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 New Forest District Council

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 year[1].

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 pollution[2].

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 $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. 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. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

[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 New Forest District covers 75,100 hectares (290 sq. miles) and has a diverse environment, including the New Forest (and associated New Forest National Park) that covers approximately three quarters of the district comprising of mainly protected heathlands and forests, a coastline of 64 km, areas of industry, towns and villages. Along Southampton Water much of the shoreline is influenced by urban and industrial development. The local landscape is dominated by a refinery, one of the largest in Europe, whilst other industrial processes include a number of energy recovery facilities and chemical installations. Furthermore, there are significant areas of sand and gravel extraction in the district to support local businesses.

The total population of the District is 176,800 although the area also attracts local, national and international visitors throughout the year with over 13 million days visits made annually[3]. With 96% of visitors arriving to the New Forest in cars or coaches, in addition to the local industry, there is the potential for air quality issues relating to both traffic and industry.

The pollutants of concern in the New Forest district are nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$) and sulphur dioxide (SO_2). Traffic produces both NO_2 and particulate emissions, whilst the local industry may produce NO_2, particulate and SO_2 emissions.

For part of 2023 there was one Air Quality Management Area (AQMA) within the New Forest.

- **Lyndhurst** (High Street). Traffic related

This was revoked in August 2023 because pollutant concentrations for nitrogen dioxide had met the Governments national objective levels for the previous 8 years. The 2023 Annual Status Report had previously reported that the Lyndhurst AQMA would be revoked and this was supported by Defra in their feedback on this report.

In 2017 New Forest District Council was named in the UK Air Quality Plan[4] as having one road which was predicted to persistently exceed nitrogen dioxide EU limit values after 2020. This road is a short stretch (approximately 1km) of the A35 over the Redbridge Causeway into Southampton and is a location where the public has access. Southampton

[3] https://www.newforestnpa.gov.uk/app/uploads/2018/01/aboutus1_keyfacts.pdf

[4] UK plan for tackling roadside nitrogen dioxide concentrations: Detailed plan (publishing.service.gov.uk)

had already been identified in 2015 as an area which also has a number of roads which persistently exceed the EU limit values for nitrogen dioxide and therefore Southampton City Council had already progressed action in understanding the issues and forwarding further measures to improve local air quality.

The area identified in the New Forest was seen as an extension of the Southampton issue therefore Southampton City Council and New Forest District Council worked in partnership to develop a Clean Air Zone (CAZ) within Southampton to ensure compliance with the EU limit value is met in the shortest time possible. Detailed and complex local air quality modelling was undertaken in the New Forest and determined that compliance would be met by 2019 in a business as usual scenario. Furthermore, it was concluded that the introduction of additional measures would not bring forward compliance, therefore, New Forest District Council's preferred option was to continue with a business as usual scenario.

A number of monitoring locations were however installed in 2018 along the A35 in Totton to corroborate results of the detailed CAZ air quality modelling work. Nitrogen dioxide concentrations were shown not to exceed EU Limit Values but were sufficiently close to suggest that monitoring should continue.

The data obtained from these tubes throughout 2023 is presented separately from the main data tables since its use was in conjunction with the Southampton CAZ work and not part of the LAQM process (see Appendix H).

Monitoring since 2019 has shown that this stretch of road has not exceeded the EU limit values for nitrogen dioxide.

Local Air Quality Management

New Forest District Council has a legal duty to continue to manage local air quality. The Council fulfils this duty by:

• following Local Air Quality Management guidance produced by Defra;

• continuously monitoring pollutants of interest at relevant sites including rural background, roadside and industrial locations;

• identifying new major sources of airborne pollution and assessing the impact on local air quality. It should be noted that no new major sources have been identified during 2023;

• working within other legislative parameters such as the planning regime and / or the permitting of industrial processes to assess the impact of development or industry on local air quality, and if appropriate, taking measures to reduce the determined impact;

• providing training and updates concerning local air quality to colleagues within the local authority, Council Members, Town and Parish Councils and members of the public; and

• working with our partners such as Hampshire County Council, the Environment Agency, local industry, district and National Park colleagues, local Council Members, neighbouring local authorities and Town and Parish Councils.

Working with our partners is vital if air quality is to be recognised as an important local issue that requires consideration and action. Some partners are legal regulators, for example Hampshire County Council regulate roads and transport in our district and the Environment Agency regulate the large industrial processes and therefore their involvement could ensure works are undertaken and / or funding is available for particular schemes.

Ensuring all partners are aware of the local air quality issues is also important, therefore New Forest District Council makes the effort to train and update partners on local air quality by attending relevant meetings and committees. Furthermore, Environmental Protection Officers work with other departments to ensure local air quality is discussed at the planning stages of a development or implementation of a scheme.

Air quality is not just a local issue because airborne pollution is not contained within district boundaries. Therefore, New Forest District Council also works with our five neighbouring local authorities when required to address air quality issues. This was of great importance during our collaborative working with Southampton City Council to progress the work on the Clean Air Zone to improve local air quality within the area as directed by Government, and in more recent years on a ‘Burn Better’ campaign to inform the public on pollutant issues concerning solid fuel burning.

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 Plan[5] 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 harm to human health. The Air Quality Strategy[6] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero[7] 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 (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

During the monitoring period of 2023, 6 of 49 diffusion tube sites presented higher annual average NO_2 concentrations than in the previous reporting year. The largest increase recorded was 1.9 µg/m^3 at co-located sites 31ai and 31aii which are located in Stoney Cross, adjacent to the A31. All other sites were found to have lower annual NO_2 concentrations than the previous year, with the largest declines being at sites 48, and triplicate sites 10ai, 10aii, and 10aiii. These are located on the A35 and Lyndhurst High Street respectively, with diffusion tube site 48 being a part of the Southampton Clean Air Zone network. The highest annual mean NO_2 value for the District in 2023 was 33.2 µg/m^3, this is on the A35 (Totton Bypass) and is also part of the Southampton Clean Air Zone network.

There have been no exceedances of the annual mean objective for NO_2 monitored in the District during 2023.

Working with the Environment Centre (tEC) and other Local Authorities to promote the 'Burn Better' scheme

New Forest District Council is currently working with tEC and other Local Authorities to support residents in avoiding air pollution from household burning and improving air quality for their health, their community and the environment. The scheme promotes awareness

[5] Defra. Environmental Improvement Plan 2023, January 2023

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

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

of the air quality issues surrounding solid fuel burning and has focussed on bonfires and the use of solid fuel appliances such as wood burners and stoves to encourage residents to turn to other means of disposing of waste or heating their homes and to 'burn better' by burning appropriate material and 'ready to burn' fuels where there is no alternative means of heating.

As part of this project the team secured 4 Zephyr sensors which were deployed around the district to monitor pollution levels, specifically PM_{10} and $PM_{2.5}$. The Zephyrs have been in use since October 2022 and the results are currently being assessed. The Council intends to use the data to provide advice and educational resources to residents on the impact of domestic burning.

Production of the air quality supplementary planning guide

A supplementary air quality planning guide has been produced to support applicants submitting planning applications and details the expectations required of them with regard to appropriate mitigation requirements to safeguard air quality during construction and upon completion.

Conclusions and Priorities

Monitoring of pollutants within the New Forest district has not shown an exceedance of the Air Quality Objectives (AQO) at any monitoring location. 2023 levels showed an overall decrease of 1.5 µg/m^3 in 2023 compared to 2022. Only 6 sites of 49 recorded an increase in NO_2 concentrations, all of these sites remain well below the AQO with the highest of these being 33.2 µg/m^3 on the A35 (Totton Bypass) (Site 46) within the Clean Air Zone, and 31.4 outside of the Clean Air Zone network, on the A35 (site 49). The location of these sites may be seen in the maps provided in Appendix D.

Further monitoring has been and will be installed within the District to assess pollutant levels when circumstances or issues arise. Additional monitoring was installed in the Emery Down area (just outside Lyndhurst) in 2020 to assess nitrogen dioxide concentrations on a known 'rat-run' avoiding Lyndhurst, in Fordingbridge to gather background data ahead of a proposed new housing development and in Lymington close to a relocated bus depot. Results have demonstrated no exceedance of objectives levels in Emery Down and Lymington over the past 2 years. Given the very low levels of NO_2 monitored at these sites, continued monitoring in Emery Down and Lymington ceased in 2023.

It is noted that planning applications are expected to be submitted to the Council for proposed large developments over the forthcoming years. As such the associated work to assess the submitted plans and the impact on local air quality (including the potential impact on the Southampton Clean Air Zone) may be significant for the Department.

Priorities

New Forest District Council has the following priorities with regards to local air quality:

- to forward the development of an Air Quality Strategy for New Forest;
- to work regionally, pooling expertise and resource to forward local and national air quality issues and strategies; and
- to continue to promote the 'burn better' scheme focussing on woodburning and bonfires in domestic properties.

Local Engagement and How to get Involved

Everyone can take small steps to improve local air quality and improve their health, for example:

Vehicles

- Find out about your local public transport and car share schemes when travelling to work, school, business trips or weekends away.
    - Find out about local bus services. For example, during the summer, bus companies in the New Forest operate hop on / off services throughout the district and to local beaches, often with offers to some local attractions. Details can be found via the following link: http://www.thenewforesttour.info
- Find out about cycle routes in your local area and across the New Forest - you may be surprised how easy it is to cycle to your destination rather than take your car.
- Use **My Journey Planner** website to identify transport options, routes (including fastest and quietest) and public transport details. This is an excellent and informative website giving the user great options to compare different journey options. Details can be found via the following link: **https://journeyplanner.myjourneyhampshire.com**

- Turn off your engine when waiting at traffic lights, closed railway barriers or in traffic jams.
- Turn your vehicles air circulation from pulling in external air to re-circulating internal air to stop drawing the surrounding air pollution into your vehicle for you to breathe.
- Become an eco-driver for example by anticipating traffic flow, maintaining a steady speed at a low revs per minute (RPM) and shifting up through the gears early. This will not only reduce pollution from your vehicle but save on fuel consumption.
- Maintain your vehicle regularly, including checking tyre pressures monthly.

Get Active

- Leave your car at home and try walking to the local shops or school, even if it is just once or twice a week. If you can make it part of your normal routine, not only will you be reducing air pollution you will be more active and healthier.
- The majority of New Forest residents live within walking or cycling distance of open spaces. Explore walking and cycling routes you can take from your doorstep, get active and leave your car at home.

Plan ahead

- Take some time to plan ahead and consider the small steps you can take to reduce pollution, for example planning journeys that you can leave your car at home or car share with work colleagues or on the school run even it is just for one day a week or fortnight.
- When planning a walk, consider the route. It may be possible to take footpaths and streets away from busy high streets or areas of local traffic congestion therefore avoiding areas of higher air pollution.
- If you are buying or leasing a new vehicle (private or business) consider the vehicle emissions and fuel type in addition to the other typical considerations such as miles per gallon, insurance group and safety.

- Be aware of air pollution forecasts for your local area, particularly if you suffer from respiratory issues. The local forecasts can be found via the following link: https://uk-air.defra.gov.uk/

Domestic Wood Burning

The burning of solid fuel in open fires, wood burners and bonfires produces particulate matter (PM) which can cause harm when breathed in. Avoid burning by taking garden waste to the tip or signing up to the Councils green waste scheme. Using wood burners only when absolutely necessary (unless they are the only source of heat), using Eco design stoves and following the 'Burn Better' Burn Better - Ready To Burn guidelines to ensure only dry, clean wood is burnt can help to reduce pollution. https://uk-air.defra.gov.uk/library/burnbetter/

Raising concerns

New Forest District Council residents and businesses can raise concerns about air pollution directly with the Environmental Protection department or their local Councillor; details and links are listed below. Officers may be able to offer advice or investigate your concerns further.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection team of New Forest District Council with the support and agreement of the following officers and departments:

Rachel Higgins (Environmental Protection Manager)

Caroline Gill (Environmental Health Technical Officer)

Joanne McClay (Service Manager Environment and Regulation)

This ASR has been approved by:

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If you have any comments on this ASR please send them to eandr@nfdc.gov.uk or

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Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in New Forest District Council 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 New Forest District 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 (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.

New Forest District Council currently does not have any declared AQMAs. Details of the Lyndhurst AQMA, revoked during the course of the last reporting year may be found in Table 2.1. A local Air Quality Strategy is under development to prevent and reduce polluting activities. For reference, a map of New Forest District Council monitoring locations is presented in Appendix D.

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
Lyndhurst AQMA	Declared 06/06/2005 Revoked 18/08/2023	NO_2 Annual Mean	An area extending 25m either side of both kerbs in the High Street, Lyndhurst between Lyndhurst Infant School and Forest Cottage, 97 High Street.	NO	52	N/A	8 yrs (at time of revocation)	Lyndhurst Action Plan 2008 & Lyndhurst Air Quality Action Plan - An update 2019	lyndhurst-air-quality-action-plan-update_2019.pdf (newforest.gov.uk)

☒ **New Forest District Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

☒ **New Forest District Council confirm that all current AQAPs have been submitted to Defra**

2.1 Progress and Impact of Measures to address Air Quality in New Forest District Council

2.1.1 Defra's Appraisal of the 2023 ASR

Defra's appraisal of last year's ASR concluded:

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports:

1. *A number of additional appendices have been added, which all help provide extra information and context to the measures and strategies implemented by the council. The Council have estimated $PM_{2.5}$ concentrations from monitored PM_{10} concentrations in line with the LAQM TG22 guidance as well as reporting the Public Health Outcomes Framework D01 indicator within as well as a comparison to England and the South-East region. This helps provide context for measures that tackle $PM_{2.5}$.*
2. *A good discussion on QA/QC procedures has been provided. Calculation of the bias adjustment factors has been stated clearly including an image of the appropriate national bias adjustment spreadsheet for completeness. The have provided good justification of their chosen bias adjustment factors ensuring that local bias adjustment factors are relevant to the site before application.*
3. *The council have continued to see low pollutant concentrations throughout the borough, this is a testament to the councils detailed list of key actions which they undertaken to improve air quality over the reporting year. Table 2.2 has been filled out in detail to providing key performance indicators, current status and/or funding status.*
4. *The council have stated their intention to revoke the Lyndhurst AQMA by September 2023 providing detailed modelling results, on top of their current eight years of compliance with the AQOs, as evidence to help ensure that compliance is continued in the future.*
5. *The trends presented in Appendix A are formatted in a way that is clear and easy to understand. The addition of the AQO to graphs is useful, providing a good frame of reference from which to visualize compliance over consecutive years, the council should ensure that this is applied to all graphs in the report as this is missing from Figure F.1. It would also be good to provide trends for non-automatic sites outside the AQMA to ensure continued compliance throughout the entire district.*
6. *The council should ensure that diffusion tube IDs are consistent across all tables, table H.1 and H.2 use different tube IDs for sites at the same location.*

7. *Defra recommends that Directors of Public Health approve draft ASRs. Sign off is not a requirement, however collaboration and consultation with those who have responsibility for Public Health is expected to increase support for measures to improve air quality, with co-benefits for all. Please bear this in mind for the next annual reporting process.*

In response to the 4th point; in line with Defra guidance and their recommendation in the New Forest District Council ASR 2022 to consider revocation of the AQMA, New Forest District Council commissioned Ricardo to carry out a detailed assessment[8] of NO_2 concentrations in and around the Lyndhurst AQMA to determine whether compliance with the Air Quality Objective for annual mean NO_2 concentrations is achieved across the area and to determine whether compliance will be achieved in future years. Modelling was carried out for a 2019 baseline and a 2023 projected year. (Scenario 1).

In addition, to assess model uncertainty in future years, three theoretical worst-case scenarios were tested to quantify the potential impacts of conditions where emissions from road transport would be higher than expected in 2023:

- Scenario 2: Traffic volumes across Lyndhurst growing by 25%;
- Scenario 3: Slower than expected replacement of older road vehicles as a result of economic conditions leading to a 2-year delay in fleet renewal across the area;
- Scenario 4: a combination of scenarios 1 and 2.

The model accurately predicted concentrations at monitoring stations in the Lyndhurst AQMA in 2019, demonstrating that the model is correctly representing real-world conditions, lending confidence to the predictions for future years.

The modelling undertaken through this study showed that:

- No location is predicted to exceed the Air Quality Objective for annual mean NO_2 at any location of relevant exposure in 2019;
- No location is predicted to have an annual mean NO_2 concentration within 10% of the Air Quality Objective for annual mean NO_2 at any location of relevant exposure in 2023 should changes in traffic volumes and fleet composition follow the forecasted national trends.
- Furthermore, no locations of relevant exposure are predicted to exceed the Objective in a number of theoretical scenarios where emissions would be higher than those predicted from forecasted national trends, including a 25% increase in road traffic on all roads in Lyndhurst, a 2-year delay in fleet renewal compared to national fleet projections, and a combination of increased traffic and fleet delay.

[8] *Lyndhurst Air Quality Management Area – Detailed assessment for New Forest District Council Feb 2023 Ricardo Energy and Environment*

Based on the data available, the modelling suggests that provided the monitoring data for 2022 matches the trends described above, the AQMA could be revoked without risk of future exceedances. Accordingly, the AQMA was revoked in August 2023.

2.1.2 Progress on Actions

New Forest District Council 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. 14 measures are included within Table 2.2

New Forest District Council expects the following measures to be completed over the course of the next reporting year:

- Completion of the Air Quality Strategy for New Forest District Council

New Forest District Council's priorities for the coming year are:

- Continued collaboration with neighbouring authorities and the Environment Centre to promote the 'Burn Better' messaging and highlight the issues surrounding burning in bonfires and woodburner.

New Forest District Council worked to implement these measures in partnership with the following stakeholders during 2023:

- Hampshire County Council (Public Health and transport)
- New Forest National Park Authority
- Forestry England
- Environment Agency
- Winchester City Council
- Southampton City Council
- Eastleigh Borough Council
- Local Industry
- Internal Stakeholders within New Forest District Council – planning, climate change, well-being, policy

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	Development of an Air Quality Strategy	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2024	NFDC, Hampshire County Council, New Forest National Park, Forestry England, Environment Agency	NFDC	NO	Not Funded	£10k - 50k	Planning	Currently unknown	Likely to be AQ assessment (monitoring / modelling)	Strategy being drafted.	Working with consultants to produce Strategy
2	Promoting public awareness of Burn Better campaign	Public Information	Other	2023	2025	The Environment Centre and other LA's (Winchester, Southampton and Eastleigh)	DEFRA grant	YES	Funded	£10k - 50k	Implementation	Currently unknown, related to behaviour change	Monitoring, public surveys / feedback	Continuation of campaign - face - to - face meetings, media, events etc.	
3	Further investigation of $PM_{2.5}$	Other	Other	2023	2027	Currently NFDC, may involve other regional LA's	Possible DEFRA grant	YES	Not Funded	£10k - 50k	Planning	Currently unknown	Likely to be AQ assessment (monitoring / modelling)	Will be an action as part of the AQ Strategy being developed	Aim is to better understand $PM_{2.5}$ in the District, source apportionment and possibility to target reductions
4	Enforcement of loading restrictions	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2012	2032	NFDC enforcement	NO	NO	Not Funded	< £10k	Implementation	< 1 µg/m^3	Surveys undertaken June 2019	Survey showed no illegal parking during survey period, further surveys required	Ongoing measure
5	Enforcement of HGV restriction in High Street	Traffic Management	Other	2012	2032	NFDC / police	NO	NO	Not Funded	< £10k	Aborted	< 1 µg/m^3	Survey undertaken June 2019	Only Police may take enforcement action. Resource intensive.	Police
6	Clean walk to school route	Promoting Travel Alternatives	School Travel Plans	2025	2032	NFDC / school / HCC	NO	NO	Not Funded	< £10k	Implementation	5-10µg/m^3 reduced impact of pollution on clean route	Implementation on-going with new year groups	Location of school means most children already walk	Ongoing measure
7	Anti idling campaign	Public Information	Other	2018	2025	NFDC / regional LA's / HCC	NO	NO	Not Funded	< £10k	Implementation	< 1 µg/m^3	Poster/banner campaign in High Street undertaken Feb 2018 and to be reviewed again	Most vehicles now have start stop engines	Use as a regional message using social media platforms
8	Reduce trade vehicle movement	Traffic Management	Other	2018	2025	NFDC / local business	NO	NO	Not Funded	< £10k	Planning	< 1 µg/m^3		Project put on hold due to Covid	
9	Improve motorway signage	Traffic Management	UTC, Congestion management, traffic reduction	2012	2022	HCC	NO	NO	Not Funded	< £10k	Completed	< 1µg/m^3	NO_2 monitoring	System installed and reviewed by HCC	System installed but requires HCC to operate

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
10	Sustainable travel	Promoting Travel Alternatives	Personalised Travel Planning	2012	2025	All local and regional agencies (Hampshire AQ group)	NO	NO	Not Funded	< £10k	Implementation	< 1 µg/m^3	NO_2 monitoring	Retro fitting of buses, promotion of cycle network	Will be included in AQS
11	Installation of electric charge points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2018	2032	NFDC	NO	NO	Partially Funded	£50k - £100k	Implementation	< 1 µg/m^3	Obtaining figures	Charge points in NFDC car parks installed	Will be included in AQS
12	Review Council Fleet	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2019	2032	NFDC	NO	NO	Not Funded	< £10k	Implementation	< 1 µg/m^3	Obtaining figures	Electric cars procured 2019	Will be included in AQS
13	Increase awareness of issues	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2019	2032	NFDC, HCC, PH	NO	NO	Not Funded	< £10k	Completed	< 1 µg/m^3	NO_2 monitoring	Publication of 2019 Air Quality Action Plan	Completed
14	Smarter working	Promoting Travel Alternatives	Encourage / Facilitate home-working	2019	2025	NFDC	NO	NO	Not Funded	£50k - £100k	Implementation	< 1µg/m^3	NO_2 monitoring	Forwarded quicker due to Covid - flexi home / office work currently continuing	Will be included in AQS

2.2 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[9], 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.

Whilst there is one measure directly targeted toward the reduction of $PM_{2.5}$ (Further investigation of $PM_{2.5}$) a number of measures in Table 2.2 have co-benefits directly related to $PM_{2.5}$ reduction such as:

- Enforcement of HGV restrictions in High Street
- Anti idling campaign
- Reduce trade vehicle movement
- Improve motorway signage

Annual mean concentration

New Forest District Council does not currently monitor $PM_{2.5}$ concentrations with continuous analysers. However, by using current guidance, Technical Guidance (Defra, 2022), the $PM_{2.5}$ annual mean concentration can be estimated using monitoring data from local PM_{10} analysers. The estimation of the $PM_{2.5}$ annual mean concentration for 2023 is provided in Appendix F.

Furthermore, it is noted that some private sector businesses in the New Forest area (along Southampton Water) monitor $PM_{2.5}$. Therefore, the Council will determine whether this data could be made available to the Local Authority and the monitoring undertaken is appropriate, in order to provide some monitored local $PM_{2.5}$ concentrations.

[9] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

Health burden

The Office for Health Improvement & Disparities[10] provide a Public Health Indicator for $PM_{2.5}$ which references the health burden of $PM_{2.5}$ at a local authority level as a fraction of mortality attributable to particulate air pollution. This enables local authorities to assess their local figure, compare it to other regions and take appropriate action by targeting resources to reduce the fraction. The figures are provided for the New Forest District and other regions of interest in Appendix G.

Local hot-spots

Background pollutant maps provided electronically by Defra also give a basic local background concentration for $PM_{2.5}$. This information may show areas of higher $PM_{2.5}$ concentrations which New Forest District Council could assess to determine if there are local particulate issues where specific measures could be implemented to reduce particulate emissions.

The above noted methods will be used to establish local $PM_{2.5}$ annual mean concentrations, identify the local health burden of particulate matter and identify any local hot spot areas for particulate matter that have not been identified to date. This will enable New Forest District Council to establish baseline figures for $PM_{2.5}$ with the aim to improve on the established baseline, including the possibility of setting targets for a measured reduction in the near future, and to target resources to assess and improve any identified hot spot areas for $PM_{2.5}$. These data will be updated on an annual basis, and therefore provide some guidance of whether implemented measures are reducing local $PM_{2.5}$ concentrations. In addition, this work could be included within any future Air Quality Strategy for the New Forest.

After eight years of reporting $PM_{2.5}$ concentrations (based on the monitored PM_{10} concentrations), concentrations at both sites (Totton and Fawley) have remained consistent.

See also Regional Partnerships - ‘Localised Burning’ on page 12.

[10] The Office for Health Improvement & Disparities (OHID) is the successor organization to Public Health England, since October 2021

Further current measures include:

Working with Public Health colleagues

~~NFDC~~ New Forest District Council meets with Public Health colleagues and Hampshire County Council at Regional Air Quality meetings.

Local Tourism

The New Forest district attracts millions of visitors each year including 13.5 million day trips. 96% of visitors will arrive in cars or coaches, however there are alternative methods of transport to arrive and explore the New Forest area. By working with partners such as New Forest National Park Authority, New Forest Tourism and transport companies on current and future schemes, the air quality link of improving not only $PM_{2.5}$ but air quality in general by using alternative transport methods could be forwarded. Transport schemes include:

- Local public transport schemes such as New Forest Bus Tour (3 tourist bus routes operating a hop on / off concession scheme)
- Promotion of cycle and walking routes throughout the New Forest
- The production of tourist maps linking local attractions with available transport routes.

New Forest District Council Public Spaces Protection Order 2022 number 1: relating to fires and BBQs

Despite a series of high-profile campaigns in and around the New Forest, about the dangers of fires on the open forest, including an operational ban on disposable BBQs on Forestry England land in 2020, significant numbers of incidents caused by BBQs and campfires, continue to be recorded by Forestry England, New Forest National Park Authority (NPA) and Hampshire and Isle of White Fire and Rescue Service (HIWFRS).

Such fires can result in serious safety concerns and risk to life; damage biodiversity, habitats and property and place an enormous strain, both operationally and financially, on the emergency services and organisations within the Forest, who have to deal with them.

To help reduce these anti social activities, New Forest District Council has invoked the Public Spaces Protection Order, referred to as The New Forest Public Spaces Protection Order 2022 (Number 1) ('PSPO No 1').

The Public Spaces Protection Order Number 1 prohibits the following activities:

(a) placing, throwing or dropping items likely to cause a fire

(b) lighting fires (of any type) or barbeques (including disposable barbeques and any outdoor temporary cooking facilities or equipment)

(c) using items which either (i) cause a naked flame or (ii) pose a risk of fire

The order applies to any land within a restricted area which principally comprises land managed and controlled by Forestry England.

Whilst this order was convened to protect habitats and bio diversity, restricting burning will also help to keep PM levels low and prevent the spikes associated with bbq's, fire pits etc which can have negative effects on those living near by.

Environment Agency

The Environment Agency permits 20 industrial installations within the New Forest and immediate vicinity including some large chemical, waste, energy generating and oil refining processes. Whilst these installations currently operate under the conditions laid out in their Permit which will include emissions to air, New Forest District Council will continue to work further with the Environment Agency and local industries to discuss local $PM_{2.5}$ emissions and whether these can be reduced further.

Planning authorities

Air quality is a material consideration within the planning regime. To make development acceptable we will expect mitigation measures to be implemented by the applicant to reduce emissions to air from all proposed development.

A Supplementary Planning Document (SPD) was adopted on 1 June 2022 which provides supplementary guidance to the Local Plan for the New Forest District Council area. It aims to prevent pollution hazards and provides guidance on when an Air Quality Assessment will be needed to support a planning application and what the assessment needs to address. It also confirms when an Air Quality Statement is required. Suggested mitigation measures to allow development to take place are also found within the document which is accessible here: Air_Quality_SPD_FINAL_Version_June_2022.pdf (newforest.gov.uk).

Regional Partnerships

Localised burning

New Forest District Council has not declared any smoke control areas. The District is primarily rural with a high proportion of domestic open fires and wood burning stoves. Residents with commoner's rights are also able to collect wood from the Forest for their

own domestic use, and therefore to some extent wood burning is an accepted form of heating for many residents within the District. In addition, landowners (including the Forestry Commission and National Trust) will periodically burn heathland to effectively manage their land, producing localised smoke episodes with the associated generation of pollution.

Whilst it is acknowledged that these fires and domestic heating sources will give rise to the production of particulate matter, there should be a balance and proportionate response to heathland burning and the use of domestic fires and stoves. Therefore, heathland burning is always controlled with an emphasis not to allow smoke to drift over residential properties, and the Council deals with issues of domestic burning as they arise (typically through a nuisance complaint or planning regime) with advice given regarding burning including stove type, flue design, fuel source, wood type, storage and seasoning.

In 2019 New Forest District Council worked with neighbouring authorities to apply for Government funding for a regional approach to the use of wood burners and bonfires. The bid was successful and New Forest District Council and other authorities are now working with the environmental charity, the Environment Centre (tEC) to promote alternatives to burning and cleaner burning.

In 2021 under the ‘Burn Better’ campaign the group publicised the burn better message through:

- Production of flyers to promote cleaning burning in urban and rural areas (see Figures 2.1-2.5)
- A mailout of the flyers to various postcodes within the district where woodburning is common
- Distribution of the leaflets to all our information offices
- Engagement with tree surgeons, chimney sweeps, and stove and fireplace suppliers
- Posting ‘burn better’ information on our social media platforms
- Producing social media banners promoting the Ready to Burn regulations which came into effect in May 2021.

These points of action continued through 2022 and 2023. In addition, flyers relating to bonfires (Figure 2.4) and an updated woodburning leaflet (Figure 2.5) were often sent to

residents as part of our nuisance investigation procedure to provide advice and education on the harms of open burning.

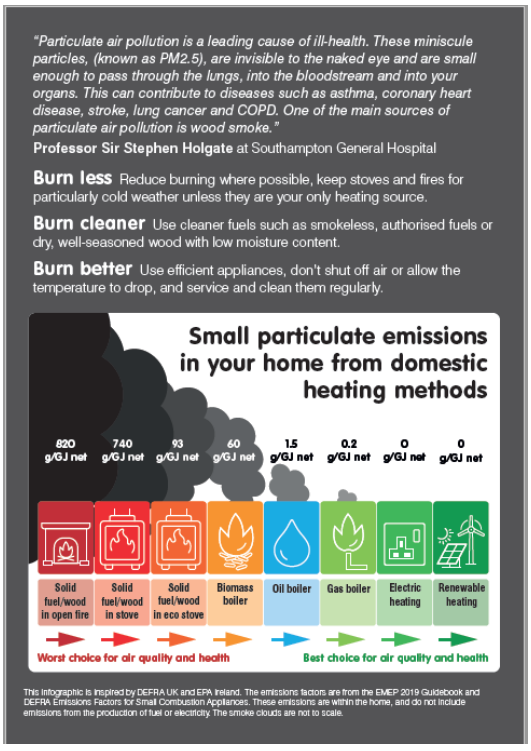
Figure 2.1 Social media banner promoting 'Ready to Burn' fuels

Figure 2.2 Flyer promoting 'better burning' aimed at residents using solid fuel appliance as their primary heating source

Figure 2.3 Flyer promoting 'better burning' aimed at users of solid fuel appliances

Figure 2.4 Flyer promoting alternatives to burning

Figure 2.5 Updated flyer giving advice on the harms of woodburning

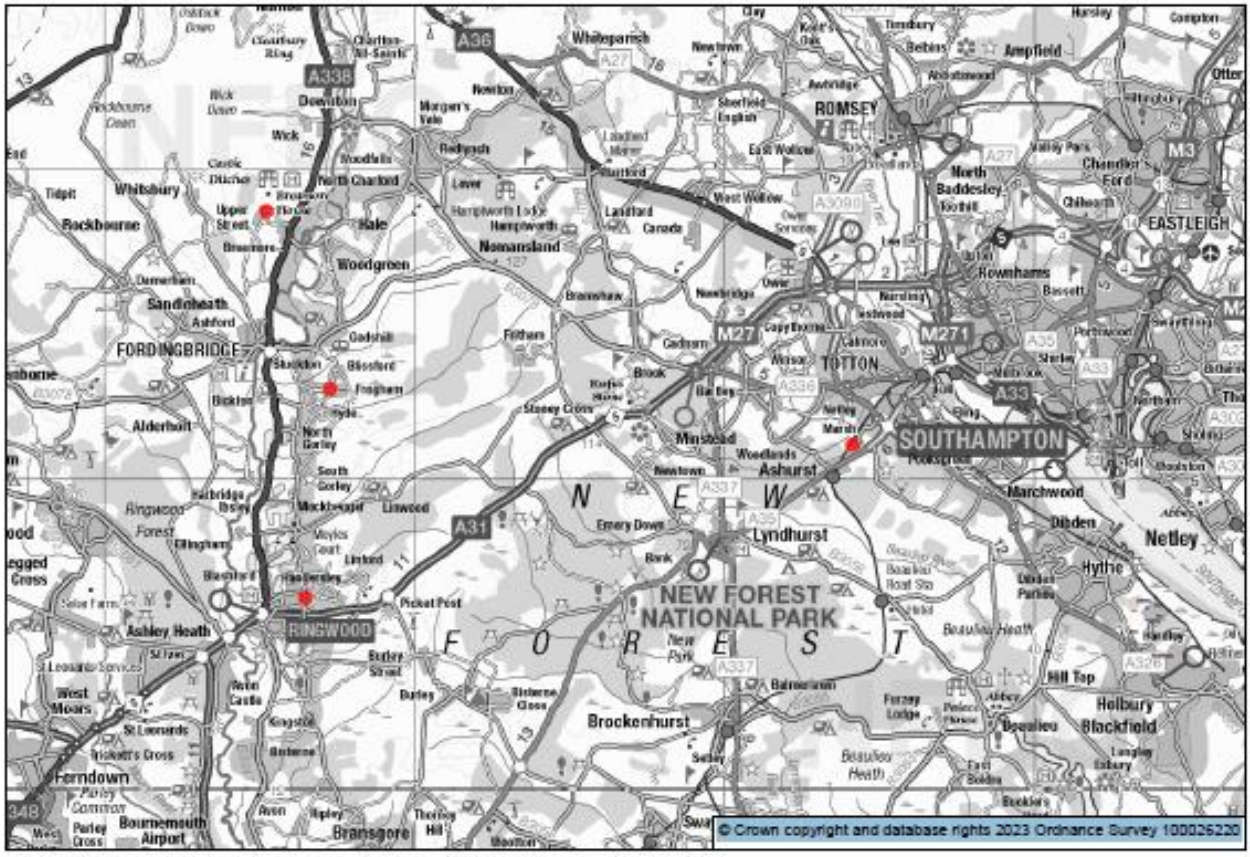


Low cost 'zephyr' sensors

As part of this campaign the group successfully bid for the purchase of low-cost sensors which can be deployed in 'hotspots' around the district to provide localised information on air quality particularly particulate matter. New Forest District Council acquired 4 zephyr sensors from Earthsense which were deployed in the autumn of 2022 in sites across the

district each with distinctive characteristics. The locations are shown in Figure 2.6. Breamore represents a background site away from high volumes of traffic and other potential sources of particulate matter. Ashurst represents a typical residential area in the east of the district but where complaints of smoke and odour from wood burners are regularly received, Poulner (Ringwood) is also a typical residential area in the west of the district whilst Hyde is a rural forest village with a nearby campsite with high bbq and fire pit use during the summer months.

Figure 2.6 Location of zephyr sensors within the New Forest district



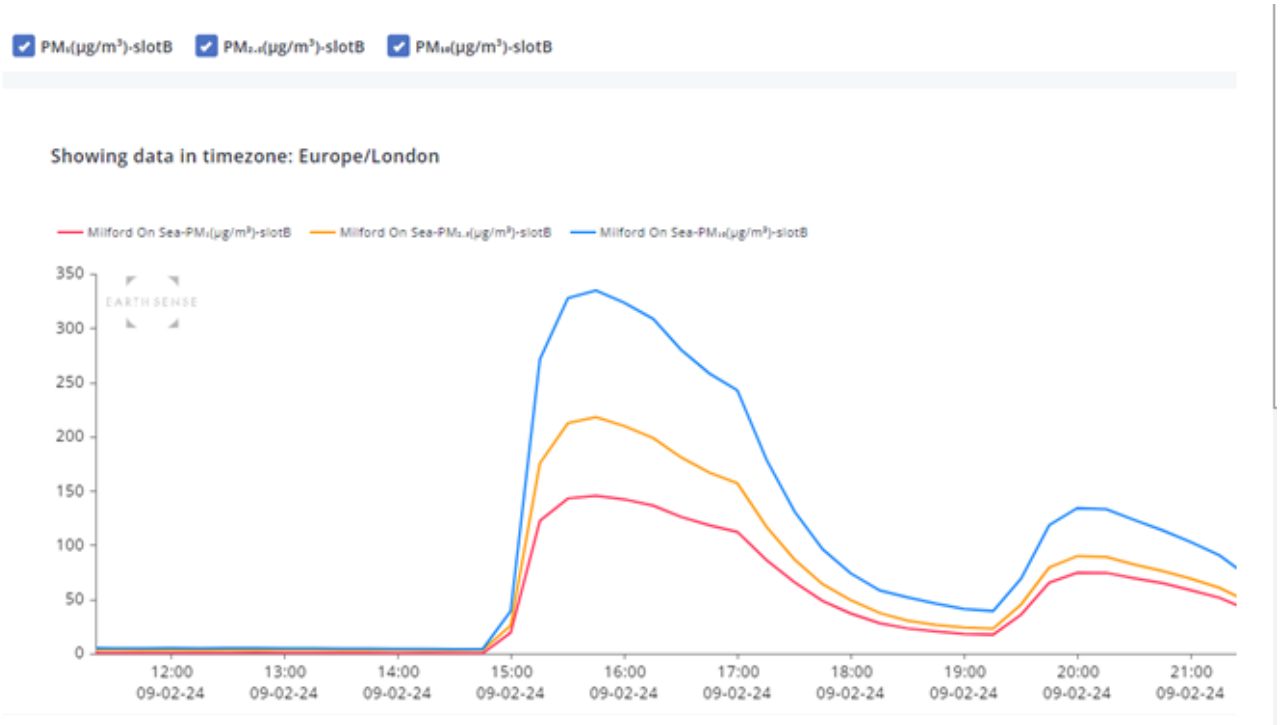
The purpose of this sensor deployment is to gather data on particulate matter (PM) levels around the district under different circumstances i.e. in an area with little burning, an area where burning is reported to frequently occur etc. and to assess whether or not there is any correlation between reports of wood burning and an increase in particulate matter concentration. If a correlation can be established, the Council aims to use this information to promote awareness of the harms to health this can cause. Many recent reports in the press indicate that people do not make the link between the use of a wood burner or bonfire with the inhalation of harmful particulate matter. The data from the zephyr sensors aims to address this and encourage people to use alternatives to burning where possible.

The Council does not currently propose to use data from the zephyrs to feed into the LAQM process. Further quality assurance and quality control measures are needed before we can have sufficient confidence in the data to report it to Defra.

The Council and its partner authorities have submitted 2023 data from the zephyr sensors to Southampton University who are analysing the data with the aim of understanding links between woodburning and particulate matter both locally and regionally. The final analysis is yet to be completed.

Towards the end of 2023, the Authority installed a further zephyr inside a residential property with a wood burner to compare internal particulate matter levels before, during and after burning. The aim is to demonstrate the rise in particulate matter within the property when a wood burner is used so that occupiers may be aware of the health effects of using their wood burner and consequently make informed choices over when and how often to use it. In depth analysis of this data is yet to be completed but the graph below provides an indication of how PM levels within a home may rise significantly when a wood burner is in use. In this example, a notable increase in PM occurs in the afternoon when the wood burner is lit.

Figure 2.7 Data from a zephyr sensor located within a home with a wood burner



New Measures

Development of an Air Quality Strategy for New Forest

With the revocation of the Lyndhurst AQMA in 2023, the Authority will be obliged to produce an Air Quality Strategy for New Forest. This will include the assessment of $PM_{2.5}$ and if required a reduction in the pollutant through working with different authorities, agencies and businesses. Work on the ASR has commenced and it should be adopted by the end of 2024 / early 2025 .

In summary

The following actions will continue to be progressed:

- to continue to determine local concentrations of $PM_{2.5}$ using current monitoring data (including the use of data from non-Council operated monitoring sites) and data from the Office for Health Improvement & Disparities (health indicators) and Defra (background maps).
- to continue to raise awareness of air quality (including particulate emissions) with partners (Public Health, , planning authorities, local tourism, Hampshire County Council and the Environment Agency), local Members and the public through training session and at public events.
- to continue to work with partners to identify and forward feasible schemes to reduce particulate emissions for example through our work with the Environment Centre.
- to encourage cleaner burning using the data obtained from the zephyr sensors.
- to forward the development of an Air Quality Strategy for New Forest

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

This section sets out the monitoring undertaken within 2023 by New Forest District Council 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

New Forest District Council undertook automatic (continuous) monitoring at 3 sites during 2023. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The http://www.airqualityengland.co.uk/local-authority/?la_id=236 page presents automatic monitoring results for New Forest District Council, with automatic monitoring results also available through the UK-Air website .

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

New Forest District Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 49 sites during 2023. Table A.2 in Appendix A presents the details of the non-automatic sites.

While the vast majority of the sites are in place to fulfil the requirements of LAQM, four are in place to support project work undertaken as part of the Southampton Clean Air Zone.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 µg/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 2023 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

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

The monitoring undertaken within New Forest District Council throughout 2023 has shown no exceedances of the annual mean objective for nitrogen dioxide at any of the automatic and non-automatic monitoring sites.

Lyndhurst

The results for Lyndhurst showed the concentrations remained significantly below the annual objective.

Within the revoked AQMA in Lyndhurst the monitoring results are presented in Table 3.1

Table 3.1- Nitrogen dioxide concentrations measured within Lyndhurst AQMA

Site ID	Location	NO_2 annual mean concentration (µg/m^3)				
		2019	2020	2021	2022	2023
CM2	Lyndhurst	31	23	25	26	21
8	School, High St.	20.5	15.1	17.2	16.4	15.2
9	15, High St.	31.5	24.4	25	25.7	23.5
10	14, High St.	31.6	24	24.9	25.8	21.2
13	16, High St.	35.1	26.6	24.9	27	23.7
14	2a, Romsey Rd	30.1	23.7	26.6	27.1	25.6
16	28, High St.	20	17	18	17.5	16.3
18	65, High St.	29	20.1	23.7	20.9	22.4

Concentrations at all sites remain compliant with the AQO and concentrations are continuing to drop at all but one site compared to the previous reporting year.

Totton

In July 2016, New Forest District Council revoked the AQMA in Totton. The AQMA was declared in 2005 for the likely exceedance of the nitrogen dioxide annual mean objective. Since the revocation monitoring in Totton using an automatic analyser and diffusion tubes (CM1 and diffusion tube Sites 33-49) has continued to ensure nitrogen dioxide concentrations remain below the air quality objective. The monitoring during 2023 has shown the nitrogen dioxide annual mean concentrations were significantly below the Air Quality Objective of 40 µg/m^3.

New Forest District Council will continue to monitor nitrogen dioxide thoughout Totton using automatic and non-automatic monitoring.

Other monitoring locations

Monitoring at the remaining locations showed an average decline in NO_2 concentrations of 1.4 µg/m^3. The largest recorded increase was 1.9 µg/m^3 which is located in Stoney Cross, adjacent to the A31. The largest recorded decrease was 4.5 µg/m^3 which was at site 54, in Ringwood. The majority of the remaining 30 sites declined in 2023, with 25 of the 30 sites

recording either no change, or a decline in NO_2 concentrations compared to the previous reporting year.

New monitoring locations since previous ASR

No new monitoring locations have been added during 2023.

Monitoring locations removed since previous ASR

Monitoring sites in Emery Down and Lymington bus station were removed in 2023.

3.2.2 Particulate Matter (PM_{10})

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

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50 µg/m^3, not to be exceeded more than 35 times per year.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

3.2.4 Sulphur Dioxide (SO_2)

Table A.9 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2023 with the air quality objectives for SO_2.

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)
CM1	Totton	Roadside	436188	113237	NO_2, PM_{10}	No	Chemiluminescent; TEOM	5	1.5	1.75
CM2	Lyndhurst	Kerbside	429859	108204	NO_2	No	Chemiluminescent	1	0.6	3
CM3	Fawley	Industrial	445885	103248	SO2, PM_{10}	No	UV Fluorescence, TEOM	5	n/a	5

Notes:

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
1	Lyndhurst Road, Goose Green, Telegraph post outside The Coachhouse	Roadside	429991	107583	NO2	No	0.0	0.4	No	3.0
2	Shrubbs Hill Road, Telegraph post outside 1, Foxlease Terrace	Roadside	429928	107687	NO2	No	0.0	1.5	No	3.0
3ai, 3aii	Shrubbs Hill Road The Orchards (road)Duplicate Site	Roadside	429895	107770	NO2	No	0.0	3.0	no	3.0
5	Shrubbs Hill Road (door)	Roadside	429895	107770	NO2	No	0.0	5.0	No	3.0
6	Shrubbs Hill Road, Lamp post outside Hillmead Lodge	Roadside	429760	107972	NO2	No	5.0	1.5	No	3.0
7	Kings House, Downpipe by front door	Roadside	429710	108128	NO2	No	0.0	5.0	No	3.0
8	High Street, School	Roadside	429767	108205	NO2	No	0.0	6.0	No	3.0
9	15 High Street, Jewellery shop	Kerbside	429864	108213	NO2	No	0.0	1.0	No	3.0
10ai, 10aii, 10aiii	14 High Street, Analyser site Triplicate Site	Kerbside	429858	108205	NO2	No	0.0	0.9	Yes	3.0

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)
13	16a High Street, Bakery	Kerbside	429875	108207	NO2	No	0.0	1.6	No	3.0
14	2a Romsey Road lights	Roadside	429891	108245	NO2	No	3.0	2.0	No	3.0
15	22 Romsey Road, Pennyfarthing Hotel	Roadside	429911	108402	NO2	No	0.0	2.3	Yes	3.0
16ai, 16aii	28 High Street, Tea Shop Duplicate Site	Roadside	429933	108200	NO2	No	5.0	4.0	No	3.0
18	65 High Street, Card Shop	Roadside	430026	108206	NO2	No	0.0	1.8	No	3.0
19	Gosport Lane Telegraph pole	Roadside	430079	108147	NO2	No	0.0	2.2	No	3.0
20	Gosport Lane 2/ Southview	Roadside	430092	108077	NO2	No	5.0	2.0	No	3.0
21	Southampton Road, Lyndhurst Park Hotel	Roadside	430162	108173	NO2	No	5.0	2.0	No	3.0
22	A35, Post outside Baytree Cottage	Roadside	429169	108129	NO2	No	0.0	1.5	No	3.0
23	Lyndhurst School 1 (1m)	Kerbside	429782	108209	NO2	No	0.0	6.0	No	3.0
24	Lyndhurst 2 School (2m)	Kerbside	429782	108209	NO2	No	0.0	6.0	No	3.0
25	Lyndhurst School 3 (3m)	Kerbside	429782	108209	NO2	No	0.0	6.0	No	3.0
26	Red Lodge, High Street, Lyndhurst	Roadside	429739	108195	NO2	No	0.0	2.0	No	1.0
27	Holbury School	Industrial	442947	103931	NO2	No	0.0	15.9	No	2.0

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)
28	Fawley, Jubilee Hall	Industrial	442947	103931	NO2	No	0.0	16.4	No	3.0
29	Beaulieu, School field	Rural	445881	103247	NO2	No	10.0	15.7	No	3.0
30	Marchwood School	Roadside	438363	109694	NO2	No	0.0	25.0	No	3.0
31ai, 31aii	Stoney Cross Duplicate Site	Roadside	425877	111778	NO2	No	0.0	20.0	No	3.0
33ai, 33aii, 33aiii	Junction Road D lamp post adjacent to analyser Triplicate site	Roadside	436189	113235	NO2	No	7.0	2.0	No	3.0
36	30 Junction Road	Roadside	436210	113210	NO2	No	3.0	1.0	No	3.0
37	25 Junction Road (old junk shop - side of building - downpipe)	Roadside	436232	113156	NO2	No	0.0	4.0	No	3.0
38	downpipe of flats 26 Rumbridge Street	Roadside	436205	113019	NO2	No	2.0	1.5	Yes	3.0
39	Junction Road BATS Corner	Roadside	436278	113081	NO2	No	0.0	1.5	No	3.0
40	High Street lamppost Elingfield Court	Roadside	436383	113135	NO2	No	0.0	1.5	No	3.0
41	55 High St, opp Eling Wharf entrance	Roadside	436476	113214	NO2	No	0.0	4.0	No	3.0
42	93 Commercial Rd, (down pipe)	Roadside	436364	113322	NO2	No	0.0	1.0	No	3.0

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)
43	26 Winsor Road	Roadside	436210	112948	NO2	No	0.0	2.0	No	3.0
44	A35 Fisher Road	Roadside	436234	112898	NO2	No	3.0	1.0	No	3.0
49ai, 49aii, 49aiii	A35 triplicate	Roadside	436465	113082	NO2	No	0.0	2.0	No	3.0
52	131 Christchurch Road, Ringwood	Roadside	438836	102115	NO2	No	0.0	1.0	No	3.0
53	84 Christchurch Road, Ringwood (prev. St Catherines)	Roadside	415118	104608	NO2	No	0.0	2.0	No	3.0
54	58 Eastfield Lane, Ringwood (A31)	Roadside	415022	104926	NO2	No	0.0	2.0	No	3.0
59	8 Shaftesbury Street Fordingbridge - downpipe	Roadside	414648	114165	NO2	No	0.0	1.5	No	3.0
60	Co-Op, High Street, Fordingbridge - downpipe	Roadside	414759	114192	NO2	No	0.0	1.5	No	3.0
61	Timothys, 10 High Street, Fordingbridge - downpipe	Roadside	414835	114234	NO2	No	0.0	1.5	No	3.0
62	Riverside House, 32 Salisbury Rd, Fordingbridge - downpipe	Roadside	414941	114354	NO2	No	0.0	1.5	No	3.0

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 2023 (%) (2)	2019	2020	2021	2022	2023
CM1 Totton	436188	113237	Roadside	63.4	63.4	21	19	23	22	19.5
CM2 Lyndhurst	429859	108204	Kerbside	92.75	92.75	31	23	25	26	21

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

☒ **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.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%).

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 2023 (%) [2]	2019	2020	2021	2022	2023
1	429991	107583	Roadside	100	100.0	16.7	12.4	13.4	13.5	11.9
2	429928	107687	Roadside	92.3	92.3	23.2	17.3	18.7	18.3	16.8
3ai, 3aii	429895	107770	Roadside	100	100.0	29.8	19.5	24.2	25.0	21.2
5	429895	107770	Roadside	100	100.0	24.2	19.0	20.3	20.4	17.7
6	429760	107972	Roadside	82.7	82.7	23.2	18.3	22.0	23.3	19.8
7	429710	108128	Roadside	82.7	82.7	16.0	11.9	13.4	13.8	11.6
8	429767	108205	Roadside	100	100.0	20.5	15.1	17.2	16.4	15.2
9	429864	108213	Kerbside	100	100.0	31.5	24.4	24.6	25.7	23.5
10ai, 10aii, 10aiii	429858	108205	Kerbside	100	100.0	31.6	24.0	24.5	25.8	21.2
13	429875	108207	Kerbside	100	100.0	35.1	26.6	24.6	27.0	23.7
14	429891	108245	Roadside	100	90.4	30.1	23.7	26.6	27.1	25.6
15	429911	108402	Roadside	100	100.0	23.9	15.6	18.4	18.3	15.4
16ai, 16aii	429933	108200	Roadside	100	100.0	20.0	17.0	18.0	17.5	16.3

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 2023 (%) [2]	2019	2020	2021	2022	2023
18	430026	108206	Roadside	90.4	100.0	29.0	20.1	23.7	20.9	22.4
19	430079	108147	Roadside	100	100.0	36.4	29.0	30.5	29.3	27.8
20	430092	108077	Roadside	100	100.0	22.6	17.8	21.2	21.0	19.7
21	430162	108173	Roadside	100	92.3	17.5	15.7	17.3	16.8	15.0
22	429169	108129	Roadside	100	75.0	26.9	19.3	21.1	17.6	18.8
23	429782	108209	Kerbside	100	75.0		18.0	18.5	18.8	14.7
24	429782	108209	Kerbside	92.3	67.3		16.6	18.5	18.5	17.5
25	429782	108209	Kerbside	75	92.3		16.3	16.9	17.0	18.0
26	429739	108195	Roadside	75	100.0	31.9	23.3	23.6	23.7	21.2
27	442947	103931	Industrial	67.3	100.0	12.2	9.7	10.9	11.1	10.1
28	442947	103931	Industrial	92.3	100.0	12.1	9.7	10.7	10.8	9.3
29	445881	103247	Rural	100	90.4	8.8	7.7	7.6	7.7	7.4
30	438363	109694	Roadside	100	100.0	16.0	13.5	15.1	14.6	12.3
31ai, 31aii	425877	111778	Roadside	100	92.3	29.1	21.9	24.4	22.1	24.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
33ai, 33aii, 33aiii	436189	113235	Roadside	90.4	100.0	22.5	18.0	22.9	22.2	20.7
36	436210	113210	Roadside	100	100.0	24.5	19.5	19.5	18.1	17.7
37	436232	113156	Roadside	92.3	100.0	22.6	17.2	22.1	21.6	20.6
38	436205	113019	Roadside	100	100.0	25.6	19.8	18.5	18.0	17.5
39	436278	113081	Roadside	100	100.0	24.8	19.5	24.3	23.1	23.1
40	436383	113135	Roadside	100	100.0	25.5	19.2	23.8	21.7	21.7
41	436476	113214	Roadside	100	92.3	24.6	18.8	22.5	21.5	23.0
42	436364	113322	Roadside	100	84.6	26.6	17.6	23.3	21.5	19.8
43	436210	112948	Roadside	100	100.0	24.1	18.0	19.6	20.3	16.8
44	436234	112898	Roadside	92.3	84.6	18.5	14.9	18.1	17.6	15.5
49ai, 49aii, 49aiii	436465	113082	Roadside	84.6	100.0		29.1	36.2	32.9	31.4
52	438836	102115	Roadside	100	100.0	25.4	19.2	21.2	21.7	19.4
53	415118	104608	Roadside	84.6	100.0	26.6	23.8	26.7	26.3	25.3
54	415022	104926	Roadside	100	100.0	24.3	18.4	22.0	23.7	19.2

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
59	414648	114165	Roadside	90.4	100.0		19.2	18.8	18.3	17.0
60	414759	114192	Roadside	100	73.1		24.8	25.9	23.7	23.7
61	414835	114234	Roadside	100	84.6		22.2	22.7	22.4	22.8
62	414941	114354	Roadside	100	90.4		18.3	16.3	16.9	16.6

☒ **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 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.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 NO_2 Concentrations

Figure A.1.1 – Lyndhurst AQMA

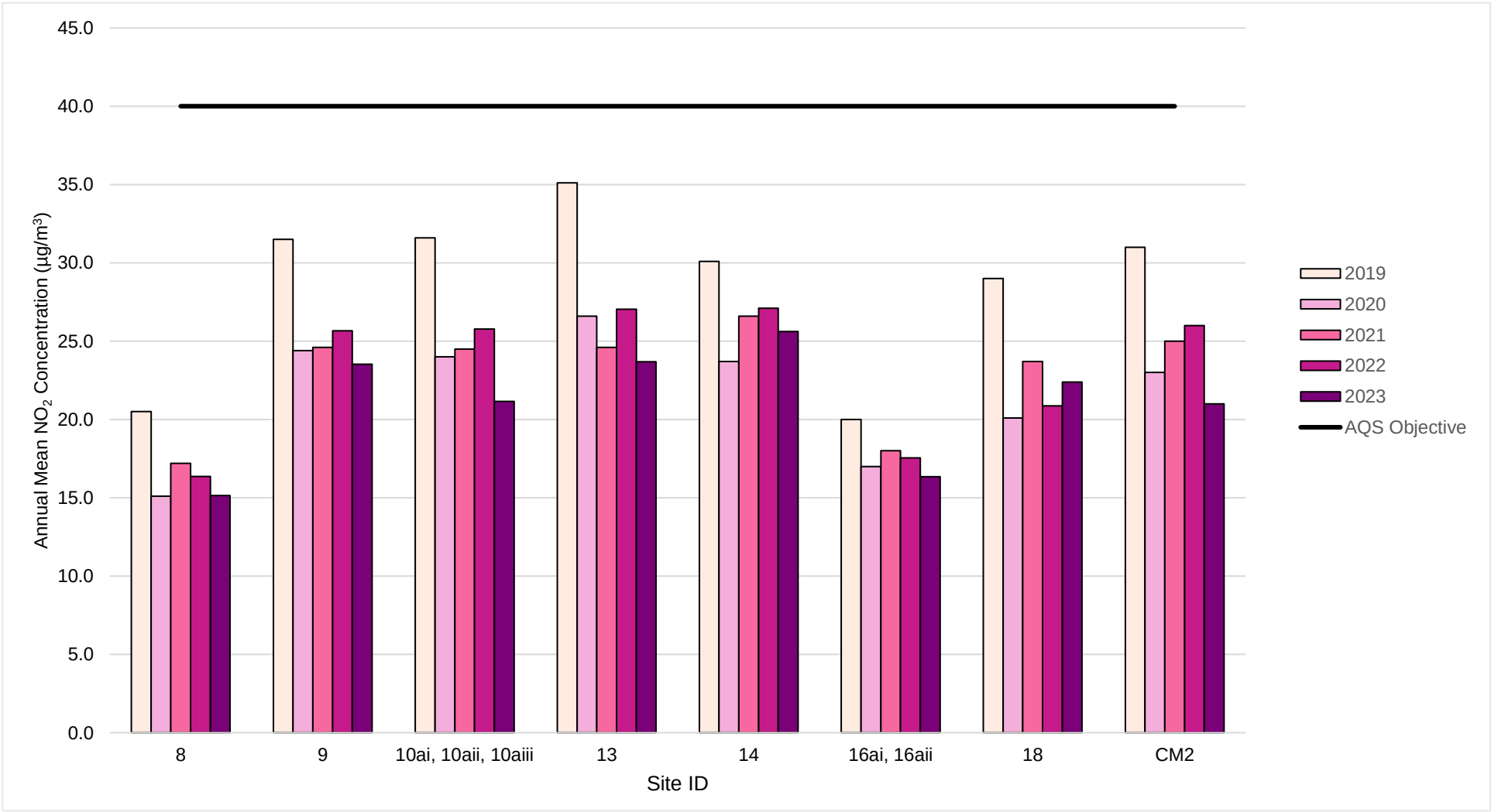


Figure A.1.2 – Lyndhurst (outside revoked AQMA)

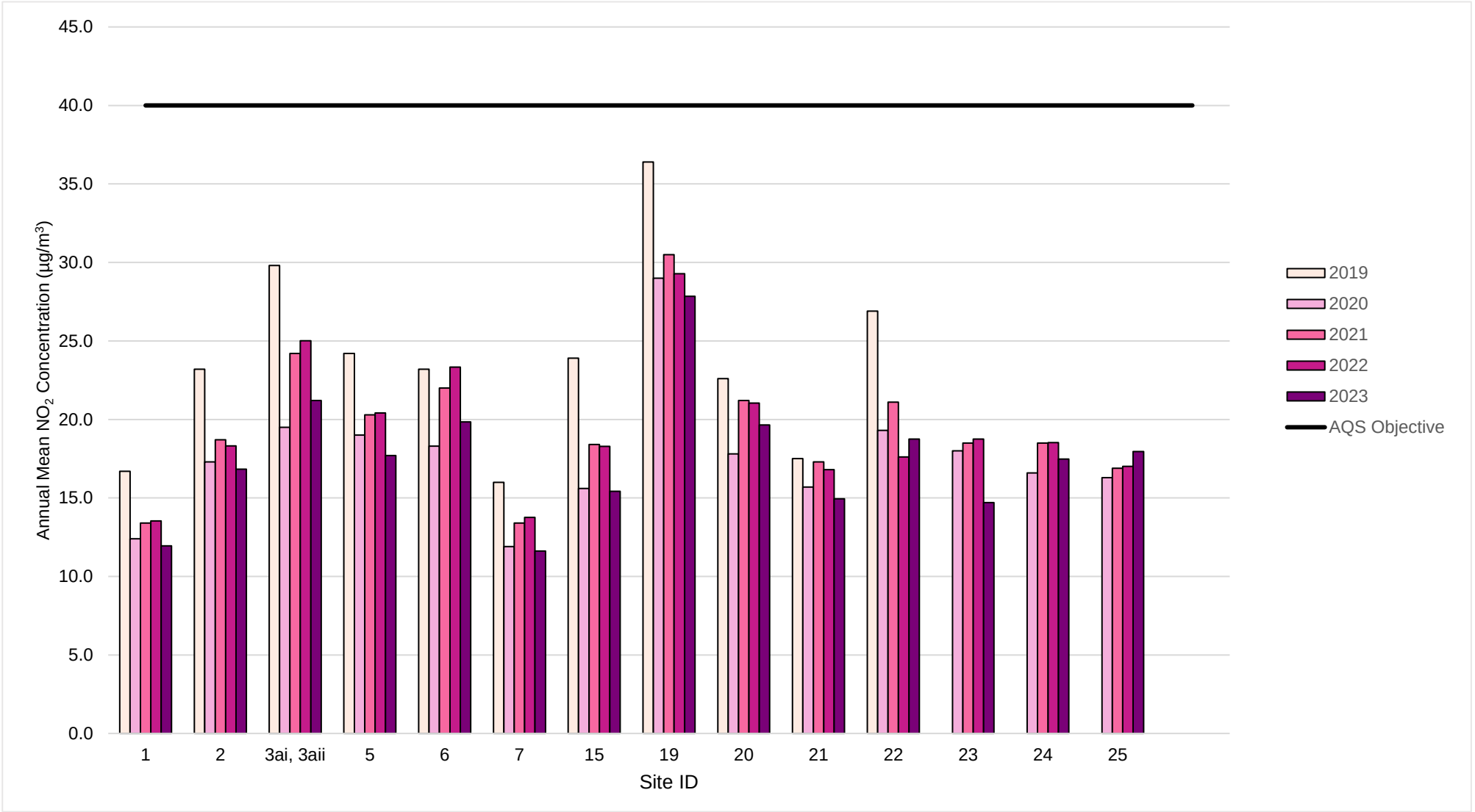


Figure A.1.3 – Totton

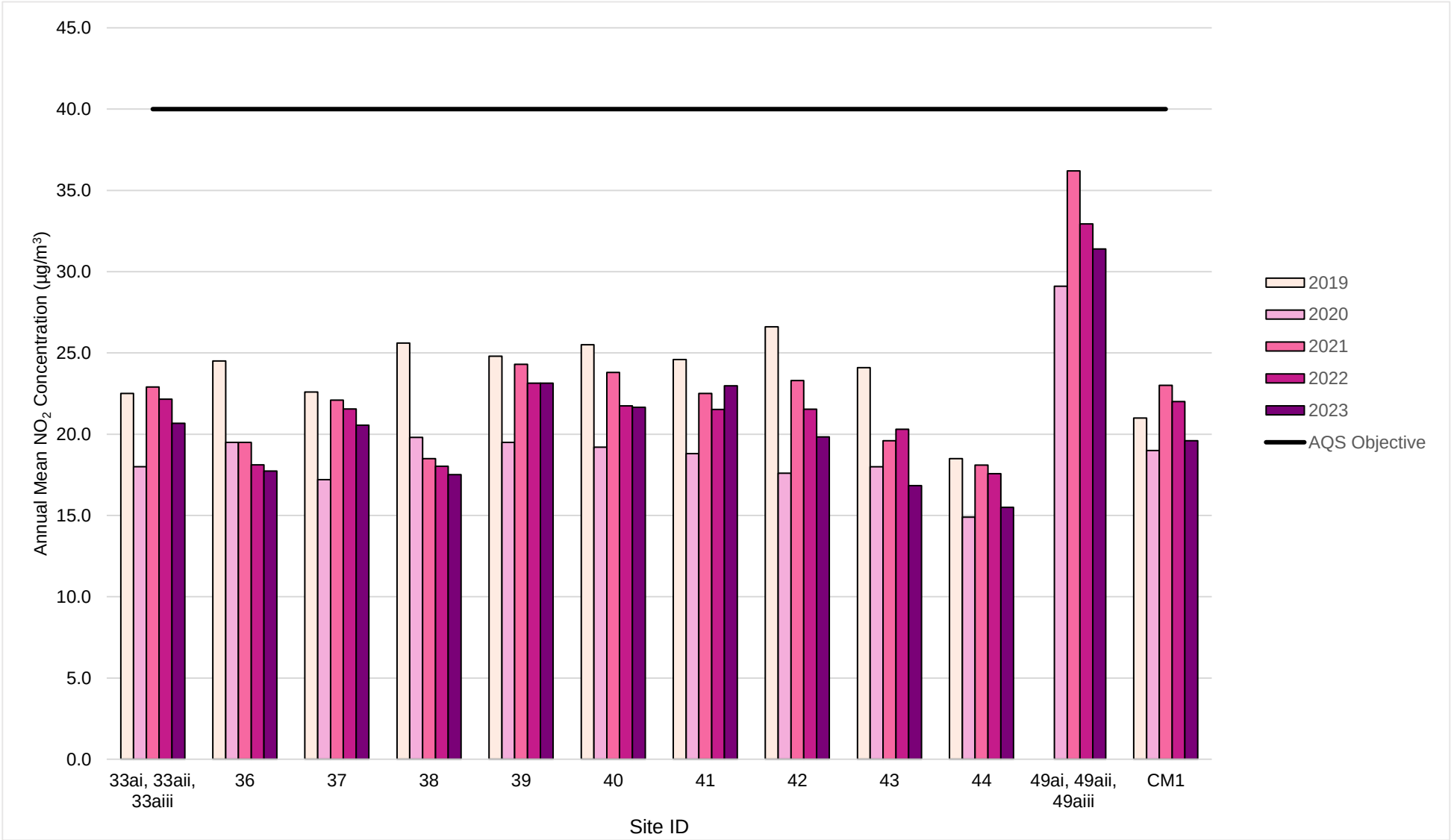


Figure A.1.4 – Other sites

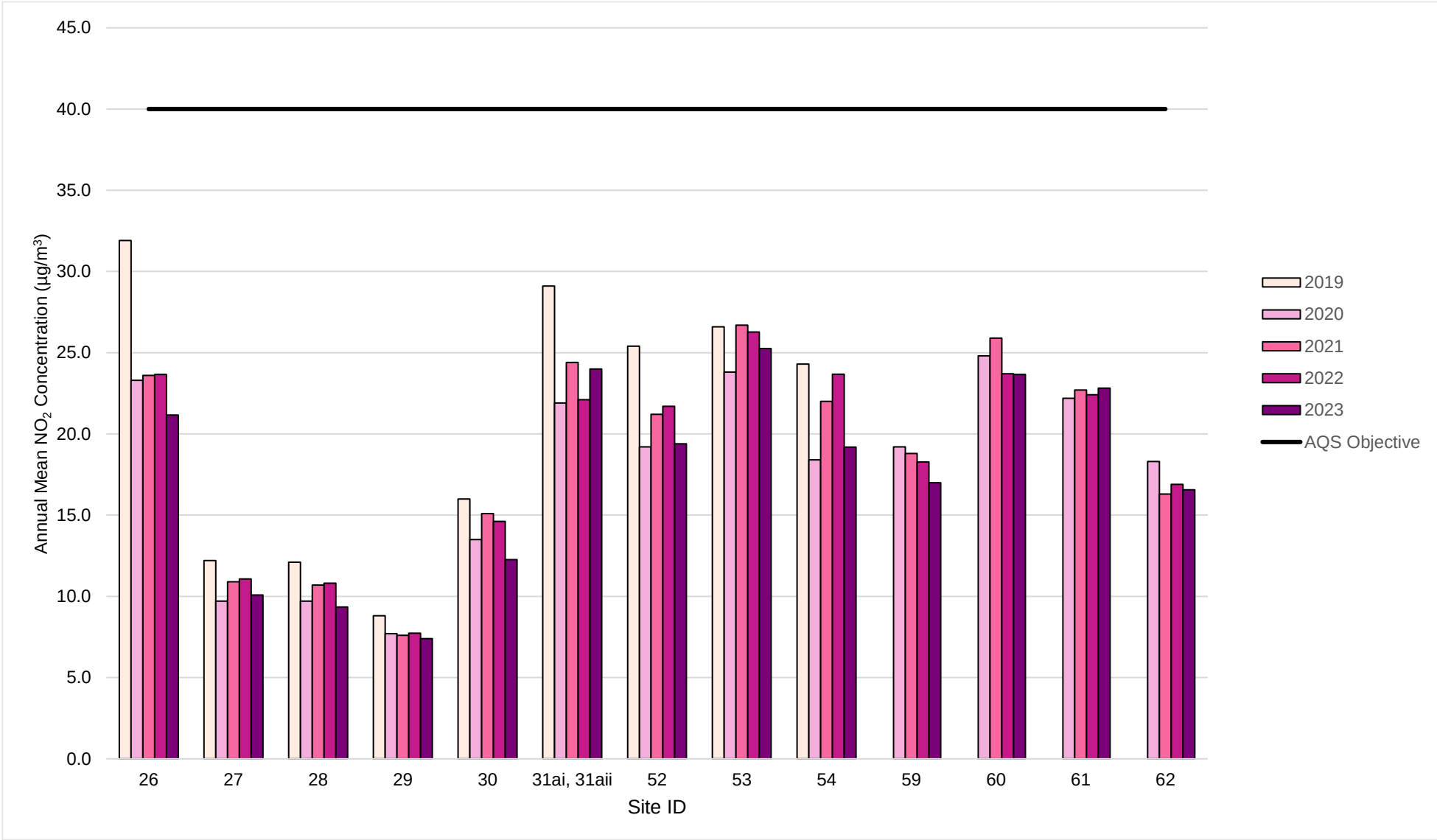


Table A.5– 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CM1 Totton	436188	113237	Roadside	63.4	63.4	0	0	0	0	**0 (86.7)**
CM2 Lyndhurst	429859	108204	Kerbside	92.75	92.75	0	0	0	0	0

Notes:

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

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

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

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

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

Table A.6– Annual Mean PM_{10} Monitoring Results (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 2023 (%) (2)	2019	2020	2021	2022	2023
CM1 Totton	436188	113237	Roadside	66.46	66.46	19	21	18	19	20.5
CM3 Fawley	445885	103248	Industrial	97.89	97.89	17	19	15	17	18

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

Notes:

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

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

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.

(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.2– Trends in Annual Mean PM_{10} Concentrations

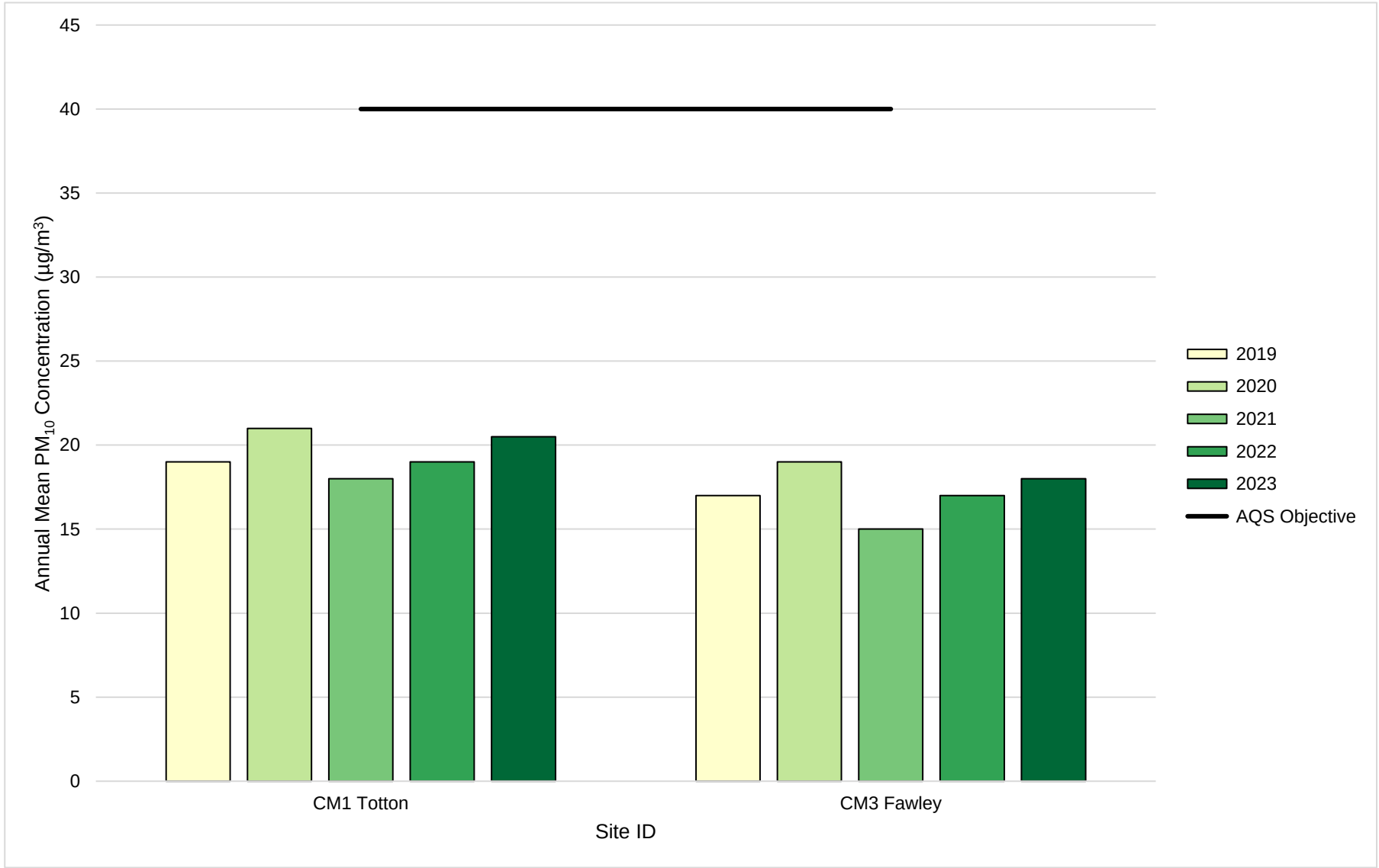


Table A.7– 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50 µg/m³

Site 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
CM1 Totton	436188	113237	Roadside	66.46	66.46	5	0	2	0	**0(32.1)**
CM3 Fawley	445885	103248	Industrial	97.89	97.89	2	0	0	3	0

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m³ have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m³ 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%).

Table A.8– SO_2 2023 Monitoring Results, Number of Relevant Instances

Site 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)	Number of 15-minute Means > 266µg/m³	Number of 1-hour Means > 350µg/m³	Number of 24-hour Means > 125µg/m³
CM3 Fawley	445885	103248	Industrial	91.93	91.93	0	0	0

Notes:

Results are presented as the number of instances where monitored concentrations are greater than the objective concentration.

Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year).

If the period of valid data is less than 85%, the relevant percentiles are 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 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 0.75 – National 0.65 - Local	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1	429991	107583	20.9	21.4	14.1	19.2	15.8	16.8	11.0	16.8	16.0	14.9	16.3	7.9	15.9	11.9	-	
2	429928	107687	25.9	27.5	21.8	25.9	24.8	21.5	14.3	22.7	20.8	19.5	22.1		22.4	16.8	-	
3ai	429895	107770	26.5	34.0	26.1	31.5	31.6	34.3	24.5	31.0	28.8	26.3	22.0	15.2	-	-	-	Duplicate Site with 3ai and 3aii - Annual data provided for 3aii only
3aii	429895	107770	29.9	34.5	23.7	29.6	35.0	33.1	24.2	34.0	30.0	28.9	28.6		28.3	21.2	-	Duplicate Site with 3ai and 3aii - Annual data provided for 3aii only
5	429895	107770	25.5	29.9	24.8	24.5	20.9	23.4	22.7	20.0	24.8	24.3	26.2	16.3	23.6	17.7	-	
6	429760	107972	31.7	30.8	24.7	23.2	22.4	24.3	24.5		27.5	28.3	27.1		26.5	19.8	-	
7	429710	108128	18.9	21.4	16.1	15.4			10.8	15.3	14.4	15.9	18.6	8.1	15.5	11.6	-	
8	429767	108205	23.2	26.1	19.2	18.0	15.7	19.0	17.0	16.4	23.6	25.6	20.3	18.3	20.2	15.2	-	
9	429864	108213	34.9	43.4	37.2	38.7	43.8	37.5	29.6	36.1	36.5	36.8	38.4	21.4	36.2	23.5	-	
10ai	429858	108205	35.5	40.7	26.9	34.1	30.0	31.3	25.9	33.1	38.7	37.8	29.7	22.9	-	-	-	Triplicate Site with 10ai, 10aii and 10aiii - Annual data provided for 10aiii only
10aii	429858	108205	35.6	37.6	34.9	34.9	28.5	31.4	26.5	34.1	38.9	35.7	34.1	22.3	-	-	-	Triplicate Site with 10ai, 10aii and 10aiii - Annual data provided for 10aiii only
10aiii	429858	108205	36.2	37.0	22.2	36.3	29.4	31.4	30.5	33.1	38.5	36.0	35.8	24.0	32.5	21.2	-	Triplicate Site with 10ai, 10aii and 10aiii - Annual data provided for 10aiii only
13	429875	108207	37.1	40.5	38.4	35.7	31.8	35.7	30.7	33.5	39.6	48.6	38.3	27.5	36.5	23.7	-	
14	429891	108245	34.4	40.9	38.4	36.7	29.9	35.0	29.7	34.3	36.3	33.9		26.2	34.2	25.6	-	
15	429911	108402	21.4	23.6	22.0	23.6	21.0	22.2	14.3	22.6	21.3	22.6	20.4	11.7	20.6	15.4	-	
16ai	429933	108200	29.3	27.7	26.7	21.7	17.0	17.5	16.5	19.0	22.2	23.4		18.3	-	-	-	Duplicate Site with 16ai and 16aii - Annual data provided for 16aii only
16aii	429933	108200	27.2	28.0	22.2	18.9	20.2	18.4	18.4	19.4	20.4	22.8	24.6	18.7	21.8	16.3	-	Duplicate Site with 16ai and 16aii - Annual data provided for 16aii only
18	430026	108206	32.1	37.3	27.9	29.3	27.4	27.3	19.8	30.5	44.5	32.1	27.4	22.5	29.8	22.4	-	
19	430079	108147	42.1	41.6	36.2	39.6	31.1	39.0	36.7	40.4	43.6	43.7	31.4	20.1	37.1	27.8	-	
20	430092	108077	29.7	34.6	22.8	26.1	30.8	24.6	17.9	27.6	26.7	32.5	30.1	11.0	26.2	19.7	-	
21	430162	108173	23.2	25.1	16.6	19.3	15.6	16.4	11.7	22.5	19.3	24.4	25.2		19.9	15.0	-	
22	429169	108129	29.8		20.7	25.6	21.0	27.2	22.4		28.1	25.3	24.9		25.0	18.8	-	
23	429782	108209	25.5	21.0			18.2	18.3	18.6	24.0	25.6	2.2	23.0		19.6	14.7	-	
24	429782	108209	27.4	32.1	21.5	22.6	17.5	21.1		24.8		27.1			24.3	17.5	-	

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 0.75 – National 0.65 - Local	Annual Mean: Distance Corrected to Nearest Exposure	Comment
25	429782	108209	25.1	29.2	21.6	29.7	17.5	19.0	17.5	21.3	25.1	30.5	26.8		23.9	18.0	-	
26	429739	108195	34.0	36.8	29.2	36.3	22.0	24.6	26.9	31.3	29.9	30.6	26.4	10.5	28.2	21.2	-	
27	442947	103931	17.7	18.2	9.9	16.9	12.4	12.1	6.5	12.2	16.6	14.0	17.5	7.4	13.5	10.1	-	
28	442947	103931	18.4	16.6	10.0	13.2	12.0	12.7	8.4	14.3	11.1	11.0	15.5	6.3	12.5	9.3	-	
29	445881	103247	14.1	13.3	8.5	9.2	8.9	8.8	6.8		11.0	10.3	12.5	5.2	9.9	7.4	-	
30	438363	109694	25.7	23.6	16.2	17.9	15.4	17.2	13.3	14.6	18.3	20.5	1.1	12.4	16.4	12.3	-	
31ai	425877	111778	35.1	34.9	29.5		31.6	32.3	30.8	33.3	32.4	36.5	31.2	20.9	-	-	-	Duplicate Site with 31ai and 31aii - Annual data provided for 31aii only
31aii	425877	111778	32.9	35.2	30.6		32.2	31.9	32.3	31.0	32.3	32.1	34.2	30.5	32.0	24.0	-	Duplicate Site with 31ai and 31aii - Annual data provided for 31aii only
33ai	436189	113235	24.7	38.4	23.8	30.9	20.9	22.7	22.0	25.1	34.5	33.0	32.8	17.4	-	-	-	Triplicate Site with 33ai, 33aii and 33aiii - Annual data provided for 33aiii only
33aii	436189	113235	32.6	36.5	15.3	26.9	22.7	26.0	21.0	23.0	35.4	34.5	22.9	18.0	-	-	-	Triplicate Site with 33ai, 33aii and 33aiii - Annual data provided for 33aiii only
33aiii	436189	113235	36.7	37.8	27.5	27.0	20.0	28.1	20.9	26.1	35.9	35.6	30.9	24.4	27.6	20.7	-	Triplicate Site with 33ai, 33aii and 33aiii - Annual data provided for 33aiii only
36	436210	113210	30.5	30.2	23.5	24.9	19.9	21.4	13.6	20.5	25.5	31.2	26.9	15.5	23.6	17.7	-	
37	436232	113156	33.5	32.4	26.4	28.0	21.1	24.2	20.3	25.2	35.2	29.7	29.9	22.9	27.4	20.6	-	
38	436205	113019	27.3	29.0	28.7	29.7	20.8	23.0	15.5	18.1	24.6	23.4	23.9	16.1	23.3	17.5	-	
39	436278	113081	40.1	41.0	31.0	30.0	29.1	31.8	24.0	25.3	29.9	30.8	32.3	24.9	30.9	23.1	-	
40	436383	113135	36.2	39.7	22.2	28.6	23.5	27.9	28.2	27.3	33.2	24.2	32.0	23.5	28.9	21.7	-	
41	436476	113214	36.2	38.5	31.9	32.1	28.0	31.3	25.5	24.0	29.9	30.8	28.8		30.6	23.0	-	
42	436364	113322		33.9	27.9	29.0	23.6	26.7	19.1	23.7	30.0	22.3	28.2		26.4	19.8	-	
43	436210	112948	29.6	29.4	22.9	25.5	15.7	19.3	15.1	20.0	28.0	26.1	17.8	19.9	22.4	16.8	-	
44	436234	112898		25.1	21.9	23.5	20.1	19.2	12.9	17.8	20.9	19.0	26.3		20.7	15.5	-	
49ai	436465	113082	55.0	46.8	45.4	45.6	34.4	37.6	33.8	38.2	35.8	44.8	50.9	35.1	-	-	-	Triplicate Site with 49ai, 49aii and 49aiii - Annual data provided for 49aiii only
49aii	436465	113082	52.6	51.0	43.6	38.9	37.9	39.1	32.9	39.2	43.2	45.0	47.0	38.2	-	-	-	Triplicate Site with 49ai, 49aii and 49aiii - Annual data provided for 49aiii only
49aiii	436465	113082	54.6	53.4	40.9	41.7	39.1	34.5	32.8	38.2	40.9	45.0	41.2	32.5	41.9	31.4	-	Triplicate Site with 49ai, 49aii and 49aiii - Annual data provided for 49aiii only
52	438836	102115	31.7	30.6	24.7	30.2	20.4	24.0	18.8	23.1	29.7	27.8	30.2	19.1	25.9	19.4	-	
53	415118	104608	41.3	41.1	38.6	32.2	24.3	29.1	30.6	31.4	40.2	34.7	36.3	24.3	33.7	25.3	-	
54	415022	104926	31.3	34.8	26.5	25.2	24.5	25.2	17.1	20.8	27.4	25.9	29.2	19.1	25.6	19.2	-	
59	414648	114165	29.1	28.8	23.3	24.6	22.6	22.9	14.4	22.1	22.7	25.4	19.1	17.0	22.7	17.0	-	

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 0.75 – National 0.65 - Local	Annual Mean: Distance Corrected to Nearest Exposure	Comment
60	414759	114192	44.9	39.8	29.9	31.1			21.6		31.6	30.8	30.0	24.2	31.5	23.7	-	
61	414835	114234	38.1	39.1	29.9	33.6		28.2	21.6	24.0	26.5	29.1	34.2		30.4	22.8	-	
62	414941	114354	26.6	28.1	24.4	22.8	14.5	18.9	18.6		26.7	26.5	21.5	14.2	22.1	16.6	-	

☒ **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**

☒ **New Forest District Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within New Forest District Council During 2023

New Forest District Council has not identified any new sources relating to air quality within the reporting year of 2023.

Additional Air Quality Works Undertaken by New Forest District Council During 2023

The District Council employed Ricardo to provide modelling evidence to support the revocation of the Lyndhurst AQMA. Ricardo's report is submitted in Appendix I.

QA/QC of Diffusion Tube Monitoring

This section provides detail regarding aspects of non-automatic monitoring using diffusion tubes.

Diffusion tube supplier

New Forest District Council's diffusion tubes are supplied and analysed by SOCOTEC Didcot utilising the 20% triethanolamine (TEA) in water preparation method.

SOCOTEC participate in the AIR-PT analysis scheme. This is an independent analytical proficiency-testing scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). Defra and the Devolved Administrations advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the AIR NO_2 PT scheme. For those reporting periods in 2023 for which SOCOTEC reported results, all results were considered satisfactory (based on z-scores less than or equal to 2). The laboratory performance for SOCOTEC is summarised below:

AIR PT Round	AIR PT AR55	AIR PT AR56	AIR PT AR58	AIR PT AR59
Round conducted in the period	January – February 2023	May – June 2023	July – August 2023	September – October 2023
SOCOTEC	100	100	100	100

The determination of nitrogen dioxide diffusion tube precision is obtained from duplicate and triplicate co-located sites. The results from triplicate diffusion tube sites operated by New Forest District Council at Totton and Lyndhurst can be seen in the spreadsheet calculation used to determine local bias correction and shown in Appendix B. Overall the triplicate diffusion tube sites showed good precision during 2023 for both sites.

Diffusion Tube Calendar

The diffusion tube calendar provided by DEFRA is provided below.

Month	Tube On	Tube Off
Jan	04/01/2023	01/02/2023
Feb	01/02/2023	01/03/2023
Mar	01/03/2023	05/04/2023
Apr	05/04/2023	03/05/2023
May	03/05/2023	31/05/2023
Jun	31/05/2023	05/07/2023
Jul	05/07/2023	02/08/2023
Aug	02/08/2023	06/09/2023
Sep	06/09/2023	04/10/2023
Oct	04/10/2023	01/11/2023
Nov	01/11/2023	06/12/2023
Dec	06/12/2023	03/01/2024

NFDC sampling periods did not deviate significantly from these dates.

Diffusion Tube Annualisation

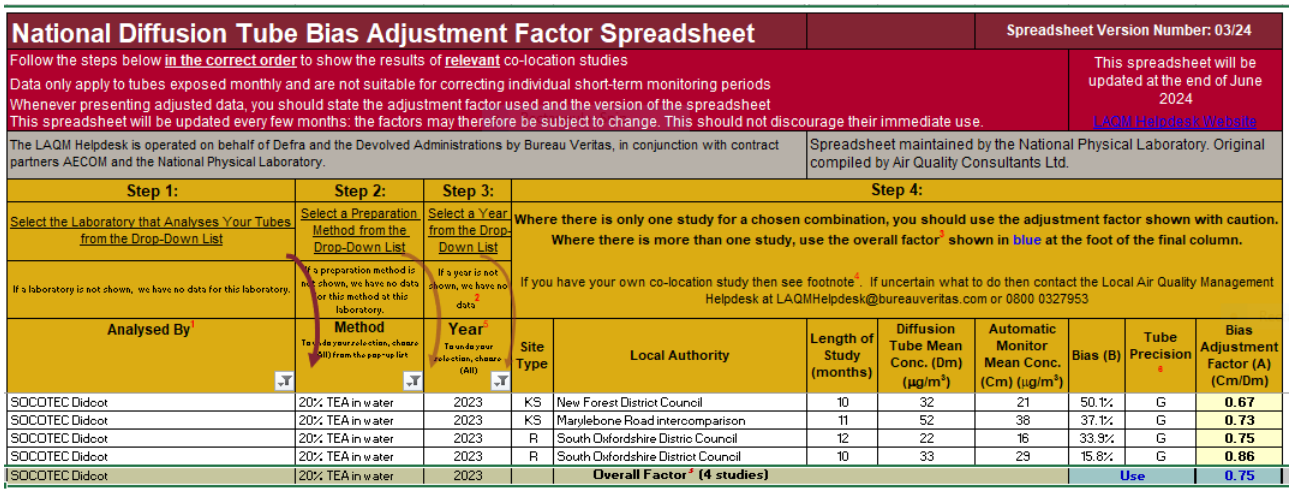
Two tubes required annualisation Lyndhurst school lamppost at 2m and Co-Op High Street, Fordingbridge.

The automatic data for the annualisation was obtained from UK-AIR and included the following background sites:

- Bournemouth
- Southampton Centre
- Charlton Mackrell
- Reading New Town

Data for the automatic monitor at Chilbolton Observatory was also considered for use in the annualisation process, but was found to have insufficient data capture, and was therefore not used for annualisation

Figure C.1 – Screenshot of the National Diffusion Tube Bias Adjustment Factor Spreadsheet



National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/24

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2024
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List
If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List
If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List
If a year is not shown, we have no data

Step 4: 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 you have your own co-location study then see footnote. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By	Method (To update your selection, choose (All) from the pop-up list)	Year (To update your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
SOCOTEC Didcot	20% TEA in water	2023	KS	New Forest District Council	10	32	21	50.1%	G	**0.67**
SOCOTEC Didcot	20% TEA in water	2023	KS	Marylebone Road intercomparison	11	52	38	37.1%	G	**0.73**
SOCOTEC Didcot	20% TEA in water	2023	R	South Oxfordshire Distric Council	12	22	16	33.9%	G	**0.75**
SOCOTEC Didcot	20% TEA in water	2023	R	South Oxfordshire District Council	10	33	29	15.8%	G	**0.86**
SOCOTEC Didcot	20% TEA in water	2023		**Overall Factor (4 studies)**				**Use**		**0.75**

Table C.1 – Annualisation Summary (concentrations presented in µg/m3)

Site ID	Annualisation Factor Bournemouth	Annualisation Factor Southampton Central	Annualisation Factor Charlton Mackrell	Annualisation Factor Reading New Town	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
24	0.9439	1.0416	0.9299	0.9248	0.9601	24.3	23.3
60	0.9291	0.9020	0.9358	0.9047	0.9179	31.5	-

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 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.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/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

As in previous years co-location of diffusion tubes with automatic analysers took place within the street canyon at Lyndhurst (using tubes 9, 10ai, 10aii, 10aiii and 13). The respective local bias adjustment factor for 2023 data is presented in Table C.3

In previous years, the Totton diffusion tubes have been bias corrected with data from the Totton automatic analyser. During 2023 however the data capture from this analyser was insufficient to allow accurate comparison and so the Totton tubes have been bias corrected using the National bias correction value.

New Forest District Council have applied a national bias adjustment factor of 0.75 to the 2023 monitoring data with the exception of the Lyndhurst tubes situated within the canyon. A local adjustment factor of 0.65 was applied to these canyon tubes. A summary of bias adjustment factors used by New Forest District Council over the past five years is presented in Table C.2

Table C.2– Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Lyndhurst National	V03/2024	0.65 0.75
2022	Lyndhurst Totton National	V03 2023	0.69 (0.75 not used) 0.76
2021	Lyndhurst Totton National	V03 2022	0.67 0.79 0.76
2020	National	V03 2021	0.74
2019	Lyndhurst National	V03 2020	0.68 0.76

Table C.3– Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	9
Bias Factor A	0.65 (0.62 - 0.68)
Bias Factor B	54% (46% - 62%)
Diffusion Tube Mean (µg/m^3)	31.9
Mean CV (Precision)	4%
Automatic Mean (µg/m^3)	20.7
Data Capture	99%
Adjusted Tube Mean (µg/m^3)	21 (20-22)

Notes:

The Lyndhurst local bias correction figure was used to correct tubes within the Lyndhurst canyon. All other sites were corrected with the National bias correction figure.

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website.

No sites required fall off calculations for 2023.

QA/QC of Automatic Monitoring

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

New Forest District Council uses TEOM analysers to monitor PM_{10}. It is noted that this monitoring equipment does not meet the equivalence criteria, however guidance states that it is not necessary to immediately replace the monitoring equipment particularly considering the monitored PM_{10} concentrations are below the objectives. When the equipment is due for replacement the Council will consider other equipment which meets the equivalence criteria.

PM_{10} data has been adjusted using the Volatile Correction Model (VCM) to correct for the use of a TEOM particulate monitor.

Automatic Monitoring Annualisation

Data capture for the CM1 Totton site was insufficient (66.46%) and so annualisation of the yearly mean was carried out as per LAQM.TG(22). As for the diffusion tube annualisation, Bournemouth, Southampton Central, and Charlton Mackrell monitors were used in the annualisation, with Chilbolton Observatory having insufficient data capture for use in annualisation calculations. Results may be seen below in Table C.4. For annualisation of the PM_{10} results, as no PM_{10} was recorded at the Bournemouth monitoring site, Portsmouth was used instead, these results can be seen in Table C.5

Table C.4 – Summary of annualisation for CM1 – Totton (NO_2)

Site ID	Annualisation Factor Bournemouth	Annualisation Factor Southampton Central	Annualisation Factor Charlton Mackrell	Annualisation Factor Reading New Town	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
CM1 Totton (NO_2)	0.8873	0.8828	0.9265	0.8799	0.8989	21.8	19.5

Table C.5 – Summary of annualisation for CM1 – Totton (PM_{10})

Site ID	Annualisation Factor Portsmouth	Annualisation Factor Chilbolton Observatory	Annualisation Factor Southampton Central	Annualisation Factor Charlton Mackrell	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
CM1 Totton (PM_{10})	1.022	1.03	1.00	1.03	1.02	20.1	20.5

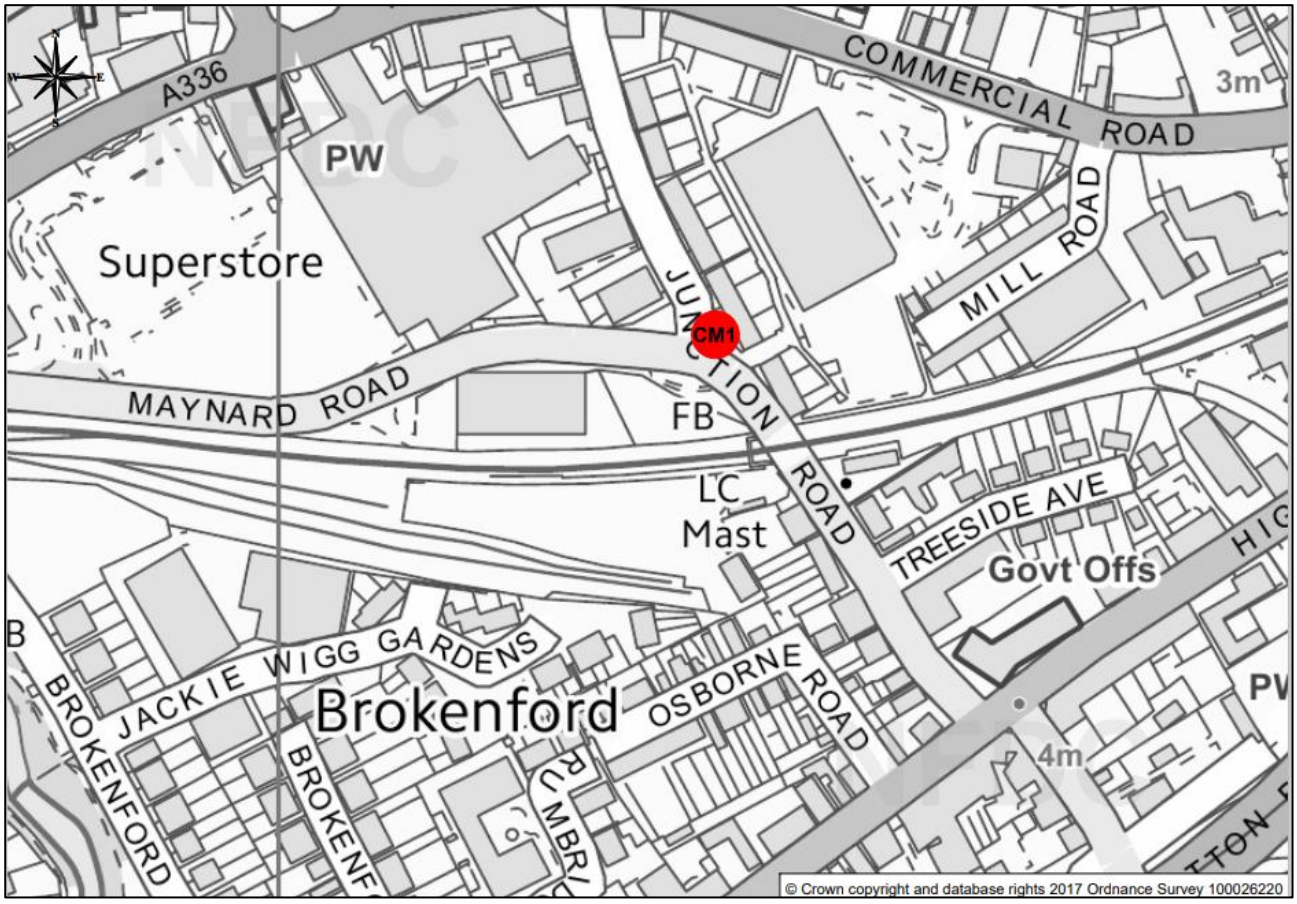
NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, automatic annual mean NO_2 concentrations corrected for distance are presented in Table A.3.

No fall off calculations were necessary in 2023.

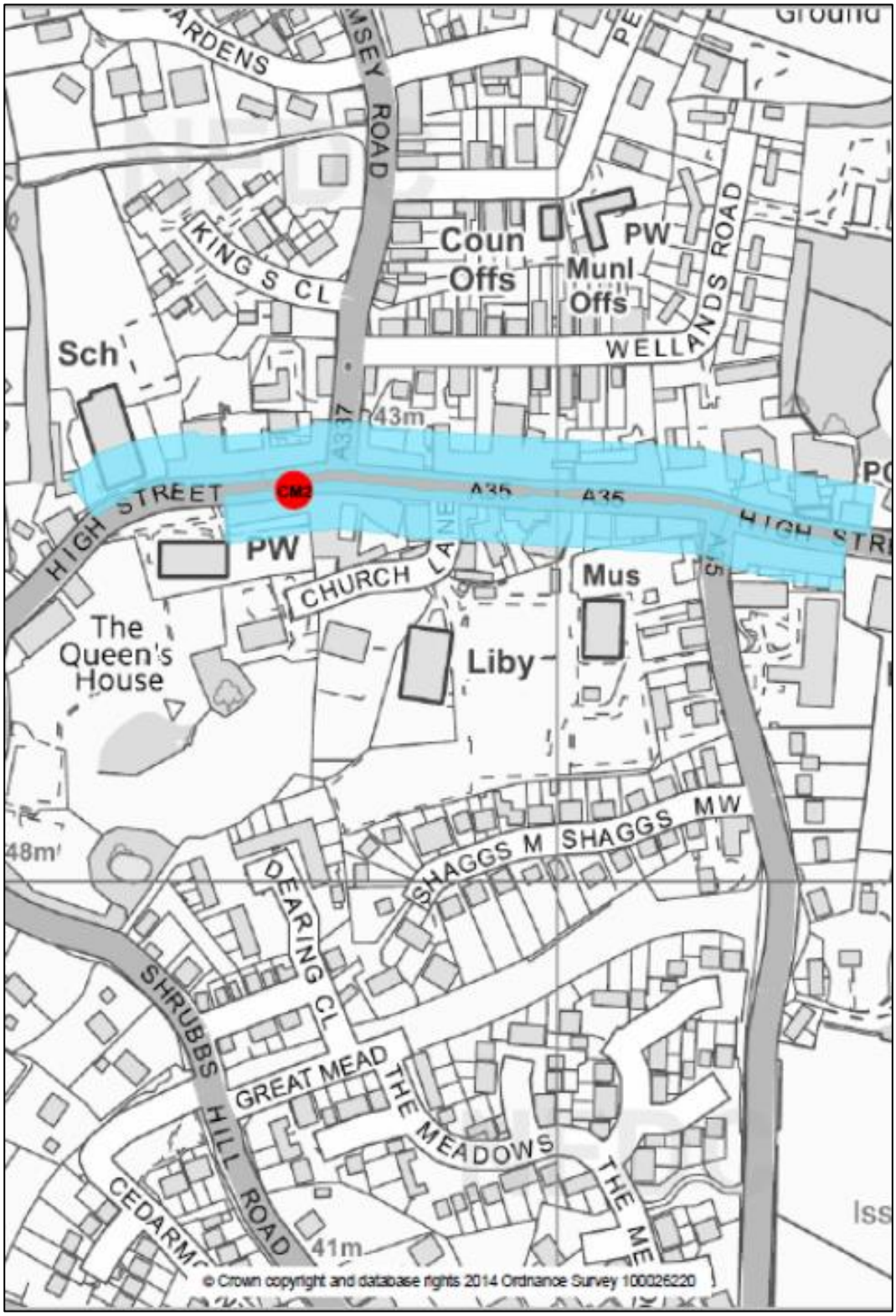
Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Map of Automatic Monitoring Site: Totton (CM1)



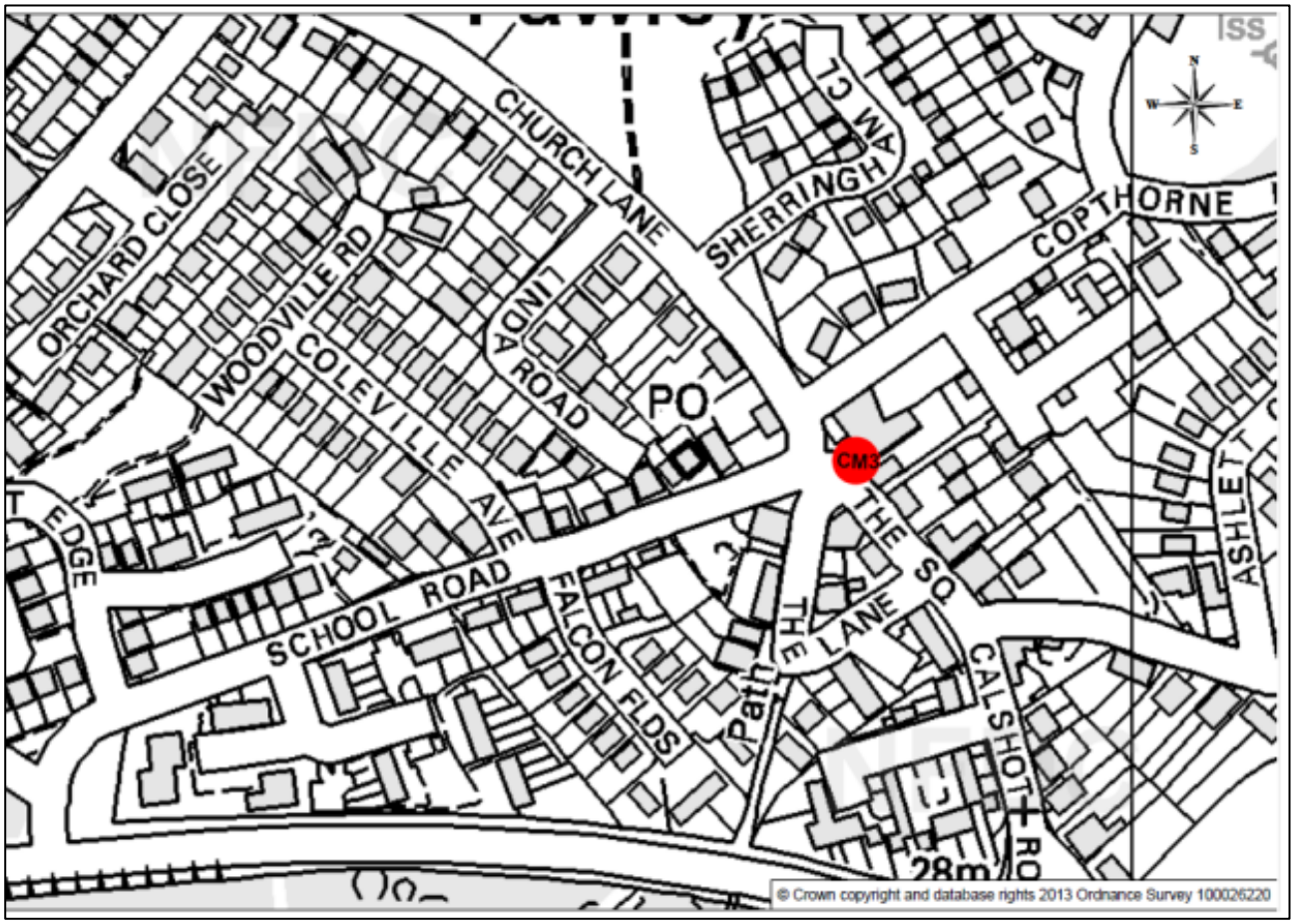
The Totton site is located in a roadside location to monitor for emissions from a road. This site is located between the road and residential properties, some 5m from the building façade. Therefore, the site is not representative of relevant public exposure.

Figure D.2– Map of Automatic Monitoring Site: Lyndhurst (CM2) with AQMA Shown



The Lyndhurst site is located on the first floor of an office. The office is situated within a street canyon and is representative of relevant public exposure because the adjacent properties are residential flats.

Figure D.3– Map of Automatic Monitoring Site: Fawley (CM3)



The Fawley site is located within a village hall, which includes a children's nursery and pre-school, at the centre of the village of Fawley. This site is representative of relevant public exposure.

Figure D.4 – Overview of diffusion tubes locations throughout NFDC

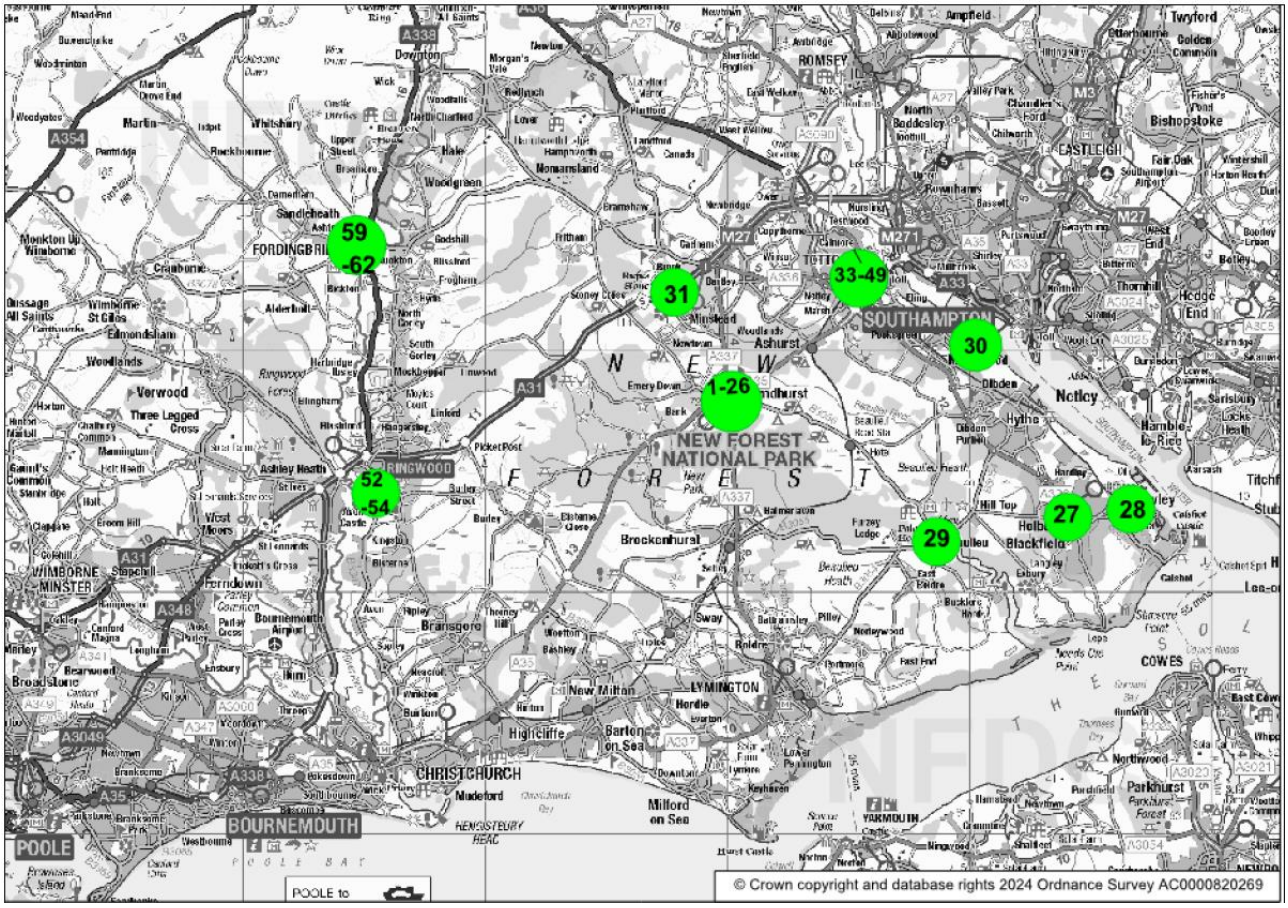


Figure D.5 – NO_2 diffusion tubes in Lyndhurst

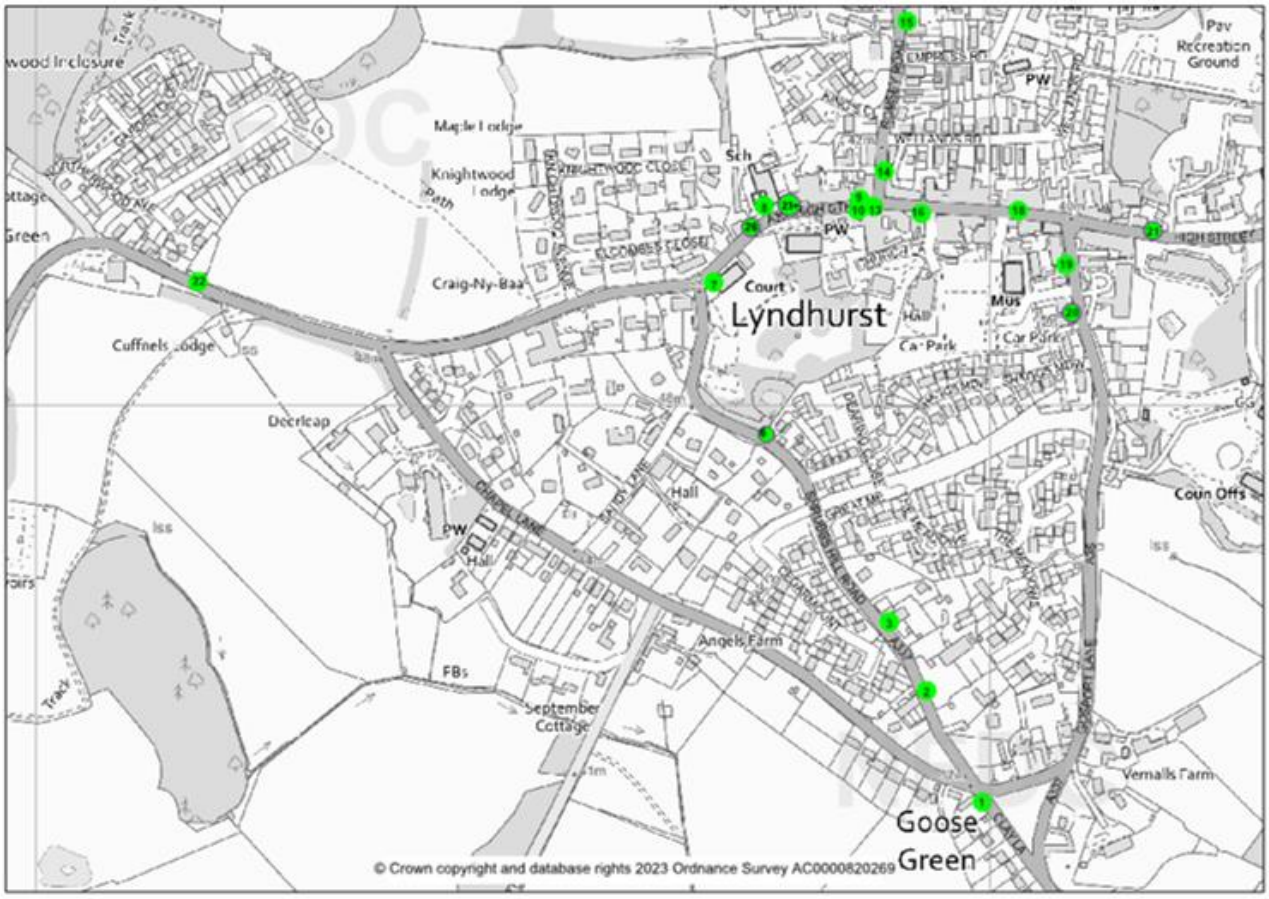
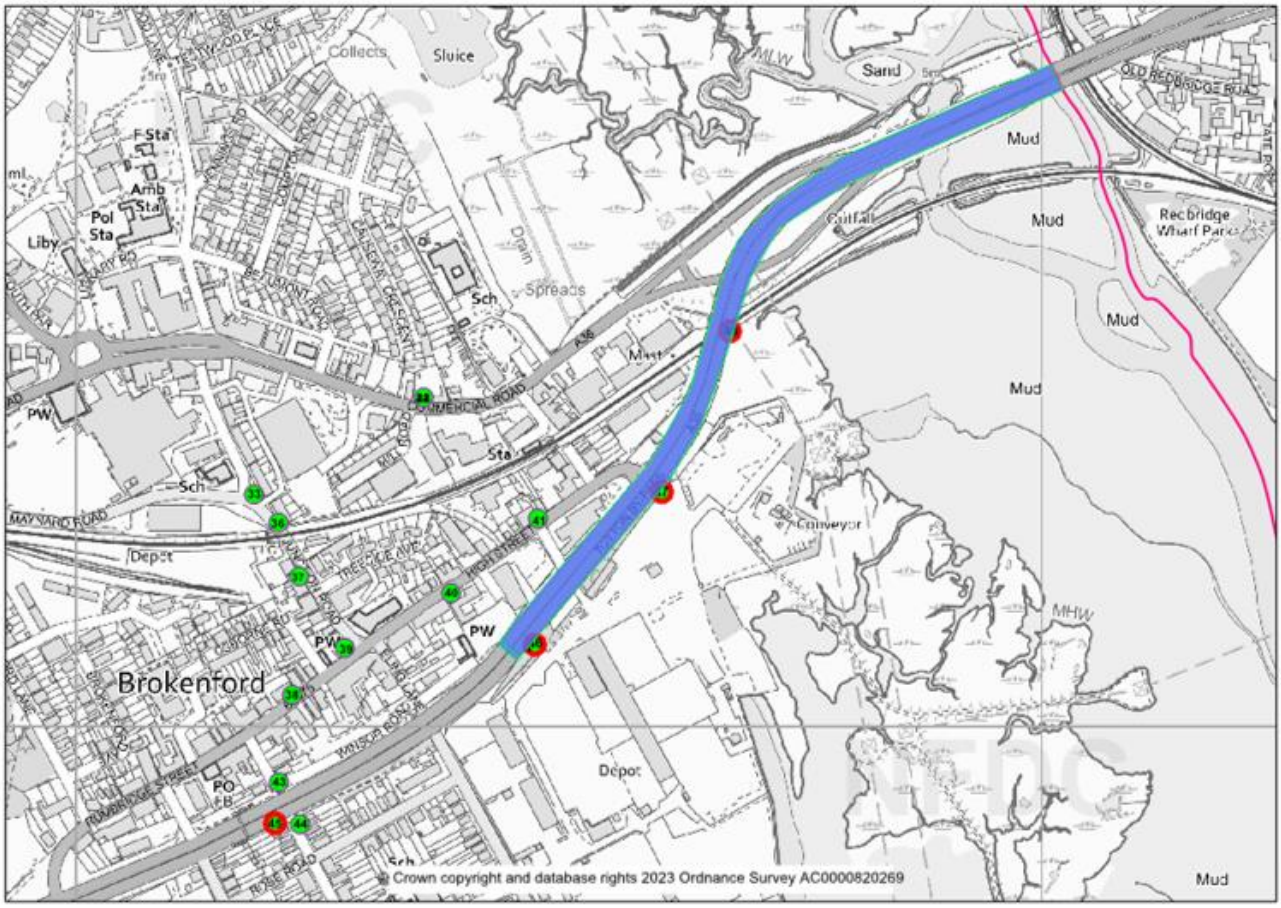


Figure D.6 – NO_2 diffusion tubes in Totton. Note: red circled sites denote CAZ monitoring site. CAZ road shown in blue



Appendix E: Summary of Air Quality Objectives in England

Table E.1– Air Quality Objectives in England[11]

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

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

Appendix F: Estimating $PM_{2.5}$ Concentrations from PM_{10} Monitoring Data

In accordance with the Technical Guidance (Defra, 2022, Box 7.7) nationally derived PM_{Coarse} concentrations of 5.7 µg/m^3 and 6.4 µg/m^3 were subtracted from the measured PM_{10} concentrations measured respectively for 2021 and 2022 at Totton. These factors are obtained from the LAQM Support Website[12].

Whilst New Forest District Council monitors PM_{10} at both Totton (roadside) and Fawley (industrial) the new guidance does not recommend applying these correction factors to industrial sites, hence the $PM_{2.5}$ concentration estimates for Fawley have not been presented. For years before 2021 TG22 recommends using the 0.7 factor (0.7 x PM_{10}) presented in TG16.

The current nationally derived PM_{coarse} concentration is 5.9 µg/m^3. This factor was applied to the monitoring results for CM1 to estimate $PM_{2.5}$

The $PM_{2.5}$ concentration estimates are presented in Table F.1 and Figure F.1.

[12] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/estimating-pm2-5-from-pm10-measurements/

Table F.1– $PM_{2.5}$ Estimates for New Forest District Council

Site 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
CM1 Totton	436188	113237	Roadside	66.46	66.46	13	15	12.4	12.5	14.6

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

☒ **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 $PM_{2.5}$ annual mean objective of 20µg/m^3 are shown in **bold**.

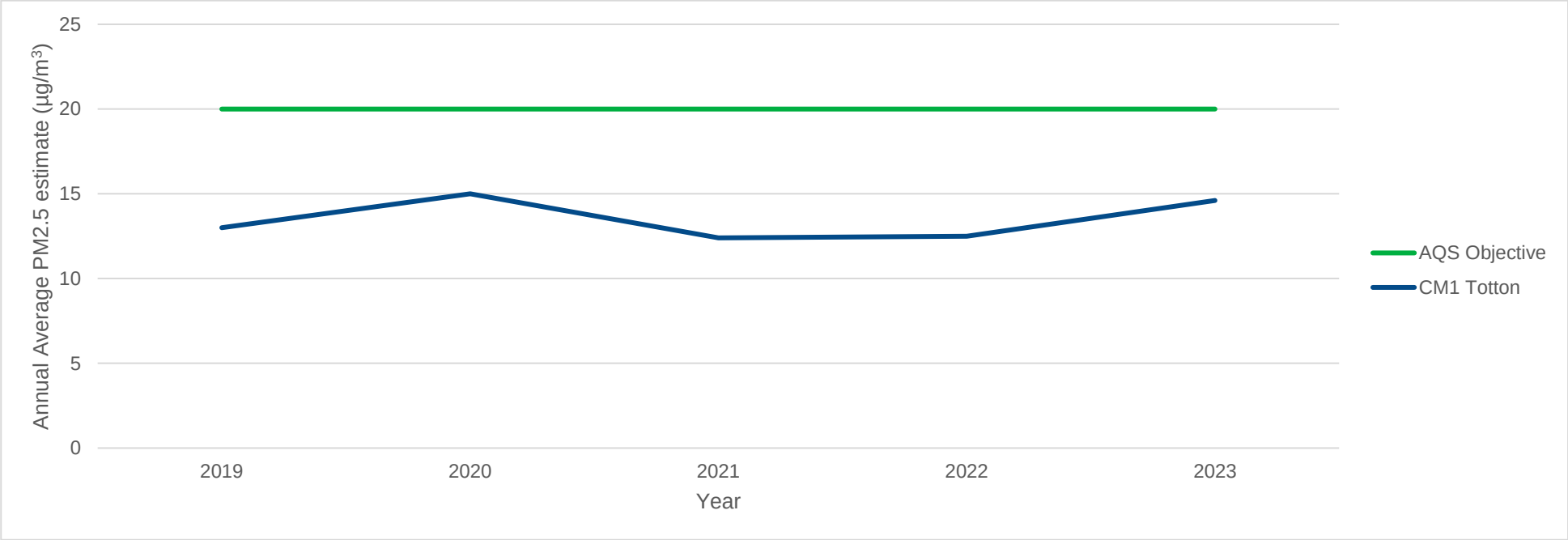
All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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 F.1 – Graph of the annual average $PM_{2.5}$ estimate in New Forest District Council

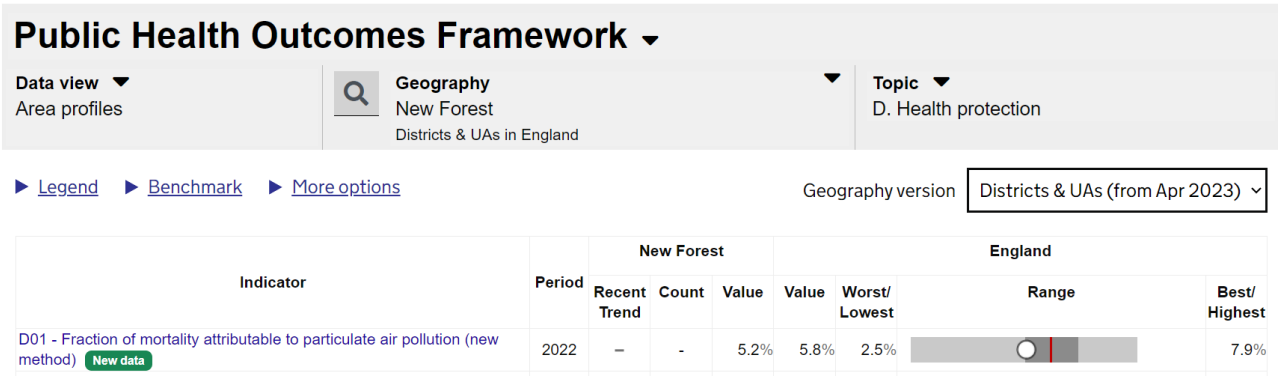


Appendix G: Health Burden of $PM_{2.5}$ As Reported by Office for Health Improvement and Disparities

Table G.1 – Table of the Fraction of Mortality Attributable to Particulate Air Pollution

Region	Fraction of Mortality Attributable to Particulate Air Pollution, %
England	5.8
South East Region	5.7
New Forest DC	5.2

Figure G.1 – Screenshot of the Public Health Outcomes Framework indicator D01



Appendix H: CAZ Monitoring Results

Monitoring of nitrogen dioxide at the CAZ monitoring sites began in 2018. The results are presented here. Concentrations in 2023 decreased at all four sites compared to 2022 results.

Table H.1 – Monitoring sites forming part of the CAZ monitoring network

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)
45	A35 1 (Totton end)	Roadside	436210	112902	NO_2	No	1.4	2.6	No	3.0
46	A35 2	Roadside	436470	113088	NO_2	No	1.4	2.6	No	3.0
47	A35 3	Roadside	436608	113254	NO_2	No	1.6	2.4	No	3.0
48	A35 4	Roadside	436675	113400	NO_2	No	0.8	3.2	No	3.0

Table H.2 – Yearly monitoring results for sites forming part of the CAZ monitoring network

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
45	436210	112902	Roadside	100	100.0	29.3	22.3	26.3	24.6	22.6
46	436470	113088	Roadside	92.3	90.4	39.7	33.5	35.6	34.6	33.2
47	436608	113254	Roadside	100	100.0	33.4	32.2	33.7	34.2	31.7
48	436675	113400	Roadside	100	100.0	37.5	34.3	35.4	36.0	30.7

☒ **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 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.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%).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.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.

Appendix I Report to support the Revocation of the Lyndhurst AQMA

LYNDHURST AIR QUALITY MANAGEMENT AREA

Detailed assessment

Report for: New Forest District Council

Ref.

Ricardo ref. ED17178102 Issue: 2 21/02/23

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Approved by:
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Signed

Ricardo reference:
ED17178102

Date:
21/02/23

EXECUTIVE SUMMARY

Ricardo Energy & Environment have completed Detailed Assessment of NO_2 concentrations in the Lyndhurst Air Quality Management Area (AQMA). The local road network is the dominant source of NO_2 within the AQMA Lyndhurst and this has been the focus of this study.

In undertaking this work, Ricardo have run air quality models to assess:

- whether citizens of Lyndhurst are likely to be exposure to concentrations of NO_2 at locations where monitoring is not currently undertaken.
- how citizen exposure to concentrations of NO_2 might change in 2023 based on national and local traffic growth and fleet renewal projections.
- whether citizens are likely to be exposed to higher NO_2 concentrations in the future if fleet renewal rates also delayed relative to national projections, or if traffic growth is significantly greater than national projections.

To achieve these goals, modelling was carried out for a 2019 baseline, to demonstrate that the model accurately predicts real-world concentrations, and a series of projected 2023 scenarios:

1. 2023 Baseline (Scenario 1): The impact on concentrations of NO_2 in 2023 based on national forecasts for traffic volumes and fleet composition
2. 2023 Scenario 2: Traffic volumes across Lyndhurst growing by 25%;
3. 2023 Scenario 3: Slower than expected replacement of older road vehicles as a result of economic conditions leading to a 2-year delay in fleet renewal across the area;
4. 2023 Scenario 4: based on a combination of scenarios 2 and 3.

The conclusions of the study are summarised in Box 1.

Box 1: Key conclusions of the Detailed Assessment

- No location is predicted to exceed the Air Quality Objective for annual mean NO_2 at any location of relevant exposure in 2019;
- No location is predicted to have an annual mean NO_2 concentration within 10% of the Air Quality Objective for annual mean NO_2 at any location of relevant exposure in 2023 should changes in traffic volumes and fleet composition follow the forecasted national trends.
- Furthermore, no locations of relevant exposure are predicted to exceed the Objective in a number of theoretical emissions scenarios where emissions would be higher than those predicted from forecasted national trends. These scenarios included a 25% increase in road traffic on all roads in Lyndhurst, a 2-year delay in fleet renewal compared to national fleet projections, and a combination of increased traffic and fleet delay.

Based on the data available, the model results indicate that provided that monitoring data for 2022 matches the trends described above, the AQMA could be revoked without risk of future exceedances.

CONTENTS

1. INTRODUCTION

Ricardo Energy & Environment (Ricardo) have been commissioned by New Forest District Council (NFDC) to undertake a study assessing the likely level of public exposure to concentrations of Nitrogen Dioxide (NO_2) across the village of Lyndhurst. Monitoring data across the Lyndhurst AQMA indicates that concentrations across the AQMA are lower than 90% of the Air Quality Objective for annual mean NO_2 concentrations. Local Air Quality Management (LAQM) guidance recommends a detailed assessment should therefore be carried out to determine whether the AQMA can be revoked.

To complete this task, Ricardo Energy and Environment have reviewed historic measurements collected by the local air pollution measurement network and developed an air dispersion model to predict current exposure at locations where measurements are not collected. This model was projected to 2023 based on national forecasts for traffic volumes and fleet composition to assess whether compliance will be achieved across the Lyndhurst AQMA in future

In order to demonstrate the robustness of compliance given uncertainties in predictions for future years, modelling was also carried out for three "worst-case" 2023 scenarios representing conditions that lead to higher emissions in 2023 than in the base 2023 model.

- Scenario 2: Traffic volumes across Lyndhurst growing by 25%;
- Scenario 3: Slower than expected replacement of older road vehicles as a result of economic conditions leading to a 2-year delay in fleet renewal across the area;
- Scenario 4: based on a combination of scenarios 2 and 3.

2. AIR QUALITY STANDARDS

The Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (Defra, 2007) sets out UK policy on air quality including a framework for reducing hazards to health from air pollution and meeting international commitments. It sets standards and objectives for ten main air pollutants (including nitrogen dioxide, PM_{10} and $PM_{2.5}$) to protect health, vegetation and ecosystems. The European Union has also set limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$ (EU Directive 2008/50/EC) and is implemented in UK law through the Air Quality Standards Regulations (2010). The limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$ are the same numerical concentrations as the UK objectives.

The AQOs which are relevant to this air quality impact assessment are detailed in Table 2.1.

Table 2.1: National Air Quality Objectives (AQOs)

Pollutant	Measured As	Objective
Nitrogen dioxide (NO_2)	Annual Mean	40 µg/m^3
	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year

LAQM.TG(22) sets out that the annual mean AQOs for human health apply at locations where the public may be regularly exposed, such as building facades of residential properties, schools, hospitals and care homes. The 1-hour and 24-hour mean AQOs apply at locations where it is reasonable to expect members of the public to spend at least these periods of time, such as busy shopping streets and school playgrounds for the 1-hour mean, and hotels or residential gardens for the 24-hour mean.

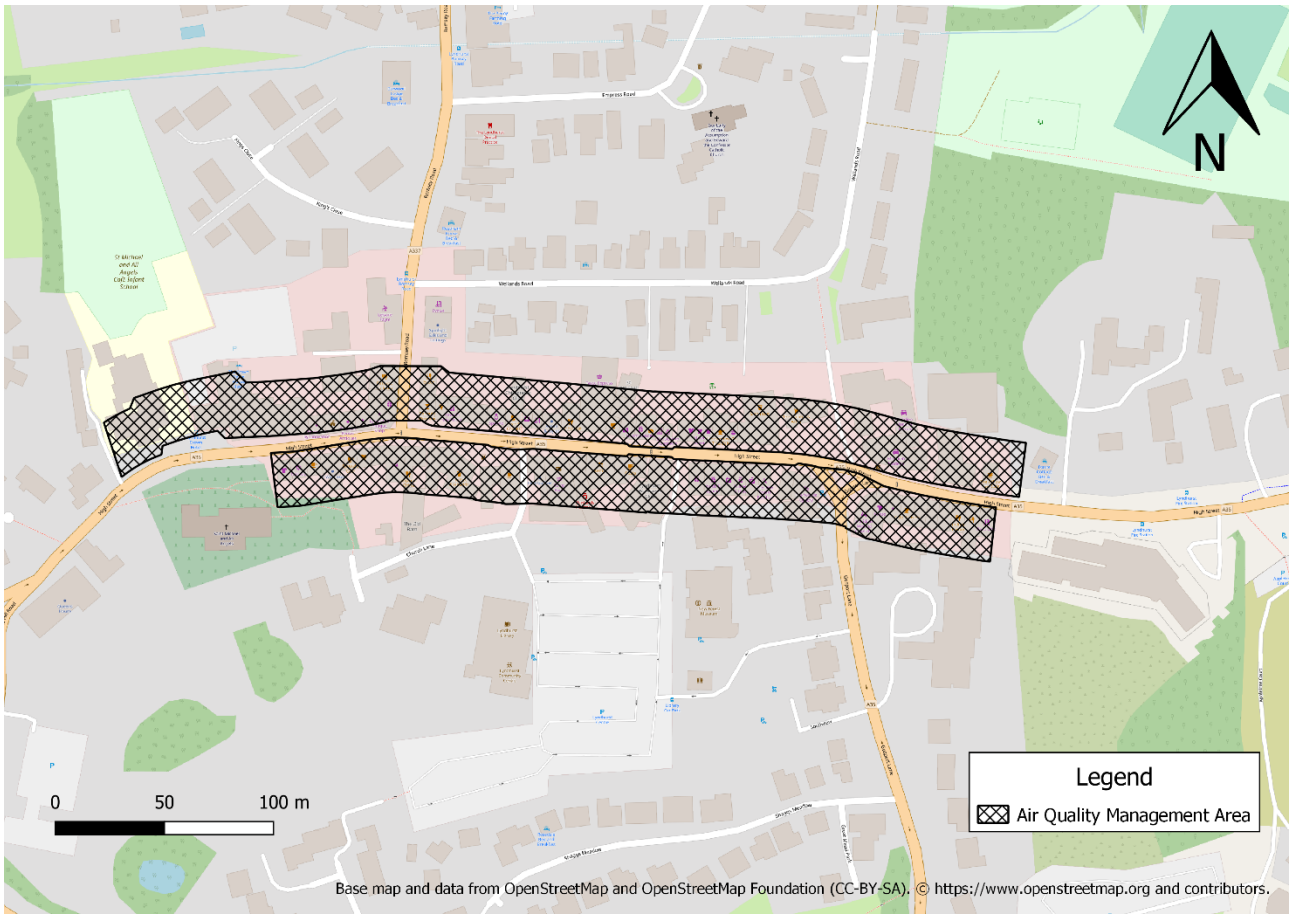
3. AIR QUALITY IN LYNDHURST

The UK parliament passed the UK Environment Act (1995, updated 2022) which sets a requirement for competent authorities to undertake routine assessment of the quality of its air. To support compliance with this objective, the UK government also introduced the Local Air Quality Management framework to ensure that Local Authorities routinely undertaking this assessment and that action is undertaken when measured concentrations of air pollutant are above threshold values set for six pollutants in its Air Quality Standards regulation.

In accordance with the LAQM framework NFDC has established an air quality monitoring network around Lyndhurst to monitor concentrations of pollutants at locations where citizens are most likely to have prolonged exposure to the area's most elevated concentrations.

The data collected by the monitoring network identified that concentrations of Nitrogen Dioxide (NO_2) along the High Street exceeded the standard set in the regulation as an annual mean concentration (40µg/m^3). In response, a further investigation was undertaken to fully understand a reason for elevated concentrations in this area of the village and a plan was drawn up to bring NO_2 concentrations into compliance with the standards regulation. As a result, part of the street was declared as an Air Quality Management Area (AQMA) in recognition of the problem in 2005. This AQMA is illustrated in Figure 3-1.

Figure 3-1: Lyndhurst AQMA



Actions implemented by NFDC to bring the AQMA into compliance with the standard have been successful as measurements collected by monitors in the AQMA show a long-term reduction trend in NO_2 concentrations, with concentrations at all monitors being compliant with the air quality objective for annual mean NO_2 concentrations in 2019. Trends in monitored concentrations in Lyndhurst are presented in Figure 3-2.

Figure 3-2: Sampled NO_2 concentrations within the AQMA (2016 – 2020)

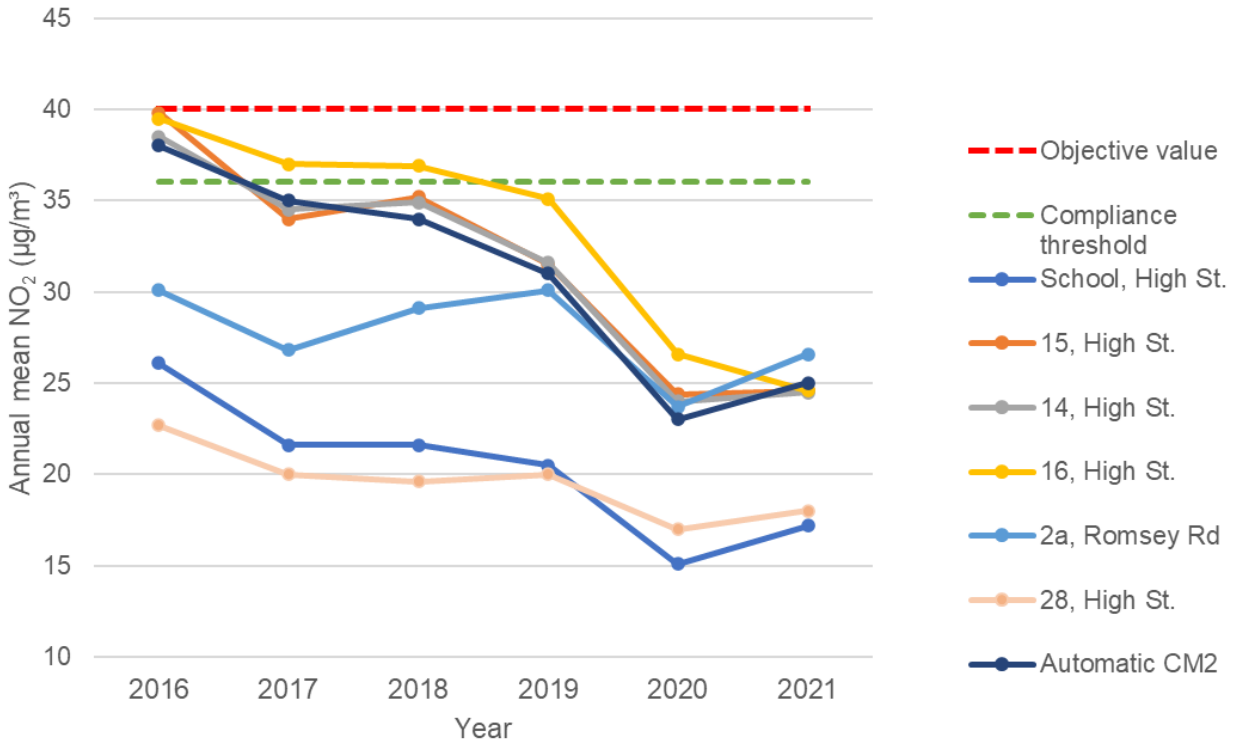


Figure 3-2 shows that:

- Annual mean concentrations of NO_2 measured by monitors placed inside the AQMA have been compliant with the Air Quality Standard since 2016.
- Annual mean concentrations have declined over the last six years at all locations.
- Annual mean concentrations have been below 90% of the threshold standard value (36µg/m^3) at all locations since 2019.

In accordance with the most recent LAQM Technical Guidance document, concentrations of NO_2 have been below 90% of the standard for three successive years and NFDC therefore has the option to consider revoking the AQMA if warranted.

4. METHODOLOGY

4.1 OVERALL APPROACH AND CHOICE OF MODEL

Ricardo Energy and Environment constructed and performed an air pollutant dispersion model to assess the likely public exposure to NO_2 pollutant. The methodology undertaken to perform this was based on the summary of best available techniques detailed in the most recent Local Air Quality Management Technical Guidance document[1] and model guidance.

The latest version of ADMS-Roads (5.1) was selected as the most appropriate tool for undertaking this study. This is a model that is widely used in assessments for Local Authorities in the UK. The tool includes advanced features for treatment of street canyons and other road geometry. In summary the following datasets were required as inputs to complete this study:

- Meteorological data
- Terrain data
- Road network location and geometries
- Traffic volumes, fleet composition and speeds
- Details of any other significant sources of NOx that are likely to impact levels of NO_2 pollutant experienced across Lyndhurst
- Data on measured background concentrations of NOx (the level of NOx present in the air that does not originate from the local road network or other dominant emission sources)

An initial model was performed using datasets collected which best reflected conditions experienced across Lyndhurst in 2019. Ratified measurements collected by the local NO_2 pollutant measurements network were then compared to the modelled result at the same location. This enabled evaluation of the model's performance and an adjustment factor was applied to further improve its results.

The framework of this modelled was then used to predict the impact on concentration of NO_2 by changes in the volume and composition in future years.

The following scenarios were modelled:

- Scenario 1 – a prediction of NO_2 concentrations across Lyndhurst in 2023 based on traffic composition and size being in line with national forecasts.
- Scenario 2 – reruns scenario 1 but with a 25% growth in traffic volumes applied on all modelled parts of the road network.
- Scenario 3 – models a two-year delay in the forecast changes to the composition of the traffic fleet materialising whilst the expected growth forecast does (i.e older vehicles are not replaced as expected).
- Scenario 4 – reruns scenario 3 but the growth factor is replaced by a factor of 1.25. This is a combination of scenario's 2 and 3.

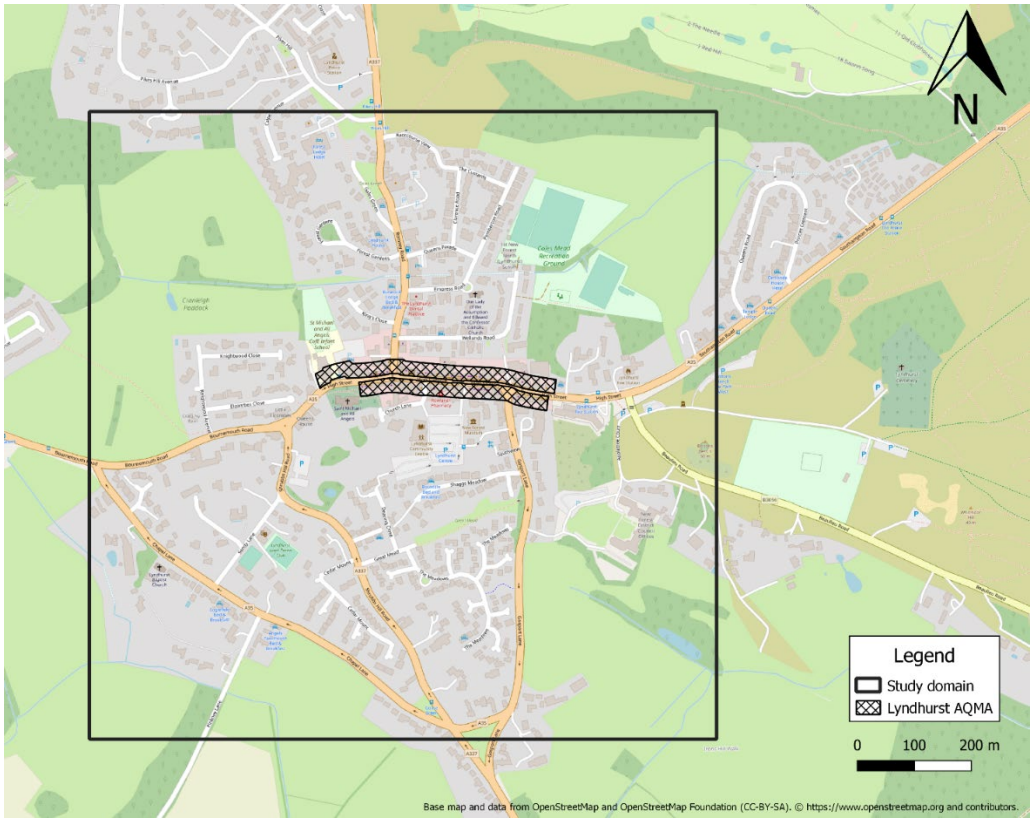
4.2 MODEL DOMAIN

Figure 4-1 shows the chosen study area of the model. Professional judgement was used to determine the size of the domain with the following considerations made:

- the location of road links that are mostly likely to be dominant emission sources
- the location of sensitive receptors (i.e areas of high population density)
- the location of NO_2 monitors which can be used to verify the air quality model

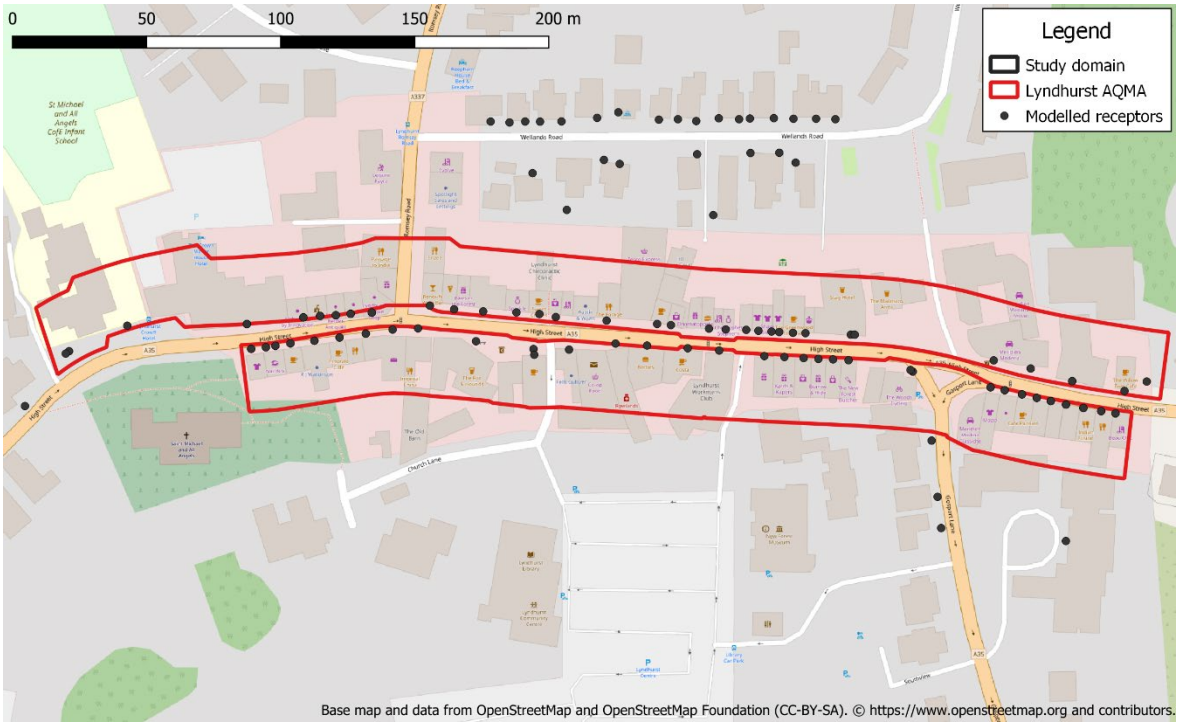
[1] https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf

Figure 4-1: Study domain region



Comprehensive review was undertaken to understand which locations within the domain shown in Figure 4-1 are likely to be most impacted by concentrations of NO_2 stemming from the use of the local road network. Figure 4-2 shows the location of key receptors that were identified through this process. Concentrations at each of these receptors were specifically modelled in each scenario.

Figure 4-2: Location of modelled sensitive receptors



4.3 SURFACE ROUGHNESS

In ADMS-Roads, a length scale parameter called the surface roughness length is used to characterise the study area in terms of its effects on wind speed and turbulence. The modelling used a surface roughness length of 0.5m, to represent a moderately built-up area.

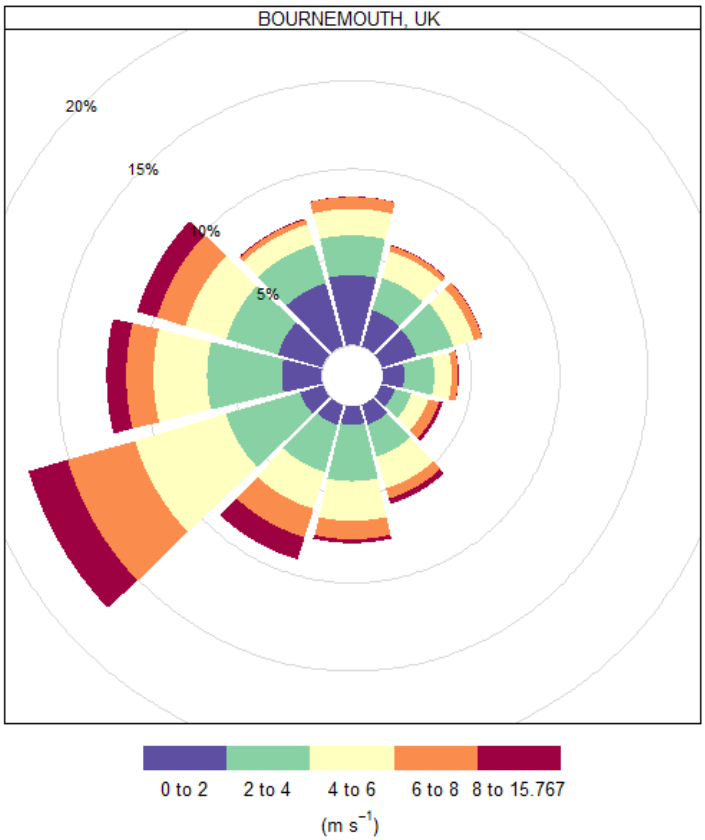
The difference in land use at the meteorological site and the model domain was accounted for by using a surface roughness of 0.25m for the meteorological site.

4.4 METEOROLOGY

Review of available meteorological datasets representative of conditions across Lyndhurst was undertaken through analysis of datasets available through the NOAA data repository and consultation with NFDC.

Datasets collected at Southampton Airport and Bournemouth Airport were identified for use in this study. Comparison of the two datasets found similarities in the conditions presented with the Bournemouth dataset containing a more complete data capture for the 2019 verification year. This dataset was used in the verification and modelling scenarios. A wind rose for the Bournemouth 2019 dataset is presented in Figure 4-3.

Figure 4-3: Windrose of meteorological data collected at Bournemouth Airport during 2019



4.5 CHEMISTRY AND BACKGROUND CONCENTRATIONS

The interconversion of NO and NO_2 emissions in the presence of ozone was calculated using the NOx:NO_2 calculator[2] published by Defra, in line with LAQM.TG(22). Background concentrations were taken from the background maps published by Defra for use with this tool. To avoid double-counting, contributions from local primary roads were removed from the background maps.

[2] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/

5. EMISSIONS INVENTORY

The development of the emission inventory for Lyndhurst was carried out through the following process:

1. Collation of traffic data;
2. Collation of national fleet fuel and technology statistics;
3. The traffic and fleet data were combined with emission factors from the most recent version of the Emissions Factors Toolkit (EFT), version 11[3] to provide total annual emissions of NOx and PM for the modelled road links.

Further detail on the emissions inventory compilation is provided below.

5.1 TRAFFIC FLOWS AND SPEEDS

A hybrid traffic volume dataset was compiled from data collected by NFDC and from the DfT traffic count network[4]. Traffic flows were provided for vehicle categories including cars, LGVs, HGVs, buses and coaches, and motorcycles. Traffic speeds were estimated based on travel time data in Google Maps, together with speed limits and local knowledge.

5.2 EMISSION FACTORS

Emissions from all modelled road traffic sources were calculated using speed-dependent vehicle emission factors for NOx, primary NO_2, and particulates from the Emission Factor Toolkit (EFT) version 11[11]. These factors provide emission factors categorised by vehicle size, age, and Euro classification, taking into account average vehicle mileage and engine degradation. Emission factors are provided for roads with uphill or downhill gradients.

5.3 VEHICLE FLEET COMPOSITION

5.3.1 2019

National projections provided by the EFT were used as a data source for vehicle composition in lieu of locally derived data being available. This dataset was used to split traffic volumes into vehicle age and fuel type.

Table 5-1 and Table 5-2 present the derived fleet age split for vehicles for non-London locations in 2019.

Table 5-1: Fleet age splits for 2019, light vehicles

Region	Vehicle type	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6	Euro 6c	Euro 6d
National average	**Petrol Car**	-	-	-	4%	15%	27%	17%	37%	-
	Diesel Car	-	-	-	3%	13%	35%	20%	28%	-
	Petrol LGV	-	-	1%	6%	15%	30%	22%	25%	-
	Diesel LGV	-	-	-	2%	13%	30%	19%	35%	-
	Full Hybrid Petrol Car	-	-	-	4%	15%	27%	17%	37%	-
	Plugin Hybrid Petrol Car	-	-	-	3%	13%	35%	20%	28%	-
	Full Diesel Hybrid Car	-	-	1%	6%	15%	30%	22%	25%	-

[3] https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

[4] https://roadtraffic.dft.gov.uk

Table 5-2: Fleet age splits for 2019, heavy vehicles

Region	Vehicle type	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V EGR	Euro V SCR	Euro VI
National average	Rigid HGV	0%	0%	1%	4%	5%	5%	14%	72%
	Artic HGV	0%	0%	0%	1%	1%	3%	10%	85%
	Buses / Coaches	0%	0%	2%	8%	8%	7%	20%	56%

5.3.2 Projections

The observed vehicle fleet 2023 was projected to future years using the EFT, following the process outlined in LAQM.TG(22). The projected vehicle age split in 2023 is presented in for light and heavy vehicles respectively.

Table 5-3: Fleet age splits for 2023, light vehicles

Region	Vehicle type	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6	Euro 6c	Euro 6d
National average	Petrol Car	-	-	-	-	4%	16%	12%	68%	-
	Diesel Car	-	-	-	-	4%	24%	17%	23%	32%
	Petrol LGV	-	-	-	1%	3%	13%	11%	72%	-
	Diesel LGV	-	-	-	-	4%	16%	11%	25%	43%
	Full Hybrid Petrol Car	-	-	-	-	0%	1%	6%	5%	89%
	Plugin Hybrid Petrol Car	-	-	-	-	-	1%	4%	95%	-
	Full Diesel Hybrid Car	-	-	-	-	-	1%	2%	19%	78%

Table 5-4: Fleet age splits for 2022, heavy vehicles

Region	Vehicle type	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V EGR	Euro V SCR	Euro VI
National average	Rigid HGV	-	-	-	1%	1%	2%	5%	91%
	Artic HGV	-	-	-	-	-	1%	2%	97%
	Buses / Coaches	-	-	-	3%	3%	3%	9%	82%

5.4 GRADIENTS

Road vehicle emissions correlate to engine load, and as a result, emissions for vehicles travelling uphill are greater than those travelling on flat roads. Road gradients were calculated using data sourced from the national lidar programme[5]. The difference in value between the surface and terrain lidar data was calculated at start and end points of road segments defined in the OS open roads dataset. A gradient for each corresponding section of road was calculated using these values.

[5] National LIDAR Programme - data.gov.uk

6. MODEL ADJUSTMENT AND VERIFICATION

Once the base year model has been developed it is then verified against monitoring data and adjusted to ensure best fit, following the approach outlined in the LAQM Technical Guidance. Following this guidance, the adjustment process is carried out for NO_X (NO and NO_2) as NO and NO_2 interconvert in the atmosphere following emission from vehicle exhausts in a non-linear fashion.

Any adjustment factors are then applied to all future modelled years. Following this adjustment, model verification is carried out by comparing the total predicted NO_2 concentrations against the measured NO_2 concentrations.

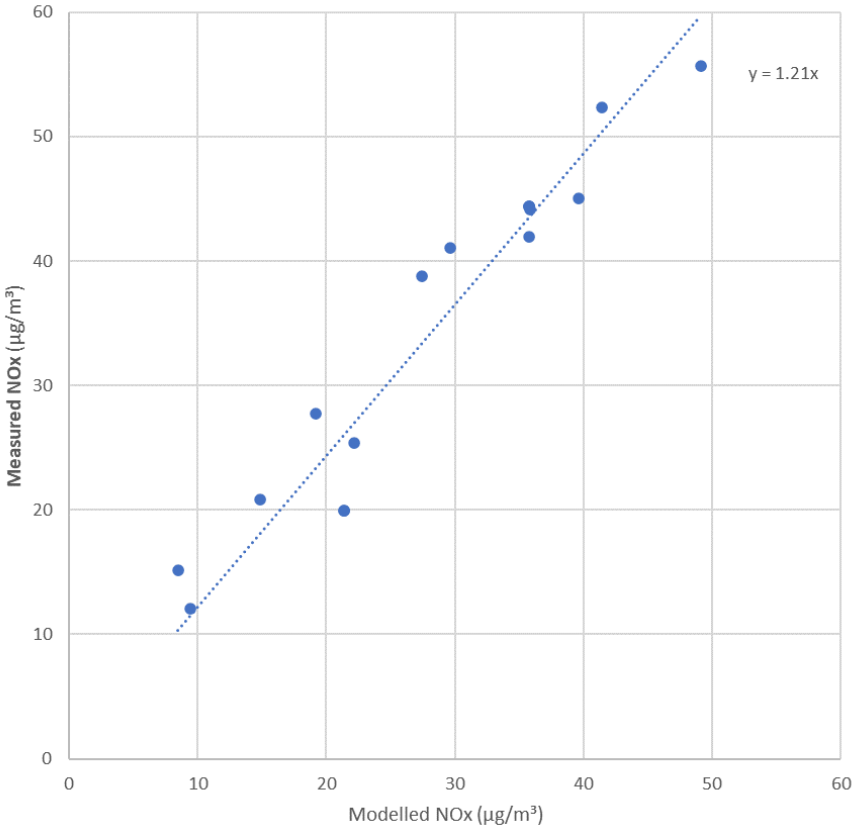
A total of 17 monitoring locations located within the study area were used for model verification. The road contribution to NO_X concentrations at these sites was estimated using the latest version of the NOx to NO_2 calculator (version 8) published by Defra. Background NO_X concentrations for use in this tool were taken from the Defra background maps. This approach uses background concentrations of NO_X as an input.

Following an initial model verification step, iterative improvements were made to the model to improve model performance in areas where the model was not accurately predicting real-world concentrations. These improvements included refinements to road geometry and street canyon locations in order to more closely reflect real-world dispersion conditions.

6.1 MODEL CALIBRATION AND ADJUSTMENT

Figure 6-1 shows model performance at locations where measurements were collected in 2019.

Figure 6-1: Measured and modelled annual mean road NOx contributions at monitoring sites, 2019, µg.m^{-3}



An adjustment factor of 1.21 was used to bias correct the results of each modelled scenario.

6.2 MODEL VERIFICATION

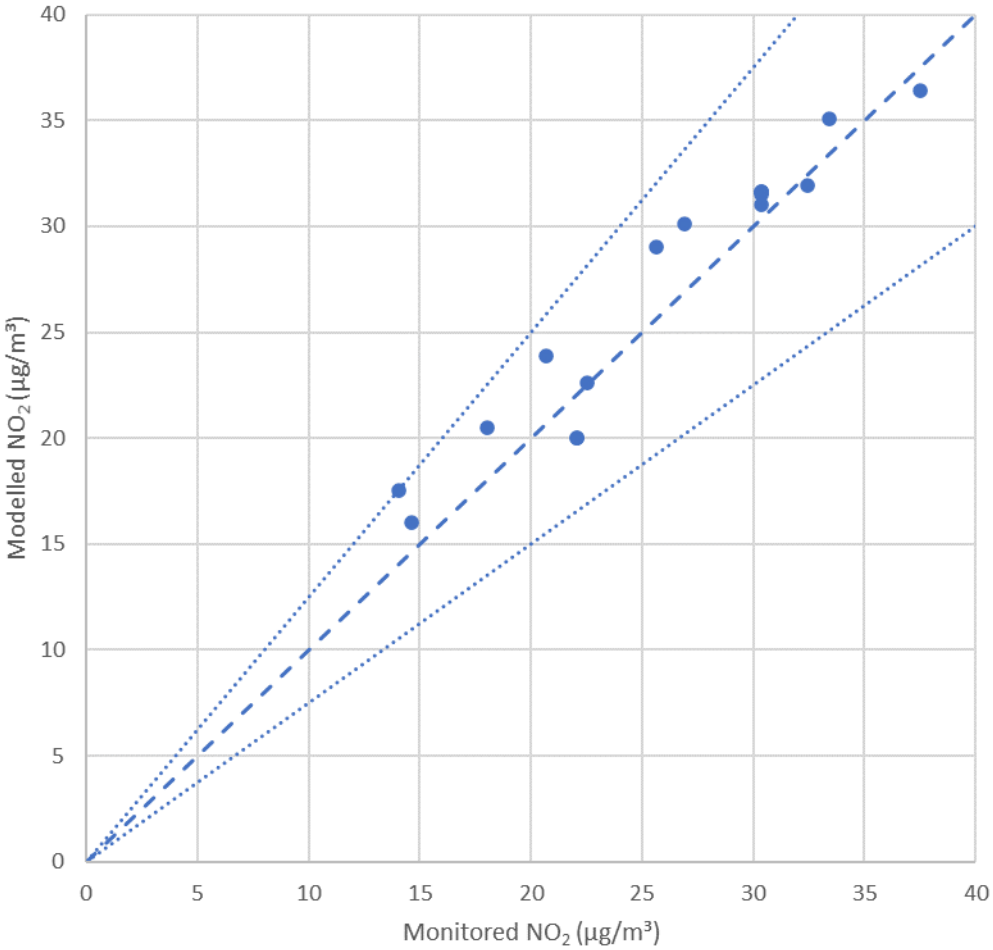
Figure 6-2 presents the model performance with respect to adjusted modelled NO_2 at monitoring locations in 2019. The model performs within the 25% acceptable threshold for model performance across all monitoring

locations, and within the ideal 10% threshold at the majority of sites. The largest discrepancy between modelled and monitored concentrations occurs at site 15, which is located outside the Lyndhurst AQMA.

This site is located at a transition point between a street canyon and a more open area, which is difficult to capture in the model; for this study, the diffusion tube was placed inside the street canyon to ensure that worst-case concentrations are predicted in future years, and as a result the model overpredicts NO_2 concentrations by 20% at this location.

Model performance was evaluated using the Root Mean Square Error, following LAQM.TG(22). The RMSE for this study is 2.1 $\mu g.m^{-3}$, well within the 4 $\mu g.m^{-3}$ ideal threshold identified in the guidance, demonstrating that the model performs well and lending confidence to model predictions of concentrations in future years.

Figure 6-2: Measured and modelled annual mean road NO_2 contributions at monitoring sites, 2019, $\mu g.m^{-3}$



7. RESULTS

The model described above was used to predict concentrations at buildings within the AQMA at ground floor level and on the first floor (as some buildings have commercial premises on the ground floor, with flats on the floor above), and across a grid of receptors covering the domain described in Section 3.2 for the following scenarios:

- 2019 baseline;
- 2023 baseline (Scenario 1); Model based on forecasted changes in traffic volumes and composition
- 2023 Scenario 2: Traffic volumes across Lyndhurst growing by 25%;
- 2023 Scenario 3: Slower than expected replacement of older road vehicles as a result of economic conditions leading to a 2-year delay in fleet renewal across the area;
- 2023 Scenario 4: based on a combination of scenarios 2 and 3.

Section 6.1 presents results at locations of relevant human exposure within the AQMA; Section 6.2 presents maps of concentrations across Lyndhurst, including at locations without relevant exposure.

7.1 RESULTS AT SENSITIVE RECEPTORS

Table 7-1 presents the annual averaged NO_2 concentrations modelled at sensitive receptors identified across the study region. No location is predicted to exceed the threshold set for annual averaged NO_2 concentrations in the 2023 baseline scenario or the worst-case sensitivity tests.

Table 7-1: Annual averaged NO_2 concentrations at key receptor locations

			Annual mean NO_2 concentration, $\mu g.m^{-3}$			
Receptor ID	Property address (absolute number)	Height	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Forest Cottage	Forest Cottage High Street	1.5	9.5	9.9	9.9	10.4
St Michaels and All Angels Infant School (playground south fence)	High Street	1	14.2	15.7	15.6	17.5
St Michaels and All Infant School (main entrance gate)	High Street	1	14.2	15.7	15.6	17.5
St Michael and All Infant School (main entrance gate)	High Street	1.5	14.0	15.5	15.4	17.2
3 High Street (Red Lodge)	3 High Street	1.5	24.9	28.7	28.7	33.2
5a High Street	5 High Street	3	21.5	24.6	24.1	27.8
Mottotoo	6 High Street	1.5	22.1	25.4	25.1	29.0
8a High Street	8 High Street	2	21.9	25.1	24.8	28.7
Nail NV	8 High Street	1.5	22.1	25.3	25.0	28.9
Nail NV first floor	8 High Street	2	21.8	25.1	24.8	28.6
The Crown Hotel	9 High Street	2	22.5	25.9	25.7	29.7
The Crown Hotel (2nd Floor)	9 High Street	4	20.0	22.8	22.6	26.0
Mad Hatter Tea Rooms	10 High Street	1.5	22.2	25.5	25.2	29.2
10 High Street	10 High Street	2	22.0	25.3	25.0	28.8
11 High Street	11 High Street	3	21.3	24.4	24.2	27.8
Bathrooms by Innovation	11 High Street	1.5	22.9	26.3	26.1	30.1
RJ Watkinson	12 High Street	1.5	22.6	26.0	25.7	29.7
12 High Street	12 High Street	3	21.1	24.2	23.9	27.5
Lyndhurst Parish Council	13 High Street	1.5	23.0	26.5	26.3	30.4
13 High Street	13 High Street	3	21.4	24.5	24.3	28.0
Emerald Crafts	14 High Street	1.5	22.6	25.9	25.6	29.6
14a High Street	14 High Street	3	21.1	24.2	23.9	27.5

			Annual mean NO_2 concentration, $\mu g.m^{-3}$			
15 High Street	15 High Street	3	21.8	25.0	24.7	28.5
Stephen Further Antiques	15 High Street	1.5	23.7	27.3	27.0	31.3
Surfing Moo Moo	16 High Street	1.5	22.6	26.0	25.7	29.7
16 High Street	16 High Street	3	21.2	24.3	24.0	27.6
Tasty Pastries (16a)	16 High Street	1.5	22.8	26.3	25.9	30.0
16a High Street	16 High Street	2.5	22.0	25.2	24.9	28.8
Black Plug Antiques	17 High Street	1.5	24.0	27.7	27.4	31.7
17 High Street	17 High Street	3	21.9	25.1	24.9	28.7
Imperial China	18 High Street	1.5	23.1	26.6	26.3	30.4
Lyndhurst Antiques Centre	19 – 21 High Street	1.5	25.3	29.3	29.0	33.6
Above Lyndhurst Antiques Centre	19 – 21 High Street	3	22.2	25.4	25.2	29.1
Lyndhurst store	19 – 21 High Street	1.5	17.2	19.3	19.1	21.8
Prezzo	20 High Street	1.5	22.9	26.3	25.8	29.9
The Fox and Hounds	22 High Street	1.5	17.3	19.5	19.2	21.8
Forest Glad Ice cream	25 High Street	1.5	18.4	20.9	20.6	23.5
The Lyndhurst Tea House	26 High Street	1.5	9.3	9.6	9.6	10.0
26a High Street	26 High Street	3	9.5	9.8	9.8	10.2
Paws in the Forest	27 High Street	1.5	18.5	21.0	20.6	23.6
30a High Street	30 High Street	3	9.3	9.7	9.7	10.1
31a High Street	31 High Street	3	17.4	19.6	19.3	22.0
Lyndhurst Coffee Shop (Sweet Chillies)	33 High Street	3	17.4	19.6	19.3	22.0
34a High Street	34 High Street	3	23.6	27.1	26.6	30.8
35a High Street	35 High Street	3	21.7	24.9	24.5	28.2
36a High Street	36 High Street	3	23.6	27.2	26.6	30.8
Costa	38 – 40 High Street	1.5	24.7	28.5	27.9	32.4
39a High Street	39 High Street	3	21.5	24.6	24.2	27.8
42a High Street	42 High Street	3	23.6	27.2	26.6	30.8
44a High Street	44 High Street	3	19.2	21.9	21.5	24.6
46a High Street	46 High Street	3	19.2	21.9	21.5	24.6
48a High Street	48 High Street	3	19.2	21.9	21.5	24.6
Peggy Mays	49 High Street	1.5	22.5	25.9	25.4	29.3
50a High Street	50 High Street	3	19.2	21.9	21.5	24.6
52a High Street	52 High Street	3	19.3	21.9	21.6	24.7
53a High Street	53 High Street	3	21.5	24.7	24.2	27.9
54a High Street	54 High Street	3	19.3	22.0	21.6	24.7
Woods Cyclery Entrance	56 High Street	1.5	15.7	17.5	17.4	19.6
Woods Cyclery 1st Floor	56 High Street	3	14.8	16.4	16.3	18.3
59a High Street	59 High Street	3	17.7	20.0	19.7	22.5
Motto	60 High Street	1.5	18.2	20.6	20.4	23.3
61a High Street	61 High Street	3	17.8	20.1	19.8	22.5
62a High Street	62 High Street	3	17.1	19.3	19.1	21.7
J & L Sturney Funeral Director	62 High Street	1.5	18.4	20.9	20.7	23.7
63a High Street	63 High Street	3	17.8	20.1	19.8	22.6
Cafe Partisan	64 High Street	1.5	18.4	20.9	20.6	23.6

			Annual mean NO_2 concentration, $\mu g.m^{-3}$			
64a High Street	64 High Street	3	17.2	19.5	19.3	21.9
The Greenwood Tree cafe	65 High Street	1.5	18.7	21.3	20.9	24.0
65a High Street	65 High Street	3	17.8	20.1	19.8	22.6
66a High Street	66 High Street	1.5	18.4	20.9	20.6	23.6
67a High Street	67 High Street	3	17.7	20.1	19.7	22.5
68 High Street	68 High Street	1.5	18.4	20.8	20.6	23.6
68a High Street	68 High Street	3	17.2	19.4	19.2	21.8
Stag Hotel Entrance	69 High Street	1.5	18.4	20.9	20.6	23.5
Stag Hotel 1st Floor	69 High Street	3	17.6	19.9	19.5	22.3
Master Barber Shop	70 High Street	1.5	18.0	20.4	20.2	23.1
72a High Street	70 High Street	3	17.0	19.2	19.0	21.6
70 High Street	70 High Street	1.5	18.3	20.8	20.6	23.5
70a High Street	70 High Street	3	17.2	19.4	19.2	21.8
Indian Fusion	72 High Street	1.5	17.9	20.3	20.1	22.9
72a High Street	72 High Street	3	17.0	19.2	19.0	21.6
Anissa Thai	74 High Street	1.5	17.8	20.1	19.9	22.7
74a High Street	74 High Street	3	16.9	19.0	18.8	21.3
76a High Street	76 High Street	3	16.8	18.9	18.7	21.3
Bean Chic Hair and Beauty	76High Street	1.5	17.7	20.0	19.8	22.6
Meridien Moderna	77 High Street	1.5	15.9	17.8	17.7	20.0
The Kebab house	83 High Street	1.5	16.1	18.1	17.9	20.3
85a High Street	85 High Street	3	15.4	17.2	17.0	19.2
The Willow Tree Cafe	97 High Street	1.5	17.8	20.1	19.9	22.7
Rufus Court	Rufus Court, Gosport Lane	1.5	9.1	9.4	9.4	9.7
1 the Boltons	1 The Boltons, Gosport Lane	1.5	29.2	33.9	33.1	38.5
2 the Boltons	2 The Boltons, Gosport Lane	1.5	29.3	34.0	33.2	38.7
Briar Cottage	Gosport Lane	1.5	29.5	34.2	33.5	39.0
2a Romsey Road	2 Romsey Road	3	20.2	23.1	22.7	26.1

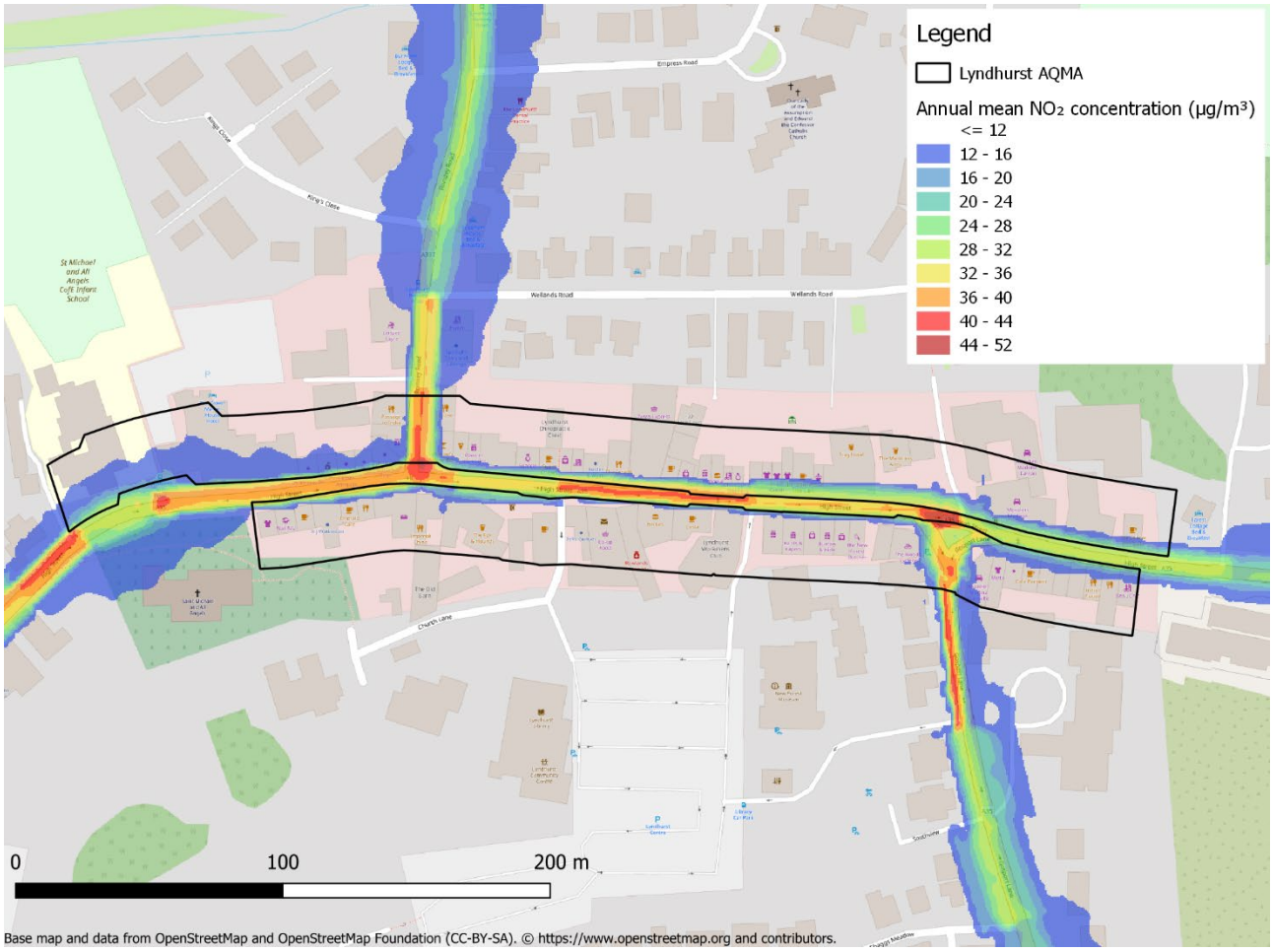
The highest predicted concentrations in the model domain lie at 1 and 2 Gosport Lane. These sites do not lie within the existing AQMA, and are not predicted to exceed the objective for annual mean NO2 concentrations in any scenario.

7.2 MAPPED CONCENTRATIONS

7.2.1 2019 Baseline

Figure 7-1 presents annual mean NO_2 concentrations in the Lyndhurst AQMA in the 2019 baseline.

Figure 7-1: Predicted annual mean NO_2 concentrations, 2019, $\mu g.m^{-3}$



Annual averaged NO_2 concentrations ($\mu g/m^3$) at locations of relevant exposure are likely to be below the 40 $\mu g/m^3$ Air Quality Objective at all relevant locations across Lyndhurst. Some locations within the study area are predicted to exceed this threshold; however, these locations were shown to be within roadways and do not represent relevant exposure.

7.2.2 2023 Baseline (Scenario 1)

Figure 7-2 presents annual mean NO_2 concentrations in the Lyndhurst AQMA in the 2023 baseline.

Figure 7-2: Predicted annual mean NO_2 concentrations, 2023 baseline, $\mu g.m^{-3}$

No location in Lyndhurst is predicted to experience an exceedance of the air quality standard regulations value for annual average NO_2 concentrations in 2023 should traffic volumes and composition change as predicted by national forecasts. All locations of relevant exposure are below the 36 $\mu g/m^3$ screening level.

7.2.3 2023 Scenario 2: 25% more traffic

Figure 7-3 presents annual mean NO_2 concentrations in the Lyndhurst AQMA with 25% additional traffic on each road.

Figure 7-3: Predicted annual mean NO_2 concentrations, 2023 with 25% more traffic, $\mu g.m^{-3}$

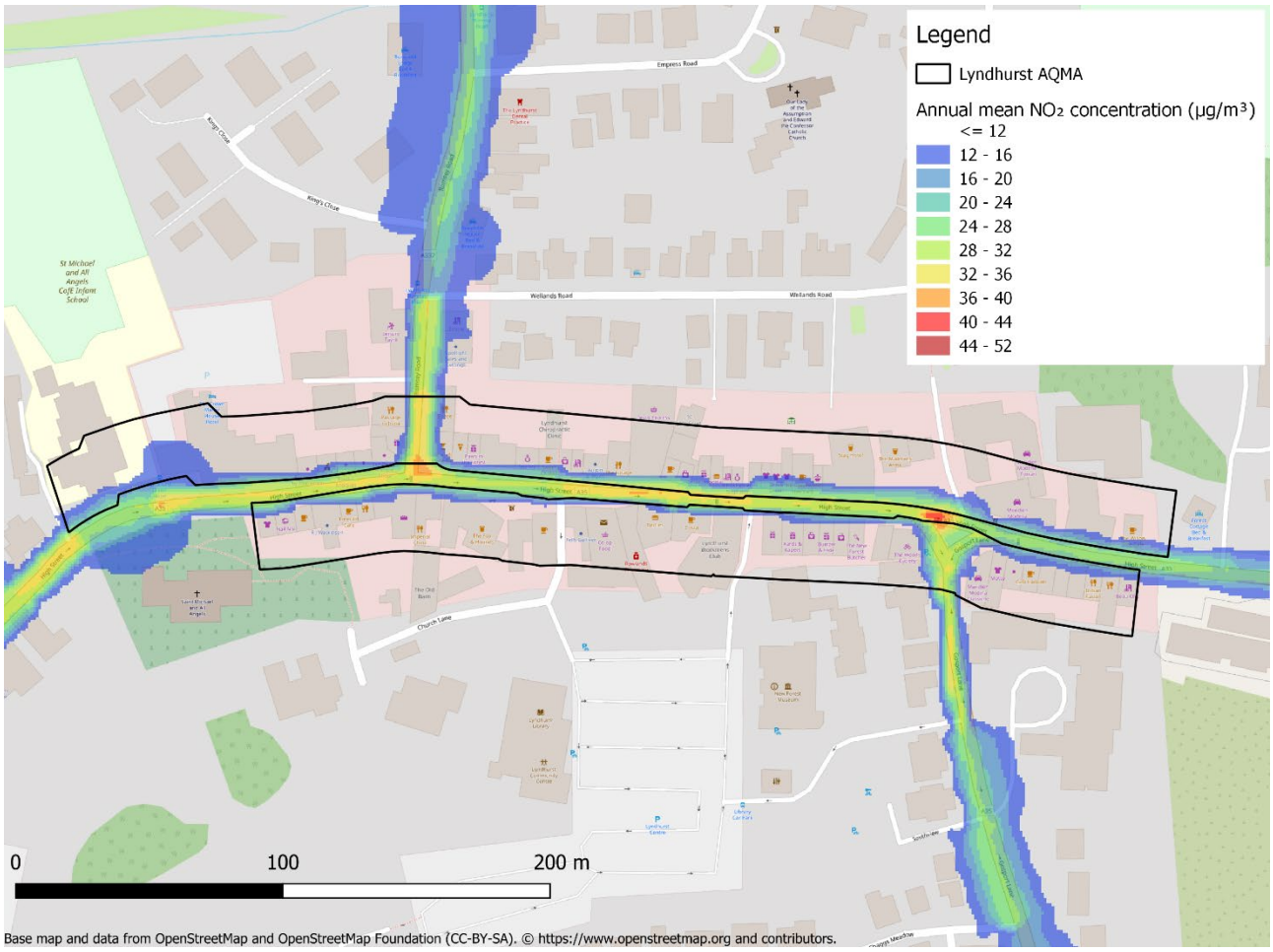
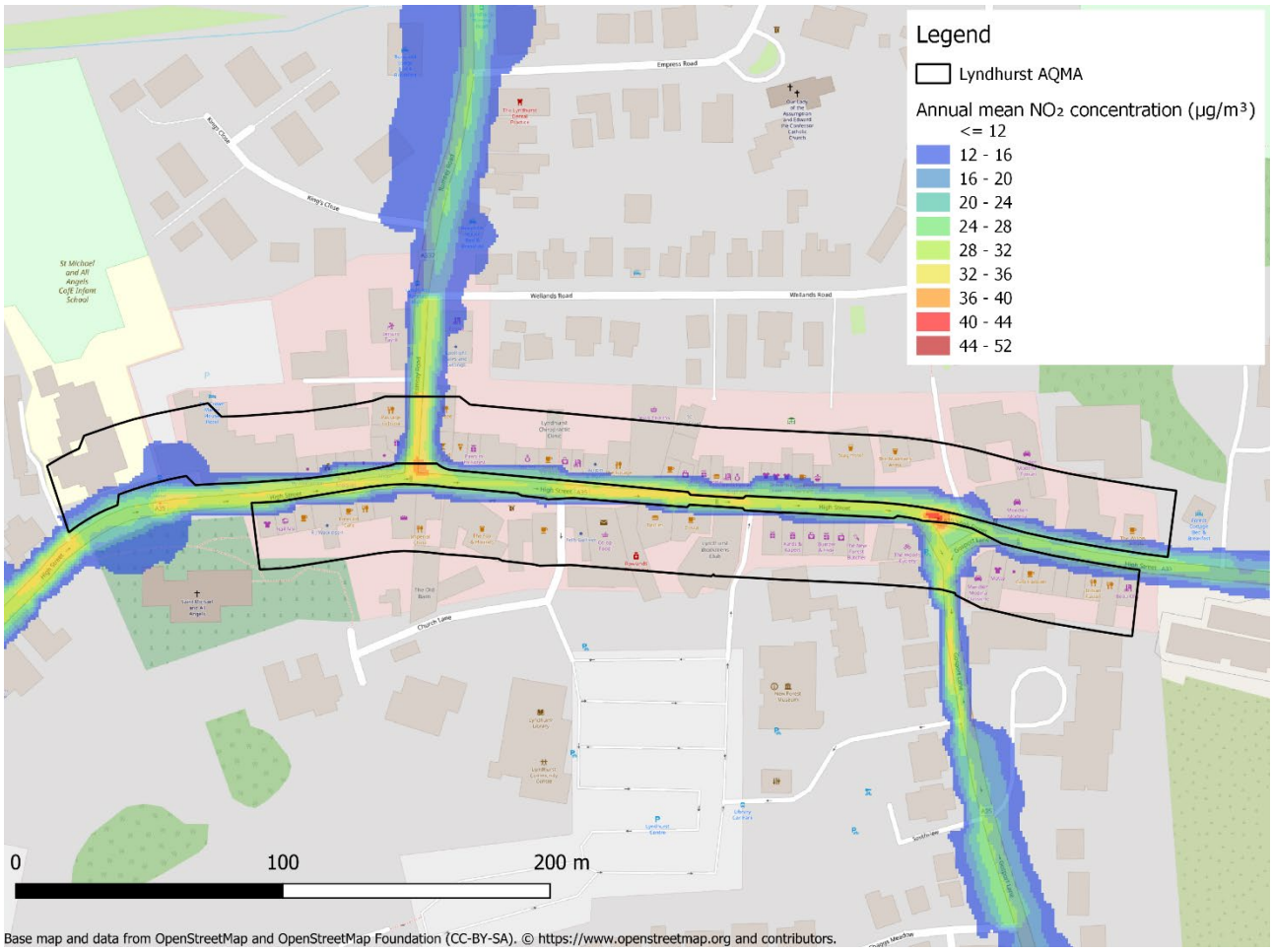


Figure 7-3 shows that no location in Lyndhurst is predicted to experience an exceedance of the air quality standard regulations value for annual averaged NO_2 should traffic volumes increase by 25% in the village.

7.2.4 2023 Scenario 3 – 2023 with 2021 fleet composition

Figure 7-4 presents annual mean NO_2 concentrations in the Lyndhurst AQMA with natural fleet turnover delayed by 2 years (i.e. using the projected vehicle fleet for 2021).

Figure 7-4: Predicted annual mean NO_2 concentrations, 2023 with delayed fleet renewal, $\mu g.m^{-3}$



No location where a person is likely to have relevant exposure is likely to exceed the Air Quality Objective for annual mean NO_2 concentrations.

7.2.5 2023 Scenario 4: 2023 with 25% additional traffic and 2021 fleet composition

Figure 7-5 presents annual mean NO_2 concentrations in the Lyndhurst AQMA with fleet turnover delayed by 2 years (i.e. using the projected vehicle fleet for 2021) and traffic volumes increased by 25% on all roads.

Figure 7-5: Predicted annual mean NO_2 concentrations, 2023 with 25% more traffic and delayed fleet renewal, $\mu g.m^{-3}$

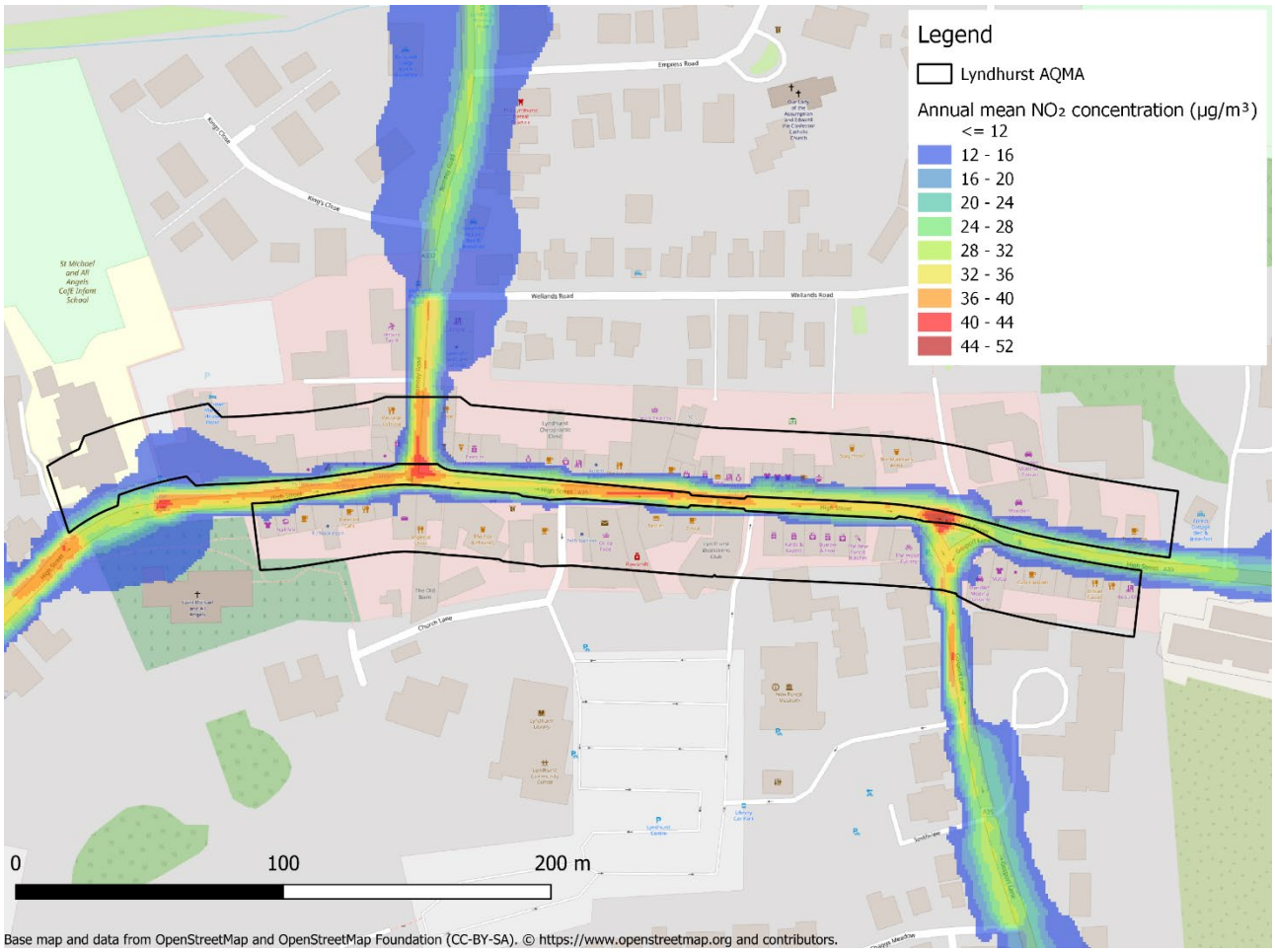


Figure 7-5 shows that no location is likely to exceed the air quality standard regulations value for annual averaged NO_2 where a person is likely to have relevant exposure. The model does predict that some sections within roadways would have a concentration above this threshold in this theoretical worst-case scenario. However, no exceedances are predicted at locations of relevant exposure.

8. CONCLUSIONS

Ricardo was commissioned to carry out a detailed assessment of NO_2 concentrations in and around the Lyndhurst AQMA to determine whether compliance with the Air Quality Objective for annual mean NO_2 concentrations is achieved across the area and to determine whether compliance will be achieved in future years. Modelling was carried out for a 2019 baseline and a 2023 projected year.

In addition, to assess model uncertainty in future years, three theoretical worst-case scenarios were tested to quantify the potential impacts of conditions where emissions from road transport would be higher than expected in 2023:

- Scenario 2: Traffic volumes across Lyndhurst growing by 25%;
- Scenario 3: Slower than expected replacement of older road vehicles as a result of economic conditions leading to a 2-year delay in fleet renewal across the area;
- Scenario 4: a combination of scenarios 1 and 2.

The model accurately predicts concentrations at monitoring stations in the Lyndhurst AQMA in 2019, demonstrating that the model is correctly representing real-world conditions, lending confidence to the predictions for future years.

The modelling undertaken through this study shows that:

- No location is predicted to exceed the Air Quality Objective for annual mean NO_2 at any location of relevant exposure in 2019;
- No location is predicted to have an annual mean NO_2 concentration within 10% of the Air Quality Objective for annual mean NO_2 at any location of relevant exposure in 2023 should changes in traffic volumes and fleet composition follow the forecasted national trends.
- Furthermore, no locations of relevant exposure are predicted to exceed the Objective in a number of theoretical scenarios where emissions would be higher than those predicted from forecasted national trends, including a 25% increase in road traffic on all roads in Lyndhurst, a 2-year delay in fleet renewal compared to national fleet projections, and a combination of increased traffic and fleet delay.

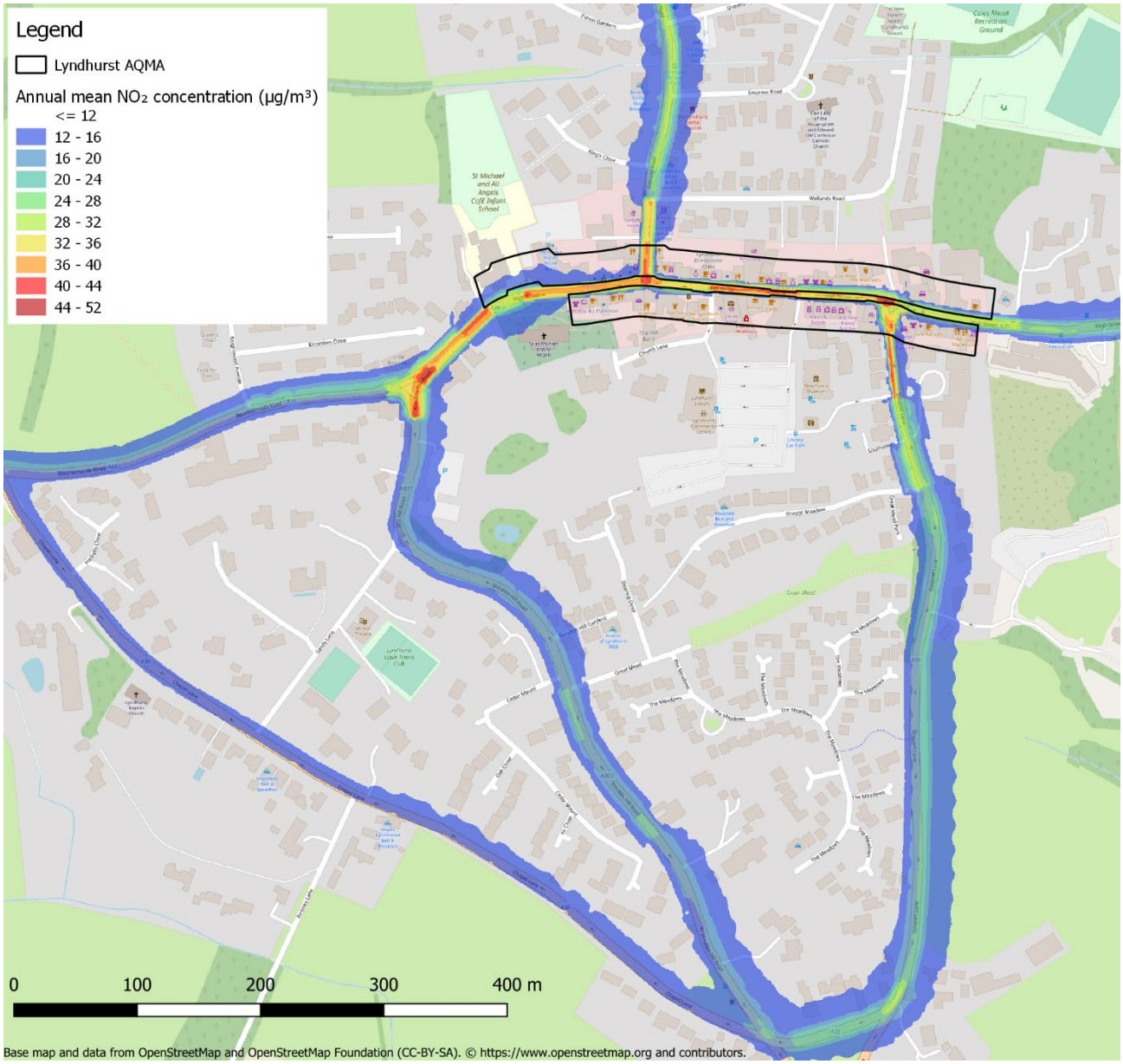
Based on the data available, the modelling suggests that provided that monitoring data for 2022 matches the trends described above, the AQMA could be revoked without risk of future exceedances.

APPENDIX A: MAPPED NO_2 CONCENTRATIONS ACROSS THE ENTIRE MODEL DOMAIN

2019 Baseline

Figure A-1 presents annual mean NO_2 concentrations in the Lyndhurst AQMA in the 2019 baseline.

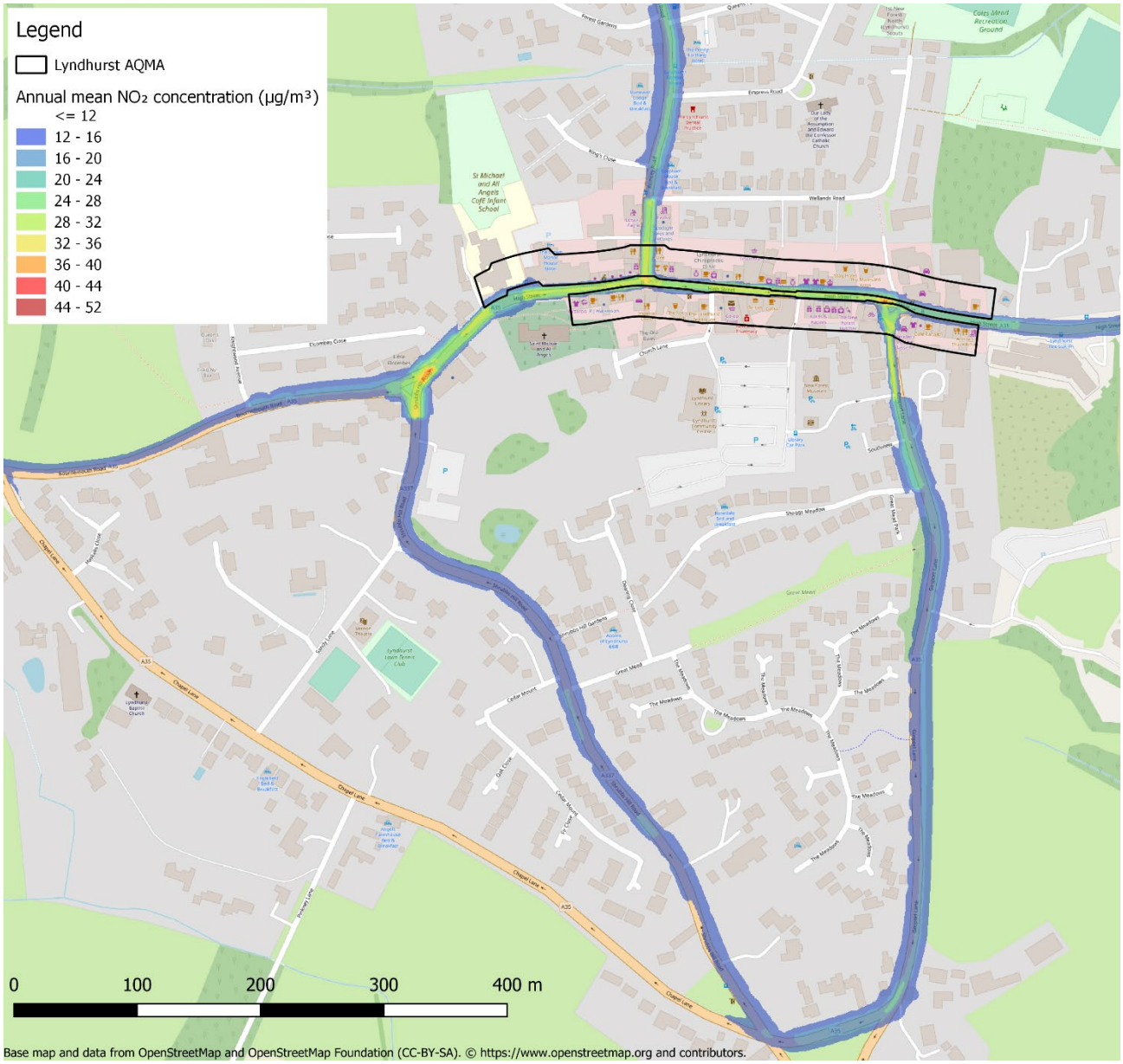
Figure A-1: Predicted annual mean NO_2 concentrations, 2019, $\mu g.m^{-3}$



2023 Baseline (Scenario 1)

Figure A-2 presents annual mean NO_2 concentrations in the Lyndhurst AQMA in the 2023 baseline.

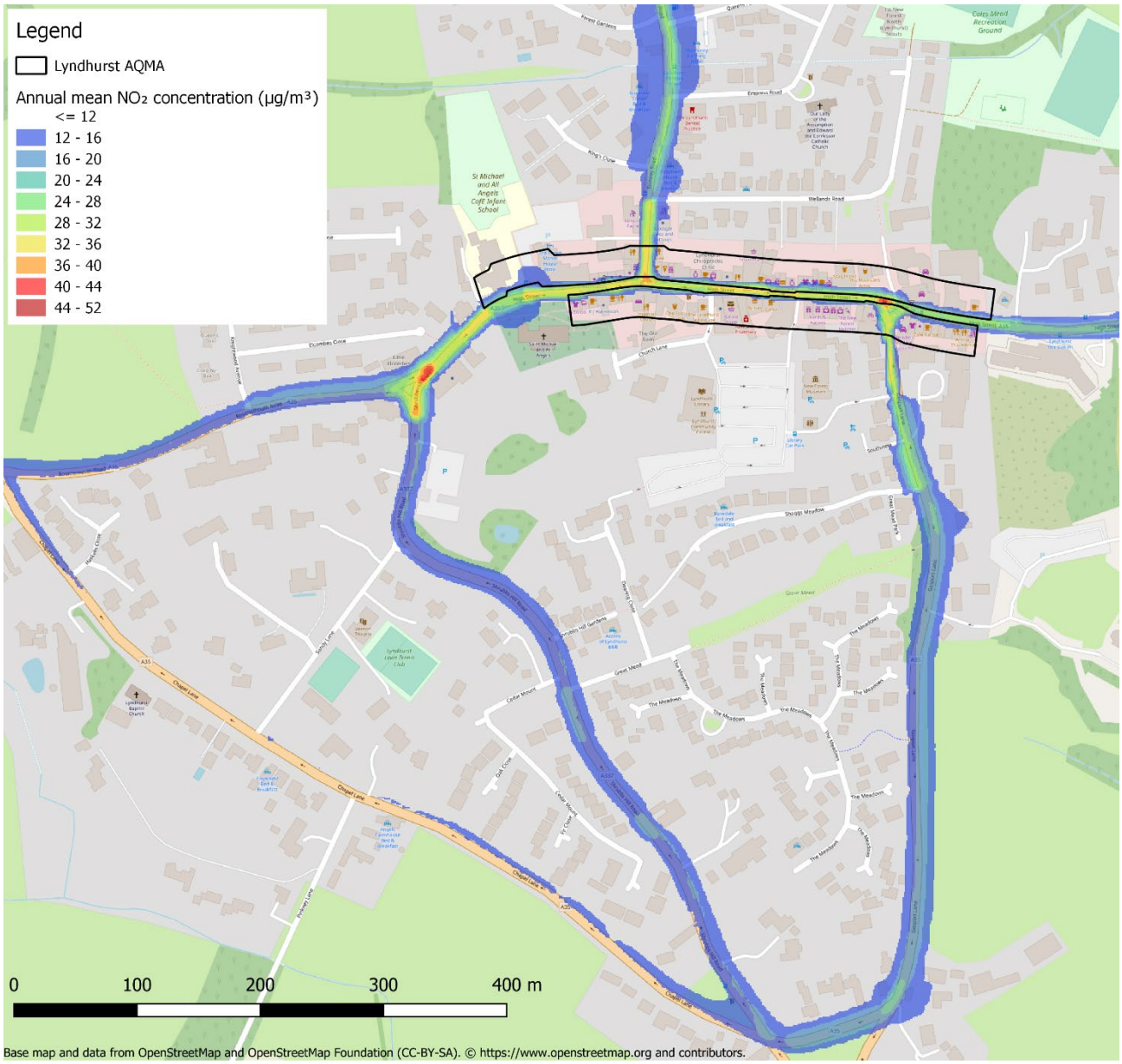
Figure A-2: Predicted annual mean NO_2 concentrations, 2023 baseline, $\mu g.m^{-3}$



2023 Scenario 2: 25% more traffic

Figure A-3 presents annual mean NO_2 concentrations in the Lyndhurst AQMA with 25% additional traffic on each road.

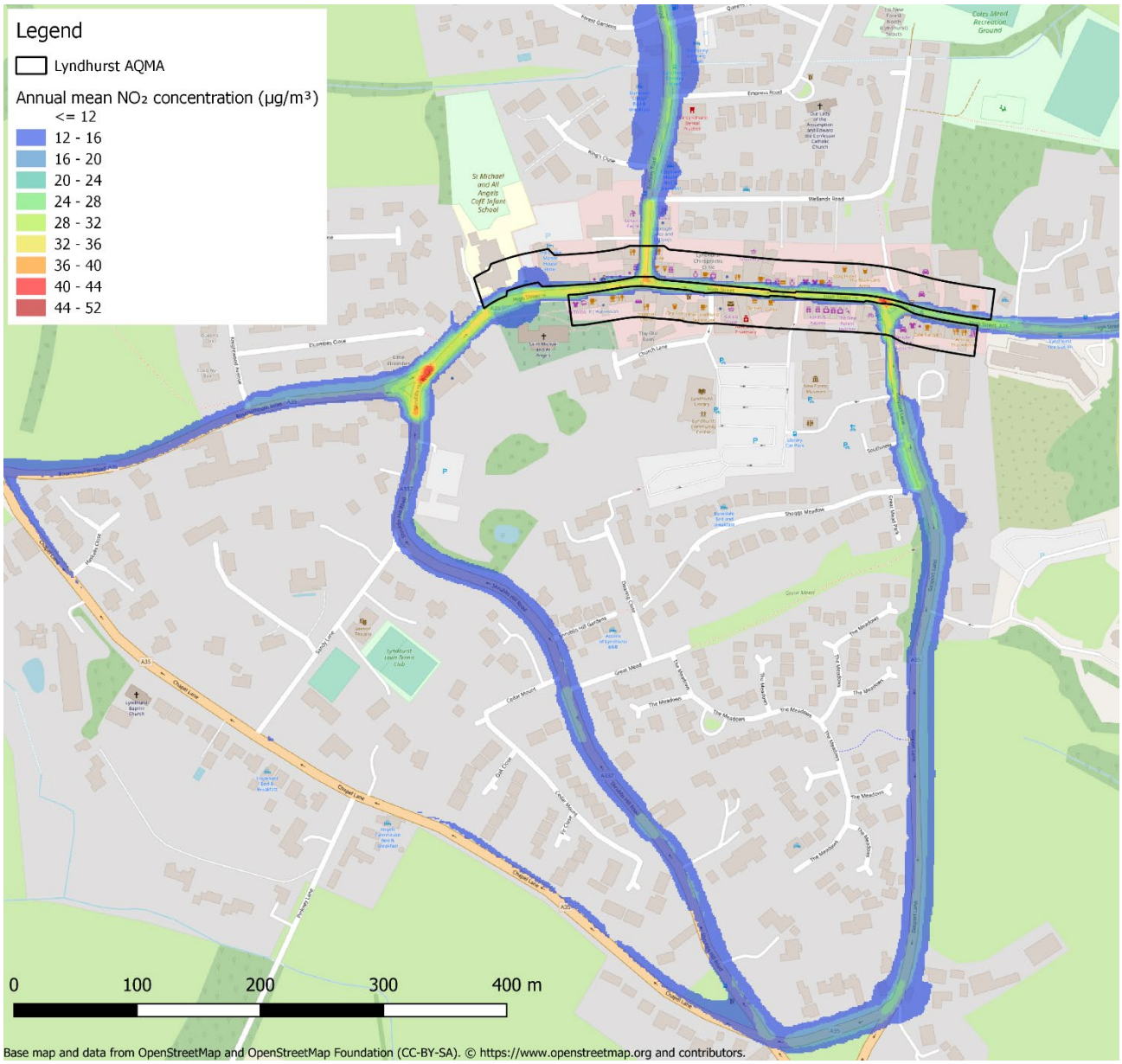
Figure A-3: Predicted annual mean NO_2 concentrations, 2023 with 25% more traffic, $\mu g.m^{-3}$



2023 Scenario 3 – 2023 with 2021 fleet composition

Figure A-4 presents annual mean NO_2 concentrations in the Lyndhurst AQMA with fleet turnover delayed by 2 years (i.e. using the projected vehicle fleet for 2021).

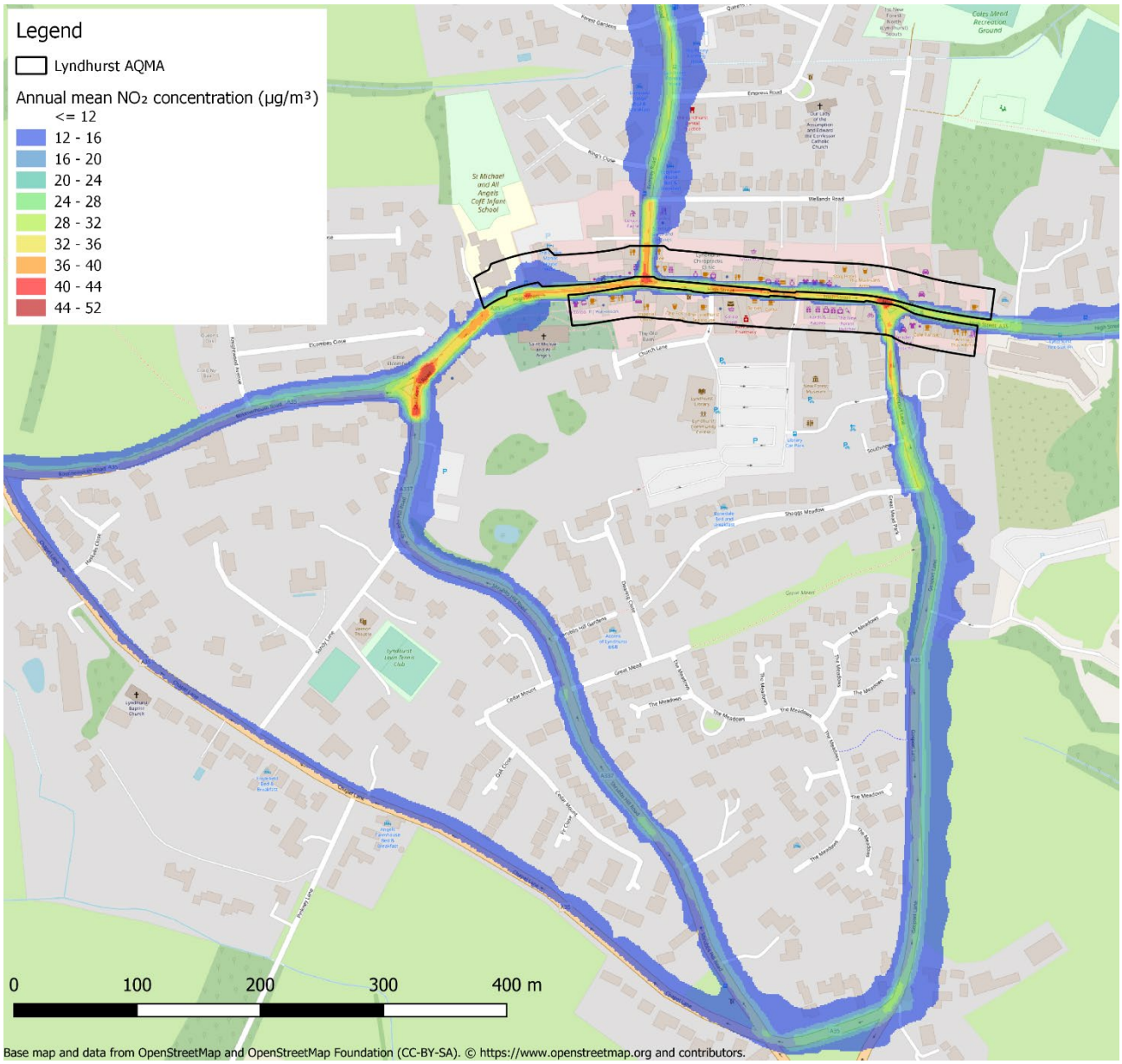
Figure A-4: Predicted annual mean NO_2 concentrations, 2023 with delayed fleet renewal, $\mu g.m^{-3}$



2023 Scenario 4: 2023 with 25% additional traffic and 2021 fleet composition

Figure A-5 presents annual mean NO_2 concentrations in the Lyndhurst AQMA with fleet turnover delayed by 2 years (i.e. using the projected vehicle fleet for 2021) and traffic volumes increased by 25% on all roads.

Figure A-5: Predicted annual mean NO_2 concentrations, 2023 with 25% more traffic and delayed fleet renewal, $\mu g.m^{-3}$



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