Sefton Metropolitan Borough Council

Annual Status Report 2024

Bureau Veritas

July 2024

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Document Control Sheet

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Sefton Council

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: July 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Sefton Metropolitan Borough 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 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

During 2023, Sefton Metropolitan Borough Council continued to undertake an extensive monitoring programme including both passive and automatic methods, as part of its ongoing Local Air Quality Management responsibilities.

There were no exceedances of the relevant air quality objectives in Sefton for NO_2, PM_{10} or $PM_{2.5}$ and there is a general decreasing trend across all pollutants recorded. Although the monitoring did indicate that there are a number of discrete areas in southern parts of the Borough where concentrations are within 10% of the AQS objective and could therefore represent areas of continued exceedance.

The following locations have been previously identified as areas of concern in Sefton and are currently designated Air Quality Management Areas (AQMAs). The pollutant(s) which each AQMA has been designated are shown in brackets alongside the corresponding criteria:

- Lathom Close, Princess Way, Seaforth (Annual Mean NO_2, 40µg/m^3);
- Millers Bridge/Derby Road junction, Bootle (Annual Mean NO_2, 40µg/m^3 and 24-hour Mean PM_{10}, 50µg/m^3 not to be exceeded more than 35 times a year);
- South Road/Crosby Road North junction, Waterloo (Annual Mean NO_2, 40µg/m^3); and,
- Hawthorne Road/Church Road junction, Litherland (Annual Mean NO_2, 40µg/m^3).

Maps have been produced showing the extent of the AQMAs in Appendix D. These can also be viewed on the DEFRA UK Air website.

In Sefton, road traffic is the main source of NO_2, PM_{10} and $PM_{2.5}$, particularly emissions from Heavy Goods Vehicles (HGVs), Light Goods Vehicles (LGVs) and diesel cars. Emissions from activities associated with the Port of Liverpool also have an impact on air quality in the Bootle and Seaforth area.

Current Air Quality Levels in Sefton

During 2023, All automatic monitoring sites within Sefton were compliant with the NO_2 AQS (Air Quality Standard) objective with no reported exceedances of the 1-hour mean objective, concentrations of 200µg/m^3 more than 18 times per year.

Automatic monitoring locations CM2 – Crosby Road North, CM4 – Princess Way and CM5 – Hawthorne Road recorded reductions in NO_2 concentrations when compared to 2022 levels. Concentrations at the CM3 – Millers Bridge location remained stable at 32.1µg/m^3,

showing no change since 2022. The data does not currently indicate a return to concentrations observed pre-pandemic.

For the passive monitoring programme, 73 sites reported a decrease in NO_2 concentrations when compared to 2022 levels and 10 reported an increase. It should be noted that all 87 locations recorded concentrations below the AQS annual mean objective during 2023.

The maximum annual average NO_2 concentration recorded in 2023 was 38.8µg/m^3 at BR – Derby Road, Bootle site which is located within the Millers Bridge AQMA (AQMA 3). The BR monitoring position is not considered a representative location of relevant exposure. As such, the concentration at the nearest receptor for this location was estimated using the distance correction via the DEFRA Diffusion Tube Processing Tool. Following distance correction, the predicted concentration at the receptor for BR – Derby Road, Bootle was still within 10% of the AQS objective and could therefore represent an area of continued exceedance within AQMA 3.

Compliance of both the annual mean PM_{10} AQS objective (40µg/m^3) and the 24-hour PM_{10} AQS objective has been achieved at all relevant automatic monitoring stations during 2023. CM3 – Millers Bridge, CM4 – Princess Way and CM5 – Hawthorne Road have all recorded reductions in PM_{10} concentrations when compared to 2022 levels. The maximum annual mean concentration recorded during 2023 was at CM5, 20.5µg/m^3. Concentrations at the CM7 – Regent Road location have remained stable at 12.9µg/m^3, showing no change since 2022.

All three automatic monitoring sites recorded $PM_{2.5}$ concentrations well below the current $PM_{2.5}$ target of 20µg/m^3. The maximum annual mean concentration recorded was 9.4µg/m^3 at CM3 – Millers Bridge. Overall concentrations appear to be stable and consistent with previous levels during the last five years.

The extensive air pollution monitoring programme will continue in 2024 and beyond to determine future trends and compliance in Sefton.

Members of the public can view current and existing pollutant levels throughout Sefton on the council's Breathing Space website.

Previous Annual Air Quality Status Reports can also be viewed here.

Working in Partnership to Improve Air Quality

As in previous years Sefton Council's Officers continue to work closely with a number of internal and external partners with the objective of collaboratively improving air quality in the Borough. Within Sefton Council an Air Quality Members Reference Group acts as a strategic steering group to oversee the work being undertaken in respect of Air Quality within the Borough. The inter-departmental group meets on a regular basis and attendees include Cabinet Members along with Senior Officers from Environmental Health, Highways, Planning, Public Health and Communications teams.

Officers regularly work with external partners outside the Council including National Highways, the Liverpool City Region Combined Authority, The Environment Agency, Public Health England, Merseytravel and Peel Ports (who operate the Port of Liverpool).

In addition, Sefton Council's Air Quality Officers attend regular scheduled meetings with air quality officers from other local authorities within the Merseyside & Cheshire region, through the Merseyside and Cheshire Air Quality Management Group, to discuss air quality issues and how to improve air quality within the wider Liverpool City Region and Cheshire. This group includes Liverpool City Region air quality officers from Sefton Council, Liverpool City Council, St Helens Council, Knowsley Council, Wirral Council, Halton Borough Council, and officers from Cheshire East, Cheshire West and Chester Councils.

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[3] 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 that is most harmful to human health. The Air Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

[3] DEFRA. Environmental Improvement Plan 2023, January 2023

[4] DEFRA. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

The Road to Zero[5] 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 AQMAs are designated due to elevated concentrations heavily influenced by transport emissions.

The following air quality actions have been progressed during the 2023 reporting year.

HGV Emissions Monitoring Enforcement Project

Officers from Sefton working in collaboration with Driver and Vehicle Standards Agency (DVSA) Inspectors have now undertaken three joint vehicle emissions monitoring and enforcement activities, in December 2021, September 2022 and most recently in September 2023. The monitoring aimed to identify HGVs travelling along the A5036, A565 and motorway network which were emitting unacceptable levels of air pollution thus potentially indicating emission control system tampering or faults.

During the most recent exercise in September 2023 sophisticated air pollution monitoring equipment was installed in DVSA stop cars and levels of Nitrogen Oxides (NO_x) and Particulate Matter (PM) were monitored in live traffic to detect suspect vehicles. The DVSA were also testing a new Particulate Monitor (Total Particle Count) in anticipation of bringing in HGV particulate emission limits as part of the HGV MOT.

Exhaust plume emissions from 230 vehicles were monitored over the two-day project. 11 suspect vehicles were stopped at the switch Island DVSA inspection site and subject to further detailed examination by DVSA inspectors. Unexpectedly, only one vehicle was found to have a fault with the emission control system. All other vehicles stopped were operating within acceptable parameters for the age of vehicle.

Compared to previous years very few HGVs were identified for high NO_x emissions and those stopped did not show faults. More HGVs were identified for high PM emissions when followed but when tested using the DVSA MOT Particulate Monitor they were found to be within acceptable parameters for the age of the vehicle.

The study suggests that fewer HGVs are operating with cheat devices and/or emission control faults than previous years which is obviously positive and may be one of the

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

factors that has led to the reductions in NO_2 and PM observed when analysing the monitoring data. To ensure this trend continues further joint work is being considered, potentially targeting LGVs/private cars and exploring the use of remote sensors and roadside monitoring equipment to detect suspect vehicles.

School Streets Air Quality Monitoring

Officers from Highways and Environmental Health are currently working on a joint air quality monitoring project as part of Sefton's School Streets initiative to help evaluate the effectiveness of the School Street restrictions. A School Street is a road outside a school with a temporary restriction on motorised traffic at school drop-off and pick-up times. The restriction applies to school traffic and through traffic. The School Street schemes offer a proactive solution for school communities to tackle air pollution, poor health and road danger reduction.

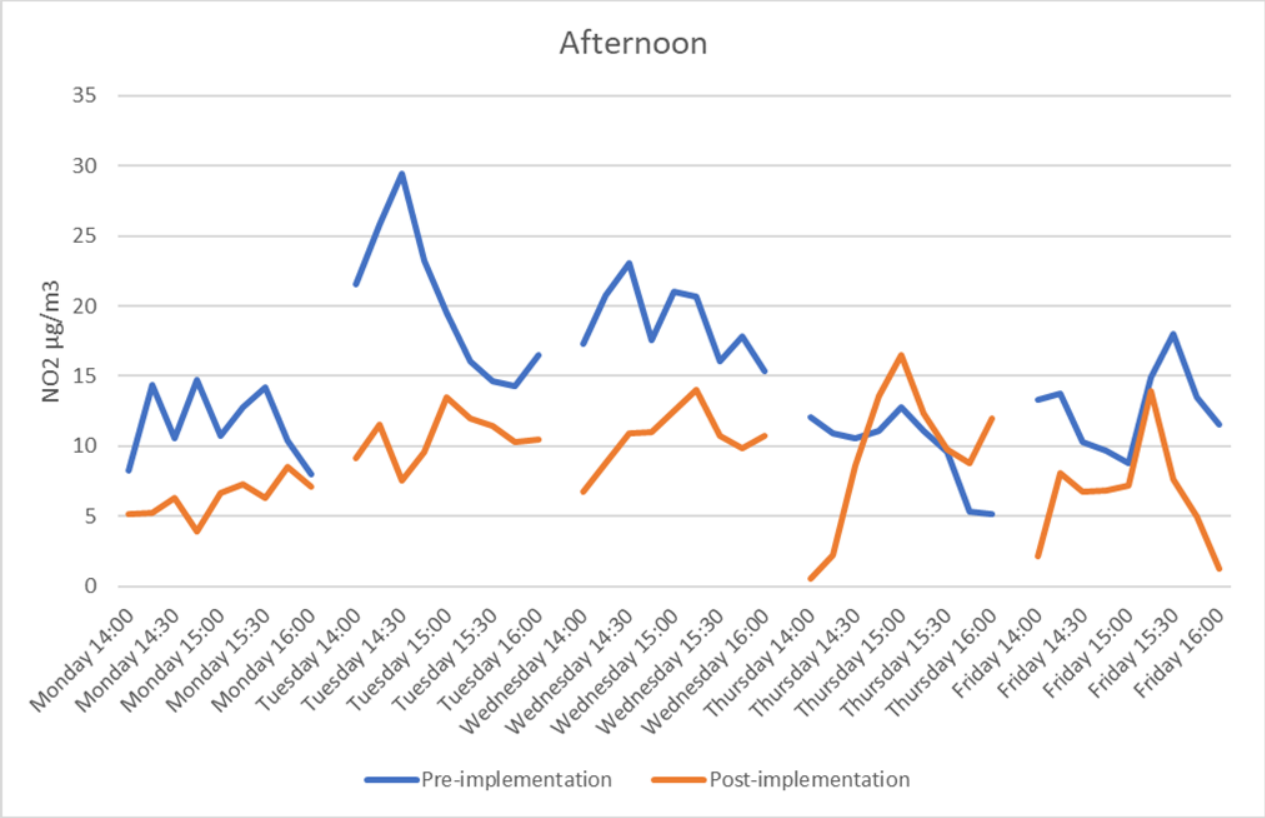
Four lower cost automatic air quality sensors have been installed to monitor air quality levels around schools participating in the project.

- Stanley High School-Marshside Road (Sensor installed June 2022);
- Birkdale High School-Windy Harbour Road (Sensor installed June 2022);
- Greenbank High School-Hastings Road (Sensor installed June 2022); and,
- Bedford Primary-Quarry Road (June 2023).

Pollutant levels were monitored initially prior to restrictions coming into force to allow effective evaluation of the measures.

Analysis of the air quality monitoring results at Greenbank and Birkdale show noticeable differences between pre-implementation and post-implementation with short term levels of NO_2 during drop off and pick up times notably higher prior to school streets restrictions coming into force compared to levels following the implementation of the measures as shown in Figure 1.

Figure 1: Monitoring Data from Greenbank High School Afternoon Period Pre-Implementation (26th-30th June 2023) and Post-Implementation (3rd-7th July 2023)



The results to date show that the restrictions are having a positive effect on improving short term air quality in the locality and will form part of the more extensive overall project evaluation which will follow. Officers are looking to include further sensors at schools as the roll out of the project continues.

Further information on the school streets project can be found here.

Traffic Signal Update and Incorporation of Air Quality Sensors

As part of a City Region Traffic Signal Upgrade project, funding for seven air quality sensors (Earthsense Zephyr) was secured which are now operational. The sensors are located at seven key traffic light junctions in the Borough and integrated into Sefton's traffic signal control system.

Real time air pollution data is now available from the sensors at these key locations, which can also be used to trigger specific traffic signal strategies to alleviate congestion if levels of localised pollution are of concern. Officers from Highways and Environmental Health are currently working together to develop potential traffic light strategies based on the sensor outputs.

SCOOT Validation and Strategy Development Project

Officers from Environmental Health are currently working with Highways Officers and Yunex Traffic on a joint project which will entail the revalidation of the SCOOT (Split Cycle and Offset Optimisation Technique) urban traffic light control system at 20 key traffic light-controlled junctions and nine crossings situated on Moor Lane, Crosby Road North, Derby Road, Dunnings Bridge Road, Southport Road and Northway.

Surveys will be carried out at each of the key junctions/crossings to determine how effectively the junction is currently functioning in terms of traffic flow and minimising air pollution.

Based on the outcome of the surveys, new strategies will be developed which will be aimed at improving traffic flow and managing the air quality issues in the locality. The new strategies will be incorporated into Sefton's SCOOT system and then tested for effectiveness.

Conclusions and Priorities

Poor air quality is a public health issue that can cause negative impacts for those who are exposed to it and affect quality of life. Air pollution can be harmful to health at all concentrations, whether above or below the air quality objectives so this remains a key issue for Sefton Metropolitan Borough Council.

Exposure to NO_2, whether short or long term is known to cause respiratory infections, airway inflammation and aggravates the symptoms of those suffering from chronic lung conditions such as asthma and chronic obstructive pulmonary disease.

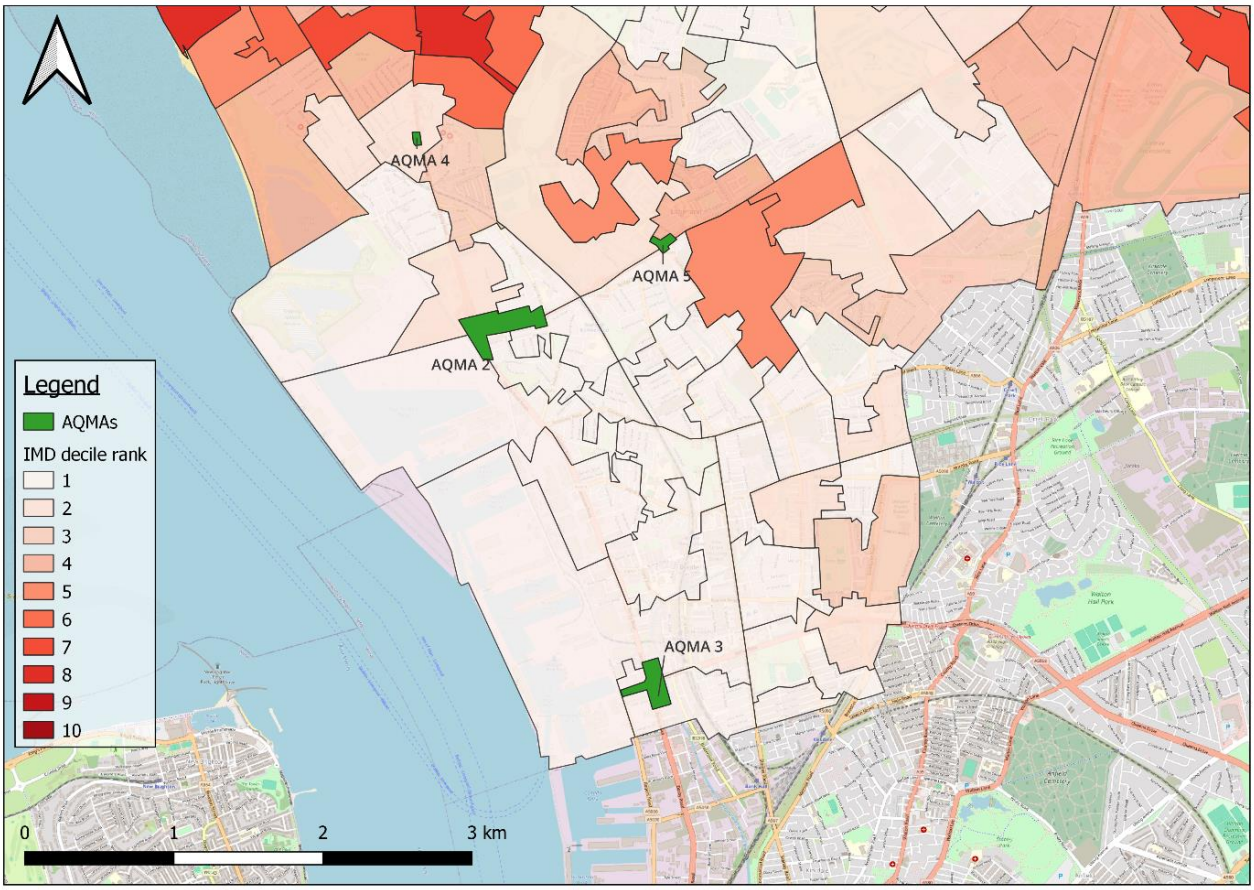
Fine particulate matter (particles of a diameter of 2.5µm and below) has been identified as a significant health risk as its small size means that it is easily able to access the nose, throat, lungs and bloodstream leading to increased mortality and morbidity from cardiovascular and respiratory issues. Evidence has also been found linking higher rates of particulate matter to increased risk of dementia and the International Agency for Research on Cancer has classified particulate matter as carcinogenic to humans.

According to Government data, the fraction of mortality for the population of Sefton that can be attributed to particulate air pollution is 5.9% of the population. This compares to averages of 5.3% for the northwest region and 5.5% for England (the highest for a local authority area in England is 7.2%).

The Consumer Data Research Centre (CDRC) provide Index of Multiple Deprivation (IMD) datasets for the UK. The levels of deprivation within the UK are measured through consideration of a number of broad themes, these include income, employment, education, health, crime, barriers to housing services, and the living environment. IMD data was gathered for Sefton and reviewed in relation to proximity to AQMAs and diffusion tube monitoring sites. The IMD dataset ranks areas from most deprived (rank 1) to least deprived (rank 10). The areas are also split into 10 bandings known as deciles.

Review of the IMD dataset has shown that the AQMAs declared by Sefton Metropolitan Borough Council are located in the areas which represent the top three most deprived deciles in Sefton. Figure 2 presents this analysis.

Figure 2: IMD Decile Rankings within AQMA's Declared by Sefton Metropolitan Borough Council



As can be seen in Figure 2, AQMA 2 and AQMA 3 are in areas which represent some of the most deprived deciles in Sefton. AQMA 4 is located within a decile which is ranked one of the second most deprived areas, and AQMA 5 is located within a decile which is ranked one of the third most deprived areas.

Sefton is therefore focusing its efforts on improving air quality in its AQMAs and surrounding areas where Sefton's most deprived and vulnerable residents reside.

To ensure appropriate targeted measures are developed to tackle air pollution in these areas it is essential to fully understand the effects that the predicted increase in HGVs due to the expansion of the Port of Liverpool will have on air quality and how this can be mitigated to protect the health and wellbeing of residents living close to the Port and main access routes. Due to the scale of the expansion, there is potential for this to impact on air quality in existing AQMAs and also impact on public exposure at residential locations on Port access routes.

The Port of Liverpool has recently undergone a £300 million expansion. Although the expansion is expected to bring economic benefits to the region, it is also predicted to lead to a significant increase in HGVs using the A5036, the main port access route, and to a lesser extent the A565, and will pass through three of Sefton’s AQMAs, potentially leading to a worsening of air quality in areas that were previously identified as having poor air quality and congestion, particularly the A5036.

In addition to measures being developed by Sefton to manage current and future air quality issues associated with increasing traffic levels, National Highways who manage the A5036 are currently progressing a route improvement option known as POLAS (Port of Liverpool Access Scheme).

An Offline route option through Rimrose Valley has been chosen by National Highways as the preferred option. Further detailed assessment and design of this option is now underway by National Highways and their appointed consultant. The COVID pandemic has delayed the project significantly however the various studies and assessments have now recommenced. National Highways is currently working to understand the impact of the pandemic on the proposed scheme. Changes in trade patterns following Brexit, initiatives like the Freeport, local employment and commuting habits since the pandemic struck in early 2020, need to be considered. As a result, traffic modelling is due to be updated and an updated project plan will be released.

Sefton will need to fully understand National Highways’ proposed scheme and the impact it will have on local air quality, particularly within the designated AQMAs. Further details regarding the project and progress can be found here.

Local Engagement and How to get Involved

Sefton continues to engage with the community on air quality and uses a number of different techniques to facilitate this.

Sefton Metropolitan Borough Council is using our internet based 'Your Sefton Your Say' (YSYS) consultation hub to provide information to the public about specifics studies and air quality matters in general. The YSYS hub can be accessed here.

Real time data from Sefton's monitoring network can be viewed by the public using Sefton's Breathing Space website. Historical information and air quality reports are also available here.

Sefton's air quality officers have completed a DEFRA air quality grant funded domestic solid fuel behaviour change project with the aim of reducing particulate emissions from the burning of this fuel. Additionally, a public website was developed which provides information and advice on this topic for residents who may be using solid fuel stoves/fires and businesses selling stoves and/or fuels. The website can be found here.

Sefton has recently completed a DEFRA grant funded schools air quality education project. Part of the project included the development of an immersive room at Sefton's Ecocentre. The immersive room is now fully operational and being used as an educational and engagement tool on air quality for school pupils and the wider community alike. Sefton's Clean Air Crew website which was designed to engage with school children, teachers and parents has also been further developed as part of the grant project. This can be found here.

Simple Actions Which Can be Taken to Help Reduce Air Pollution

There are a number of things the public can do to help improve air quality in their area. These include:

- Reducing the use of your car and consider cycling, walking, or using public transport. 55% of car journeys are less than five miles. Many of these trips could be walked or made by bike or public transport.
- Consider car sharing. When two or more people share a car and travel together, it allows people to benefit from the convenience of the car, sharing travel costs, whilst helping to reduce congestion and air pollution.
- When using your car consider taking an ‘eco-driving’ approach. This can not only save you money in reduced fuel costs but also reduce emissions of air pollutants and impact on climate change. This includes:
    - Regular maintenance and servicing of your vehicle according to the manufacturers schedule to maintain the engine’s efficiency;
    - Making sure your tyres are inflated to the manufacturer’s recommended pressures. Under-inflated tyres create more rolling resistance and so use more fuel;
    - Removing unused roof racks or roof boxes to reduce wind resistance and not overloading your vehicle or carrying unnecessary weight;
    - Reducing your use of air conditioning which increases fuel consumption at low speeds;
    - Avoid warming up your car while stationary this can consume more fuel and increase pollution. If you start driving immediately, the engine will reach its working temperature quicker;
    - Avoiding unnecessary idling of your car engine when in traffic or waiting to pick up people;
    - Driving smoothly and avoiding sharp acceleration and harsh braking;
    - Shifting into a higher gear as soon as possible; Maintaining a steady speed, using the highest gear possible as soon as possible between 2000rpm and 2500rpm to keep your engine working most efficiently; and
    - The faster you go, the greater the fuel consumption and pollution. For example, driving at 70mph uses up to 9% more fuel than at 60mph and up to 15% more than at 50mph.

- Consider purchasing a lower emissions, hybrid or electric vehicle or high efficiency petrol vehicle.
- If possible, avoid driving during the morning and evening peak times as levels of congestion and therefore air pollution will be highest.
- If stationary in a traffic jam, traffic lights or at a pelican crossing for over 30 seconds, switch off your engine to reduce air pollution.
- Don't burn garden or domestic waste. This not only releases pollutants into the atmosphere, but it can also cause a nuisance to your neighbours. All waste should be either disposed of or recycled. Details of waste and recycling facilities in Sefton can be found here.
- Should I burn wood? Air pollution affects the health of everyone in Sefton. Along with emissions from transport and construction, burning wood and other solid fuels can contribute to this air pollution problem. The main pollutant emitted by solid fuel burning is ultra-fine particulate matter, also known as $PM_{2.5}$. This pollutant is not visible to the naked eye, so even "smokeless" fuels and appliances may be causing pollution.
- If you need to burn solid fuels to heat your home, choosing what you burn and how you burn it can make a big difference to the pollution it creates.
- Parts of Sefton are designated as Smoke Control Areas and the type of fuel and/or appliance you are allowed to use is restricted in these locations. You can check if your property is in one of Sefton's Smoke Control Areas here.
- Open fireplaces are the most polluting way to burn solid fuels. Using a well-designed, properly installed stove or appliance can make a big difference.
- As a minimum, you should make sure that your stove meets the legal requirements, but even approved stoves can emit high levels of pollution. The Stove Industry Alliance has recently introduced the "Eco-design Ready" label.
- An Eco-design Ready stove can emit up to 80 per cent less pollution than a normal DEFRA approved appliance. An up-to-date list of these stoves can be found on the HETAS website.
- Any stove or fireplace should also be properly maintained, and your chimney should be swept regularly.
- If you are using an open fireplace it is recommended that you should only burn smokeless fuels, if in doubt ask your supplier.

Local Responsibilities and Commitment

This ASR was prepared by Bureau Veritas on behalf of Sefton Metropolitan Borough Council with the support and agreement of the following officers and departments:

Peter Moore- Assistant Director (Highways and Public Protection)

Greg Martin- Environmental Health and Licensing Service Manager (Highways and Public Protection)

Helen Cumiskey - Manager/ Strategic Transport Planner (Highways and Public Protection)

Andrew Dunsmore - Transport Planning Manager (Highways and Public Protection)

This ASR has been approved by:

Peter Moore- Assistant Director (Highways and Public Protection)

This ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to Greg Martin at:

Mr Greg Martin

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Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Sefton Metropolitan Borough 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 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 Sefton Metropolitan Borough 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

2.1 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 AQAP within 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

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

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

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 2 Princess Way	Declared 2009, Amended 2015, 2016	NO_2 Annual Mean	An area encompassing a number of residential properties from the Ewart Road flyover, Princess Way (A5036) up to and including the Roundabout and flyover at the junction with Crosby Road South (A565)	YES	45.8 µg/m^3	31.5 µg/m^3	4 years	Draft Air Quality Action Plan for Sefton Council, 2015	Draft Air Quality Action Plan for Sefton Council for Air Quality Management Areas 1 - 5
AQMA 3 Millers Bridge	Declared 2009, Amended 2015, 2016	NO_2 Annual Mean PM_{10} 24-Hour Mean	An area encompassing a number of residential properties around the junction of Millers Bridge (A5058) and Derby Road (A565)	NO	60 µg/m^3 46 hours	36.8 µg/m^3 4 hours	0 years Over 5 years	Draft Air Quality Action Plan for Sefton Council, 2015	Draft Air Quality Action Plan for Sefton Council for Air Quality Management Areas 1 - 5

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
AQMA 4 South Road	Declared 2012, Amended 2015, 2016	NO_2 Annual Mean	An area encompassing the Liver Hotel and a number of residential properties around the junction of Crosby Road North (A565) and South Road	NO	48 µg/m^3	32.9 µg/m^3	4 years	Draft Air Quality Action Plan for Sefton Council for Air Quality Management Areas 1 - 5	Draft Air Quality Action Plan for Sefton Council for Air Quality Management Areas 1 - 5
AQMA 5 Hawthorne Road	Declared 2012, Amended 2015, 2016	NO_2 Annual Mean	An area encompassing a number of residential properties around the junction of Hawthorne Road (B5058) and Church Road (A5036)	YES	42.6 µg/m^3	31.9 µg/m^3	4 years	Draft Air Quality Action Plan for Sefton Council for Air Quality Management Areas 1 - 5	Draft Air Quality Action Plan for Sefton Council for Air Quality Management Areas 1 - 5

☒ **Sefton Metropolitan Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Sefton Metropolitan Borough Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Sefton Metropolitan Borough Council

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

"The report is written to an extremely high standard and can be considered as an exemplar "best practice report" for other councils to try and replicate."

The following comments were designed to help inform Sefton Metropolitan Borough Council 2024 ASR:

1. Extensive Trend graphs and analysis have been provided for all monitoring data including diffusion tubes, which is commended.
    - Trend graphs and analysis have been provided.
2. It is encouraging to see the council considered the comments made during the previous appraisal and actively made an effort to address all of these actions for this year's ASR.
    - Appraisal comments have been reviewed and addressed.
3. The Council have provided excellent mapping of all monitoring locations within the district.
    - Mapping for all monitoring locations has been provided.
4. The Council are commended for measures implemented to improve air quality during 2022. Sefton Metropolitan Borough Council has developed site specific measures to address particular air quality issues within each individual AQMA, which is demonstrative of good practice.
    - Air quality measures developed and implemented during 2023 are shown in Table 2.2.
5. As mentioned in previous appraisals, it is not clear within the report that the council have triplicate co-location sites, from which the local factor has been derived, or which of the sites (automatic and passive) these are. This should be indicated in Table A.2 within the 'Tube Co-located with a Continuous Analyser' column. It is recommended that it is indicated within this column which automatic monitoring site the co-location relates to. It would also be beneficial for Table C.3 to be labelled with which automatic monitor each local bias factor relates to.

- Sefton Metropolitan Borough Council operate four triplicate co-location studies, shown in Table A.2. Table C.3 has been labelled to provide clarity regarding which automatic monitor is referenced.

6. If triplicate (or duplicate) diffusion tube sites are presented, the data for these sites should be processed correctly for presentation within Tables A.4 and B.1, by deriving the average annual mean in line with the guidance in LAQM.TG(22), for presentation within next year's ASR. The council should contact the LAQM Helpdesk if assistance is required.
    - Triplicate data has been processed for presentation within Tables A.4 and B.1.
7. The report includes detailed discussion of the measures the council are taking to address $PM_{2.5}$, which is welcomed. It is recommended that the council includes their discussion around monitored concentrations alongside any links to the Public Health Outcomes Framework and fraction of mortality attributable to $PM_{2.5}$ emissions. Comparisons to the regional and national averages would be welcomed and are encouraged to be included in all future reports.
    - Commentary provided in Section 3.3 in regard to $PM_{2.5}$ concentrations and the Public Health Outcomes Framework.

The comments made in the 2023 appraisal have been detailed and responded to within this 2024 ASR as outlined above.

Sefton Metropolitan Borough 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. 17 measures are included within Table 2.2, with the type of measure and the progress Sefton Metropolitan Borough Council have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

Despite the positive effects of changed commuting habits, since the COVID-19 pandemic, on reducing levels of air pollution in 2020/2021, Sefton has observed traffic on key Port access routes (A565 and A5036) returning to pre-COVID-19 levels. In addition, HGV traffic associated with the expansion of the Port of Liverpool is predicted to increase significantly in the coming years. As such there are likely to be challenges ahead to ensure levels of NO_2 in some of Sefton's AQMAs, particularly those impacted by traffic entering and leaving the Port of Liverpool, remain below the national air quality standard.

As reported in last year's ASR, Sefton's AQAP required updating. A draft AQAP has been submitted to Defra which has recently been approved. External consultation with stakeholders and the public on the draft AQAP is due to commence imminently. The AQAP will be available via the link contained within Table 2.1. The development of Sefton's draft AQAP and proposed air quality improvement actions detailed in Table 2.2 follows on from an initial study by consultants AECOM into the feasibility of implementing a Clean Air Zone (CAZ) to reduce traffic related emissions. The AECOM report found that a Charging CAZ could potentially deliver more rapid improvements in NO_2 than more traditional air quality improvement measures.

Following on from the Preliminary CAZ feasibility study, Sefton's Cabinet gave approval for Officers to progress the development of a detailed Outline Business Case (OBC) for the potential implementation of a Sefton based CAZ, in line with the approach recommended by DEFRA. AECOM were commissioned in 2020 to undertake the additional detailed air quality and transport modelling work.

The modelling work undertaken as part of the OBC identified several future NO_2 exceedances resulting from the predicted increase in Port related traffic. Several different CAZ scenarios were then tested to determine which would be the most effective and efficient in terms of reducing traffic related NO_2.

The work to develop the OBC for the creation of a Sefton based CAZ is complete, with the main proposal, comprising a HGV Charging CAZ scheme that aims to address persistent air quality issues identified within Sefton in the shortest time possible. The CAZ scheme preferred option (referred to as 'Option 2A') features a charging CAZ applied to non-compliant HGVs (Euro 5 and older) that cross into a designated section of the Sefton highway network. The preferred option HGV CAZ is focused on the A565 and A5036 corridors, incorporating all four of the existing AQMAs.

Following completion of the OBC, detailed stakeholder engagement took place in relation to the possible CAZ implementation. A number of significant observations and challenges were raised by the stakeholders on the preferred option which required further detailed consideration by officers.

In response, additional technical studies and assessments have been undertaken including an updated Automatic Number Plate Recognition (ANPR) study to determine the current make up and age of Sefton's vehicle Fleet and an updated natural compliance assessment to determine when the predicted NO_2 exceedances would become naturally compliant.

The outcome of the stakeholder engagement indicates that progression to Full Business Case for a HGV Charging CAZ would be extremely challenging and given the analysis of the most recent ANPR study and compliance assessment may not be the most appropriate way forward. Consequently, the implementation of a CAZ is not being considered as a current air quality improvement action within the AQAP.

Notwithstanding this, the work undertaken as part of the OBC, and recent technical assessments has provided vital information on the air quality issues in Sefton and where to target our actions.

A package of non-CAZ measures and actions has therefore been developed to tackle current and future air quality issues within the AQMA's and wider Borough.

Sefton Metropolitan Borough Council's priorities for the coming year include mitigating the impact of the port expansion specifically in AQMA 2, AQMA 3 and AQMA 5 to ensure compliance with the NO_2 air quality objective.

A number of measures within Table 2.2 have been completed and the air quality benefits are currently being assessed. During 2023 Sefton Council worked in partnership with the following stakeholders to implement these measures:

- Liverpool City Region Combined Authority;
- National Highways;
- DVSA; and,
- Environment Agency.

A number of actions in Table 2.2 are in the planning stage and will be taken forward in the coming year(s) where possible.

The principal challenges and barriers to implementation that Sefton Council anticipates facing include the identification of appropriate funding sources and the willingness of key stakeholders and port industry/operators to engage and consider/implement improvement actions.

National Highways progress on the AQMA2 SS2 and AQMA5 SS1 measures has been slower than expected due to impact of COVID-19.

Sefton Metropolitan Borough Council anticipates that the measures stated above and in Table 2.2 will help in achieving compliance in AQMA 4 – South Road.

It is anticipated that the measures underway and proposed in Table 2.2 will help contribute to compliance, however further measures may be required to ensure levels of NO_2 remain below the national AQS objective and enable revocation of AQMA2, AQMA3 and AQMA5.

Further details regarding the measures contained within Table 2.2 can be found in Appendix F alongside a review of the previous Air Quality Action Plan Measures.

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
AQMA2 SS2	Port expansion mitigation measure No1 National Highways A5036 Road option study	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2017	2028	National Highways	NH	No	Funded	> £10 million	Planning	No Target pollution reduction set-hard to quantify	Compliance with the NO_2 air quality objective. Strategic highways improvements delivered to timescales	Stage1 offline option chosen by NH/DfT. Detailed assessment underway by NH consultants. Delays due to Covid	Awaiting detailed assessment from consultants
AQMA5 SS1	Port expansion mitigation measure No 1 National Highways A5036 Road options study	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2017	2028	National Highways	NH	No	Funded	> £10 million	Planning	No Target pollution reduction set-hard to quantify	Compliance with the NO_2 air quality objective. Strategic highways improvements delivered to timescales	Stage1 offline option chosen by NH/DfT. Detailed assessment underway by NH consultants. Delays due to Covid	Awaiting consultant report on options
AQMA4 - Junction Improvements	South Road/Crosby Road North Junction improvements	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2018	2020	Sefton	LA	No	Funded	£1 million - £10 million	Completed	No Target pollution reduction set-hard to quantify	Compliance with the NO_2 objective in AQMA	Junction improvement works now completed - Compliance observed in 2018/2019/2020/2021 consideration being given to revocation of AQMA	Junction improvement works now completed - Compliance observed in 2018/2019/2020/2021 consideration being given to revocation of AQMA
AQMA 3 - Junction Improvements	Millers Bridge Junction improvements	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2020	2022	Sefton	LA/CA	No	Funded	£1 million - £10 million	Completed	No Target pollution reduction set-hard to quantify	Compliance with the NO_2 objective in AQMA	Millers Bridge Junction improvement works completed	Works only just completed - commencing review of monitoring data
APM1	Sefton/DVSA emissions monitoring and enforcements project - targeting high emission HGVs/LGVs	Traffic Management	Testing Vehicle Emissions	2024	2026	Sefton, DVSA, Police	Sefton/DVSA	No	Not Funded	£10k - £50k	Planning	Reduced vehicle emissions	Number of vehicles found with high emissions	Currently in planning phase	Currently in discussions with DVSA following completion of a successful project in 2023. Unable to progress without support from DVSA
APM2	Traffic signal strategies optimisation	Traffic Management	UTC, congestion management, traffic reduction	2024	2025	Sefton, Consultants	Internal Funding	No	Fully Funded	£10k - £50k	Implementation	Reduced vehicle emissions	Measured concentration of NO_2 within AQMA's	Traffic consultant engaged work plan in development	SCOOT revalidation taking place at key 20 Junctions and 9 Crossings in Sefton. Upon completion of validation, the consultancy service team will agree preferred locations and set up strategies at the appropriate junctions to assist with managing the air

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
															quality issues in the area
APM3	Explore feasibility of using Air Quality Sensors to trigger traffic light strategies	Traffic Management	UTC, congestion management, traffic reduction	2024	2026	Sefton, Consultants	Internal Funding	No	Not Funded Yet	£10k - £50k	Planning	Reduced vehicle emissions	Measured concentration of NO_2 within AQMA's	Currently in planning phase	Currently in discussions with Traffic Engineers and consultants to explore possibility of using existing AQ sensors to trigger specific traffic light strategies during periods of congestion
APM4	Maritime Corridor (A5036) improvement project	Traffic Management	Strategic Highway Improvement	2025	2027	Sefton Combined Authority, National Highways	External Funding	No	Funded	£1 million - £10 million	Planning	Improved traffic flow, reduced vehicle emissions	Measured concentration of NO_2 within AQMAs	Currently in planning/development phase	Scheme is currently moving to Full Business Case Phase and is focused on improving transport links along the corridor area by improving junctions and introducing walking and cycling routes along Dunnings Bridge Road (A5036), Netherton Way (A5038), Bridle Road, Park Lane, Heysham Road and Atlantic Park Drive
APM5	Targeting location non-compliant HGVs (particularly rigids) to encourage vehicle upgrade	Vehicle Fleet Efficiency	Other	2024	2026	Sefton, Fleet operators, Peel, Port Access SG, Freeport, LCRCA, DfT, JAQU	External Funding Required	No	Not Funded	£100k - £500k	Planning	Reduced vehicle emissions/Number of non-compliant HGVs	Measured concentration of NO_2 within AQMA's	Currently in planning/development phase	Currently developing this action to target most polluting pre-Euro 6 HGVs (particularly rigids)
APM6	Working with Peel Ports to explore further opportunities to reduce HGV related emissions	Freight and Delivery Management	Delivery and Service Plans	2024	2026	Sefton, Peel, Port Access SG, Haulage Companies, Freeport	External Funding Required	No	Not Funded	£100k - £500k	Planning	Reduced vehicle emissions	Measured concentration of NO_2 within AQMA's	Currently in planning/development phase	Currently developing this action
APM7	Working with Peel Ports to explore further opportunities to reduce non-HGV related emissions	Promoting Low Emission Transport	Other	2024	2026	Sefton, Peel Ports, Shipping Companies, Energy Supply Companies, Peel Ports tenant businesses	Some External Funding	No	Not Funded	£10k - £50k	Planning	Reduced vehicle emissions	Hard to quantify	Currently in planning/development phase	Currently developing this action
APM8	Working with LCRCA, Bus Operators and LCRCA Bus Alliance to concentrate compliant fleet in areas with worst AQ	Transport Planning	Other	2024	2026	Sefton, LCRCA, Bus operators	Some External Funding	No	Not Funded	£10k - £50k	Planning	Reduced bus emissions	Measured concentration of NO_2 within AQMA's	Currently in planning/development phase	Currently in development stage. Barriers include willingness of operators to locate fleet on key Sefton routes
APM9	Working with LCRCA, Bus operators and LCRCA Bus Alliance on fleet	Promoting Low Emission Transport	Other	2024	2027	Sefton, LCRCA, Bus operators	Some External Funding	No	Not Funded	£10k - £50k	Planning	Reduced bus emissions	Measured concentration of NO_2 within AQMA's	Currently in planning/development phase	Action currently in development phase. Barriers include funding for newer fleet. Assume not all

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
	improvements: - retrofit grants, - Use of hybrid vehicles, - Implementation of Green Bus Corridor, - Hydrogen buses														vehicles will be compliant with this technology
APM10	Detailed study around Millers bridge to understand significant non-traffic background sources contributing to NO_2 exceedances	Environmental Permits	Other	2024	2026	Sefton, Peel/Port Industries, Environment Agency	External Funding	No	Not Funded	£10k - £50k	Planning	No direct impact	No direct impact	Currently in planning/development phase	Study currently in development phase. Barriers include willingness of port industries to engage/consider improvement measures. Agreeing a feasible scope for the study
APM11	Intensive road and footpath cleaning in AQMA's	Other	Other	2024	2026	Sefton	Sefton	No	Funded	£10k - £50k	Planning	Reduced PM in AQMA's	Reduced PM in AQMA's	Currently in planning/development phase	
APM12	Use the planning system to mitigate the air quality impacts of any new development likely to have an impact on the AQMAs through the use of planning conditions incorporating Low Emissions Strategy measures from developers and the use of Section 106 Agreements	Policy Guidance and Development Control	Air Quality Planning and Guidance	2024	Ongoing	Sefton	Sefton	No	Funded	N/A	Implementation	Hard to quantify	Number of Planning applications consulted on/Number of AQA reviewed	Ongoing	All planning applications received are reviewed and where an AQ concern is identified an AQA will be required. Measures to mitigate impacts will be required as part of planning approval where AQA concludes the development will impact AQ negatively
APM13	Develop and promote active travel initiatives and campaigns	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2024	Ongoing	Sefton	Sefton	No	Funded	N/A	Development/ Implementation	Hard to quantify	Number of campaigns and initiatives undertaken	Ongoing/ In development	A number of successful active travel initiatives campaigns already underway others being developed

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[6], local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter. There is clear evidence that $PM_{2.5}$ (particulate matter smaller than 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

During 2023 all three automatic monitoring sites recording $PM_{2.5}$ concentrations indicated levels were well below the current national $PM_{2.5}$ target of 20µg/m^3. The results of the $PM_{2.5}$ monitoring are discussed in more detail in Section 4.2.3.

The Public Health Outcomes Framework data tool[7] compiled by Public Heath England (PHE) quantifies the mortality burden of $PM_{2.5}$ within England on a county and local authority scale. The 2022 fraction of mortality attributable to $PM_{2.5}$ pollution across England is 5.8%. Sefton is 0.8% higher at 6.6%, while the North West region average is 5.6%.

Sefton Metropolitan Borough Council has already implemented a number of measures to address $PM_{2.5}$, as many of the existing actions in the current Air Quality Action Plans to reduce PM_{10} also serve in reducing $PM_{2.5}$, see Table 2.2.

The measures that continue to have a positive effect on reducing $PM_{2.5}$ in 2023 include:

- Traffic Signal Optimisation and Management measures – SCOOT;
- Developing and promoting Active and Alternative Travel initiatives and campaigns through school and workplace Travel Plans and encouraging walking and cycling;
- Reducing dust emissions from industry through the LAPPC Environmental Permitting system;
- Reducing emissions from the freight transport sector through the continuation of the ECO Stars Fleet Recognitions Scheme;

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

[7] https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/1/gid/1000043/pat/6/par/E12000004/ati/301/are/E07000136/yrr/3/cid/4/tbm/1

- Strategic highway and junction improvements to reduce congestion and pollutant emissions within the AQMAs and specifically at Millers Bridge and Crosby Road North/South Road junctions; and,
- Addressing PM emissions from construction activities through specific conditions using the Land Use Planning and Development Control System.

Smoke Control Areas

Areas of Sefton are already covered by Smoke Control Areas which formally restrict the type of fuel and/or appliance that can be used in these locations. Residents can easily determine whether their property is within a designated Smoke Control Area by reviewing Sefton's website and associated mapping tool.

Compliance in Sefton's Smoke Control Areas is actively enforced and any complaints or allegations of properties breaching the regulations are investigated and appropriate action taken. These measures, although hard to quantify, assist in reducing levels of particulates including $PM_{2.5}$ in Sefton.

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

This section sets out the monitoring undertaken within 2023 by Sefton Metropolitan Borough 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

Sefton Metropolitan Borough Council undertook automatic (continuous) monitoring at five sites during 2023. Monitoring of PM_{10} concentrations at CM2 on Crosby Road North were not recorded during 2023 due to faults associated with the monitoring equipment during the first quarter of the year, the monitor was subsequently removed from this station. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The sefton.gov.uk page presents automatic monitoring results for Sefton Metropolitan Borough 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

Sefton Metropolitan Borough Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 87 sites during 2023, including four triplicate locations. Table A.2 in Appendix A presents the details of the non-automatic sites. No changes to the passive monitoring programme occurred in 2023.

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 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 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 200µg/m^3, not to be exceeded more than 18 times per year.

Automatic Monitoring (NO_2)

All automatic monitoring sites within Sefton continue to show compliance with the AQS objectives with no reported exceedances of the annual mean or 1-hour mean objectives in 2023.

CM2 – Crosby Road North, CM4 – Princess Way and CM5 – Hawthorne Road have recorded reductions in NO_2 concentrations when compared to 2022 levels. Concentrations at the CM3 – Millers Bridge location have remained stable at 32.1µg/m^3, showing no change since 2022. This was also the maximum annual mean NO_2 concentration recorded at an automatic monitor in 2023. The data continues to reflect the trends demonstrated over the last 5 years.

Diffusion Tube Monitoring (NO_2)

During 2023, 73 diffusion tube sites reported a decrease and 10 reported an increase in annual mean NO_2 concentrations when compared to 2022 levels. It should be noted that all 87 locations recorded concentrations below the AQS annual mean objective (40µg/m^3).

Following bias adjustment and annualisation, the maximum concentration recorded during 2023 was 38.8µg/m^3 at BR – Derby Road, Bootle which is located within the Millers Bridge AQMA (AQMA 3). This position has recorded exceedances of the AQS objective since 2019. The BR monitoring site is not considered a representative location of relevant exposure. As such, the concentration at the nearest receptor for this location was estimated using the distance correction via the DEFRA Diffusion Tube Processing Tool.

Alongside the BR – Derby Road, Bootle site, one other monitoring location reported annual mean concentrations within 10% of the AQS objective and were therefore subject to fall off with distance calculations:

- Site BR – Derby Road, Bootle: 38.8µg/m^3
    - Distance corrected: 36.8µg/m^3
- Site HB – Breeze Hill: 38.6µg/m^3
    - Distance corrected: 30.9µg/m^3

Following distance correction, the predicted concentration at the receptor for BR – Derby Road, Bootle was still within 10% of the AQS objective and could therefore represent an area of continued exceedance within AQMA 3.

Figure A.1 to Figure A.8 show annual mean NO_2 concentration trends over the last 5 years, there is a general decreasing trend in the majority of passive monitoring locations from 2019 to 2023. The reduction in levels at 73 sites during 2023 further supports the declining trend in concentrations.

Four triplicate co-location studies were also in operation during 2023 for the automatic stations for CM2 – Crosby Road North, CM3 – Millers Bridge, CM4 – Princess Way and CM5 – Hawthorne Road to determine a localised bias adjustment factor. Further details can be found in Appendix A.

No passive monitoring sites reported an annual mean NO_2 concentration greater than 60µg/m^3 in 2023, therefore it can be assumed that there are no sites where there is likely

to be a risk of exceeding the 1-hour mean NO_2 AQS objective, in accordance with the guidance provided in LAQM.TG(22).

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 40µg/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 50µg/m^3, not to be exceeded more than 35 times per year.

Compliance of both the annual mean PM_{10} AQS objective (40µg/m^3) as well as the 24-hour PM_{10} AQS objective has been achieved at all relevant automatic monitoring stations during 2023.

The maximum annual mean PM_{10} concentration measured in 2023 was 20.5µg/m^3 at CM5 – Hawthorne Road. CM3 – Millers Bridge, CM4 – Princess Way and CM5 – Hawthorne Road all recorded reductions in PM_{10} concentrations when compared to 2022 levels, 0.7µg/m^3, 0.1µg/m^3 and 1µg/m^3 respectively. Concentrations at the CM7 – Regent Road location have remained stable at 12.9µg/m^3, showing no change since 2022.

The 24-hour mean PM_{10} monitoring for 2023 shows no exceedances of the 50µg/m^3 AQS objective, which continues the same trend over the last 5 years of monitoring.

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.

During 2023 all three automatic monitoring sites recorded $PM_{2.5}$ concentrations well below the current $PM_{2.5}$ national target of 20µg/m^3 as well as below the national target of 10µg/m^3 that is not to be exceeded at any monitoring station by 31st December 2040.

The maximum annual mean $PM_{2.5}$ concentration measured in 2023 was 9.4µg/m^3 at CM3 – Millers Bridge. CM3 – Millers Bridge, CM4 – Princess Way and CM7 – Regent Road all recorded reductions in $PM_{2.5}$ concentrations when compared to 2022 levels, 0.3µg/m^3, 0.9µg/m^3 and 0.5µg/m^3 respectively. Overall concentrations appear to be stable and consistent with previous levels during the last 5 years.

3.2.4 Sulphur Dioxide (SO_2)

No sulphur dioxide monitoring was undertaken by Sefton Metropolitan Borough Council in 2023.

3.2.5 Compliance with National Air Quality Standards Objectives in AQMAs

A summary of each AQMA with regards to the relevant pollutant objective is discussed below.

AQMA 2 – Princess Way

- There were no recorded exceedances of the annual mean NO_2 objective at any diffusion tube site or automatic monitor within the AQMA during 2023. The highest concentration observed, 31.5µg/m^3, was recorded at the triplicate position CQ1, CQ2, CQ3 which is co-located with the CM4 automatic monitor. Levels across all monitors in 2023 showed a reduction in concentrations when compared to 2022. This marks the fourth year that AQMA 2 has been compliant with the annual mean air quality objective for NO_2.

AQMA 3 – Millers Bridge

- There were no recorded exceedances of the annual mean NO_2 objective at any diffusion tube site or automatic monitor within the AQMA during 2023. The highest concentration observed, 38.8µg/m^3, was recorded at BR – Derby Road, Bootle. As this site recorded a NO_2 annual mean concentration within 10% of the AQS at a position that is not considered representative of public exposure, the concentration at the nearest relevant receptor for this location was estimated using distance correction via the DEFRA Diffusion Tube Processing Tool. This indicated the estimated concentration of 36.8µg/m^3 which is still within 10% of the AQS objective. This may indicate an area of continued exceedance within AQMA 3.
- Levels across the majority of monitors in 2023 showed a reduction in concentrations when compared to 2022. Positions BO, GT and GU recorded increases of less than 1µg/m^3 in 2023 although levels were still compliant with the annual NO_2 objective.
- The 24-hour mean PM_{10} monitoring for 2023 in AQMA 3 shows no exceedances of the 50µg/m^3 AQS objective, which continues the same trend over the last 5 years of monitoring. This marks the fifth year that AQMA 3 has been compliant with the 24-hour air quality objective for PM_{10}.

AQMA 4 – South Road

- There were no recorded exceedances of the annual mean NO_2 objective at any diffusion tube site within the AQMA during 2023. The highest concentration observed, 25.3µg/m^3, was recorded at DI – Crosby Road North, Waterloo. Levels across the majority of monitors in 2023 showed a reduction in concentrations when compared to 2022. An increase of 0.7µg/m^3 was observed at GM – South Road, Waterloo. This marks the fifth year that AQMA 4 has been compliant with the annual mean air quality objective for NO_2.

AQMA 5 – Hawthorne Road

- There were no recorded exceedances of the annual mean NO_2 objective at any diffusion tube site or automatic monitor within the AQMA during 2023. The highest concentration observed, 31.9µg/m^3, was recorded at CI – Hawthorne Road, Bootle. Levels across all monitors in 2023 showed a reduction in concentrations when compared to 2022. This marks the fourth year that AQMA 5 has been compliant with the annual mean air quality objective for NO_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)
CM2	Crosby Road North	Roadside	322175	398483	NO_2	NO	Chemiluminescent	4.49	4.11	1.8
CM3	Millers Bridge, Bootle	Roadside	333772	394602	NO_2; PM_{10}; $PM_{2.5}$	YES AQMA3	Chemiluminescent; FIDAS	6.23	8.68	1.8
CM4	Lathom Close, Princess Way, Seaforth	Roadside	332649	396942	NO_2; PM_{10}; $PM_{2.5}$	YES AQMA2	Chemiluminescent; FIDAS	10.63	3.81	1.8
CM5	Hawthorne Road, Litherland	Roadside	333812	397519	NO_2; PM_{10}	YES AQMA5	Chemiluminescent; Beta Attenuation	13.84	7.04	1.8
CM7	Regent Road	Urban Background	331643	399588	PM_{10}; $PM_{2.5}$	NO	FIDAS	N/A	3.00	1.8

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)
BB	Eaton Avenue, Seaforth	Roadside	333510	397186	NO_2	No	3.0	1.9	No	2.7
BO	Douglas Place, Bootle	Roadside	333847	394461	NO_2	Yes AQMA3	5.2	1.9	No	2.7
BQ	Douglas Place/Millers Bridge, Bootle	Roadside	333835	394572	NO_2	Yes AQMA3	6.5	1.8	No	2.8
BR	Derby Road, Bootle	Roadside	333753	394552	NO_2	Yes AQMA3	1.6	1.1	No	2.6
BS	Derby Road, Bootle	Roadside	333757	394622	NO_2	Yes AQMA3	7.2	2.8	No	2.5
BV	Quarry Road, Thornton	Roadside	333395	400863	NO_2	No	7.5	1.7	No	2.5
BW	Crosby Road South/Riversdale Road, Seaforth	Roadside	332600	397021	NO_2	Yes AQMA2	2.1	1.3	No	2.6
CI	Hawthorne Road, Bootle	Roadside	333813	397514	NO_2	Yes AQMA5	17.9	3.2	No	2.5
CJ	South Road, Waterloo	Roadside	332204	398229	NO_2	Yes AQMA4	0.7	2.5	No	2.6
CR	Parker Avenue, Seaforth	Roadside	332511	397332	NO_2	No	2.5	2.1	No	2.7
CY	Lytton Grove, Seaforth	Roadside	332981	396972	NO_2	Yes AQMA2	3.7	2.2	No	2.6
DC	Marsh Lane, Bootle	Kerbside	334339	395800	NO_2	No	4.1	0.6	No	2.5
DD	Hawthorne Road, Litherland	Roadside	333778	397534	NO_2	Yes AQMA5	5.6	2.3	No	2.6
DE	Wilson's Lane, Litherland	Roadside	333917	397575	NO_2	No	9.4	2.2	No	2.6
DF	Church Road flats. Litherland	Roadside	333916	397506	NO_2	No	3.9	12.3	No	2.6
DH	South Road, Waterloo	Roadside	332193	398193	NO_2	Yes AQMA4	0.0	3.6	No	2.8
DI	Crosby Road North, Waterloo	Roadside	332206	398187	NO_2	Yes AQMA4	0.0	3.6	No	2.5
DO	Hawthorne Road/ Linacre Lane, Bootle	Kerbside	334640	396399	NO_2	No	4.7	0.6	No	2.6
DP	Gordon Road/ Rawson Road, Bootle	Kerbside	332793	396974	NO_2	Yes AQMA2	9.2	0.6	No	2.7
DQ	Rawson Road, Bootle	Roadside	332791	396922	NO_2	Yes AQMA2	5.6	1.7	No	2.6

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)
DR	Crosby Road North, Waterloo	Roadside	332226	398231	NO_2	Yes AQMA4	21.1	2.5	No	2.5
DS	South Road, Waterloo	Roadside	332134	398169	NO_2	No	2.1	1.4	No	2.6
DU	Liverpool Road/ Kingsway, Waterloo	Roadside	332196	398786	NO_2	No	6.9	3.5	No	2.6
DV	Moor Lane, Crosby	Roadside	332341	400168	NO_2	No	4.7	1.4	No	2.6
DW	Church Road/ Kirkstone Road North	Roadside	334572	397918	NO_2	No	7.4	7.3	No	2.6
DX	Merton Road, Bootle	Roadside	334738	395138	NO_2	No	13.6	5.8	No	2.6
DY	Hougoumont Avenue/Crosby Road North	Kerbside	332250	398008	NO_2	No	6.2	0.4	No	2.4
DZ	Bailey Drive, Bootle	Roadside	335394	397282	NO_2	No	8.3	2.3	No	2.6
EA	Copy Lane, Netherton	Roadside	336639	399496	NO_2	No	10.5	35.1	No	2.5
EB	Copy Lane, Netherton	Roadside	336592	399453	NO_2	No	22.7	1.0	No	2.6
EC	Copy Lane/ Dunningsbridge Road	Roadside	336539	399477	NO_2	No	25.7	2.7	No	2.6
EE	Copy Lane Police Station, Netherton	Roadside	336572	399524	NO_2	No	N/A	3.4	No	2.6
EK	Hawthorne Road, Bootle	Roadside	334782	395189	NO_2	No	13.1	1.1	No	2.3
EL	Breeze Hill, Bootle	Kerbside	335265	394968	NO_2	No	8.2	0.9	No	2.6
EN	Hawthorne Road, Litherland	Roadside	333740	397561	NO_2	No	9.6	3.9	No	2.5
EO	Hatton Hill Road, Litherland	Roadside	333692	397615	NO_2	No	8.4	2.0	No	2.6
EP	Ash Road, Seaforth	Roadside	333343	397210	NO_2	No	11.5	1.3	No	2.6
EQ	Crosby Road South, Seaforth	Roadside	332611	396985	NO_2	Yes AQMA2	3.8	2.3	No	2.6
ES	Chatham Close, Seaforth	Roadside	332712	397003	NO_2	Yes AQMA2	7.1	1.3	No	2.6
EV	Princess Way, Seaforth	Kerbside	332650	396915	NO_2	Yes AQMA2	N/A	0.2	No	2.6

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)
EW	Crosby Road South, Seaforth	Roadside	332666	396822	NO_2	Yes AQMA2	1.1	1.2	No	2.7
EY	Lathom Avenue, Seaforth	Roadside	332681	396949	NO_2	Yes AQMA2	6.2	1.2	No	2.7
FB	Hawthorne Road, Litherland	Roadside	334017	397317	NO_2	No	N/A	2.4	No	2.6
FC	St Phillips Avenue, Litherland	Roadside	334217	397663	NO_2	No	9.9	2.3	No	2.6
FD	Church Road, Litherland	Roadside	334242	397713	NO_2	No	7.9	2.6	No	2.6
FE	Church Road, Litherland	Roadside	334642	397923	NO_2	No	6.4	7.0	No	2.6
FF	Boundary Road, Litherland	Roadside	334978	398171	NO_2	No	14.4	1.2	No	2.6
FH	Church Road, Netherton	Kerbside	334962	398134	NO_2	No	12.2	0.6	No	2.6
FI	Hemans Street, Bootle	Roadside	333280	395958	NO_2	No	13.5	8.7	No	2.6
FL	Hawthorne Road Opp. 20A Litherland	Kerbside	333701	397574	NO_2	No	6.8	0.7	No	2.5
GA	Lord Street	Roadside	333431	417166	NO_2	No	9.6	1.5	No	2.6
GB	Lord Street	Roadside	333704	417415	NO_2	No	9.7	1.8	No	2.6
GC	Haigh Road - Illuminated Sign	Roadside	332296	398268	NO_2	No	15.0	1.0	No	2.6
GD	Crosby Road North - Lighting Column 46D	Roadside	332210	398338	NO_2	No	N/A	2.0	No	2.6
GE	Crosby Road North - Lighting Column 48D	Roadside	332206	398369	NO_2	No	N/A	1.6	No	2.6
GF	Bridle Road - Lighting Column 0010	Roadside	335347	397500	NO_2	No	12.5	1.3	No	2.6
GG	A565/Hemans Street - Lighting Column 0038	Roadside	333270	395967	NO_2	No	5.3	3.1	No	2.6
GH	A565 Opp. car wash - Lighting Column 0044	Roadside	333231	396069	NO_2	No	12.4	3.5	No	2.6

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)
GJ	A565 Liverpool Road - Lighting column 120D	Kerbside	332088	399829	NO_2	No	4.0	0.6	No	2.6
GK	Derby Road, Bootle	Roadside	333669	394912	NO_2	No	8.0	2.1	No	2.6
GL	Green Lane, Seaforth	Roadside	333110	397072	NO_2	No	1.4	2.2	No	2.6
GM	South Road, Waterloo	Roadside	332189	398210	NO_2	Yes AQMA4	9.5	1.5	No	2.6
GN	Moor Lane, Thornton	Roadside	333326	400772	NO_2	No	10.8	1.4	No	2.6
GO	Marsh Lane, Bootle	Roadside	334204	395749	NO_2	No	3.8	2.4	No	2.6
GP	Barkeley Drive, Seaforth	Roadside	332681	396776	NO_2	Yes AQMA2	0.8	1.0	No	2.6
GQ	Mariners Road, Blundellsands	Roadside	330706	398904	NO_2	No	11.5	0.6	No	2.6
GR	School Lane	Roadside	339201	402503	NO_2	No	32.9	2.4	No	2.6
GS	Poverty Lane	Kerbside	338710	401571	NO_2	No	13.6	0.7	No	2.6
GT	Miller's Bridge	Roadside	333736	394597	NO_2	Yes AQMA3	34.3	3.4	No	2.6
GU	Miller's Bridge	Roadside	333784	394596	NO_2	Yes AQMA3	16.9	5.0	No	2.6
GV	Hall Lane	Roadside	337537	401542	NO_2	No	16.1	1.6	No	2.6
GW	A59 Northway	Roadside	337499	401552	NO_2	No	11.6	2.0	No	2.6
GX	Prescot Road	Kerbside	340334	401214	NO_2	No	5.2	0.7	No	2.6
GY	Raven Meols Lane	Roadside	329188	406600	NO_2	No	1.6	2.0	No	2.6
GZ	Weld Parade	Roadside	332988	415800	NO_2	No	9.0	2.6	No	2.6
HA	Liverpool Road South	Roadside	337295	400874	NO_2	No	11.9	2.5	No	2.5
HB	Breeze Hill	Roadside	335137	394996	NO_2	No	7.6	2.1	No	2.5
HC	Breeze Hill	Roadside	335267	394995	NO_2	No	50.0	2.5	No	2.5
HD	Ormskirk Road	Roadside	336691	398032	NO_2	No	10.5	1.9	No	2.5
HE	Ormskirk Road	Roadside	337091	399333	NO_2	No	7.4	0.9	No	2.5
UK 2	Church Road, Litherland	Roadside	334799	398065	NO_2	No	7.1	1.7	No	2.5
UK 4	Crosby Road North, Waterloo	Kerbside	332171	398547	NO_2	No	3.5	0.9	No	2.6
W	Gladstone Road/Gordon Road, Seaforth	Roadside	332982	397022	NO_2	Yes AQMA2	1.4	2.4	No	2.6

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)
CO1, CO2, CO3	Waterloo/ Crosby Road North	Roadside	332175	398483	NO_2	No	4.5	4.1	Yes CM2	1.8
CP1, CP2, CP3	Millers Bridge	Roadside	333772	394602	NO_2	Yes AQMA3	6.2	8.7	Yes CM3	1.8
CQ1, CQ2, CQ3	Princess Way	Roadside	332649	396942	NO_2	Yes AQMA2	10.6	3.8	Yes CM4	1.8
DB1, DB2, DB3	Hawthorne Road	Roadside	333812	397519	NO_2	Yes AQMA5	13.8	7.0	Yes CM5	1.8

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
CM2	322175	398483	Roadside	100	100	32.8	25.9	30.0	25.1	23.2
CM3	333772	394602	Roadside	80	80	38.2	33.2	35.0	32.1	32.1
CM4	332649	396942	Roadside	100	100	**41.6**	31.7	32.9	33.8	27.8
CM5	333812	397519	Roadside	91	91	33.6	28.0	27.1	26.4	24.4

☒ **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.**

☒ **Where exceedances of the NO_2 annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023.**

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
BB	333510	397186	Roadside	100	100	26.6	22.0	24.2	21.4	20.8
BO	333847	394461	Roadside	100	100	29.9	25.1	27.6	24.6	24.7
BQ	333835	394572	Roadside	100	100	31.7	28.4	30.3	31.0	25.8
BR	333753	394552	Roadside	100	100	**50.5**	**41.3**	**46.0**	**41.0**	38.8
BS	333757	394622	Roadside	100	100	37.0	34.0	36.9	33.6	31.9
BV	333395	400863	Roadside	100	100	31.6	25.4	25.7	24.0	24.4
BW	332600	397021	Roadside	92	90	29.9	24.3	27.6	25.3	24.2
CI	333813	397514	Roadside	83	83	**40.8**	33.3	34.0	32.2	31.9
CJ	332204	398229	Roadside	92	90	38.0	32.1	35.0	32.5	31.3
CR	332511	397332	Roadside	100	100	31.6	24.3	27.1	23.9	22.4
CY	332981	396972	Roadside	100	100	27.0	23.0	25.4	21.8	20.7
DC	334339	395800	Kerbside	100	100	36.3	32.2	34.0	30.4	29.8
DD	333778	397534	Roadside	58	60	39.2	35.0	36.4	34.3	31.4
DE	333917	397575	Roadside	100	100	27.6	23.9	25.3	22.0	21.6
DF	333916	397506	Roadside	100	100	28.6	22.8	23.4	21.3	20.0
DH	332193	398193	Roadside	100	100	32.4	27.7	29.3	27.9	26.8
DI	332206	398187	Roadside	83	83	36.3	28.7	31.5	30.9	29.2

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
DO	334640	396399	Kerbside	100	100	**43.8**	35.4	38.9	36.6	35.9
DP	332793	396974	Kerbside	58	58	32.4	28.6	29.8	27.0	26.5
DQ	332791	396922	Roadside	92	92	29.2	25.7	28.6	25.8	22.9
DR	332226	398231	Roadside	100	100	34.6	30.2	32.7	30.3	28.0
DS	332134	398169	Roadside	100	100	31.0	25.7	29.1	27.2	25.9
DU	332196	398786	Roadside	92	90	33.3	27.3	29.6	28.2	26.4
DV	332341	400168	Roadside	100	100	36.6	29.5	32.9	30.2	28.3
DW	334572	397918	Roadside	50	48	32.6	25.5	27.9	23.4	22.6
DX	334738	395138	Roadside	100	100	35.2	28.2	31.8	28.3	27.8
DY	332250	398008	Kerbside	92	92	24.4	20.8	21.7	21.0	20.4
DZ	335394	397282	Roadside	100	100	32.7	26.4	28.1	27.1	26.8
EA	336639	399496	Roadside	92	92	26.3	21.5	23.1	20.7	19.5
EB	336592	399453	Roadside	100	100	30.4	26.1	28.8	25.1	24.4
EC	336539	399477	Roadside	100	100	32.4	24.6	27.6	28.5	25.2
EE	336572	399524	Roadside	83	81	36.0	24.7	29.5	27.2	24.5
EK	334782	395189	Roadside	92	92	37.0	28.4	31.3	27.9	27.7
EL	335265	394968	Kerbside	58	58	37.5	31.5	35.2	31.4	33.6
EN	333740	397561	Roadside	100	100	30.4	27.6	28.3	28.3	27.3

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
EO	333692	397615	Roadside	100	100	37.4	28.1	30.7	30.3	29.7
EP	333343	397210	Roadside	92	92	29.2	22.8	24.8	23.0	22.2
EQ	332611	396985	Roadside	100	100	32.3	27.4	28.5	27.7	25.2
ES	332712	397003	Roadside	100	100	30.8	23.6	25.4	24.0	22.4
EV	332650	396915	Kerbside	100	100	36.0	30.3	34.0	29.5	27.6
EW	332666	396822	Roadside	75	75	34.3	30.0	33.1	29.4	29.2
EY	332681	396949	Roadside	100	100	**40.5**	32.1	35.9	34.8	30.1
FB	334017	397317	Roadside	100	100	35.8	30.0	31.1	27.4	26.4
FC	334217	397663	Roadside	100	100	31.2	22.5	23.9	21.3	20.2
FD	334242	397713	Roadside	100	100	27.3	22.2	23.8	22.0	19.9
FE	334642	397923	Roadside	92	92	30.0	24.7	27.7	22.3	21.4
FF	334978	398171	Roadside	100	100	35.1	27.2	28.9	28.3	25.9
FH	334962	398134	Kerbside	100	100	**40.4**	31.9	34.2	31.6	30.3
FI	333280	395958	Roadside	100	100	38.1	32.0	36.2	31.6	28.7
FL	333701	397574	Kerbside	100	100	36.2	26.7	29.3	31.1	28.1
GA	333431	417166	Roadside	100	100	34.3	24.5	26.9	25.2	25.8
GB	333704	417415	Roadside	92	90	34.3	28.4	27.4	27.7	26.4
GC	332296	398268	Roadside	75	75	20.5	18.1	22.0	17.6	16.1

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
GD	332210	398338	Roadside	100	100	28.1	23.1	26.6	23.9	21.8
GE	332206	398369	Roadside	92	90	30.0	22.9	26.7	24.8	22.5
GF	335347	397500	Roadside	100	100	35.5	29.9	30.0	28.5	27.2
GG	333270	395967	Roadside	100	50	**40.9**	32.7	39.4	33.2	32.1
GH	333231	396069	Roadside	83	83	**47.0**	38.6	**40.6**	38.1	34.4
GJ	332088	399829	Kerbside	100	100	33.5	26.1	32.1	29.5	27.4
GK	333669	394912	Roadside	83	83	37.1	31.6	35.0	32.7	29.9
GL	333110	397072	Roadside	100	100	29.2	24.8	26.4	24.0	23.1
GM	332189	398210	Roadside	75	73	39.9	33.9	35.2	33.0	33.7
GN	333326	400772	Roadside	92	92	31.9	26.1	29.0	26.8	25.8
GO	334204	395749	Roadside	100	100	34.6	26.7	32.5	29.2	27.6
GP	332681	396776	Roadside	75	75	36.9	28.7	31.2	30.8	28.7
GQ	330706	398904	Roadside	75	75	21.7	16.1	18.5	17.7	17.6
GR	339201	402503	Roadside	100	100		16.7	17.7	16.0	16.2
GS	338710	401571	Kerbside	100	100		13.7	14.4	14.1	14.1
GT	333736	394597	Roadside	100	100		36.9	38.2	35.6	35.8
GU	333784	394596	Roadside	92	90		35.5	36.2	32.9	33.8
GV	337537	401542	Roadside	100	100		23.7	25.6	22.4	21.9

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
GW	337499	401552	Roadside	100	100		22.8	24.2	23.1	22.0
GX	340334	401214	Kerbside	100	100		19.6	21.3	18.7	18.7
GY	329188	406600	Roadside	100	100		14.0	18.0	13.1	13.9
GZ	332988	415800	Roadside	92	92		14.6	15.6	13.8	13.9
HA	337295	400874	Roadside	92	90			19.2	17.8	16.7
HB	335137	394996	Roadside	67	65			**41.5**	36.5	38.6
HC	335267	394995	Roadside	75	75			**40.2**	36.5	32.8
HD	336691	398032	Roadside	100	100				21.8	21.9
HE	337091	399333	Roadside	100	100				24.4	24.2
UK 2	334799	398065	Roadside	83	83	27.5	22.2	21.4	20.8	20.6
UK 4	332171	398547	Kerbside	100	100	34.4	24.8	29.7	26.7	25.2
W	332982	397022	Roadside	83	81	31.3	27.3	27.9	24.5	23.3
CO1, CO2, CO3	332175	398483	Roadside	97	100					24.4
CP1, CP2, CP3	333772	394602	Roadside	100	100					28.5
CQ1, CQ2, CQ3	332649	396942	Roadside	100	100					31.5
DB1, DB2, DB3	333812	397519	Roadside	100	100					25.5

☒ **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 within AQMA 2

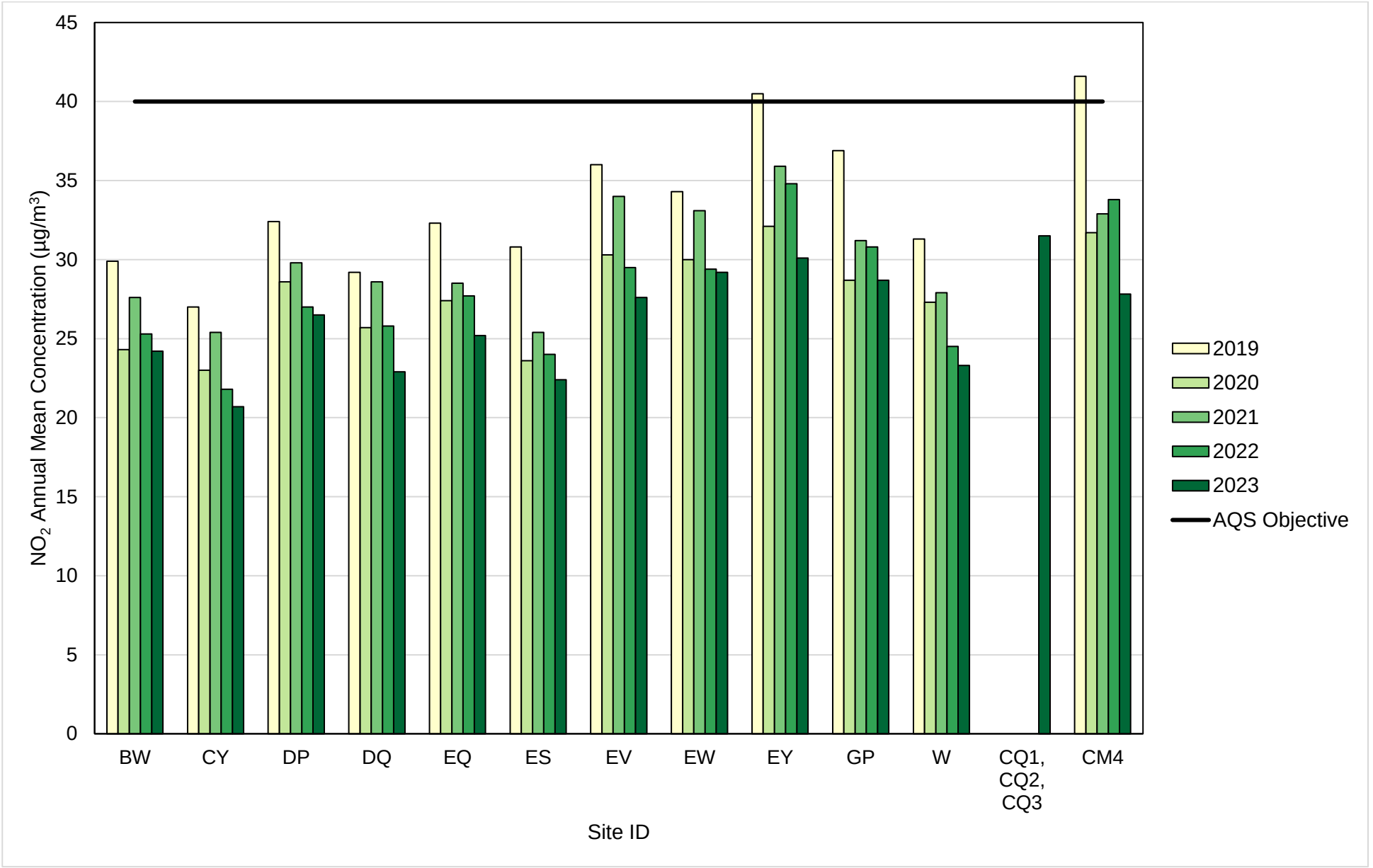


Figure A.2 – Trends in Annual Mean NO_2 Concentrations within AQMA 3

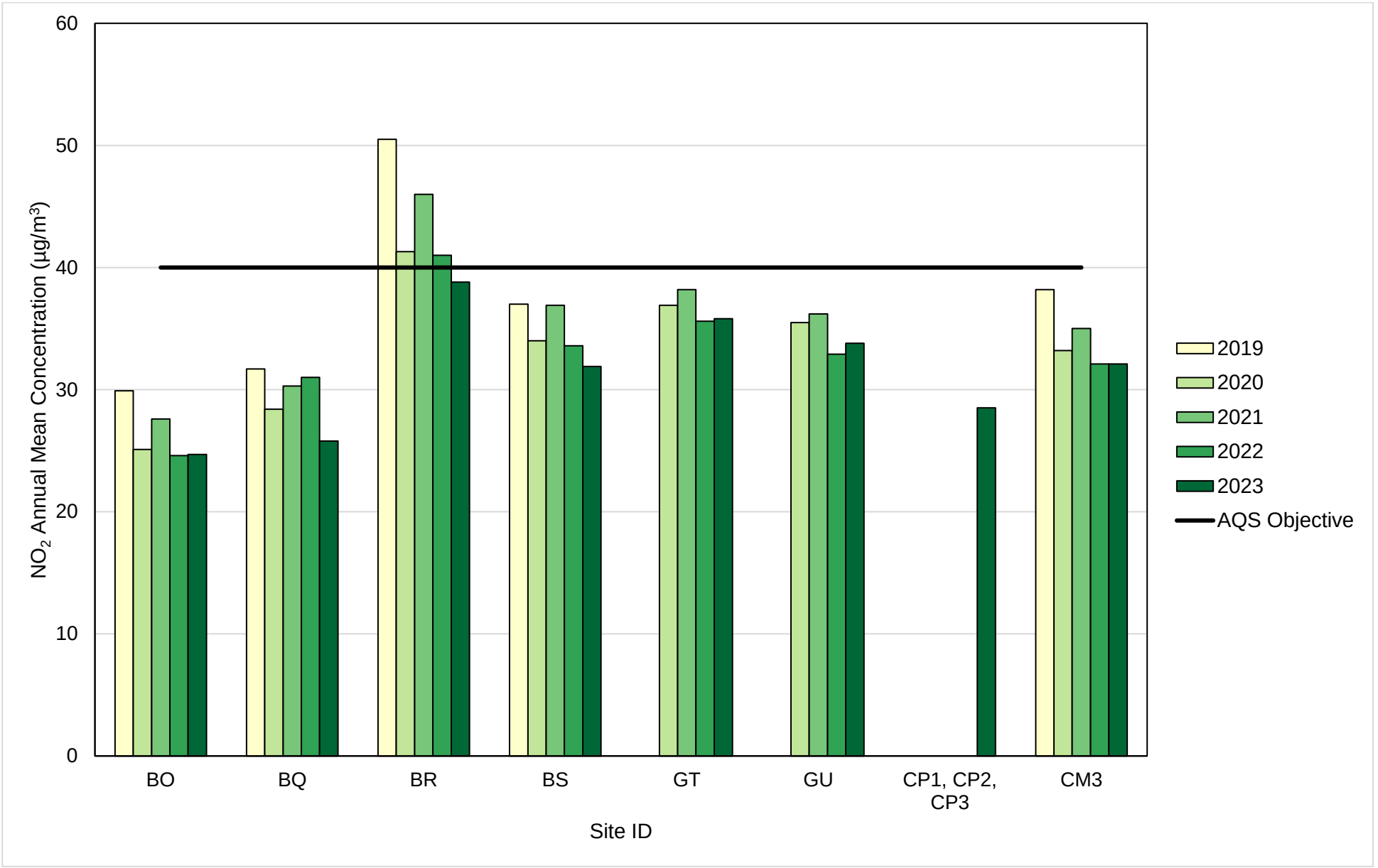


Figure A.3 – Trends in Annual Mean NO_2 Concentrations within AQMA 4

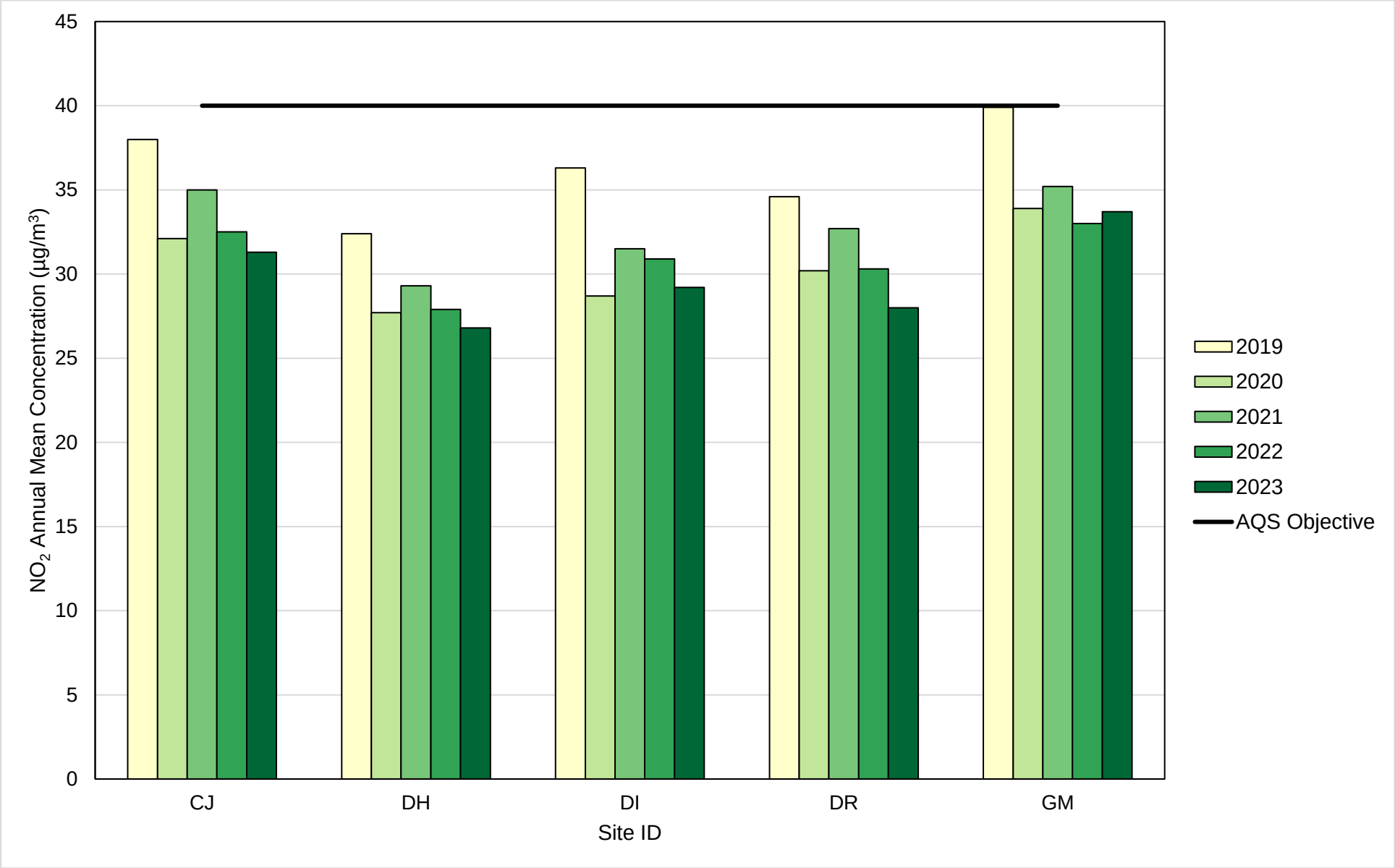


Figure A.4 – Trends in Annual Mean NO_2 Concentrations within AQMA 5

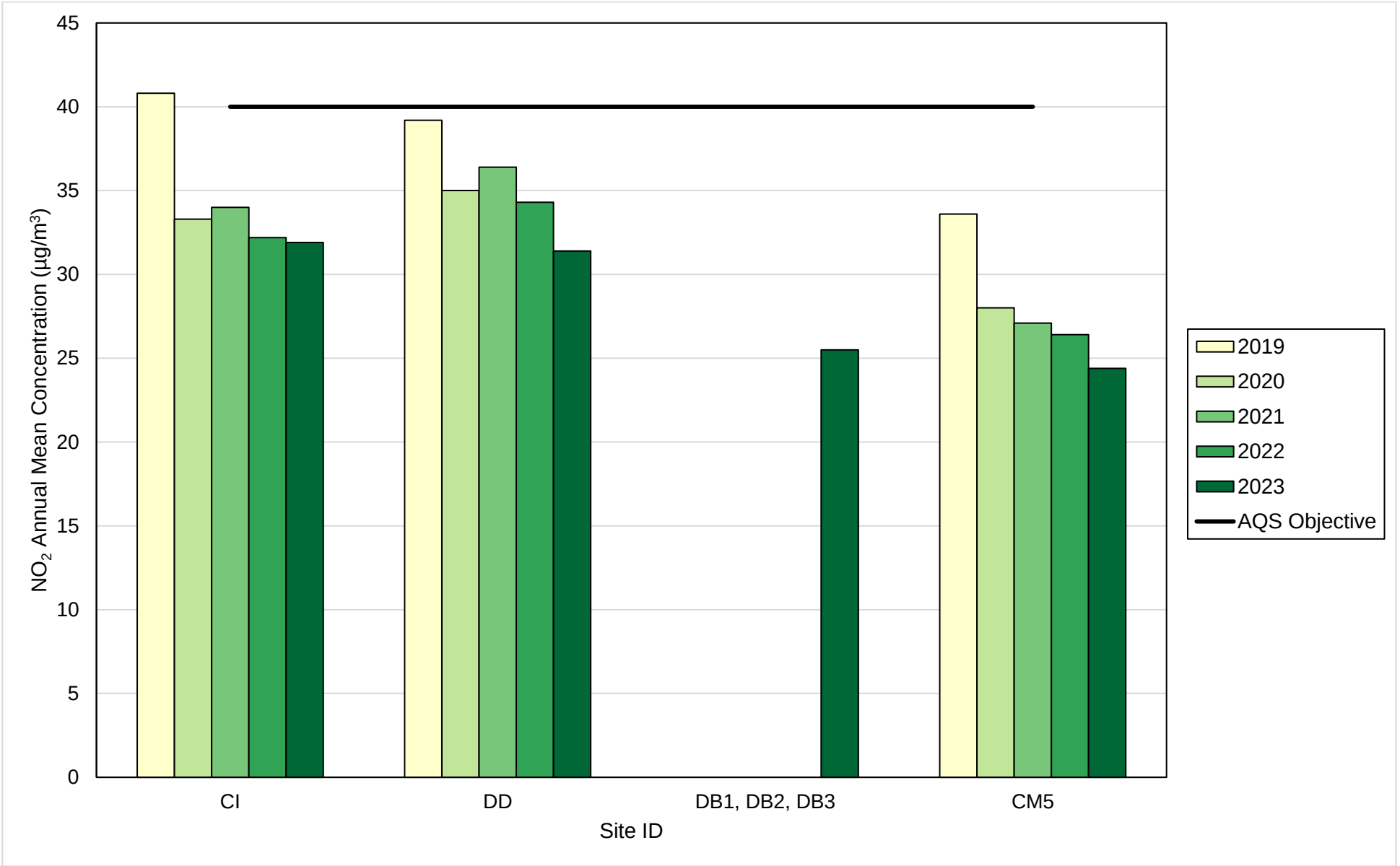


Figure A.5 – Trends in Annual Mean NO_2 Concentrations within Bootle (South Sefton)

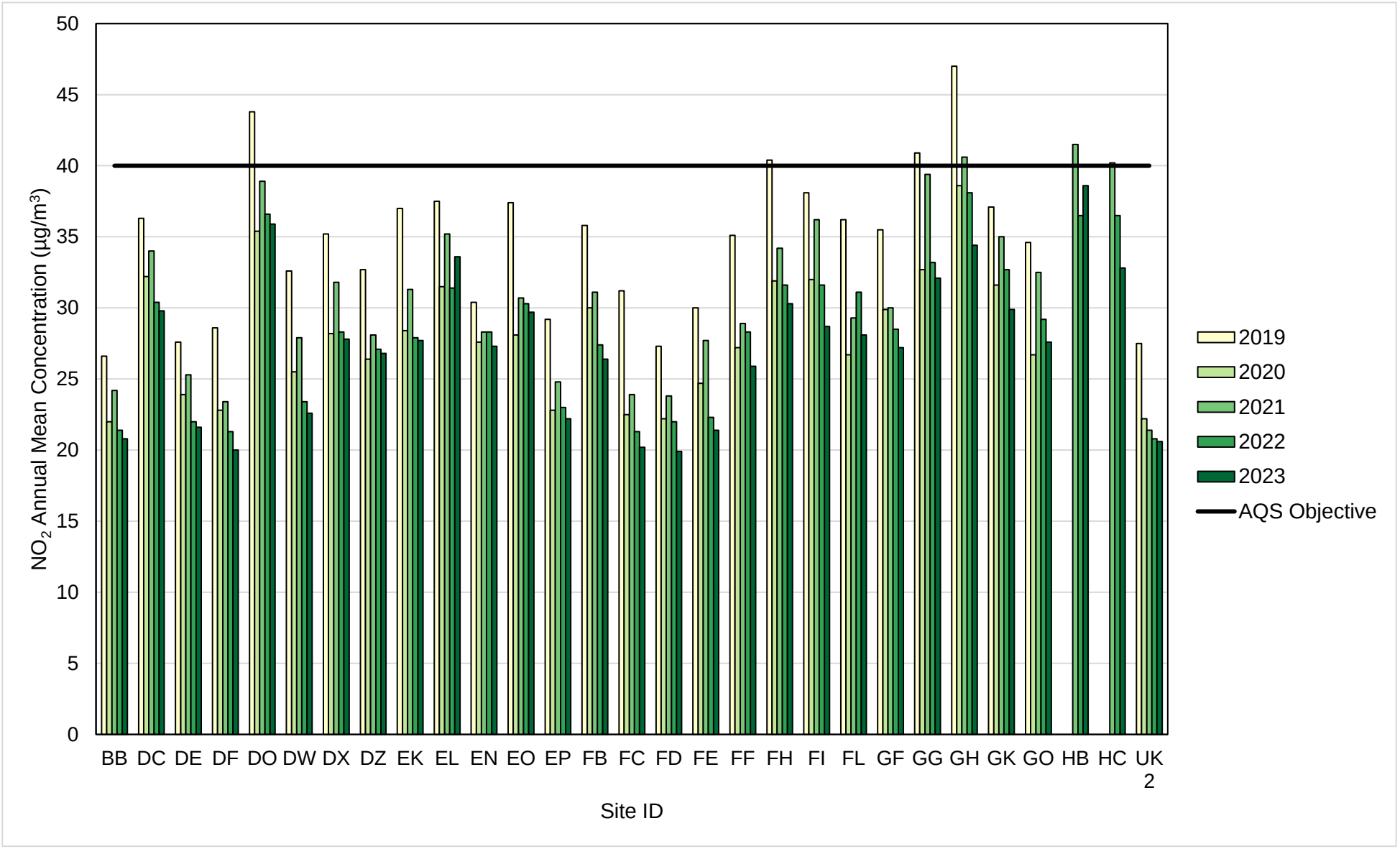


Figure A.6 – Trends in Annual Mean NO_2 Concentrations within Crosby (Central Sefton)

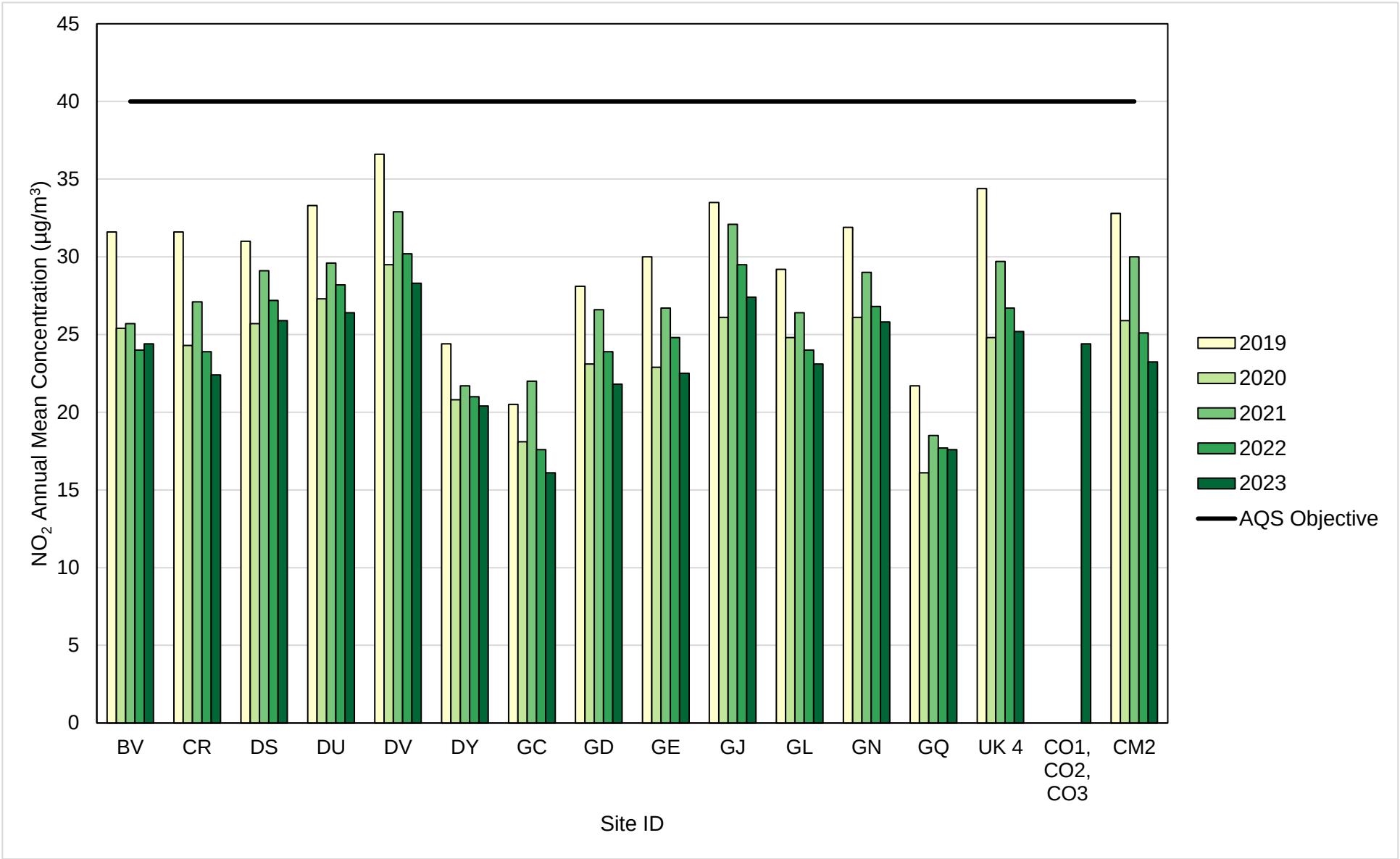


Figure A.7 – Trends in Annual Mean NO_2 Concentrations within Maghull/ Netherton (East Sefton)

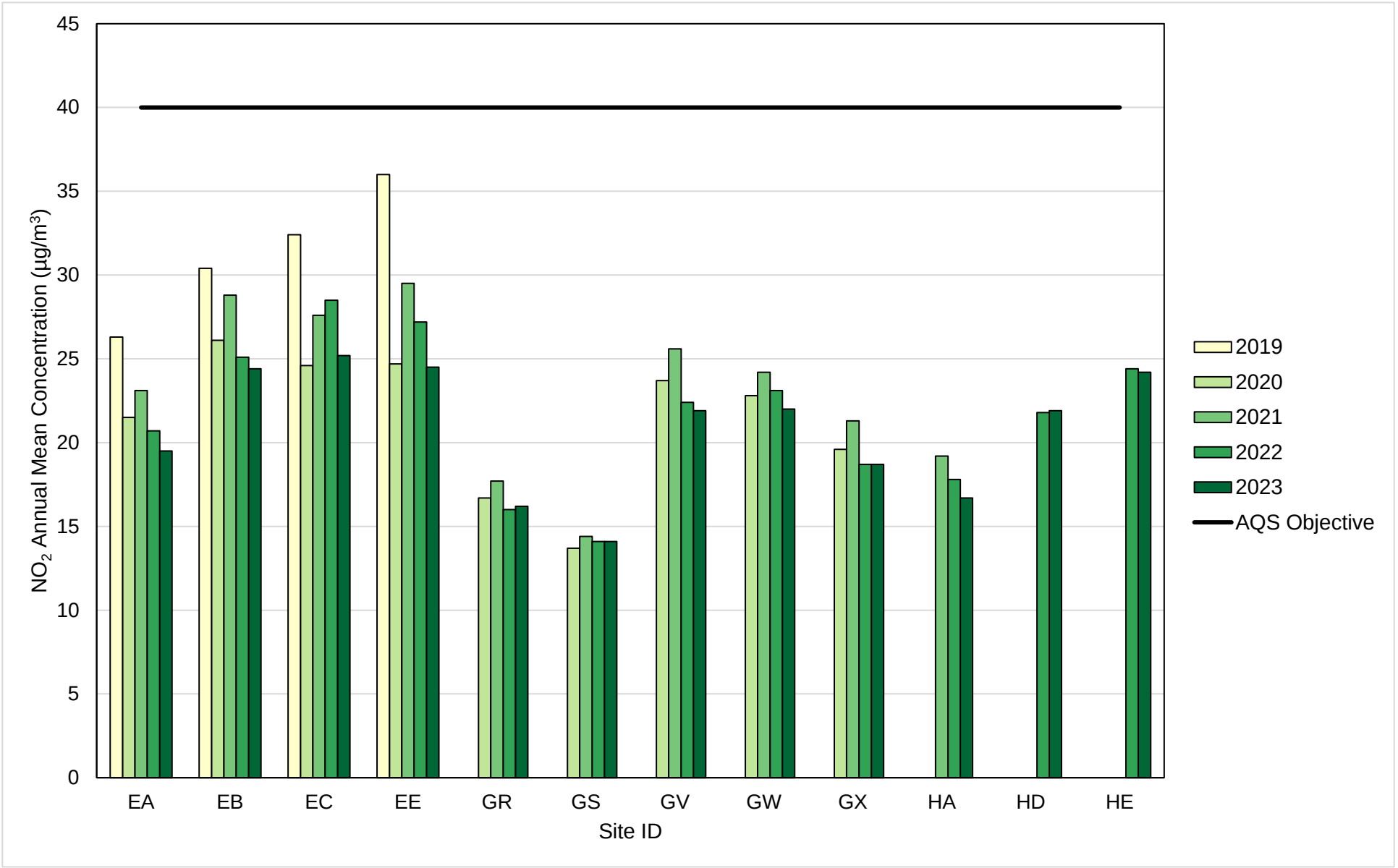


Figure A.8 – Trends in Annual Mean NO_2 Concentrations within Southport/ Formby (North Sefton)

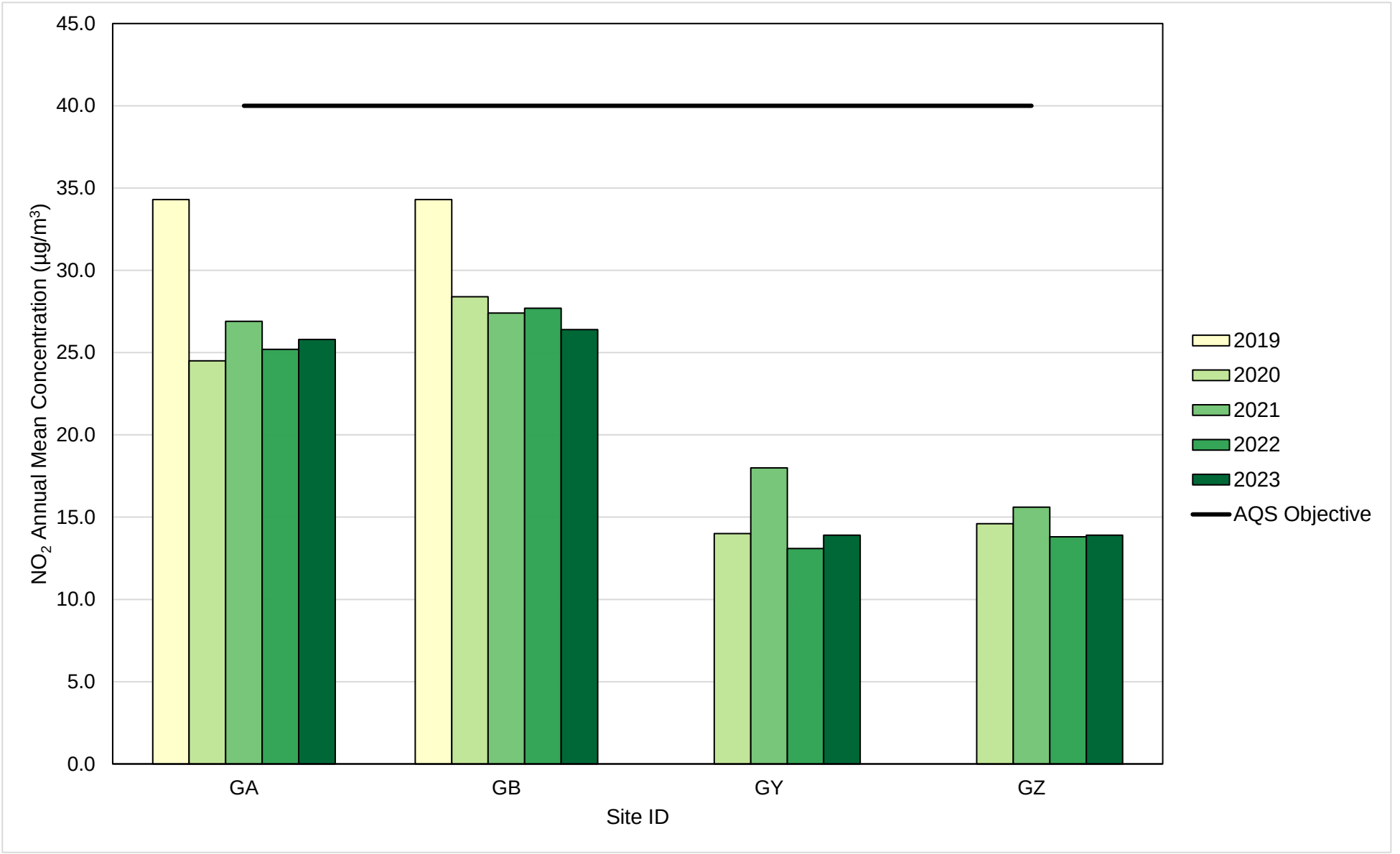


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

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
CM2	322175	398483	Roadside	100	100	0	0	0	0	0
CM3	333772	394602	Roadside	80	80	0	0	0	0	0
CM4	332649	396942	Roadside	100	100	0	0	0	0	0
CM5	333812	397519	Roadside	91	91	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 ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CM3	333772	394602	Roadside	94	94	17.6	16.1	19.5	19.9	19.2
CM4	332649	396942	Roadside	91	91	16.9	20.0	17.5	17.2	17.1
CM5	333812	397519	Roadside	99	99	23.7	20.3	18.7	21.5	20.5
CM7	331643	399588	Urban Background	94	94	-	13.2	9.5	12.9	12.9

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

Notes:

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

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

All means have been “annualised” as per LAQM.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.9 – Trends in Annual Mean PM_{10} Concentrations

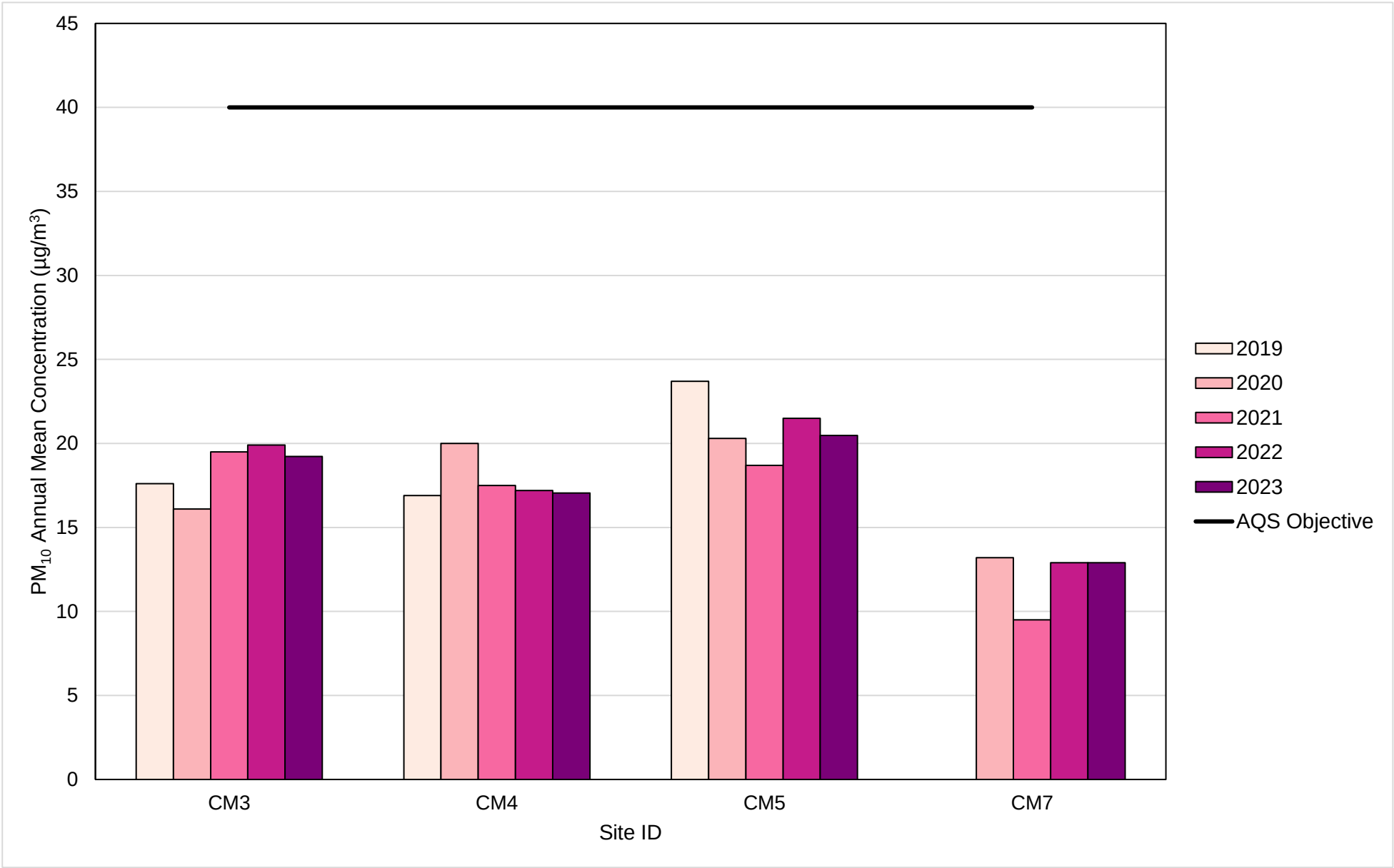


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CM3	333772	394602	Roadside	94	94	1(27)	2	3	6	4
CM4	332649	396942	Roadside	91	91	1(28)	1	2	7(29)	1
CM5	333812	397519	Roadside	99	99	10	1	2	7	1
CM7	331643	399588	Urban Background	94	94	-	0(18)	0	3	0

Notes:

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

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

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

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

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

Figure A.10 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

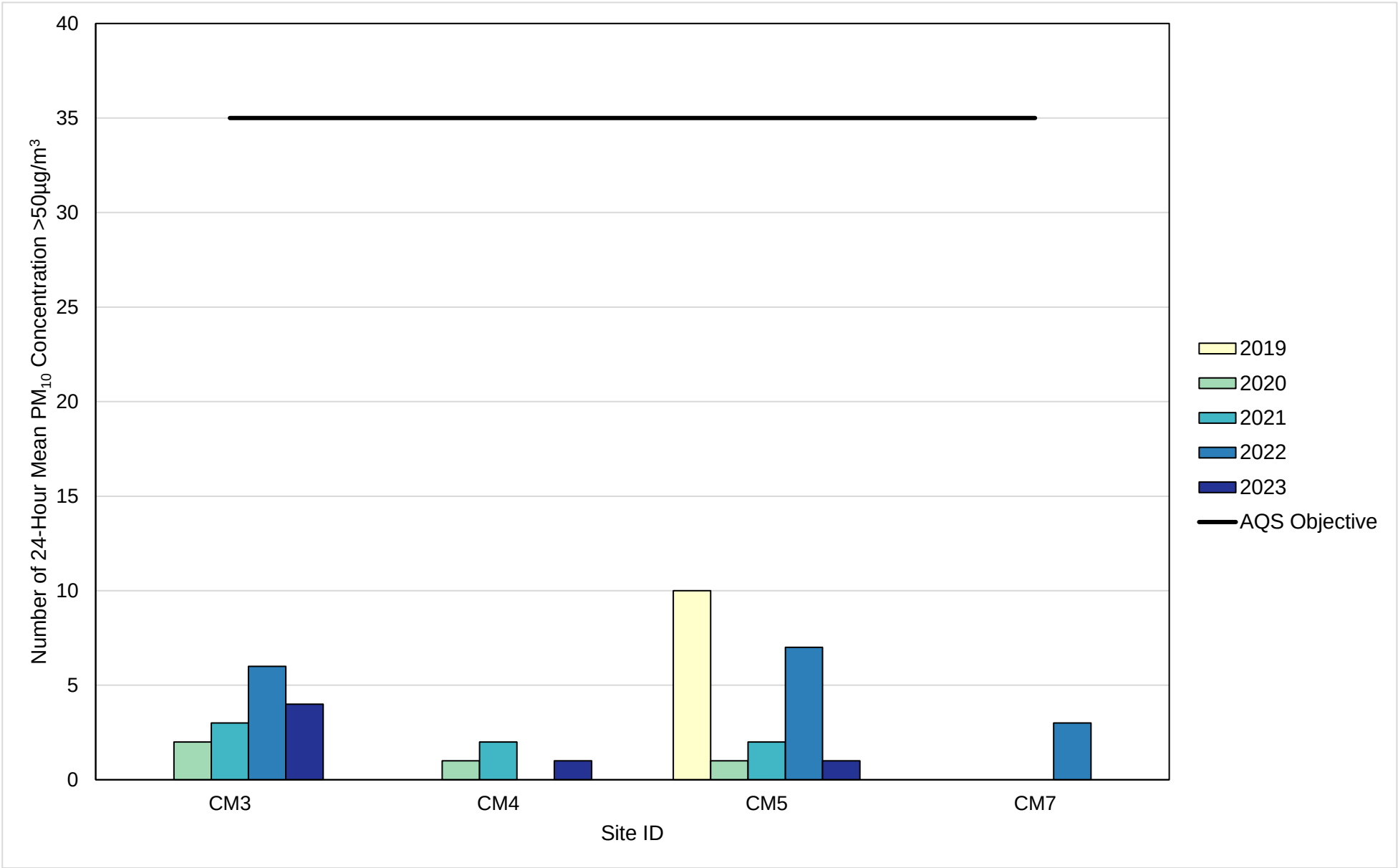


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CM3	333772	394602	Roadside	94	94	10.2	8.3	9.6	9.7	9.4
CM4	332649	396942	Roadside	59	59	-	-	-	9.5	8.6
CM7	331643	399588	Urban Background	93	93	-	7.3	5.9	8.1	7.6

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

Notes:

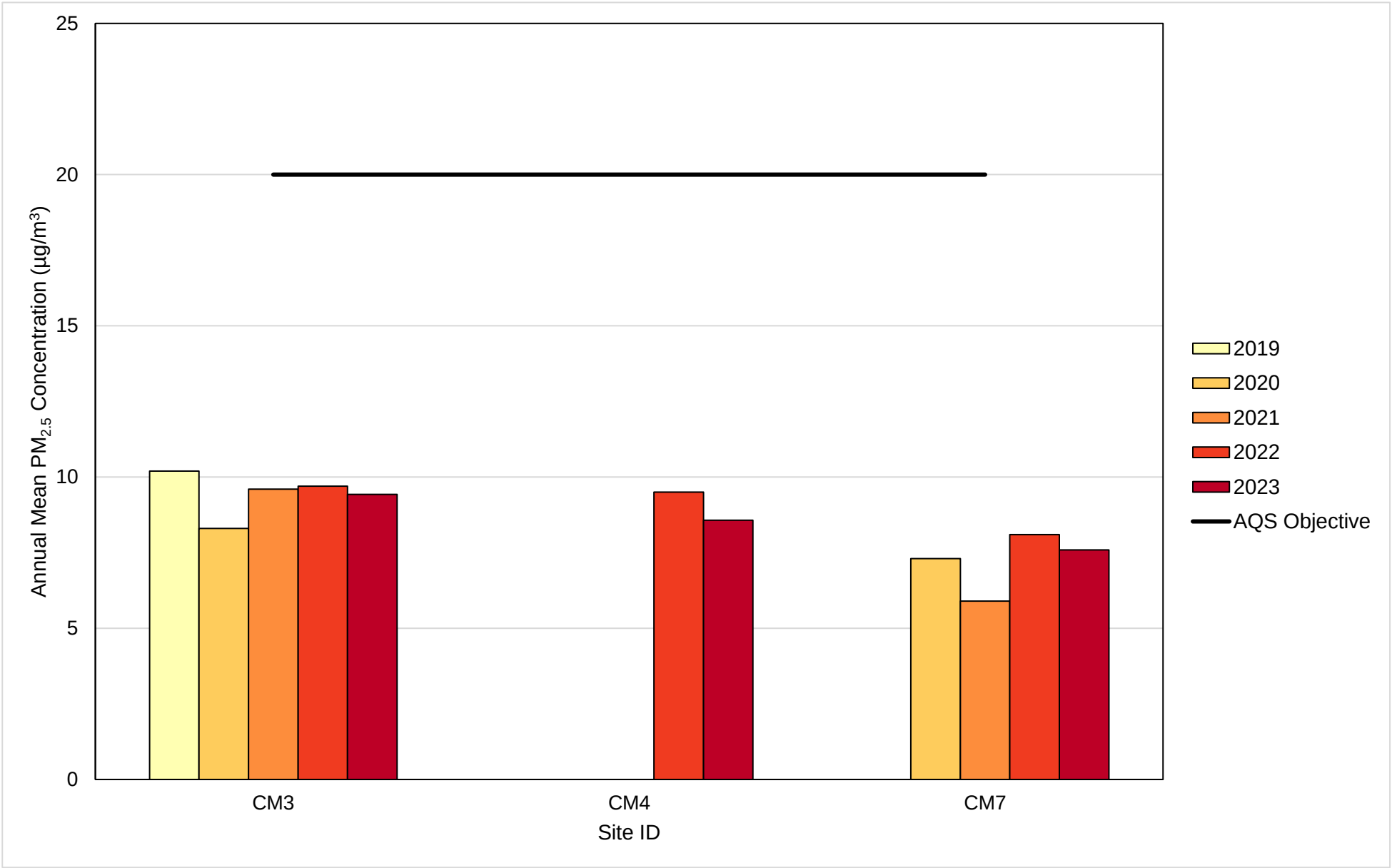
The annual mean concentrations are presented as $\mu g/m^3$.

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.11 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO_2 2023 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
BB	333510	397186	33.3	32.9	28.2	23.6	21.1	18.5	18.0	19.7	25.9	30.1	30.7	26.5	25.7	20.8		
BO	333847	394461	37.7	34.0	30.2	29.7	28.6	25.5	25.4	23.5	31.2	35.3	35.5	29.0	30.5	24.7		
BQ	333835	394572	39.3	38.8	31.0	30.6	34.0	27.2	27.0	25.6	30.8	31.3	35.4	31.0	31.8	25.8		
BR	333753	394552	57.7	48.9	46.7	50.1	53.1	43.1	43.6	41.5	47.2	45.5	55.5	41.7	47.9	38.8	36.8	
BS	333757	394622	42.1	44.8	40.9	39.4	36.2	41.2	33.8	32.6	41.0	42.5	42.5	36.1	39.4	31.9		
BV	333395	400863	35.3	36.3	32.7	32.3	26.3	27.4	20.0	25.6	31.3	33.9	32.5	27.6	30.1	24.4		
BW	332600	397021	35.6	35.0	36.0	29.7	22.9		22.3	23.3	31.3	32.4	30.8	29.6	29.9	24.2		Tube missing June
CI	333813	397514	45.8	52.0	41.5	39.7			29.7	28.8	38.4	40.2	37.8	40.0	39.4	31.9		Gradko indicated results for May could be unreliable, therefore removed. Tube missing June
CJ	332204	398229	41.4	48.3	45.5	40.2	37.8	36.0	29.6		38.5	38.1	37.5	32.3	38.7	31.3		Tube missing August
CR	332511	397332	33.8	35.6	30.5	26.4	20.6	20.2	21.8	22.9	30.8	32.4	31.3	25.7	27.7	22.4		
CY	332981	396972	34.1	31.6	27.7	23.6	19.7	18.4	19.6	19.7	25.9	28.8	29.6	27.3	25.5	20.7		
DC	334339	395800	39.5	47.5	36.9	33.7	32.9	34.0	32.1	32.1	39.2	40.6	40.4	32.9	36.8	29.8		
DD	333778	397534	48.3		42.8	40.7		41.4				46.7	40.0	38.5	42.6	31.4		Tubes missing February, May, July, August and September
DE	333917	397575	31.0	32.8	30.0	25.3	15.1	23.6	25.2	19.3	29.8	32.6	28.8	27.0	26.7	21.6		
DF	333916	397506	30.7	33.3	25.1	23.1	18.2	19.6	18.2	18.5	25.6	28.6	29.6	25.6	24.7	20.0		
DH	332193	398193	36.5	42.2	39.0	35.8	27.6	30.1	26.0	28.2	36.7	35.8	30.4	28.2	33.0	26.8		
DI	332206	398187	41.7	42.9	39.5	37.5	31.1	33.8	30.7	29.7	37.2	36.4			36.0	29.2		Holder missing November. Tube missing December
DO	334640	396399	52.8	53.8	45.9	44.8	42.4	42.1	36.3	38.4	45.8	49.4	44.0	35.8	44.3	35.9		
DP	332793	396974			35.3	30.0	14.8		22.5	22.8	41.7	30.4			28.2	26.5		Two grey caps received January and February. Gradko indicated results for June and November could be unreliable, therefore removed. Tube missing December
DQ	332791	396922	31.5	34.4	31.6	27.7	25.7	22.7	22.9	22.8	28.9	30.3	32.1		28.2	22.9		Tube missing December
DR	332226	398231	44.5	39.6	37.8	33.4	32.8	26.0	29.6	30.6	38.1	35.3	36.2	31.0	34.6	28.0		
DS	332134	398169	36.0	39.5	36.8	33.1	29.2	28.7	24.3	26.5	31.8	35.8	34.5	27.3	31.9	25.9		
DU	332196	398786	36.3	41.0	35.1	32.1	27.4	26.7	26.0		35.5	34.8	34.7	29.5	32.6	26.4		Tube missing August
DV	332341	400168	40.2	46.4	39.6	38.7	25.8	29.6	27.4	31.0	36.9	38.7	35.4	29.4	34.9	28.3		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DW	334572	397918	32.6	35.7	32.5	30.3	20.1					33.2			30.7	22.6		No access to location June and July. Tube missing August, September and December. Holder missing November
DX	334738	395138	41.9	39.0	32.7	35.2	29.5	32.1	24.1	28.2	36.5	40.5	37.5	34.3	34.3	27.8		
DY	332250	398008	27.8	30.1	28.7	26.9	19.5	22.1		19.3	26.2	28.9	27.3	20.1	25.2	20.4		Tube missing July
DZ	335394	397282	39.6	43.2	35.7	33.6	25.4	29.0	23.8	25.4	35.3	38.2	38.2	30.5	33.1	26.8		
EA	336639	399496	31.8	33.3	26.0	21.5	19.7	16.4	18.6	19.7	23.0	26.7	28.2		24.1	19.5		Gradko indicated results for December could be unreliable, therefore removed
EB	336592	399453	37.1	38.9	29.0	28.7	31.7	23.9	23.6	26.0	27.4	33.6	35.3	26.9	30.2	24.4		
EC	336539	399477	32.9	38.0	36.5	35.2	22.3	31.2	18.0	23.4	34.9	39.7	33.7	27.3	31.1	25.2		
EE	336572	399524	32.4	38.9	38.2	35.7	21.7		19.5	22.5	31.4	36.4		26.3	30.3	24.5		Gradko indicated results for June could be unreliable, therefore removed. Tube missing November
EK	334782	395189	41.5	40.3	36.2	34.1	26.9	30.0		24.5	36.2	37.0	36.1	33.4	34.2	27.7		Tube missing July
EL	335265	394968			37.9	41.7	43.2			31.8	33.5	42.0		33.1	37.6	33.6		Gradko indicated results for January could be unreliable, therefore removed. No access to location in February. Holder missing June. Tubes missing July and November.
EN	333740	397561	39.5	39.8	39.8	34.4	28.6	32.0	25.5	25.5	35.9	37.4	34.0	32.9	33.8	27.3		
EO	333692	397615	42.5	44.3	38.5	38.1	31.9	35.2	26.3	25.2	39.4	43.6	39.3	35.7	36.7	29.7		
EP	333343	397210	30.3	31.2	32.5		16.2	25.0	20.4	21.9	32.3	34.6	30.3	26.8	27.4	22.2		Tube missing April
EQ	332611	396985	37.7	37.5	36.7	29.5	25.7	25.6	23.4	23.5	34.2	36.4	33.0	30.4	31.1	25.2		
ES	332712	397003	32.3	36.0	29.8	25.2	17.8	20.6	30.3	20.0	30.0	32.6	27.8	29.1	27.6	22.4		
EV	332650	396915	39.8	43.0	39.4	35.3	32.5	27.9	27.6	27.1	33.4	33.3	39.0	30.5	34.1	27.6		
EW	332666	396822	40.3	41.4	37.5	33.0				30.2	36.1	36.2	35.4	34.1	36.0	29.2		Tubes missing May and July. Holder missing June
EY	332681	396949	42.6	43.0	44.2	39.3	31.0	35.6	19.7	30.1	41.7	46.2	37.3	35.8	37.2	30.1		
FB	334017	397317	40.1	41.2	35.5	30.1	26.1	26.0	26.4	25.5	34.5	35.7	35.9	34.6	32.6	26.4		
FC	334217	397663	32.8	33.4	24.8	21.8	20.0	18.7	18.4	18.5	25.6	27.3	30.7	27.3	24.9	20.2		
FD	334242	397713	30.5	30.2	26.4	22.5	16.8	20.1	16.1	17.6	27.0	32.4	28.8	26.5	24.6	19.9		
FE	334642	397923	33.2	36.2	26.1	22.8	23.3	19.6		20.7	24.5	28.6	29.5	25.6	26.4	21.4		Gradko indicated results for July could be unreliable, therefore removed
FF	334978	398171	33.7	39.1	36.9	35.8	22.2	31.8	20.4	25.4	33.4	40.1	36.8	28.4	32.0	25.9		
FH	334962	398134	47.4	49.0	39.2	36.6	36.9	33.0	27.1	28.6	36.5	42.4	39.0	33.4	37.4	30.3		
FI	333280	395958	45.6	43.3	36.8	30.8	33.9	28.1	30.3	29.9	37.1	38.6	36.4	34.6	35.4	28.7		
FL	333701	397574	38.2	42.0	38.4	34.9	27.2	31.8	22.5	28.4	36.4	45.8	38.2	33.0	34.7	28.1		
GA	333431	417166	35.4	40.6	34.9	33.4	33.4	27.7	23.3	27.0	30.1	32.5	35.4	28.9	31.9	25.8		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
GB	333704	417415	38.8	43.5	36.3	30.7	29.1	25.4	26.7	27.7	30.8	34.1		35.3	32.6	26.4		Tube missing November
GC	332296	398268	22.7	24.2	22.7	16.6			13.0	15.3		22.5	23.3	18.7	19.9	16.1		Gradko indicated results for May and June could be unreliable, therefore removed. Tube missing September
GD	332210	398338	34.6	36.8	33.4	26.7	19.3	20.0	19.9	21.5	27.8	28.3	30.4	24.7	27.0	21.8		
GE	332206	398369	34.1	34.4	32.2	28.1	22.8		20.6	21.0	26.6	30.0	30.5	25.0	27.7	22.5		Gradko indicated results for June could be unreliable, therefore removed
GF	335347	397500	42.0	44.3	34.9	30.7	29.0	25.0	27.0	27.8	34.7	36.6	37.5	33.8	33.6	27.2		
GG	333270	395967	49.6	48.7	42.8	37.6	38.0	22.8							39.9	32.1		Tubes missing July to December. Location to be removed in 2024
GH	333231	396069	46.6	53.9	48.6	42.5	43.1	34.4	36.1	36.1	42.6			40.4	42.4	34.4		Holder missing November. Tube missing December
GJ	332088	399829	43.1	42.5	35.9	33.6	32.4	29.4	26.9	28.7	35.5	35.5	31.7	31.4	33.9	27.4		
GK	333669	394912	46.8	42.8	37.4	37.4	37.0	33.0	29.7	31.4	40.1			34.0	36.9	29.9		Holder missing November. Tube missing December
GL	333110	397072	34.6	36.1	28.2	25.9	23.3	25.5	22.5	22.7	30.2	32.3	33.3	28.2	28.5	23.1		
GM	332189	398210	47.7	51.7	46.6	41.2	35.5	34.5	29.2		38.0	40.6			40.6	32.9		Gradko indicated results for August could be unreliable, therefore removed. Holder missing November, Tube missing December
GN	333326	400772	37.3	44.2	34.7		29.8	27.7	21.9	25.8	33.1	36.5	33.5	26.4	31.9	25.8		Gradko indicated results for April could be unreliable, therefore removed
GO	334204	395749	39.9	44.0	39.2	35.0	23.8	33.2	25.3	27.3	33.5	37.9	38.4	30.9	34.0	27.6		
GP	332681	396776	38.2	41.2	41.4	31.8				28.5	35.1	35.8	34.3	32.1	35.4	28.7		Gradko indicated results for May could be unreliable, therefore removed. Holder missing June. Tube missing July
GQ	330706	398904	22.4	25.8	23.7	22.6			10.5	16.5	18.8	28.0	26.8		21.7	17.6		No access to location May and June. Tube missing December
GR	339201	402503	24.8	26.0	20.5	19.7	15.0	17.3	12.8	15.7	19.2	24.8	25.6	19.0	20.0	16.2		
GS	338710	401571	21.8	23.9	19.0	18.1	12.3	16.1	8.8	12.4	15.7	22.4	23.0	15.4	17.4	14.1		
GT	333736	394597	47.1	50.6	45.9	43.8	37.2	45.3	36.5	33.4	46.3	51.0	51.1	42.4	44.2	35.8		
GU	333784	394596	47.5	41.3	38.1	41.2	37.6	43.7	36.7		45.2	46.6	43.8	37.1	41.7	33.8		Tube missing August
GV	337537	401542	35.1	31.2	27.2	24.1	22.7	22.3	21.9	21.2	29.4	30.8	32.5	26.7	27.1	21.9		
GW	337499	401552	33.6	32.7	28.2	23.5	24.8	21.3	23.1	23.9	29.0	29.5	30.7	26.3	27.2	22.0		
GX	340334	401214	28.3	28.0	24.2	22.4	20.8	21.3	16.1	19.4	23.8	25.5	27.2	20.7	23.1	18.7		
GY	329188	406600	20.2	22.4	19.3	18.2	12.9	15.9	10.2	12.0	17.2	22.4	17.6	18.1	17.2	13.9		
GZ	332988	415800	19.3	21.6	18.5	16.7	12.5	15.0	10.6	13.8	16.7	21.9	22.1		17.2	13.9		Tube missing December
HA	337295	400874	24.5	29.7	23.8	24.0	15.0	19.0	12.6	15.6	20.6	23.1		19.1	20.6	16.7		Gradko indicated results for November could be unreliable, therefore removed
HB	335137	394996			44.1	47.2	43.3		34.5	37.6	43.9	49.8		32.1	41.6	38.6	30.9	No available tubes January. No access to location February. Gradko indicated results for June could be unreliable, therefore removed. Tube missing in November

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
HC	335267	394995			44.4	40.9	36.6	39.9	39.8	38.2	42.5	44.4		38.1	40.5	32.8		No available tubes January. No access to location February. Tube missing in November
HD	336691	398032	29.9	34.2	30.7	33.0	21.3	23.4	17.9	20.8	26.2	31.8	33.6	21.6	27.0	21.9		
HE	337091	399333	35.1	39.1	33.0	27.3	23.2	24.7	22.4	25.6	30.3	34.1	32.8	30.7	29.8	24.2		
UK 2	334799	398065	28.3	29.1	28.3	24.3			15.2	18.8	26.4	31.9	27.0	24.6	25.4	20.6		Tube missing May. Gradko indicated results for June could be unreliable, therefore removed
UK 4	332171	398547	38.1	38.0	36.2	30.9	32.2	24.5	22.9	25.3	31.6	34.4	33.3	25.9	31.1	25.2		
W	332982	397022	34.9	36.7	33.0	27.9	17.8	24.2	20.4		30.5	31.8		31.0	28.8	23.3		Gradko indicated results for August and November could be unreliable, therefore removed
CO1	332175	398483	36.4	38.3	35.8	29.5	28.7	24.7	22.2	25.9	32.6	31.5	35.5	23.6	-	-		Triplicate Site with CO1, CO2 and CO3 - Annual data provided for CO3 only
CO2	332175	398483	32.2	38.9	34.4	30.8	28.8	25.2	23.0	23.8	31.3	32.8	31.7	22.7	-	-		Triplicate Site with CO1, CO2 and CO3 - Annual data provided for CO3 only
CO3	332175	398483	34.9	35.8	33.9	30.4	29.1	24.9	23.4	24.9	33.4	34.1	34.8		30.1	24.4		Triplicate Site with CO1, CO2 and CO3 - Annual data provided for CO3 only
CP1	333772	394602	43.9	37.1	36.3	31.6	35.0	36.3	29.0	29.8	35.5	39.2	36.4	31.2	-	-		Triplicate Site with CP1, CP2 and CP3 - Annual data provided for CP3 only
CP2	333772	394602	41.7	36.0	36.0	35.3	35.5	31.8	30.1	30.4	37.8	39.4	35.3	32.5	-	-		Triplicate Site with CP1, CP2 and CP3 - Annual data provided for CP3 only
CP3	333772	394602	42.3	38.4	35.5	34.1	35.1	34.6	31.0	29.3	35.8	37.9	36.0	33.3	35.2	28.5		Triplicate Site with CP1, CP2 and CP3 - Annual data provided for CP3 only
CQ1	332649	396942	47.3	41.7	44.3	39.4	31.0	37.9	33.0	32.3	42.9	43.4	38.1	36.9	-	-		Triplicate Site with CQ1, CQ2 and CQ3 - Annual data provided for CQ3 only
CQ2	332649	396942	46.0	43.7	42.9	37.4	32.6	38.5	33.8	33.0	42.7	43.4	37.3	35.0	-	-		Triplicate Site with CQ1, CQ2 and CQ3 - Annual data provided for CQ3 only
CQ3	332649	396942	44.3	38.6	42.2	40.8	32.9	38.1	34.8	33.5	42.9	42.4	36.1	37.9	38.9	31.5		Triplicate Site with CQ1, CQ2 and CQ3 - Annual data provided for CQ3 only
DB1	333812	397519	39.4	39.8	36.1	32.0	25.5	30.0	25.1	24.5	33.6	35.7	31.2	32.9	-	-		Triplicate Site with DB1, DB2 and DB3 - Annual data provided for DB3 only
DB2	333812	397519	40.3	37.3	35.2	31.9	24.4	28.3	17.7	25.5	33.2	35.0	30.6	30.6	-	-		Triplicate Site with DB1, DB2 and DB3 - Annual data provided for DB3 only
DB3	333812	397519	39.8	39.5	35.2	30.9	23.7	28.5	24.0	24.6	33.4	33.8	31.5	31.8	31.5	25.5		Triplicate Site with DB1, DB2 and DB3 - Annual data provided for DB3 only

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

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

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **Sefton Metropolitan Borough 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 Sefton Metropolitan Borough Council During 2023

Sefton Metropolitan Borough Council has not identified any new sources relating to air quality within the reporting year of 2023.

Additional Air Quality Works Undertaken by Sefton Metropolitan Borough Council During 2023

Sefton Metropolitan Borough Council has not completed any additional works within the reporting year of 2023.

QA/QC of Diffusion Tube Monitoring

Sefton Metropolitan Borough Council use a large number of passive nitrogen dioxide diffusion tubes to monitor NO_2 throughout the Borough, the majority of which form part of its in-house monitoring programme and the remainder are used for the Community Air Watch programme.

The tubes are currently prepared and analysed by Gradko International Limited, St Martins House, 77 Wales Street, Winchester, Hampshire, SO23 0RH. Gradko are amongst the market leaders in the preparation, supply and analysis of NO_2 diffusion tubes. Gradko representatives participated and provided input into the working group on the harmonisation of diffusion tubes set up to manage the process of harmonisation of NO_2 tube preparation and analysis methods. The diffusion tubes used are prepared by making up a solution of 20% Triethanolamine (TEA) solution and 80% deionised water. The grey caps are loaded with two stainless steel mesh grids onto which is pipetted 50µL of 20%TEA/water. The tube is then fully assembled and stored under refrigerated conditions ready for use. On receipt the unexposed tubes are stored in a refrigerator prior to and following exposure and then returned to Gradko for analysis. A travel blank is also used to identify possible contamination of diffusion tubes while in transport or storage. Analysis is carried out in accordance with Gradko's documented UKAS accredited in-house laboratory method GLM7 and follows the harmonisation practical guidance for diffusion tube.

Gradko participate in AIR, an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL Workplace Analysis Scheme for Proficiency (WASP) PT scheme. AIR offers a number of test samples designed to test the proficiency of laboratories undertaking analysis of chemical pollutants in ambient, indoor, stack and workplace air. One such sample is the AIR NO_2 test sample type that is distributed to participants on a quarterly basis.

AIR NO_2 PT forms an integral part of the UK NO_2 Network's QA/QC and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). With consent from the participating laboratories, LGC Standards provides summary proficiency testing data to the LAQM Helpdesk for hosting on the webpages at: http://laqm.DEFRA.gov.uk/diffusion-tubes/qa-qc-framework.html. This information is updated on a quarterly basis following completion of each AIR PT round.

DEFRA advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the AIR PT scheme. Laboratory performance in AIR PT is also assessed, by the National Physical Laboratory (NPL), alongside laboratory data from the monthly NPL Field Intercomparison Exercise carried out at Marylebone Road, central London.

The information is used to help the laboratories to identify if they have problems and may assist devising measures to improve their performance and forms part of work for DEFRA and the Devolved Administrations under the LAQM Services Contract.

The AIR PT scheme uses laboratory spiked Palmes type diffusion tubes to test each participating laboratory's analytical performance on a quarterly basis and continues the format used in the preceding Workplace Analysis Scheme for Proficiency WASP PT scheme. Such tubes are not designed to test other parts of the measurement system e.g., sampling. Every quarter, roughly January, April, July and October each year, each laboratory receives four diffusion tubes doped with an amount of nitrite, known to LGC Standards, but not the participants. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. The masses of nitrite on the spiked tubes are different each quarter, and reflect the typical analytical range encountered in actual NO_2 ambient monitoring in the UK.

The passive monitoring network changeover was aligned with the DEFRA LAQM calendar for the 2023 reporting year.

Diffusion Tube Annualisation

LAQM.TG(22) states that annualisation is required for any site which has a data capture of less than 75%, but greater than 25%. Passive monitoring site DD, DP, DQ, WL, GG, GM and HB recorded data captures of 59.6%, 57.7%, 48.1%, 57.7%, 50.0%, 65.4% and 73.1% in 2023, and therefore required annualisation. Annualisation was completed using version 4.0 of the 'Diffusion Tube Data Processing Tool'. Four continuous background monitoring locations were used:

- Wirral Tranmere;
- Wigan Centre;
- Preston; and,
- Blackpool Marton.

Each location had >85% data capture and therefore could be used for annualisation. Table C.1 presents the annualisation summary, taken from the 'Diffusion Tube Data Processing Tool'.

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Wirral Tranmere	Annualisation Factor Wigan Centre	Annualisation Factor Preston	Annualisation Factor Blackpool Marton	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
DD	0.9292	0.8999	0.9162	0.8932	0.9096	42.6	38.8
DP	1.0891	1.1645	1.1779	1.2008	1.1581	28.2	32.7
DW	0.9333	0.9040	0.9144	0.8814	0.9083	30.7	27.9
EL	1.0960	1.0859	1.1144	1.1219	1.1045	37.6	41.5
GG	1.0325	0.9952	0.9800	0.9604	0.9920	39.9	39.6
HB	1.1142	1.1384	1.1606	1.1752	1.1471	41.6	47.7

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.

Sefton Metropolitan Borough Council have applied a national bias adjustment factor of 0.81 to the 2023 monitoring data. A summary of bias adjustment factors used by Sefton Metropolitan Borough Council over the past five years is presented in Table C.2.

The national bias adjustment spreadsheet (version 03/24) was used to derive the national bias adjustment factor for diffusion tubes analysed by Gradko during 2023. The national bias adjustment factor for Gradko was 0.81 and was based on 23 studies. As shown in Figure C.1.

Figure C.1 – 2023 National Bias Adjustment Factor for Gradko

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[2]

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[3] shown in **blue** at the foot of the final column.

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

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo 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[5]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in Water	2023	R	Monmouthshire County Council	11	33	26	26.5%	G	**0.79**
Gradko	20% TEA in water	2023	R	Blackburn With Darwen Bc	12	23	16	43.8%	G	**0.70**
Gradko	20% TEA in water	2023	R	Lancaster City Council	10	35	27	28.6%	G	**0.78**
Gradko	20% TEA in water	2023	R	Eastleigh Borough Council	12	33	26	26.4%	G	**0.79**
Gradko	20% TEA in water	2023	R	Eastleigh Borough Council	12	22	19	12.5%	G	**0.89**
Gradko	20% TEA in water	2023	R	Plymouth City Council	12	35	26	38.3%	S	**0.72**
Gradko	20% TEA in water	2023	R	Plymouth City Council	10	39	31	24.2%	S	**0.80**
Gradko	20% TEA in water	2023	UC	Belfast City Council	10	26	19	38.3%	G	**0.72**
Gradko	20% TEA in water	2023	R	Cheshire West And Chester	12	35	32	10.0%	G	**0.91**
Gradko	20% TEA in water	2023	R	Cheshire West And Chester	10	32	28	14.6%	G	**0.87**
Gradko	20% TEA in water	2023	R	Dudley Mbc	12	27	23	17.1%	G	**0.85**
Gradko	20% TEA in water	2023	UB	Dudley Mbc	12	19	13	45.4%	G	**0.69**
Gradko	20% TEA in water	2023	R	Dudley Mbc	12	40	37	7.7%	G	**0.93**
Gradko	20% TEA in water	2023	R	Gateshead Council	12	23	20	17.7%	G	**0.85**
Gradko	20% TEA in water	2023	R	Gateshead Council	11	23	18	26.9%	G	**0.79**
Gradko	20% TEA in water	2023	R	Gateshead Council	12	27	22	20.7%	G	**0.83**
Gradko	20% TEA in water	2023	R	Gateshead Council	12	29	23	25.9%	G	**0.79**
Gradko	20% TEA in water	2023	R	Gateshead Council	12	30	33	-7.8%	G	**1.08**
Gradko	20% TEA in water	2023	KS	Marylebone Road intercomparison	11	45	38	20.3%	G	**0.83**
Gradko	20% TEA in water	2023	B	South Holland District Council	10	8	7	12.4%	G	**0.89**
Gradko	20% TEA in water	2023	R	Worcestershire	12	12	11	17.4%	G	**0.85**
Gradko	20% TEA in Water	2023	R	Ards And North Down Borough Council	12	33	21	60.2%	G	**0.62**
Gradko	20% TEA in Water	2023	R	Lisburn & Castlereagh City Council	11	24	20	22.1%	G	**0.82**
Gradko	20% TEA in water	2023		**Overall Factor[3] (23 studies)**				Use		**0.81**

For completeness, a combined local bias adjustment factor was also calculated utilising Sefton Metropolitan Borough Council's triplicate co-location studies. As shown in Table C.3, the combined local bias adjustment factor of 0.78 was lower than the national factor of 0.81 As such, the national bias adjustment factor was applied to the 2023 monitoring data to ensure the reported concentrations are robust. It should be noted that the national bias adjustment factor for 2023 is in line with factors applied in previous years.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.81
2022	Local	-	0.81
2021	Local	-	0.87
2020	National	09/20	0.81
2019	National	06/19	0.91

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1 – CM2	Local Bias Adjustment Input 2 – CM3	Local Bias Adjustment Input 3 – CM4	Local Bias Adjustment Input 4 – CM5
Periods used to calculate bias	12	11	12	11
Bias Factor A	0.77 (0.71 - 0.84)	0.86 (0.7 - 1.1)	0.71 (0.57 - 0.96)	0.79 (0.73 - 0.87)
Bias Factor B	30% (19% - 40%)	16% (-9% - 42%)	40% (4% - 76%)	26% (15% - 37%)
Diffusion Tube Mean (µg/m^3)	30.1	35.4	38.9	30.7
Mean CV (Precision)	3.3%	2.9%	2.8%	3.9%
Automatic Mean (µg/m^3)	23.2	30.4	27.8	24.3
Data Capture	99%	100%	99%	98%
Adjusted Tube Mean (µg/m^3)	23 (21 - 25)	30 (25 - 39)	28 (22 - 37)	24 (22 - 27)
Combined Local Bias Adjustment Factor	0.78			

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. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

Table C.4 – Non-Automatic NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
BR	1.1	2.7	38.8	28.2	36.8	Predicted Concentration at Receptor within 10% of the AQS
HB	2.1	9.7	38.6	17.4	30.9	

QA/QC of Automatic Monitoring

Sefton Metropolitan Borough Council's monitoring network is operated and run by officers who have been trained in all aspects of air quality monitoring, including routine site maintenance, calibration of analysers and data ratification. The QA/QC procedures used are detailed below.

Horiba 360 and 370 series analysers are used for gaseous pollutants and BAM analysers used for particulates PM_{10}. FIDAS dual Particulate monitor is used for PM_{10}/$PM_{2.5}$.

Sefton Council have in place a rigorous QA/QC programme which incorporates the daily screening, by visual examination of all monitoring and calibration data to ascertain if any immediate action is necessary, fortnightly site visits to carry out routine maintenance and calibration checks, equipment maintenance support including breakdown repair and 6 monthly servicing following the manufacturers recommendations carried out by trained service engineers, 6 monthly QA/QC audits carried out by an external UKAS accredited field auditor (Ricardo) and data validation and ratification of all datasets.

The QA/QC audit independent organisation used must hold UKAS accreditation to ISO 17025 for the on-site calibration of the NO_x gas analysers and for flow rate checks on particulate (PM_{10}) analysers and for the determination of the spring constant, k0, for conventional and TEOM-FDMS instruments. ISO17025 accreditation provides confidence that the analyser calibration factors produced are traceable to national metrology standards, that the calibration methodology is suitable, and that the uncertainties are appropriate for data reporting purposes and ISO17025 accreditation for laboratory certification of NO, NO_2, CO and SO_2 gas cylinders is also held.

Horiba gas analysers carry out automatic checks every three days for zero and span calibration and Horiba software scales the data of the three-day calibration checks.

Monitoring and calibration data from automatic monitors for the previous day(s) are examined on the morning of each working day by an air quality officer to check for spurious or unusual readings, allowing for the identification of anomalies or instrument faults, so they can be investigated and dealt with promptly.

An air quality officer carries out routine site visits every 30 days in accordance with a documented procedure, during which routine maintenance is carried out including the changing of all sample inlet filters. Zero and span calibration checks and gas cylinder pressures checks are also made. Any faults identified are either rectified at the time of the visit or are reported immediately to the instrument supplier service department to arrange an engineer call out.

Sefton Council has a maintenance contract currently with Horiba UK, which includes six monthly servicing intervals and breakdown cover to ensure optimum performance of the analysers throughout the year. External QA/QC audits are carried out at 6 monthly intervals. This work is presently carried out by Ricardo Energy & Environment, who provide a report with recommendations and comments relating to data management as a result of the audit and any necessary action to correct data for long term drift or any other matters which need to be addressed.

Primary data validation (application of calibration factors, screening of data for spurious and unusual measurements) is followed up with a more detailed process known as data ratification, a more rigorous data management procedure involving a critical review of all information relating to a particular dataset, the purpose being to verify, amend or reject as necessary. These methods are given in more detail in DEFRA technical guidance LAQM.TG(22).

DEFRA and the Devolved Administrations have approved a number of different monitoring technologies to be equivalent to the reference method. In some cases, the data must be corrected before they can be used.

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

In 2023, Sefton Metropolitan Borough Council used two different instrument types to measure PM_{10} and $PM_{2.5}$:

- Met-One 1020 Beta Attenuation Monitor (BAM) with unheated inlet; and,
- FIDAS dual monitor with unheated inlet.

In accordance with LAQM.TG22 Chapter 7, the following factors have been applied:

- Met-One 1020 BAM with unheated inlet – divide by 1.2; and,
- FIDAS dual monitor with unheated inlet – divide by 1.06.

Automatic Monitoring Annualisation

The LAQM.TG(22) states that annualisation is required for any site which has a data capture of less than 75%, but greater than 25%. One automatic monitoring site recorded below the acceptable data capture in 2023 for $PM_{2.5}$ and therefore required annualisation. Annualisation was carried out for the annual mean $PM_{2.5}$ at CM4 Lathom Close, Princess Way, Seaforth with data capture of 59%. Four continuous background monitoring locations were used, the three locations within a 50-mile radius were selected to annualise the data:

- Wirral Tranmere;
- Wigan Centre;
- Preston; and,
- Blackpool Marton.

Table C.5 – Annualisation Summary for Automatic Monitors for Annual Mean $PM_{2.5}$

Site ID	Annualisation Factor Wirral Tranmere	Annualisation Factor Wigan Centre	Annualisation Factor Preston	Annualisation Factor Blackpool Marton	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
CM4	0.9599	0.9900	0.9655	0.9815	0.9742	8.8	8.6

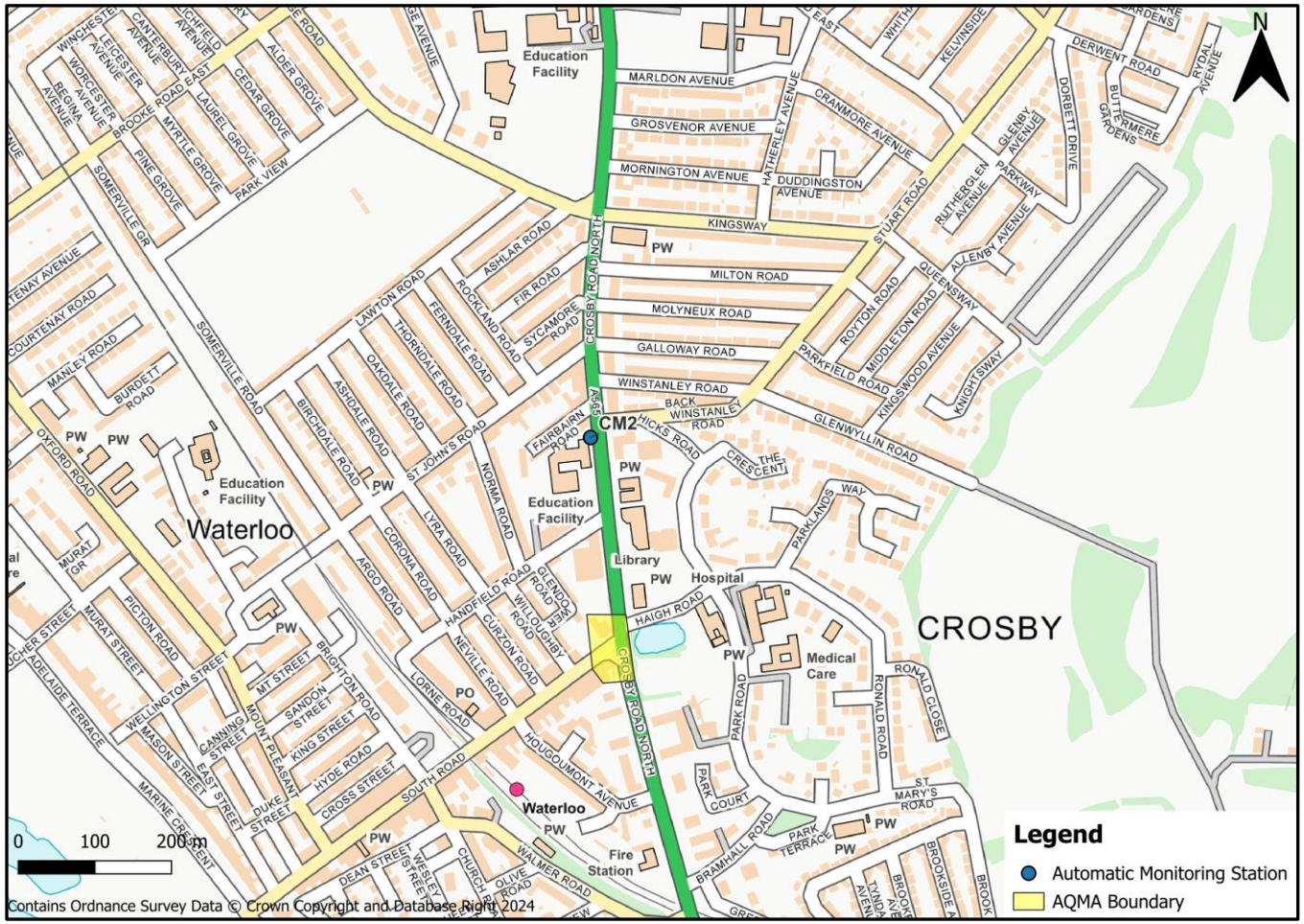
NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Sefton Metropolitan Borough Council required distance correction during 2023.

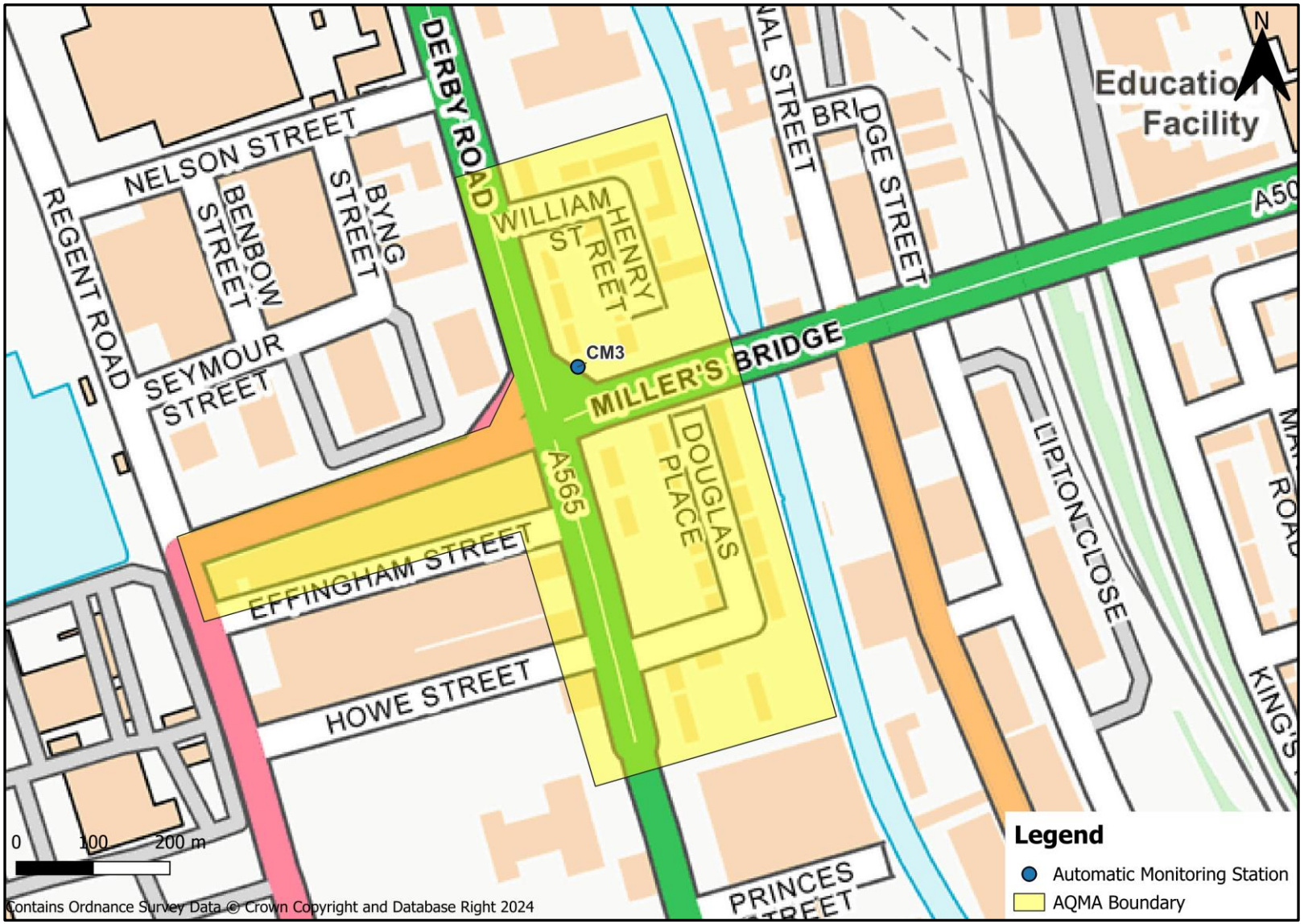
Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Map(s) of Automatic Monitoring Sites

CM2 – Crosby Road North

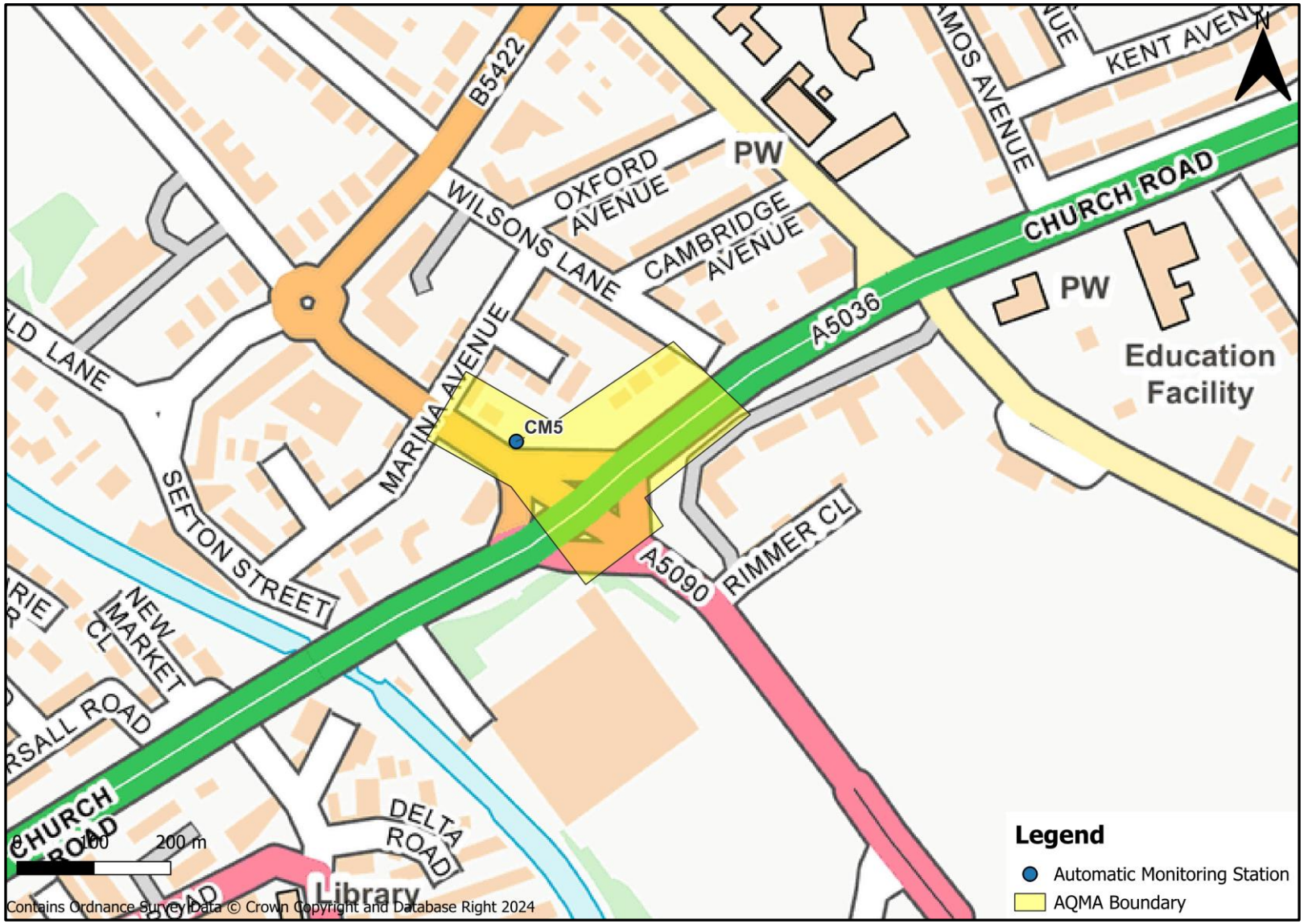


CM3 – Millers Bridge, Bootle



CM4 – Lathom Close, Princess Way, Seaforth

CM5 – Hawthorne Road, Litherland



CM7 – Regent Road

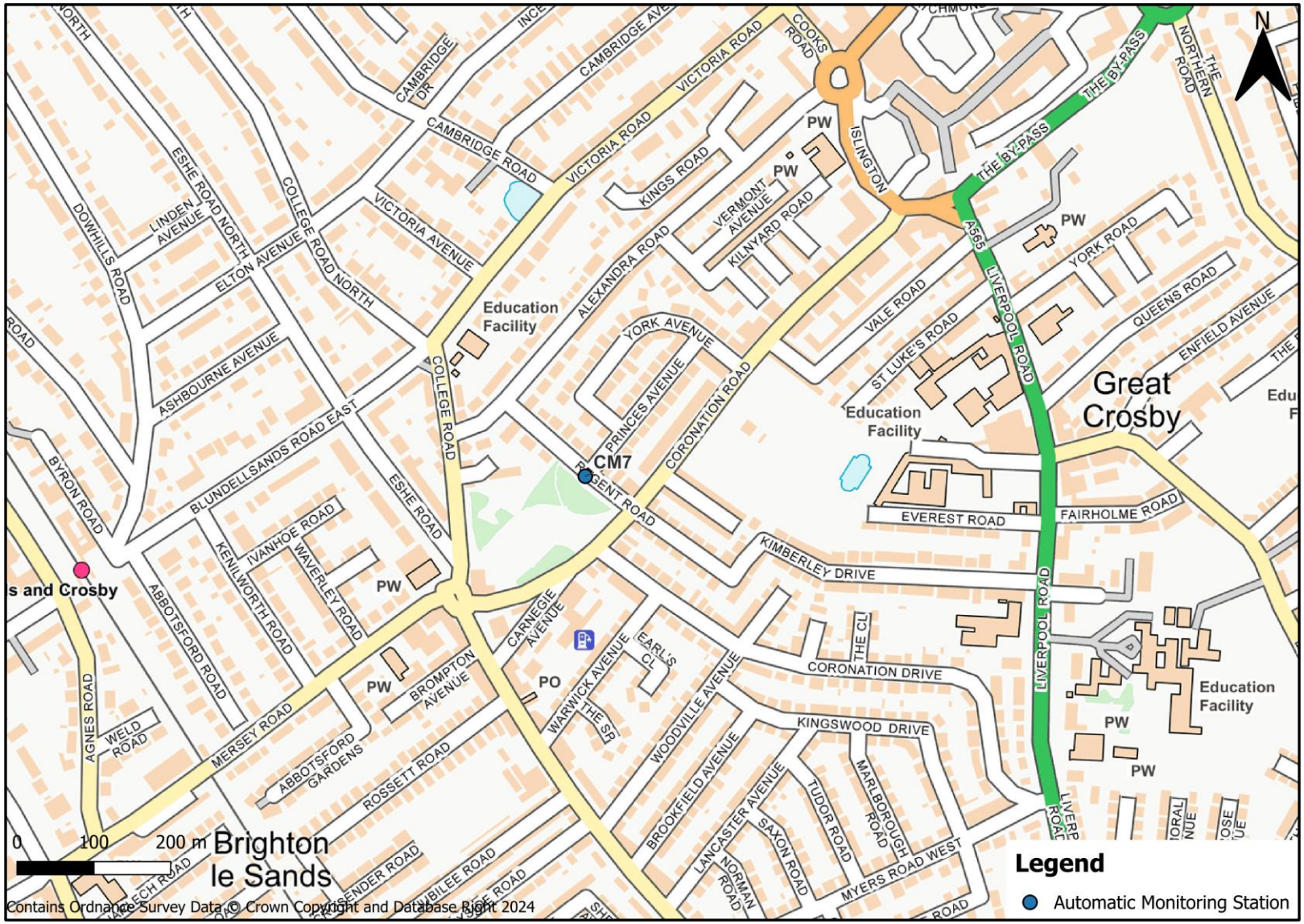


Figure D.2 – Map of Non-Automatic Monitoring Sites within and around AQMA 2

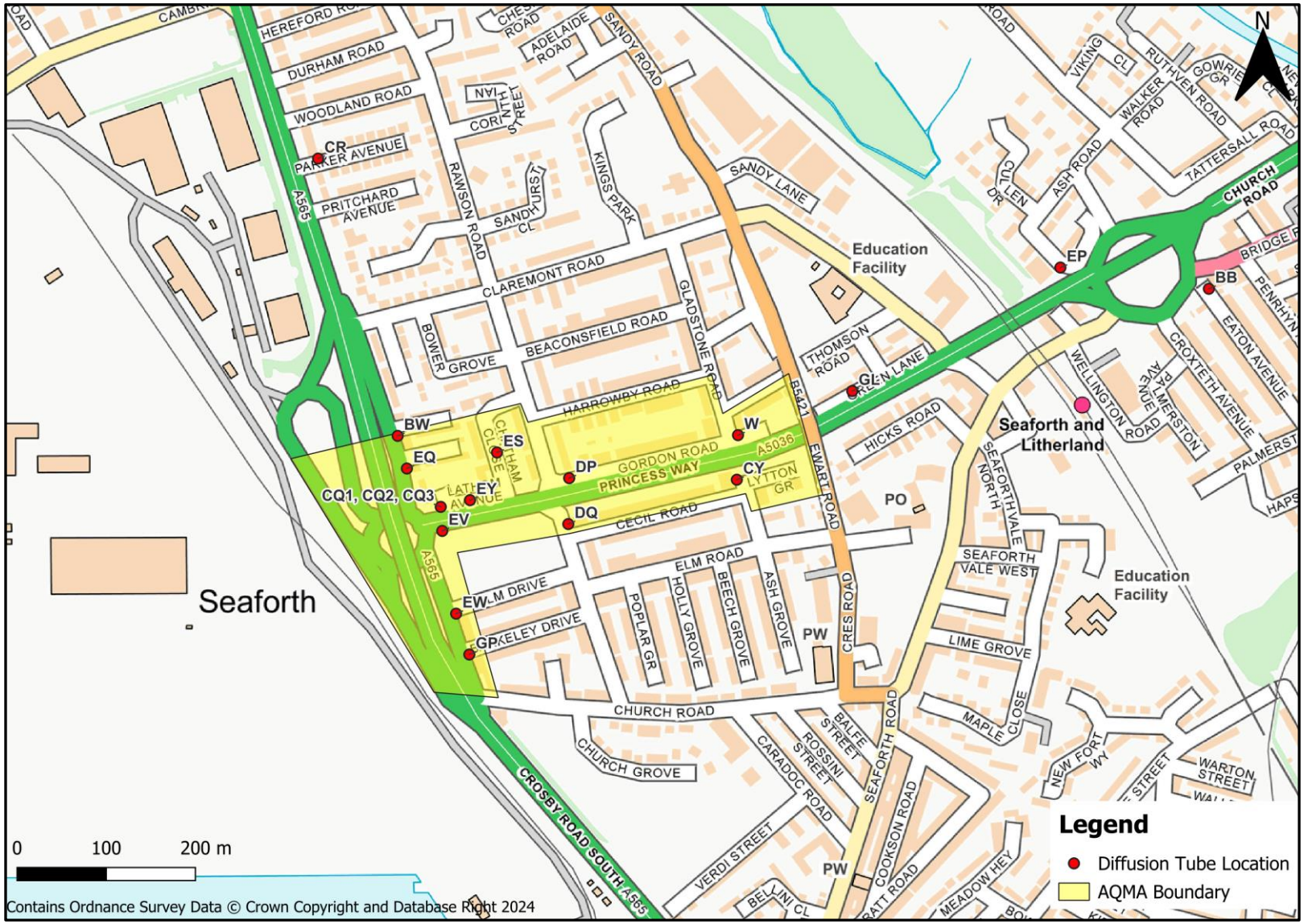


Figure D.3 – Map of Non-Automatic Monitoring Sites within and around AQMA 3

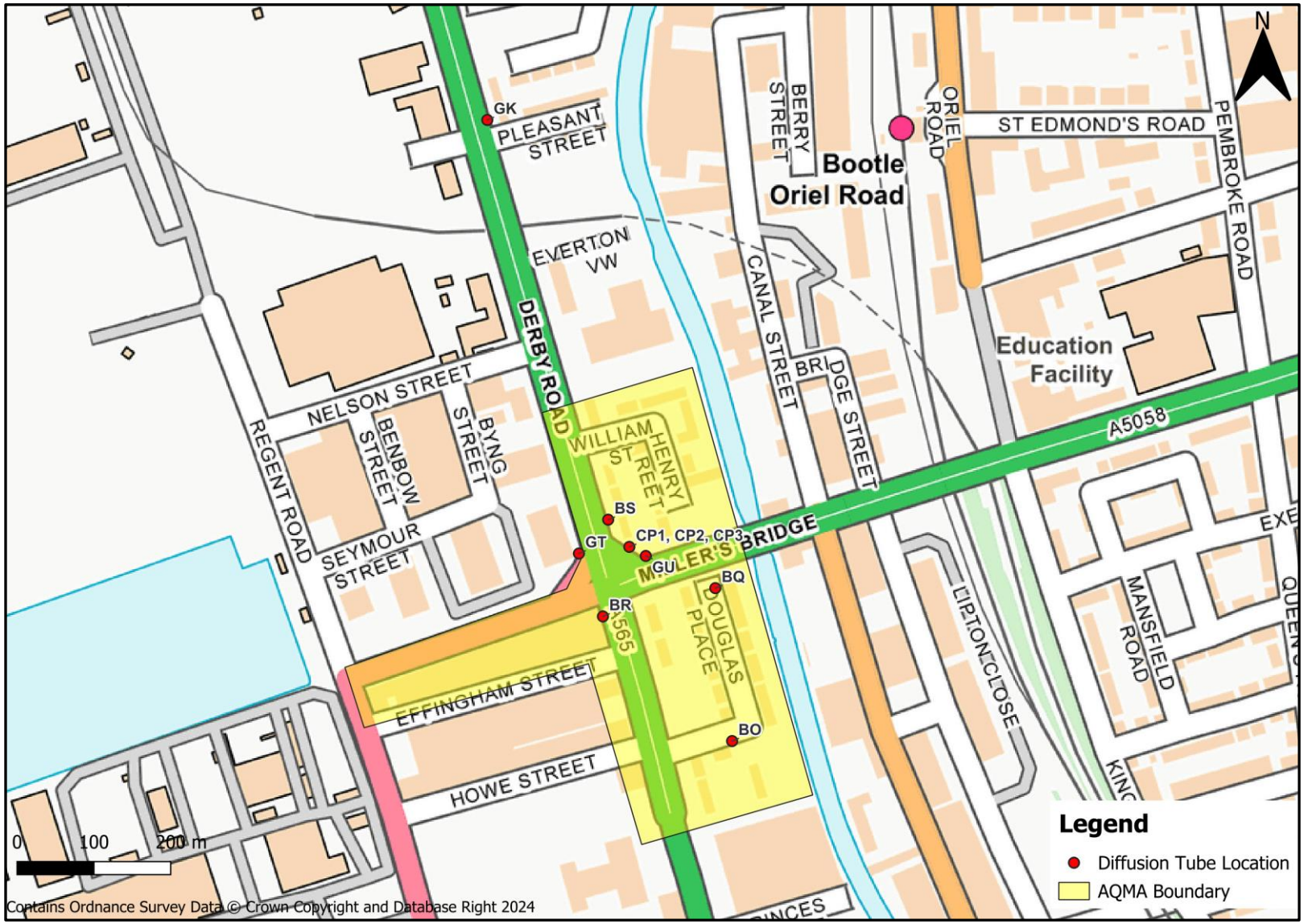


Figure D.4 – Map of Non-Automatic Monitoring Sites within and around AQMA 4

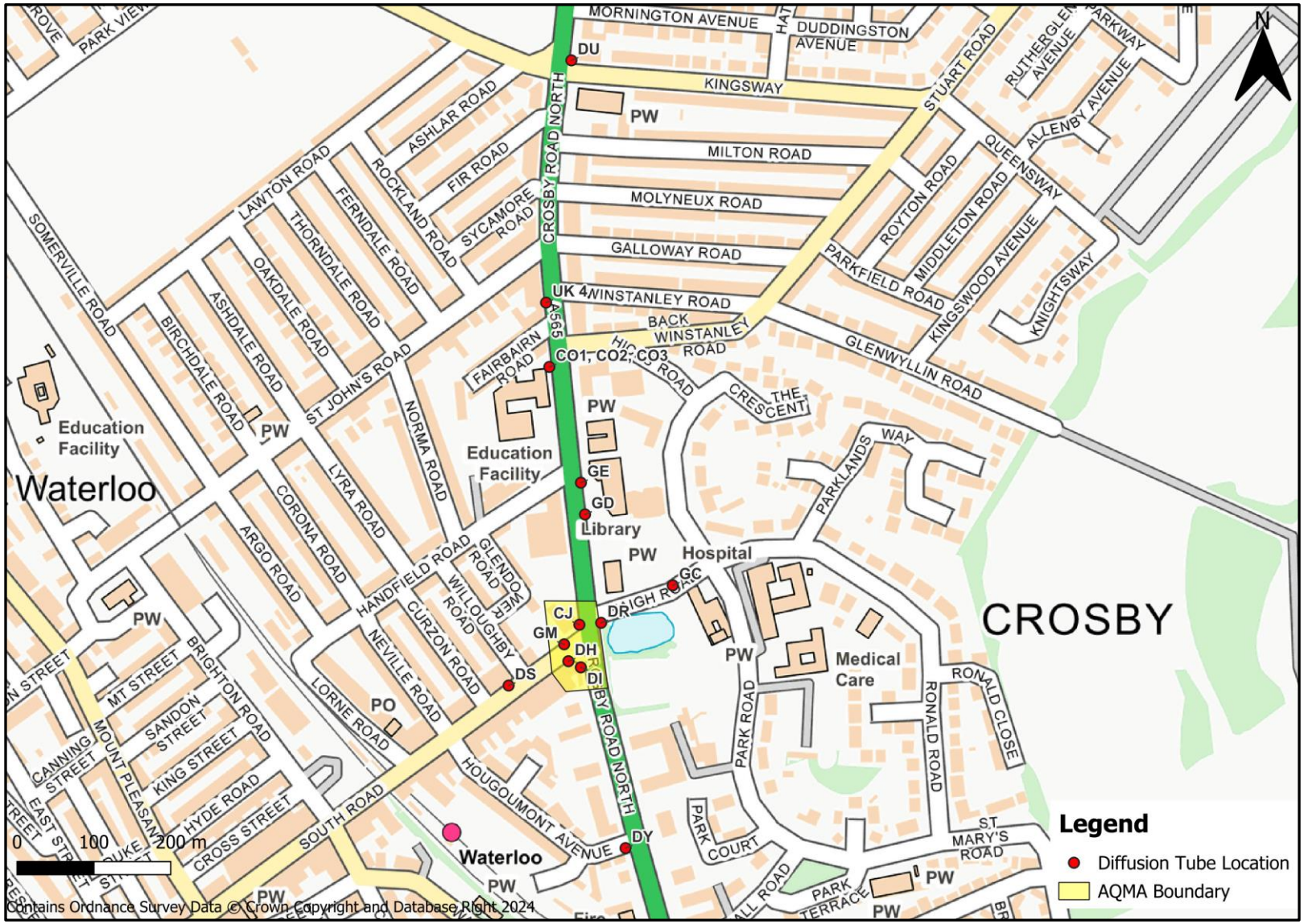


Figure D.5 – Map of Non-Automatic Monitoring Sites within and around AQMA 5

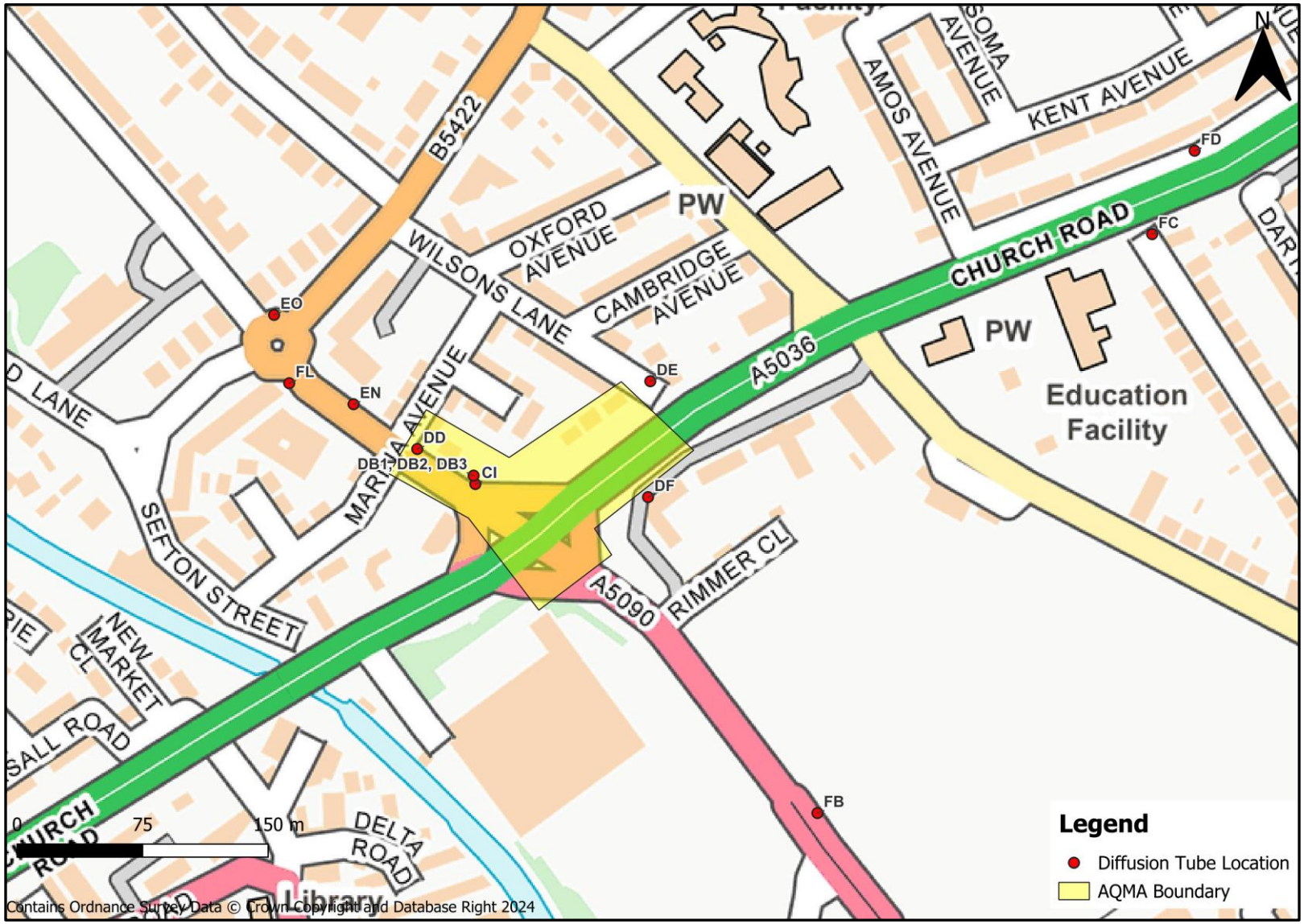
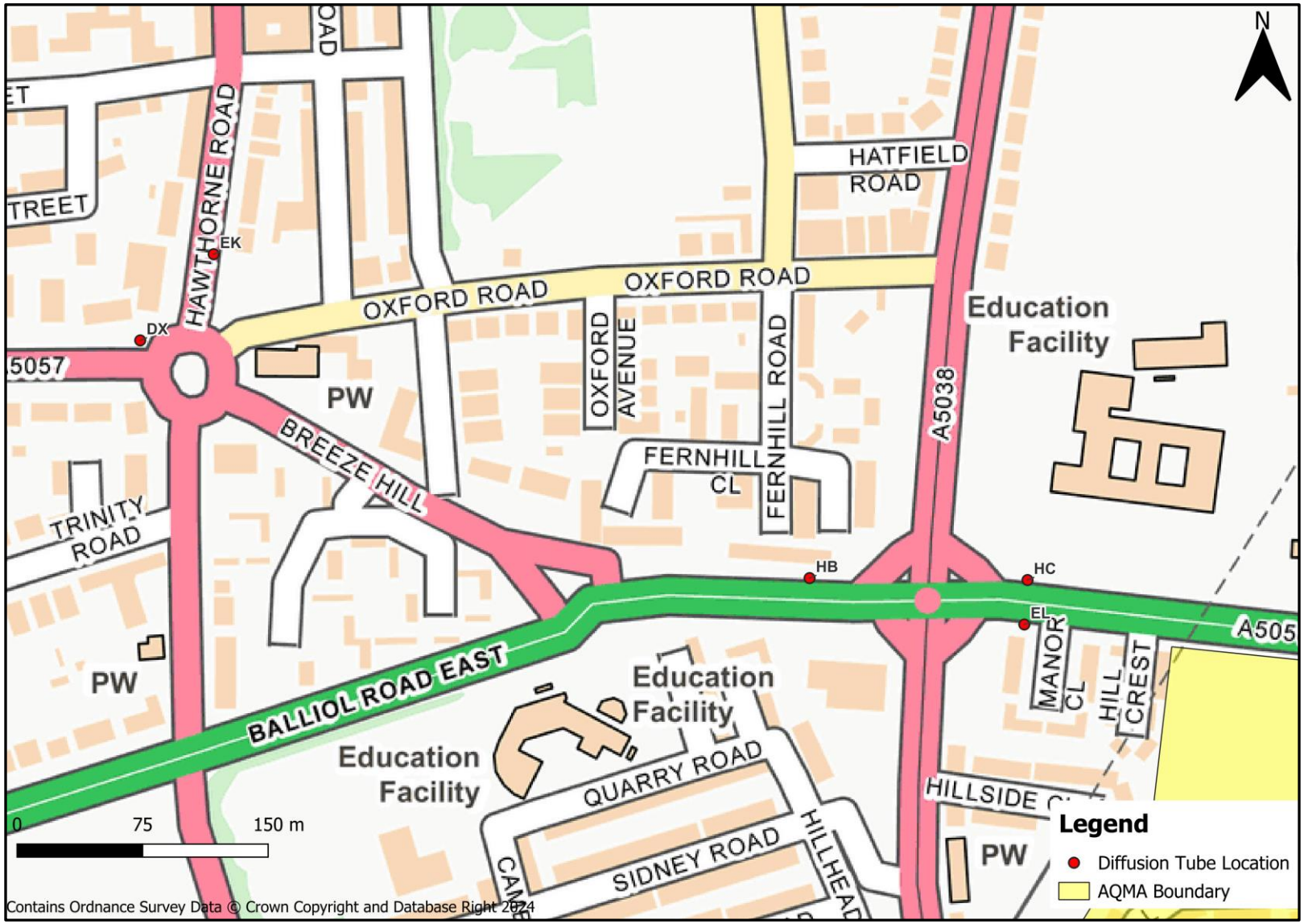
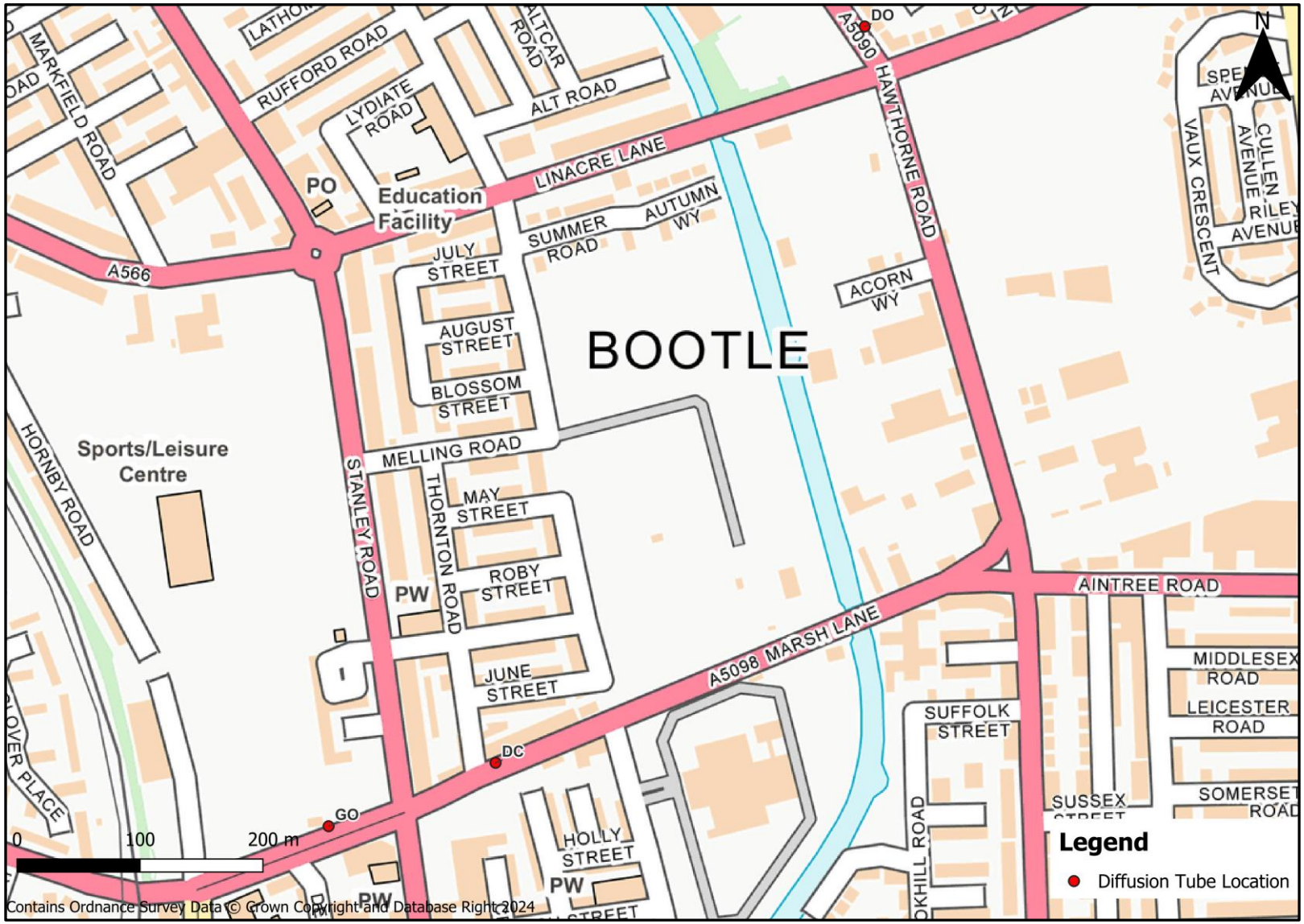


Figure D.6 – Map(s) of Non-Automatic Monitoring Sites within Bootle



Non-Automatic Monitoring Sites within Bootle – DC, DO and GO



Non-Automatic Monitoring Sites within Bootle – GG, GH and FI

Figure D.7 – Map of Non-Automatic Monitoring Sites within Maghull

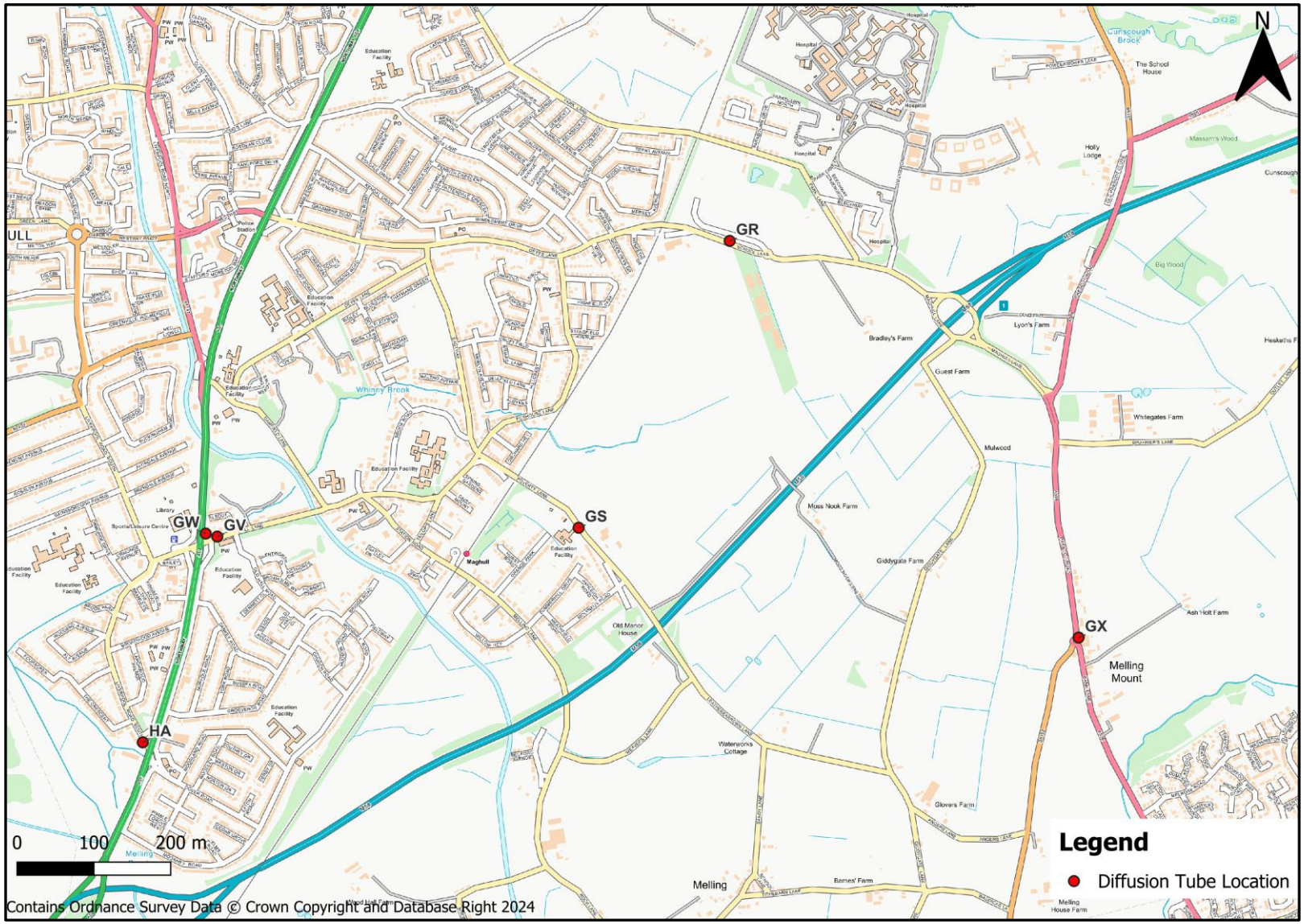


Figure D.8 – Map of Non-Automatic Monitoring Sites within Netherton

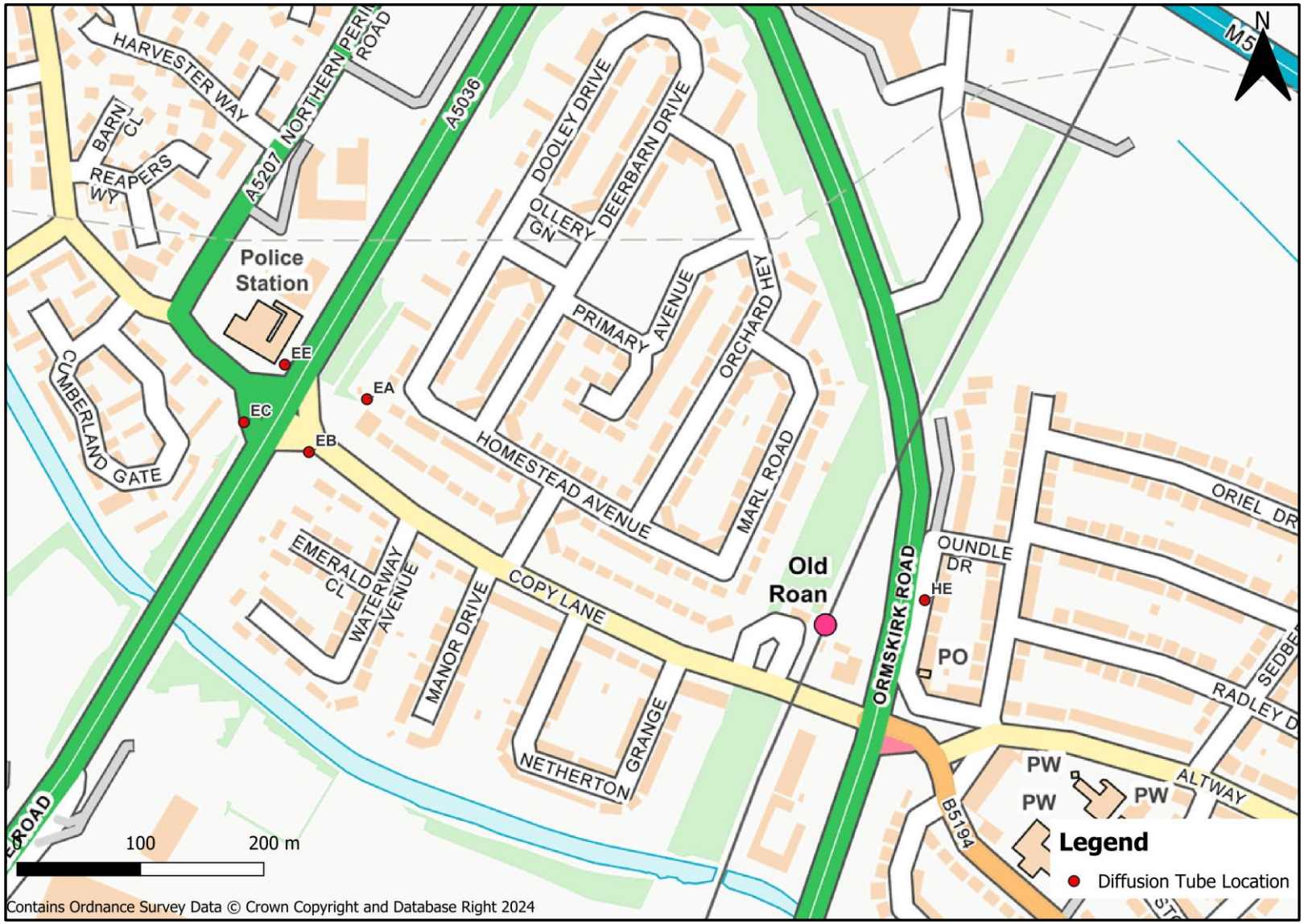


Figure D.9 – Map of Non-Automatic Monitoring Sites within Formby

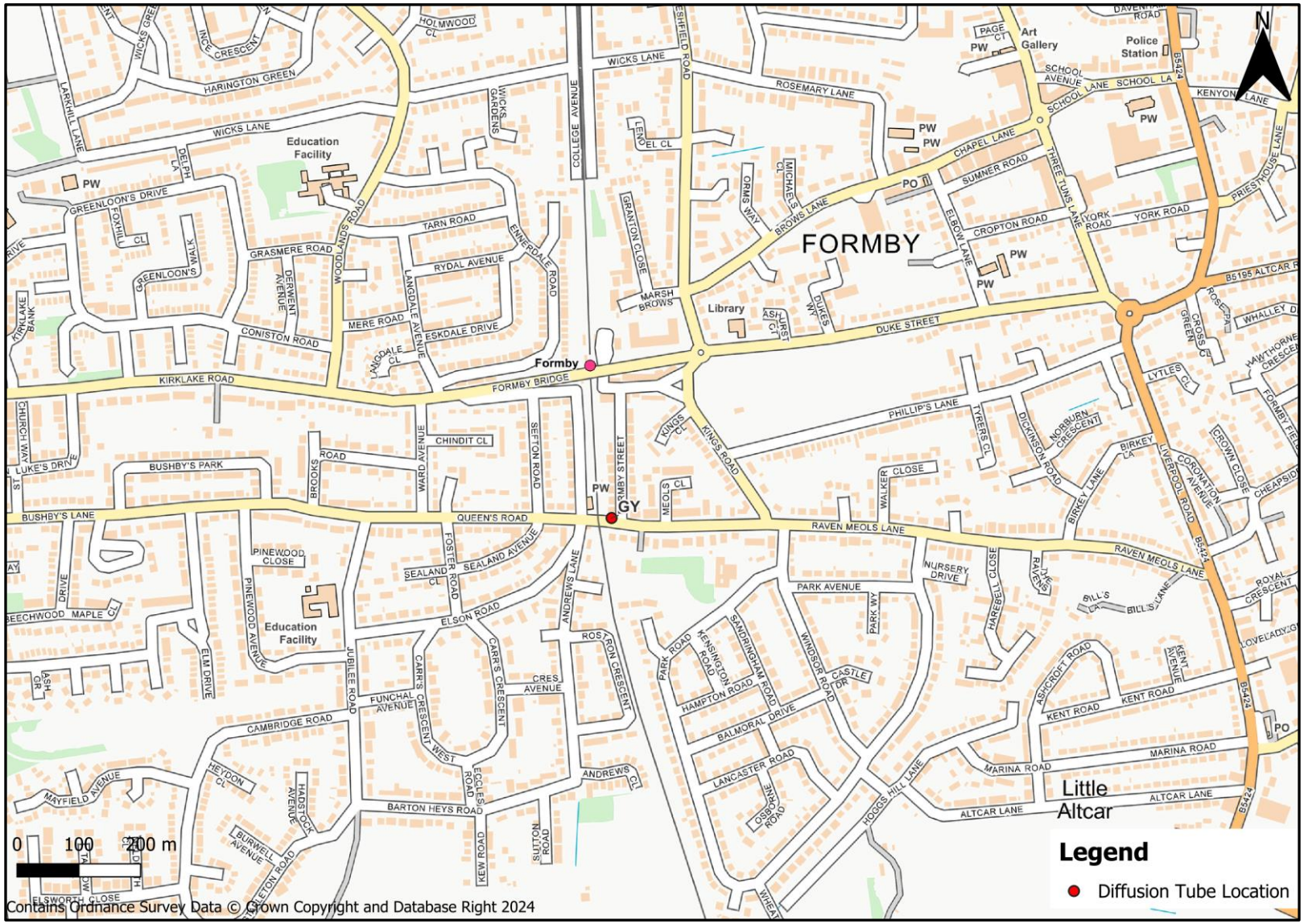


Figure D.10 – Map of Non-Automatic Monitoring Sites within Orrell

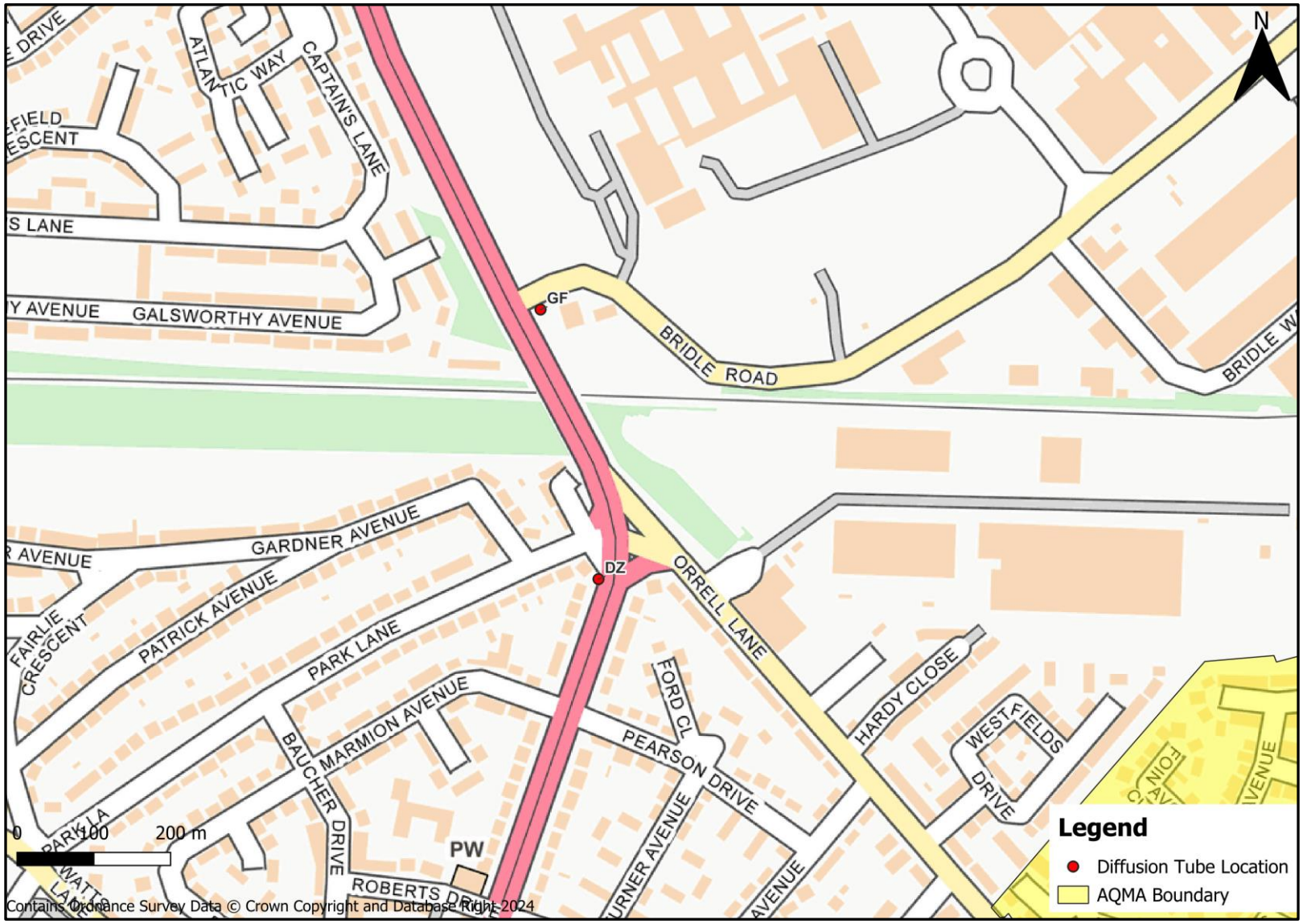


Figure D.11 – Map of Non-Automatic Monitoring Sites within Litherland

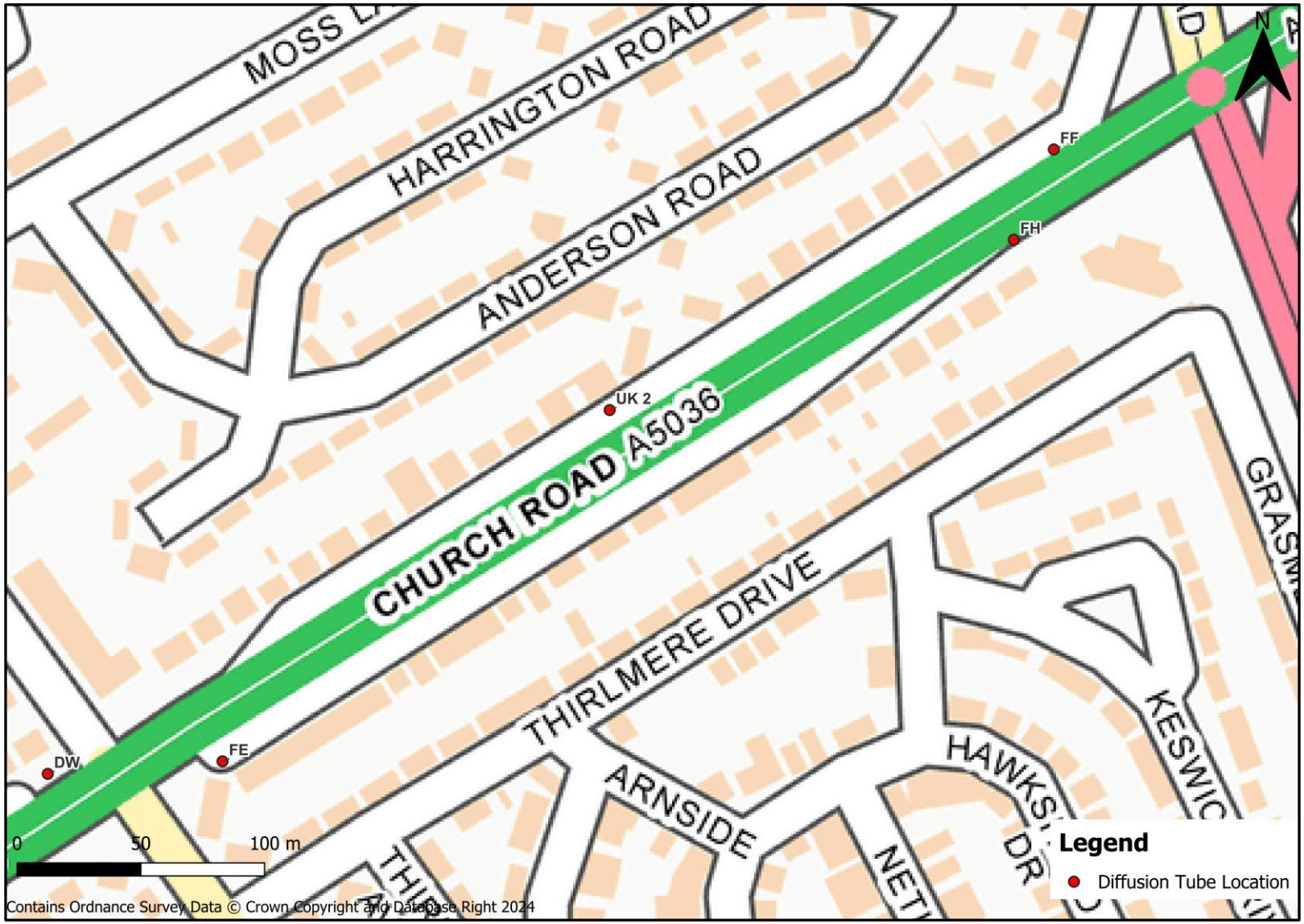


Figure D.12 – Map of Non-Automatic Monitoring Sites within Southport

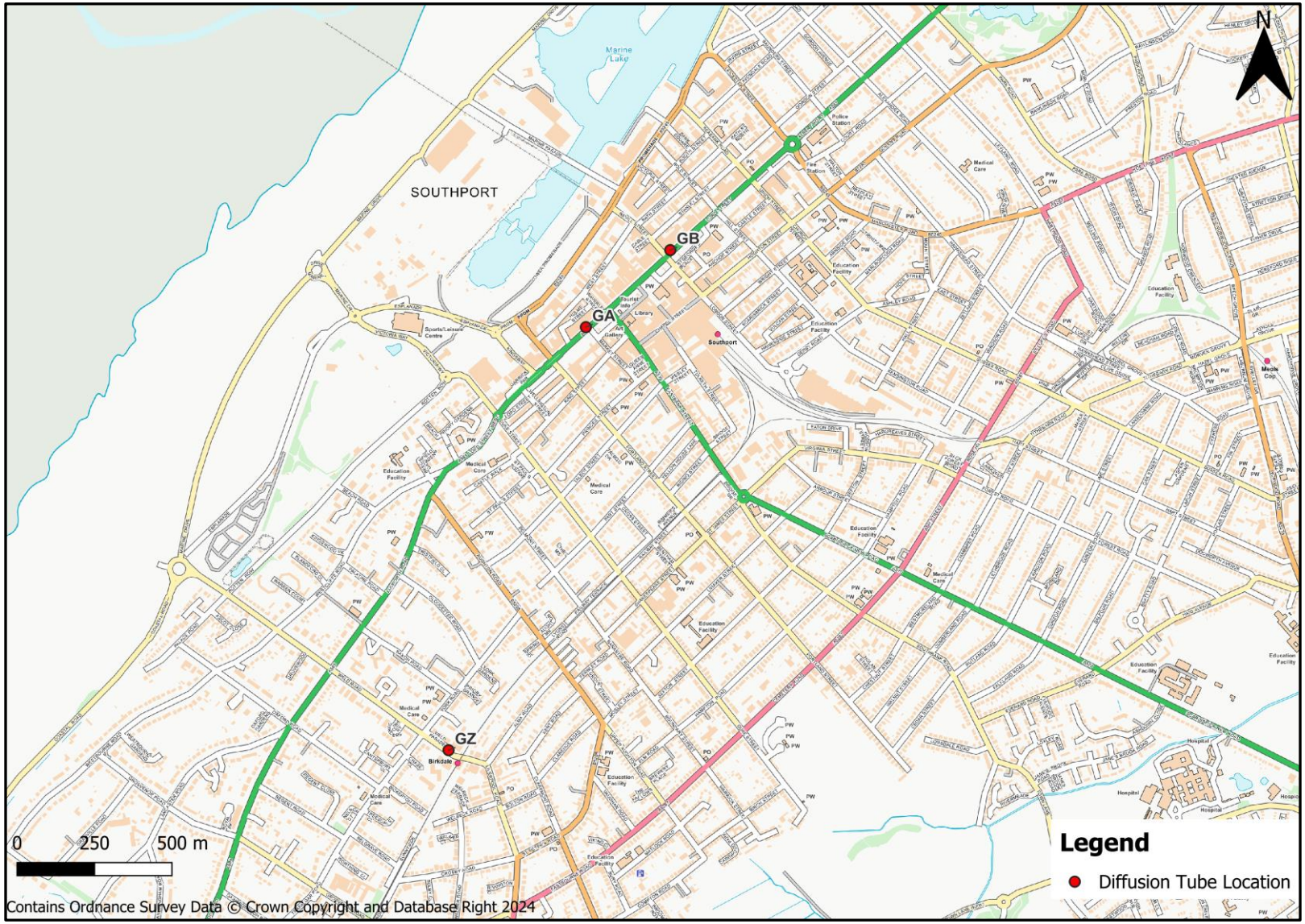


Figure D.13 – Map of Non-Automatic Monitoring Sites within Blundellsands

Figure D.14 – Map of Non-Automatic Monitoring Sites within Aintree

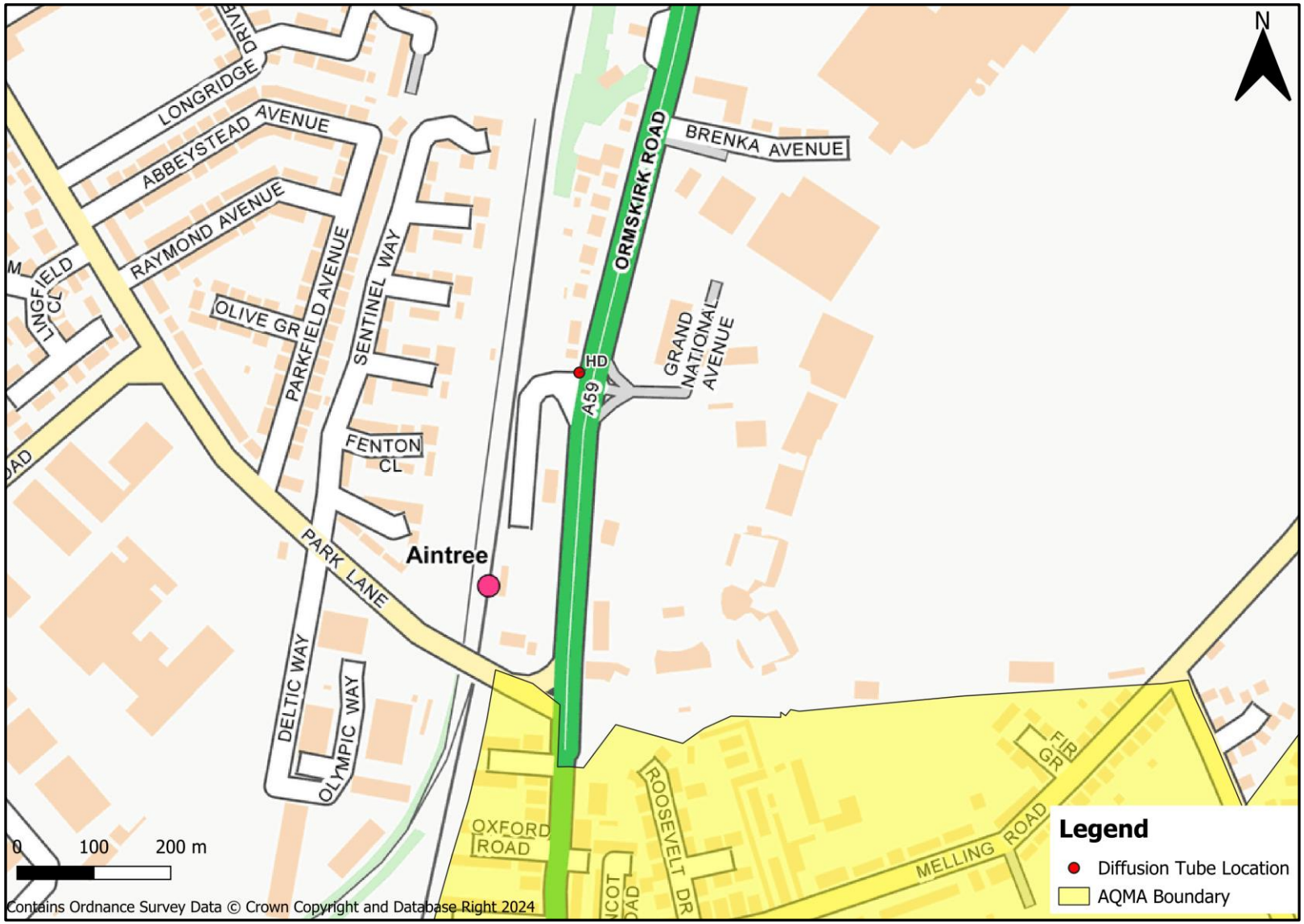


Figure D.15 – Map of Non-Automatic Monitoring Sites within Thornton

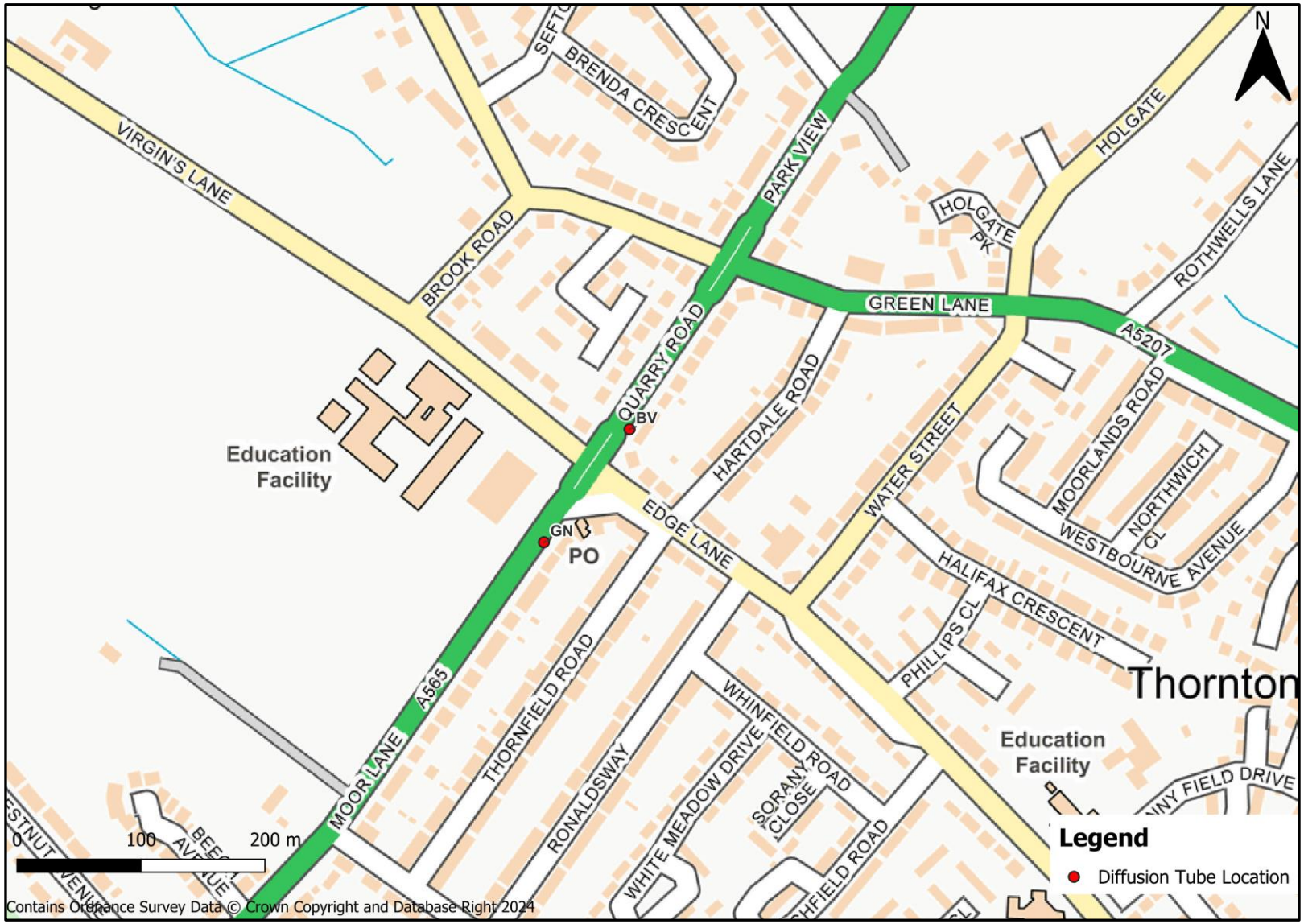


Figure D.16 – Map of Non-Automatic Monitoring Sites within Crosby

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[8]

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

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

Appendix F: Further Details of the Measures Contained within Table 2.2 of the Annual Status Report and a Review of the Previous Air Quality Action Plan Measures

Further Details of the Measures Contained within Table 2.2 of the Annual Statues Report

APM1 – Emissions Enforcement - Joint Sefton/DVSA emissions monitoring enforcement project

- To target Heavy Goods Vehicle (HGV) related emissions in key areas, officers from Sefton working in collaboration with Driver and Vehicle Standards Agency (DVSA) Inspectors developed and have now undertaken three joint vehicle emissions monitoring/enforcement activities between December 2021 and September 2023 to identify HGV's travelling along the A5036, A565 and motorway network which were emitting unacceptable levels of air pollution thus potentially indicating emission control system tampering or faults.
- During the most recent exercise in September 2023 sophisticated air pollution monitoring equipment was installed in DVSA stop cars and levels of Nitrogen Oxides (NO_x) and Particulate Matter (PM) were monitored in live traffic to detect suspect vehicles. The DVSA were also testing a new Particulate Monitor (Total Particle Count) in anticipation of bringing in HGV particulate emission limits as part of the HGV MOT.
- Exhaust plume emissions from 230 vehicles were monitored over the two-day project. 11 suspect vehicles were stopped at the switch Island DVSA inspection site and subject to further detailed examination by DVSA inspectors.
- Compared to previous years very few HGV's were identified for High NOx emissions and those stopped did not show faults. More HGV's were identified for high PM emissions when followed but when tested using the DVSA MOT Particulate monitor they were found to be within acceptable parameters for the age of the vehicle.
- The recent study confirms that fewer HGV's are operating with cheat devices/emission control faults than previous years which is obviously positive and likely to be one of the contributing factors that has led to the reductions in Nitrogen Dioxide (NO_2) and PM observed when analysing the monitoring data in these key areas.
- To ensure this trend continues further joint work is being developed with DVSA, which will continue to target HGVs but also include Light Duty Vehicles (LGVs) and private cars as these now represent the largest non-compliant (i.e. Euro 5 or older) element of Sefton's Vehicle fleet.

APM2 – Traffic Management – Optimisation of Traffic Light Strategies on Key Routes

- To ensure traffic flow is optimised and thus road traffic emissions minimised as far as practicable in our Air Quality Management Areas (AQMAs) and wider borough, Officers from Environmental Health are currently developing a joint project with Highways and Yunex Traffic consultants. This will entail the revalidation of the SCOOT (Split Cycle and Offset Optimisation Technique) urban traffic light control system at 20 key traffic light-controlled junctions and 9 crossings in the Borough situated on Moor Lane, Crosby Road North, Derby Road, Dunnings Bridge Road, Southport Road and Northway.
- Surveys are due to be carried out at each of the key junctions/crossings to determine how effectively the junction is currently functioning in terms of traffic flow, congestion levels and minimising air pollution.
- Based on the outcome of the surveys new strategies will be developed aimed at improving traffic flow/congestion and managing the air quality issues in the locality. The new strategies will be incorporated into Sefton's SCOOT/STRATOS system and then tested for effectiveness.

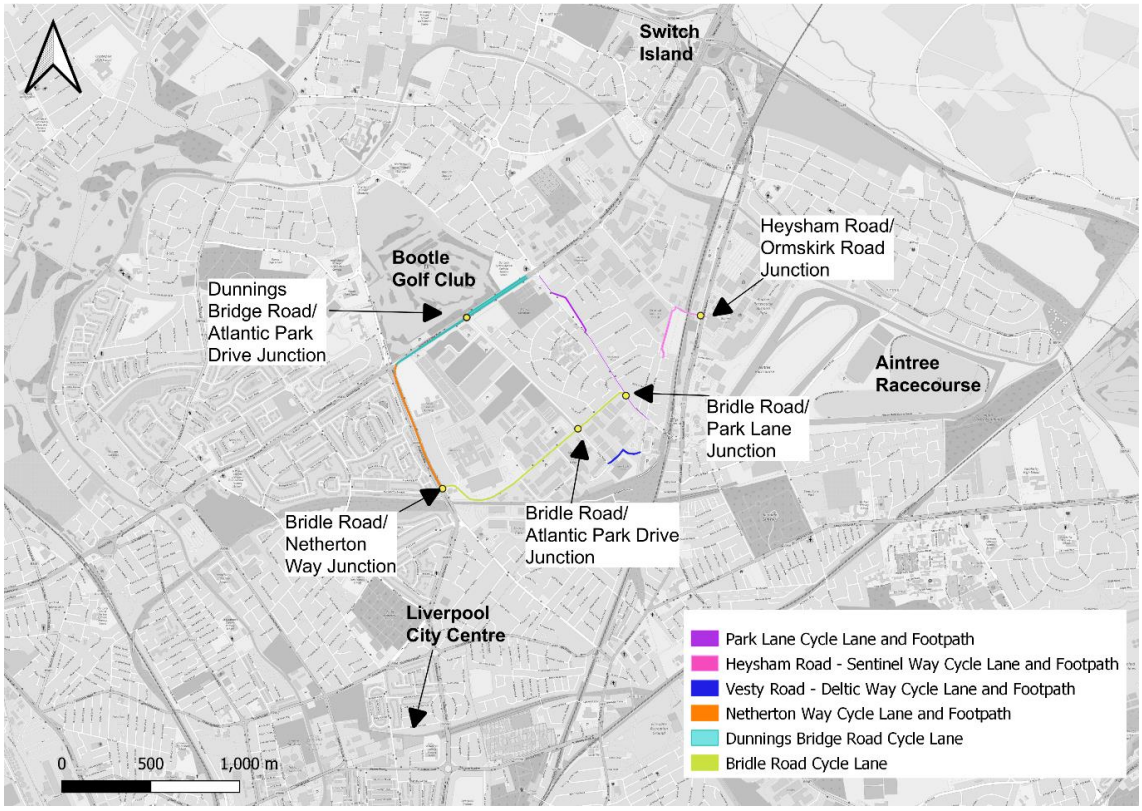
APM3 – Traffic Management – Explore Feasibility of using Air Quality Sensors to trigger Traffic Light Strategies

- As part of a City Region traffic light LED signal upgrade project, funding for seven air quality sensors (Earthsense Zephyr) was secured which are now operational. The sensors are located at seven key traffic light junctions in the Borough and integrated into Sefton's Stratos traffic signal control system.
- Real time air pollution data is now available from the sensors at these key locations, which can also be used to trigger specific traffic signal strategies to alleviate congestion if levels of localised pollution are of concern.
- Officers from Highways and Environmental Health are currently working together to develop potential traffic light strategies based on the sensor outputs. The strategies are being designed to alleviate congestion and therefore reduced vehicle emissions.
- The effectiveness of the strategies will be measured directly in terms of pollutant levels and traffic flow/congestion.

APM4 – Maritime Corridor Improvement Project

- The Maritime Corridor is the area spanning from Switch Island to Netherton Way (A5038). It links to Atlantic Park and the wider area to the Port of Liverpool.
- Sefton's Maritime Corridor improvement scheme is focused on improving transport links throughout this area by improving junctions and introducing walking and cycling routes along Dunnings Bridge Road (A5036), Netherton Way (A5038), Bridle Road, Park Lane, Heysham Road and Atlantic Park Drive. The scheme is intended to make it easier for vehicles, cyclists and those walking to move around the area.

The map below shows the walking and cycling improvements as well as the junctions which are going to be improved.



- The Maritime Corridor is recognised as an area for existing employment, education and leisure opportunities, as well as being directly linked to local residential areas. In addition, both Sefton Council and the Liverpool City Region Combined Authority recognise the Maritime Corridor as a key area for potential future growth.
- Currently the area experiences high volumes of traffic and limited routes for walking and cycling. This can lead to congestion, travel time delays, air and noise pollution, as well as limiting the accessibility of employment and other opportunities for those unable to travel by car or choosing more sustainable modes of travel.
- The aim of the scheme is to therefore tackle these issues and create connected active travel routes throughout the wider area, whilst improving traffic conditions. We are also looking to improve the public space and overall attractiveness of the area. Our plan is that this scheme will help to promote and enable the growth of the wider region and bring further opportunities for local residents and businesses.
- Following the Liverpool City Region Combined Authority's (LCRCA) securing of funding from the Central Government's Levelling Up Fund and City Region Sustainable Transport Settlements Fund, Sefton Council are now working towards developing a Full Business Case to progress the scheme.

Further information can be found here:

https://www.sefton.gov.uk/parking-roads-travel/feeback-on-maritime-corridor-improvements-consultation-we-asked-you-said-we-did/

https://yourseftonyoursay.sefton.gov.uk/investment-programmes-and-infrastructure/mc-scheme/

APM5 – Targeting Local Non-Compliant HGVs (particularly rigids) to Encourage Vehicle Upgrade

- An Automatic Number Plate Recognition study was undertaken in late 2022 to understand the current fleet composition in Sefton, in response to questions raised during stakeholder engagement on Sefton's Clean Air Zone (CAZ) proposals. The ANPR study provided up to date information on the age and Euro standard composition of the fleet and highlighted a number of vehicle categories that were significantly older (and thus more polluting) in Sefton than the national fleet. Rigid HGVs were identified as a vehicle type that overall was much older and as such worth targeting in terms of encouraging vehicle upgrade.
- This action is currently in the development phase but will include engaging with fleet operators to obtain a better understanding of the composition of the local fleet and help understand the challenges to upgrade.
- Exploration of possible grant opportunities in collaboration with external partners and agencies will also be a key element of this action.

APM6 – Working with Peel Ports to Explore Further Opportunities to Reduce HGV Related Emissions

- Emissions from HGV traffic going to and from the Port of Liverpool impact significantly on a number of Sefton's AQMA's. Working in partnership with Peel Ports and the wider Port Access Steering Group to explore opportunities to reduce HGV related emissions has been identified as a key action in Sefton's Air Quality Action Plan (AQAP).
- This action is currently in the development phase however, Specific project elements are likely to include:
    - Refining Port Booking System to ensure minimal waiting / queuing of HGV's.
    - Management of waiting/rest areas/vehicle idling on site for HGVs.
    - Exploring opportunities to restrict non-compliant (Euro 5 and Older) vehicles.
    - Supporting Port AQ & Carbon Reduction Strategy

APM7 – Working with Peel Ports to Explore Further Opportunities to Reduce Non-HGV Related Emissions

- Working with Peel Ports to explore opportunities to reduce non-HGV related emissions has been identified as a key action due to the proximity of the port to two of Sefton's AQMA's.
- Work undertaken as part of the previous CAZ outline business case has identified non-traffic sources of pollution having a notable impact on air quality levels in the nearest AQMA's. As such Sefton is currently working in partnership with Peel to develop this action further.

- Opportunities include exploring the use of electric portside vehicles i.e. cranes and tugs, investigating the use of electric ship-to-shore power (cold ironing) and installation of renewable energy generators (solar, wind, tidal) to replace CHP derived electric/power.

APM8 and APM9 – Working with the LCRCA, Bus Operators and LCRCA Bus Alliance to Concentrate Compliant Fleet in Areas with Worst Air Quality and Improve the Bus Fleet

- The ANPR study undertaken in Nov 2022 provided information on the age and Euro standard of the bus fleet in Sefton.
- Like the rigid HGV fleet the Bus fleet was notably older than the national average with proportionally more non-compliant buses (Euro 5 and older) travelling within Sefton and through our AQMA's.
- As part of its Bus Reform programme, the LCRCA is committed to phasing in zero-emission electric and hydrogen powered buses, and phasing out diesel engines from the bus fleet. LCRCA has also committed to introducing a new bus franchising model, under which the Combined Authority will have greater control over fares, routes, timetables and fleet. This presents an opportunity to work with them to maximise positive impact on AQ in Sefton's AQMAs
- As such working in partnership with the LCRCA, bus operators and the bus alliance to concentrate the compliant bus fleet in our areas with the worst Air quality along with exploring opportunities to improve the bus fleet operating in these areas has been identified as a key air quality improvement action.
- This action is currently in the development phase but activities are likely to include working with LCRCA, Bus operators and LCRCA Bus Alliance to explore opportunities for fleet improvements including:
    - Use of hybrid and electric vehicles;
    - Hydrogen buses;
    - Implementation of Green Bus Corridor; and,
    - Retrofit grants.

APM10 – Detailed Air Quality Study around Millers Bridge to Understand Significant Non-Traffic Background Sources Contributing to NO_2 Exceedances

- Work undertaken as part of the previous CAZ outline business case has identified some non-traffic sources of pollution are impacting on levels of NO_2 and PM in the Millers Bridge AQMA.
- A detailed air quality study around Millers Bridge to understand significant non-traffic background sources contributing to NO_2 exceedances (and also PM levels) is planned as an AQAP action.
- This will assist in Identifying the key issues/contributors to the high NO_2 background concentrations (non-traffic) and enables targeted proposals to be developed for tackling emissions from industry operations/shipping and internal fleet.

APM11 – Intensive Road and Footpath Cleaning in AQMA's

- Whilst levels of PM_{10} within the AQMAs are well below the national air quality limit, levels of $PM_{2.5}$ are very close to the new upcoming standard and the build-up of fine debris and detritus in road gullies and footpaths within the AQMA's has been observed.
- As such a second phase of intensive road and footpath cleaning in the AQMA's is being developed with colleagues in Sefton's Cleansing Department and will form a specific action within the proposed AQAP.
- This work is anticipated to start in spring/summer 2024.

APM12 – Use of the Planning System to Mitigate Air Quality Impacts

- Sefton continues to use the planning system to mitigate the air quality impacts of any new development likely to have an impact on the AQMAs through the use of planning conditions and Section 106 Agreements.
- All planning applications received are reviewed and where an air quality concern is identified an Air Quality Assessment will be required. Measures to mitigate impacts will be included as part of planning approval where Air Quality Assessment concludes the development will impact air quality negatively.

APM13 – Develop and Promote Active Travel Initiatives and Campaigns.

- Sefton has already developed and implemented a number of successful active travel campaigns and initiatives.
- A key action within this proposed AQAP is to continue to explore opportunities to develop active travel options including workplace travel plans and improving the associated infrastructure.

Review of the Previous Air Quality Action Plan Measures

A review of the effectiveness of measures introduced for the previous Air Quality Action Plan for Sefton Council was undertaken, using trends in air quality data across the various AQMAs where relevant. The review of the measures is presented in Table F.1, where each measure has been assigned a Red, Amber or Green (RAG) score as follows:

- Green = measure has been effective at reducing pollutant concentrations and will continue to be implemented.
- Amber = measure has not had clear effect on pollutant concentrations, but it will be continued.
- Red = measure ineffective at reducing pollutant concentrations and has (or will be) ceased.

It should be noted that for some of the implemented measures it is difficult to comment on the effectiveness. There are various reasons for this such as the lack of available monitoring in that area or that there is no clear method of assessing success.

Table F.1 – Review of Previous Air Quality Action Plan

ID	Description of Measure	RAG Score	Notes
SSM1 Crosby Road North AQMA 1	Implementation of the package of measures contained within the A565 Route Management Strategy and Action Plan.	Green	AQMA revoked as result of reduced levels of NO_2 and PM_{10} following implementation of measures. Continued compliance with NAQS objectives
SSM2 Crosby Road North AQMA 1	Increased road sweeping and pavement and carriageway washing to reduce the impact of resuspended dust on PM_{10} levels.	Green	Measure ceased in 2013 due to funding issues however reductions in PM10 levels were observed following cleaning operations
SSM1 Princess Way AQMA 2	HGV booking system to improve movement of HGVs in and out of the Port of Liverpool.	Green	Monitoring in the Princess Way AQMA shows significant improvements in air quality over time, with no exceedances recorded in 2022. Amongst other measures, it is highly likely that reduced congestion has contributed to this improvement since its implementation.
SSM2 Princess Way AQMA2	ANPR survey to gather intelligence on the HGV fleet on the A5036.	N/A	Completed in 2013 and replaced with the measures below. This measure will not have a direct impact on air quality.
SSM2 Princess	Port expansion mitigation measure No1 National	N/A	Measure number 1 is still under review/consideration by National Highways.

ID	Description of Measure	RAG Score	Notes
Way AQMA2	Highways A5036 Road option study Port expansion mitigation measure No3. Alternative fuels strategy for HGV's and buses Port expansion mitigation measure No4. HGV parking demand study		Studies for measure numbers 3 and 4 completed – results used to inform further actions. No direct impact on air quality.
SSM2 Princess Way AQMA2	ECO stars Vehicle fleet recognition scheme	Green	Monitoring in Princess Way AQMA shows significant improvements in air quality over time, with no exceedances recorded in 2022. The Eco Stars Fleet Recognition Scheme will not have a direct impact on air quality, but it is assumed its implementation has contributed to the improvement in concentrations in the Princess Way AQMA.
SSM1 Millers Bridge AQMA3	Installation of Hurry Call HGV priority traffic light System	Amber	For the Millers Bridge AQMA whilst levels of NO_2 have shown reductions over time, these are not as significant as in other AQMA's suggesting that the measures implemented have not been as effective as envisaged in the previous AQAP. There is one remaining monitored exceedance within the AQMA for annual mean NO_2.
SSM2 Millers Bridge AQMA3	Effective regulatory control and monitoring of industrial sites within the Port of Liverpool to minimise their impact on PM_{10} levels.	Green	For PM_{10}, there has been notable improvement in concentrations over time, confirming that these measures have had positive impacts on concentrations. The trends analysis shows that, for PM_{10}, there is a significant reduction in pollutant concentrations over time in this AQMA.
SSM3 Millers Bridge AQMA3	Increased road sweeping and pavement and carriageway washing to reduce the impact of resuspended dust on PM_{10} levels	Green	Measure ceased in 2013 due to funding issues. however, some notable reductions in PM levels were observed following cleaning operations
SSM1 South Road AQMA4	Implementation of the package of measures contained within the A565 Route Management Strategy and Action Plan.	Green	Monitoring in South Road AQMA shows significant improvements in air quality over time, with no exceedances recorded in 2022. The measures adopted within the A565 Route Management Strategy and Action Plan seem to be taking effect, with concentrations of NO2 reducing every year since 2017.Sefton Currently considering revoking this AQMA.

ID	Description of Measure	RAG Score	Notes
SSM2 Hawthorne Road AQMA5	Eco Stars Fleet Recognition Scheme	Green	As for the Princess Way AQMA it seems as though the Eco Stars Fleet Recognition Scheme is having an impact on Sefton's air quality. Although the monitoring does not indicate a significant trend over time for the Hawthorne Road AQMA, there are no exceedances in 2022 and generally air quality is improving. The Eco Stars Fleet Recognition Scheme will not have a direct impact on air quality, but it is assumed its implementation has contributed to the improvement in concentrations in the Hawthorne Road AQMA.
GM1	Optimum use of SCOOT on all AQMA corridors.	Green	It is difficult to comment on the effectiveness of this measure, but AQ monitoring is showing general decreases over time across the borough suggesting this may be having some effect.
GM2	Introduce the display of air quality information, advice and alerts into Variable Message Signage.	N/A	It is difficult to comment on the effectiveness of this measure.
GM3	Encourage businesses through the planning system to implement workplace travel plans, particularly in and around areas likely to impact on AQMAs.	Green	Several workplace travel plans have been implemented. It is difficult to comment on the effectiveness of this measure, but monitoring is showing general decreases over time across the borough suggesting this may be having some effect.
GM4	Encourage the uptake and implementation of school travel plans, particularly in and around AQMAs.	Green	A number of schools within Sefton have an active travel plan aimed at improving air quality in the borough
GM5	Encourage cycling and walking.	Green	Again, it is difficult to comment on the effectiveness of this measure. It is assumed that there has been an increase in participation across the borough, but it is difficult to quantify this.
GM6	Use the planning system to mitigate the air quality impacts of any new development likely to have an impact on the AQMAs through the use of planning conditions incorporating Low Emissions Strategy measures from	Green	All planning applications received, were reviewed and where an AQ concern is identified a AQA was required. Measures to mitigate impacts required as part of planning approval where AQA concludes the development will impact AQ negatively

ID	Description of Measure	RAG Score	Notes
	developers and the use of Section 106 Agreements.		
GM7	Develop and implement a low emissions strategy.	Green	A number of Low Emission Strategies have been implemented. It is assumed that this has had an impact on pollutant concentrations across the borough.
GM8	Plant trees where appropriate within AQMAs to reduce PM_{10}.	Green	
GM9	Raise awareness of air quality issues through a range of initiatives.	N/A	It is difficult to comment on the effectiveness of this measure, but monitoring is showing general decreases over time across the borough suggesting this may be having some effect.
GM10	Work with the Merseyside and Halton Freight Quality Partnership and the Freight and Air Quality Task Group to seek and implement measures to reduce the impact of freight on air quality, particularly within the Millers Bridge and Princess Way AQMAs.	Green	It is difficult to comment on the effectiveness of this measure, but monitoring is showing general decreases over time across the borough suggesting this may be having some effect.

Glossary of Terms

Abbreviation	Description
ANPR	Automatic Number Plate Recognition
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
AQS	Air Quality Standard
ASR	Annual Status Report
CAZ	Clean Air Zone
CDRC	Consumer Data Research Centre
DEFRA	Department for Environment, Food and Rural Affairs
FDMS	Filter Dynamics Measurement System
HGV	Heavy Goods Vehicle
IMD	Index of Multiple Deprivation
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
NH	National Highways
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
OBC	Outline Business Case
PHE	Public Health England
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
PM	Particulate Matter
POLAS	Port of Liverpool Access Scheme
QA/QC	Quality Assurance and Quality Control
SCOOT	Split Cycle and Offset Optimisation Technique
SO_2	Sulphur Dioxide

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