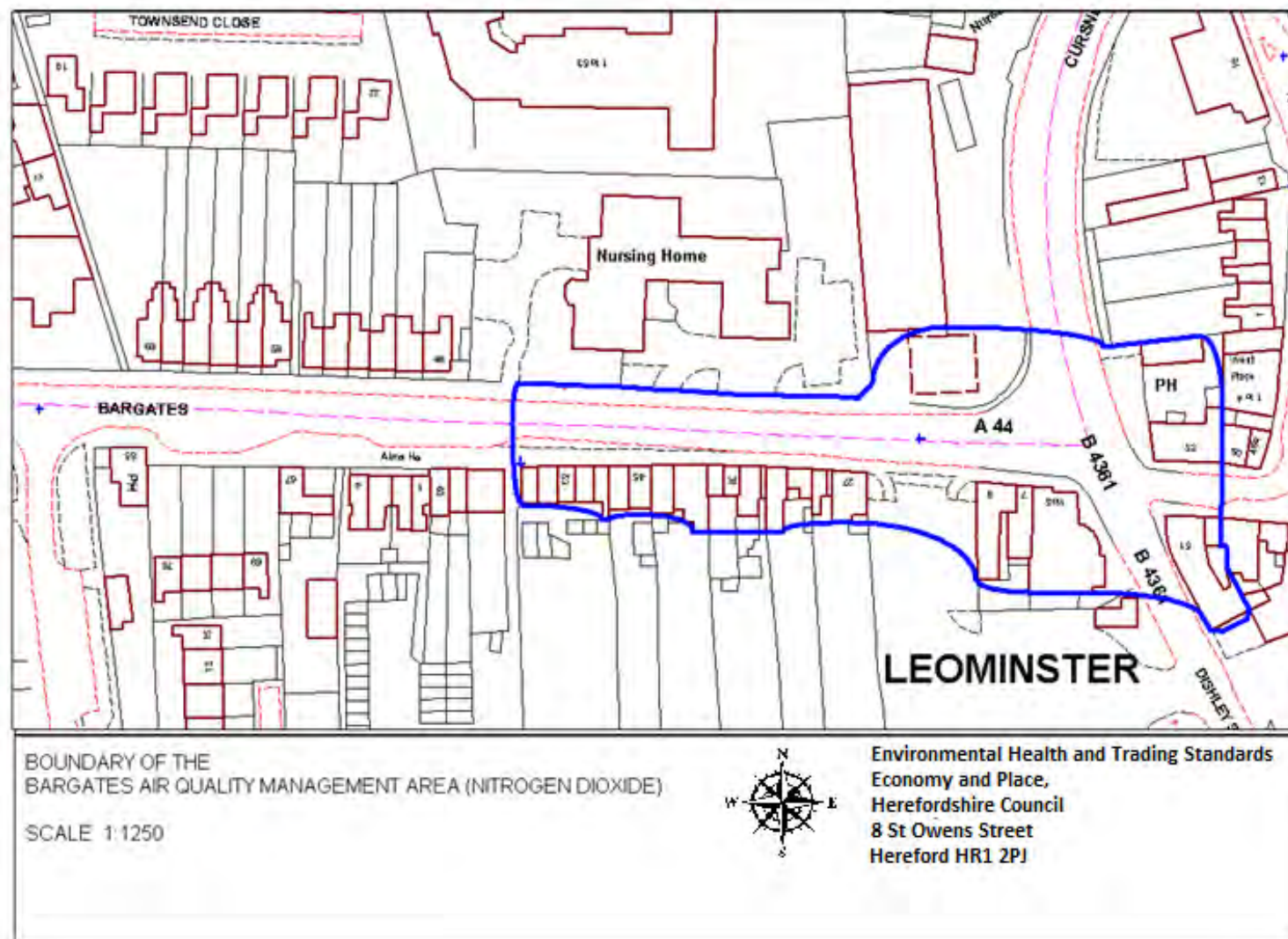


Figure D.18 – Leominster Monitoring Locations

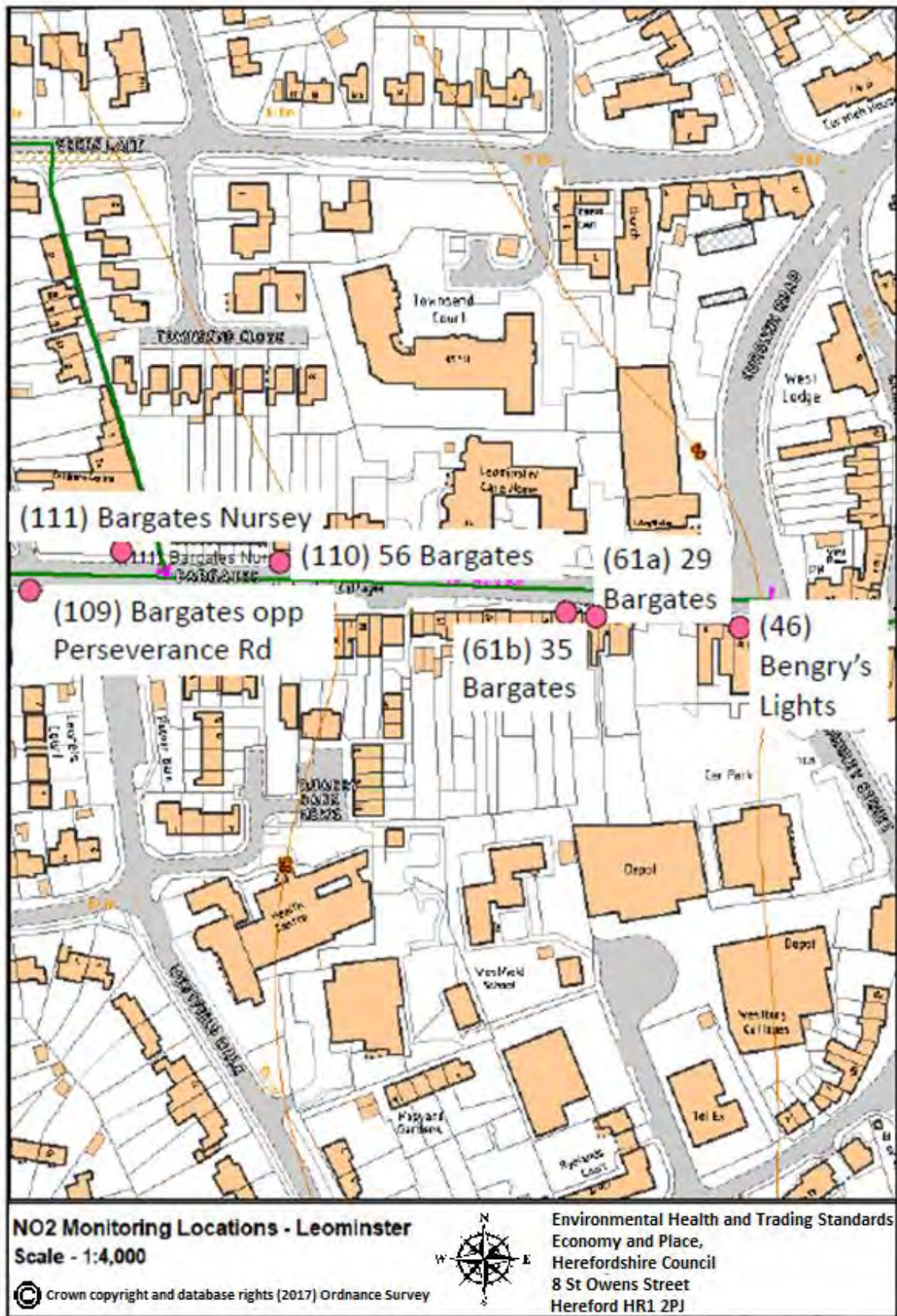


Figure D.19– A40 Corridor, Ross-on-Wye Monitoring Locations

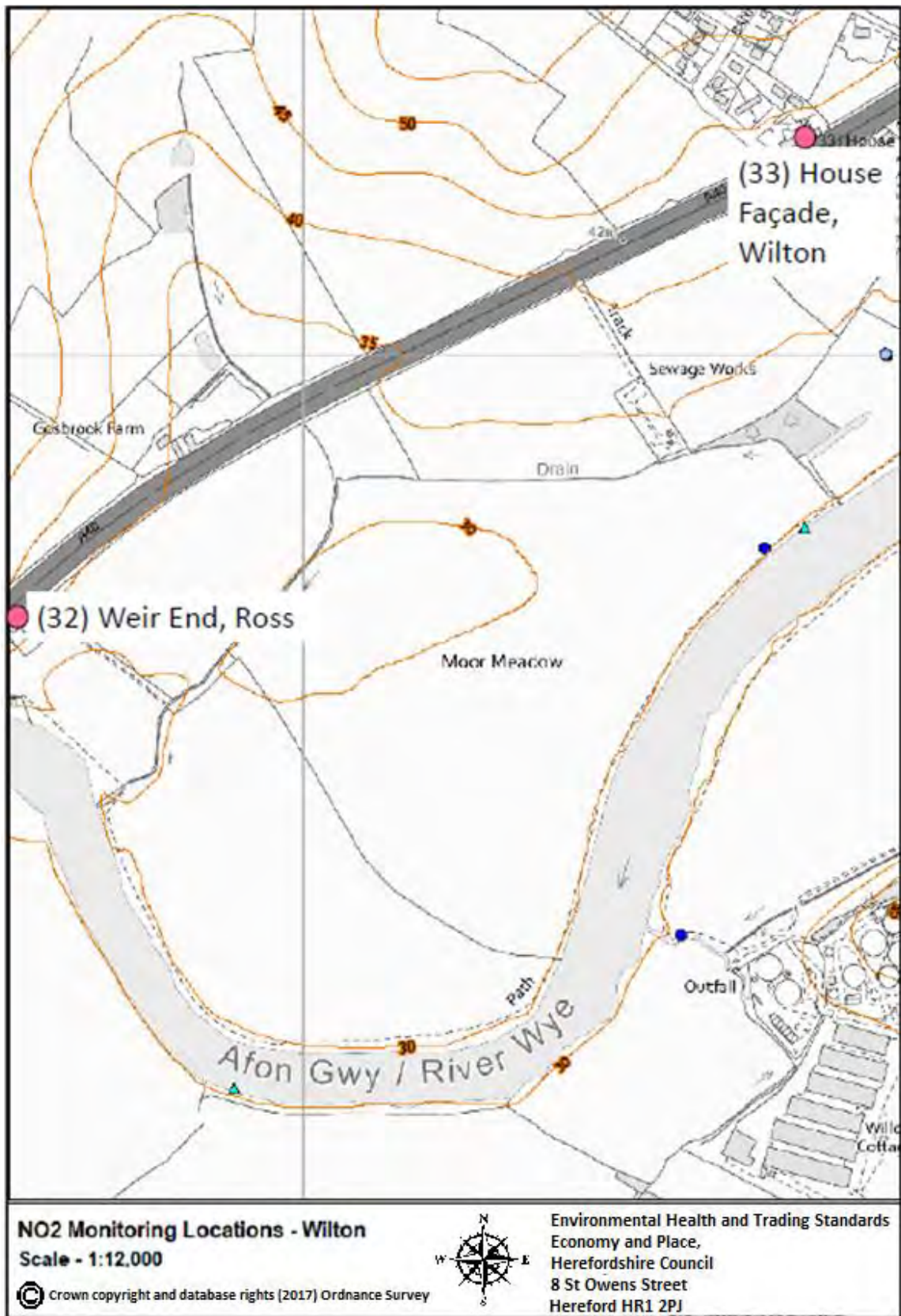


Figure D.20 – Ross-on-Wye Monitoring Location

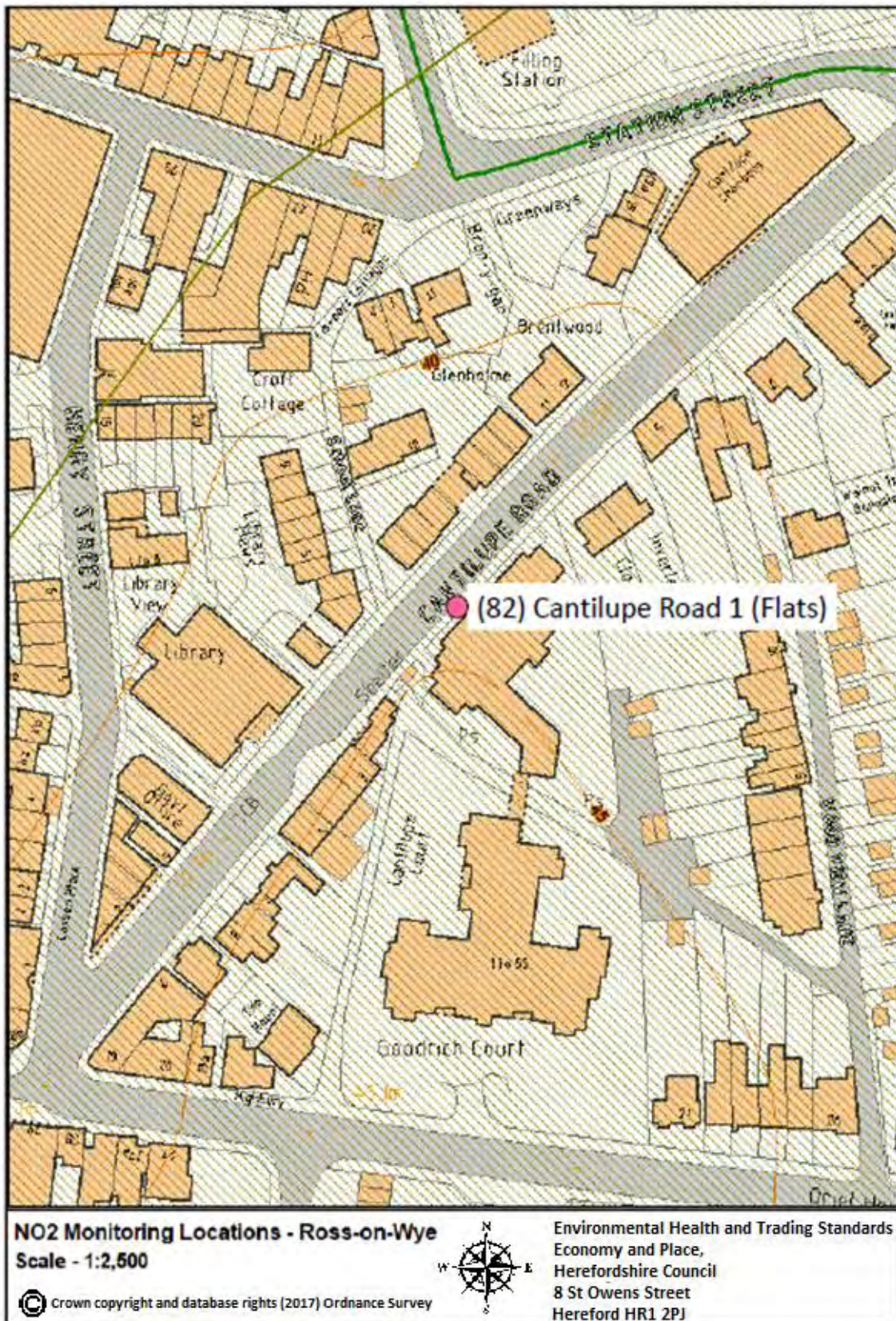
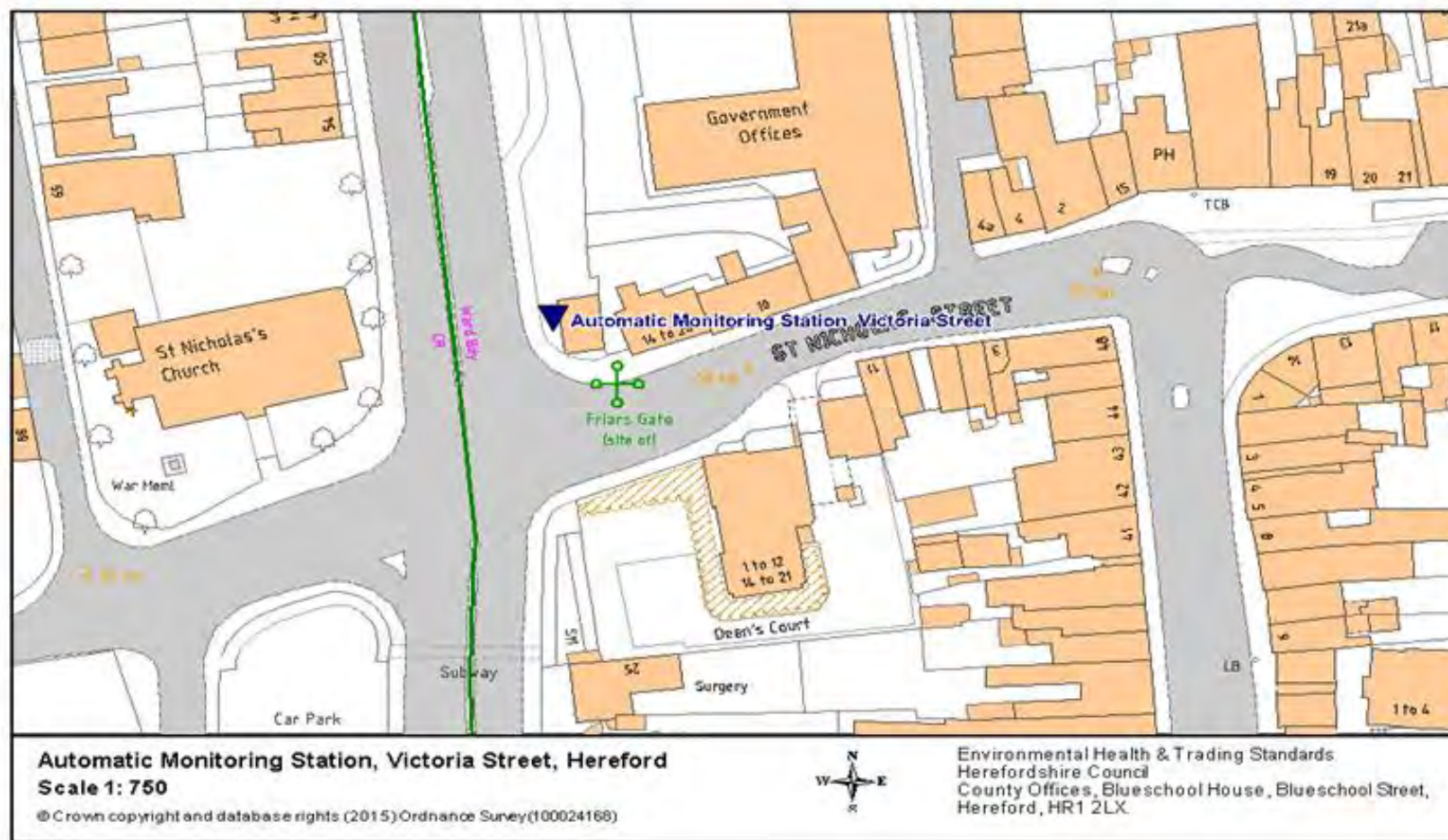




Figure D.21 – Location of the Automatic Monitoring Station (site HRD1), Hereford



## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>6</sup>	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>6</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide

## References

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)