



2024 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995
Local Air Quality Management, as amended by the
Environment Act 2021

Date: June, 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Forest of Dean District

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year¹.

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution².

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO ₂)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO ₂)	Sulphur dioxide (SO ₂) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM ₁₀ and PM _{2.5})	<p>Particulate matter is everything in the air that is not a gas.</p> <p>Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes.</p> <p>PM₁₀ refers to particles under 10 micrometres. Fine particulate matter or PM_{2.5} are particles under 2.5 micrometres.</p>

¹ UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

The monitoring reported within this 2024 Annual Status Report for Forest of Dean District Council (FoDDC) took place during the whole of 2023. It does not indicate any additional areas of general concern with regard to air quality. As with last year's results, this year's annual mean levels did not exceed the national objective of 40 µg/m³, which is set to protect health.

We have one Air Quality Management Area (AQMA) in the district located in Lydney, declared in July 2010. It was identified that traffic congestion (at the T-junction between the High Street and the Bream Road) was the most likely cause of the NO₂ levels, which exceeded the national air quality objectives at the time the AQMA was declared. The district's centralised national AQMA page can be found here: [Link to Forest of Dean AQMA details.](#)

The results of NO₂ monitoring during 2023 have shown concentrations are continuing to generally fall across the district, with no sign of a return to pre-pandemic concentrations. Consequently, there is increasing confidence that the concentrations of NO₂ which have been observed in 2022 and 2023 are a reflection of the 'new norm' for this pollutant. Although some locations showed a slight increase compared to 2022 (maximum increase 0.6µg/m³), 20 out of 25 locations (monitored in 2022 and 2023) showed a decrease in NO₂ concentrations. This has had a particularly positive effect on the AQMA, which has had average annual concentrations of NO₂ below the national objective for two consecutive years (post-pandemic). The reasons for this continual decline are still considered to be a consequence of the uptake of low emission vehicles, improvements in engine efficiency, the popularity of working from home and virtual meetings.

New Developments

All development proposals were considered with regard to their potential to increase traffic pollution in the AQMA and other areas. The Council has considered the air quality implications of each development proposal and worked closely with developers and other bodies, in particular Gloucestershire County Council (GCC) highways officers and the Environment Agency where required.

2023 did not see planning applications for large housing or commercial developments in the Lydney area. There has been approval of smaller developments across the district, none of which were shown to have an impact on air quality.

Redevelopment of Lydney Harbour is ongoing, however planning permission remains pending for the redevelopment of the former Pine End plywood manufacturing site. If approved, this will see the transformation of the currently derelict site into an eel fishery and smokery, which will include café and education/visitor centre.

Air Quality Partners

As the district's highway authority, GCC, is the FoDDC's main air quality partner. This is predominantly due to road traffic being the main pollution source within the district. The two councils regularly work together within a planning context, regarding highways and new developments, either directly or via consultations through the planning process.

FoDDC is also beginning to engage with town and parish councils to support them with projects which may benefit air quality, regardless of the current status.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan³ sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter (PM_{2.5}), the pollutant of most harmful to human health. The Air Quality Strategy⁴ provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero⁵ details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel, and the majority of Air Quality Management Areas (AQMA) are designated due to elevated concentrations heavily influenced by transport emissions.

³ Defra. Environmental Improvement Plan 2023, January 2023

⁴ Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

⁵ DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Improvements detailed in the [Local Transport Plan 2020-2041](#) for Lydney are still awaiting funding and consequently there has been no further progress since last year. A similar situation applies to the proposed improvements to Lydney Train Station. However, there has been some progress with the Dean Forest Greenway. Following objections and concerns raised regarding the impact on areas of ancient woodland, the amenity value of some properties and road safety, the original route has now been revised to avoid sensitive areas and improve safety. The intention is to resume the planning process in the coming year ([Dean Forest Greenway Report](#)).

Other actions which have been implemented or are planned include:

- Purchase of a community transport electric bus;
- Lydney Town Council have improved green infrastructure and installed signage to raise awareness of the 20mph speed limit in the town;
- Use of telematics by the waste contractor to encourage fuel efficient driving.
- Installation of new electric vehicle chargers for public use.

In addition, FoDDC will be launching a public consultation on the new District Local Plan in June 2024. The plan will include measures to tackle air pollution and climate change.

FoDDC have published their Climate Emergency and Action Plan 2022-2025, which focuses on electric vehicle charging points, active travel and public transport. It is expected that there will be progress on these actions in the coming year.

District Air Quality Group

GCC have recently re-started regular meetings of air quality officers working for the district, city, and borough councils within the county. The aim is to develop a more co-ordinated approach to air quality across Gloucestershire, with the support of GCC's air quality officer and Healthy Place Shaping team. As part of this initiative, GCC have set up an air quality webpage as part of the [InformGloucestershire](#) site.

Conclusions and Priorities

We deploy a number of diffusion tube monitors across the district, measuring nitrogen dioxide as part of an ongoing survey. These are collected and sent for analysis on a monthly basis.

2023 has continued the trend in NO₂ concentration set by the Covid-19 pandemic, providing increased confidence that this scenario is the 'new norm'. Overall, the majority of locations monitored saw a fall in NO₂ concentrations compared with 2022. Nitrogen dioxide levels in the AQMA remained below the national air quality objective, with 8 of the 11 locations monitored showing a decrease in this pollutant.

Despite the continued trend of concentrations below the UK objective across the district, air pollution remains a contributing factor to poor health. Consequently, the County Council, District Council, residents and businesses continue to have a part to play in reducing emissions and improving the quality of the air we breathe. It is important that GCC Transport Department are kept informed of proposed developments and that developers are aware of the need for appropriate mitigation in respect of associated air pollution.

Overall, there is a cautious positive outlook for air quality in the AQMA, which reflects changes in how we work and the technology in the cars we drive. Over the coming years, we anticipate further improvements as a consequence of changes in the way we travel, how our roads are used and further improvements in car technology. FoDDC will continue to work with GCC to explore and develop highway improvements, and ensure future large developments include, or provide funding for, mitigation measures to minimise the impact of the consequential additional traffic.

Over the next year we will continue the diffusion tube monitoring survey, as well as continuing to seek funding for particulate monitors or sensors.

The 2005 – 2021 FoDDC Air Quality reports are available online at:

[Forest of Dean District Council - Air Quality pages](#)

Local Engagement and How to get Involved

We can all contribute to improving air quality our district by:

- Reducing how much we use petrol/diesel vehicles;
- Where driving diesel/petrol cars is necessary, using 'eco-driving' styles, which reduces fuel usage, and consequently reduces emissions;

- Consider car sharing – encourage your workplace to co-ordinate car sharing;
- Using car clubs instead of buying a car. Even better, join an electric car club;
- Using public transport; and,
- If you are able, use alternative travel modes such as walking or cycling;

These measures not only improve air quality, but also will contribute to tackling climate change and, in the case of cycling and walking, will improve your health too!

Other ways which you can get involved include:

- Participating in consultations on local plans such as FoDDC Local Plan;
- Joining local campaign groups;
- Communicating issues or ideas to town/parish councils, district council or county council;

More information on air quality can be found on the following websites:

- [Defra UK Air](#)
- [Action for Clean Air](#)
- [Inform Gloucestershire](#)

Any queries about Air Quality should be directed to the Environmental Protection team within FoDDC. This team can be contacted by email on: ers@fdean.gov.uk

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection department of FoDDC with the support and agreement of the following officers:

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This ASR has been approved and signed off by the Gloucestershire Head of Public Health, Siobhan Farmer.

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1 Local Air Quality Management

This report provides an overview of air quality in Forest of Dean District during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by FoDDC to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by FoDDC can be found in Table 2.1. The table presents a description of the AQMA that is currently designated within Forest of Dean District. Appendix D provides maps of AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO₂ annual mean

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	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
High Street Lydney	July 2010	Annual Mean NO ₂ ; 40µg/m ³	High Street, Hill Street and Newerne Street from Temple Way junction to Albert Street Junction; and Bream Road from High Street junction to approximately 75m past the entrance to Lydney C of E Primary School; and Forest Road from Hill Street to just past 17 Forest Road.	NO	50µg/m ³	28.8µg/m ³	4 (including Covid pandemic)	A draft Lydney AQMA Action Plan dated January 2015 has been prepared with the assistance of a steering group and after local consultation with stakeholders.	

Forest of Dean District Council confirm the information on UK-Air regarding their AQMA(s) is up to date.

Forest of Dean District Council confirm that all current AQAPs have been submitted to Defra.

2.2 Progress and Impact of Measures to address Air Quality in Forest of Dean District

Defra's appraisal of last year's ASR concluded '*The report is well structured, detailed, and provides the information specified in the Guidance*'. The appraisal provided the following suggested improvements to subsequent reports:

Comment	Action
The Council have included a detailed discussion of measures to improve air quality in the District and have completed a number of air quality improvement measures, particularly those that focus on new cycling schemes to encourage the uptake of active travel. The Council are encouraged to review and update their AQAP, as it is now over 5 years old, and consider additional measures to improve air quality in the AQMA	A review of the Lydney AQMA has been carried out and was submitted on 28/02/2024.
The QA/QC procedures are thorough, following the methodologies outlined in TG16. The methodology and factors applied for bias adjustment are well presented. However the council could provide some discussion for the monitoring method and lab used, such as including the latest results from the AIR PT/WASP Scheme to verify the quality of the lab's results.	This has been included in Appendix C.
It would be good if the council verify if tube deployments are in line with the Defra Calendar, or if there was any reason as to why this couldn't happen.	Where relevant, this has been included in Appendix C
Please ensure the excel file matches the report, table 2.1, states the current years level of exceedance as 28.5 in the excel file but it has been reported as 40 in the report. Also, to avoid confusion please delete values from the excel sheet template if not relevant to monitoring undertaken by the council.	The 2023 report has been amended accordingly and comments applied to the current report.

Forest of Dean District Council (FoDDC) has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in [Table 2.2](#). Eleven measures

are included within [Table 2.2](#), with the type of measure and the progress FoDDC have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within [Table 2.2](#).

The measures in [Table 2.2](#) are discussed in more detail in the 2024 revised Air Quality Action Plan, currently under appraisal by Defra. More detail on these measures can also be found in the following documents:

- [Gloucestershire Local Transport Plan 2020-2041](#)
- [Gloucestershire Climate Change Strategy](#)
- [Forest of Dean Local Plan](#)
- [Gloucestershire County Council Ultra Low Emission Vehicle Strategy](#)
- [Bus Service Improvement Plan](#)
- [Forest of Dean Allocations Plan 2006 to 2026](#)
- [Lydney Neighbourhood Development Plan](#)
- [Lydney Town Council Strategic Plan 2015-2024](#)
- [Forest of Dean District Council Climate Emergency Strategy and Action Plan 2022-25](#)

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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	Gloucestershire's Local Transport Plan 2020-2041	Transport Planning and Infrastructure	Other	2021	2040	Gloucestershire County Council	Gloucestershire County Council	NO	Partially Funded	£10k - 50k	Implementation	Reduced vehicle emissions	Improvements to: Lydney rail station and services; walking/cycle networks; bus services; key road junctions. Also introduction of transport interchange hubs.	Implementation on-going	Funding
2	Forest of Dean District Local Plan 2041	Policy Guidance and Development Control	Other policy	2023	2040	FoDDC	FoDDC	NO	Funded	£10k - 50k	Planning	Potential to improve: public transport and active transport facilities; infrastructure for electric vehicles; traffic flow to reduce congestion.	Improvements in overall population health. Increase in cycling and walking. Reduced concentrations of NO ₂	Public Consultation commencing June/July 2024	Funding and changing attitudes and behaviours
3	ThinkTravel	Promoting Travel Alternatives	Promotion of walking	2020	2025	Gloucestershire County Council & FODD Council	Gloucestershire County Council	NO	Funded	< £10k	Implementation	Reduced vehicle emissions & improve health	Improvements in overall population health. Increase in cycling and walking. Reduced concentrations of NO ₂	Implementation on-going	None
4	Air Quality Technical Guidance for Forest of Dean District Council 2015	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2015	2015	District Council	Local Authority, Funding: Defra Air Quality Grant	NO	Funded	< £10k	Completed	Address potential increase in vehicular emissions due to vehicle usage associated with new residential and business developments	Approved policy in place and in use, with associated technical guidance available on FODDC website	Policy approved and in use from 30 July 2015	Air quality guidance available on FoDDC website
5	The Lydney Cycle Improvement Scheme	Promoting Travel Alternatives	Promotion of cycling	2020	2021	Gloucestershire County Council, with First LEP Growth Deal	Gloucestershire County Council	NO	Funded	£500k - £1 million	Completed	Provides alternatives for travel around Lydney, especially within the AQMA	The Scheme involves the construction of an integrated cycleway network incorporating 5 individual "links" throughout Lydney.	Completed	None
6	Facilitating home working among council personnel	Promoting Travel Alternatives	Encourage / Facilitate home-working	2020	2025	Gloucestershire County Council & FODD Council	Gloucestershire County Council & FODD Council	NO	Funded	< £10k	Implementation	Reduced vehicle emissions	Reduced NO ₂ concentrations	Implementation on-going	None
7	Targeted speed limit reductions	Traffic Management	Reduction of speed limits, 20mph zones	2018	2018	Gloucestershire County Council	Gloucestershire County Council	NO	Funded	£100k - £500k	Completed	Reduced vehicle emissions	Improved traffic flow at peak hours in the Lydney Town Centre	Completed	None

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
8	Dean Forest Greenway	Promoting Travel Alternatives	Promotion of cycling	2022		West Dean Parish Council	West Dean Parish Council, Lydney Town Council, Forestry England, Dean Forest Railway and Lydney Park Estate	NO	Funded	Not known	Planning	Reduced vehicle emissions	Provision of a traffic free walking & cycling route from Parkend to Lydney, as an alternative to driving.	Awaiting approval of revised route	Planning approval
9	The Robin	Transport Planning and Infrastructure	Bus route improvements	2022	Ongoing	Gloucestershire County Council & Lydney Dial-a-Ride	Gloucestershire County Council	No	Funded	Not known	Pilot Trial ongoing	Reduce number of private cars on the road, and consequently emissions	Uptake of the service	Pilot Trial	Ongoing funding and uptake of the service
10	Climate Emergency Strategy and Action Plan 2022-25	Policy Guidance and Development Control	Other policy	2023	2025	Gloucestershire County Council & FODD Council	Gloucestershire County Council & FODD Council	No	Partially funded	Not known	Adopted January 2023	Reduced vehicle emissions, Reduced number of vehicles on the road.	Number of actions successfully implemented	Recently adopted, most actions yet to be implemented	Funding
11	Installation of electric vehicle charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2022	2025	Gloucestershire County Council & FODD Council	Gloucestershire County Council - Local Electric Vehicle Infrastructure (LEVI) Capital Fund; FoDDC - On-Street Residential Chargepoint Scheme	No	Partially funded	£500k - £1 million	Implementation	Reduced vehicle emissions	Frequency of use	Four chargers installed in Lydney in 2023, with addition chargers to be installed in 2024.	Identification of suitable locations with adequate electric supply.

Dean Forest Greenway

There was further work to progress the Dean Forest Greenway multi use path, connecting Lydney and Parkend. The original planning application (P1913/21/FUL), submitted in 2021 raised the following concerns regarding the proposed route:

- Impact on ancient woodland
- Health and safety at junctions with main roads
- Impact on the amenity of residential housing
- Potential of flooding

To address these concerns, the route has now been revised, and agreement is now to be sought from the various interested parties, before resuming the planning process. More information on the project can be found at [Dean Forest Greenway](#).

Lydney Town Council

Lydney Town Council have carried out various projects to improve air quality in 2023. They have implemented green infrastructure improvements by planting wildflower areas on roadsides, leaving some grassed areas uncut and planting community orchards. Speed safety signs have been installed on the High Street and Highfield Road, reminding drivers to reduce their speed as they enter the town centre. Finally, flower tubs in the town have been fitted with reservoirs in flower tubs to reduce the number of maintenance visits needed.

Waste Collection Vehicles

Ongoing work by the council's waste collection contractor Biffa, has seen a reduction in their annual carbon footprint, as a result of using telematics to detect harsh braking, speeding and over accelerating. Overall, 2024 is showing they have a lower carbon footprint compared to 2023.

Electric Vehicle (EV) Charging

2023 saw the installation of on street EV chargers at three of the district's towns. Church Street, Newent, Templeway West, Lydney and Station Street, Cinderford now have four 7kw on street chargers, with more expected in the coming year.

In addition, FoDDC have received £200,000 from the ['On Street Residential ChargePoint Scheme'](#), which will be used to install 33 new charging points, creating 66 sockets in total.

Public Transport

Community transport service Lydney Dial-A-Ride will be purchasing an electric minibus in the coming year funded by the Rural England Prosperity Fund and Zero Emission Bus Regional Areas 2 programme as part of a scheme run by Gloucestershire County Council (GCC). The bus will operate the 777 route providing transport between Lydney and Milkwall.

District Air Quality Group

GCC have recently re-started regular meetings with air quality officers working for the district, city and borough councils within the county. The aim is to develop a more co-ordinated approach to air quality across Gloucestershire, with the support of GCC's air quality officer and Healthy Place Shaping team. As part of this initiative, GCC have also set up an air quality webpage, part of the [InformGloucestershire](#) site, providing information on NO₂ concentrations across the county, as well as other information relating to air quality and health.

District Local Plan 2041

FoDDC are currently in the process of developing a new local plan for the district, which will replace the existing plan ending in 2026. The draft plan has been approved by Cabinet and can be found [here](#). The plan shows a commitment to promoting active travel and developing numerous cycle routes throughout the district. The public consultation on the plan is expected to take place during June/July 2024.

The principal challenges and barriers to implementation that FoDDC anticipates facing are:

- securing the required funding, particularly for highways improvements; and,
- changing attitudes and behaviours to encourage less car use and more active travel and use of public transport.

FoDDC anticipates that the measures stated above and in Table 2.2 will continue to achieve compliance in the Lydney AQMA

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy⁶, local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter (PM_{2.5}). There is clear evidence that PM_{2.5} (particulate matter smaller 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Other than the potential source from vehicles, no other significant source of PM_{2.5} has been identified within the district. Therefore, the control at this stage is aligned with the measures designed to achieve a reduction in vehicular emissions.

In addition, FoDDC is taking the following measures to address PM_{2.5}:

- Highlight the issues of PM_{2.5} including the impacts on health and activities which generate the particles. This will be achieved through campaigns such as responsible use of wood burners, fire pits, garden bonfires etc.
- Seek funding to install PM_{2.5} monitors within the AQMAs and other areas of the Forest of Dean district.

⁶ Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

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

This section sets out the monitoring undertaken within 2023 by FoDDC and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

FoDDC has no automatic (continuous) monitoring sites within its area.

3.1.2 Non-Automatic Monitoring Sites

FoDDC undertook non- automatic (i.e. passive) monitoring of NO₂ at 28 sites during 2023. Table A.1 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.

Most sample locations remain the same as the previous year, however the following locations have either been discontinued or are new for 2023 (please refer to Appendix D for exact position of new locations):

Discontinued	New
NEW04 - Newent	MIT03 - Mitcheldean
MIT01 – Mitcheldean	MIT04 - Mitcheldean
CIN04 - Cinderford	CIN07 - Cinderford

The rationale behind the relocations is summarised as follows:

- MIT03 – located near a pinch point near Mitcheldean Primary School. Location NEW04 had shown very low NO₂ concentrations during 2022, with an annual average of 9.8µg/m³.
- MIT04 – Moved from the junction of Gloucester Road, Hawker Hill and New Road (MIT01), to before the Puffin Crossing on Hawker Hill to capture the impact of traffic queuing before the crossing.
- CIN07 – Previously positioned at CIN04 on Market Street where NO₂ concentrations had been consistently below 25µg/m³ since 2017, this tube was relocated to Belle Vue Road, one of the main routes into Cinderford.

To the knowledge of the Council, no third party monitoring was carried out in the District during 2022.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40µg/m³. 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).

The full 2023 dataset of monthly mean values is provided in Appendix B, Table B.1. Note that the monthly data has not been subject to bias adjustment. Where relevant the table includes distance corrected values.

Overall NO₂ levels are somewhat lower across the District in comparison with 2022 data, with the exceptions only showing a marginal increase (max 0.6µg/m³). This continual decline in concentrations across the district provides a strong indication NO₂ concentrations are unlikely to revert to pre-pandemic levels, which is thought to be a result

in the increase in the number of people working from home, coupled with improvements in engine technology and the uptake of hybrid and fully electric vehicles.

Trends

The trend of nitrogen dioxide levels, at a representative selection of sites monitored in our Lydney AQMA, over the last 12 years are presented in Appendix A, Figure A.1. The graph illustrates the fall in NO₂ concentration during 2023 compared with 2022. A similar trend can be seen in Figure A.2, which presents changes in NO₂ concentration at locations in other areas of the district. It is notable that NO₂ concentrations remained below the national objective of 40µg/m³ across the district. In addition, during 2023 no annual mean was greater than 60µg/m³, which indicates that an exceedance of the 1-hour mean objective was unlikely at any of the locations.

The results from 2023 are positive and indicate a general improvement in the air quality within the Lydney AQMA. With the implementation of the measures described in Section 2.2, we hope to see this trend continue, with a view of revoking the AQMA in the near future. FoDDC will continue to work with the county and town councils to implement measures to tackle air pollution in the AQMA.

3.2.2 Particulate Matter (PM₁₀)

Measurements of particulate matter were not made within the district during 2023.

Particulate matter can enter the respiratory system and have consequential health implications. Particulates which are routinely monitored in the UK are PM₁₀ and PM_{2.5}. PM₁₀ are particles that have a diameter of 10µm or less and can pass through the upper respiratory system and travel deep into the lungs. PM_{2.5} particles have a diameter of 2.5µm or less and can pass into the deepest parts of the lungs, and potentially through the lung walls into the blood stream. These particles have been strongly connected with respiratory problems such as asthma, chronic obstructive pulmonary disease and cardiovascular disease.

The Environment Act 2021 required the Secretary of State to set PM_{2.5} objectives for the UK, which were laid out in The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. The targets set within the 2023 Regulations are:

- *The annual mean concentration target is that by the end of 31st December 2040 the annual mean level of PM_{2.5} in ambient air must be equal to or less than 10 µg/m³*

- *The population exposure reduction target is that there is at least a 35% reduction in population exposure by the end of 31st December 2040, as compared with the average population exposure in the three-year period from 1st January 2016 to 31st December 2018.*

To monitor progress in meeting these objectives, new monitors are expected to be installed across the country to provide concentration data for fine particles in the air. These will predominantly be in urban areas.

Trends in PM_{2.5} in the UK, at urban background and roadside sites, between 2009 and 2023 have been published by DEFRA: [Link to: Particulate matter \(PM10/PM2.5\)](#). Annual average concentration of the fine particles peaked in 2011 and have since shown a steady decline. In 2023 concentrations fell to their lowest since 2019.

The data for 2023 showed temporal changes in PM_{2.5}, with concentrations peaking during the winter and spring months, although in 2023 there was also a peak in concentrations during September.

Residential combustion of wood and coal in stoves and open fires is a large contributor to emissions of particulate matter in the UK, contributing towards elevated concentrations in winter months. Emissions from this source are typically located closer to urban background sites than roadside sites, which may partially explain the reduction in the gap between concentrations recorded at urban background and roadside sites throughout the winter months. The contribution of solid fuel stoves is further reflected in the average hourly concentrations, which show the highest emissions of PM_{2.5} occurred mid to late evening.

Peaks were also recorded in April and September during 2023. These are thought to be due to elevated concentrations of nitrates transported from agricultural operations across UK and continental Europe during the spring, and the significantly warm and dry start to September.

The impact of solid fuel stoves and open fires demonstrates the importance of the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020, which stipulates that wet wood (that is, wood having a moisture content of more than 20%) cannot be sold in units of less than 2m³. The same legislation outlaw's sale of bags of coal for domestic fireplaces. This is intended to encourage use of approved kiln-dried logs which produce much less smoke and particulates.

3.2.3 Public Health Outcomes Framework

UK Health Security Agency (UKHSA) and the Office for Health Improvements and Disparities (OHID) publish various information related to public health.

The importance of the effect of air pollution on public health is reflected by the inclusion of an indicator described as “D01 - Fraction of mortality attributable to particulate air pollution”. This indicator provides an insight into the probable number of deaths which occur within the UK as a direct consequence of particulate air pollution. Data can be broken down into region, county, district, unitary authority, NHS region or integrated care board.

For Gloucestershire as a whole, the estimated fraction of mortality attributable to particulate air pollution (2022 data) is 5.4% of the county’s population, which is a slight increase on 2021 (5.3%). In comparison, the average for the southwest region was 4.6% in 2022, which fell from 5.1% in 2021.

For the Forest of Dean District, the estimated fraction of mortality attributable to particulate air pollution is 4.8% (a fall of 0.2% from 2021) compared with the southwest regional average of 4.6%.

The fall in mortality attributed to particulate matter coincides with an increase in physical activity in adults⁷ (19 and over) across the district from 67.8% (2021) to 68.2% (2022).

⁷ Based on the number of respondents aged 19 and over, with valid responses to questions on physical activity, doing at least 150 moderate intensity equivalent (MIE) minutes physical activity per week in bouts of 10 minutes or more in the previous 28 days expressed as a percentage of the total number of respondents aged 19 and over.

Appendix A: Monitoring Results

Table A.1 - 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)
CIN03	Cinderford: 167 High Street	Roadside	365290	214733	NO ₂		0.2	0.9	No	3.0
CIN06	Cinderford: zebra crossing, opposite side to Factory shop	Roadside	365659	214171	NO ₂		1.2	1.8	No	2.9
CIN07	Cinderford: 30 Belle Vue Road	Roadside	365920	213743	NO ₂		6.0	2.2	No	2.8
COL03	Coleford: 17 Old Vicarage Court (closer to 11)	Roadside	357741	210598	NO ₂		3.6	1.2	No	2.9
COL04	Coleford: crossroads by former King's Head Hotel (new 05/01/2022)	Roadside	357609	210774	NO ₂		0.4	3.9	No	2.7
COL05	Coleford - 29, Market Place	Roadside	357559	210740	NO ₂		0.9	3.2	No	3.1
LYD01	Lydney: 57 High Street	Roadside	363147	203074	NO ₂	Lydney AQMA	0.1	3.7	No	2.9
LYD02	Lydney: Tucker, Bridge House, Newerne Street	Roadside	363527	203261	NO ₂	Lydney AQMA	0.1	7.7	No	2.8

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)
LYD04	Lydney: 13 High Street	Roadside	362954	202898	NO ₂	Lydney AQMA	0.1	3.6	No	2.9
LYD05	Lydney: Unit 1, Regents Arcade, Newerne Street	Roadside	363439	203207	NO ₂	Lydney AQMA	0.6	1.5	No	2.8
LYD06	Lydney: Inspirations Gallery, Hill Street	Roadside	363185	203111	NO ₂	Lydney AQMA	0.4	1.5	No	2.9
LYD08	Lydney: 13 Bream Road (bottom)	Roadside	363109	203213	NO ₂	Lydney AQMA	0.1	3.8	No	2.9
LYD09	Lydney: 17 Bream Road (top)	Roadside	363042	203322	NO ₂	Lydney AQMA	0.3	1.0	No	2.8
LYD10	Lydney: Forest Road, opposite Forest Parade (former chip shop)	Roadside	363408	203226	NO ₂	Lydney AQMA	0.1	2.2	No	2.7
LYD12	Lydney: Kaplans, 61 Newerne Street	Roadside	363607	203320	NO ₂	Lydney AQMA	0.1	1.6	No	2.9
LYD15	Lydney: Tegfan, Highfield Lane	Roadside	364042	204125	NO ₂		0.1	>15	No	2.0
LYD16	Lydney: Lydney Laundrette, 55 High Street	Roadside	363142	203069	NO ₂	Lydney AQMQ	0.1	2.3	No	2.2
LYD17, LYD18, LYD19	Lydney: 61 High Street (3 of 3)	Roadside	363160	203088	NO ₂	Lydney AQMQ	0.1	2.1	No	2.9
LYD20	Lydney: 2 Cross Hands, Highfield Road	Roadside	364301	203968	NO ₂		2.5	1.5	No	2.5

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)
MIT03	Mitcheldean: 5 Hawker Hill	Roadside	366475	218403	NO ₂		1.7	0.5	No	2.8
MIT04	Mitcheldean: 20 The Merrin	Roadside	366469	218245	NO ₂		3.0	3.5	No	2.9
NAI01	Nailbridge: pedestrian crossing (location amended 05/01/2022)	Roadside	364566	216246	NO ₂		0.3	3.3	No	2.8
NEW03	Newent: 12 High Street	Roadside	372117	226049	NO ₂		0.6	1.6	No	2.9
NEW05	Newent: 3 Ross Road (05/01/2022)	Roadside	371943	226212	NO ₂		2.0	1.7	No	2.7
NEW06	Newent: Picklenash Junior School, Ross Road (new 05/01/2022)	Roadside	371675	226149	NO ₂		3.0	1.5	No	2.7
NOS02	Newnham-on-Severn: Galen House, High Street (location amended Dec 2021)	Roadside	369038	211590	NO ₂		2.9	1.9	No	2.7
TUT02	Tutshill: Beachley Road (near Wyedean School)	Roadside	354269	193951	NO ₂		17.0	2.3	No	2.9
TUT03	Tutshill: Victoria Cottage,	Roadside	353988	194695	NO ₂		4.2	1.2	No	2.7

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)
	Gloucester Road (new 05/01/2022)									

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 - Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CIN03	365290	214733	Roadside	91.7	90.7	22.7	16.5	19.2	18.2	18.8
CIN06	365659	214171	Roadside	100	100.0	27.3	23.4	27.5	26.1	24.6
CIN07	365920	213743	Roadside	91.7	90.7	-	-	-	-	16.3
COL03	357741	210598	Roadside	100	100.0	22.5	16.7	19.4	18.6	16.6
COL04	357609	210774	Roadside	100	100.0	-	-	-	22.2	20.9
COL05	357559	210740	Roadside	100	100.0	-	-	-	15.4	13.2
LYD01	363147	203074	Roadside	100	100.0	40.9	30.3	31.5	28.5	28.8
LYD02	363527	203261	Roadside	100	100.0	19.0	15.6	15.4	14.8	14.2
LYD04	362954	202898	Roadside	100	100.0	36.5	27.0	29.1	27.1	25.3
LYD05	363439	203207	Roadside	100	100.0	35.1	26.5	28.7	26.0	25.9
LYD06	363185	203111	Roadside	100	100.0	37.5	27.5	31.1	26.3	26.7
LYD08	363109	203213	Roadside	100	100.0	36.6	25.2	31.2	28.4	25.9

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 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
LYD09	363042	203322	Roadside	100	100.0	34.2	26.2	28.9	27.1	25.2
LYD10	363408	203226	Roadside	100	100.0	24.5	18.6	20.3	19.4	18.2
LYD12	363607	203320	Roadside	100	100.0	27.0	20.4	22.2	19.8	19.4
LYD15	364042	204125	Roadside	100	100.0	9.0	6.9	7.1	7.0	6.2
LYD16	363142	203069	Roadside	100	100.0	37.9	28.4	30.0	27.4	27.7
LYD17, LYD18, LYD19	363160	203088	Roadside	100	100.0	35.1	26.3	28.2	25.3	25.2
LYD20	364301	203968	Roadside	100	100.0	-	18.5	22.1	21.4	20.5
MIT03	366475	218403	Roadside	100	100.0	-	-	-	-	22.3
MIT04	366469	218245	Roadside	100	100.0	-	-	-	-	16.8
NAI01	364566	216246	Roadside	100	100.0	28.7	22.1	23.2	27.1	25.5
NEW03	372117	226049	Roadside	100	100.0	28.1	20.1	23.1	20.9	19.8
NEW05	371943	226212	Roadside	91.7	92.3	-	-	-	16.6	16.7
NEW06	371675	226149	Roadside	100	100.0	-	-	-	18.1	18.2
NOS02	369038	211590	Roadside	100	100.0	26.7	19.4	21.0	21.9	20.7

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 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
TUT02	354269	193951	Roadside	100	100.0	15.8	12.6	11.2	11.4	10.2
TUT03	353988	194695	Roadside	100	100.0	-	-	-	11.5	10.7

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

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 $\mu\text{g}/\text{m}^3$.

Exceedances of the NO₂ annual mean objective of 40 $\mu\text{g}/\text{m}^3$ are shown in **bold**.

NO₂ annual means exceeding 60 $\mu\text{g}/\text{m}^3$, indicating a potential exceedance of the NO₂ 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.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

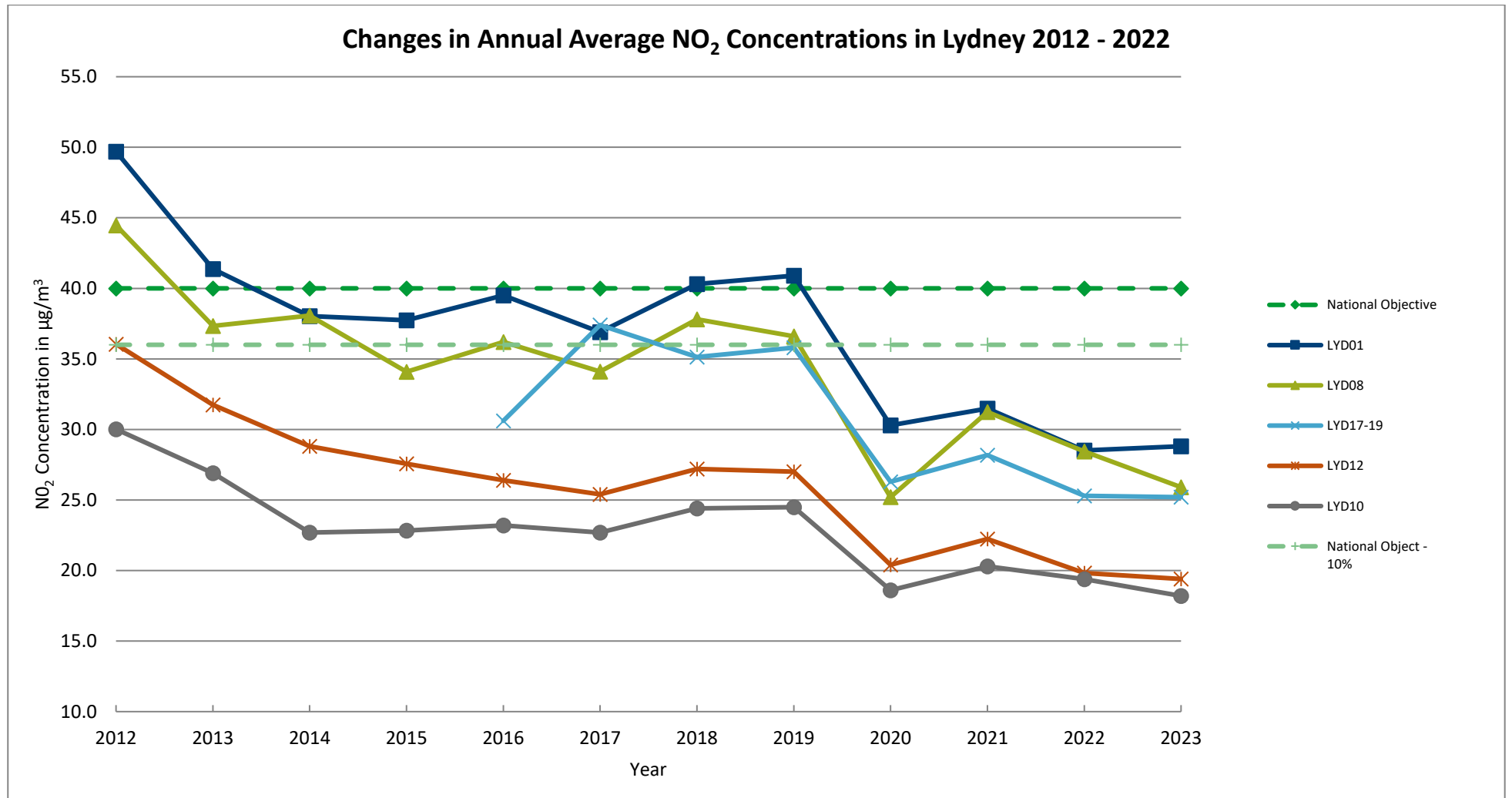


Figure A.1 -Trends in Annual Mean NO₂ Concentrations in Lydney AQMA

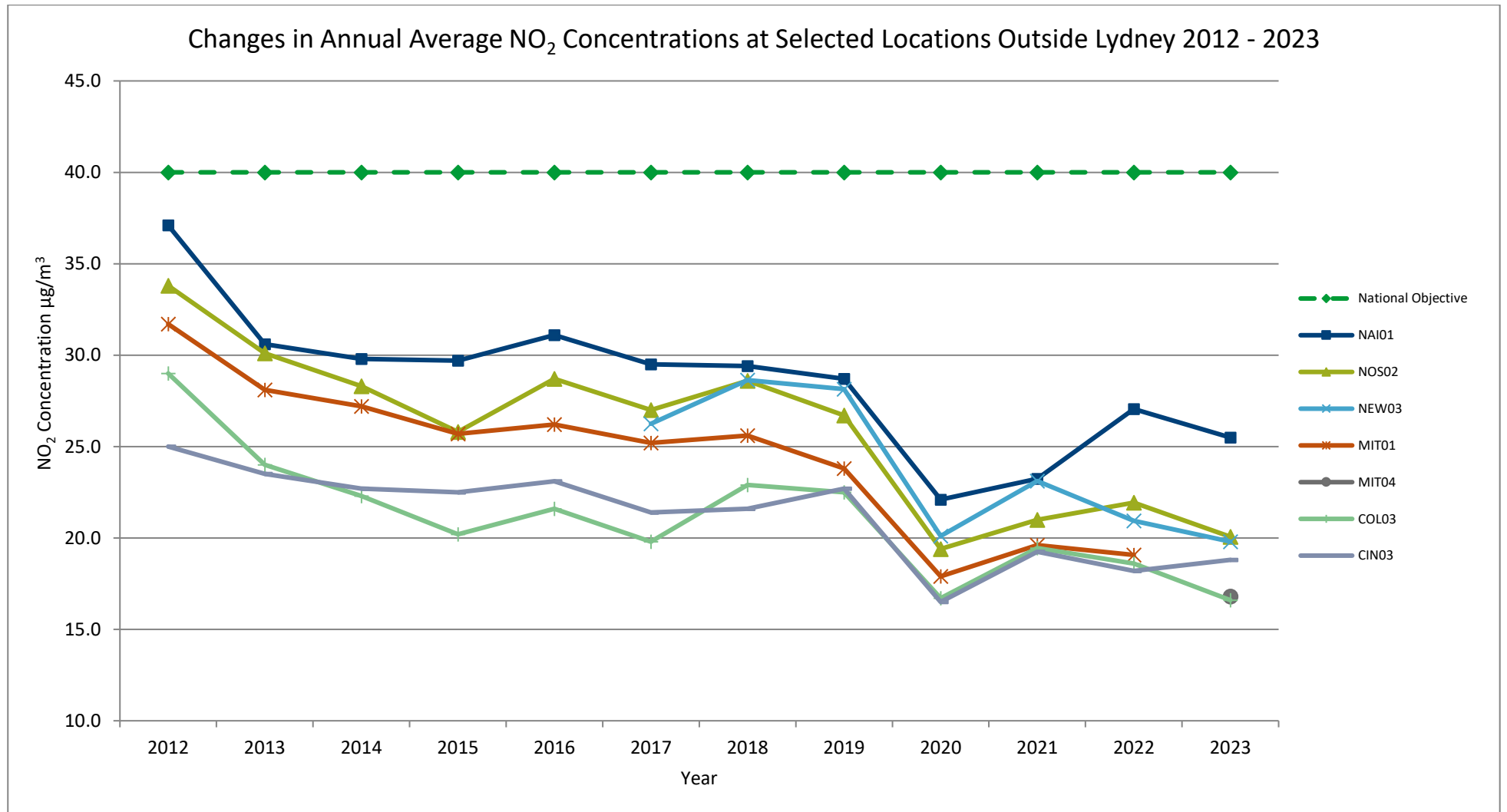


Figure A.2 - Trends in Annual Mean NO₂ Concentrations in Selected Areas Across the District

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 - NO₂ 2023 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
CIN03	365290	214733	28.2	27.0	Missing	24.6	20.2	22.4	15.8	19.2	23.1	26.5	28.8	20.1	23.2	18.8	-	
CIN06	365659	214171	35.4	34.6	28.6	36.7	31.7	30.9	19.7	27.2	32.9	34.4	31.6	20.7	30.4	24.6	-	
CIN07	365920	213743	24.5	24.5	Missing	22.1	19.2	19.4	15.8	16.2	21.1	20.7	23.1	15.1	20.1	16.3	-	
COL03	357741	210598	24.7	24.5	21.7	19.8	17.2	18.8	15.6	18.7	21.3	21.4	25.7	16.3	20.5	16.6	-	
COL04	357609	210774	29.8	30.2	27.6	27.8	27.6	25.6	18.6	22.3	25.9	24.8	28.7	20.8	25.8	20.9	-	
COL05	357559	210740	19.8	20.5	18.1	19.5	13.1	13.6	12.9	13.3	16.1	17.3	19.6	12.2	16.3	13.2	-	
LYD01	363147	203074	43.8	41.7	35.4	36.6	31.2	36.6	29.3	31.6	37.8	35.7	33.7	32.6	35.5	28.8	-	
LYD02	363527	203261	24.4	22.8	19.0	14.3	11.0	15.8	15.0	11.9	16.5	18.8	20.8	19.6	17.5	14.2	-	
LYD04	362954	202898	41.3	40.3	33.3	33.2	27.9	30.8	22.9	23.8	29.7	31.4	34.4	26.1	31.2	25.3	-	
LYD05	363439	203207	38.6	36.1	33.0	32.8	22.3	34.2	31.5	27.0	32.6	34.6	30.6	30.1	31.9	25.9	-	
LYD06	363185	203111	38.4	41.2	33.5	36.9	32.1	35.0	24.4	27.0	32.4	35.2	31.5	28.3	33.0	26.7	-	
LYD08	363109	203213	36.5	37.1	33.5	34.2	27.8	35.0	27.4	28.8	30.9	33.0	29.2	30.2	32.0	25.9	-	
LYD09	363042	203322	38.2	37.4	32.3	30.7	22.8	32.0	26.7	24.8	29.2	33.7	33.7	32.0	31.1	25.2	-	
LYD10	363408	203226	28.2	29.1	22.0	22.6	18.9	22.6	16.2	18.9	22.5	24.9	24.2	19.5	22.5	18.2	-	
LYD12	363607	203320	30.4	30.0	25.9	26.9	24.0	23.9	16.1	19.1	22.3	24.0	23.9	21.5	24.0	19.4	-	
LYD15	364042	204125	10.1	12.1	8.0	6.3	4.5	5.5	4.9	4.8	7.2	9.6	10.7	7.9	7.6	6.2	-	
LYD16	363142	203069	40.4	42.6	36.2	33.6	28.8	34.1	27.5	29.1	37.9	32.5	36.6	31.4	34.2	27.7	-	
LYD17	363160	203088	36.3	37.9	29.8	32.2	22.9	30.2	29.8	27.8	35.6	32.2	30.9	33.4	-	-	-	Triplicate Site with LYD17, LYD18 and LYD19 - Annual data provided for LYD19 only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LYD18	363160	203088	37.2	38.3	33.1	32.4	22.8	32.9	29.5	26.1	36.5	33.5	29.3	32.9	-	-	-	Triplicate Site with LYD17, LYD18 and LYD19 - Annual data provided for LYD19 only
LYD19	363160	203088	35.0	36.4	29.3	29.0	23.2	29.0	25.9	24.6	31.8	30.8	28.6	31.0	31.1	25.2	-	Triplicate Site with LYD17, LYD18 and LYD19 - Annual data provided for LYD19 only
LYD20	364301	203968	29.5	29.9	24.9	23.6	19.9	26.4	22.4	22.6	27.5	27.8	27.3	22.7	25.4	20.5	-	
MIT03	366475	218403	30.7	33.9	30.7	31.0	25.3	27.8	19.5	21.8	28.6	30.6	29.3	20.9	27.5	22.3	-	
MIT04	366469	218245	25.4	26.7	20.2	21.1	18.0	19.1	14.8	18.1	21.6	21.4	26.3	16.5	20.8	16.8	-	
NAI01	364566	216246	35.3	36.9	28.5	34.7	34.0	35.8	23.7	27.2	29.6	33.1	34.6	24.5	31.5	25.5	-	
NEW03	372117	226049	26.8	30.8	24.1	26.5	24.9	26.4	16.7	20.3	26.2	27.0	24.7	18.9	24.4	19.8	-	
NEW05	371943	226212	21.8	22.4	18.3	20.5	15.5	21.4	18.1	18.1	22.6	25.8	22.5	Missing	20.6	16.7	-	
NEW06	371675	226149	24.7	27.1	22.0	23.8	19.5	22.7	16.0	18.5	24.8	26.0	26.5	17.6	22.4	18.2	-	
NOS02	369038	211590	27.2	30.9	24.0	26.4	22.8	24.6	20.3	22.5	27.8	28.9	29.9	21.0	25.5	20.7	-	
TUT02	354269	193951	18.3	17.4	12.6	11.6	9.5	10.2	7.7	8.6	12.2	13.5	16.4	12.8	12.6	10.2	-	
TUT03	353988	194695	17.0	18.4	12.7	12.6	10.0	11.6	8.8	9.7	12.9	14.1	18.0	12.6	13.2	10.7	-	

All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

Local bias adjustment factor used.

National bias adjustment factor used.

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

Forest of Dean District Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System (confirm by selecting in box).

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Forest of Dean District During 2023

FoDDC has not identified any new sources relating to air quality within the reporting year of 2023.

Additional Air Quality Works Undertaken by Forest of Dean District Council During 2023

FoDDC has not completed any additional works within the reporting year of 2023.

QA/QC of Diffusion Tube Monitoring

Diffusion Tube Annualisation

All diffusion tube monitoring locations recorded data capture of >75% and therefore annualisation was not required.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2024 ASR has 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.TG22 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/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

FoDDC diffusion tubes are analysed by Gradko International, using 20% TEA / Water preparation method. FoDDC have applied a national bias adjustment factor of 0.81 to the 2023 monitoring data, derived from comparisons of other tubes analysed by the same laboratory, which are co-located with continuous analysers. A summary of bias adjustment factors used by FoDDC over the past five years is presented in Table C.1.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.81
2022	National	03/23	0.83
2021	National	03/22	0.84
2020	National	09/19	0.81
2019	National	06/18	0.93

A copy of the National Diffusion Tube Bias Adjustment Factor Spreadsheet is provided below.

National Diffusion Tube Bias Adjustment Factor Spreadsheet						Spreadsheet Version Number: 03/24				
<p>Follow the steps below in the correct order to show the results of relevant co-location studies</p> <p>Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods</p> <p>Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet</p> <p>This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.</p>						<p>This spreadsheet will be updated at the end of June 2024</p> <p>LAQM Helpdesk Website</p>				
<p>The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECCM and the National Physical Laboratory.</p>						<p>Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.</p>				
Step 1:		Step 2:		Step 3:		Step 4:				
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List		Select a Year from the Drop-Down List		Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.				
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.		If a year is not shown, we have no data.		If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953				
Analysed By ¹	Method ²	Year ³	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automated Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ⁴	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in Water	2023	R	Monmouthshire County Council	11	33	26	26.5%	G	0.79
Gradko	20% TEA in water	2023	R	Blackburn With Darwen Be	12	23	16	43.8%	G	0.70
Gradko	20% TEA in water	2023	R	Lancaster City Council	10	35	27	28.6%	G	0.78
Gradko	20% TEA in water	2023	R	Eastleigh Borough Council	12	33	26	26.4%	G	0.79
Gradko	20% TEA in water	2023	R	Eastleigh Borough Council	12	22	19	12.5%	G	0.89
Gradko	20% TEA in water	2023	R	Plymouth City Council	12	35	26	38.3%	S	0.72
Gradko	20% TEA in water	2023	R	Plymouth City Council	10	39	31	24.2%	S	0.80
Gradko	20% TEA in water	2023	UC	Belfast City Council	10	26	19	38.3%	G	0.72
Gradko	20% TEA in water	2023	R	Cheshire West And Chester	12	35	32	10.0%	G	0.91
Gradko	20% TEA in water	2023	R	Cheshire West And Chester	10	32	28	14.6%	G	0.87
Gradko	20% TEA in water	2023	R	Dudley Mbc	12	27	23	17.1%	G	0.85
Gradko	20% TEA in water	2023	UB	Dudley Mbc	12	19	13	45.4%	G	0.69
Gradko	20% TEA in water	2023	R	Dudley Mbc	12	40	37	7.7%	G	0.93
Gradko	20% TEA in water	2023	R	Gateshead Council	12	23	20	17.7%	G	0.85
Gradko	20% TEA in water	2023	R	Gateshead Council	11	23	18	26.9%	G	0.79
Gradko	20% TEA in water	2023	R	Gateshead Council	12	27	22	20.7%	G	0.83
Gradko	20% TEA in water	2023	R	Gateshead Council	12	29	23	25.8%	G	0.79
Gradko	20% TEA in water	2023	R	Gateshead Council	12	30	33	-7.8%	G	1.08
Gradko	20% TEA in water	2023	KS	Manglebone Road Intercomparison	11	45	38	20.3%	G	0.83
Gradko	20% TEA in water	2023	B	South Holland District Council	10	8	7	12.4%	G	0.89
Gradko	20% TEA in water	2023	R	Worcestershire	12	12	11	17.4%	G	0.85
Gradko	20% TEA in Water	2023	R	Airds And North Down Borough Council	12	33	21	60.2%	G	0.62
Gradko	20% TEA in Water	2023	R	Lisburn & Castlereagh City Council	11	24	20	22.1%	G	0.82
Overall Factor* (23 studies)									Use	0.81

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within Forest of Dean District required distance correction during 2023.

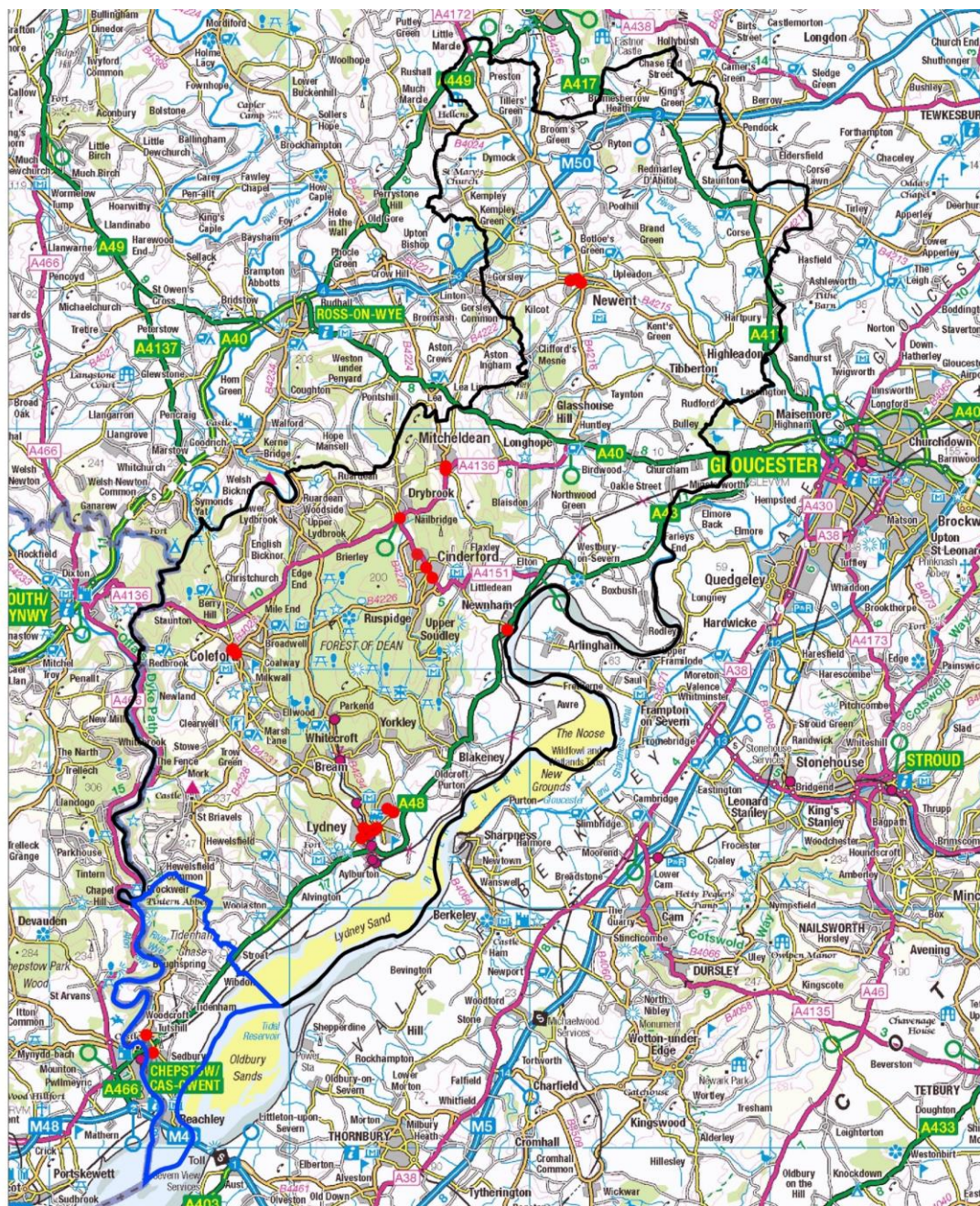
Other QA/QC Information

Gradko International laboratories participate in the AIR NO₂ Proficiency Scheme, which assesses the analytical performance of laboratories analysing NO₂ diffusion tubes. In

2023, four rounds of proficiency testing were carried out, round 55 between January and February, round 56 between May and June, round 58 between July and August and round 59 between September and October. During each round, Gradko International laboratories scored 100%, which provides confidence in the diffusion tube analysis for the district. The full results from 2015 onwards can be found at <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/ga-qc-framework/>.

DEFRA recommend the dates when the diffusion tubes are exchanged, and local authorities are expected to adhere to these dates +/- 2 days wherever possible. Due to other commitments one of the exchanges were carried out outside the recommended exchange period (June exposure). However, all tubes were exposed for the minimum recommended period of four weeks.

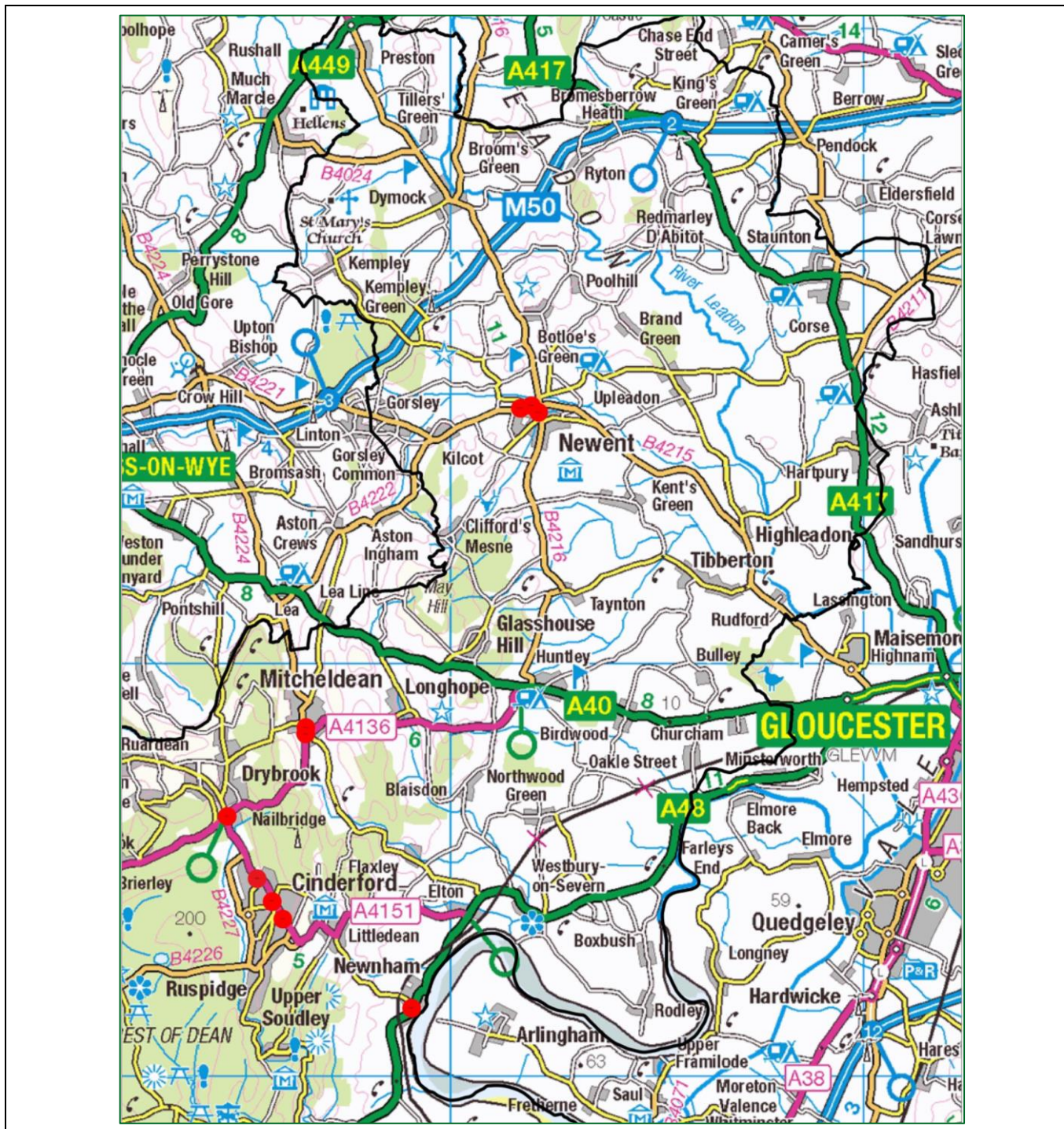
Appendix D: Map(s) of Monitoring Locations and AQMAs



<p>Title</p> <p>Diffusion Tube Locations</p>	<p>Legend:</p> <ul style="list-style-type: none"> ● NO₂ Monitoring Location — District Boundary 	
<p>Location:</p> <p>Forest of Dean District</p>	<p>Date</p> <p>June 2024</p>	<p>Figure No.</p> <p>D1</p>

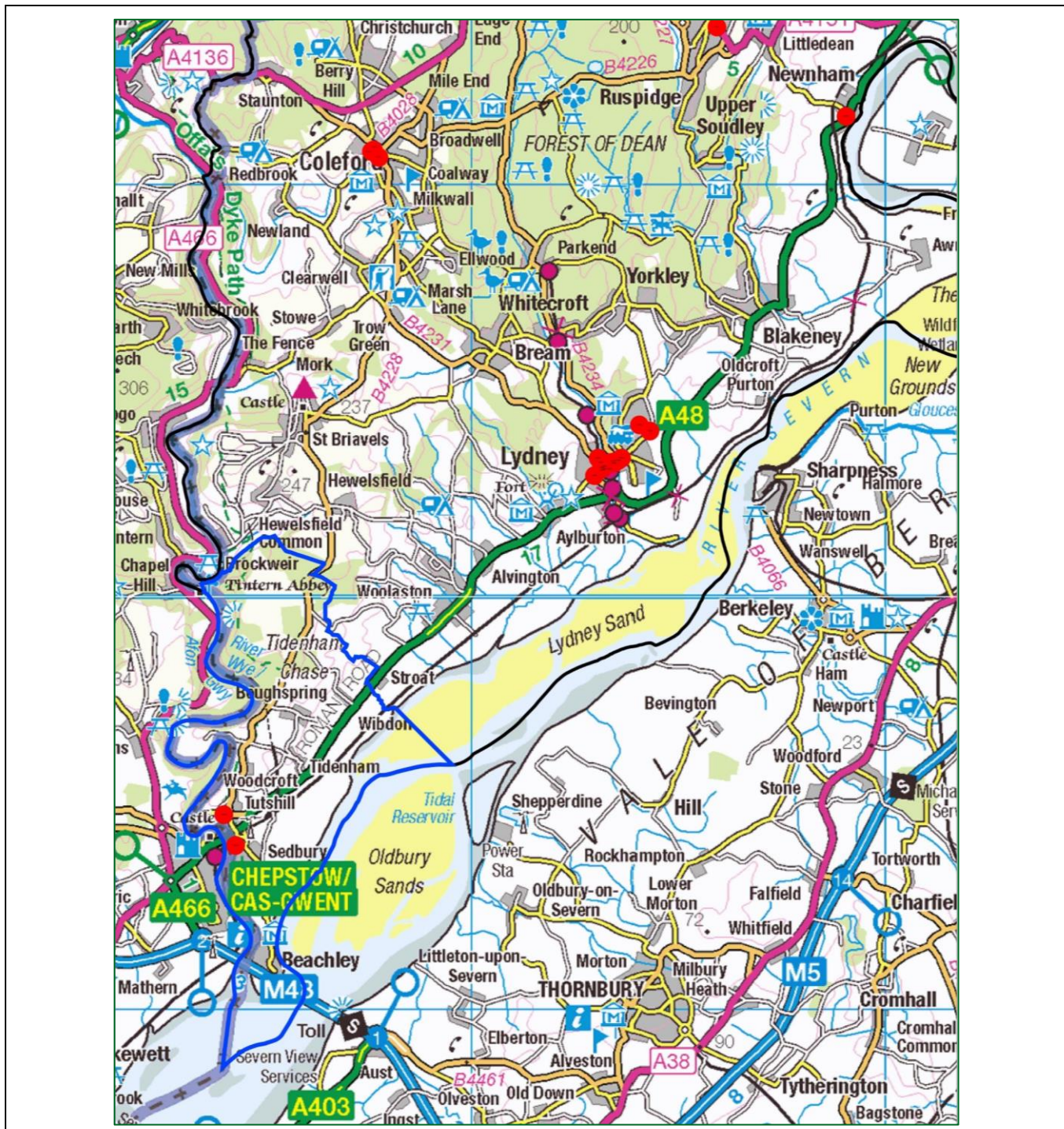
Contains Ordnance Survey Data Crown Copyright and Database Right [2024]

Figure D.1 – Map of Non-Automatic Monitoring Sites



<p>Title</p> <p>Diffusion Tube Location</p>	<p>Legend:</p> <ul style="list-style-type: none"> ● NO₂ Monitoring Location — District Boundary 	
<p>Location:</p> <p>Forest of Dean District - North</p>	<p>Date</p> <p>June 2024</p>	<p>Figure No.</p> <p>D2</p>
<p>Contains Ordnance Survey Data Crown Copyright and Database Right [2024]</p>		

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



<p>Title</p> <p>Diffusion Tube Location</p>	<p>Legend:</p> <ul style="list-style-type: none"> ● NO₂ Monitoring Location — District Boundary 	
<p>Location:</p> <p>Forest of Dean District - South</p>	<p>Date</p> <p>June 2024</p>	<p>Figure No.</p> <p>D3</p>
<p>Contains Ordnance Survey Data Crown Copyright and Database Right [2024]</p>		

Figure D.3 - Map of Non-Automatic Monitoring Sites - South



Figure D.4 - Map of Non-Automatic Monitoring Site - CIN03

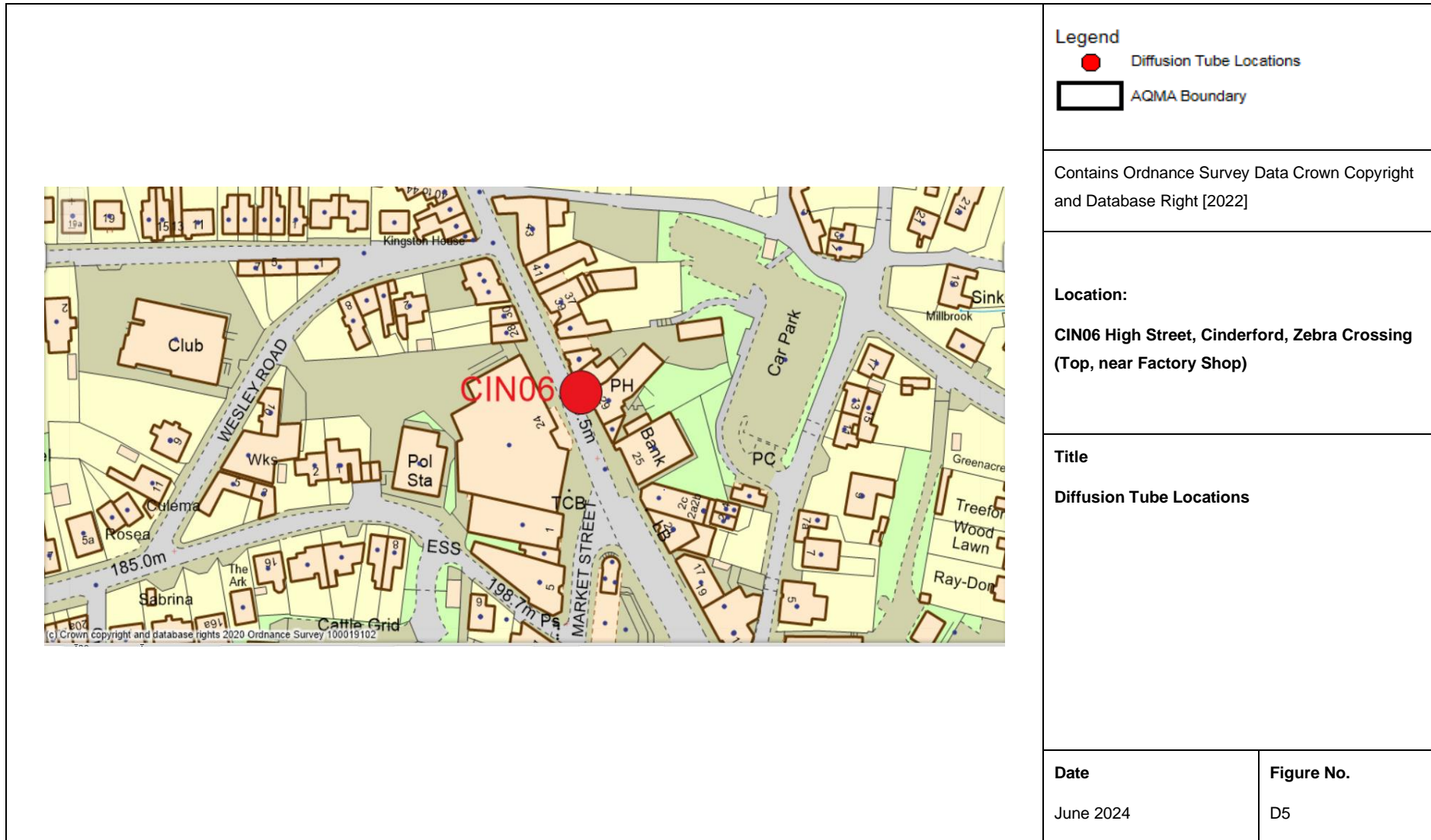


Figure D.5 - Map of Non-Automatic Monitoring Site - CIN06

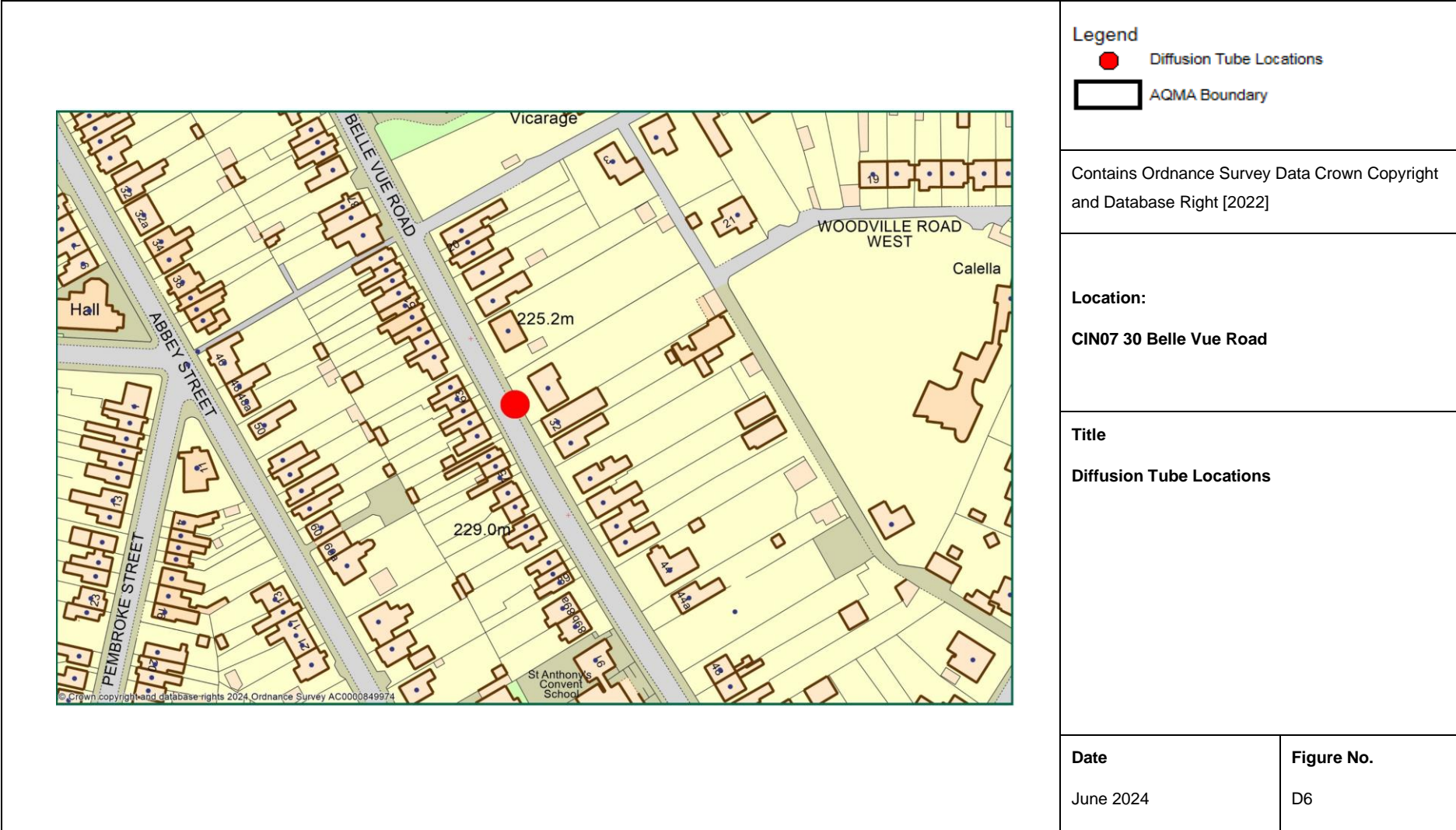


Figure D.6 - Map of Non-Automatic Monitoring Site - CIN07

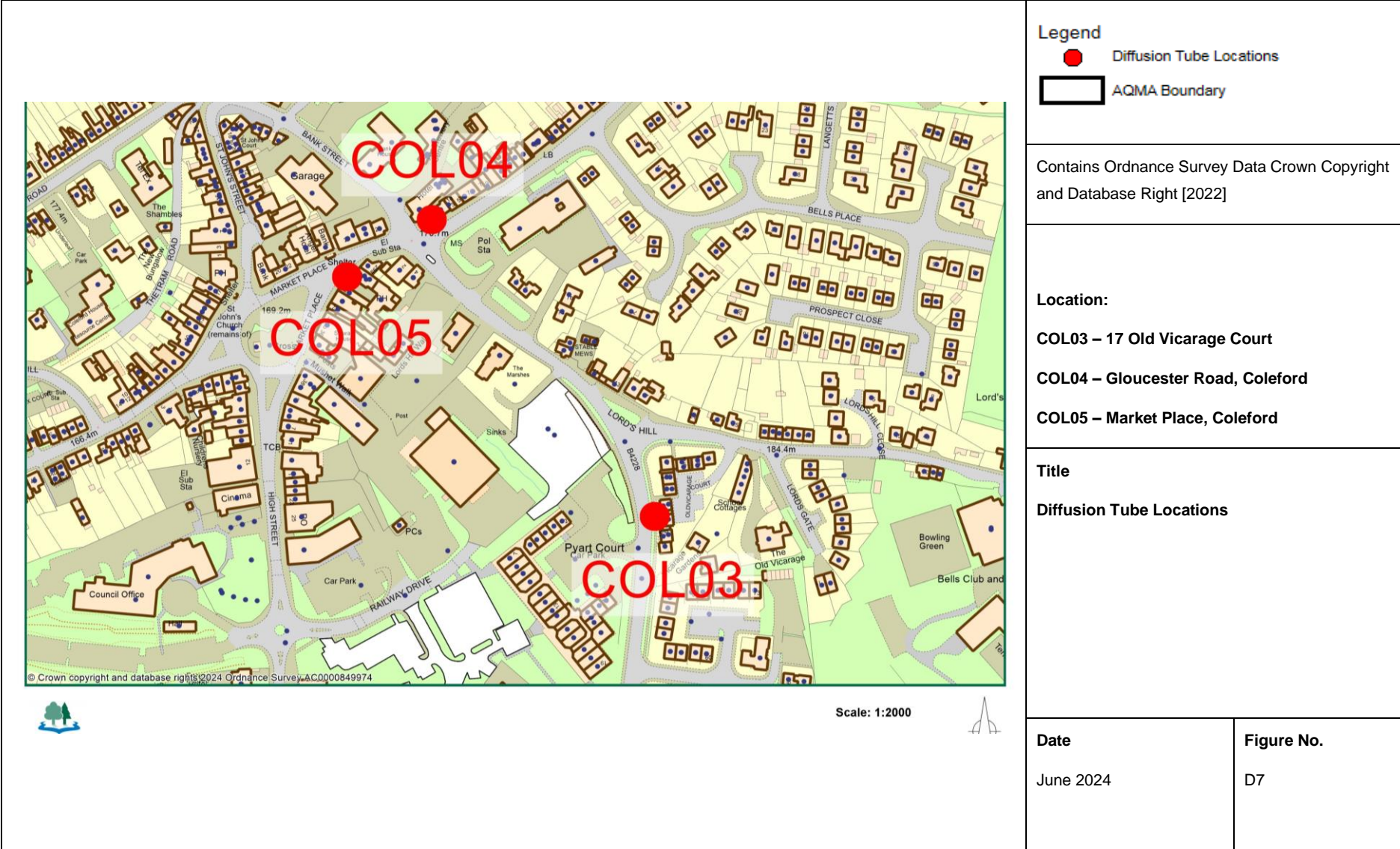


Figure D.7 - COL03, COL04 & COL05

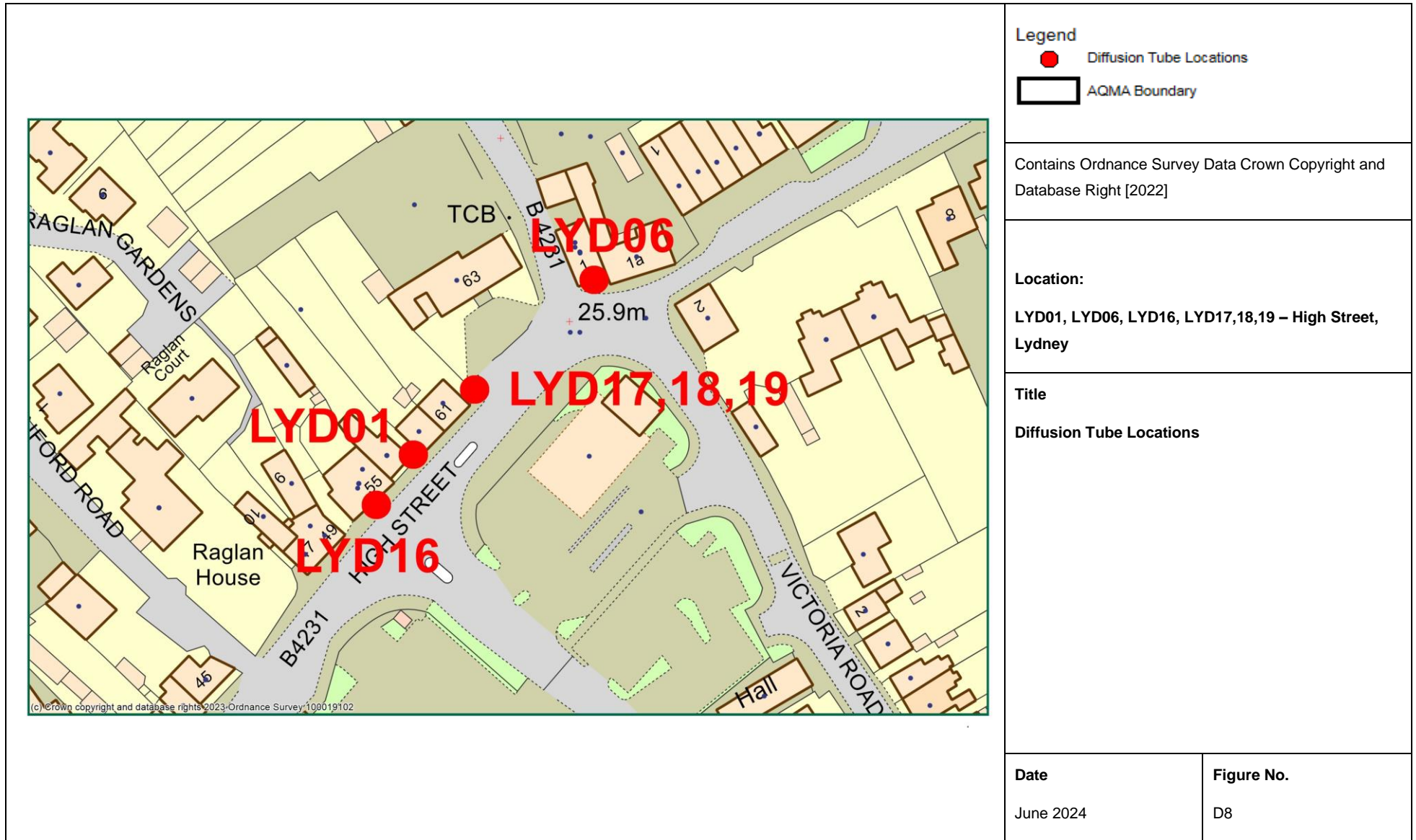


Figure D.8 - Map of Non-Automatic Monitoring Site - LYD01, LYD06, LYD16 & LYD17 - 19

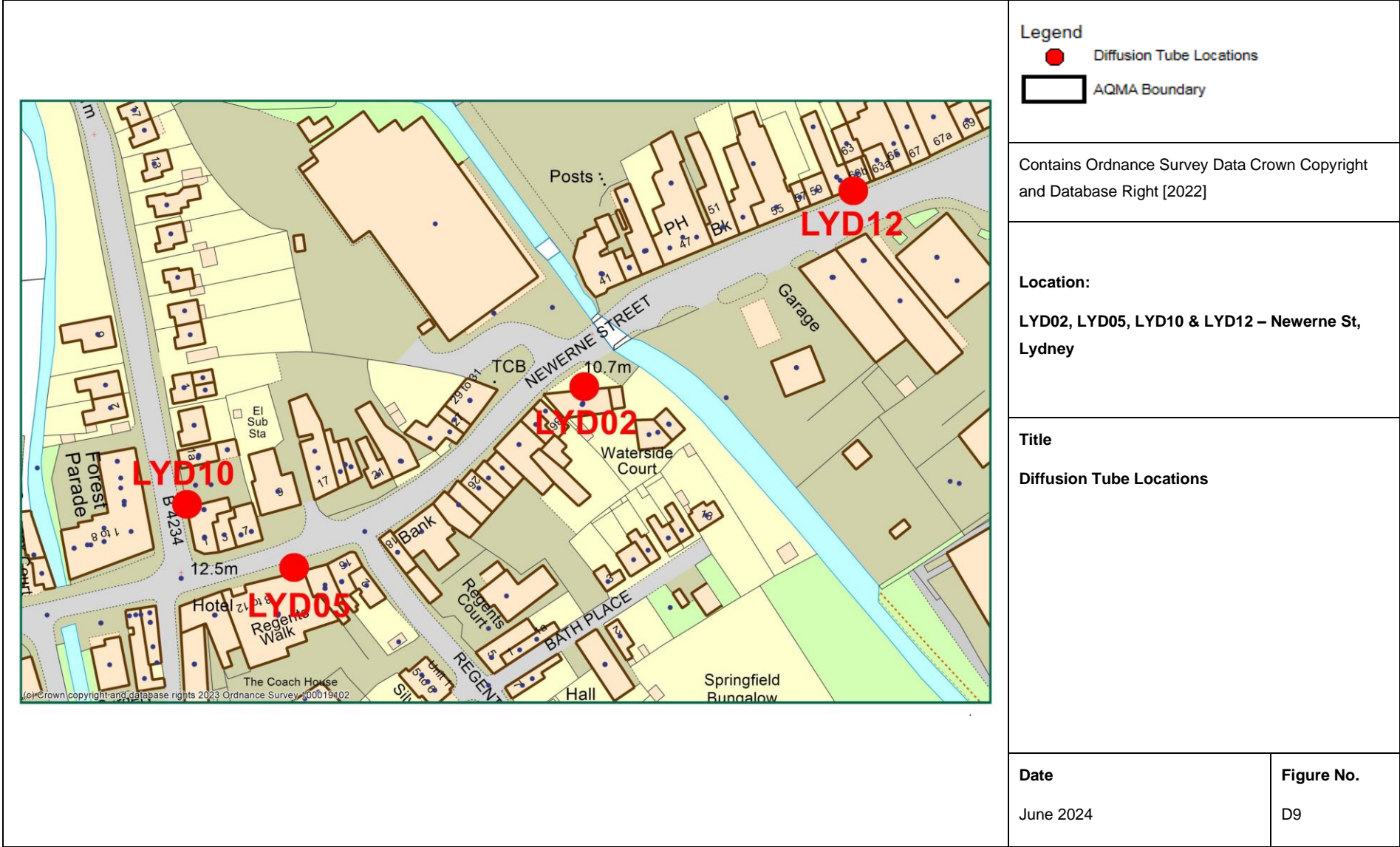


Figure D.9 - Map of Non-Automatic Monitoring Site - LYD02, LYD05, LYD10 & LYD12

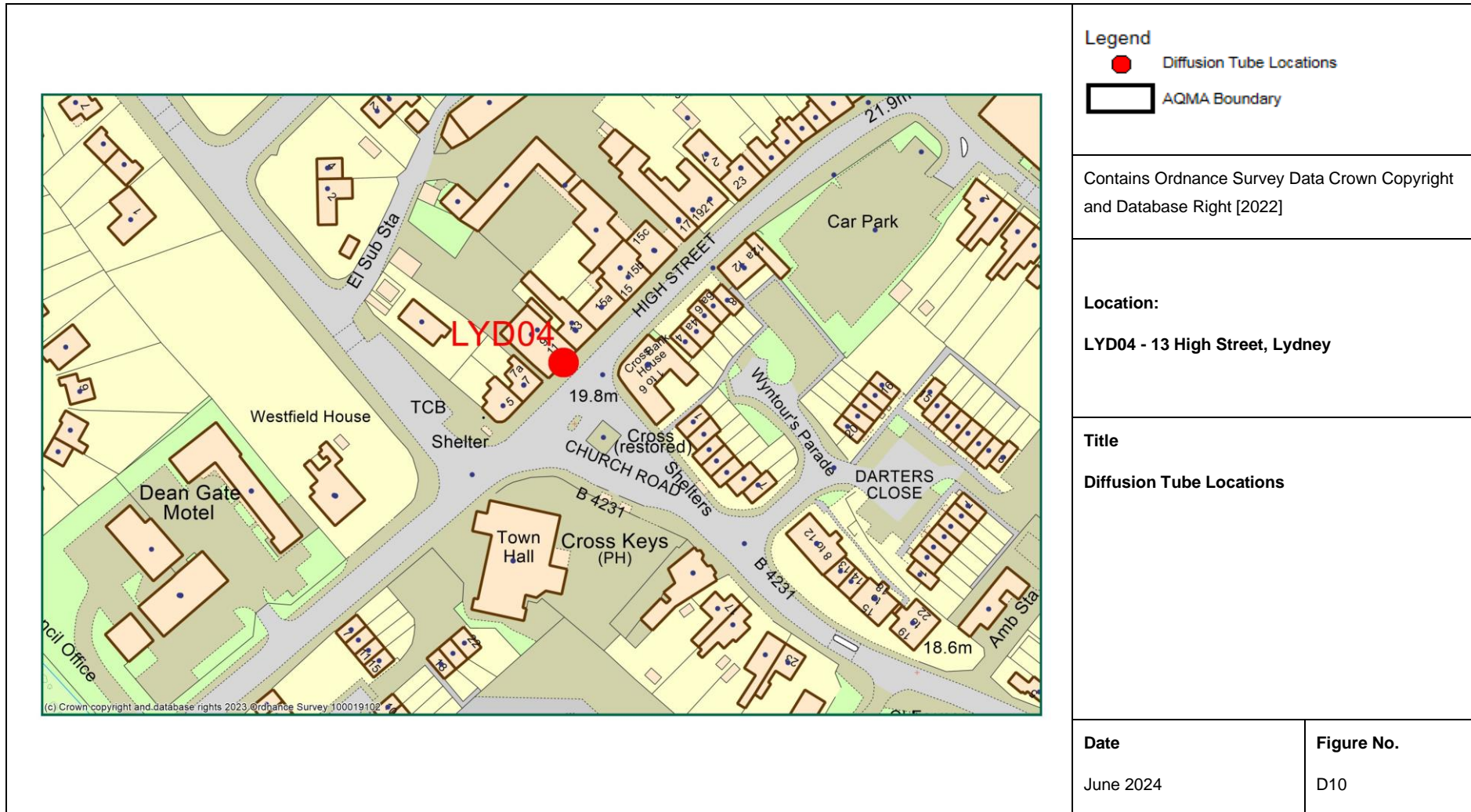


Figure D.10 - Map of Non-Automatic Monitoring Site - LYD04

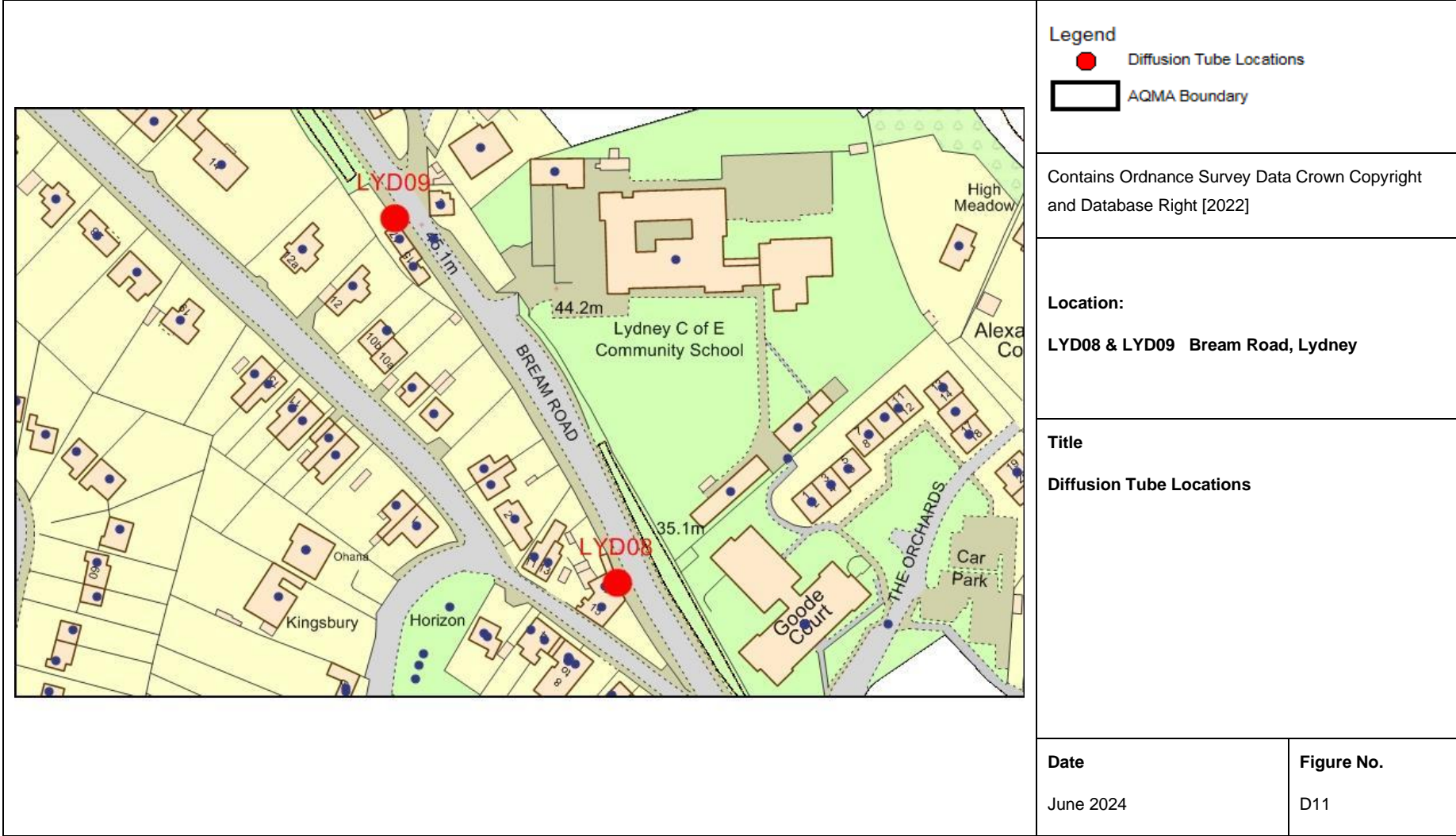


Figure D.11 - Map of Non-Automatic Monitoring Site - LYD08 & LYD09

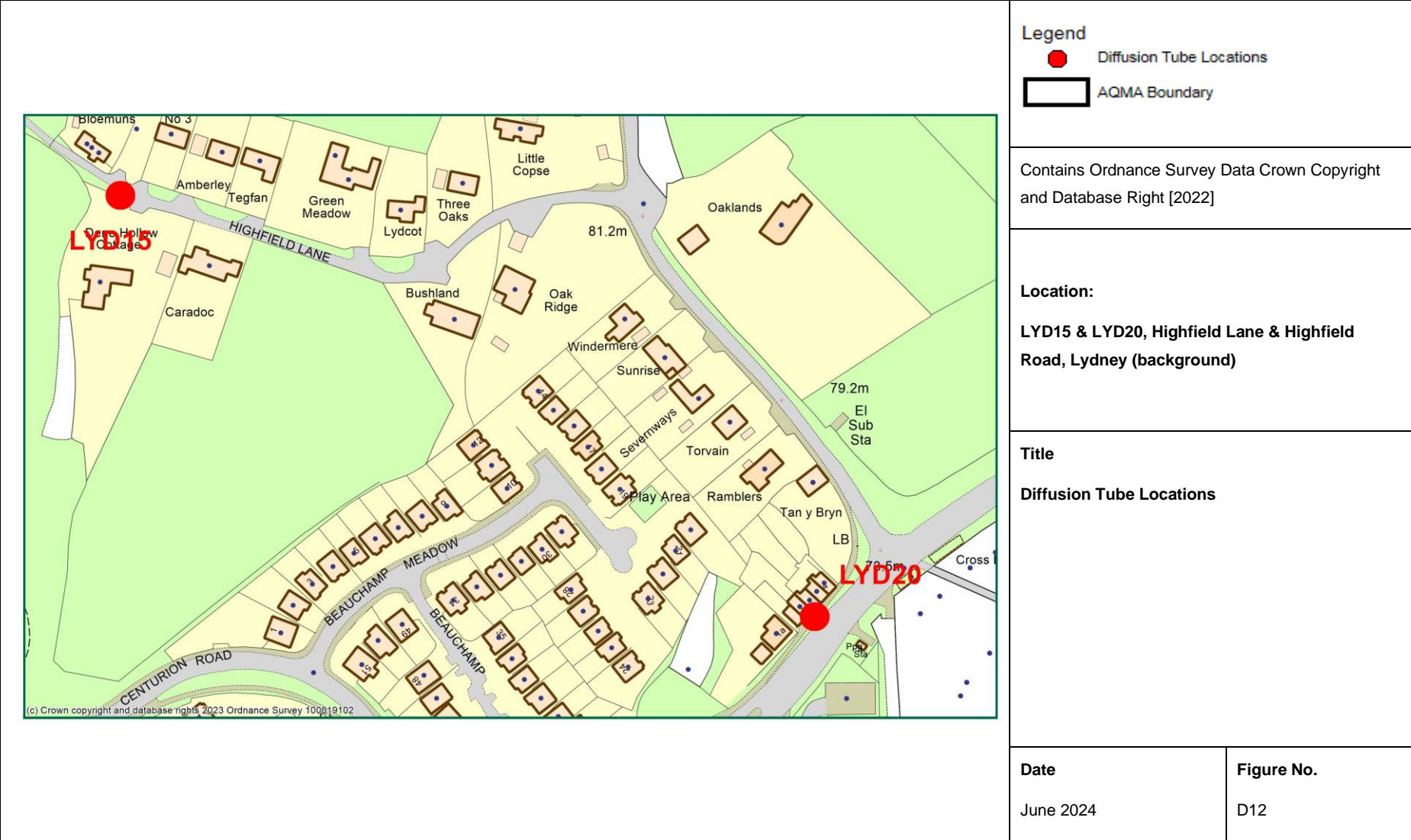


Figure D.12 - Map of Non-Automatic Monitoring Site - LYD15 & LYD20

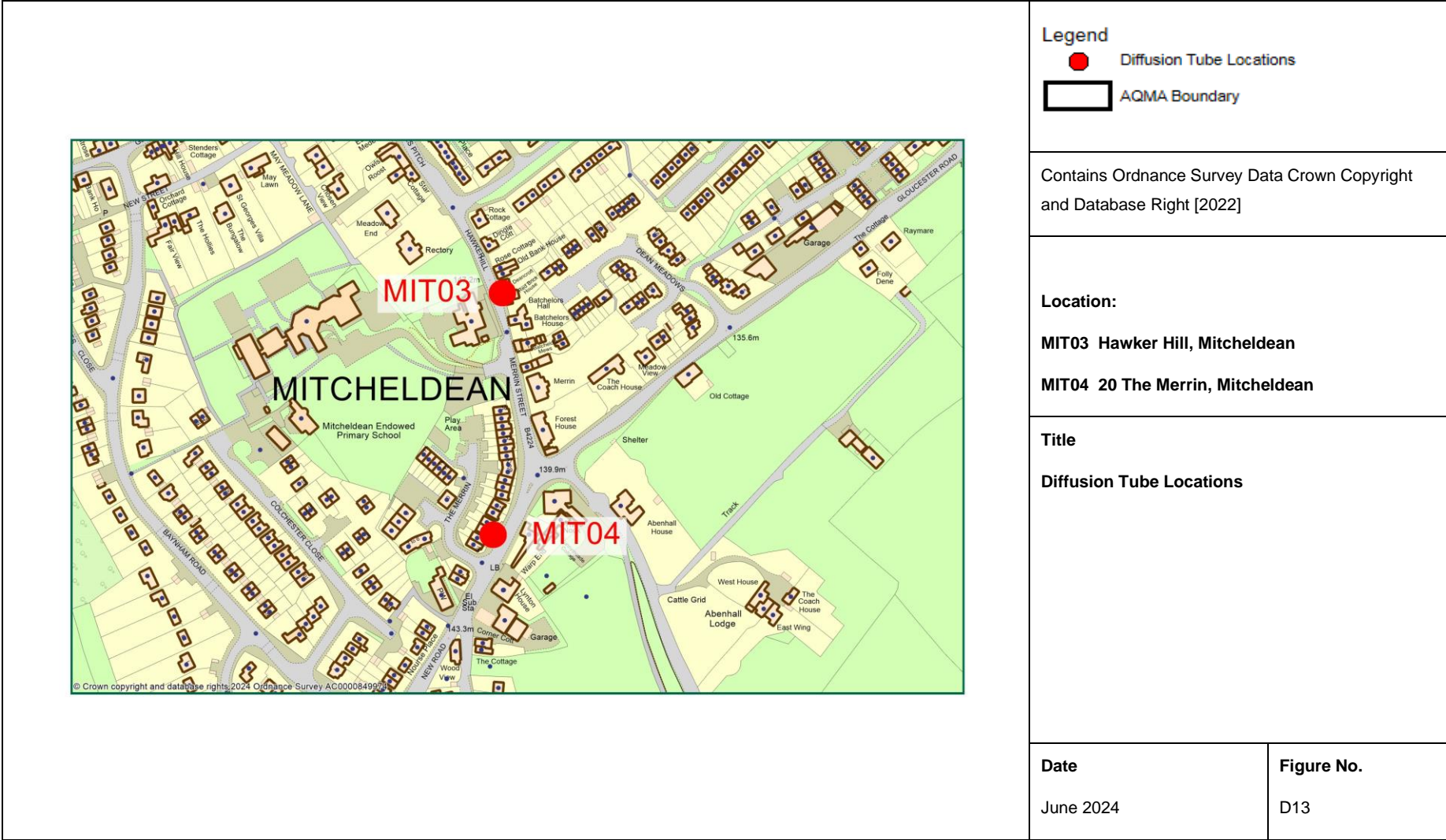


Figure D.13 - Map of Non-Automatic Monitoring Site - MIT03 & MIT04

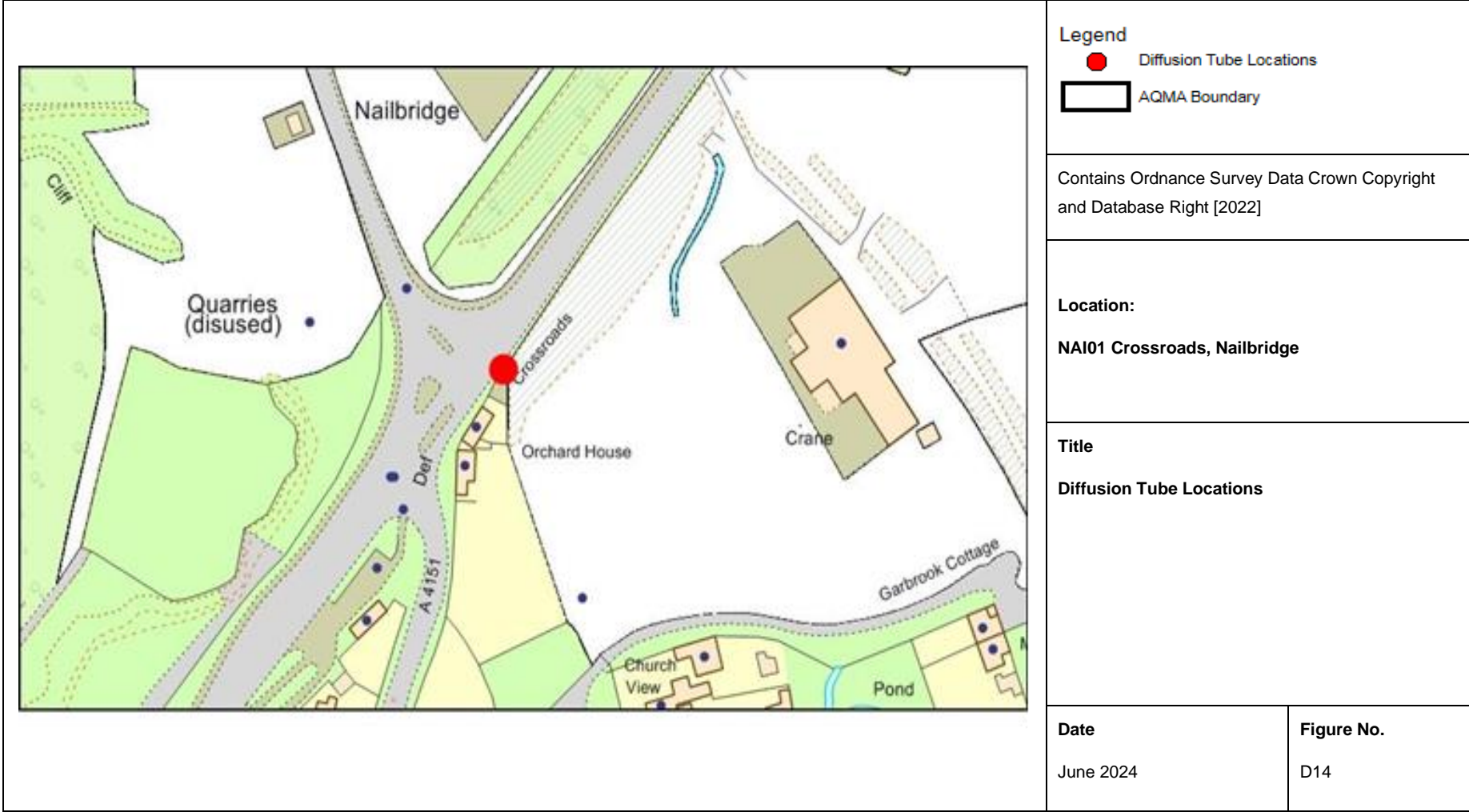


Figure D.14 - Map of Non-Automatic Monitoring Site - NAI01

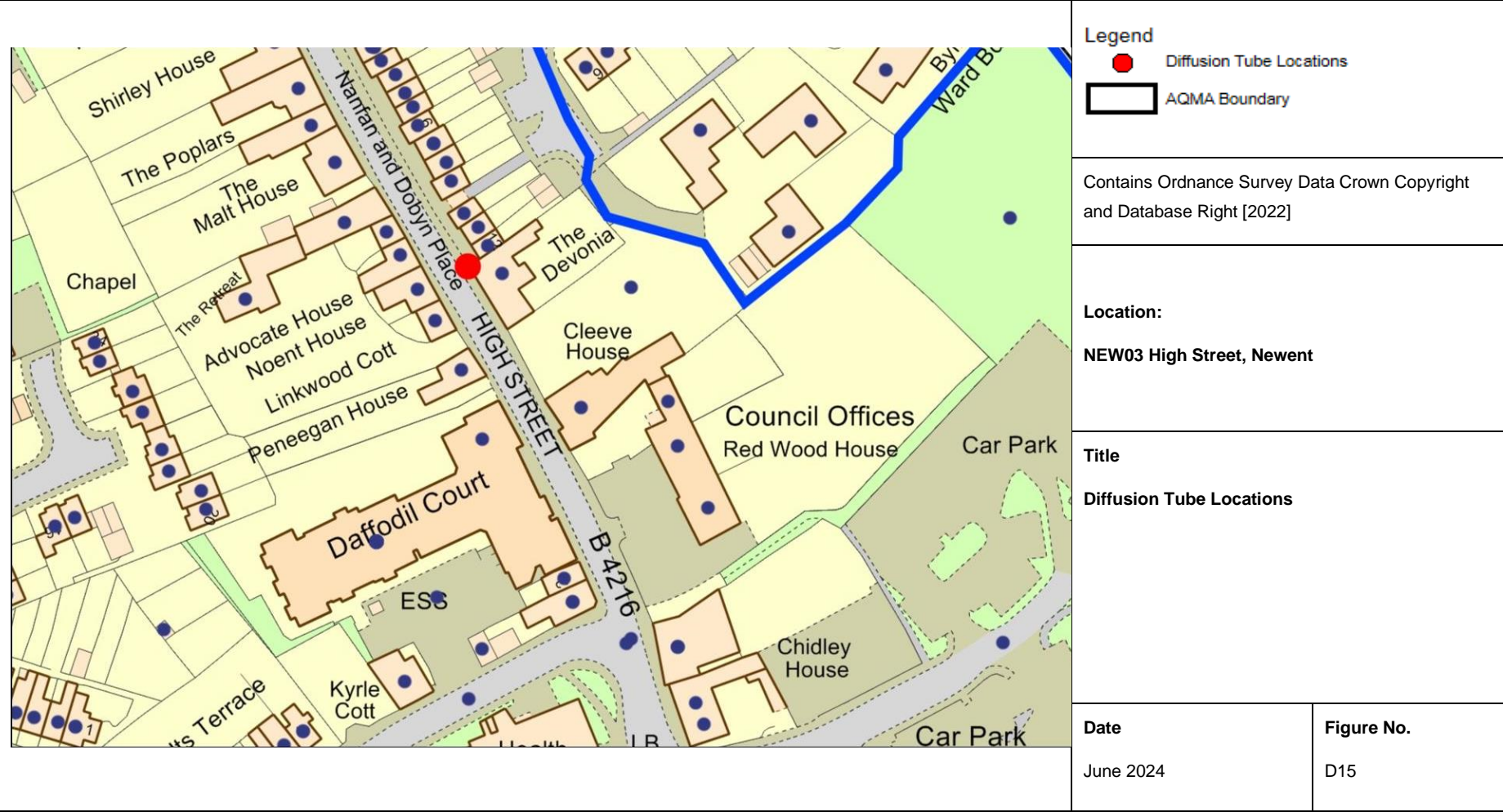


Figure D.15 - Map of Non-Automatic Monitoring Site - NEW03

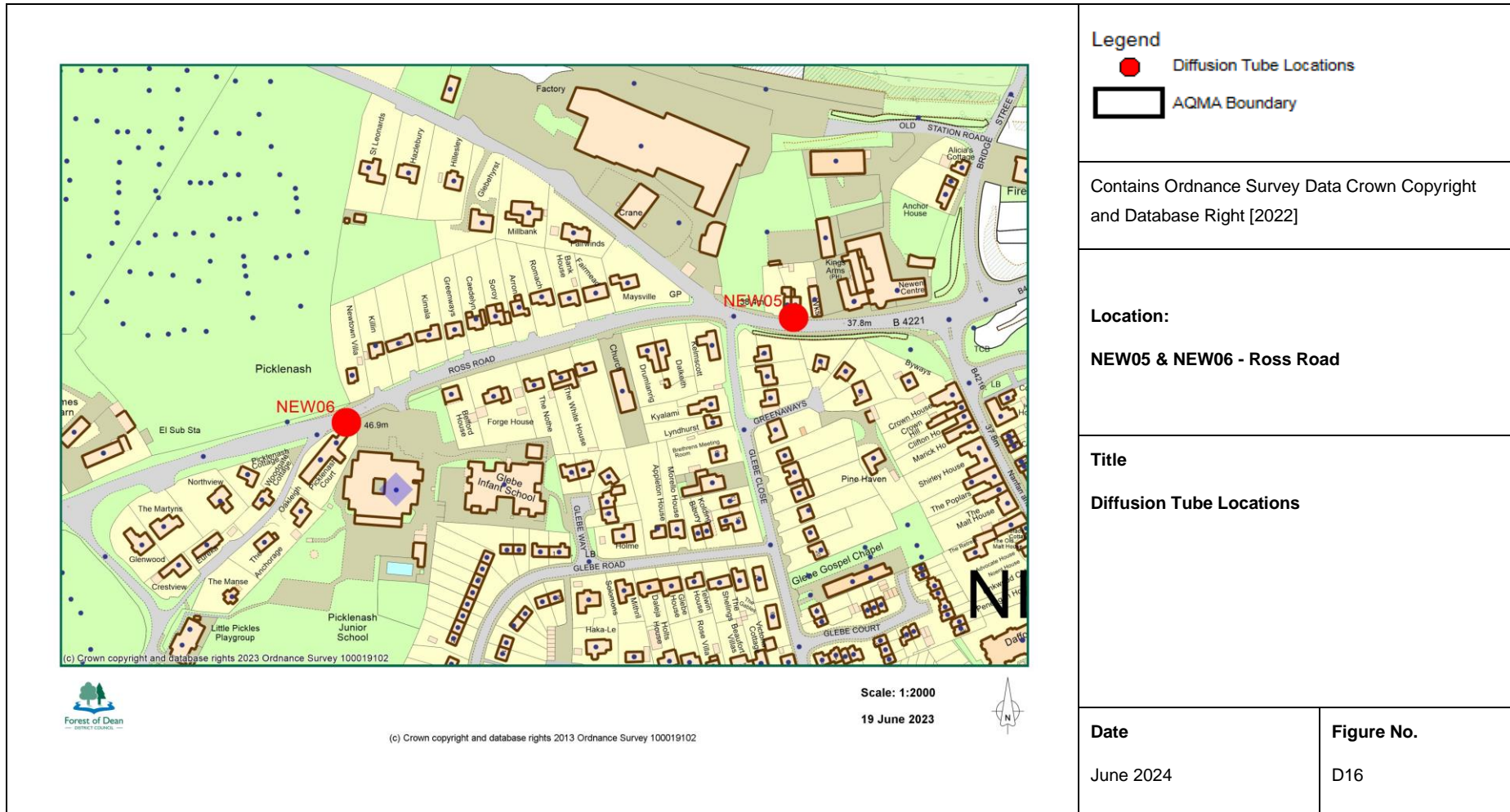


Figure D.16 - Map of Non-Automatic Monitoring Site NEW05 & NEW06

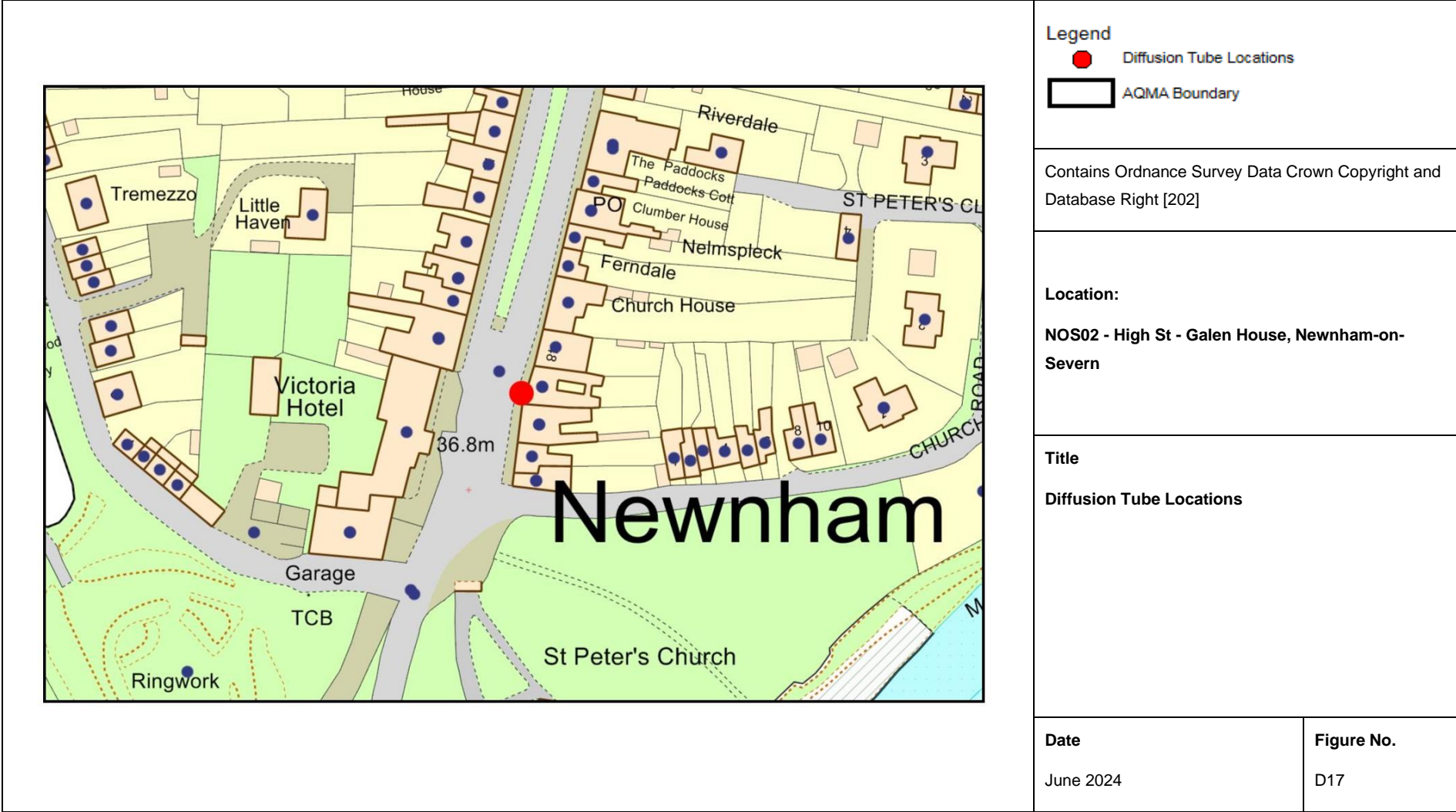


Figure D.17 - Map of Non-Automatic Monitoring Site NOS02

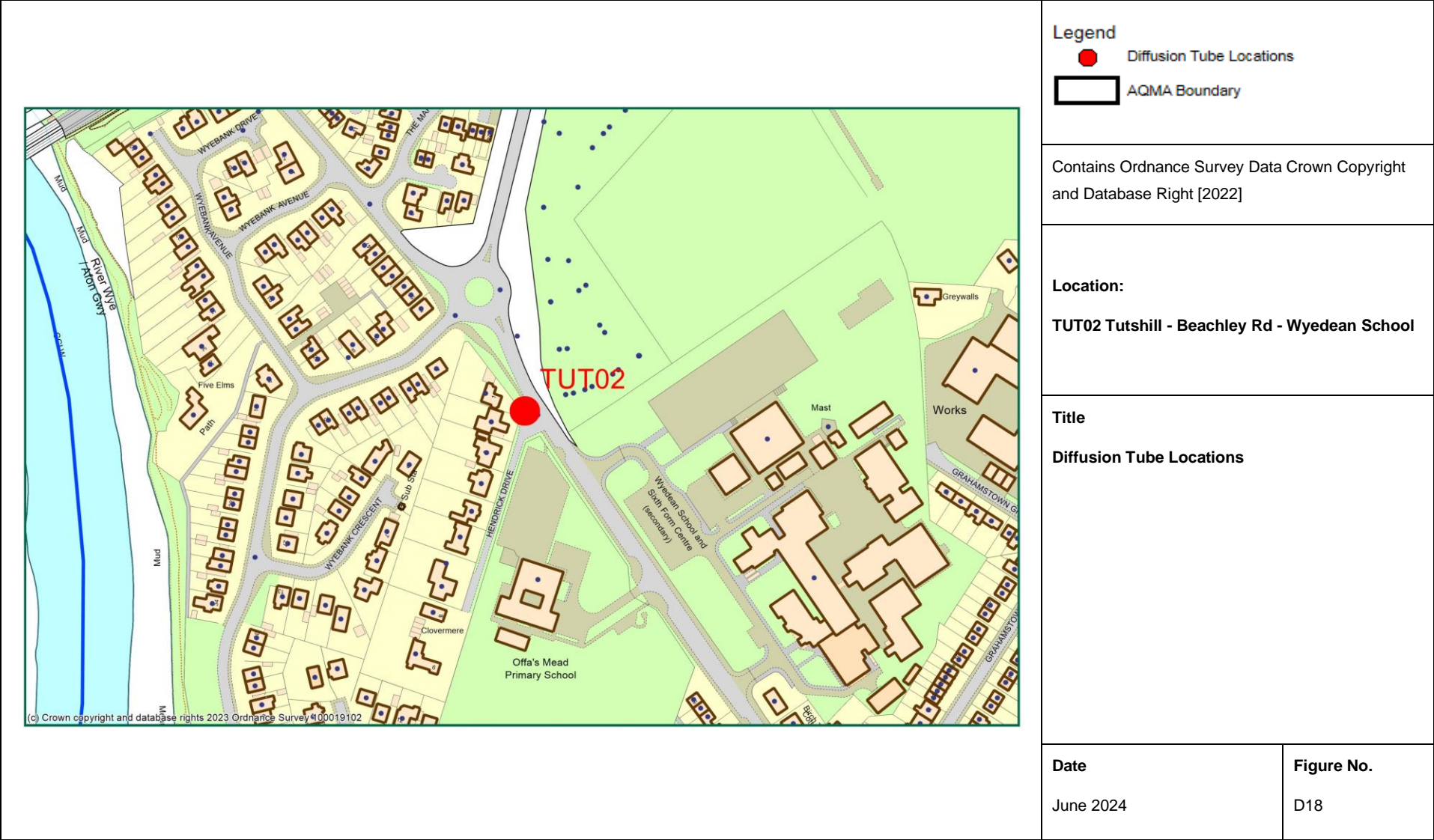


Figure D.18 - Map of Non-Automatic Monitoring Site - TUT02

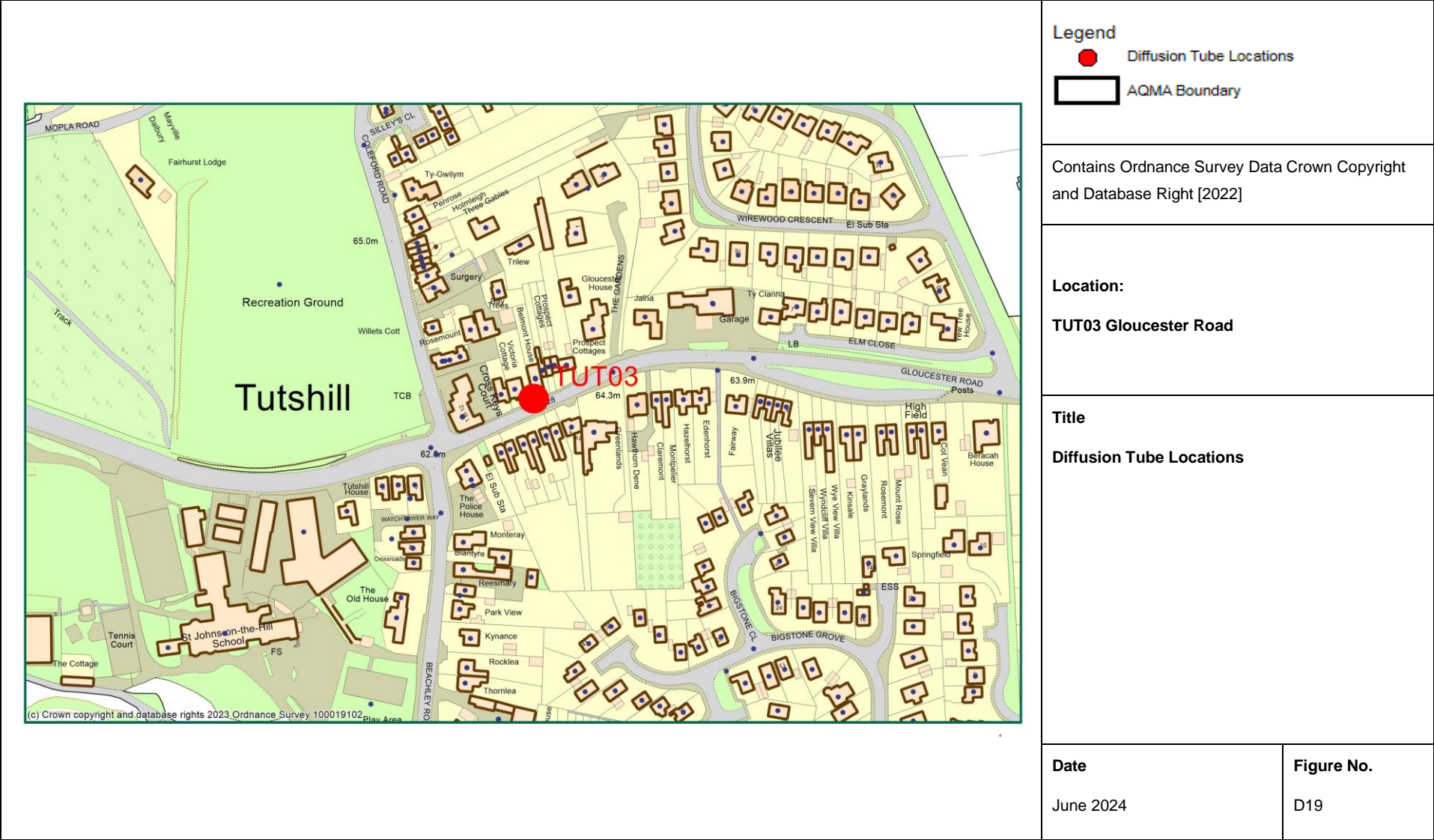


Figure D.19 - Map of Non-Automatic Monitoring Site - TUT03

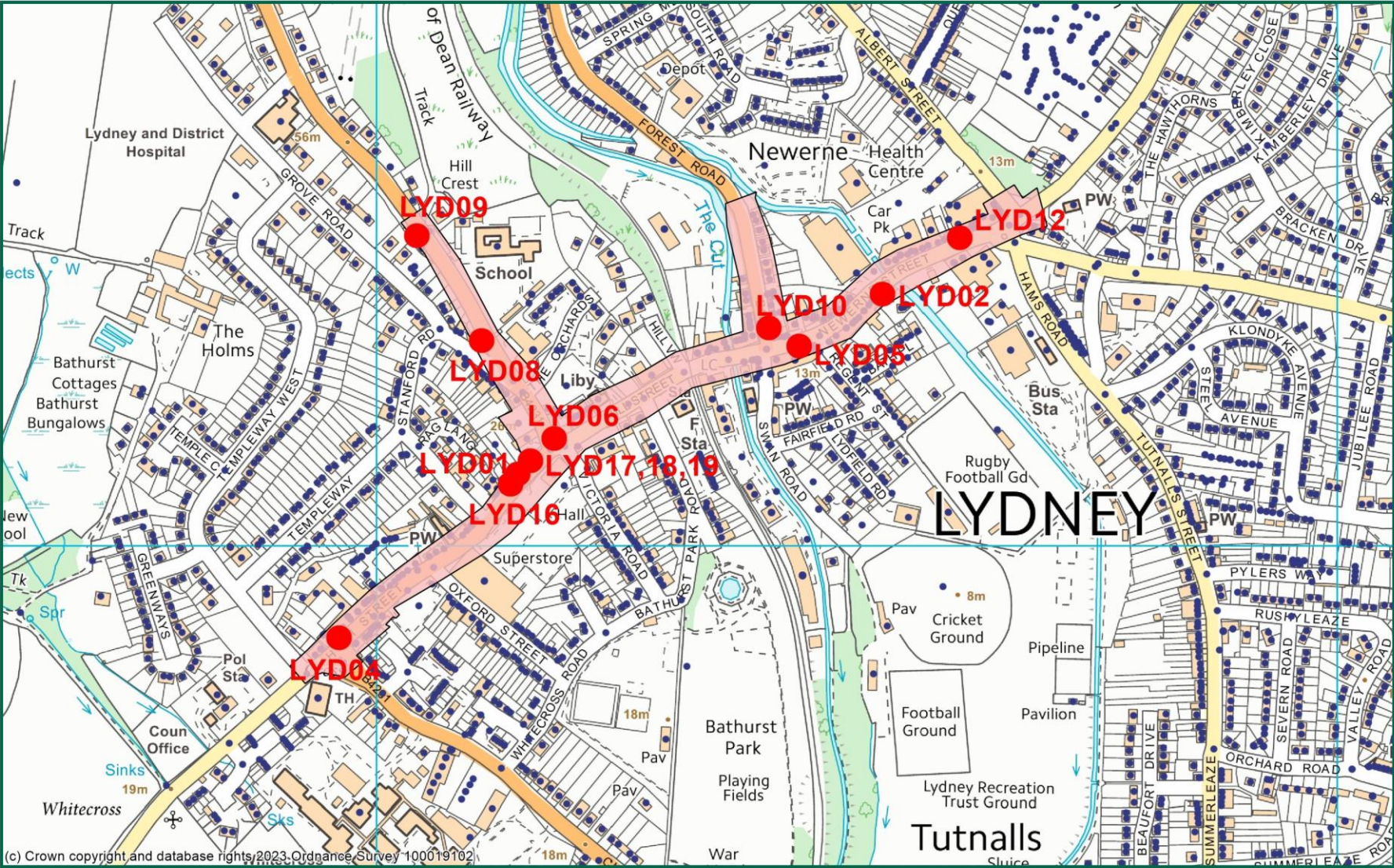


Figure D.20 - Map of Lydney AQMA Showing Monitoring Locations

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁸

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

⁸ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

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

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.