2021 Air Quality Annual Status Report (ASR)

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

Date: August, 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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

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

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

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

In 2020, the ratified continuous monitored nitrogen dioxide annual mean was 31µg/m^3 for Hereford AQMA (site HRD1). From 2019 to 2020, the nitrogen dioxide levels at site HRD1 have decreased by 7µg/m3. The Bargates AQMA is monitored using three diffusion tubes

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1 Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

3 Defra. Air quality appraisal: damage cost guidance, July 2020

4 Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

at three various locations within the AQMA. The highest nitrogen dioxide annual mean concentration, of the three sites, for 2020 was 35.4µg/m^3 at site 61b (35 Bargates, Leominster). From 2019 to 2020, the nitrogen dioxide levels at site 61b have decreased by 10.63µg/m^3.

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

All monitored sites have shown a reduction in levels of NO_2 from 2019 to 2020. This is due to the global pandemic COVID-19 (see Appendix F for more information).

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

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy *5* sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero *6* sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

5 Defra. Clean Air Strategy, 2019

6 DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Bargates Air Quality Action Plan

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

The Major Infrastructure Projects

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

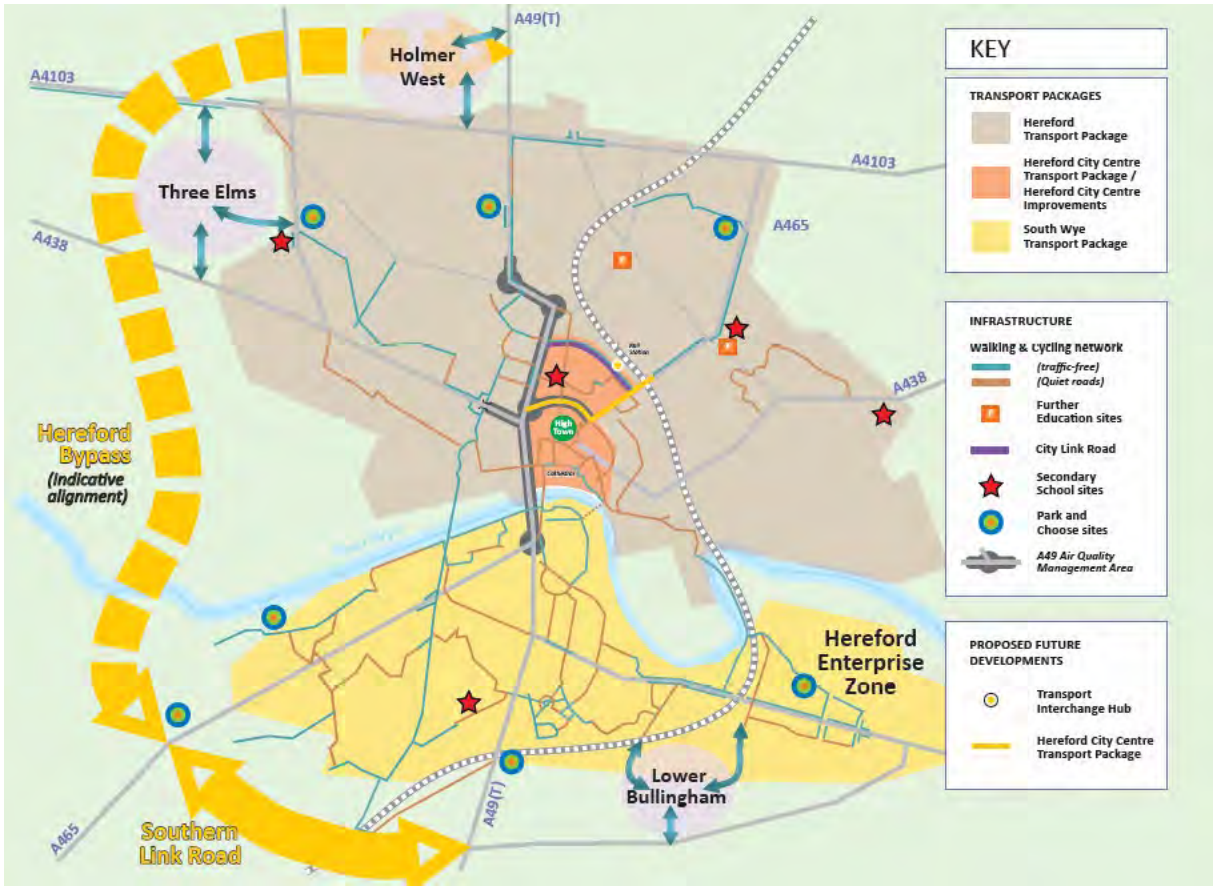

Figure 1: *Major transport projects geographical scope in Hereford*

Hereford City Centre Transport Package

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

South Wye Transport Package

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

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

Hereford Transport Package

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

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

Market Town Studies

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

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

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

Local Cycling and Walking Infrastructure Plan (LCWIP)

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

Destination Hereford

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

Sustainable Modes of Travel to School Strategy (SMOTS)

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

Active Travel measures

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

These include:

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

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

Other Relevant Policies:

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

Conclusions and Priorities

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

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

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

Other Priorities for Herefordshire include:

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

Local Engagement and How to get Involved

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

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

7 Local Transport Plan 2016 – 2031 Strategy

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* 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 Council during 2020. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

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

2 Actions to Improve Air Quality

Air Quality Management Areas

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

A summary of AQMAs declared by Herefordshire Council can be found in Table 2.1. The table presents a description of the 2 AQMAs that are currently designated within Herefordshire Council. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the Herefords AQMA are as follows:

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

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

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA Hereford	Declared 23/11/2001	NO2 Annual Mean	The A49(T) corridor in Hereford, extending from Holmer Road in the north to Belmont Road in the south and extending east along New Market/Blue School Street and west along Eign Street as far as Barton Yard.	YES	47µg/m^3	31µg/m^3	Hereford Action Plan 2008	http://aqma.defra.gov.uk/action-plans/HC%20AQAP%202008.pdf
AQMA Bargates	Declared 01/03/2006	NO2 Annual Mean	An area encompassing the junction between the A44 Bargates and B4361 Dishley Street/Cursneh Road in Leominster.	NO	61 µg/m^3	35.4µg/m^3	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 AQMAs is up to date.**

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

Progress and Impact of Measures to address Air Quality in Herefordshire

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. The Air Quality Action Plans will be reviewed before next year's ASR (2022).
- The text within the QA/QC of Diffusion Tube Monitoring section had not been updated. This section has been updated.
- Defra identified that the base of the maps provided in 2020 ASR were of low quality. These maps have been updated and the text at the base of the maps changed to a higher standard of quality.
- Defra asked that Herefordshire Council update the air quality measure table for Bargates action plan. This table has been updated accordingly.

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. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

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

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

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

- Continue to monitor and review both the Hereford and Leominster AQMA's
- Identify and review other locations in Herefordshire that may benefit from additional monitoring considering identified sites in the core strategy.

- Review the Air Quality Action Plans for Herefordshire including setting emission reduction targets and providing more discussion on the progress of each measure.
- Comment on planning applications for major housing, road schemes and industrial installations in relation to air quality.
- Continue to inspect Local Authority Permitted installations.

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

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

Table 2.2 – Progress on Measures to Improve Air Quality

Hereford Action Plan

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	**Funding Source**	**Defra AQ Grant Funding**	Funding Status	**Estimated Cost of Measure**	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Edgar Street Grid Re-development	Traffic Management	Reduction of speed limits, 20mph zones	2009	2025	Herefordshire Council & Advantage West Midlands formed ESG Herefordshire Ltd	Mostly developer funded, along with Herefordshire Council	NO	-	-	Completed	NO_2 levels at the city centre sites have been gradually reducing since 2007, although this cannot be attributed to the actual re-development.	Trends in diffusion tube results	"Old Market" retail area development completed 2015.	
2	Improvement of A4103 road west of Herefordshire	Transport Planning and Infrastructure	Other	2003	2008	Herefordshire Council - Highways and Transportation Service	Herefordshire Council - Highways and Transportation Service	NO	-	-	Completed	Since 2007 NO_2 levels along the Roman Road have been below the objective. Annual Average Daily Flow trends (AADT) along the Roman Road indicate a continuing increase of traffic since the completion of the improved road and an increase in HGVs until 2008 with a slight reduction in 2009.	Not Applicable	Road completed 2005.	
3	Rotherwas Access Road Link	Transport Planning and Infrastructure	Other	2003	2008	Herefordshire Council - Highways and Transportation Service	Herefordshire Council - Highways and Transportation Service and Advantage West Midlands	NO	-	-	Completed	Annual Average Daily Flow trends (AADT) show a reduction in HGVs from 1045 in 2008 to 964 in 2009 however total motor vehicles has increased	Annual Average Daily Flow trends (AADT) and diffusion tubes	Completed June 2008.	
4	City Link Road Hereford	Transport Planning and Infrastructure	Other	2008	Construction complete December 2017.	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO	-	-	Completed	NO_2 levels at the city centre sites have been gradually reducing since 2007	Annual Average Daily Flow trends (AADT) and diffusion tubes	Completed in 2017.	
5	New Outer Distributer road (3rd Link) Hereford Relief Road	Transport Planning and Infrastructure	Other	2006	Constructed by 2031	Herefordshire Council – Highways and Transportation Service	Herefordshire Council	NO	-	-	Implementation	N/A	Annual Average Daily Flow trends (AADT) and diffusion tubes	Work ongoing.	
6	Install and implement a new transport system on A49 and its feeder roads	Transport Planning and Infrastructure	Other	2005	Ongoing	Highway Agency and Herefordshire Council – Highways and Transportation Service	Herefordshire Council	NO	-	-	Implementation	N/A	Annual Average Daily Flow trends (AADT) and diffusion tubes	Ongoing	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	**Funding Source**	**Defra AQ Grant Funding**	Funding Status	**Estimated Cost of Measure**	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
7	Alteration of traffic management at the Belmont Roundabout	Traffic Management	Other	2005	Complete	Highway Agency	s.106	NO	-	-	Completed	The diffusion tube measurements at this roundabout were showing exceedances of the NO_2 objective in 2006 and 2007 although levels were falling. However, a noticeable reduction occurred in 2008 and 2009, to a level well below the objective level.	Diffusion tube at the roundabout	Completed in 2006. New signals are now fully integrated into the Council's SCOOT system and the infrastructure improvements have greatly improved traffic movements	
8	"North & South" Park and ride Scheme in Hereford	Alternatives to private vehicle use	Bus based Park & Ride	2001	Not Applicable	Herefordshire Council – Highways and Transportation Service	Herefordshire Council	NO	-	-	Aborted	N/A	Annual Average Daily Flow trends (AADT) and diffusion tubes	No longer being taken forward.	
9	Parking Strategy in Hereford to reduce commuter parking	Traffic Management	Other	2001	Not Applicable	Herefordshire Council – Highways and Transportation Service and Planning Services	Herefordshire Council	NO	-	-	Aborted	N/A	Annual Average Daily Flow trends (AADT) and diffusion tubes	No longer being taken forward. Alternative parking strategy in place.	
10	Improve and increase number of cycle routes and facilities in Hereford	Transport Planning and Infrastructure	Cycle network	2004	Rotherwas Cycle Link currently in progress – Completed Dec 2013	Herefordshire Council – Highways and Transportation Service	Herefordshire Council	NO	-	-	Completed	NO_2 levels at the city centre sites have been gradually reducing since 2007	Diffusion tubes	1.5km of the Great Western Way was completed in 2008 along with a cycle lane along Aylestone Hill. Connect 2 Rotherwas Cycle Link completed.	
11	City Centre Pedestrian Enhancement in Hereford	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2005	Complete	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO	-	-	Completed	NO_2 levels at Site 6 (Broad Street) and site 59 (Widemarsh St) have remained at or below 75% of the objective for the last 5 year trend, following the introduction of the scheme. Sites 12, 13 and 14 (Edgar Street) are no longer monitored.	Diffusion tubes at Wide-marsh Street, Broad Street and Edgar Street sites	Completed in 2006.	
12	Behavioural Change Programme	Promoting Travel Alternatives	Workplace Travel Planning	2004	Ongoing	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO	-	-	Implementation	N/A	Diffusion tubes	Ongoing programme of promotions and initiatives. Examples include Bike ability Training and the promotion of TwoShare, Destination Herefordshire.	
13	Designation of a Traffic manager for network management Duties along the A49 in Hereford	Traffic Management	Other	2007	Complete	Highway Agency and Herefordshire Council	Herefordshire Council	NO	-	-	Completed	NO_2 levels at the sites along the A49 have been gradually reducing since 2007.	Diffusion tubes along A49 corridor	Completed in 2008.	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	**Funding Source**	**Defra AQ Grant Funding**	Funding Status	**Estimated Cost of Measure**	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
14	Continue to implement Vehicle Emission Testing in Hereford	Traffic Management	Testing Vehicle Emissions	2008	This project has been completed. No plans for further testing.	Herefordshire Council - Environmental Health and Trading Standards. Liaison with Vehicle and Operator Services Agency (VOSA)	Herefordshire Council and VOSA	NO	-	-	Completed	A continual improvement in exhaust emissions with the Hereford AQMA noted each year. No failures in 2006 and 2007.	Review of project dependent upon number of vehicles failing.	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.	
15	Information and awareness raising	Public Information	Via the Internet	2008	Ongoing	Herefordshire Council - Environmental Health and Trading Standards. Liaison with Herefordshire PCT	Herefordshire Council	NO	-	-	Implementation	N/A	Number of hits on the website.	Ongoing	

Bargates Action Plan

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	**Funding Source**	**Defra AQ Grant Funding**	Funding Status	**Estimated Cost of Measure**	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Improvements to the traffic light sequencing at the A44/B4361 junction at Bargates	Transport Planning and Infrastructure	Other	2013	2016	Herefordshire Council - Highways and Transportation Service	Herefordshire Council, s.106	NO	-	-	Completed	No measureable improvements	Reduction of NO_2 levels at diffusion tubes	Report commissioned reviewing the best options for the junction arrangement and works were completed in 2017	
2	Improvements to cycle facilities/ routes between Morrisons Store and the Town centre	Transport Planning and Infrastructure	Cycle network	2014	2014-2016	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO	-	-	Completed	No measurable improvements	Reduction of NO_2 levels at diffusion tubes		
3	Improvements to the public transport facilities between Morrisons Store and the Town centre	Transport Planning and Infrastructure	Other	2014	2016	Herefordshire Council - Highways and Transportation Service	Herefordshire Council, s. 106	NO	-	-	Completed	No measureable improvements	Reduction of NO_2 levels at diffusion tubes		
4	Improve and increase number of pedestrian routes and facilities in Leominster	Transport Planning and Infrastructure	Other	2014	Not Applicable	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO	-	-	Implementation	N/A	Reduction of NO_2 levels at diffusion tubes	Awaiting S106 monies.	Awaiting S106 monies.
5	Behavioural Change Programme	Promoting Travel Alternatives	Promotion of walking	2014	Ongoing	Herefordshire Council - Highways and Transportation Service	Herefordshire Council	NO	-	-	Implementation	N/A	Reduction of NO_2 levels at diffusion tubes	Work ongoing.	
6	Behavioural Change Programme	Promoting Travel Alternatives	Promotion of cycling	2014	Ongoing	Herefordshire Council - Environmental Health and Trading Standards. Liaison with Public Health.	Herefordshire Council	NO	-	-	Implementation	N/A	Reduction of NO_2 levels at diffusion tubes	Work ongoing.	
7	Development of the southern Relief Road	Transport Planning and Infrastructure	Other	2011	Not set	Herefordshire Council	Herefordshire Council	NO	-	-	Implementation	N/A	Reduction of NO_2 levels at diffusion tubes	Ongoing	

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

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

There are many different sources of $PM_{2.5}$, 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.[8]

Health based objective levels for $PM_{2.5}$'s have not yet been set for local authorities. The EU limit value for $PM_{2.5}$ is 25µg/m^3 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 2019 (the most up to date figures) states that the fraction of mortality in Herefordshire attributable to anthropogenic (man-made) PM2.5 particulate air pollution is 4.2% of all deaths. The average for this indicator in the West Midlands is 5.3% and in England is 5.1%.

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. $PM_{2.5}$'s are measured at some of the network of AURN sites. The closest AURN monitoring site to Herefordshire that measures $PM_{2.5}$ is Chepstow on the A48, this is an urban traffic site. Therefore, it is difficult to draw direct comparisons to Herefordshire.

It has been recognised that the cost of monitoring for $PM_{2.5}$'s can be prohibitive. Therefore, other methods of estimating the likely $PM_{2.5}$ levels in Herefordshire have been considered to establish an overview of the possible levels.

8 Fine Particulate Matter PM 2.5 in the United Kingdom, AQEG, 2012

Background mapping of $PM_{2.5}$ 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 5.95µg/m^3 and 9.59µg/m^3.

Calculations can be undertaken to estimate the $PM_{2.5}$ fraction from PM_{10} monitoring data. The monitoring data for PM_{10}'s at the Victoria Street location in 2020 was 22µg/m^3 (as measured by a BAM using a gravimetric factor of 0.833 for Indicative Gravimetric Equivalent). The data capture for PM_{10} in 2020 was 79.8%. Further, $PM_{2.5}$ was estimated based on the recorded PM_{10} measurements, using the calculation method detailed in LAQM.TG16. As such, the estimated annual mean of $PM_{2.5}$ in 2020 was 15.4µg/m^3. It should be noted that this estimation would only give an indication of $PM_{2.5}$'s at the roadside location in the Hereford AQMA (a worst-case scenario). For further information on the calculation used to estimate $PM_{2.5}$ from PM_{10} measurements please refer to Appendix C.

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

- Ensure $PM_{2.5}$'s are considered at the planning application stage for relevant development
- Inspection of Local Authority Permitted installations
- Review AQAP's to include additional actions for $PM_{2.5}$
- Consider the need for background monitoring of $PM_{2.5}$

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

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

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

This section sets out the monitoring undertaken within 2020 by Herefordshire Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Herefordshire Council undertook automatic (continuous) monitoring at HRD1 site (Victoria Street in Hereford city centre) during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. 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 continuous monitors Nitrogen Dioxide and Ozone. During 2020, the annual mean Nitrogen Dioxide levels was 7µg/m^3 (data capture 99.4%) and the annual mean Ozone levels was 54µg/m^3 (data capture 99.5%). 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 (i.e. passive) monitoring of NO_2 at 46 sites during 2020 using diffusion tubes. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.1.3 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Figure A.1.3 – Trends in Annual Mean NO_2 Concentrations Hereford AQMA (3)

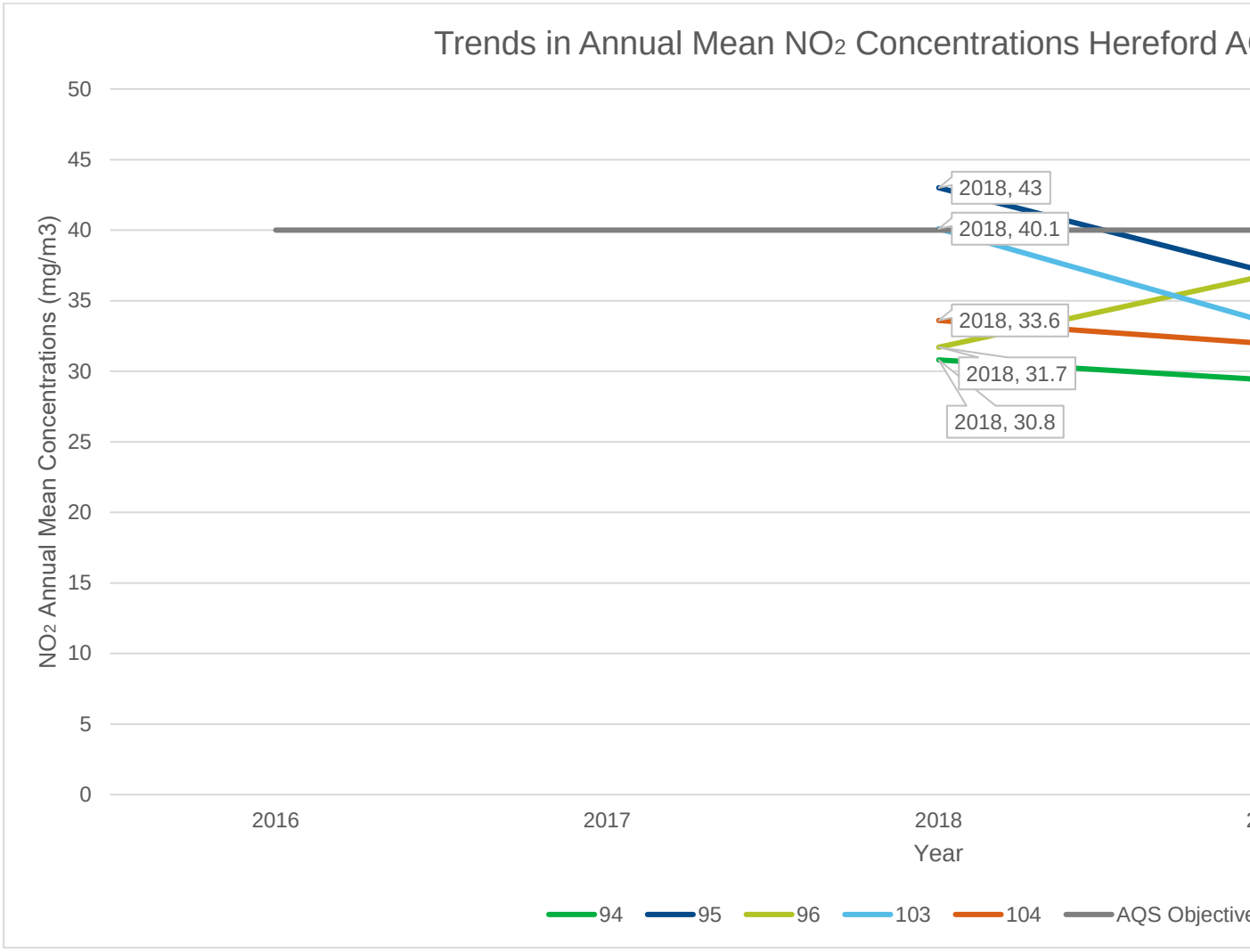


Figure A.1.4 – Trends in Annual Mean NO_2 Concentrations in Hereford's AQMA Boundary

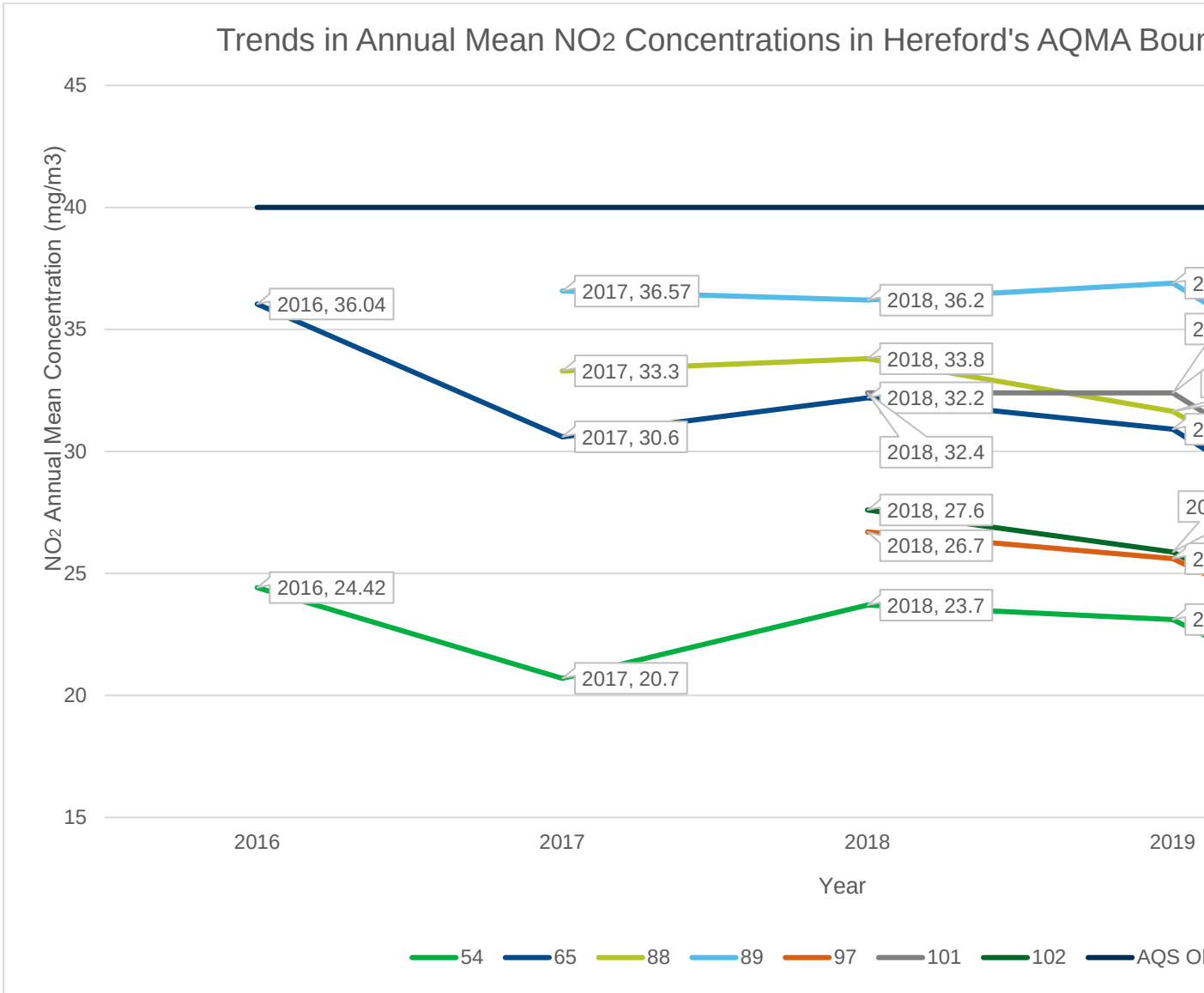


Figure A.1.5 – Trends in Annual Mean NO_2 Concentrations in Hereford, outside AQMA (1)

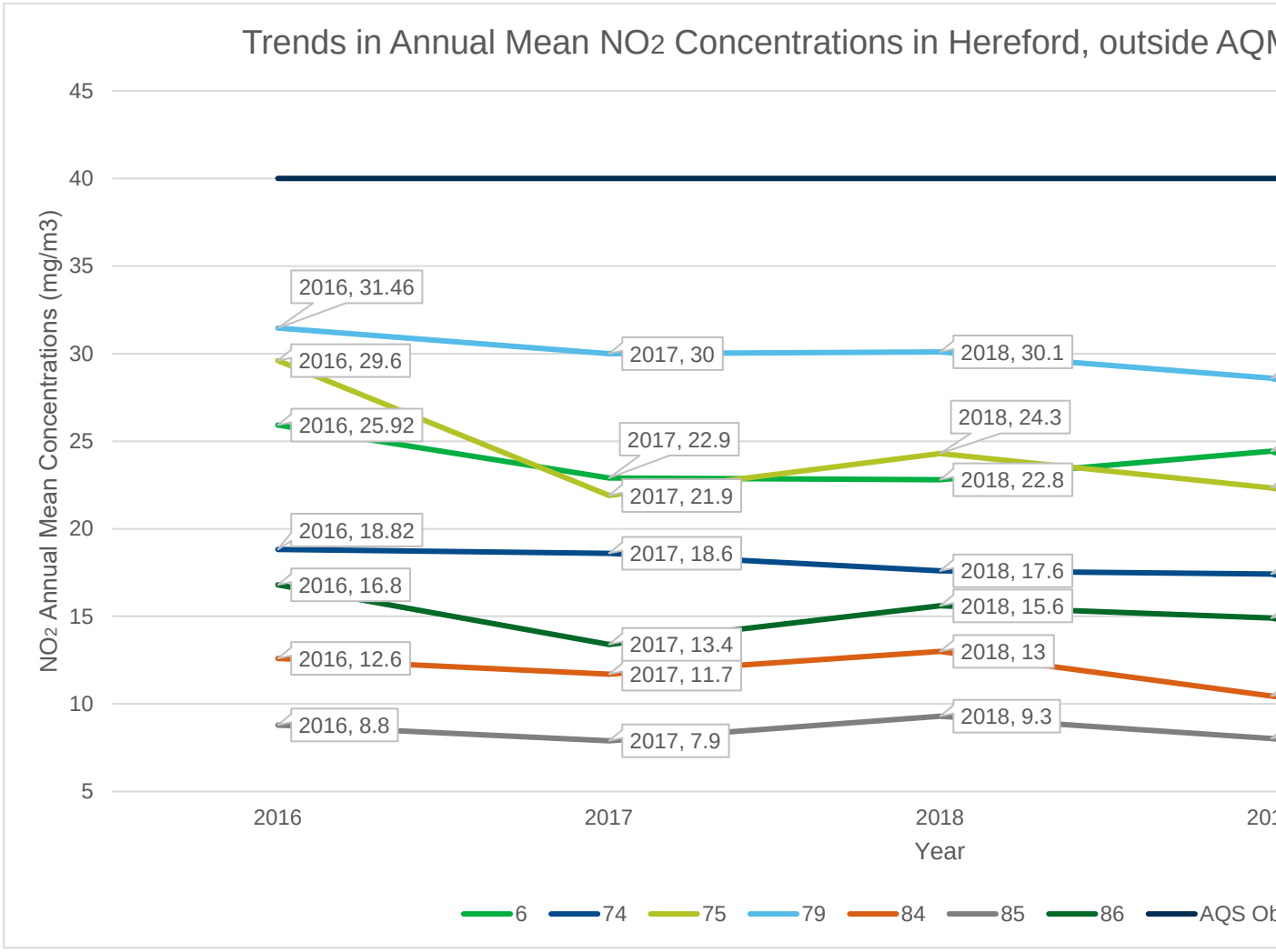


Figure A.1.6 – Trends in Annual Mean NO_2 Concentrations in Hereford, outside AQMA (2)

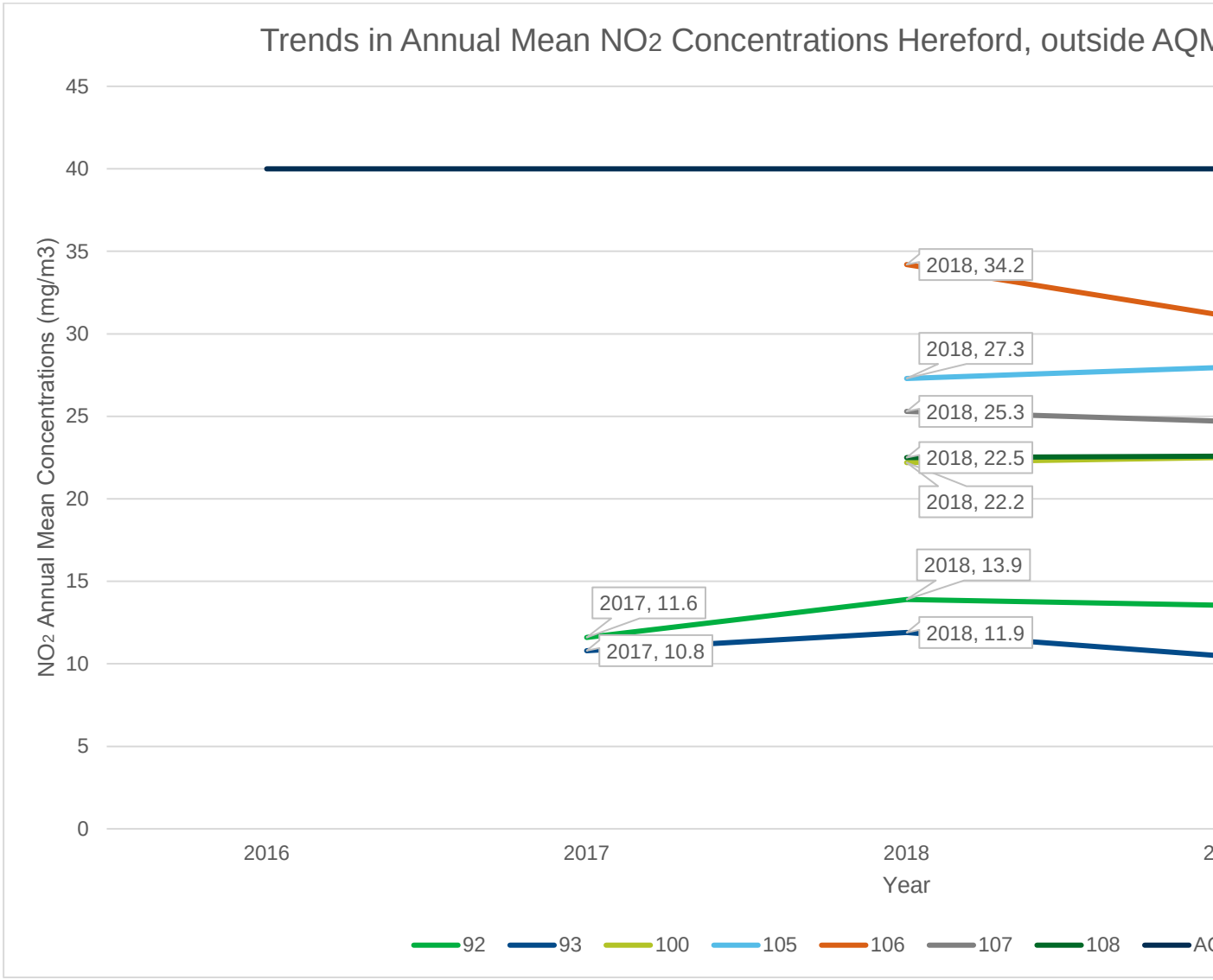


Figure A.1.7 – Trends in Annual Mean NO_2 Concentrations Leominster AQMA

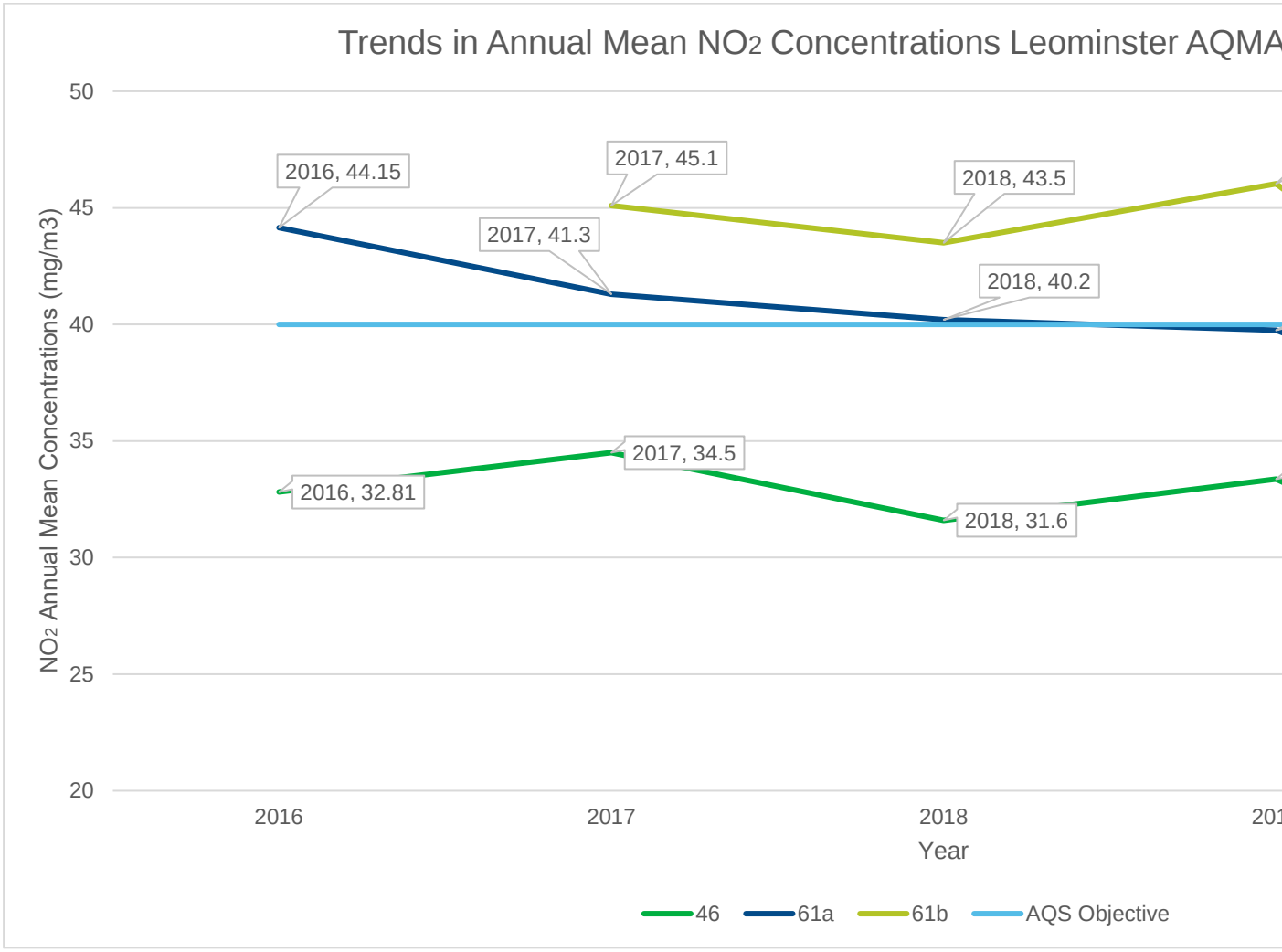


Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. During 2020, the NO_2 hourly mean limit (200 µg/m^3) was not exceeded.

Hereford AQMA sites

During 2020, the annual mean NO_2 levels at the Hereford automatic monitoring site (HRD1) were 31µg/m^3, which is below the air quality objective (40µg/m^3). Data collected in 2017 showed a breach in the annual mean NO_2 objective (42µg/m^3) at

site HRD1. Despite data from 2018 to 2020 identifying a reduction of annual mean NO_2 levels, it is concluded that Herefordshire Council will not be revoking Hereford AQMA. Particularly as trends have not demonstrated that NO_2 levels are unlikely to breach the national objective. However, Herefordshire Council will continue to review Hereford AQMA.

There are 16 non-automatic monitoring sites within Hereford AQMA (sites 9, 10, 22, 53, 57, 59, 87, 88, 89, 90, 91, 94, 95, 96, 103 and 104). All of these site have decreased in annual mean NO_2 levels between 2019 and 2020. None of these sites have exceeded the annual mean NO_2 air quality objective in 2020.

The data capture for site 87 was below 75%, as such annualisation was conducted on this site. The calculations of the annualisation can be found in Appendix C.

Hereford AQMA boundary sites

The boundaries of the AQMA are monitored through a number of sites which indicate whether the AQMA boundaries need to be extended. These sites include site 54, 65, 88, 89, 97,101 and 102 (please refer to figure A.1.4).

In 2020, none of the monitoring sites at the boundary of Hereford AQMA exceeded the annual mean NO_2 air quality objective. As such, Herefordshire Council will not be extending the boundary of Hereford AQMA.

Outside Hereford's AQMA

There are 14 monitoring sites which are located outside Hereford's AQMA, these sites include 6, 74, 75, 79, 84, 85, 86, 92, 93, 100, 105, 106, 107 and 108. All of these locations were below the air quality objective.

Leominster AQMA

The Leominster AQMA includes 3 monitoring sites (site 46, 61a and 61b). In 2020, all sites were below the annual mean NO_2 air quality objective.

From 2016 to 2020 trend data for sites in the Leominster AQMA can be found in figure A.1.7. Site 61b annual mean NO_2 levels recorded 46.03µg/m^3 in 2019, in comparison to 2020 readings were 35.4µg/m^3.

Outside Leominster AQMA

Outside the Leominster AQMA there are 3 monitoring sites which include sites 109, 110 and 111. In 2020, the annual mean NO_2 levels of the sites outside Leominster's AQMA were below the air quality objective.

A40 corridor

There are two monitoring sites that are located on the A40 corridor, these include sites 32 and 33. In 2020, the annual mean NO_2 recorded levels at site 32 were 17.5µg/m^3 and at site 33 the levels were 18.4µg/m^3. Both of these sites will continue to be monitored in 2021.

Other Market Towns and Villages

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

Since 2017 the site 83 has no longer be monitored. In 2020, site 82 recorded annual mean NO_2 levels of 20.08µg/m^3, which is below the air quality objective. This site will continue to be monitored in 2021.

Distance correction

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

3.1.4 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 have been subsequently available since 2017.

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. As shown in table A.6, the monitored PM_{10} annual mean concentrations at Victoria Street in 2020 was 22µg/m^3. This was measured by a BAM using a gravimatric factor of 0.833 for Indicative Gravimetric Equivalent. The annual data capture for this reading was 79.8% compared to the 85% target.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year. The gravimetric PM_{10} daily mean limit (50 µg/m^3) was exceeded on 3 days in 2020. Although, the annual allowance for this limit value is 35 days, as such this objective was not exceeded.

3.1.5 Particulate Matter ($PM_{2.5}$)

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

3.1.6 Sulphur Dioxide (SO_2)

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

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
HRD1	Victoria Street	Roadside	350721	239791	NO2; PM10	YES	Chemiluminescent and PM10	10	5	1.9

Notes:

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

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
6	Broad Street, Hereford	Urban Background	350890	240000	NO_2	NO	1.0	0.3	No	2.8
9	Bus Stop,Victoria Street, Hereford (A49)	Roadside	350688	239864	NO_2	YES	0.0	2.9	No	2.9
10	7 Victoria Street, Hereford (A49)	Roadside	350677	240015	NO_2	YES	0.0	2.9	No	2.5
22	Façade Edgar/ Mor St, Hfd (A49)	Roadside	350860	240615	NO_2	YES	0.0	2.3	No	2.3
32	Weir End, Ross (A40)	Roadside	357717	223736	NO_2	NO	0.0	4.5	No	2
33	House façade, Wilton (A40)	Roadside	358506	224214	NO_2	NO	0.0	2.9	No	1.9
46	Bengry's Lights, Leominster (A44)	Roadside	349409	259010	NO_2	YES	0.0	3.4	No	2.1
53	Façade, Belmont Rd/Asda Junc Hfd	Roadside	350723	239163	NO_2	YES	0.0	5.3	No	2.1
54	House façade, Holmer Rd Hfd (A49)	Urban Background	350602	241097	NO_2	NO	0.0	9.5	No	1.7
57	Eign Street, Hereford (A438)	Urban Background	350499	240108	NO_2	YES	1.0	0.5	No	2.2
59	Façade, Widemarsh St, Town Hfd	Urban Centre	350987	240108	NO_2	YES	0.0	3.0	No	2.4
61a	29 Bargates, Leominster (A44)	Roadside	349363	259013	NO_2	YES	0.0	2.9	No	2.2

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
61b	35 Bargates, Leominster (A44)	Roadside	349352	259015	NO_2	YES	0.0	2.0	No	2.2
65	96 Whitecross Road, Hfd (A438)	Urban Background	350086	240296	NO_2	NO	4.0	1.3	No	2.2
74	140 Whitecross Rd, Hfd (A438)	Roadside	349985	240334	NO_2	NO	0.0	8.2	No	2.1
75	22 Barton Road, Hfd	Roadside	350511	239740	NO_2	NO	15.0	1.4	No	2.4
79	76 Belmont Road, Hfd (A465)	Roadside	350472	238999	NO_2	NO	7.0	1.0	No	2.3
82	Cantilupe Road 1 (Flats), Ross-on-Wye	Urban Background	360204	224177	NO_2	NO	1.5	1.7	No	2.3
84	Kings Acre Rd, Hfd (A438)	Suburban	347864	241236	NO_2	NO	N/A	6.2	No	2.55
85	Huntington Lane, Hfd	Rural	348752	241941	NO_2	NO	N/A	1.2	No	2.1
86	Three Elms Rd, Hfd (A4110)	Roadside	349067	241933	NO_2	NO	N/A	1.5	No	1.7
87	Nr Cemetery, Victoria St, Hfd (A49)	Roadside	350694	239819	NO_2	YES	N/A	2.7	No	2.5
88	Adj 34 Victoria St, Hfd (A49)	Roadside	350684	239900	NO_2	YES	0.0	2.8	No	2.32
89	Edgar St/Blackfriars St Junc, Hfd (A49)	Roadside	350800	240441	NO_2	YES	6.5	2.2	No	2.1

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
90	Cross Street, Asda Traffic Island, Hfd	Roadside	350719	239164	NO_2	YES	5.0	2.25	No	2.12
91	Ross Road/Asda Traffic Island, Hfd (A49)	Roadside	350759	239125	NO_2	YES	7.5	1.1	No	2.23
92	Rotherwas Industrial Estate, Hfd	Urban Background	352919	237840	NO_2	NO	N/A	1.9	No	2.3
93	Rotherwas Relief Road, Hereford (B4399)	Roadside	351881	239984	NO_2	NO	N/A	5.5	No	2.15
94	Edgar St opp Nolan Rd, Hfd (A49)	Roadside	350933	240798	NO_2	YES	3.0	9.35	No	2.35
95	Edgar St. nr Prior St. Hfd (A49)	Roadside	350876	240678	NO_2	YES	1.0	3.65	No	1.65
96	Edgar St. nr Junc Newtown Rd (A49)	Roadside	350941	240858	NO_2	YES	N/A	7.7	No	2.2
97	Newtown Rd, nr Postbox, Hfd	Roadside	351025	240874	NO_2	NO	0.5	2.9	No	2.4
98	Link Road A, Hereford	Urban Background	350992	240652	NO_2	NO	N/A	n/a	No	1.75
99	Link Road B, Hereford	Urban Background	351022	240668	NO_2	NO	N/A	n/a	No	2.36
100	Link Road C, Hereford	Urban Background	351440	240539	NO_2	NO	N/A	n/a	No	3

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
101	Widemarsh St, opp Garrick CP, Hfd	Roadside	351053	240290	NO_2	NO	0.0	1.7	No	1.7
102	Widemarsh St. nr juct Link Road, Hfd	Roadside	351100	240640	NO_2	NO	0.5	2.25	No	1.25
103	Bus stop, Newmarket Street, Hfd (A438)	Roadside	350898	240223	NO_2	YES	N/A	3.7	No	3.4
104	Wall Street, Hereford	Roadside	350979	240212	NO_2	YES	1.0	3.25	No	1.25
105	Aylestone Hill/Barscourt Rd, Hfd	Roadside	351725	240443	NO_2	NO	5.0	6.8	No	1.8
106	Commercial Road, Hfd	Roadside	351483	240323	NO_2	NO	2.5	5.4	No	2.9
107	St Mary's Church, Grandstand Rd, Hfd (A49)	Roadside	350412	241161	NO_2	NO	4.0	5.47	No	1.47
108	Roman Road, Hereford (A4103)	Urban Background	350166	242175	NO_2	NO	N/A	n/a	No	1.65
109	Bargates, opp Perseverance Rd Leominster	Roadside	349176	259020	NO_2	YES	0.0	7.45	No	0.95

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
110	56 Bargates, (HR6 8EY), Leominster (A44)	Roadside	349262	259030	NO_2	NO	5.0	6.4	No	1.4
111	Bargates Nursery, Leominster (A44)	Roadside	349228	259031	NO_2	NO	5.0	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_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
HRD1	350721	239791	Roadside	-	95.2	-	**42**	**40**	38	31

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

Notes:

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

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

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

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
6	350890	240000	Urban Background	-	82.7	**25.92**	**22.9**	**22.8**	24.43	18.3
9	350688	239864	Roadside	-	82.7	37.96	31.8	32.6	34.46	27.2
10	350677	240015	Roadside	-	82.7	**39.71**	-	**41.33a**	39.28	30.3
22	350860	240615	Roadside	-	82.7	28.82	25.3	27.6	27.65	21.5
32	357717	223736	Roadside	-	82.7	33.74	31.6	28.3	24.85	17.5
33	358506	224214	Roadside	-	82.7	33.63	30.2	28.1	24.98	18.4
46	349409	259010	Roadside	-	82.7	32.81	34.5	31.6	33.36	26.6
53	350723	239163	Roadside	-	82.7	31.2	29.4	30.7	30.45	24.8
54	350602	241097	Urban Background	-	82.7	24.42	20.7	23.7	23.11	17.0
57	350499	240108	Urban Background	-	82.7	31.07	26.7	27.7	28.81	21.2
59	350987	240108	Urban Centre	-	82.7	23.92	19.9	20.3	19.65	14.1
61a	349363	259013	Roadside	-	75.0	**44.15**	**41.3**	**40.2**	39.75	34.3
61b	349352	259015	Roadside	-	82.7	-	**45.1**	**43.5**	**46.03**	35.4

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2020 (%) [2]	2016	2017	2018	2019	2020
65	350086	240296	Urban Background	-	73.1	36.04	30.6	32.2	30.91	23.1
74	349985	240334	Roadside	-	82.7	18.82	18.6	17.6	17.42	14.1
75	350511	239740	Roadside	-	82.7	29.6	21.9	24.3	22.34	18.4
79	350472	238999	Roadside	-	82.7	31.46	30	30.1	28.60	23.4
82	360204	224177	Urban Background	-	82.7	22.3	20.5	21.3	20.08	16.1
84	347864	241236	Suburban	-	82.7	12.6	11.7	13	10.45	8.5
85	348752	241941	Rural	-	82.7	8.8	7.9	9.3	8.03	6.2
86	349067	241933	Roadside	-	82.7	16.8	13.4	15.6	14.91	11.3
87	350694	239819	Roadside	-	57.7	-	30.2	30.1	29.78	21.6
88	350684	239900	Roadside	-	82.7	-	33.3	33.8	31.64	24.5
89	350800	240441	Roadside	-	82.7	-	**36.57a**	36.2	36.90	29.3
90	350719	239164	Roadside	-	82.7	-	**26.21a**	26.8	25.29	19.9
91	350759	239125	Roadside	-	82.7	-	**30.69a**	**40.9**	38.74	27.8
92	352919	237840	Urban Background	-	82.7	-	11.6	13.9	13.54	9.8

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2020 (%) [2]	2016	2017	2018	2019	2020
93	351881	239984	Roadside	-	82.7	-	10.8	11.9	10.46	9.2
94	350933	240798	Roadside	-	82.7	-	-	30.8	29.38	24.7
95	350876	240678	Roadside	-	82.7	-	-	**43**	36.98	25.1
96	350941	240858	Roadside	-	82.7	-	-	31.7	36.85	32.4
97	351025	240874	Roadside	-	82.7	-	-	26.7	25.60	19.7
98	350992	240652	Urban Background	-	73.1	-	-	21.7	19.93	15.9
99	351022	240668	Urban Background	-	82.7	-	-	19.8	19.25	14.5
100	351440	240539	Urban Background	-	82.7	-	-	22.2	22.51	18.3
101	351053	240290	Roadside	-	82.7	-	-	32.4	32.40	24.6
102	351100	240640	Roadside	-	82.7	-	-	27.6	25.87	19.4
103	350898	240223	Roadside	-	82.7	-	-	**40.1**	33.41	26.2
104	350979	240212	Roadside	-	82.7	-	-	33.6	31.94	24.3
105	351725	240443	Roadside	-	82.7	-	-	27.3	27.97	21.5
106	351483	240323	Roadside	-	82.7	-	-	34.2	31.08	22.7

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
107	350412	241161	Roadside	-	82.7	-	-	25.3	24.70	18.4
108	350166	242175	Urban Background	-	82.7	-	-	22.5	22.59	16.9
109	349176	259020	Roadside	-	82.7	-	-	**41.61a**	32.41	24.7
110	349262	259030	Roadside	-	82.7	-	-	29.22a	22.90	15.3
111	349228	259031	Roadside	-	82.7	-	-	**32.01a**	25.86a	16.1

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

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

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

Notes:

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

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

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

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

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

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

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

Figure A.1.1 – Trends in Annual Mean NO_2 Concentrations Hereford AQMA (1)

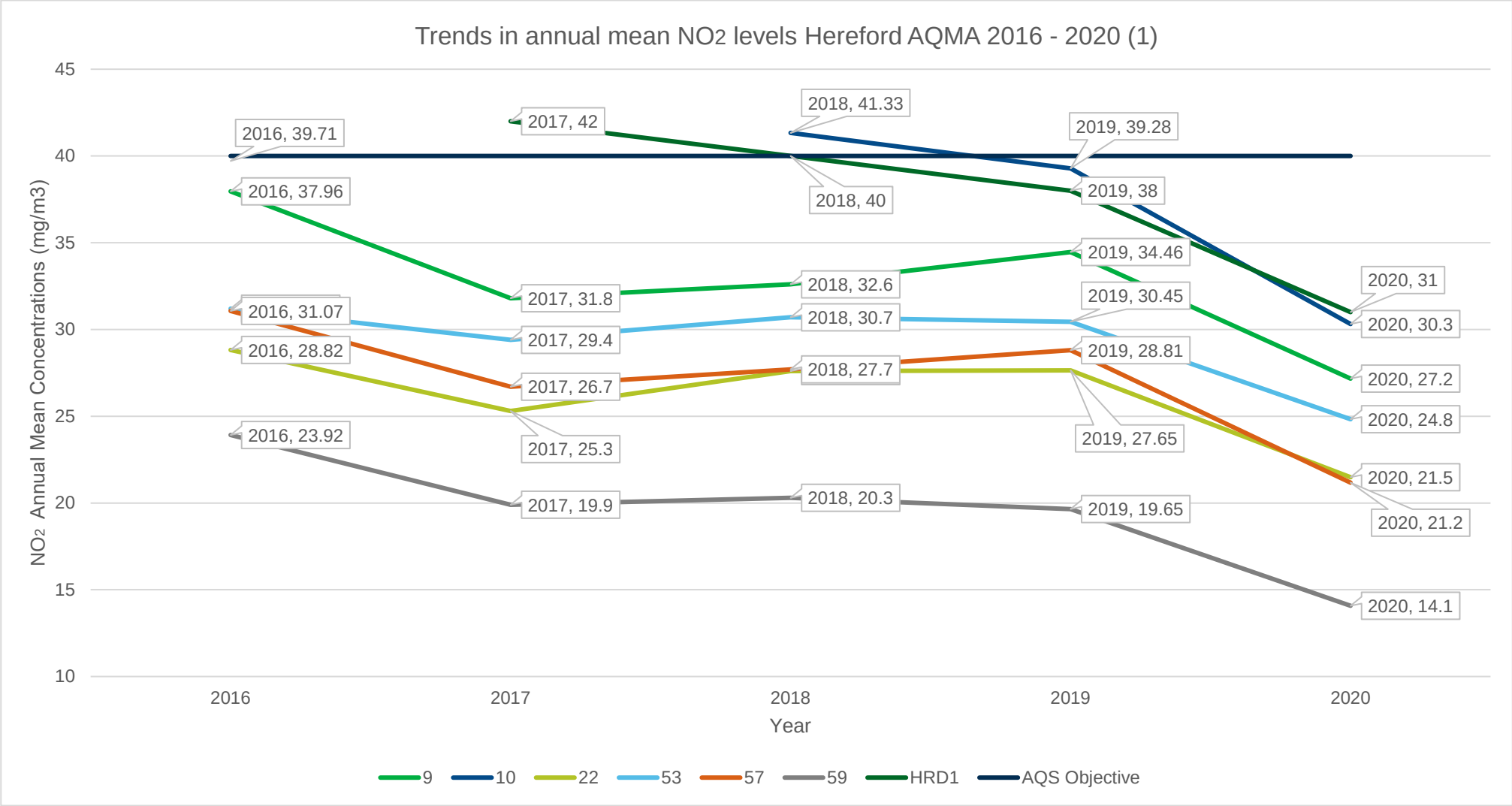


Figure A.1.2 – Trends in Annual Mean NO_2 Concentrations Hereford AQMA (2)

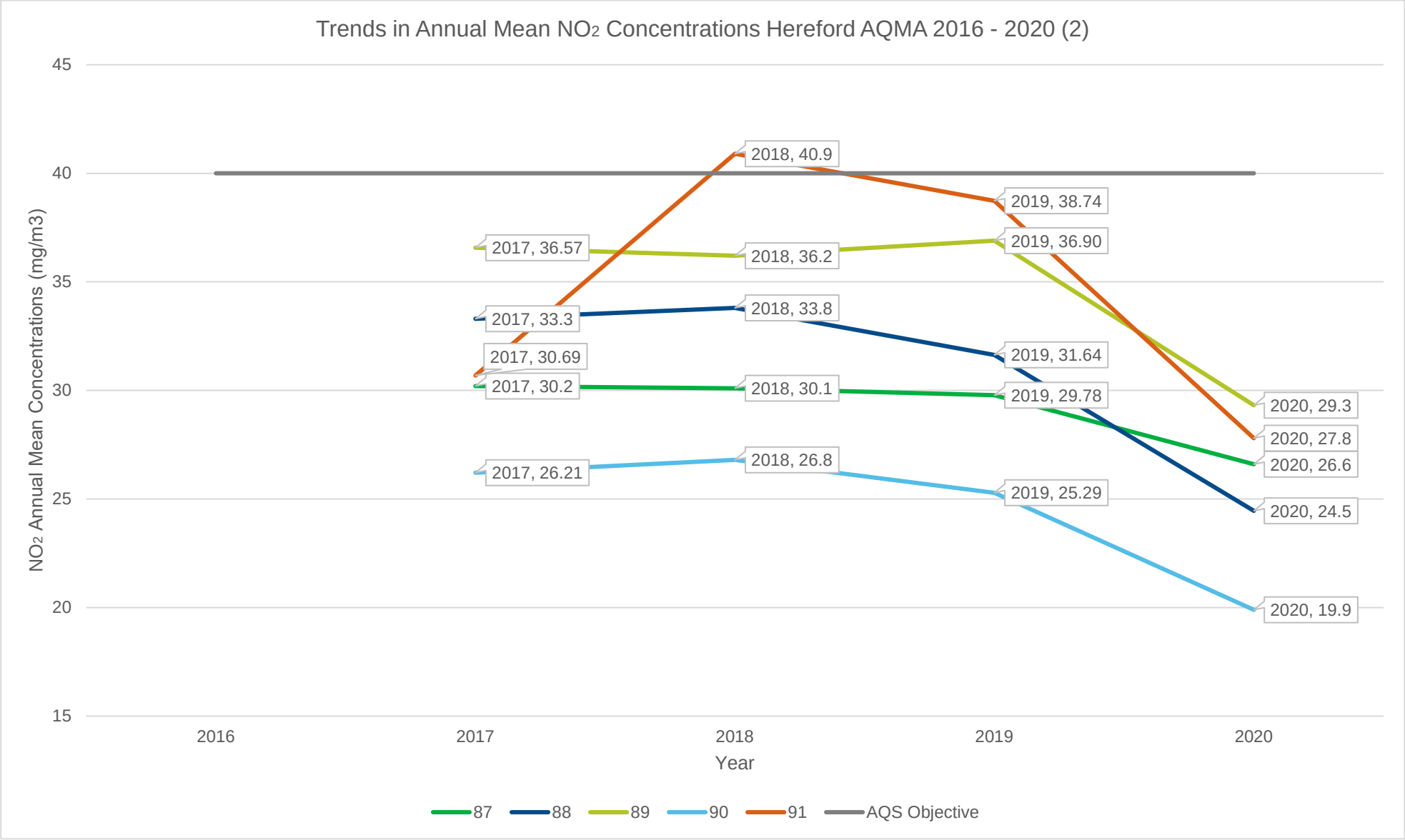


Figure A.1.3 – Trends in Annual Mean NO_2 Concentrations Hereford AQMA (3)

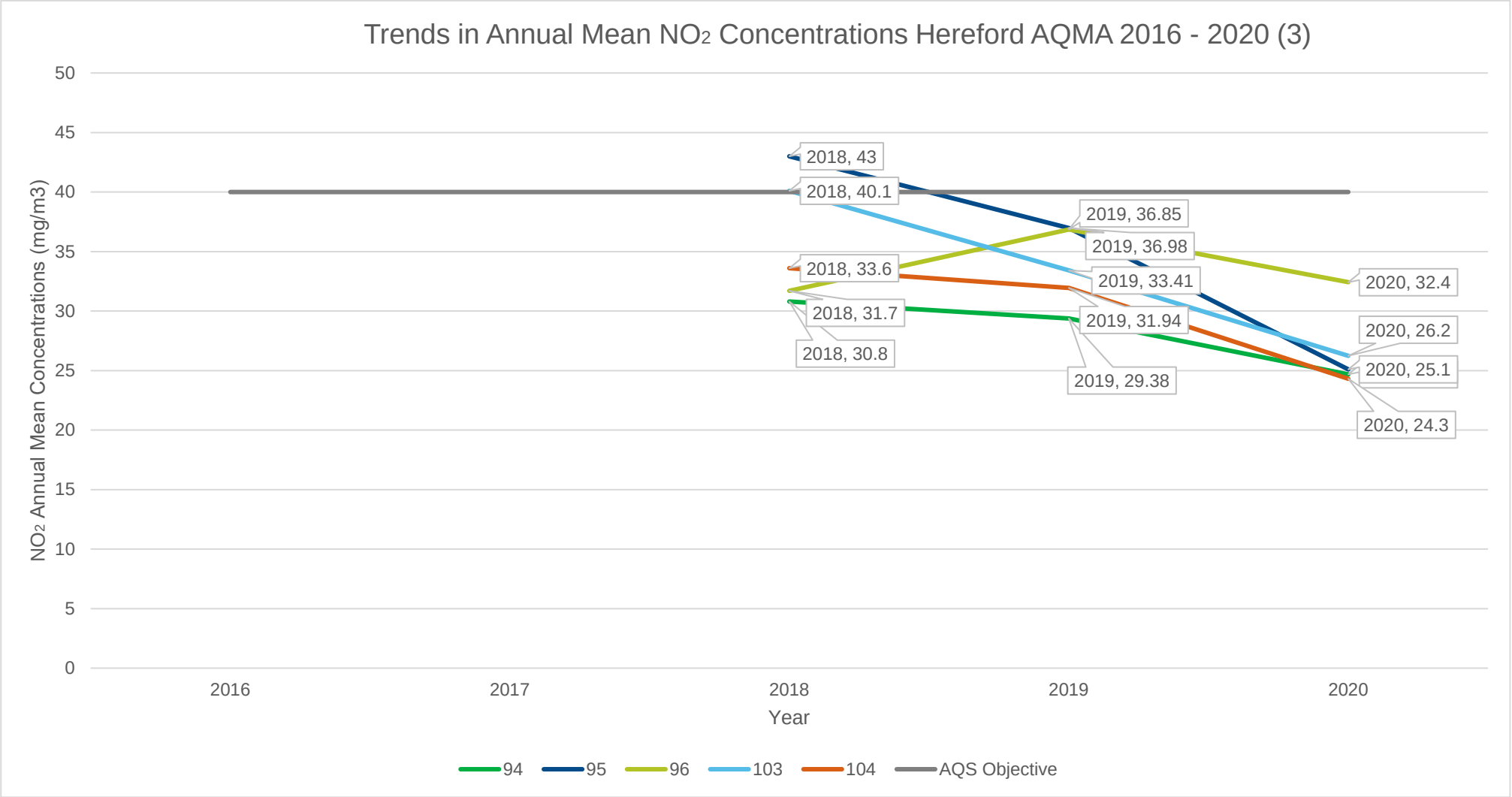


Figure A.1.4 – Trends in Annual Mean NO_2 Concentrations in Hereford's AQMA Boundary

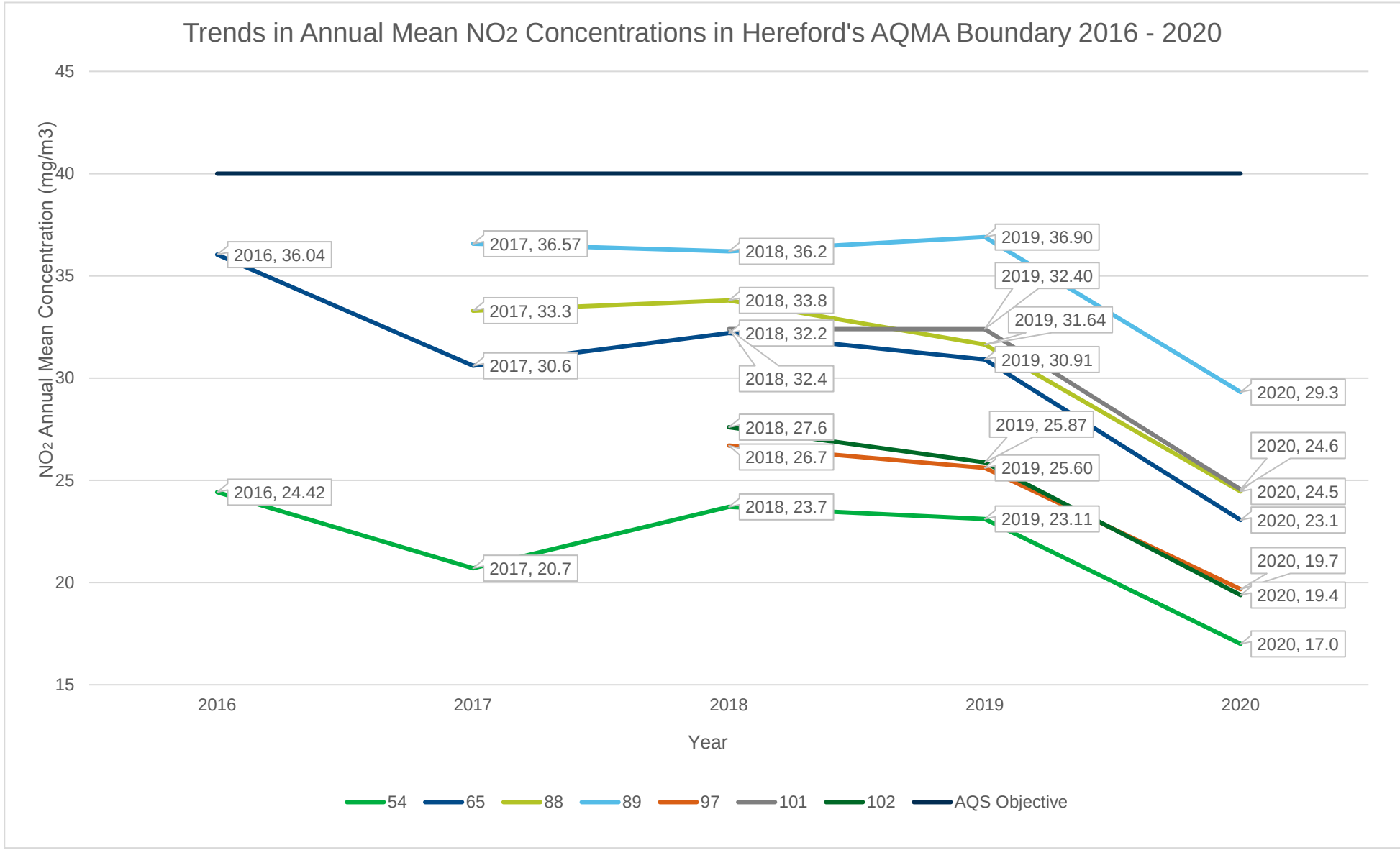


Figure A.1.5 – Trends in Annual Mean NO_2 Concentrations in Hereford, outside AQMA (1)

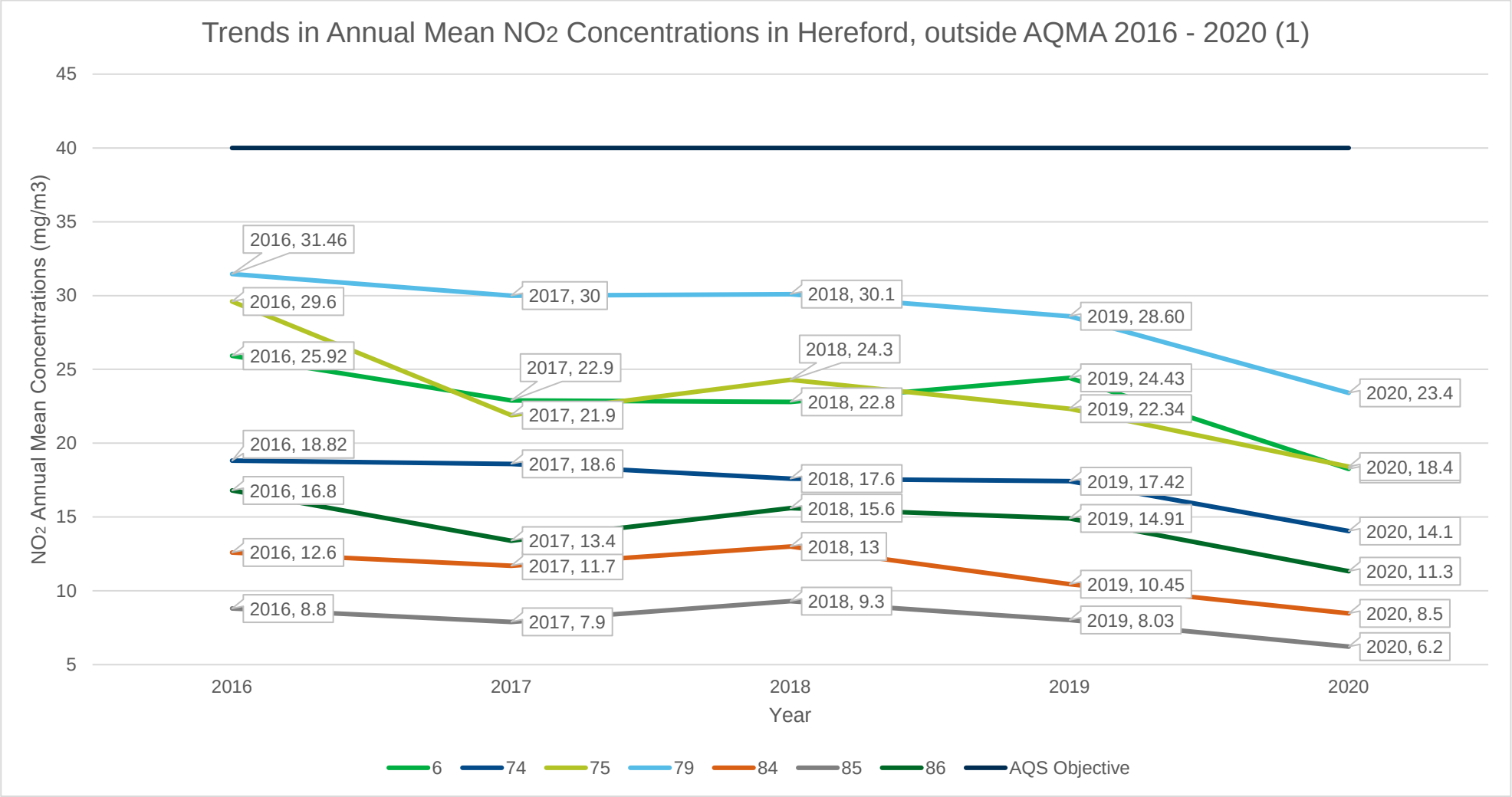


Figure A.1.6 – Trends in Annual Mean NO_2 Concentrations in Hereford, outside AQMA (2)

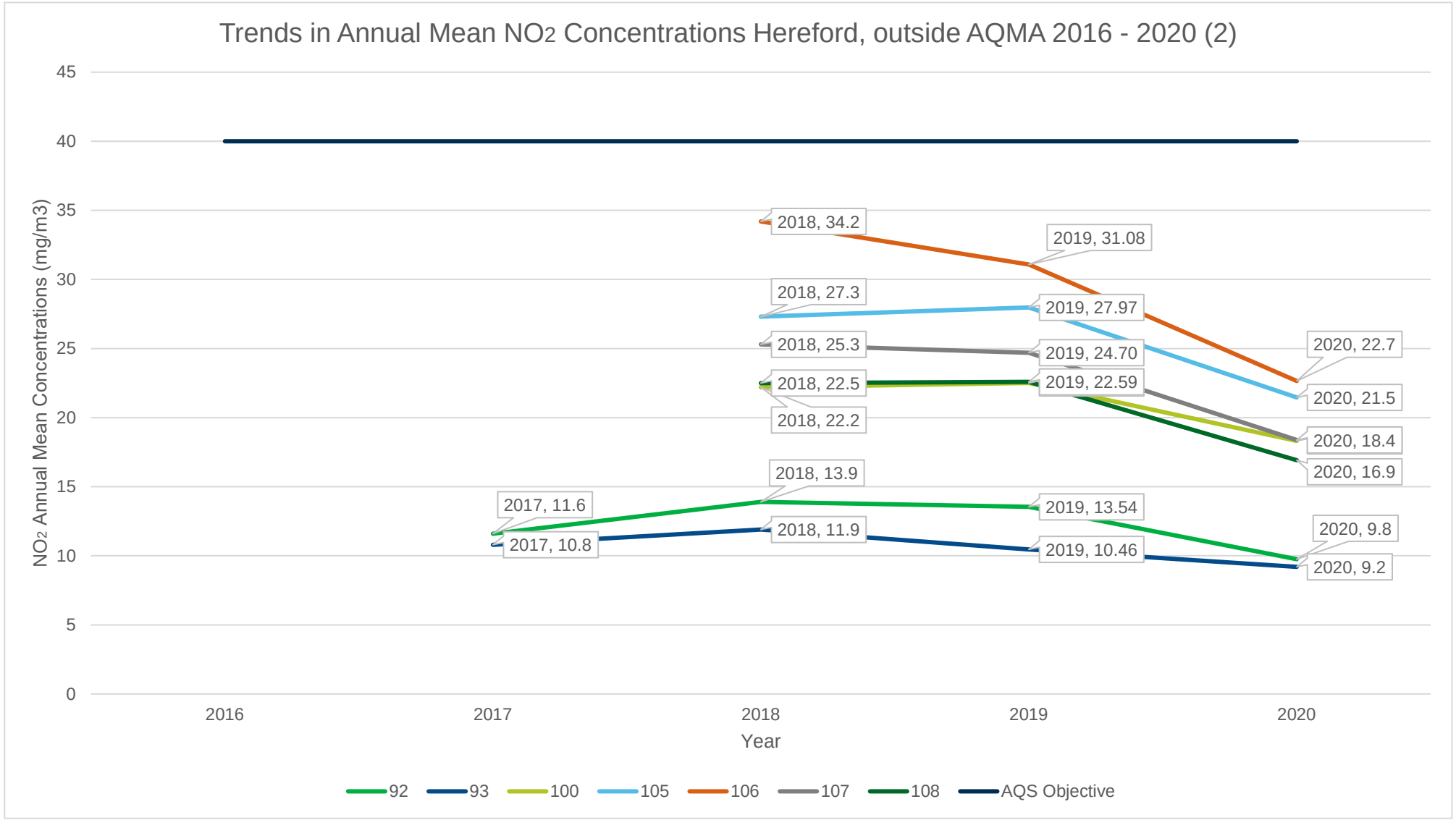


Figure A.1.7 – Trends in Annual Mean NO_2 Concentrations Leominster AQMA

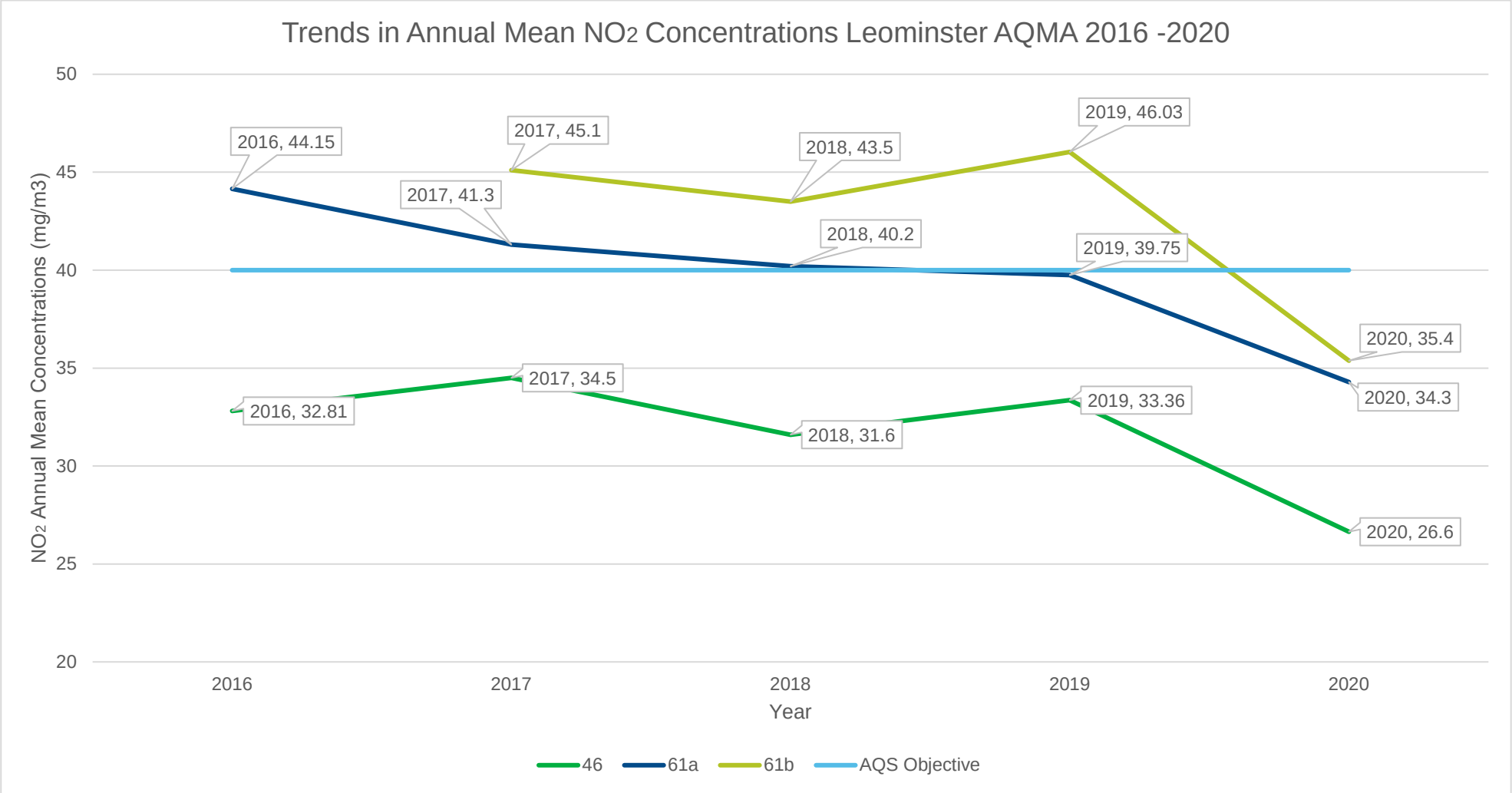


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
HRD1	350721	239791	Roadside	-	95.2	-	0	**0**	**1**	0

Notes:

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

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

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

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

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

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
HRD1	350721	239791	Roadside	-	79.8	-	25	24	21	22

Notes:

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

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

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

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

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

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
HRD1	350721	239791	Roadside	-	79.8	-	10	2	7	3

Notes:

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

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
6	350890	240000	32.4	25.7	22.0	-	-	15.4	15.3	18.4	20.2	21.6	27.9	26.6	22.5	18.3	-	
9	350688	239864	41.1	32.1	36.0	-	-	30.6	19.0	30.2	30.9	28.7	41.5	44.6	33.5	27.2	-	
10	350677	240015	48.0	41.2	38.2	-	-	29.1	25.7	33.9	38.0	36.7	41.0	42.4	37.4	30.3	-	
22	350860	240615	32.6	22.8	26.7	-	-	23.0	14.2	26.4	25.9	26.1	33.3	32.7	26.5	21.5	-	
32	357717	223736	33.0	24.7	24.8	-	-	17.9	16.3	21.8	26.4	25.0	-	24.3	21.6	17.5	-	
33	358506	224214	29.1	22.0	24.1	-	-	19.6	14.2	22.5	25.9	21.5	25.4	23.3	22.8	18.4	-	
46	349409	259010	41.6	37.7	29.7	-	-	27.1	26.4	30.5	32.9	31.2	39.0	33.6	32.9	26.6	-	
53	350723	239163	35.7	28.7	32.5	-	-	26.2	23.4	28.9	31.6	33.0	32.0	33.7	30.7	24.8	-	
54	350602	241097	24.8	18.9	21.5	-	-	18.8	13.9	19.2	21.8	20.4	25.8	24.5	21.0	17.0	-	
57	350499	240108	32.9	23.7	28.4	-	-	20.9	16.7	24.9	28.7	22.5	30.5	32.0	26.1	21.2	-	
59	350987	240108	24.1	19.7	17.2	-	-	11.3	10.6	13.6	16.4	17.3	21.7	21.7	17.4	14.1	-	
61a	349363	259013	52.4	49.5	41.5	-	-	36.7	31.5	39.3	-	39.1	47.6	44.6	42.3	34.3	-	
61b	349352	259015	54.1	48.4	44.7	-	-	38.3	33.1	40.9	43.0	42.6	47.8	44.6	43.7	35.4	-	
65	350086	240296	32.2	27.0	30.8	-	-	22.8	18.0	-	26.8	29.6	33.2	34.0	28.5	23.1	-	
74	349985	240334	25.0	18.4	18.0	-	-	11.8	10.5	13.9	16.3	16.9	20.7	21.8	17.3	14.1	-	
75	350511	239740	25.7	21.7	23.6	-	-	19.7	14.3	22.2	24.3	22.8	23.8	28.0	22.7	18.4	-	
79	350472	238999	35.1	30.1	34.1	-	-	24.4	20.4	26.8	28.7	30.6	30.5	28.5	28.9	23.4	-	
82	360204	224177	25.0	17.0	22.4	-	-	16.6	10.8	18.4	21.0	18.5	24.8	24.2	19.9	16.1	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
84	347864	241236	13.0	10.1	11.2	-	-	9.0	6.1	9.0	10.1	10.1	13.7	12.2	10.5	8.5	-	
85	348752	241941	9.7	5.9	8.4	-	-	5.7	3.5	6.3	6.8	7.6	11.9	10.6	7.7	6.2	-	
86	349067	241933	18.3	10.8	14.0	-	-	9.2	6.2	13.9	13.5	13.3	20.3	19.2	14.0	11.3	-	
87	350694	239819	34.6	24.7	31.7	-	-	-	-	-	30.6	26.4	35.2	37.9	31.6	26.6(a)	-	
88	350684	239900	35.3	28.2	33.1	-	-	27.4	18.2	28.3	29.9	26.7	33.3	40.4	30.2	24.5	-	
89	350800	240441	43.3	34.6	34.4	-	-	30.0	25.9	32.6	39.1	36.4	43.2	41.9	36.2	29.3	-	
90	350719	239164	27.5	24.3	27.9	-	-	21.1	16.3	23.2	26.4	24.9	25.8	27.8	24.6	19.9	-	
91	350759	239125	40.0	44.3	13.6	-	-	26.7	32.4	33.8	36.1	39.4	34.2	40.0	34.3	27.8	-	
92	352919	237840	16.9	11.5	13.9	-	-	10.5	7.8	9.7	10.8	11.7	12.7	14.9	12.0	9.8	-	
93	351881	239984	12.1	10.3	12.5	-	-	11.0	8.5	10.6	11.2	10.1	17.3	10.7	11.4	9.2	-	
94	350933	240798	44.0	30.5	28.2	-	-	22.2	22.7	28.0	31.3	28.4	36.8	33.1	30.5	24.7	-	
95	350876	240678	43.2	34.7	30.4	-	-	24.4	20.6	22.5	30.5	31.0	35.8	37.4	31.0	25.1	-	
96	350941	240858	42.3	48.5	39.3	-	-	28.7	33.3	30.8	41.5	41.8	49.8	45.1	40.0	32.4	-	
97	351025	240874	32.8	23.3	20.9	-	-	18.3	14.6	22.4	22.3	24.6	30.2	32.0	24.3	19.7	-	
98	350992	240652	27.7	20.6	17.4	-	-	10.8	11.4	-	18.7	19.4	24.3	24.5	19.6	15.9	-	
99	351022	240668	26.3	17.8	18.7	-	-	11.8	9.5	13.6	16.6	17.5	24.1	23.5	18.0	14.5	-	
100	351440	240539	28.9	23.3	22.1	-	-	15.7	12.2	17.9	22.8	22.4	27.9	31.8	22.6	18.3	-	
101	351053	240290	41.1	35.2	28.8	-	-	20.8	21.8	28.2	28.4	30.4	31.6	35.9	30.3	24.6	-	
102	351100	240640	31.0	19.6	24.0	-	-	19.7	13.9	22.0	24.5	23.5	29.8	30.2	23.9	19.4	-	
103	350898	240223	39.8	34.8	28.6	-	-	22.5	26.2	30.9	35.4	28.7	37.1	39.5	32.4	26.2	-	
104	350979	240212	38.1	31.2	30.4	-	-	25.0	18.7	28.9	29.8	29.3	33.1	34.9	30.0	24.3	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
105	351725	240443	37.4	28.7	26.4	-	-	20.6	19.0	22.0	24.1	25.7	31.7	29.7	26.5	21.5	-	
106	351483	240323	39.8	33.0	29.7	-	-	23.2	24.2	-	34.1	31.1	35.7	33.7	28.0	22.7	-	
107	350412	241161	32.3	24.4	24.6	-	-	17.7	12.8	18.9	21.1	22.6	25.8	26.6	22.7	18.4	-	
108	350166	242175	28.8	25.4	20.1	-	-	17.1	11.3	17.5	19.8	18.7	24.7	25.6	20.9	16.9	-	
109	349176	259020	44.5	37.7	28.4	-	-	25.4	23.3	27.7	30.3	29.1	32.6	28.0	30.5	24.7	-	
110	349262	259030	21.6	17.9	20.0	-	-	15.9	12.0	18.1	20.0	18.9	22.0	21.5	18.8	15.3	-	
111	349228	259031	28.8	24.5	21.4	-	-	14.8	13.2	17.3	19.3	19.1	22.7	18.5	19.8	16.1	-	

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

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

☒ **National bias adjustment factor used.**

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

☒ **Herefordshire Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

Annualisation data shown with the (a).

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Herefordshire Council During 2020

Herefordshire Council has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Herefordshire Council During 2020

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

QA/QC of Diffusion Tube Monitoring

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

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

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

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

Diffusion Tube Annualisation

Only one diffusion tube required annualisation during 2020 (site 87). This was due to the impact on collection and analysis of the tubes during the COVID-19 pandemic (see Appendix F for more detail) and because the tube were missing from the site location during July, July and August.

As such, site 87 has been annualised using the results from Herefordshire city centre automatic monitoring site (site HRD1) and Leominster Automatic Urban and Rural Network (AURN). Both of these sites have been chosen in accordance with LAQM.TG16. The data was included in the Diffusion Tube Data Processing Tool provided by DEFRA (see Table C.2).

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Herefordshire Council have applied a national bias adjustment factor of 0.81 to the 2020 monitoring data. A summary of bias adjustment factors used by Herefordshire Council over the past five years is presented in

Table C.1.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.81
2019	National	09/20	0.93
2018	National	06/19	0.93
2017	National	09/18	0.89
2016	National	06/17	0.94

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO_2 monitoring locations within Herefordshire Council required distance correction during 2020.

QA/QC of Automatic Monitoring

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

Herefordshire Council Officers have received supplier training in relation to the calibration of the monitor. Calibration is conducted on a 2 weekly basis which was extended to 4 weekly basis due to the COVID-19 pandemic.

Historic data of the automatic monitoring site is available through Herefordshire Council's website.

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

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

Calculation for estimating $PM_{2.5}$ from PM_{10} measurements

Step 1: Multiply PM_{10} recorded concentrations by nationally derived correction ratio

$22\mu g/m^3 \times 0.7 = 15.4\mu g/m^3$

Step 2: Estimated annual mean $PM_{2.5} = 15.4\mu g/m^3$

Automatic Monitoring Annualisation

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

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within Herefordshire Council required distance correction during 2020.

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

Site ID	Annualisation Factor Hereford (site HRD1)	Annualisation Factor Leominster AURN	**Average Annualisation Factor**	**Raw Data Annual Mean (µg/m^3)**	**Annualised Annual Mean (µg/m^3)**	Comments
87	0.8692	0.8152	0.8422	31.6	26.6	

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

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

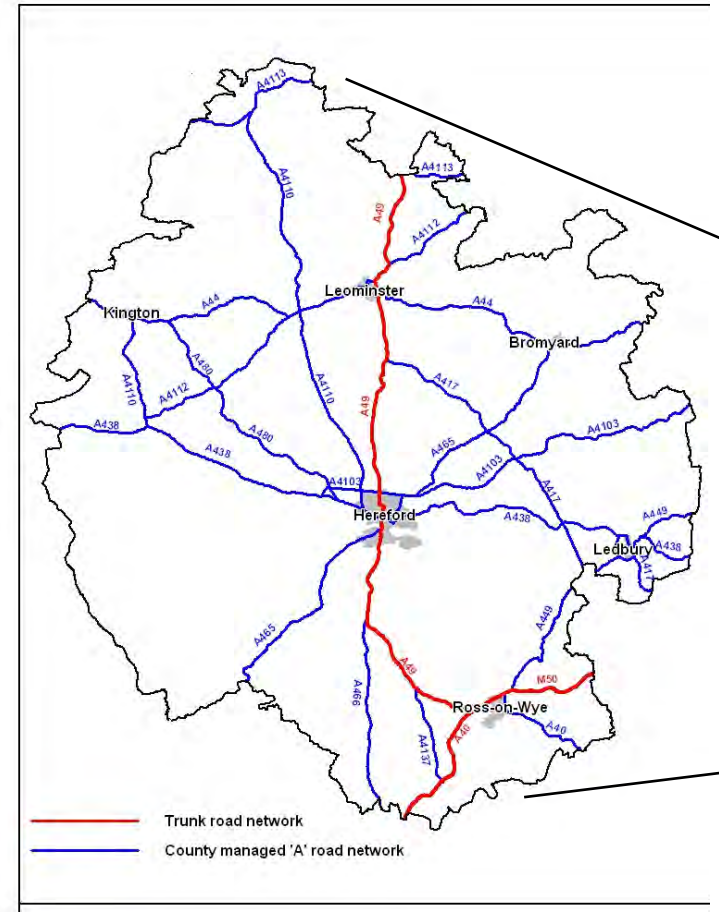


Figure D.2 – Location of Herefordshire

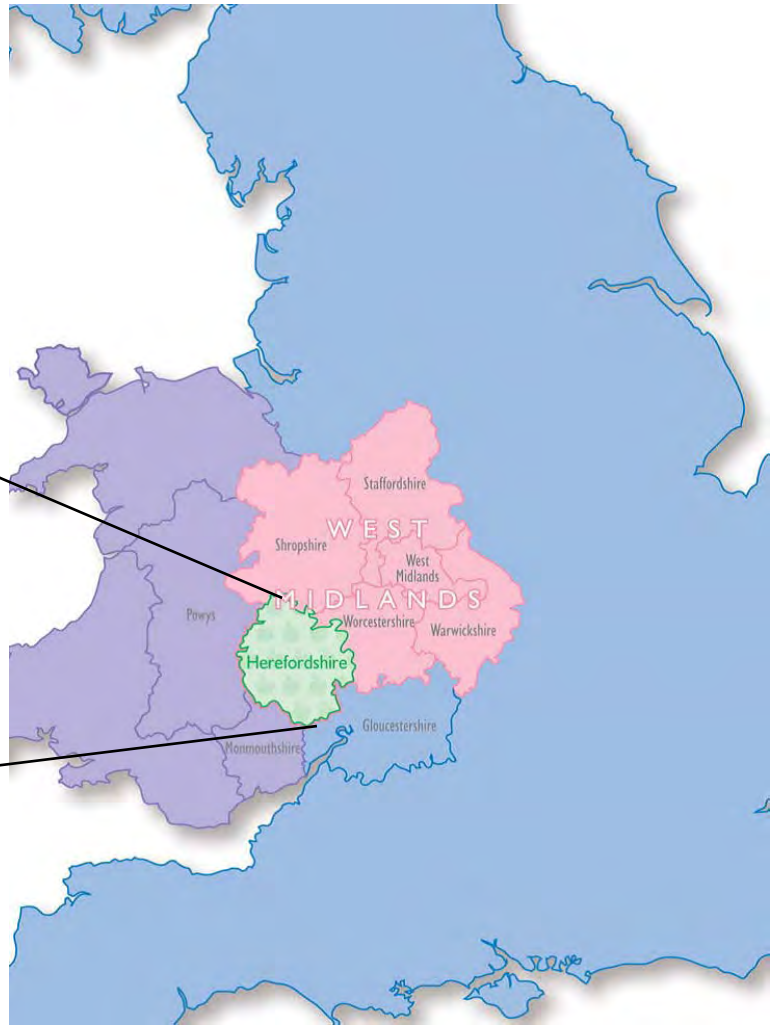


Figure D.3 – Hereford AQMA Boundary

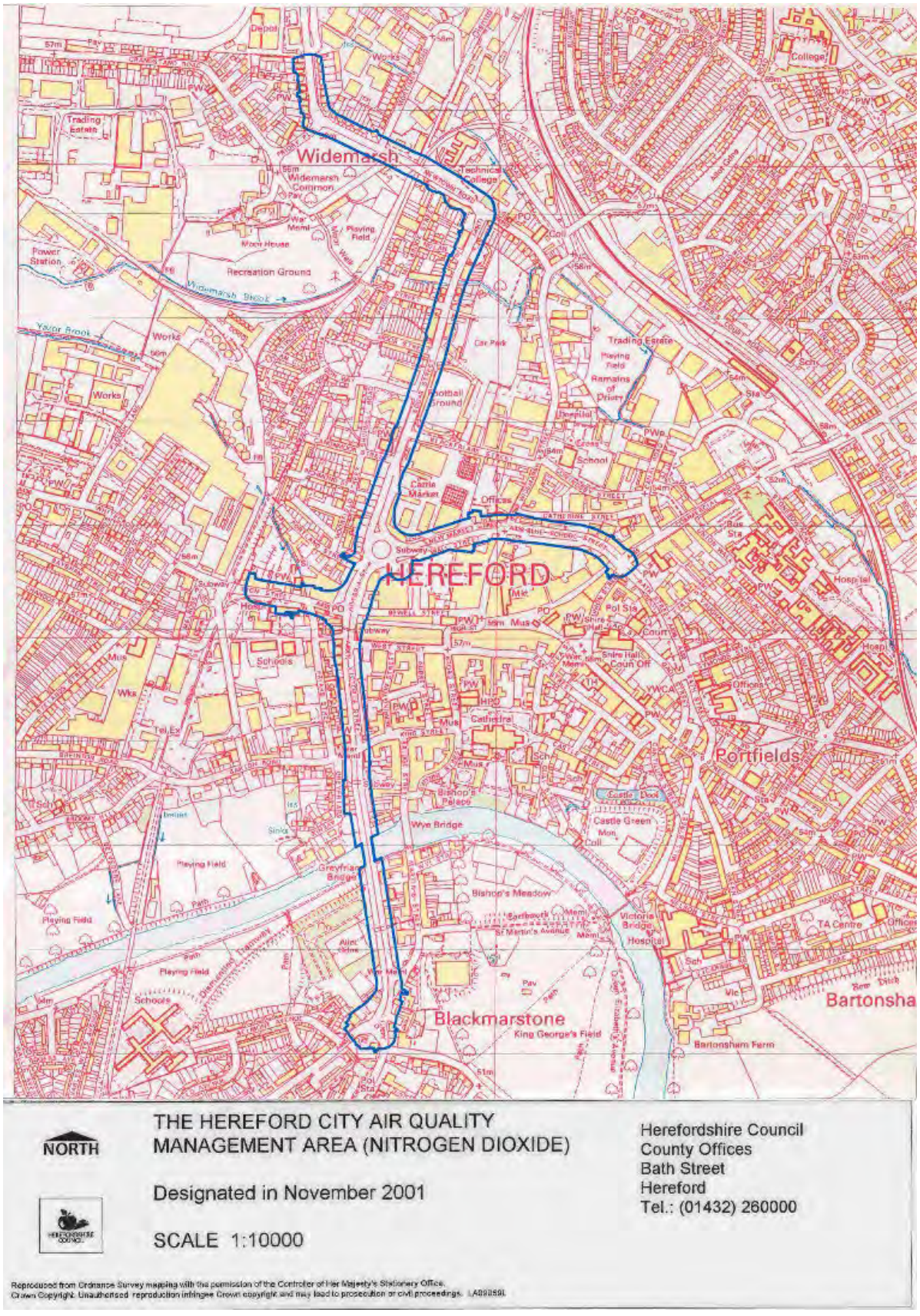


Figure D.4 – Hereford City (North) Monitoring Locations (1)

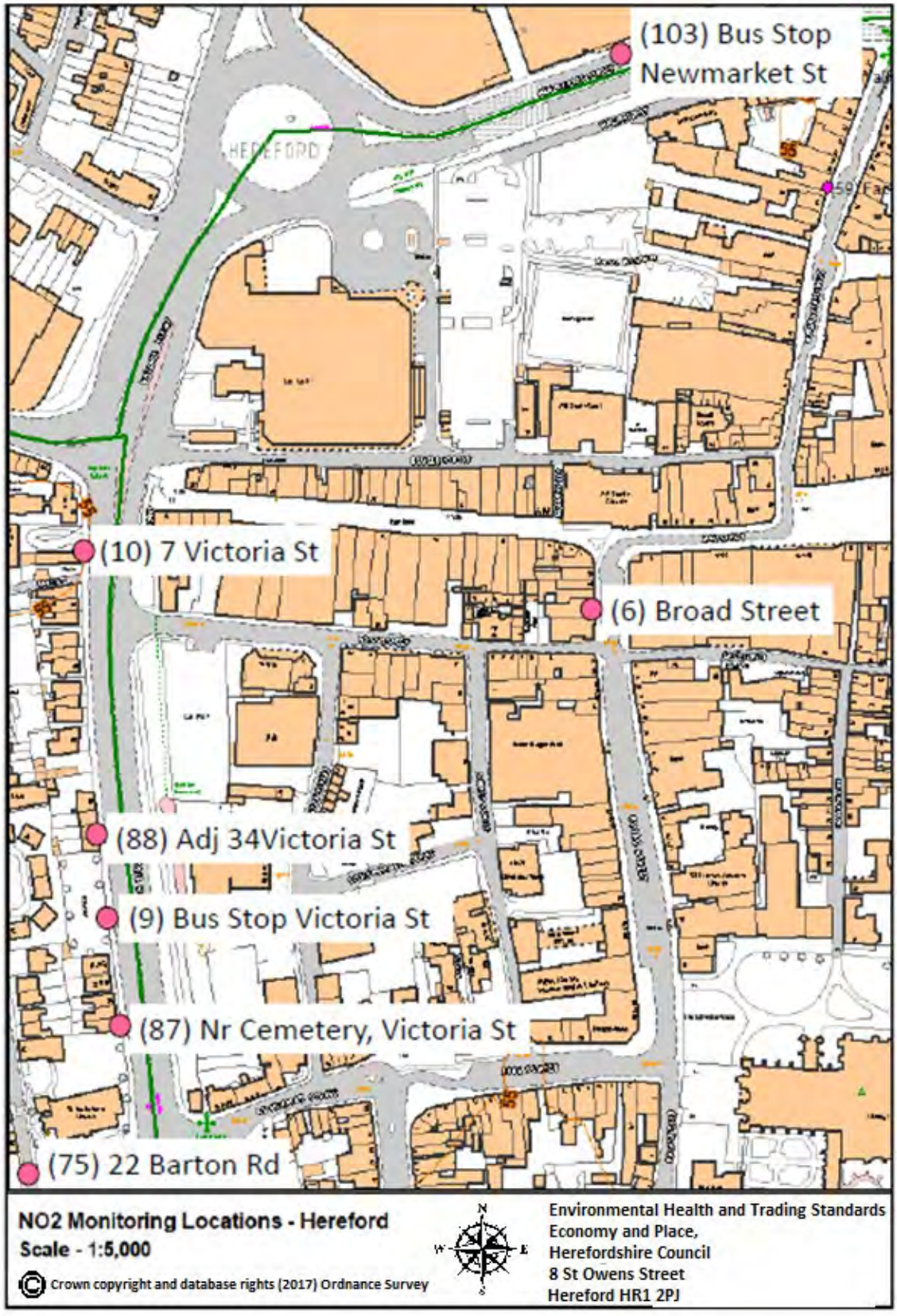


Figure D.5 – Hereford City (North) Monitoring Locations (2)

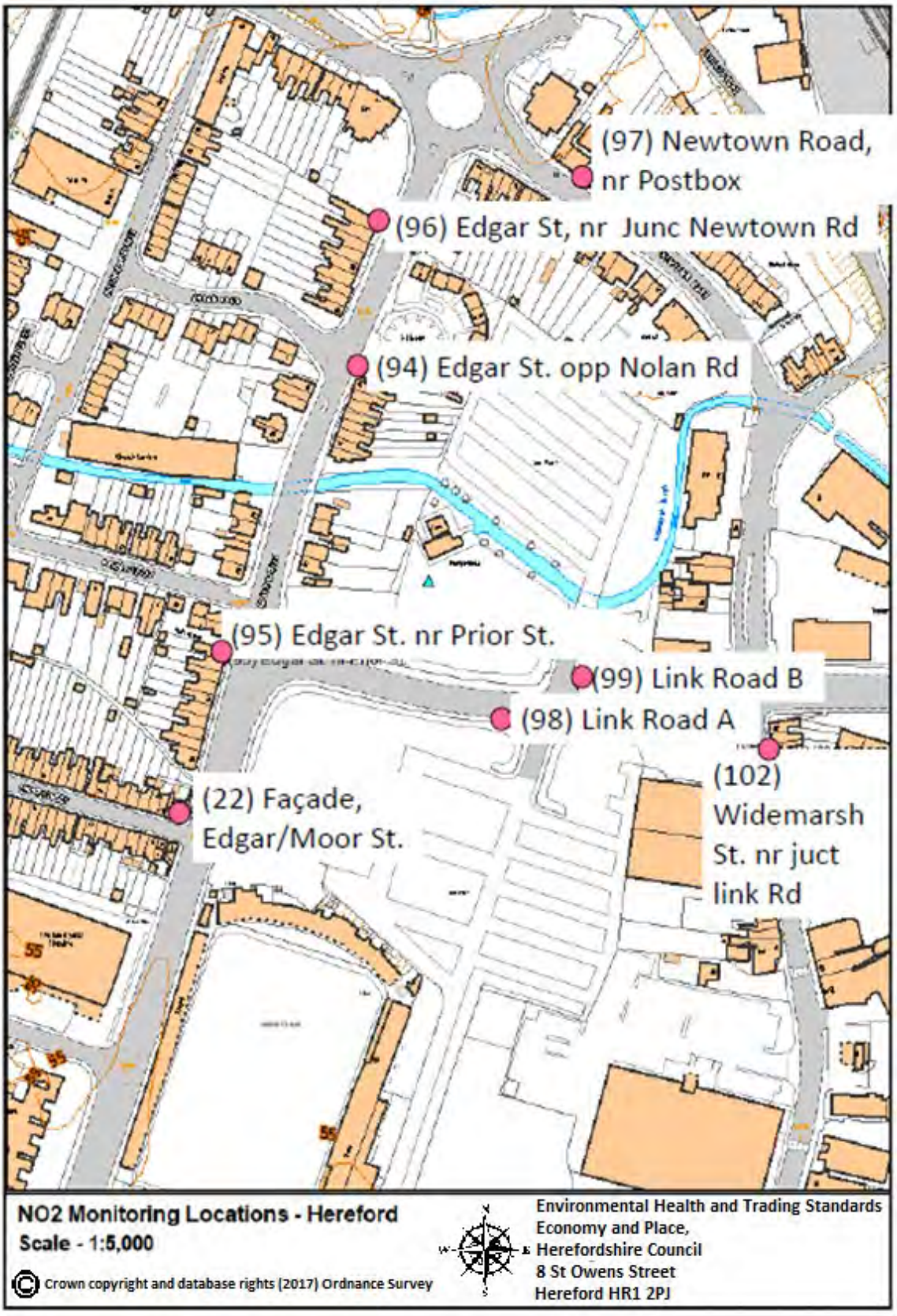


Figure D.6 – Hereford City (North) Monitoring Locations (3)

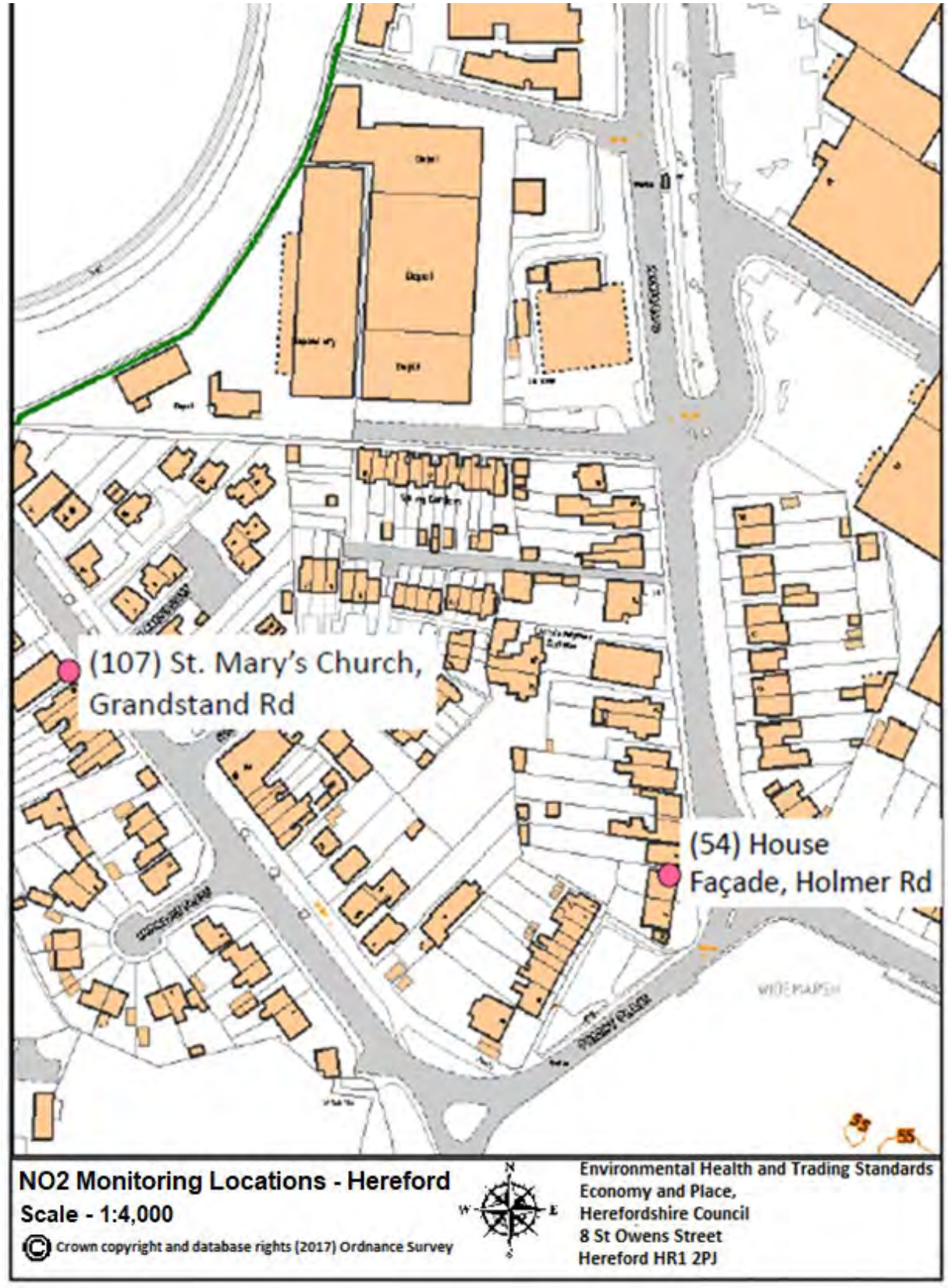


Figure D.7 – Hereford City (North) Monitoring Locations (4)

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

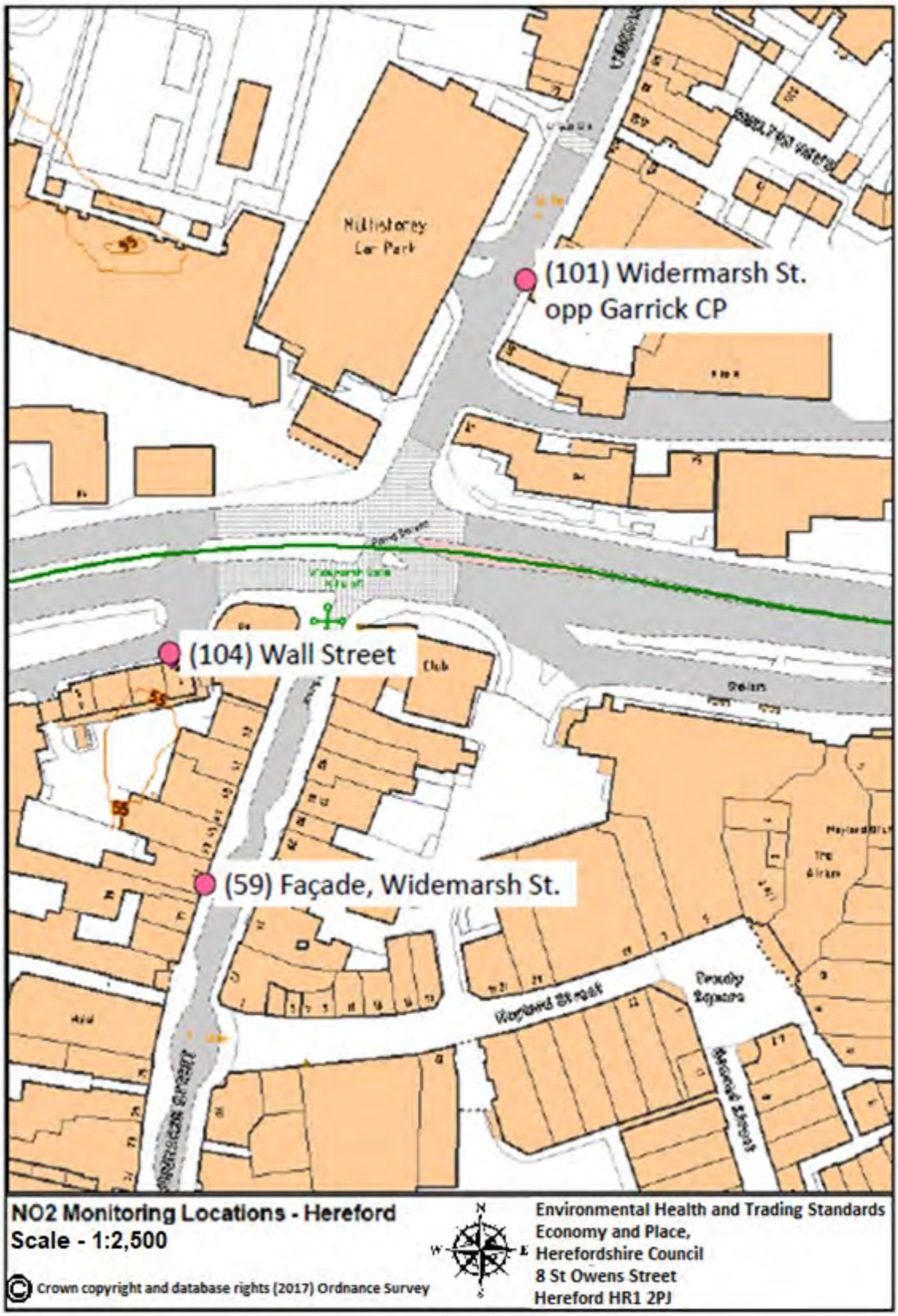


Figure D.9 – Hereford City (North) Monitoring Locations (6)

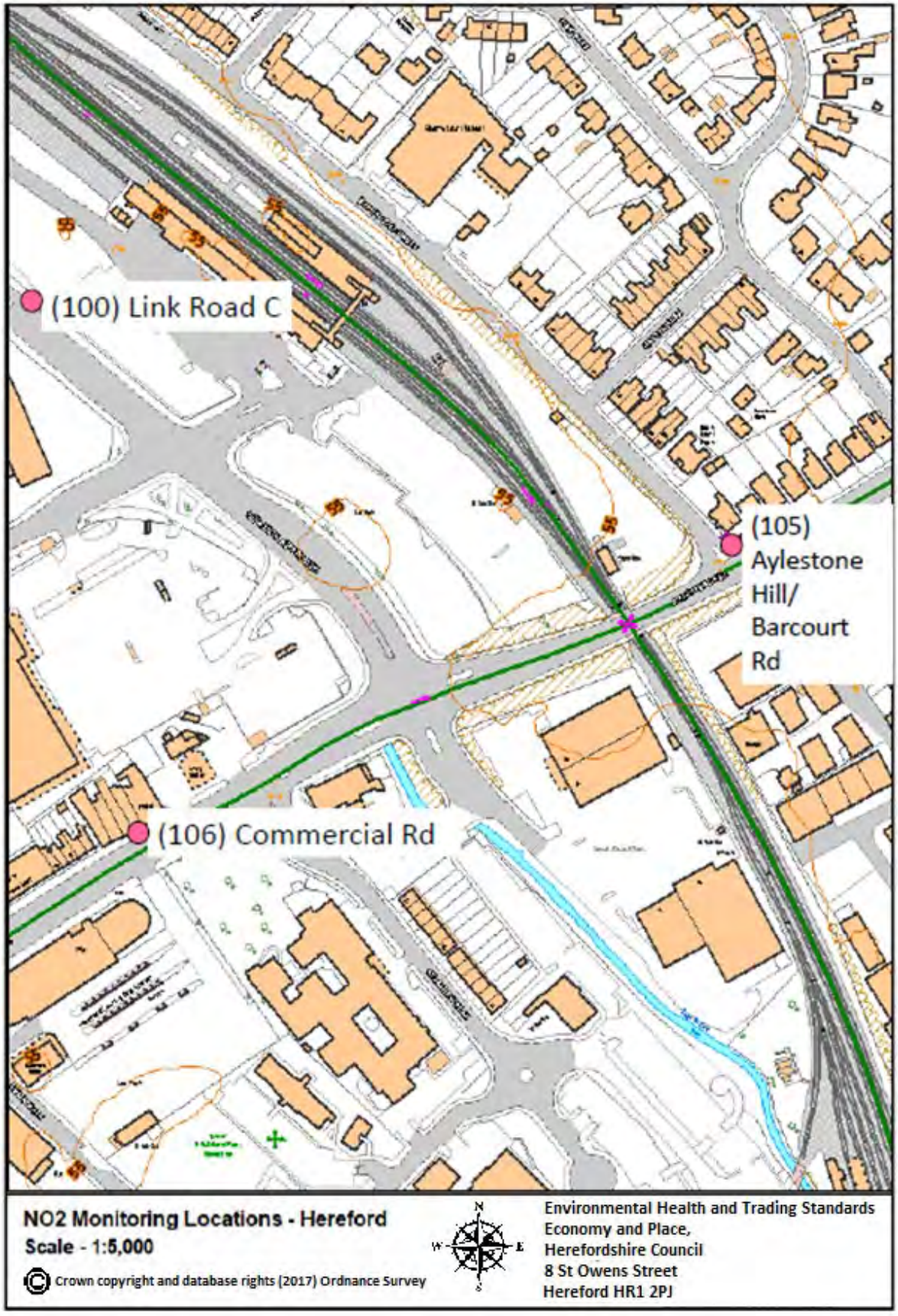


Figure D.10 – Hereford City (South) Monitoring Locations

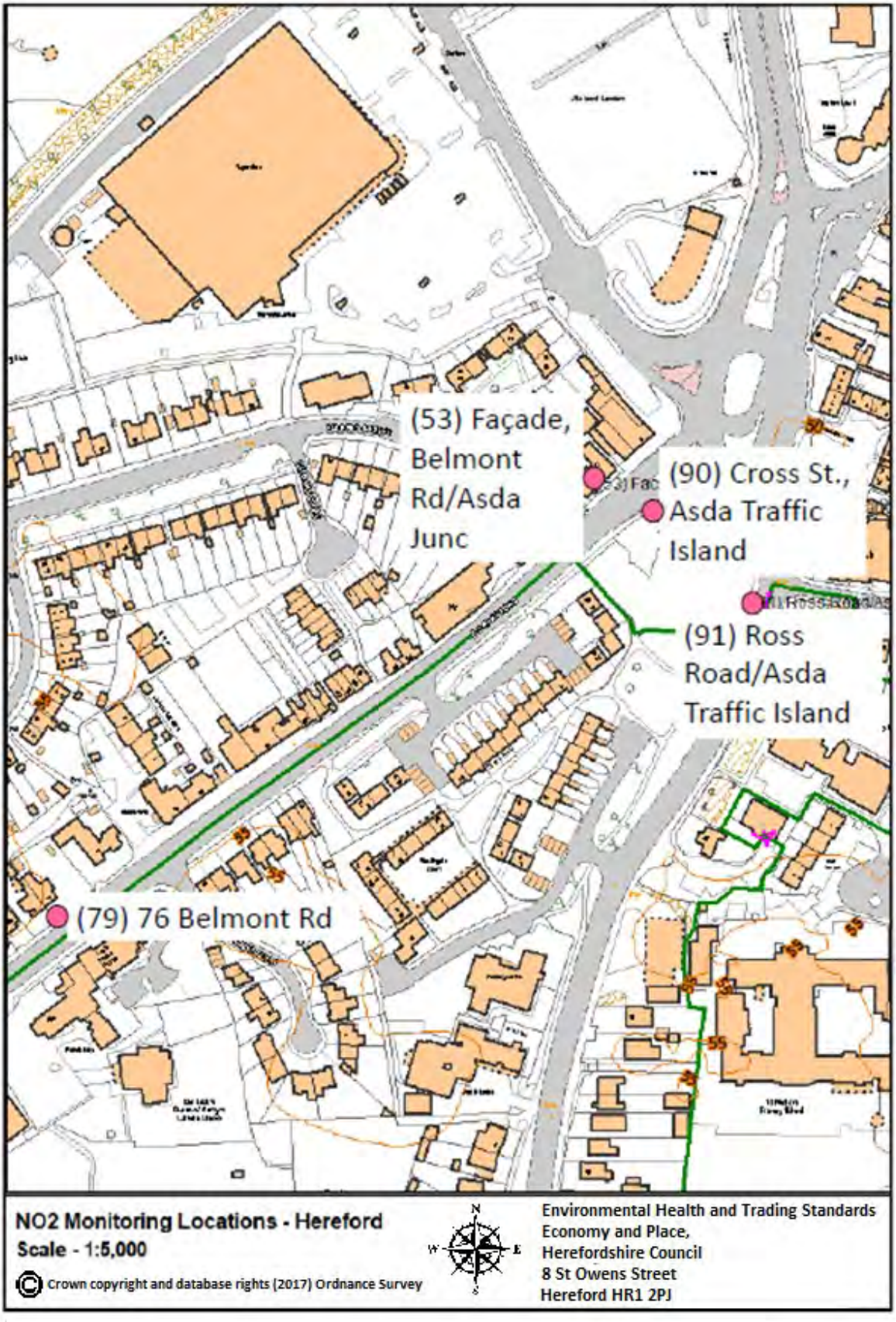


Figure D.11 - Kings Acre Road Monitoring Location

Figure D.12 - Three Elms Road Monitoring Location

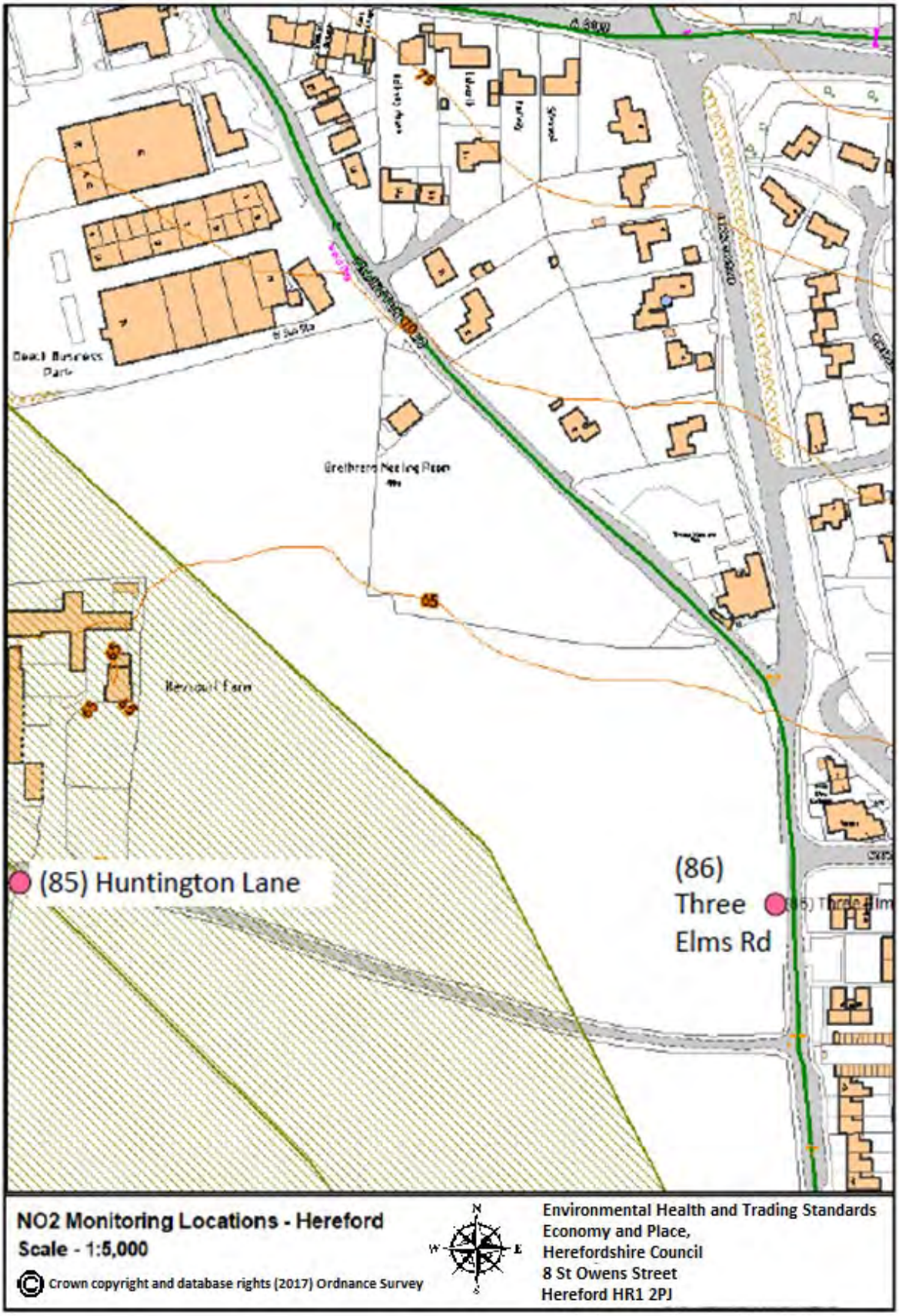


Figure D.13 – Whitecross Road Monitoring Locations

Figure D.14 – Rotherwas Industrial Estate Monitoring Location

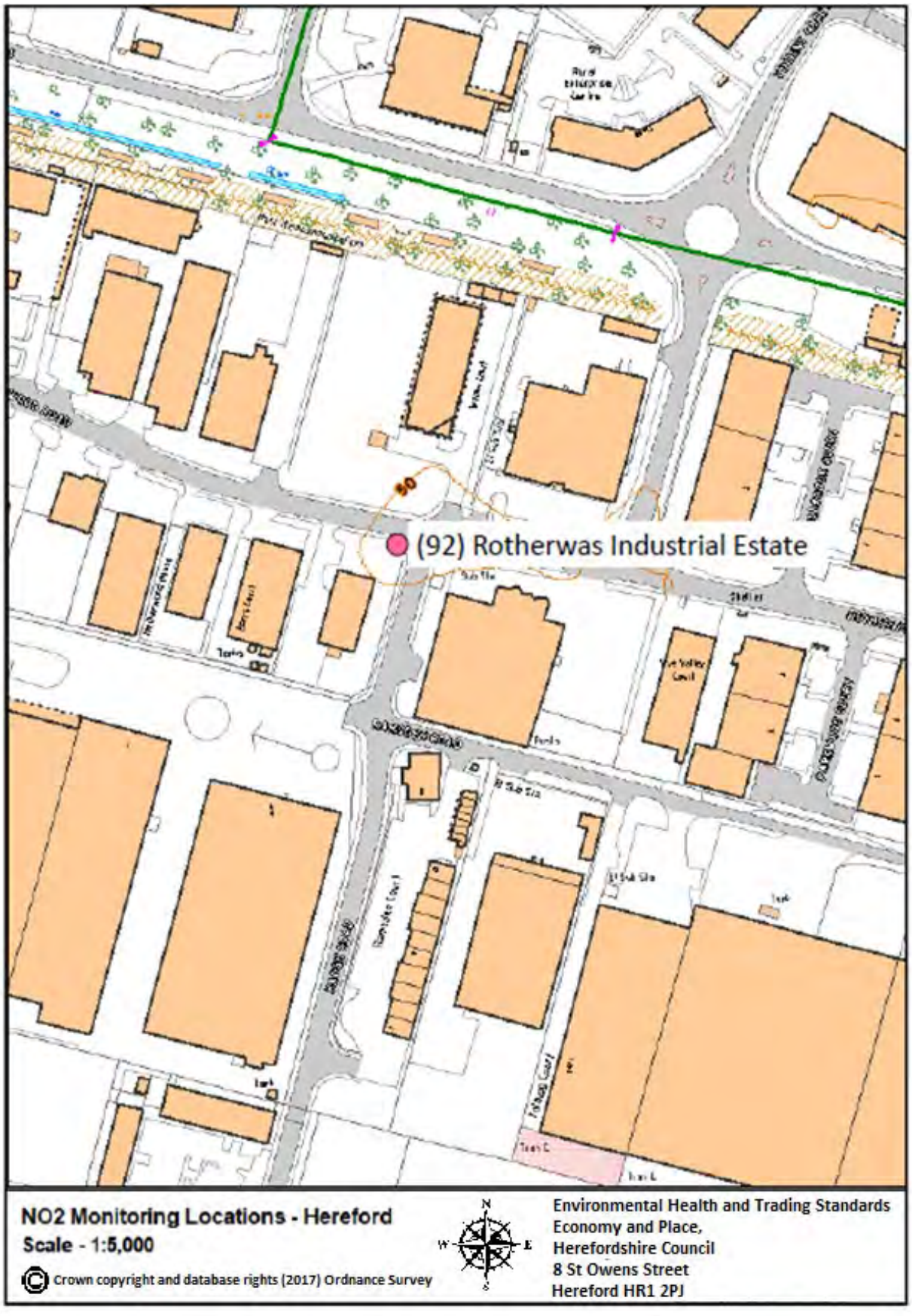


Figure D.15 – Rotherwas Relief Road Monitoring Location

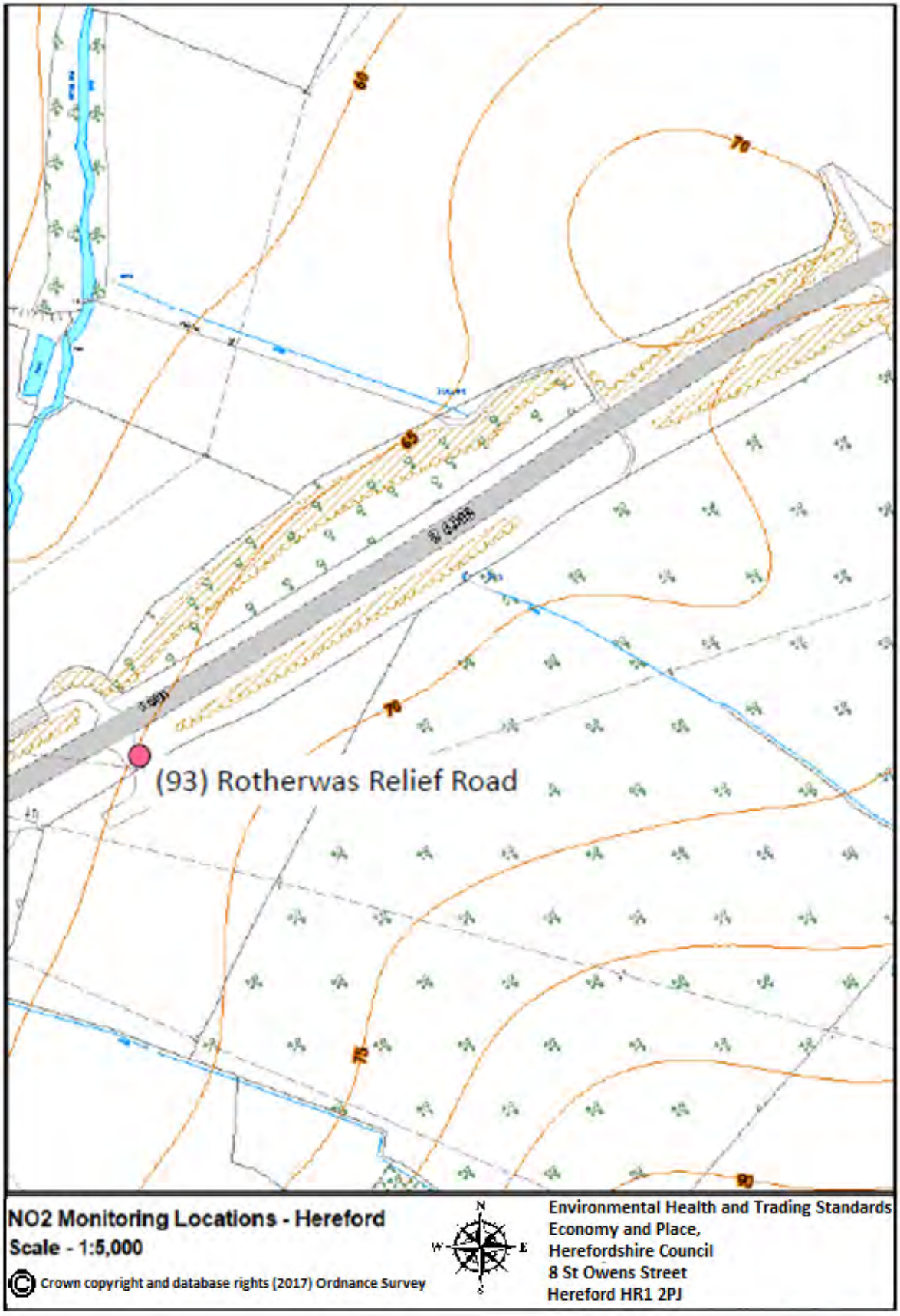


Figure D.16 – Roman Road Monitoring Location

Figure D.17 – Leominster AQMA Boundary

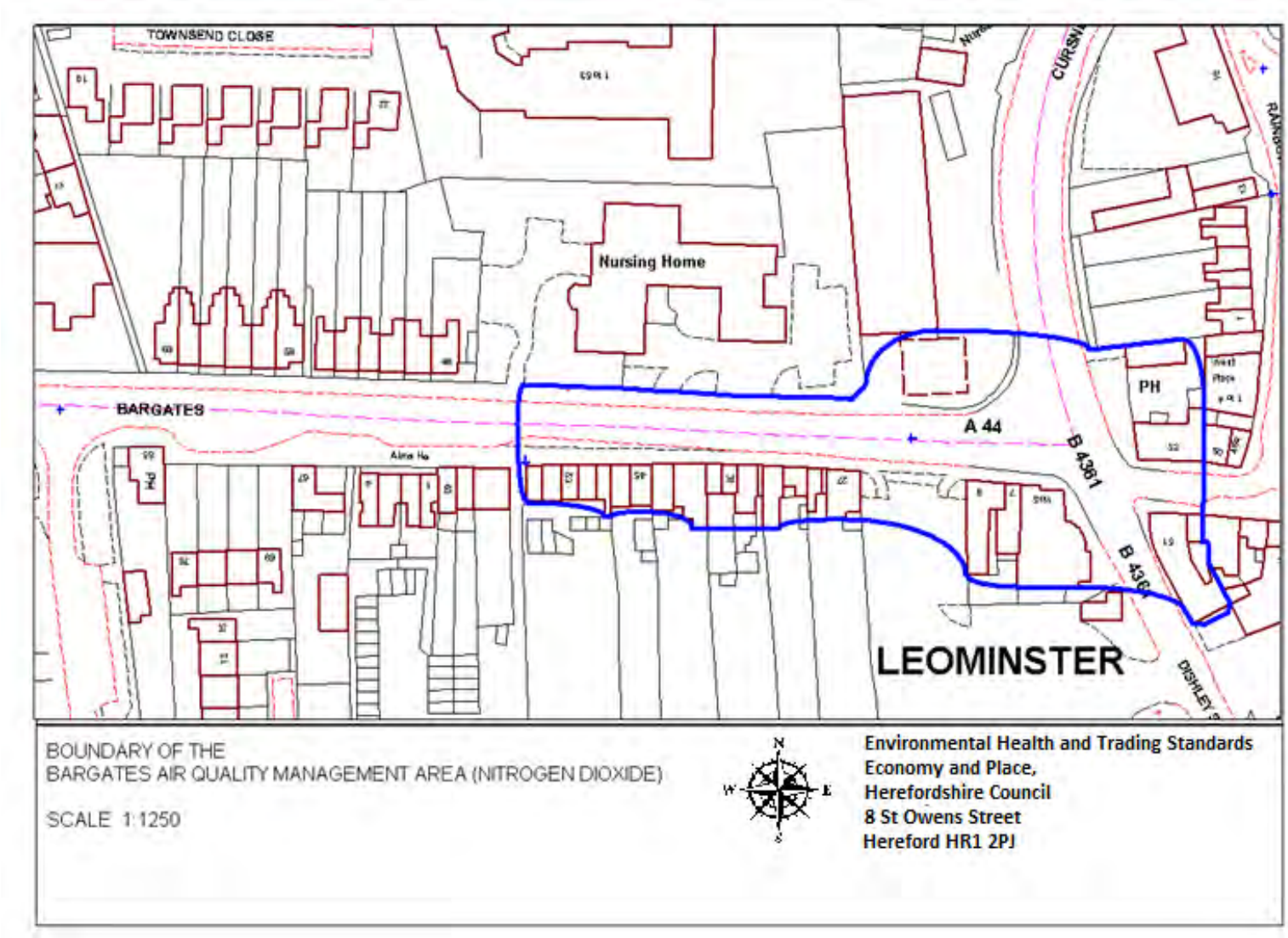


Figure D.18 – Leominster Monitoring Locations

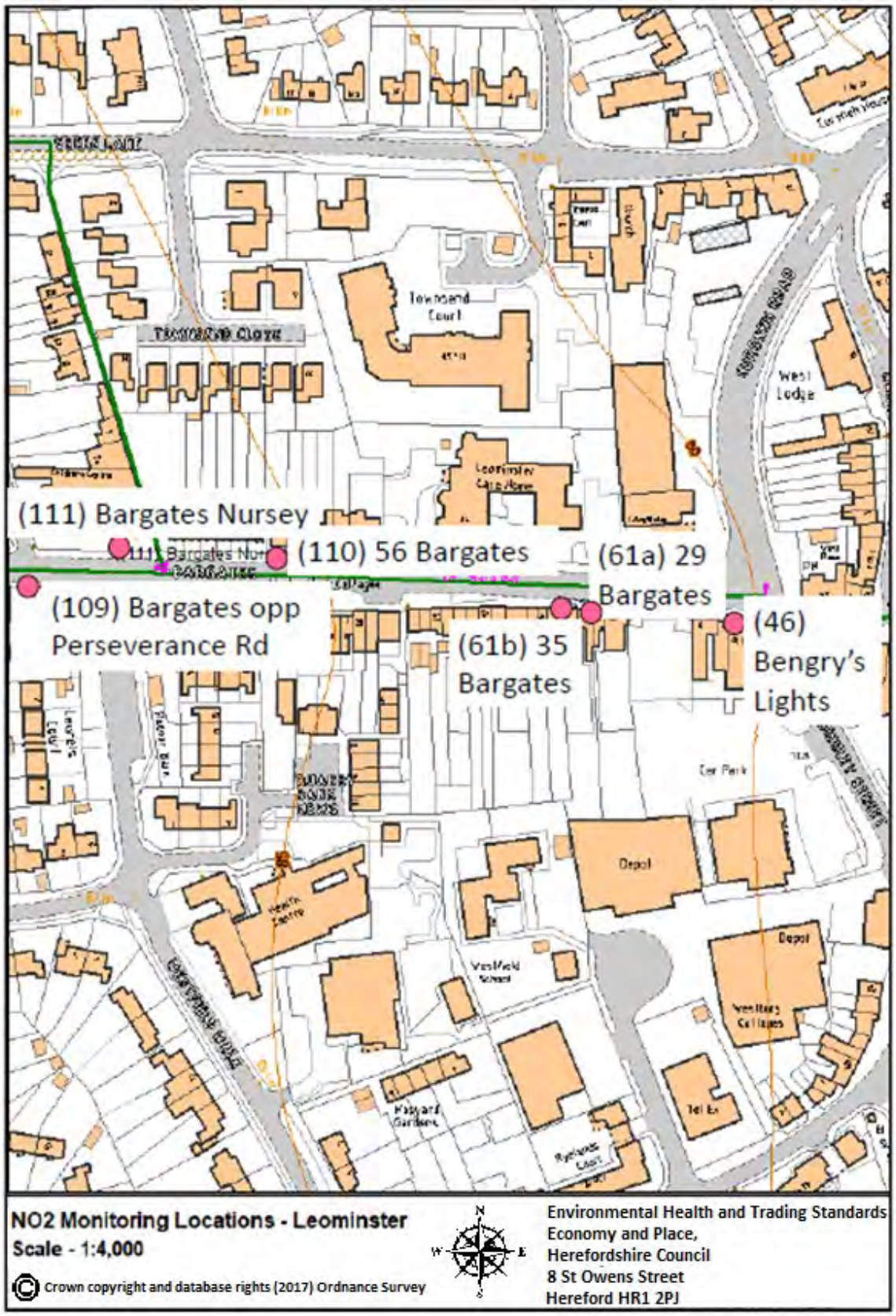


Figure D.19– A40 Corridor, Ross-on-Wye Monitoring Locations

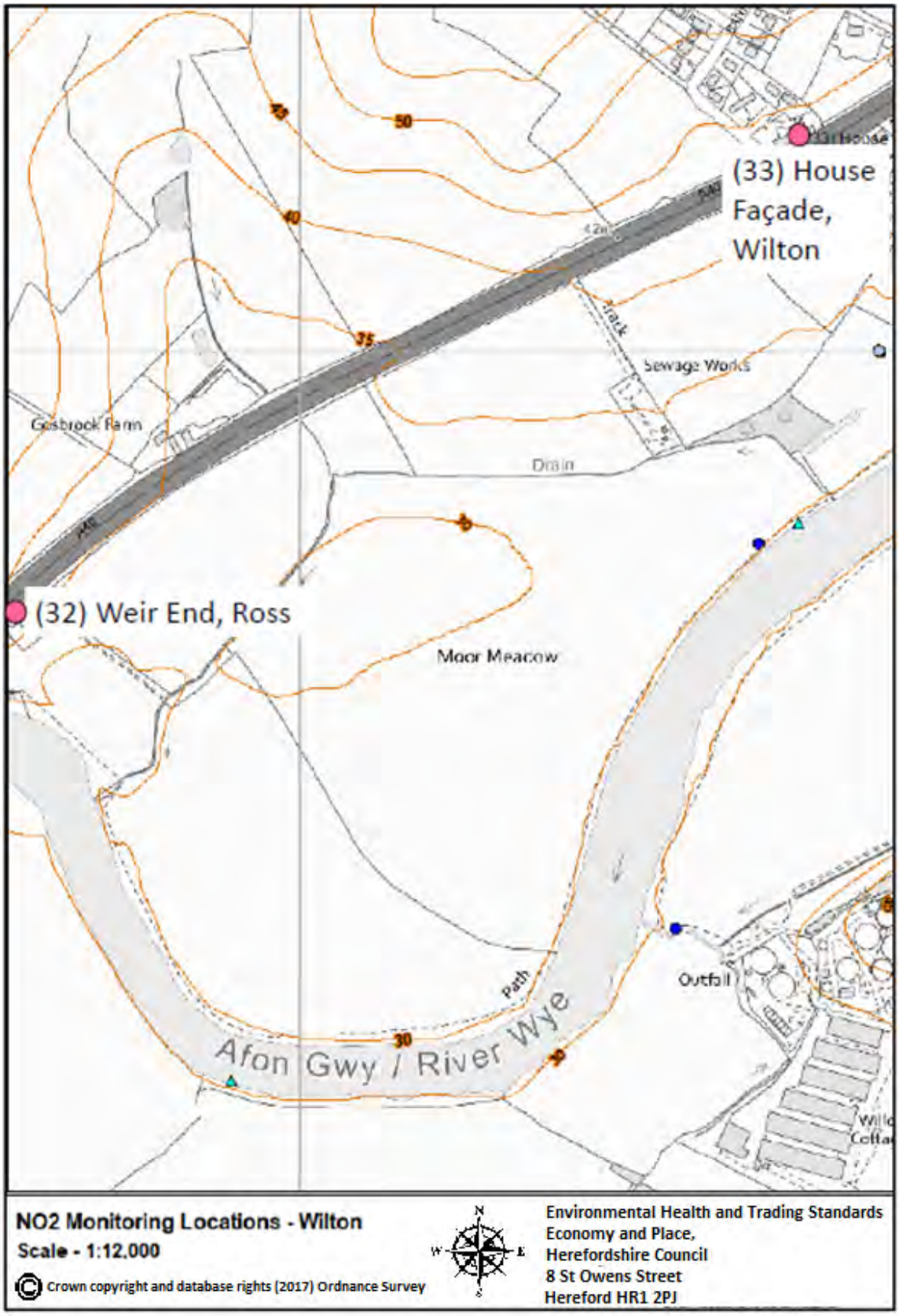
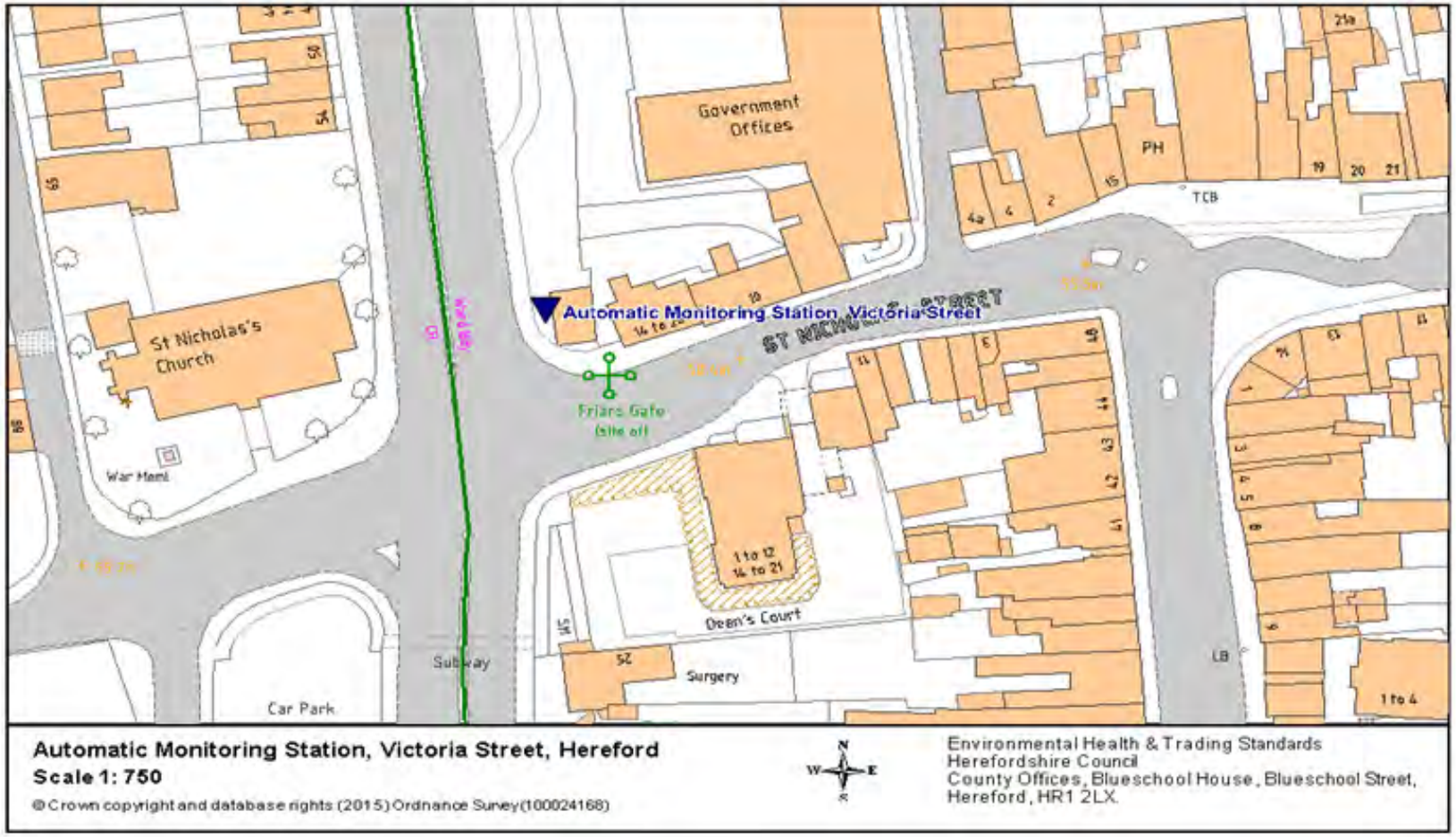


Figure D.20 – Ross-on-Wye Monitoring Location

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[9]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data*10* suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)*11* has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

10 Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

11 Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Herefordshire Council

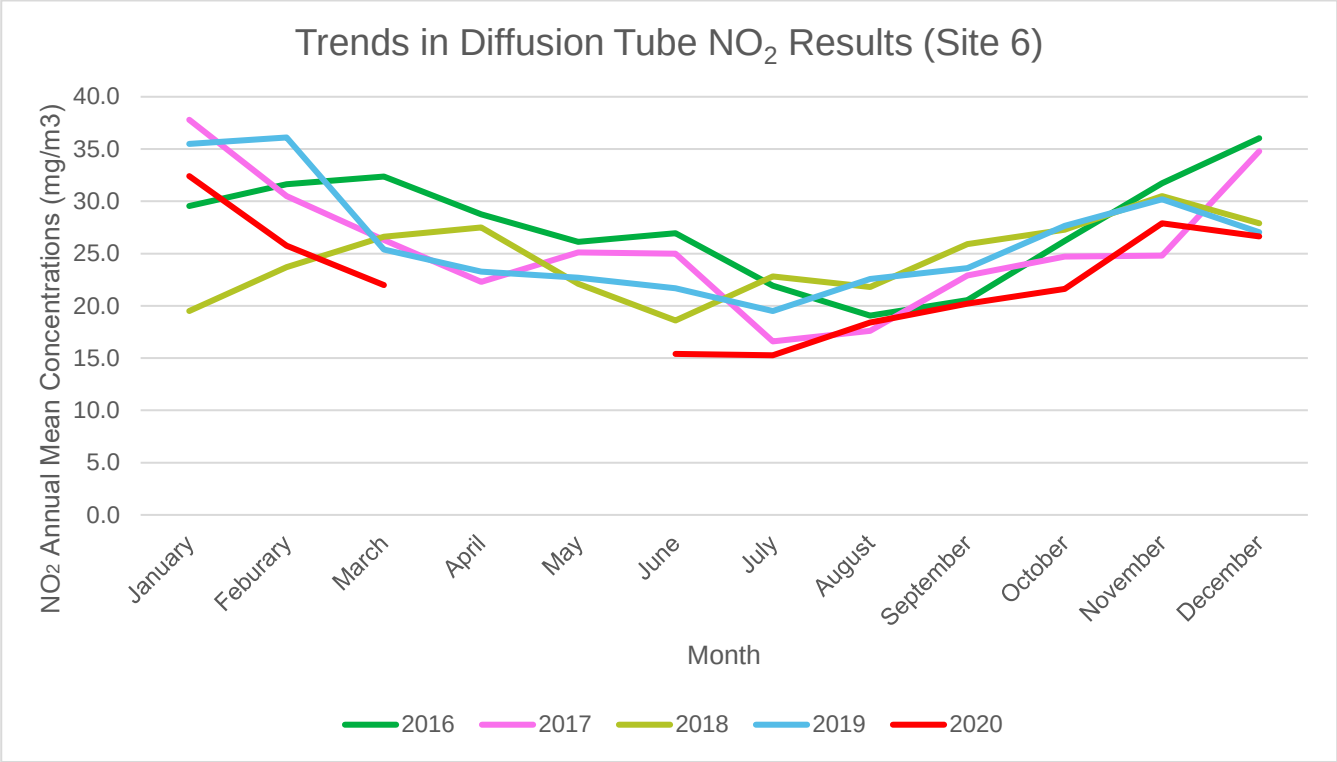
Diffusion tube results

Comparatively the annual mean NO_2 levels recorded in 2020 were lower than previous years (going back as far as 2016). This is likely to have been influenced by traffic reductions as a direct result of COVID-19 ‘stay at home’ measures. The average reduction in the annual mean (annualised and bias adjusted) across the diffusion tube sites between 2019 and 2020 was 6.25µg/m³.

As a result of the first national lockdown, there is no diffusion data available over two months (April and May). During this time, our laboratory analysis was closed therefore we were not able to record NO_2 levels in April or May.

As shown in Figure F.1, concentrations were generally lower in 2020 compared to previous years. The below figure shows site 6 as an example, these figures are not bias adjusted.

Figure F.1 – Trends in Diffusion Tube NO_2 Results (Site 6)



Caution should be used when considering the impacts based solely on diffusion tubes. Diffusion tube data is a monitoring method namely suitable at analysing long term trends rather than short term trends.

Road Traffic Data

According to Department for Transport vehicle miles travelled in Herefordshire have grown in each year between 2010 and 2019. However, there has been a significant decrease in 2020 has resulted in traffic estimates that are lower than the 2010 levels. 978.1 million Vehicle miles were travelled on the roads in Herefordshire in 2020. In comparison, 1, 242.7 million vehicle miles were travelled on the roads in Herefordshire in 2019. The details of the methodology and full statistics can be found on the following link: (https://roadtraffic.dft.gov.uk/local-authorities/155).

Opportunities Presented by COVID-19 upon LAQM within Herefordshire Council

Since March 2020 staff at Herefordshire Council have worked from home. The council is looking at ways to support more colleague to be able to work from home in the future. This will reduce the level of commuter traffic and associated emissions

Challenges and Constraints Imposed by COVID-19 upon LAQM within Herefordshire Council

During 2020, our laboratory analysis was closed during two months as a direct result of the first national lockdown imposed because of COVID-19. As such we were unable to collect any diffusion tube data over the months April and May. This affected the data capture within 2020, resulting in 1 monitoring site having to be annualised (site 87). The main challenge during the pandemic was the redeployment of staff resources. As a result the main areas impacted by resourcing was the reporting/ creating the air quality annual status report (this has been delayed in 2020 and 2021) and a reduction in planning and permitting responses. Overall, in line with the guidance presented within the LAQM Impact Matrix provided within Table F.1, I would class these impacts as small.

The impacts as presented above are aligned with the criteria as defined in Table F 1, with professional judgement considered as part of their application.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by 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 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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