2018 Air Quality Annual Status Report (ASR)

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

March 2019

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Executive Summary: Air Quality in Our Area

Air Quality in Herefordshire

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[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Herefordshire is a county in the West Midlands of England. It is bordered by five counties; Shropshire, Worcestershire, Gloucestershire, Powys and Monmouthshire. The 2017 estimated resident population was 191,000 which had increased by 1,500 since 2016. 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. 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/m3). The AQMA's include A49 Road through Hereford and Bargates Road junction in Leominster.

In 2017, the ratified continuous monitored nitrogen dioxide annual mean was 42µg/m3 for Hereford AQMA, exceeding the air quality objective. Although this monitoring site is not at a receptor location. The Bargates AQMA is monitored using 3 diffusion tubes at three various locations within the AQMA. The highest nitrogen dioxide annual mean concentration, of the three sites, for 2017 was 45.1µg/m3 at site 61b (35 Bargates, Leominster), identifying an exceedance of the Air Quality Objective by 5.1µg/m3. These sites are at receptor location. There is currently no requirements

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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.

Generally, the monitoring data undertaken from 2013 until 2017 identified that nitrogen dioxide levels have fallen. Specifically, areas in Herefordshire including Holmer Road and Cantilupe Road in 2017 were 50% below the national standard.

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 to review the best options for the junction arrangement to improve. The findings of the report were to upgrade the pedestrian crossing and road surfacing and to install a MOVA' (Microprocessor Optimised Vehicle Actuation) traffic management system. The MOVA system which will increase the capacity at the junction and help to disperse queues more effectively. A result of this could be a reduction in emissions created from idling vehicles at the traffic lights. This work commenced in September 2016 and has now been completed. 2018 monitoring data will be reviewed in the 2019 ASR together with the previous year to evaluate if there are any improvement in NO2 levels.

City Link Road - Hereford

Construction work commenced on the City link road in 2015 and was completed in December 2017. The road has opened up brownfield land for new affordable housing and regeneration in the centre of Hereford. The new Link Road connects Edgar Street to the west and Commercial Road to the east (with a spur linking Blackfriars Street to the south). The completed road includes a shared use path along the north side and a walking and cycling link between Morrisons and Canal Road.

It is anticipated that the road will help ease congestion within the core of the city along part of the AQMA. There are proposals to re-design Newmarket Street, Blueschool Street and Commercial Square with safe and attractive routes for pedestrians and cyclists and improved public transport facilities[4].

Southern Link Road and South Wye Transport Package

[4] Herefordshire Local Plan Core Strategy 2011-2031, Herefordshire Council, Adopted 2015

The Southern Link Road planning application was submitted in May 2015 and given permission in July 2016. This road will aim to reduce congestion on Belmont Road and provide improved access to the Enterprise Zone at Rotherwas. This action was identified in the Hereford Air Quality Action Plan. The Southern Link Road forms part of the South Wye Package along with a range of active travel measures, including walking and cycling improvements to Belmont Road and Holme Lacy Road. During 2019 the business case, baseline data collection and the start of the constriction (subject to funding approval timescales) are proposed to be completed for the South Wye Transport Package. Additionally, air quality monitoring pre and post construction will be undertaken as part of the monitoring and evaluation process of the South Wye Transport Package. More information on the South Wye Transport Package can be found on the following website https://www.herefordshire.gov.uk/info/200196/roads/252/hereford_2020/5.

Destination Hereford

Herefordshire Council was awarded £4.97 million from the Local Sustainable Transport Fund (LSTF) for the very successful Destination Hereford project from 2011 to 2015. The aim of the project was to reduce congestion and help improve journey choices. A further bid was successful in 2016 with £419,000 of funding from the Department of Transport (DfT) Transition Fund to deliver a one year programme of walking and cycling promotions and improvements across the county in 2016/17 principally to Holme Lacy Road in the vicinity of Putson Post Office between Oak Crescent and the Co-op.

In 2017, an additional £1.5 million was awarded to Herefordshire Council as part of a three year behavioural change project that continued the Transition Fund Project (Destination Hereford Phase 3 Access Fund). This fund covers a variety of activities including St. Owens Street cycle lane, Holme Lacy Road walking and cycling scheme and Hereford City Centre Transport Package.

The Oval redevelopment also included a shared use path along the frontage between Goodrich Grove and Broxash Drive, and a new traffic-free link from Kilvert Drive to Great Western Way.

Other notable projects that are being worked on include:

- City Centre Improvements. In 2017, a public consultation on these improvements were conducted. Further information can be found on the following website; https://www.herefordshire.gov.uk/consultations/article/10034/st_owen_street_consultation.
- Hereford Transport Package. Plans are going ahead for a public consultation to be undertaken in 2018. This public consultation hopes to gain views on the current proposals of improving walking, cycling, bus and public spaces in Hereford. Further details can be found on the following website; https://www.herefordshire.gov.uk/info/200196/roads/252/hereford_2020/4.

Herefordshire Council is a Unitary Authority which enables close working between the sections and teams which are involved with air quality, it' s 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.

Conclusions and Priorities

The Core Strategy was adopted in October 2015. The Core strategy is a key document in the Local Plan, which provides the strategic planning framework for the county'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 Priories for Herefordshire include:

- Continue to monitor and review both the Hereford and Leominster AQMA's
- Identify and review other locations in the County 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

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 2 miles.[4] 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, with government funding and grants available.
- 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 is a good place to find information on ways to travel sustainably and help to reduce vehicle emissions.

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1 Local Air Quality Management

This report provides an overview of air quality in Herefordshire during 2017. 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.

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	42	µg/m3	Hereford Action Plan	2008	http://aqma.defra.gov.uk/action-plans/HC%20AQAP%202008.pdf
AQMA Bargates	Declared 01/03/2006	NO2 Annual Mean	Leominster	An area encompassing the junction between the A44 Bargates and B4361 Dishley Street/Cursneh Road in Leominster.	NO	61	µg/m3	45.1	µg/m3	Bargates Action Plan	2014	https://www.herefordshire.gov.uk/download/downloads/id/4823/bargates_air_quality_draft_action_plan.pdf

☒ **Herefordshire Council confirm the information on UK-Air regarding their AQMA(s) 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 the vast majority of monitoring sites in Herefordshire demonstrated continued reductions of NO2 levels over the past 5 years.

Defra identified corrective measures required for the Hereford and Bargate AQAP including setting emission reduction targets and providing further discussion on the progress of each measure within the AQAP. Although it was suggested that both AQAPs were generally good and monitoring results demonstrated the measures in the AQAPs were effective in reducing NO2 emissions.

Further, DEFRA suggested that this service should identify new hotspots in Herefordshire. During 2017, Herefordshire Council has added 7 new NO2 diffusion tubes.

Herefordshire Council has taken forward a number of direct measures during the current reporting year of 2018 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.

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 the County 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 Leominster 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	Organisations involved and Funding Source	Planning Phase	Implementation Phase	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	Herefordshire Council & Advantage West Midlands formed ESG Herefordshire Ltd	Not Applicable	2010 - 2025 OR JUN-08	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	Herefordshire Council - Highways and Transportation Service	Not Applicable	Jun-08	Not Applicable	Not Specified	Road completed 2005.	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	Herefordshire Council - Highways and Transportation Service	Not Applicable	Jun-08	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	Herefordshire Council - Highways and Transportation Service	2012-2014	2014-2017	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) Hereford Relief Road	Transport Planning and Infrastructure	Other	Herefordshire Council – Highways and Transportation Service	Ongoing	2016-2031	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Applicable	The potential corridor for the road has been proposed in the Councils Draft Core Strategy.	Constructed by 2031	Not applicable until road is constructed.
6	Alteration of traffic management at the Belmont Roundabout	Traffic Management	Other	Highway Agency	Not Applicable	2005-2006	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.
7	"North & South" Park and ride Scheme in Hereford	Alternatives to private vehicle use	Bus based Park & Ride	Herefordshire Council – Highways and Transportation Service	Not Applicable	Timescales are currently undecided	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Applicable	No longer being taken forward.	Not Applicable	Not Applicable
8	Parking Strategy in Hereford to reduce commuter parking	Traffic Management	Other	Herefordshire Council – Highways and Transportation Service and Planning Services	Not Applicable	Not Applicable	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

9	Improve and increase number of cycle routes and facilities in Hereford	Transport Planning and Infrastructure	Cycle network	Herefordshire Council – Highways and Transportation Service	Not Applicable	Ongoing	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
10	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	Herefordshire Council – Highways and Transportation Service	Not Applicable	2005	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.
11	Behavioural Change Programme	Promoting Travel Alternatives	Workplace Travel Planning	Herefordshire Council - Highways and Transportation Service	Ongoing	Ongoing	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.
12	Designation of a Traffic manager for network management Duties along the A49 in Hereford	Traffic Management	Other	Highway Agency and Herefordshire Council	Not Applicable	Not Applicable	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.

13	Continue to implement Vehicle Emission Testing in Hereford	Traffic Management	Testing Vehicle Emissions	Herefordshire Council - Environmental Health and Trading Standards	Not Applicable	Annually since 2000	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.
14	Information and awareness training	Public Information	Via the Internet	Herefordshire Council - Environmental Health and Trading Standards	Not Applicable	On-going improvement of web-site material on air quality	Number of hits on the website.	Not Specified	Ongoing	Ongoing	Currently investigating whether the hits on the website can be calculated.
15	Southern Link Road A49 Ross Road / Rotherwas Access Road roundabout to the A465 and the B4349 Clehonger Road	Transport Planning and Infrastructure	Other	Herefordshire Council - Highways and Transportation Service	2012-2016	2016-2026	Annual Average Daily Flow trends (AADT) and diffusion tubes	Not Specified	Scope route was undertaken in 2010. Planning permission has been granted	Constructed by 2021.	Air quality monitoring pre and post construction will be undertaken as part of the Monitoring and Evaluation of the project.

Bargates Action Plan

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	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	Herefordshire Council	2014-2015	2016	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	Herefordshire Council	2014-2016	Sep-16	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	Herefordshire Council	2014-2016	2016	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	Herefordshire Council	2014-2016	Not Applicable	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	Herefordshire Council	2014-2016	Not Applicable	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	Herefordshire Council	2014-2016	Not Applicable	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	Herefordshire Council	For the period up to 2031	Not Applicable	Reduction of NO2 levels at diffusion tubes	Not Specified	Ongoing	Not set	Not Applicable

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

As detailed in Policy Guidance LAQM.TG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

There are many different sources of PM2.5, 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.[5]

Health based objective levels for PM2.5's have not yet been set for local authorities. The EU limit value for PM2.5 is 25µg/m3 as an annual average with an additional requirement to reduce average urban background concentrations by 15% by 2020 (against a 2010 baseline).

PM 2.5's in Herefordshire.

Public health framework indicator 3.01 states that the fraction of mortality in Herefordshire attributable to anthropogenic (man-made) PM2.5 particulate air pollution is 4.5% of all deaths. The average for this indicator in the West Midlands is 5.2% and in England is 5.1%.

Policy Guidance LAQM.TG(16) acknowledges that many local authorities will consider how to address PM2.5 alongside other pollutants such as Nitrogen Dioxide and PM 10's when determining appropriate actions and that a few standalone PM2.5 measures will be chosen (unless in order to address a very specific local problem).

The AURN is the UK's largest automatic monitoring network and is the main network used for compliance reporting against the Ambient Air Quality Directives. PM2.5's are measured at some of the network of ARUN sites. The closest ARUN monitoring site to Herefordshire that measures PM2.5 is Chepstow on the A48, this is an urban traffic site. Therefore, it is perhaps difficult to draw direct comparisons to Herefordshire.

[5] Fine Particulate Matter (PM2.5) in the United Kingdom, AQEG, 2012

It has been recognised that the cost of monitoring for PM2.5s can be prohibitive. Therefore other methods of estimating the likely PM2.5 levels in the County have been considered to establish an overview of the possible levels.

Background mapping of PM2.5 published by DEFRA has been reviewed http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html and the background levels in 2017 were found to be between 6.04 and 11.81 µg/m3.

Calculations can be undertaken to estimate the PM 2.5 fraction from PM10 monitoring data. The monitoring data for PM10's at the Victoria Street location in 2017 was 25 µg/m3 (as measures by a BAM using a gravimetric factor of 0.833 for Indicative Gravimetric Equivalent). Data capture for PM10 in 2017 was 93.6%. Further, PM 2.5 was estimated based on the recorded PM10 measurements, using the calculation method detailed in TG16. As such the estimated annual mean of PM2.5 in 2017 was 17.5 µg/m3. It should be noted that this estimation would only give an indication of PM2.5 's at the roadside location in the Hereford AQMA (a worst case scenario). For further information on the calculation used to estimate PM2.5 from PM10 measurements please refer to Appendix C.

Herefordshire Council is taking the following measures to address PM2.5:

Ensure PM2.5'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 PM2.5
- Consider the need for background monitoring of PM2.5

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 PM2.5 as well as NO2.

The approach being taken taking in terms of PM2.5 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

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 site during 2017. Table A.1 in Appendix A shows the details of the sites. 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 which is located opposite to the Minster school in Leominster. This suburban background site continuous monitors Nitrogen Dioxide and Ozone. During 2017 the annual mean Nitrogen Dioxide levels were 6 µg/m3. 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 NO_2 at 29 sites during 2017. 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, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. In 2017 the highest recorded monthly means of NO_2 were in the winter months. In comparison, the lowest recorded monthly means of NO_2 were in the summer.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past year with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. The maximum hourly mean was 180 µg m-3 in 2017, as such there were no exceedences of the NO2 hourly limit of 200 µg m-3.

Note: 2013 data was omitted from the trend analysis in figures A1 to A4. This is because the 2013 results were noticeably higher at every monitoring location than in the other years shown in the five-year trend. It is considered this is due to only 8 months data being collected and the requirement to annualise that data. Although the data has been annualised in line with Defra guidance (Box3.2 of TG(09)), there is only data from two appropriate automatic Defra monitors within a 50 mile radius to include in the annualisation process (see Appendix A). The Council consider the annualised 2013 results should be regarded with caution. It is, therefore, considered more appropriate to review the long-term trend of monitoring results between 2014 and 2017.

Hereford AQMA

The NO2 data within the AQMA in Hereford (table A.3) shows that there was an exceedance of the air aquality objective in 2017 at the automatic monitoring site which showed levels of 42 µg/m3, although this monitoring location is not at a receptor location. There were no exceedances in 2016. In 2017 Herefordshire Council has added five new monitoring sites which are in the AQMA these include sites 87, 88, 89, 90 and 91. These sites have not exceeded the air quality objective, with the highest NO2 levels being recorded at site 89 (36.57µg/m3) at the kerbside. The results have been calcuated back to the nearest receptor as shown in Table C1. From this calcuation site 89 NO2 levels is 31.2 µg/m3 at the nearest receptor. Further Herefordshire Council were unable to conduct any monitoring data for site 10 which

has historically recorded elevated NO2 levels (7 Victoria Street, Hereford), however it is believed that the site will be operational in 2018.

Prior to revoking the AQMA, several years of data demonstrating the NO2 levels are unlikely to breach the national objective will be required. Further, consideration will need to be given to the national trends in emissions, as well as local factors that may affect the AQMA, including measures introduced as part of the Air Quality Action Plan, together with information from national monitoring on high and low pollution years will also need to be taken into account. As such a review of the AQMA will be undertaken in 2018.

Two sites are monitored outside the AQMA to determine whether the boundaries of the AQMA need to be extended. These are Site 54 (Holmer Road) and Site 65 (95 Whitecross Road), please refer to figure A2.

Site 54 continues to demonstrate declining concentrations below the air quality objective in line with previous year's results, although this site in 2016 appeared to have a marginal increase in annual values which has decreased in 2017. This site will continue to be monitored.

Site 65 is a kerbside monitoring location and the results have been calculated back to position of nearest receptor to compare with air quality objective, see Table C1. The estimation of concentration at the nearest receptor, 29.5 μg/m^3 which is below the air quality objective confirming no extension of the AQMA boundary is required at this time. Site 65 will continue to remain as an indicator of any changes in NO2 levels along Whitecross Road which is a key traffic route into the City.

The sites in Hereford located further afield from the AQMA, including sites 6, 74, 75 and 79, have followed the general downward trend seen across the County between 2014 and 2017. Although the site 75 (22 Barton Road) has previously experienced increased levels in NO2 during 2012 and 2014 the latest figures demonstrate the site is now following a downward trend in reducing concentrations. Site 74 (140 Whitecross Road) has decreased in concentration levels marginally from 2016 to 2017 by 0.22μg/m3. Two new monitoring sites 92 (Rotherwas Industrial Estate, Hfd) and 93 (Rotherwas Relief Road, Hereford) were below the air quality objective level. The Council will continue to closely monitor these locations.

Leominster AQMA

2011 to 2017 trend data for sites in the Leominster AQMA can be found in the graph of figure A3. Site 46 – Bengry's Light, was below the air quality objective in 2017 recording concentrations 34.5 µg/m3. Previous years (2011 - 2016) have shown a linear downward trend. However, NO2 concentrations have increased at this site by 1.69µg/m3 between 2016 and 2017. Site 61a (29 Bargates) and the newest monitoring site 61b (35 Bargates) have recorded the highest concentrations of NO2 in the county in 2017. The site 61a recorded NO2 levels of 41.3 µg/m3 and the site 61b recorded NO2 levels of 45.1 µg/m3. Both these recorded levels exceed the objective level of 40 µg/m3.

A40 corridor

With reference to figure A4, the two roadside locations along this corridor (site 32 – Weir End House and site 33 – Apple Tree Cottage) continue to follow the linear downward trend. In 2017 the NO2 recorded levels at site 32 were 31.6µg/m3 and at site 33 were 30.2µg/m3. Both of these sites will continue to be monitored in 2018.

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. During 2017, site 83 will no longer be monitored.

The monitoring undertaken to date is under the air quality objective in this location, the annual mean concentrations were 20.5 µg/m3 for 2017.

3.2.2 Particulate Matter (PM_{10})

PM_{10} 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_{10} figures are susequently avaliable for 2017.

Table A.5 in Appendix A identifies the ratified and adjusted monitored PM_{10} annual mean concentrations at Victoria Street in 2017 (25µg/m3). This annual mean is 37.5% below the air quality objective level of 40µg/m3. This was measured by a BAM using a gravimetric factor of 0.833 for Indicative Gravimetric Equivalent, the data capture for this reading was 93.6%.

In 2017 the highest recorded monthly means of PM_{10} were in the spring months (29µg/m^3). In comparison, the lowest recorded monthly means of NO_2 were in the summer (19µg/m^3).

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past year with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year. The maximum daily mean of PM_{10} was 70 µg m-3, as such the daily mean limit value of 50 µg m-3 was exceeded on 10 days. The annual allowance is 35 days so 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	Y OS Grid Ref	Pollutants Monitored	In 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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
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
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	2	2.7	NO	2.5
88	Adj 34 Victoria St, Hfd (A49)	Roadside	350684	239900	NO2	YES	0	2.8	NO	2.32
89	Blackfriars/ Edgar Street	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	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

Notes:

Herefordshire Council were unable to conduct any monitoring data for site 10 (7 Victoria Street, Hereford), however it is believed that the site will be operational in 2018.

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2013	2014	2015	2016	2017
6	Urban Background	Diffusion Tube	-	100	**37.17a**	**28.93**	**25.53**	**25.92**	**22.9**
9	Roadside	Diffusion Tube	-	100	**54.38a**	**40.25**	**35.94**	**37.96**	**31.8**
10	Roadside	Diffusion Tube	-	-	**50.40a**	**43.71**	**38.54**	**39.71**	**-**
22	Roadside	Diffusion Tube	-	100	**42.58a**	**30.59**	**24.68**	**28.82**	**25.3**
32	Roadside	Diffusion Tube	-	100	**48.75a**	**36.07**	**34.25**	**33.74**	**31.6**
33	Roadside	Diffusion Tube	-	100	**50.11a**	**36.27**	**33.93**	**33.63**	**30.2**
46	Roadside	Diffusion Tube	-	100	**49.33a**	**38.43**	**32.7**	**32.81**	**34.5**
53	Roadside	Diffusion Tube	-	100	**41.71a**	**33.73**	**31.39**	**31.2**	**29.4**
54	Urban Background	Diffusion Tube	-	100	**31.59a**	**25.58**	**22.42**	**24.42**	**20.7**
57	Urban Background	Diffusion Tube	-	100	**43.94a**	**34.05**	**28.27**	**31.07**	**26.7**
59	Urban Centre	Diffusion Tube	-	91.7	**37.11a**	**24.61**	**23.42**	**23.92**	**19.9**
61a	Roadside	Diffusion Tube	-	100	**60.02a**	**47.63**	**42.9**	**44.15**	**41.3**
61b	Roadside	Diffusion Tube	-	100	**-**	**-**	**-**	**-**	**45.1**
65	Urban Background	Diffusion Tube	-	100	**51.87a**	**40.18**	**36.35**	**36.04**	**30.6**
74	Roadside	Diffusion Tube	-	100	**25.65a**	**19.44**	**19.59**	**18.82**	**18.6**
75	Roadside	Diffusion Tube	-	91.7	**48.38a**	**36.7**	**30.33**	**29.6**	**21.9**
79	Roadside	Diffusion Tube	-	100	**47.50a**	**35.33**	**32.76**	**31.46**	**30**
82	Urban Background	Diffusion Tube	-	91.7	**-**	**-**	**-**	**22.3**	**20.5**
84	Suburban	Diffusion Tube	-	91.7	**-**	**-**	**-**	**12.6**	**11.7**

85	Rural	Diffusion Tube	-	100	-	-	-	**8.8**	**7.9**
86	Roadside	Diffusion Tube	-	100	-	-	-	**16.8**	**13.4**
87	Roadside	Diffusion Tube	-	83.3	-	-	-	-	**30.2**
88	Roadside	Diffusion Tube	-	75	-	-	-	-	**33.3**
89	Roadside	Diffusion Tube	-	66.7	-	-	-	-	**36.57a**
90	Roadside	Diffusion Tube	-	75	-	-	-	-	**26.21a**
91	Roadside	Diffusion Tube	-	66.7	-	-	-	-	**30.69a**
92	Urban Background	Diffusion Tube	-	75	-	-	-	-	**11.6**
93	Roadside	Diffusion Tube	-	75	-	-	-	-	**10.8**
HRD1	Roadside	Automatic	-	98.8	-	-	-	-	**42**

☒ **Diffusion tube data has been bias corrected**

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

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.**

Herefordshire Council were unable to conduct any monitoring data for site 10 (7 Victoria Street, Hereford), however it is believed that the site will be operational in 2018.

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

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

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

Figure A.1 – Trends in NO_2 Hereford AQMA 2014 - 2017

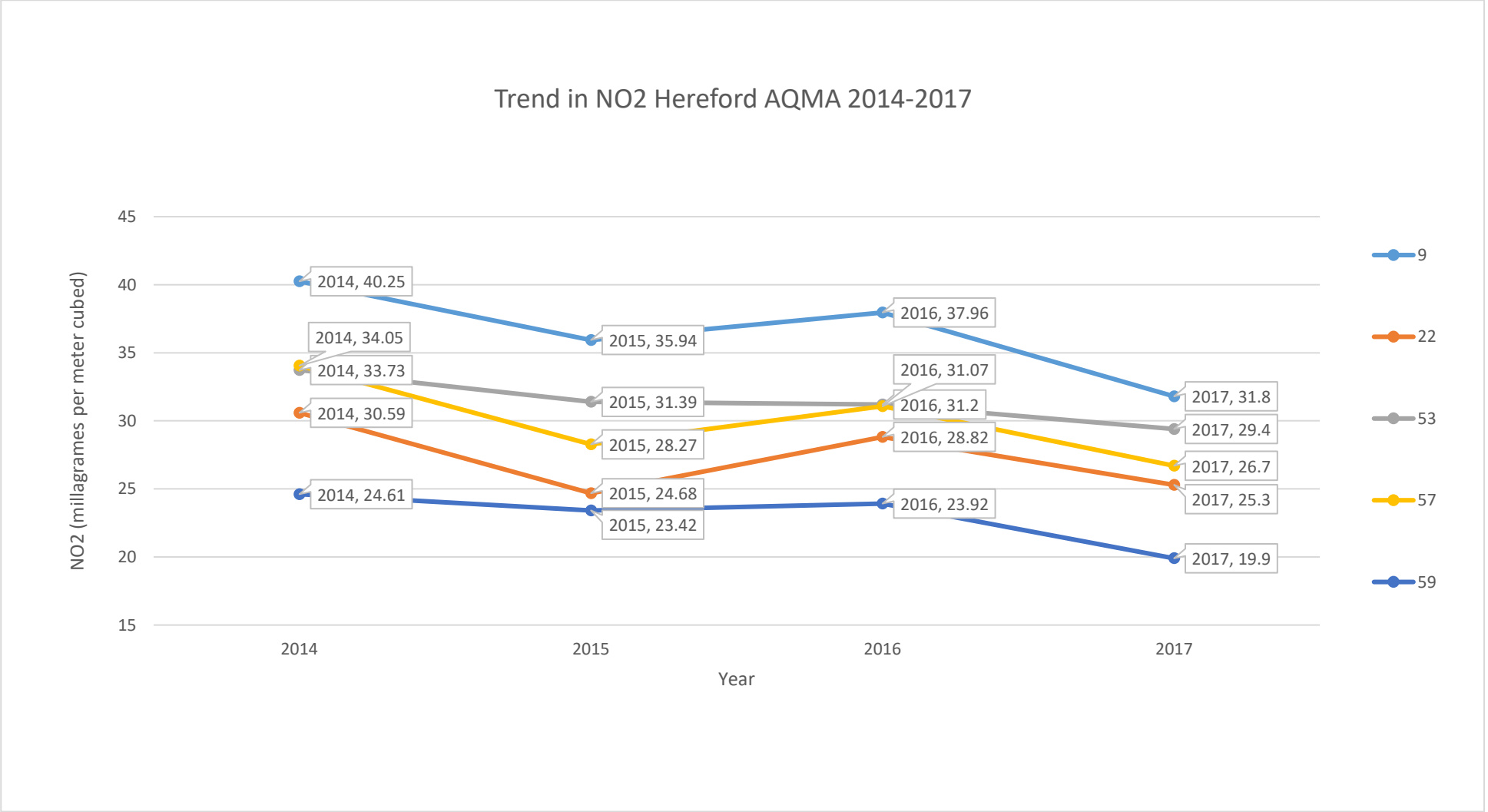


Figure A.2 – Trends in NO_2 Hereford, Outside AQMA 2014- 2017

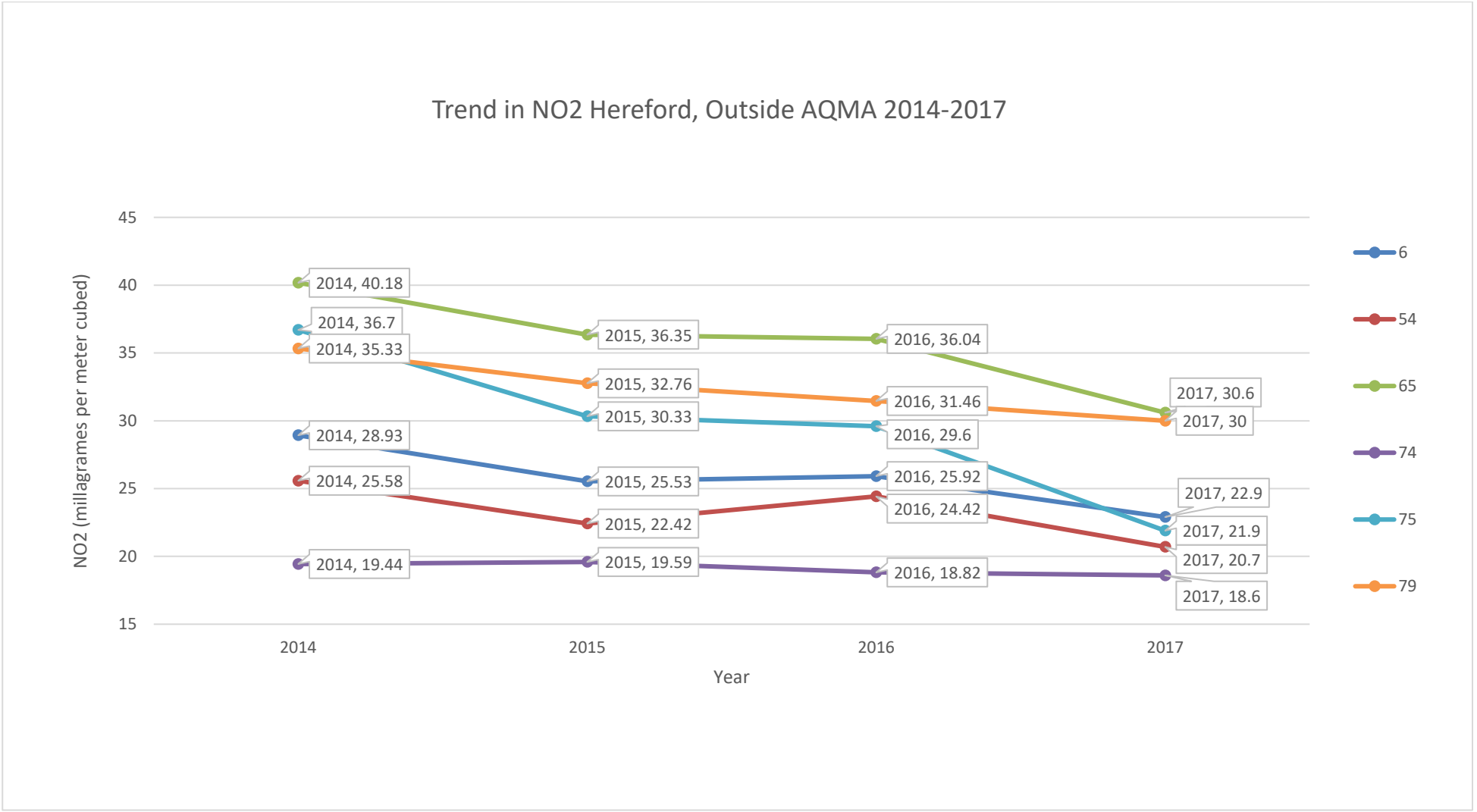


Figure A.3 – Trends in NO_2 Leominster, Outside AQMA 2014- 2017

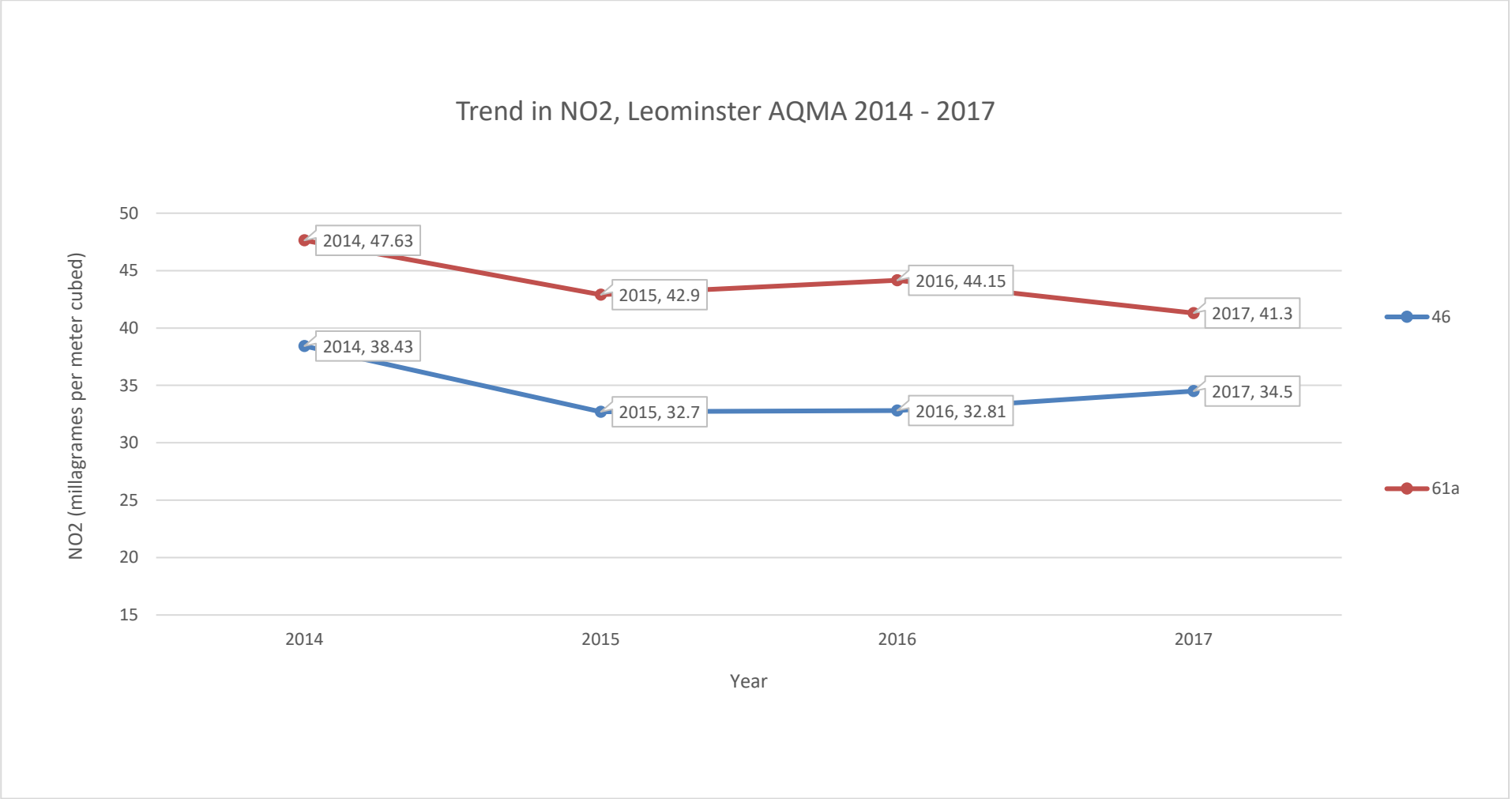


Figure A.4 – Trends in NO_2 Hereford, Outside AQMA 2014- 2017

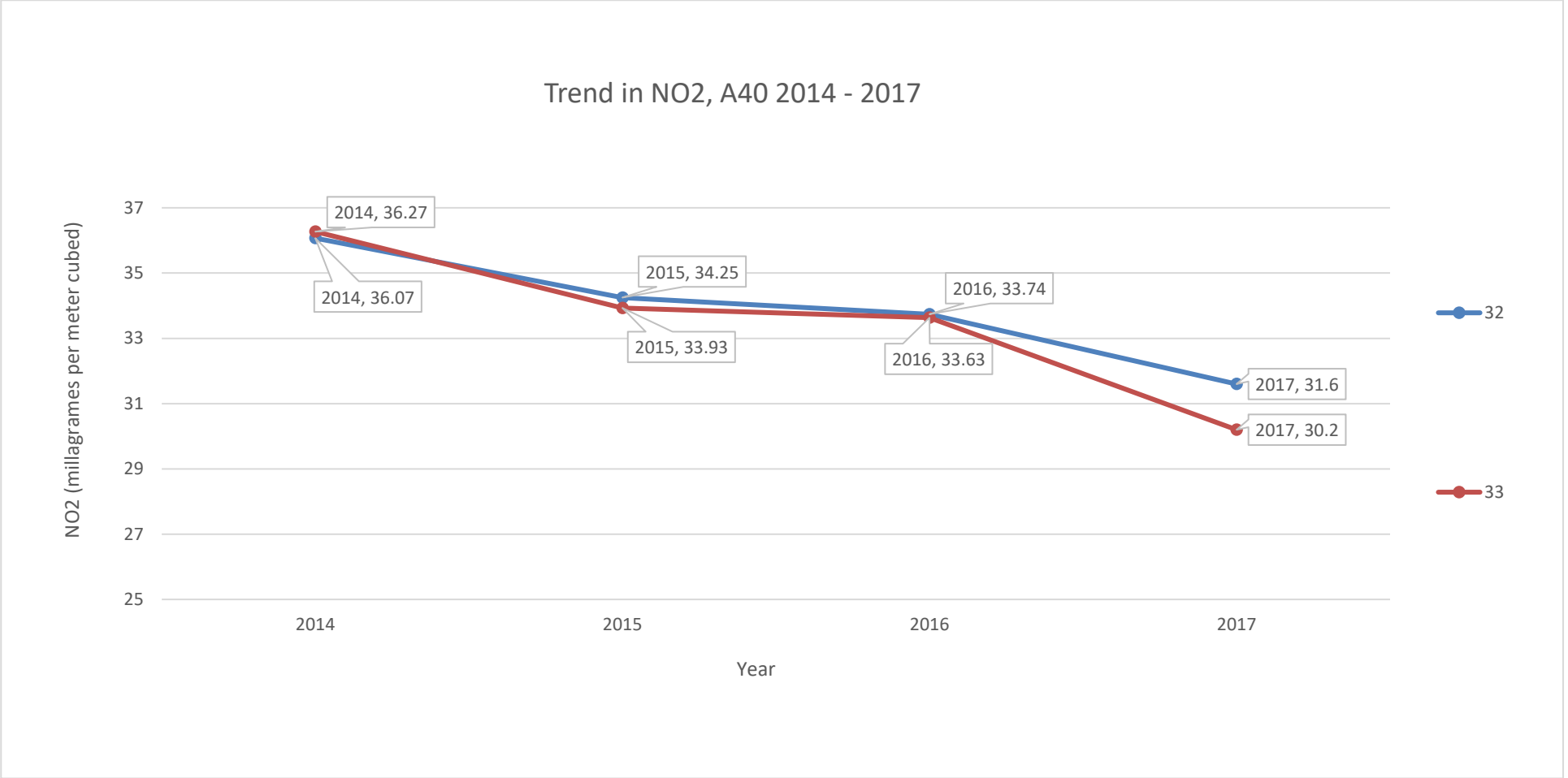


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2013	2014	2015	2016	2017
HRD1	Roadside	Automatic	98.8	98.8	-	-	-	-	**0**

Notes:

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.**

(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 99.8th percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2013	2014	2015	2016	2017
HRD1	Roadside	93.6	93.6	-	-	-	-	25

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ 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_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2013	2014	2015	2016	2017
HRD1	Roadside	93.6	93.6	-	-	-	-	10

Notes:

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.**

(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 90.4th percentile of 24-hour means is provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2017

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.89) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
6	37.8	30.5	26.3	22.3	25.1	25.0	16.6	17.6	22.9	24.7	24.8	34.8	25.7	22.9	24
9	55.8	47.9	37.8	39.0	40.3	25.0	27.6	27.0	31.3	23.1	31.1	42.7	35.7	31.8	NA
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA
22	46.6	38.3	34.9	33	32.1	22.7	13.3	19	22.3	24.3	17.9	36.1	28.4	25.3	NA
32	48.1	41.1	38.8	41.4	31.1	32.3	33	29.3	32.6	31.3	28	39.2	35.5	31.6	NA
33	41.7	40.9	37.6	33.7	38.2	38.4	35.2	31.1	32	32.6	13.9	32.5	34.0	30.2	NA
46	49.2	43.1	44.3	42.2	36.4	40.7	36.3	36.1	38.5	36	22.3	39.6	38.7	34.5	NA
53	44.8	37.4	38.2	34.9	37.1	32.9	33.3	30.6	28.7	30	15.9	32.9	33.1	29.4	NA
54	34.6	26.6	27	25.5	26.3	20.2	21.7	16.9	22	20.5	13	25.2	23.3	20.7	NA
57	45.4	33.7	34.1	30.4	32.4	24.7	26.6	26.1	29.2	26.4	15.4	35.2	30.0	26.7	29.3
59	35.2	25	24.9	20.9	21.5	16.4	22.9	23	24.9	21	n.d.	31.9	22.3	19.8	NA
61a	48.4	50	52.6	46.8	55.6	52.3	44.5	45.4	46.5	45	25.5	44.4	46.4	41.3	NA
61b	58.8	47.6	61.2	53.1	51.5	57.1	44.8	48.4	48.9	-	31.4	54.9	47.4	45.1	NA
65	49	41.9	36	42.7	38	27.1	31.4	24.4	30.4	28.9	26.7	36.1	34.4	30.6	33.9
74	33.7	24.6	22.3	23.6	17.7	14.8	18.1	14.6	20.4	20.7	14	26.46	20.9	18.6	NA
75	39.2	33.5	29.3	26.9	27.2	22.4	19	23.1	24.5	n.d.	21.7	29	24.7	21.9	28.8

79	53	42.2	39.2	35.3	30.2	27.8	8.9	29	31	28.7	17.7	36.9	33.7	30.0	30.5
82	36.8	28.6	28.4	23.2	25.7	17.8	21.2	16.8	n.d.	19	13.3	22.5	23.0	20.5	22.2
84	25.6	n.d	11.5	12.7	11.5	8	10.7	9	12.3	10.5	14.1	18.1	13.1	11.7	NA
85	20.2	12.5	9.6	6.1	7.8	4.8	6.4	5.8	9.4	5.1	6.4	12.3	8.9	7.9	NA
86	29.6	19.6	17.2	12.6	15.6	10.5	12.2	11.7	13.1	12.3	8.2	18.1	15.1	13.4	NA
87	n.d	n.d	37.4	36.1	38	29.6	34.2	27.8	33	28.6	38.1	37	34.0	30.2	NA
88	n.d	n.d	36.5	44.6	38.8	n.d.	31.5	30.2	34.6	33.1	42.8	45	37.5	33.3	NA
89	n.d	n.d	n.d	40.4	43.7	38	n.d.	32.6	39.6	36.9	36.1	41.9	38.7	36.57a	NA
90	n.d	n.d	n.d	33.5	29.1	27.2	28.8	26.3	9.2	23.6	13.2	35.5	27.2	26.21a	NA
91	n.d	n.d	n.d	37	38.4	n.d.	31.5	27.2	29.2	26.9	25.8	42.9	32.4	30.69a	NA
92	n.d	n.d	n.d	14.4	13.7	8.8	12.2	11.6	12.4	18.6	7.4	18.1	13.0	11.6	NA
93	n.d	n.d	n.d	12.1	12.2	9.4	13.1	11.5	14	12.5	9.6	14.4	12.1	10.8	NA

☒ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

☒ **Where applicable, data has been distance corrected for relevant exposure**

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.**

Herefordshire Council were unable to conduct any monitoring data for site 10 (7 Victoria Street, Hereford), however it is believed that the site will be operational in 2018.

(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 2017.

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

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

The bias adjustment factor applied to the results in 2017 was 0.89 (spreadsheet 03/17 v2) 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 2017. Tube precision was generally ‘Good’ throughout 2017.

Calculation for estimating PM2.5 from PM10 measurements

Step 1: Multiply PM10 recorded concentrations by nationally derived correction ratio

25µg/m3 x 0.7 = 17.5µg/m3

Step 2: Estimated annual mean PM2.5 = 17.5µg/m3

Table C.1 – Estimation of NO2 concentrations at the nearest receptor

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration (µg/m^3)		
	Monitoring Site to Kerb	Receptor to Kerb	Background*	Monitored at Site	Predicted at Receptor
6	0.2	2.0	16	22.9	20.5
9	NA				
10	NA				
22	NA				
32	NA				
33	NA				
46	NA				
53	NA				
54	NA				
57	0.3	0.8	16	26.7	25.0
59	NA				
61a	NA				
61b	NA				
65	1.4	5.2	16	30.6	26.4
74	NA				
75	1.3	12.0	16	21.9	19.1
79	1.0	7.0	16	30	24.5
82	1.3	3.4	8.0	20.5	17.9
84	NA				
85	NA				
86	NA				
87	NA				
88	NA				
89	2.2	6.6	16	36.6	31.2
90	2.1	7.1	16	26.2	23.3
91	1.1	4.2	16	30.7	26.6
92	NA				
93	NA				

Notes:
The background NO2 levels were identified using Defra background maps with the following grid references 350500, 240500 (Herefordshire sites) and 360500,224500 (Ross-on-Wye site).
Herefordshire Council were unable to conduct any monitoring data for site 10 (7 Victoria Street, Hereford), however it is believed that the site will be operational in 2018.

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

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

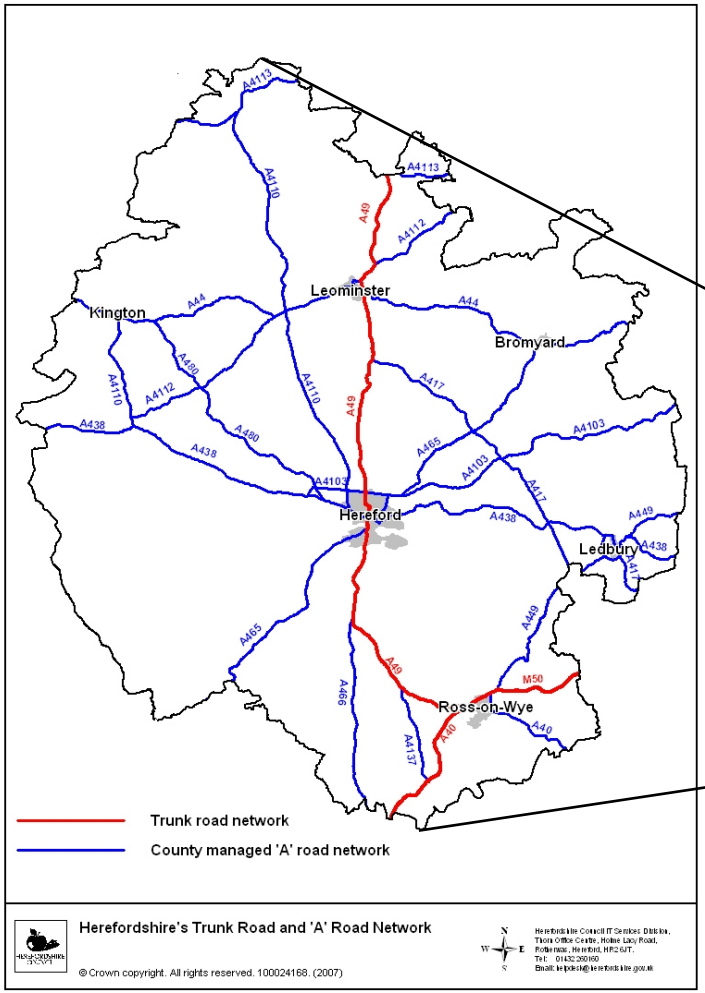


Figure D.2 – Location of Herefordshire

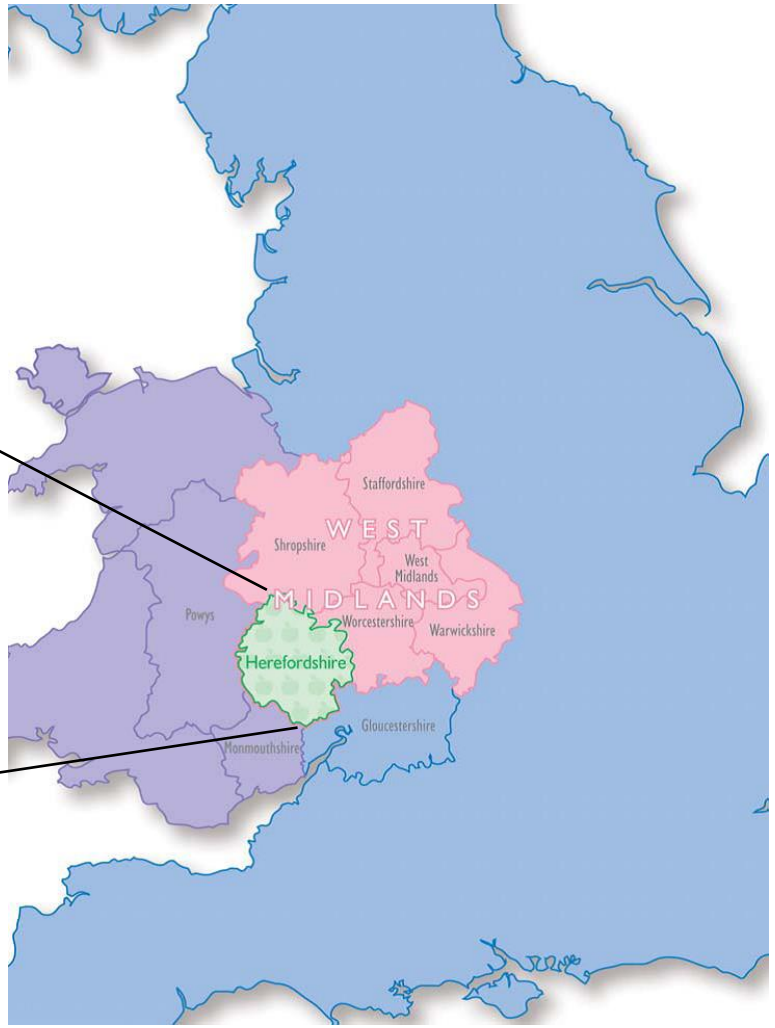


Figure D.3 – Hereford AQMA Boundary

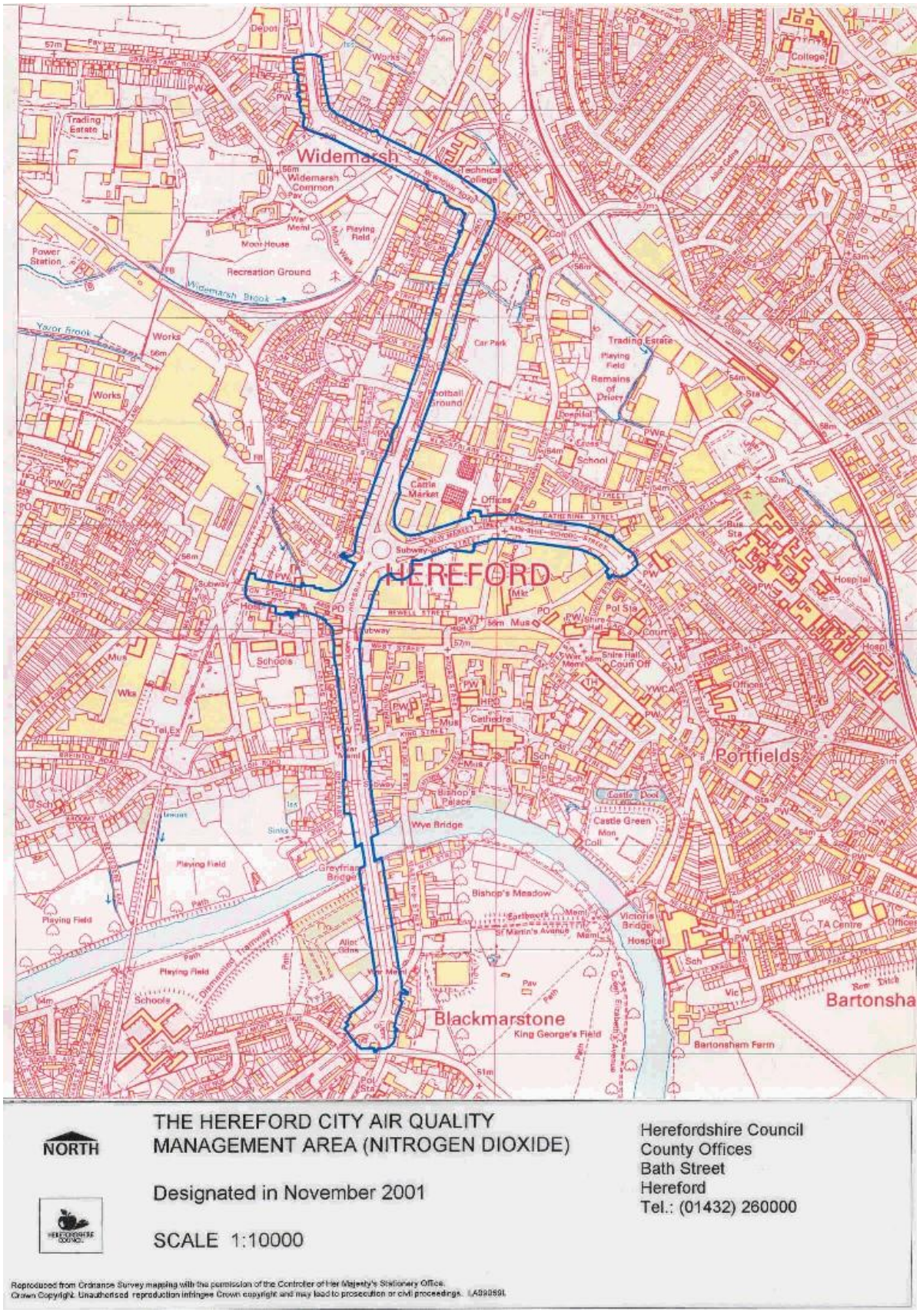


Figure D.4 – Hereford City (North) Monitoring Locations

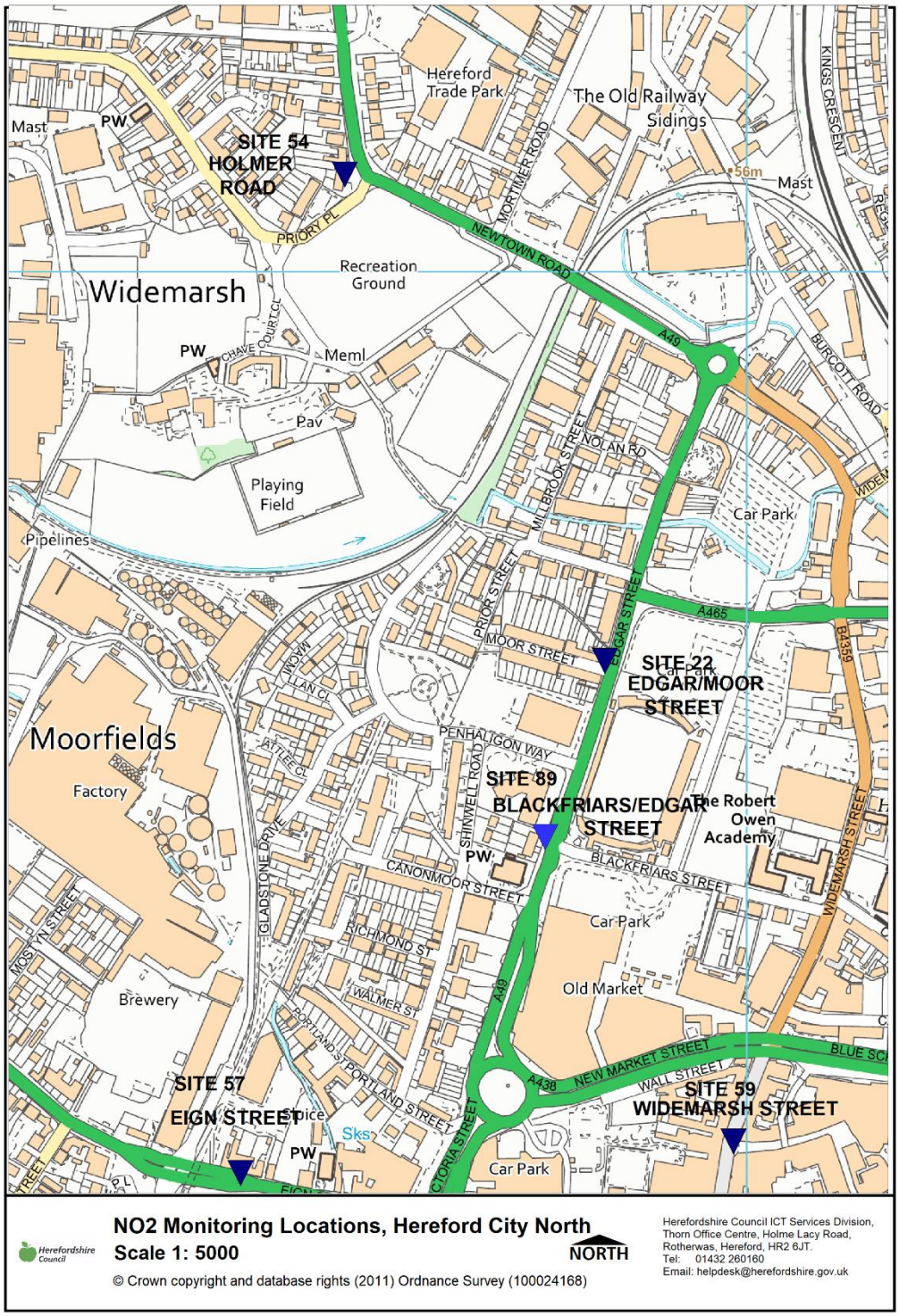


Figure D.5 – Hereford City (South) Monitoring Locations

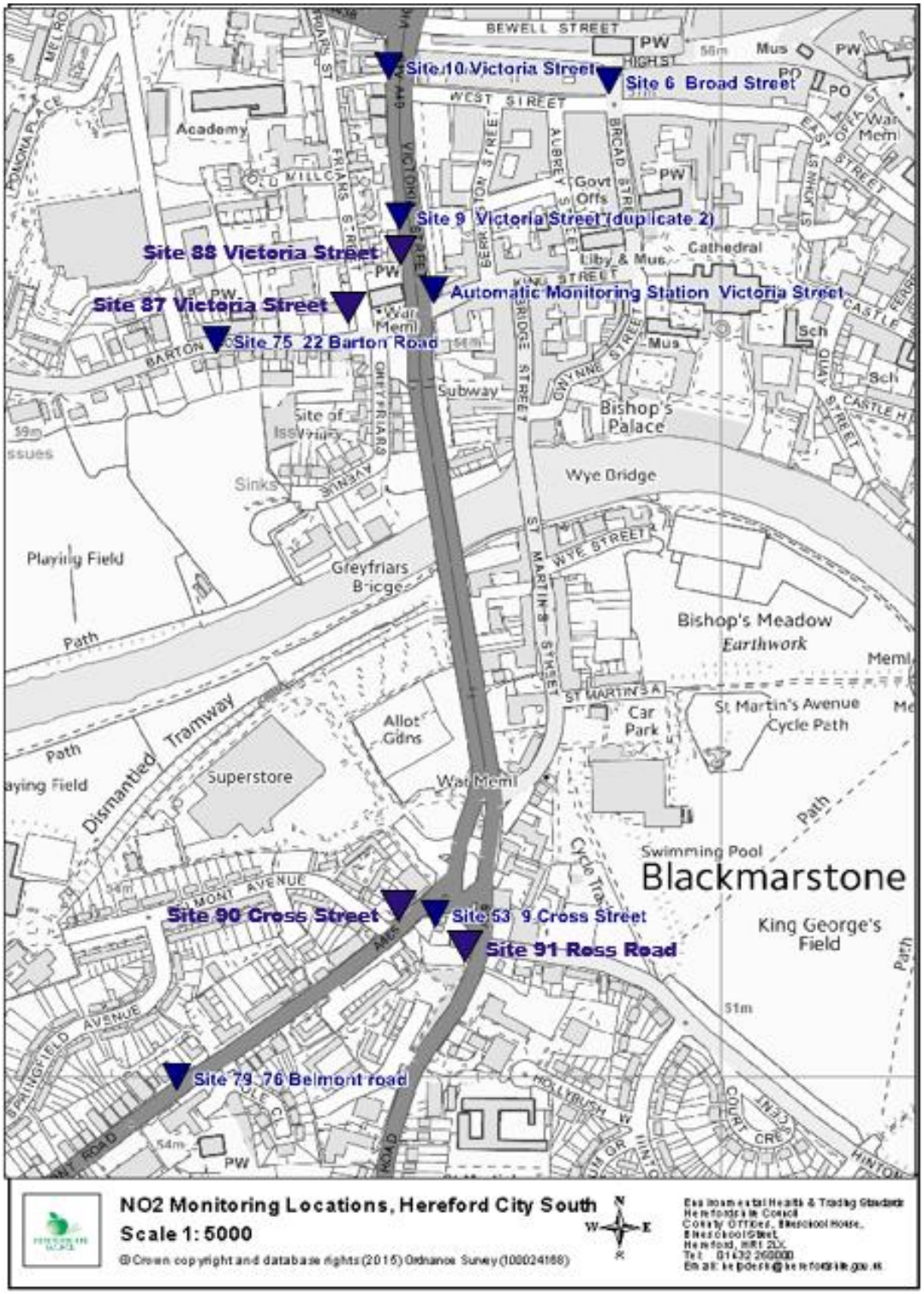


Figure D.6 – Rotherwas, Hereford Monitoring Locations

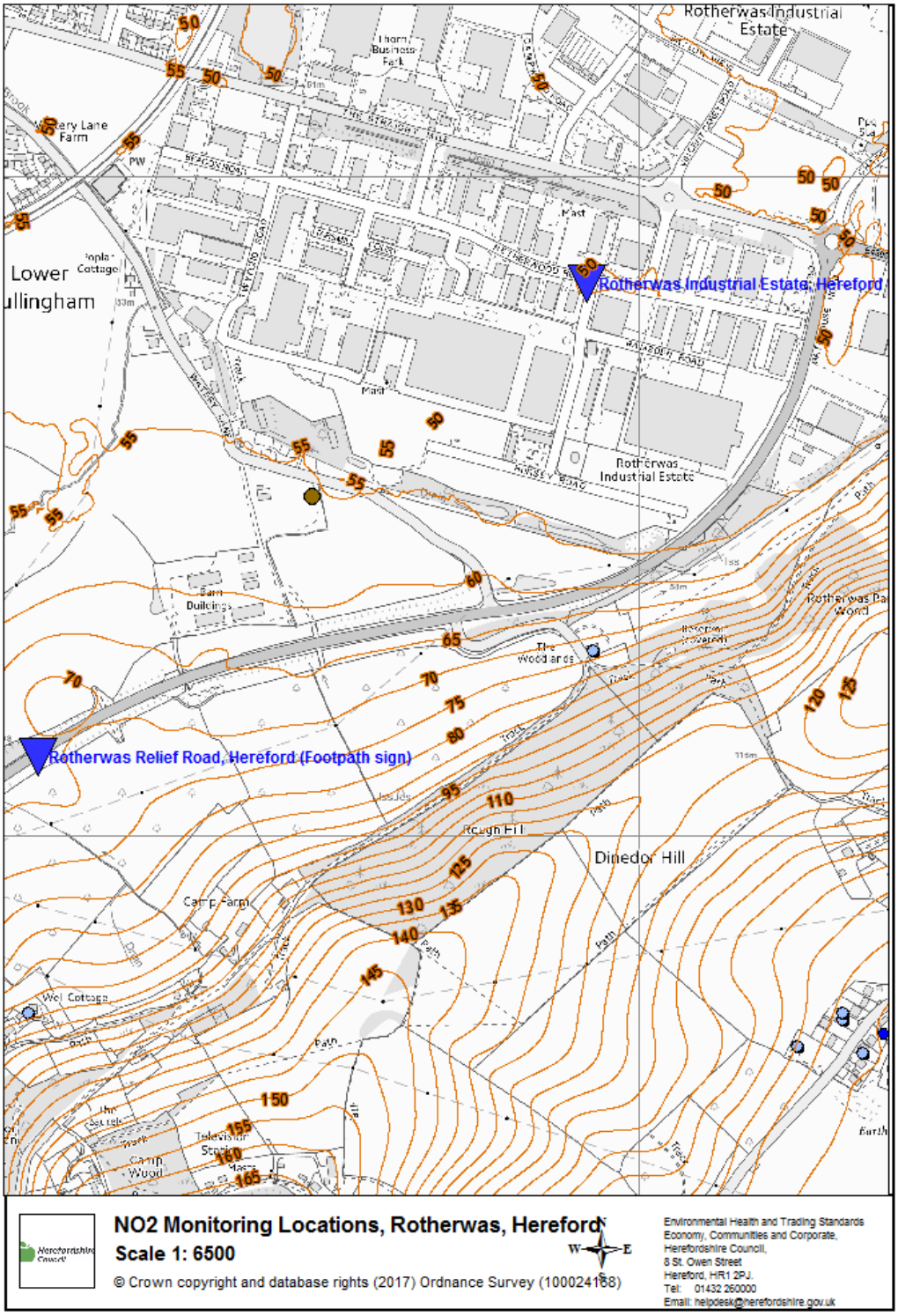


Figure D.7 – Whitecross Road, Hereford Monitoring Locations

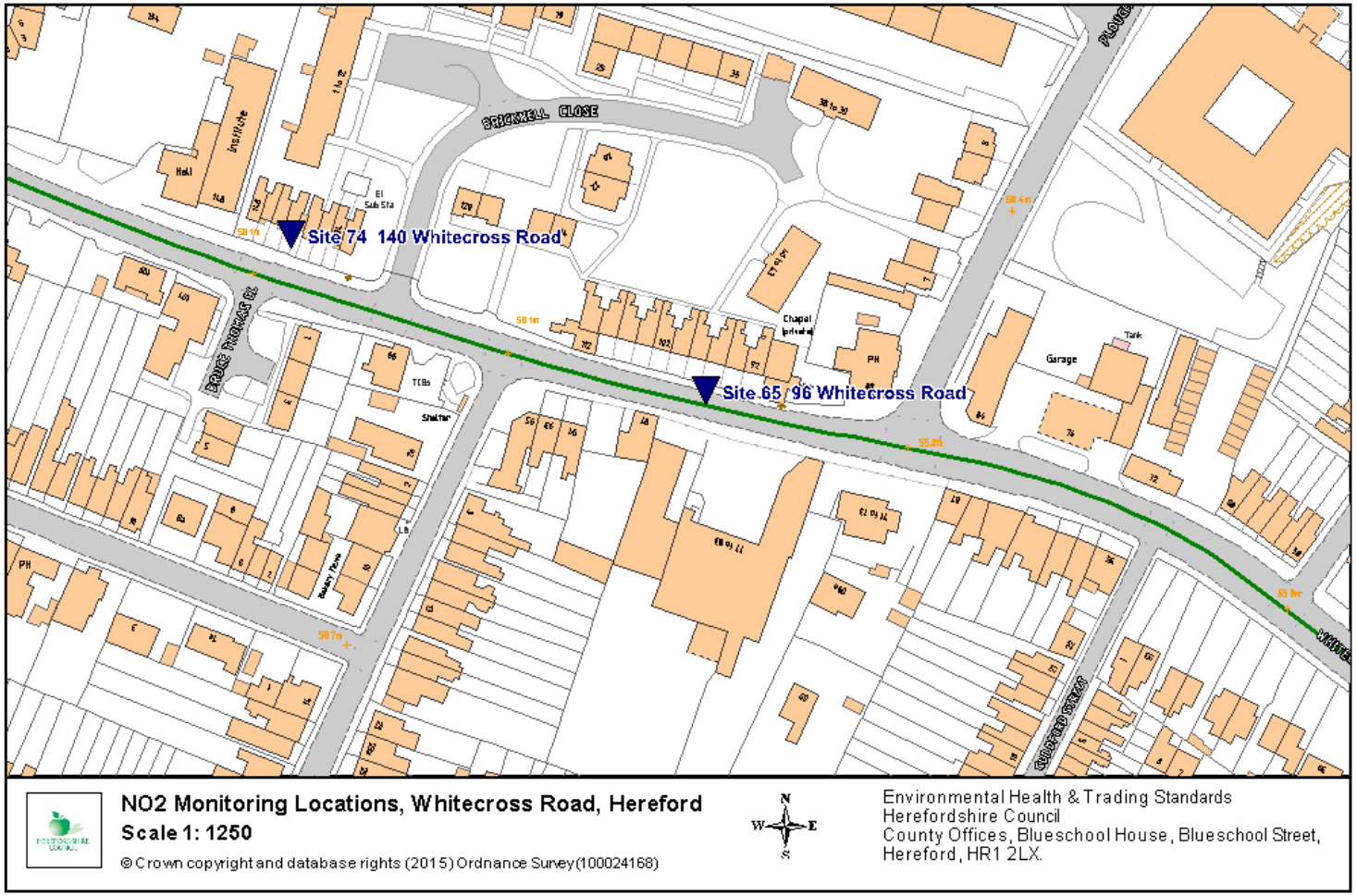
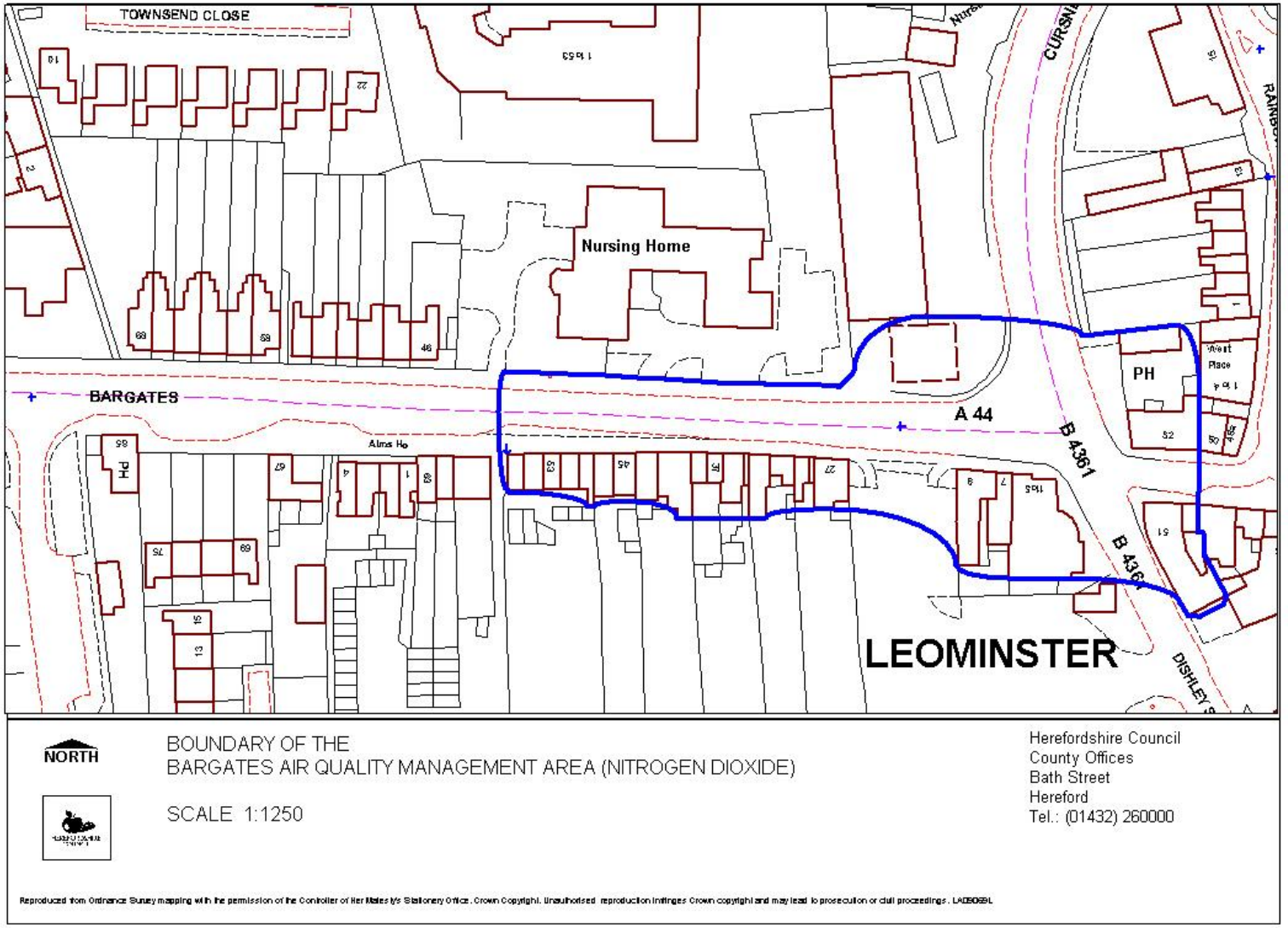


Figure D.8 – Leominster AQMA Boundary



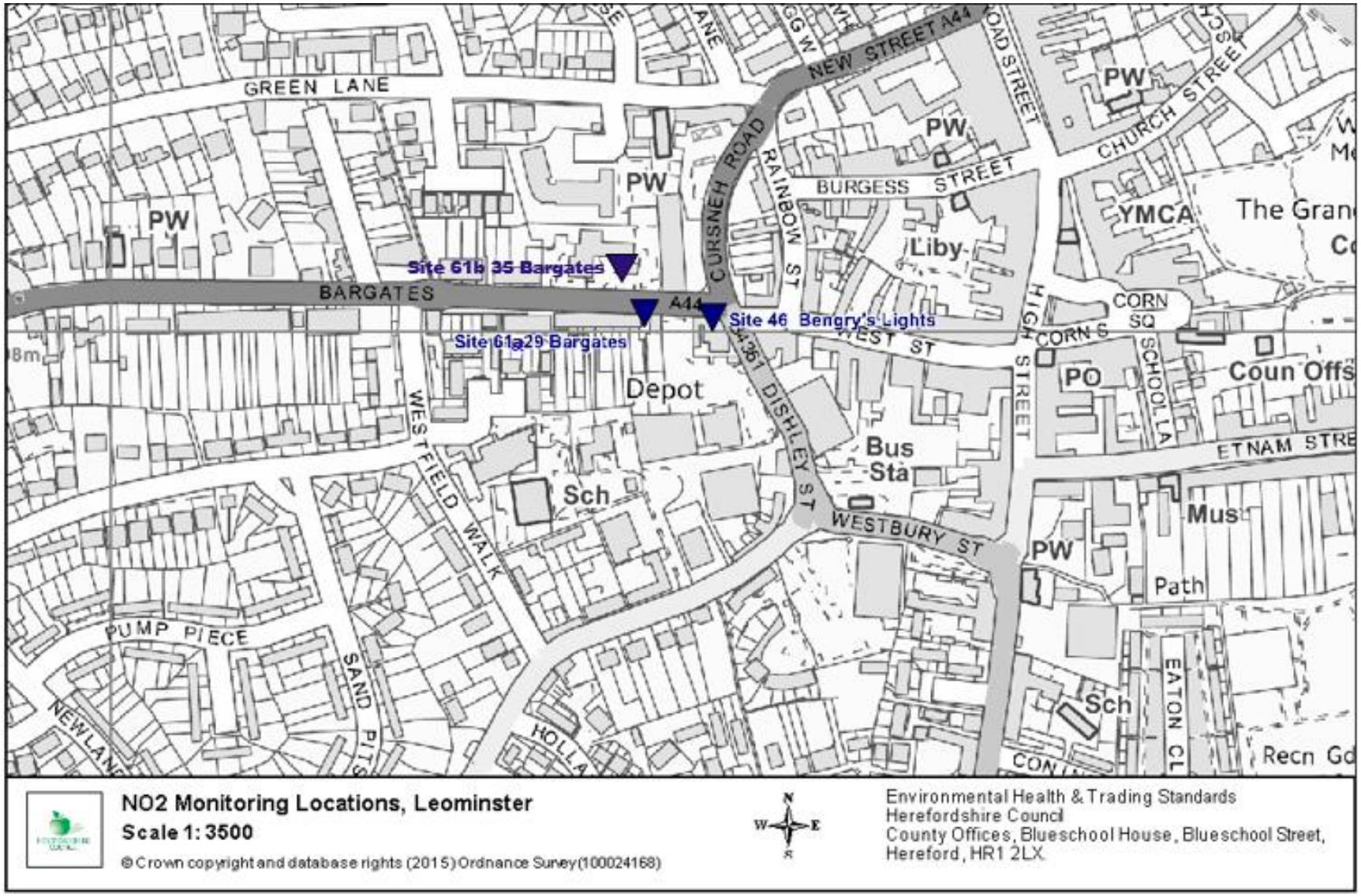


Figure D.9 – Leominster Monitoring Locations

Figure D.10 – A40 Corridor, Ross-on-Wye Monitoring Locations

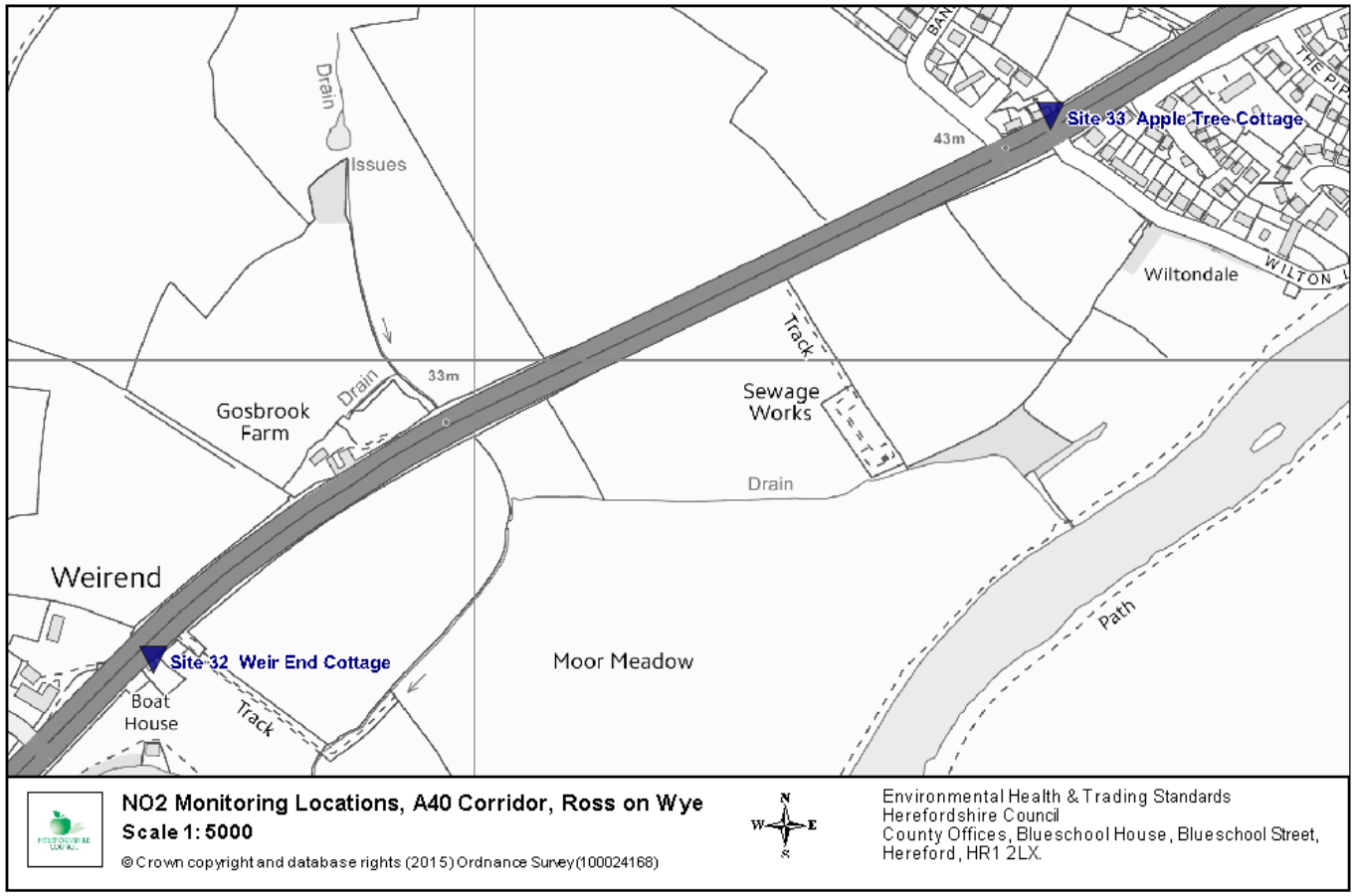


Figure D.11 – Ross-on-Wye Monitoring Locations

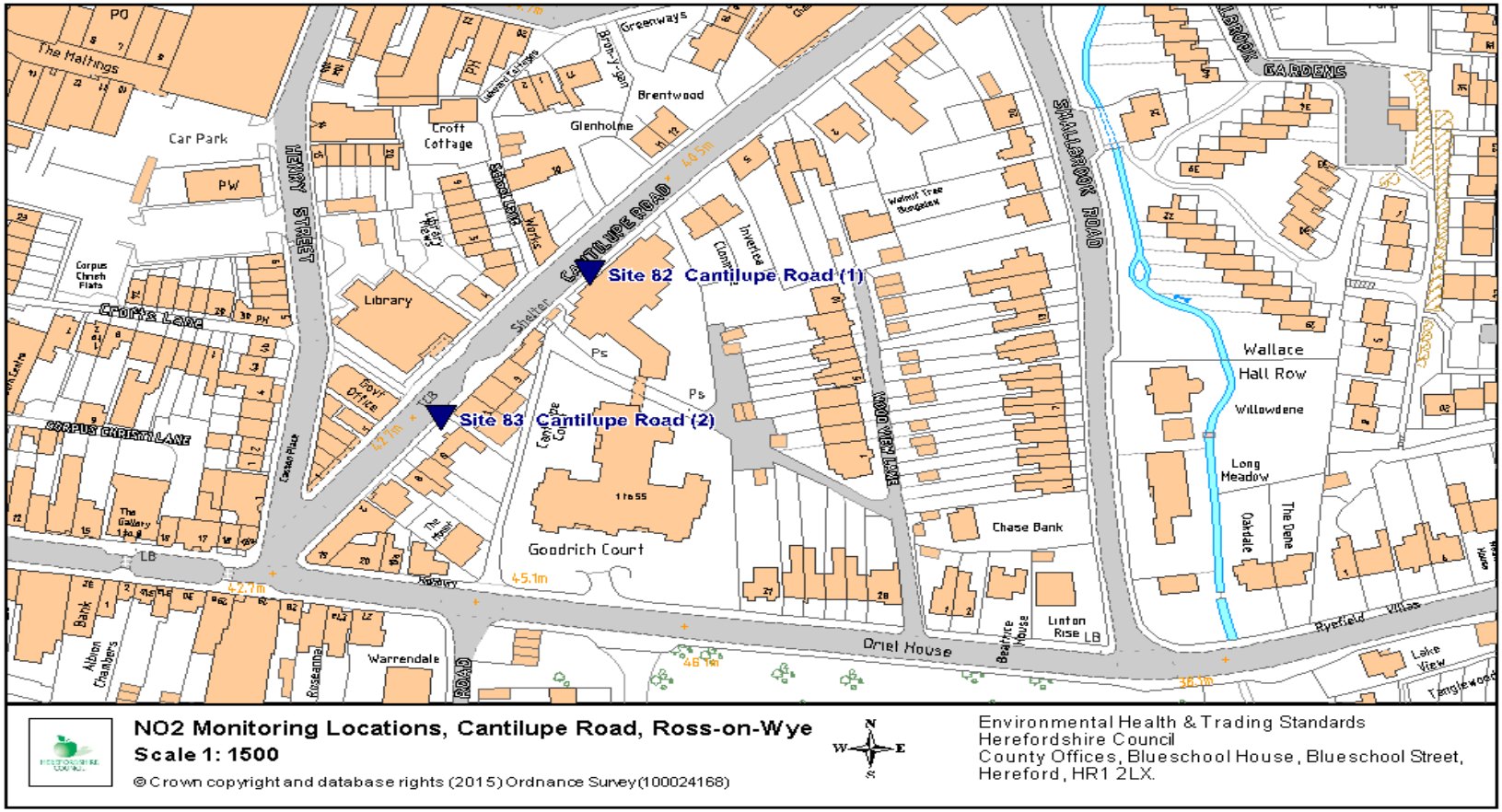


Figure D12 – Kings Acre Road, Huntington Lane and Three Elms Road Monitoring Locations

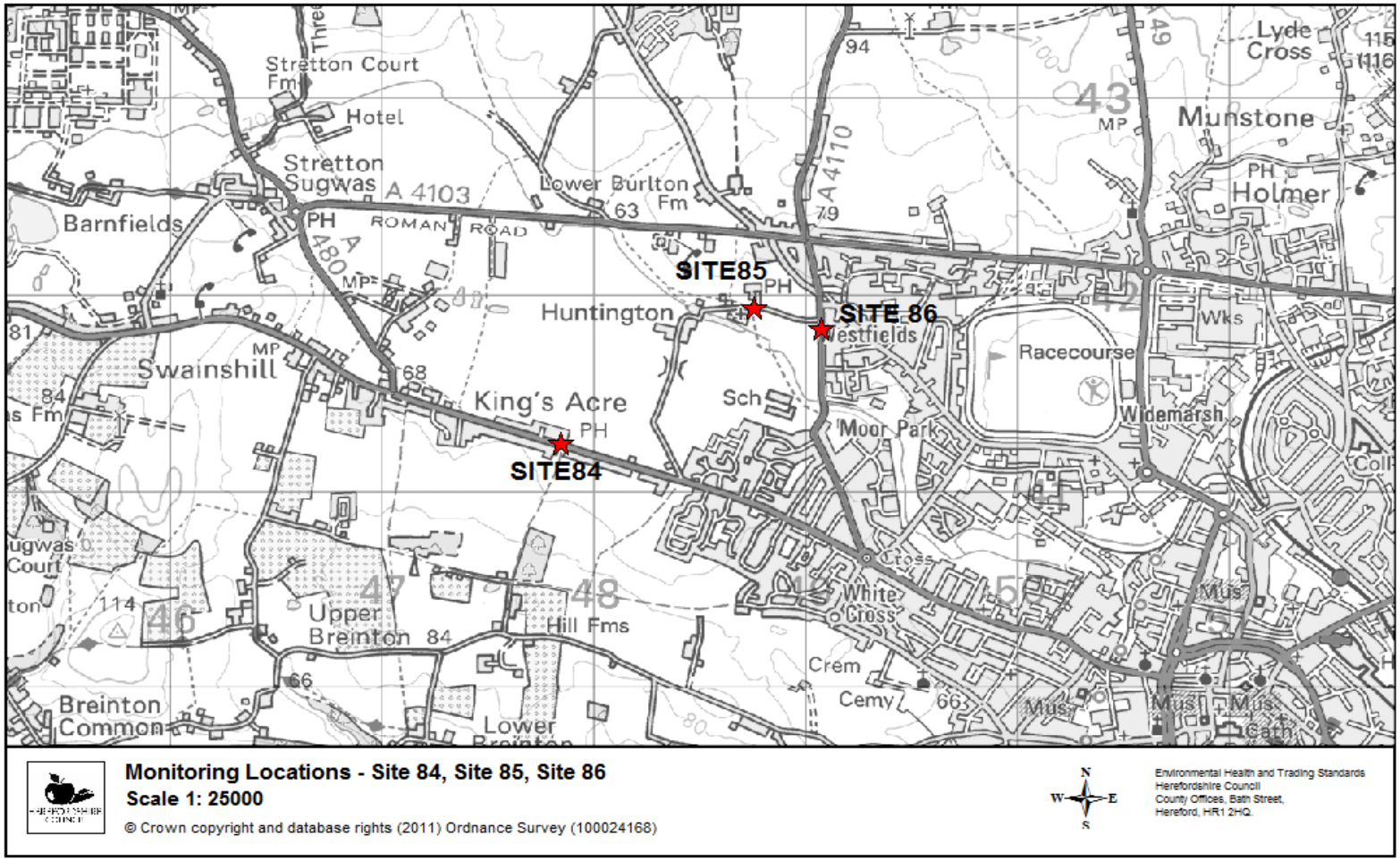
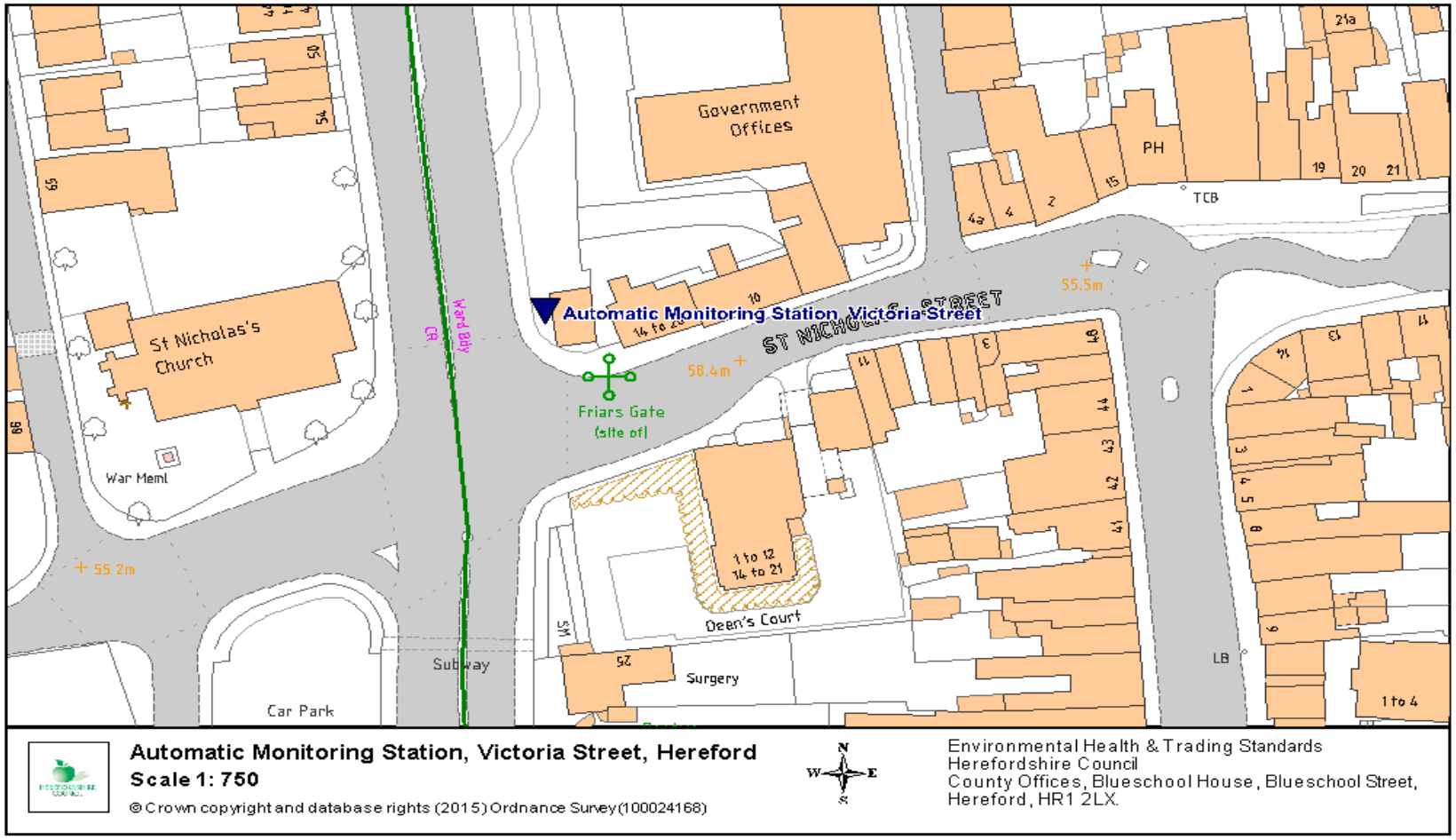


Figure D13 – Location of Automatic Monitoring Station, Hereford



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[5]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[5] 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	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_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

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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

Herefordshire Local Plan Core Strategy 2011-2031, Herefordshire Council, Adopted 2015
https://www.herefordshire.gov.uk/info/200185/local_plan/137/adopted_core_strategy/2

Local Transport Plan 2016 – 2031 Strategy

https://www.herefordshire.gov.uk/directory_record/2093/local_transport_plan_2016-2031

Fine Particulate Matter ($PM_{2.5}$) in the United Kingdom, AQEG, 2012