Sefton Metropolitan Borough Council
2023 Annual Status Report

Bureau Veritas

September 2023

Document Control Sheet

Identification	
Client	Sefton Metropolitan Borough Council
Document Title	2023 Annual Status Report
Bureau Veritas Ref No.	AIR18990352

Contact Details		
Company Name	Bureau Veritas UK Limited	Sefton Metropolitan Borough Council
Contact Name	Alicia Dale	Greg Martin
Position	Senior Consultant	Principal Environmental Health Officer
Address	Atlantic House Atlas Park, Manchester, M22 5PR	Sefton Council Magdalen House 30 Trinity Road Bootle L20 3NJ

Configuration				
Version	**Date**	**Author**	**Reason for Issue/Summary of Changes**	**Status**
v1.0	14/07/2023	J Mistry	Draft for comment	Draft
v2.0	31/08/2023	J Mistry	Incorporated Client Comments	Issue
v3.0	06/09/2023	J Mistry	Incorporated Client Comments	Final

	Name	Job Title	Signature
Prepared By	Jai Mistry	Graduate Air Quality Consultant	
Reviewed By	Hannah Pearson	Senior Consultant	H Pearson

Sefton Council

2023 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: September 2023

Information	Sefton Metropolitan Borough Council Details
Local Authority Officer	Greg Martin
Department	Highways and Public Protection Department
Address	Sefton Council Magdalen House 30 Trinity Road Bootle L20 3NJ
Telephone	07971623489
E-mail	greg.martin@sefton.gov.uk
Report Reference Number	ASR 2023
Date	September 2023

Executive Summary: Air Quality in Our Area

Air Quality in Sefton Metropolitan Borough Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 29,000 to 43,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

In 2022, Sefton Metropolitan Borough Council as part of its ongoing Local Air Quality Management duties, continued to undertake detailed air quality monitoring. The monitoring was undertaken using both automatic air quality monitoring equipment and an extensive network of passive diffusion tubes to assess levels of certain harmful pollutants, that the Council is required to monitor by Central Government.

Through this monitoring, the Council has identified a number of discrete areas, all in the south of the Borough, where air quality has exceeded or is currently exceeding national standards.

The pollutant for which air quality standard objectives have been exceeded recently in Sefton is Nitrogen Dioxide (NO_2) and historically Particulate Matter (PM_{10})

The areas where objectives have not been met are generally located around busy road junctions or near heavily trafficked roads and residents living closest to these junctions and roads are most affected.

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

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

[3] Defra. Air quality appraisal: damage cost guidance, January 2023

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

The locations where air quality has been identified as a current concern in Sefton are shown below. The pollutant(s) that have shown exceedance are shown in brackets:

- Lathom Close, Princess Way, Seaforth (NO_2 Annual Mean);
- Millers Bridge/Derby Road junction, Bootle (Exceedance of the 24 hr Mean Limit - PM_{10} & NO_2 Annual Mean);
- South Road/Crosby Road North junction, Waterloo (NO_2 Annual Mean); and,
- Hawthorne Road/Church Road junction, Litherland (NO_2 Annual Mean).

These areas where air quality objectives have been exceeded (or likely to be exceeded) have been designated as Air Quality Management Areas (AQMAs) and maps have been produced showing the extent and boundaries of the AQMAs, see Appendix D and also via the following link to DEFRA's website:

https://uk-air.defra.gov.uk/aqma/list?la=S&country=all&pollutant=alllist

Sefton Council is not alone in having declared AQMAs. Currently over 700 AQMAs have been designated by UK local authorities, mostly for NO_2.

In Sefton, road traffic is the main source of NO_2 and PM_{10}, 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 2022, all automatic monitoring sites within Sefton showed compliance with the AQS objective, additionally, none of the automatic monitoring sites reported 1-hour concentration exceedances more than 18 times/year of 200 $\mu g/m^3$.

Sites CM2 (Crosby Road North), CM3 (Millers Bridge) and CM5 (Hawthorne Road) have shown reductions in NO_2 levels compared to those observed in 2021 and currently show no indication that they are returning to pre pandemic levels observed in 2019.

CM4 (Princess Way) is the only site to report an increase from 2021 with concentrations over the past two years showing a rising trend. Notwithstanding this NO_2 levels at this location are still much reduced compared to those observed in 2018 and 2019.

All passive monitoring locations, except one, were compliant with the NO_2 AQS objective in 2022. 78 sites reported decreases from 2021, with the remaining four sites reporting increases. The decrease in NO_2 concentrations from 2021 at 95% of sites suggests that the legacy of changed transport habits during the COVID-19 pandemic, coupled with some fleet improvement, has continued to have a positive effect on Sefton's air quality in 2022, as overall levels have still not returned to pre-pandemic levels. There was one reported exceedance of the annual mean NO_2 AQS objective of 40 µg/m^3 within Sefton, which was at monitoring location BR (41.0 µg/m^3), located in AQMA 3. BR (41.0 µg/m^3) is not at a location of relevant exposure, and once fall-off with distance calculations have been carried out to predict the concentration at the nearest relevant receptor, the estimated concentration is 38.6 µg/m^3.

Levels of Particulate Matter have increased slightly compared to 2021, but as in previous years all AQMA's show compliance with the PM_{10} national air quality standard objective by some margin.

The extensive air pollution monitoring will continue in 2023 and beyond to determine future trends and compliance in Sefton.

Members of the public can view current and past pollutant levels from all the monitoring locations on Sefton Council's Breathing Space air quality website at:

http://breathingspace.sefton.gov.uk/Default.aspx?bsPage=air_pollution

Previous Annual Air Quality Status Reports with full details of previous years monitoring results can also be viewed here https://www.sefton.gov.uk/environment/air-quality/

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 is chaired by Cabinet Members for Health and Wellbeing and Regulation and Compliance, along with other Cabinet Memebers, Senior Officers from Environmental Health, Public Health, Planning, Highways, Economic Development, 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).

Sefton is currently working with the Driver and Vehicle Standards Agency (DVSA) and John Moores University (JMU) on two innovative projects which are discussed in more detail later in the Annual Status Report (ASR).

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[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, recently published provides more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations, heavily influenced by transport emissions.

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

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

Sefton Council has developed and implemented Air Quality Action Plans (AQAPs) for all of its AQMAs. Sefton's current AQAPs are being updated and will be referenced in detail in next year's ASR.

The plans include two categories of Action Plan measures that are called site-specific measures and general measures.

Site-specific measures are targeted measures to address particular site-specific air quality issues within an individual AQMA. These measures provide the greatest benefits in terms of air pollutant emissions reductions for an identified source of pollution at each particular AQMA.

General measures are measures that will benefit all AQMAs. Individually they may not have the same extent of emissions reduction as site specific measures, but collectively they will bring significant benefits to all AQMAs.

The current AQAPs for Sefton can be viewed at:

http://breathingspace.sefton.gov.uk/Docs/Action_Plans/Draft_AQAP_AQMAs_1-5_2015.pdf

Examples of successful site-specific measures that have been included in the Action Plans include:

- A package of measures contained within the A565 Route Management Strategy and Action Plan, which includes junction improvements to the South Road/Crosby Road North/ Haigh Road, Waterloo junction;
- Hurry Call traffic management system to allow HGVs through the Millers Bridge/ Derby Road traffic lights without having to stop/start on the incline at Millers Bridge, thus reducing pollution from this vehicle type;
- Effective regulatory control and monitoring of industrial sites within the Port of Liverpool to minimise their impact on PM_{10} levels;
- A study on HGVs using the A5036, to gain information on destination, age of vehicle & Euro emission standard;
- HGV Port booking system to reduce congestion on the routes into the Port and improve movement of HGVs within the Port of Liverpool;
- ECO Stars fleet recognition scheme to improve emissions from HGV fleet operators using roads in Sefton and Sefton Council's own fleet of vehicles;

- Port expansion mitigation measures. These include a Defra funded study looking at an alternative fuels strategy (AFS) for HGVs and buses in Sefton and the Liverpool City Region, rather than using diesel as a fuel;
- Many of the site-specific measures detailed above and in the AQAPs have been completed and were successful in reducing pollutant levels within the AQMAs; and,
- Sefton recognises, however, that dealing with air pollution is an ongoing challenge and continues to invest significant resource to bring about further improvements in air quality.

Current and ongoing air quality improvement initiatives

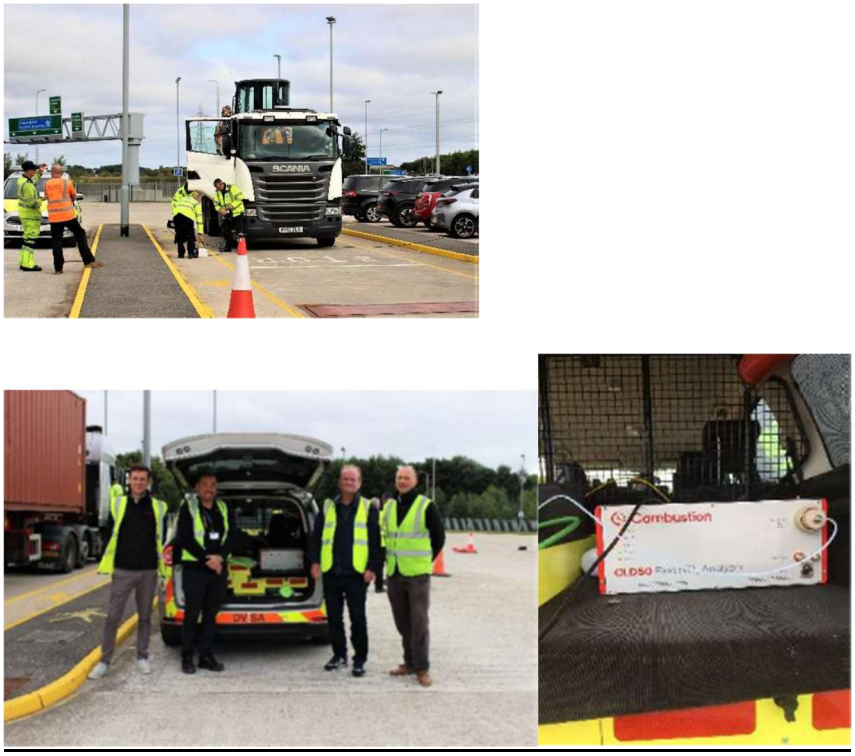
Examples of more recent air quality initiatives and interventions which will be included in the updated AQAP's are detailed below:

AQ improvement action - Sefton's Clean Air Plan (CAP)

- Sefton recognises that there are still challenges ahead, with regard to reducing levels of NO_2 in some of Sefton's AQMAs, particularly those impacted by traffic entering and leaving the Port of Liverpool. A Preliminary Clean Air Zone (CAZ) feasibility study indicated that a CAZ type B could have a positive effect on reducing NO_2 exceedances in and around the AQMAs.
- Following this, the Council committed to undertaking a more detailed assessment and commenced the development of an Outline Business Case (OBC) for Sefton looking at air quality interventions including a Sefton based CAZ under an overarching Sefton Clean Air Plan. This work commenced in 2020 but unfortunately was heavily impacted upon by the COVID-19 Pandemic during 2020/2021. The outline business case is now complete.
- The initial outcomes of the OBC were presented to Sefton's cabinet in July 2022. Since then further stakeholder engagement and technical assessments have been undertaken to assist Cabinet in determining the next steps which are currently under consideration. Further detail on Sefton's Clean Air Plan and OBC can be found on Sefton's Your Sefton Your Say engagement website. SeftonCleanAirPlan - Sefton Council - Citizen Space

Further detail is also provided later on in the ASR.

AQ improvement action - Joint Sefton/ Driver and Vehicle Standards Agency (DVSA) Emissions Enforcement Project



Images of the joint enforcement project Sept 2022

Following a successful project in 2021 a second joint Sefton / DVSA vehicle emissions enforcement project took place in September 2022 to identify HGVs travelling on the A5036 between the Port and Switch Island, emitting unacceptable levels of pollution.

The two plume chasing DVSA stop cars fitted with air pollution monitoring equipment followed in excess of 150 vehicles travelling on the A5036, A595 and motorway network.

A number of vehicles were stopped by DVSA officers after being identified as a potential high emitting vehicle and subjected to more detailed investigations to determine if any faults or cheat devices were present.

Following the detailed examinations faults were identified in seven vehicles and enforcement action was taken by the DVSA requiring the operators to rectify the faults

AQ monitoring action - Low-Cost Sensor co-location project Sefton /Liverpool - John Moores University

Picture - Co-Location of Sensors at Millers Bridge Monitoring site

Sefton Council and John Moores University (JMU) are currently undertaking a joint air quality monitoring co-location study to determine how accurate lower cost air pollution sensors are, compared to Sefton's own DEFRA approved automatic monitoring equipment.

- The study is underway at the Millers Bridge monitoring site and in collaboration with JMU, three low-cost sensors are currently being tested for accuracy. The three sensors being tested are:
  - Libelium Smart Cities Plug & Sense (NO_2);
  - Aeroqual AQY (NO_2, $PM_{2.5}$ and PM_{10}); and,
  - Earth Sense Zephyr (NO, NO_2, PM_1, $PM_{2.5}$ and PM_{10}).

Comparison of $NO/NO_2/PM_{10}/PM_{2.5}$ data has commenced, and the project is planned to continue for a further 12 months.

AQ improvement action - DEFRA Grant Funded Domestic Solid Fuel Behaviour Change Project

Evidence from ongoing research suggests that the use of domestic fossil fuels can increase local levels of particulates including $PM_{2.5}$.

Sefton was successful in obtaining a grant through the Local Authority Air Quality grant fund with the primary aim of minimising the Particulate Matter (PM) contribution from

domestic solid fuel use in Sefton through behaviour change. The project was unfortunately impacted upon by the pandemic but is now complete as far as practicable.

Notwithstanding the impact of the pandemic several successful elements were completed and will remain as a legacy of the project with the ongoing objective of reducing PM emissions including $PM_{2.5}$. The headline actions are detailed below:

- Development of a library of behaviour change publicity material - leaflets, posters, factsheets etc
- Continued engagement with stove suppliers/ installers /chimney sweeps and fuel suppliers in area using communication material produced as part of the project.
- Real time ongoing measurement of PM_{10} and $PM_{2.5}$ levels in the Crosby area (high stove use neighbourhood) using a FIDAS dual particulate monitor.
- Development of a public website https://smokecontrolsefton.co.uk/ which contains a host of behaviour change information for householders, businesses, and suppliers on ways to minimise particulate emissions from the use of solid fuels for heating.

AQ improvement action - DEFRA Grant Funded Educational Behaviour Change Project

Officers from Sefton's Energy and Environmental Management Team supported by Environmental Health were successful in obtaining a DEFRA AQ grant of £122,500 to undertake an educational behaviour change project. The Project commenced in April 2021 and is now complete.

The overall aim of the project was to raise awareness of Air Quality and in turn encourage behavioural changes that will have immediate and long-term positive impacts on Air Quality in Sefton.

In partnership with Sefton Council's Educational Staff based in the Eco Centre, a termly programme of AQ support and learning has been offered to all Sefton Primary schools (and in turn the wider local community) during the 2021/22 academic year, with a

particular focus on schools within or close to one of Sefton's four Air Quality Management Areas (AQMAs).

The programme consisted of:

- A dedicated Educational officer to support schools with a termly programme of AQ support and learning all linking to core national curriculum subjects. Including lesson plans, activity sheets, homework booklets, campaigns (walk to school, anti-idling), activities, how-to guides;
- Expansion of the Clean Air Crew website, including also making it appeal to KS3/4 (Secondary schools);
- Development of higher level online AQ training course for parents/ teachers/ Sefton Staff/ residents;
- Installation of a state of the art, digital technology immersive room at the Eco Centre and the development of 2 immersive experiences based on AQ. This will be accessed by both schools and the wider community. It will also be managed by the educational staff after the programme has finished leaving a legacy of the project for years to come; and,
- In addition, 20 schools in the AQMA areas were provided with an AQ monitoring pack and training of how to use it (including 12 monthly NO_2 diffusion tubes that will provide localised AQ evidence of any immediate improvements).

Evaluation of the project is currently underway.

AQ improvement action - Low-Cost Sensor / School Streets AQ monitoring Project

Officers from Highways and Environmental Health are currently working on a joint air quality project as part of the School Streets and active travel agenda.

Three low-cost air quality sensors (Earth Sense Zephyr as shown in picture) have been installed to monitor air quality levels around the three schools identified as part of the initial phases of the School Streets project.

The monitors were installed in June 2022 to enable Air Quality levels to be monitored before and after the School Street initiatives are implemented to assess any reductions in pollution as a result of the measures. Sensors will also be used to determine the different travel methods used (walk /cycle/car).

The school streets traffic restrictions have recently been implemented (June 2023) and ongoing review and analysis of air quality data has commenced.

AQ Improvement Action -Traffic signal upgrade/incorporation of AQ 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 (Stratos). 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 developer potential traffic light strategies based on the sensor outputs.

Conclusions and Priorities

As in last year's ASR, the main on-going priority in Sefton for the coming years is to fully understand the effects that the predicted increase in HGVs due to port expansion will have on air quality and how this can be mitigated. This is undoubtedly the most significant challenge for the Council in terms of air quality impact at the present time. 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 undergone a £300 million expansion, known as L2, which included the building of a new deep-water berth. This allows large post panamax container ships to berth there.

Although port 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 are already identified as having poor air quality and congestion, particularly on the A5036.

Sefton has recently undertaken its own detailed traffic and air quality modelling to assess the impact of this potential increase in port traffic on air quality levels. This modelling has

been used to inform Sefton's Clean Air Plan (CAP) Outline Business Case (OBC) which includes consideration of a Sefton Based CAZ. A number of possible air quality intervention options to deal with the predicted increase in emissions, including an HGV only CAZ are currently being considered by Sefton Council. Further detail on Sefton's Clean Plan Outline Business Case and options under consideration is provided in section 2 of this ASR - Actions to improve air quality.

In addition to this work being undertaken by Sefton to deal with 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 (NH) as the preferred option. Further detailed assessment and design of this option is now underway by NH 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, following this an updated project plan will be released. The Council will need to fully understand NH's 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 via the following link: https://highwaysengland.co.uk/our-work/north-west/a5036-port-of-liverpool-access/

In addition to the above, the Council will continue to use their monitoring networks to determine whether AQMAs need amending or whether there are any new identifiable areas of concern. Sefton Metropolitan Borough Council are focused on reducing annual mean NO_2 concentrations via the implementation of currently identified measures, but also through the development of new measures as part of the required AQAP updates.

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.

As detailed within the ASR Officers are currently undertaking a complex study into the potential use of a Clean Air Zone in Sefton under an overarching Clean Air Plan. Sefton is using our internet based 'Your Sefton Your Say' (YSYS) consultation hub to provide information to the public about the study and air quality matters in general. The YSYS hub can be accessed via the following link: https://yourseftonyoursay.sefton.gov.uk/seftoncleanairplan/

As the study progresses the YSYS will be used as a consultation platform to engage and seek views from the community on the outcomes and proposals in regard to the Clean Air Zone study and wider air quality matters.

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: http://breathingspace.sefton.gov.uk/

Sefton's AQ officers have completed a Defra AQ grant funded domestic solid fuel behaviour change project with the aim of reducing particulate emissions from the burning of this fuel. A number of engagement activities including questionnaires and presentations were undertaken as part of the project which are discussed in more detail within the ASR. 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: https://smokecontrolsefton.co.uk/

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: https://www.cleanaircrew.co.uk/

Southport School Street & School Neighbourhood Pilot

Sustrans and Sefton Council are working collaboratively with three High Schools in Southport on developing a pilot project to deliver two School Streets projects and a School Neighbourhood project.

The pilot schools are as follows;

- Birkdale High School – (School Streets);
- Greenbank High School – (School Streets); and,
- Stanley High School – (School Neighbourhood).

Progress of the pilot are shown below.

Birkdale High School (School Streets)

- Engagement planning - Complete
- Pupil engagement and community consultation - Complete
- Council decision report - Available here
- Trial School Street launch date - Tuesday 4th July 2023
- Monitoring and evaluation period - To be determined
- Council decision report - To be determined

Greenbank High School (School Streets)

- Engagement planning - Complete
- Pupil engagement and community consultation - Complete
- Council decision report - Available here
- Trial School Street launch date - Monday 3rd July 2023
- Monitoring and evaluation period - To be determined
- Council decision report - To be determined

Stanley High School (School Neighbourhood)

- Engagement planning - Complete
- Pupil co-design and community co-design - Complete
- Council decision report - Available here
- Street design community engagement - To be determined

- Council decision report - To be determined

More information can be found at: https://southportschools-sustrans-uk.hub.arcgis.com/

Simple actions that all can take 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 more. 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 https://www.sefton.gov.uk/bins-and-recycling
- 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 by clicking on the following link: https://www.sefton.gov.uk/environmental-protection/pests,-pollution-and-food-hygiene/pollution/smoke-control-areas.aspx
- 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. https://www.hetas.co.uk/ecodesign-ready/

- 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:

Greg Martin – Principal Environmental Health Officer- Highways and Public Protection

This ASR has been approved by:

Peter Moore – Assistant Director (Highways and Public Protection)

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

Mr Greg Martin

Principal Environmental Health Officer

Pollution Control Team

Sefton MBC

Magdalen house

30 Trinity Road

Bootle

L20 3NJ

Contact Number: 07971623489

Email: greg.martin@sefton.gov.uk

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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 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by 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

Air Quality Management Areas

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

A summary of AQMAs declared by 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. Table 2.1 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	2009	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	34.8 µg/m^3	3 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	2009	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	41 µg/m^3 6	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 4 South Road	2012	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	33.0 µg/m^3	3 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 5 Hawthorne Road	2012	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	34.3 µg/m^3	3 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

☒ **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.**

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

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

A large number of measures and initiatives are currently being implemented within Sefton by the Council. The level of detail presented throughout the ASR in terms of actions and assessment of compliance is welcomed.

As the annual data capture at automatic site CM3 was <85% for PM_{10}, the 90.4th percentile for the short-term pollutant averaging period (24-hour mean) should have been included within Table A.7, in accordance with the Technical Guidance (from paragraph 7.81). The council should be aware of this for inclusion in future reports where necessary, please contact the LAQM Helpdesk if assistance is required.

Sufficient detail is included on the QA/QC procedures for both the automatic analysers and the NO_2 diffusion tubes. Calculations for distance correction are outlined in detail within the report. Annualisation was not required for any of the diffusion tube or automatic sites.

Data showing the choice of bias adjustment factors for previous years is included. The local bias adjustment factor has been applied to the 2021 data. However, a discussion around the choice of factor and comparison to the national factor is not provided. The choice of factor should be clearly justified.

In addition, 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.

The X and Y OS co-ordinates of all monitoring sites should also be checked, as these are all currently unique (with the exception of sites EL and EN, which have the same co-ordinates but different site names and different site type classifications). If triplicate diffusion tube sites are presented, they should have the same co-ordinates and if they are co-located with an automatic monitor, the co-ordinates should match this monitor.

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.

The council have not discussed whether the diffusion tubes were deployed in line with the Defra calendar dates during 2021. This information should be included within all future reports.

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.

The council are considering revocation of the designation of AQMA 3 for the PM_{10} 24-hour mean, as recommended in last year's appraisal. This should be completed in line with the most up-to-date criteria for AQMA revocation in the Technical Guidance (from paragraph 3.53) and the Policy Guidance (from paragraph 4.10). All other AQMAs are to remain in place for now, with a further review to be completed next year. These decisions are supported.

Three diffusion tube sites outside of the current AQMA boundaries exceeded the annual mean NO_2 objective during 2021. Following distance correction to the nearest point of relevant exposure, concentrations at sites GH and HB (40.6 µg/m^3 and 41.5 µg/m^3, respectively) fell below the objective (32.1 µg/m^3 and 33.2 µg/m^3, respectively). Site HC (40.2 µg/m^3) could not be distance corrected due to the degree of uncertainty created by the distance between nearest relevant receptor and kerb being >50m. It would be beneficial for the council to include a discussion around any monitored exceedances outside of the declared AQMAs in all future years.The 90.4th percentile for the short-term pollutant averaging period (24-hour mean) has been included within brackets in Table A.7.

The current Air Quality Action Plan (AQAP) was adopted in 2015 and updates on the measures have been detailed within the 2022 ASR. As set out in LAQM.PG(22) and TG(22), local authorities are expected to review and update AQAPs at least every five years. In last year's appraisal it was recommended that the AQAP be completed in conjunction with the Local NO_2 Plan as there will be a high level of cross-over between the two projects. It is therefore welcomed that the council have noted in their 2022 ASR that updates to the revised AQAP are continuing in conjunction with progress on the Outline Business Case to support the implementation of a CAZ within Sefton, and following

internal approval, the next steps will be incorporated into the updated AQAP. An update should be provided in the 2023 ASR and as soon as the AQAP has been completed it should be submitted through the LAQM Portal.

The ASR benefits from detailed maps of the AQMA boundaries and relevant monitoring locations. Detailed and clearly presented trend analysis graphs are also included, which is welcomed.

The level of both internal and external local engagement the council continue to undertake is commended.

Overall, the report is detailed, thorough and satisfies the criteria of relevant standards. The council should continue their good work."

The comments made in the 2022 appraisal have been detailed and responded to within this 2023 ASR

Sefton Metropolitan Borough Council has taken forward a number of direct measures during the current reporting year in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Twenty eight measures are included within Table 2.2 – Progress on Measures to Improve Air Quality, with the type of measure and the progress Sefton Metropolitan Borough Council have made during the current reporting presented. Where there have been, or continue to be barriers restricting the implementation of the measure, these are also presented within Table 2.2.

- Sefton Council has developed and implemented Air Quality Action Plans (AQAPs) for all of its AQMAs.
- The plans include two categories of Action Plan measures that are called site-specific measures and general measures.
- Site-specific measures are targeted measures to address particular specific air quality issues within an individual AQMA. These measures provide the greatest benefits in terms of air pollutant emissions reductions for an identified source of pollution at each particular AQMA.
- General measures are measures that will benefit all AQMAs. Individually they may not have the same extent of emissions reduction as site specific measures, but collectively they will bring significant benefits to all AQMAs.

The current AQAPs for Sefton can be viewed at:

http://breathingspace.sefton.gov.uk/Docs/Action_Plans/Draft_AQAP_AQMAs_1-5_2015.pdf

Sefton Council Draft Air Quality Action Plan measures consist of eleven general measures that are applicable to all AQMAs and a number of site-specific measures that are applicable to each individual AQMA.

Please note some action plan measures are being implemented by other Agencies and are not controlled by Sefton Council. This includes the Port Expansion mitigation measure which is being progressed by National Highways.

NB In addition to the actions detailed in the AQAP's further actions are also underway which are discussed in more detail below. The AQAP is due to be updated imminently to include these additional measures.

The progress/update on key site-specific measures within the AQMA's are discussed in more detail below:

2.2 AQMA 2 Princess Way, Seaforth and AQMA5 Hawthorne Road

- Port expansion mitigation measure No1 National Highways A5036 Road option study. The Port of Liverpool Port Access Road Scheme (POLAS) is currently being progressed by National Highways.
- Stage 1 of the study has been completed. An offline route option through Rimrose Valley has been chosen by National Highways/Department for Transport. Further detailed assessment and design of this option is now underway by National Highways and their appointed consultant. COVID-19 has delayed the project significantly, however the various studies and assessment 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. Following this, an updated project plan will be released. The Council will need to fully understand NH's 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 via the following link:

  https://highwaysengland.co.uk/our-work/north-west/a5036-port-of-liverpool-access/

- AQMA 2 - Princess Way was identified for NO_2 exceedances. The main source of NO_2 in this AQMA is related to HGV traffic. The deep-water berth at the Port of Liverpool is now complete and HGV traffic is predicted to increase as a result. A major highways scheme is currently being considered by National Highways to accommodate the increase in road traffic because of the port expansion.
- Several air quality actions have been implemented by Sefton to reduce levels of NO_2 in this area. These include assisting in the development of port booking systems, development of Sefton's ECOstars fleet recognition scheme, the redesigned 'hamburger' roundabout improvements and recent joint emissions enforcement work with the Driver and Vehicle Standards Agency (DVSA)
- It is recognised, however, that dealing with road traffic related emissions in this area with the potential increase in HGV port traffic is extremely challenging and alternative/innovative measures need to be considered.

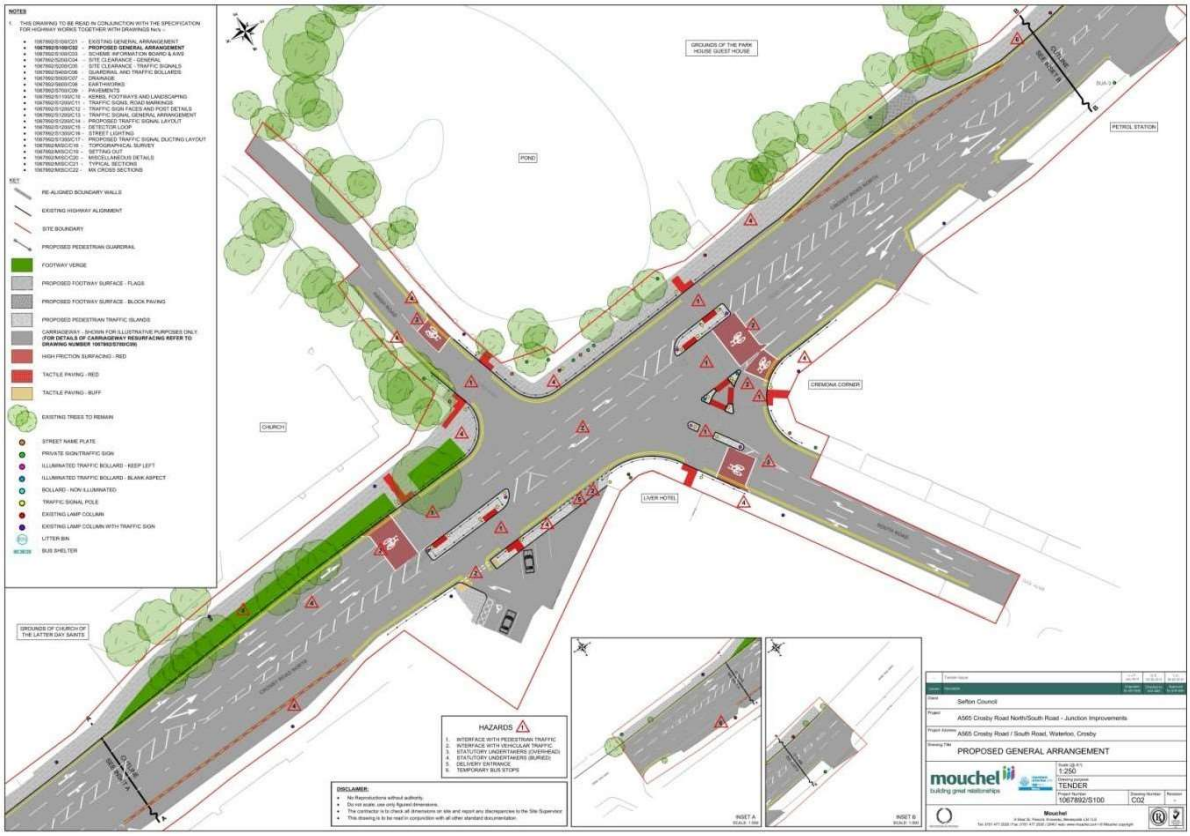
2.21 AQMA 3 Millers Bridge, Bootle

- Several successful measures have been implemented in this area as part of the action plan to reduce emissions. Officers continue to work jointly with the Environment Agency to ensure industrial emissions are monitored and controlled effectively in this area. A HGV hurry call system has also been introduced which gives priority to HGVs heading up Millers Bridge, reducing the need for stopping at the traffic lights, thus reducing emissions. This major junction has also recently been redesigned as part of the North Liverpool Key Corridor Improvement Scheme to improve traffic flow and reduce waiting times at the traffic lights.
- As a result of these measures the national AQS objective for PM_{10} has consistently been met for a number of years. However, this will be kept under review as the port expands in the future.
- With regard to NO_2 in this AQMA, the results of monitoring continue to show some exceedances of the annual national AQS objective. Dealing with NO_2 exceedances in this location is challenging due to the level of traffic that passes through the junction, physical characteristics of the area and the proximity to the port. Any future increase in traffic resulting from the port expansion could also lead to additional exceedances in this area.

2.22 AQMA 4 South Road, Waterloo

Work on the South Road/ Crosby Road North/Haigh Road junction improvements has been completed.

Figure 2.1 – South Road/ Crosby Road North/Haigh Road junction improvements



- As reported in last year's ASR the junction improvement work shown above continues to have a positive effect on reducing levels of NO_2 within the AQMA boundary. NO_2 Levels at all receptors within the AQMA in 2018, 2019, 2020, 2021 and 2022 were below the national AQS objective. In 2020, and to a lesser degree 2021 COVID-19 had an 'additional' positive impact on NO_2 in this AQMA due to reduced traffic levels, the various lock-downs and work from home mandates.
- As detailed in this ASR, an outline business case which includes the potential implementation of a CAZ is now complete and Sefton is currently considering the next steps. Should a CAZ be introduced there may be localised changes to traffic routing and, in view of this and ongoing changes to commuting habits resulting from COVID-19. The Council is currently reviewing the position regarding the revocation of this AQMA.

In addition to the improvement actions associated with the AQAPs, Sefton continues to develop further strategies and actions to tackle poor air quality within the AQMAs. These will be included within Sefton's updated AQAPs.

These additional actions are discussed in more detail below:

2.23 Sefton's Clean Air Plan (CAP)

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, traffic associated with the expansion of the port is predicted to increase significantly in the coming years. As such there is likely to be significant challenges ahead regarding reducing levels of NO_2 in some of Sefton's AQMAs particularly those impacted by traffic entering and leaving the Port of Liverpool.

In view of these challenges officers from Environmental Health, Public Health and Transport teams, overseen by the Air Quality Member Reference Group, commissioned environmental consultants AECOM to undertake a preliminary Clean Air Zone (CAZ) feasibility study to assess the feasibility of implementing CAZs in Sefton to reduce traffic related emissions. A copy of the technical report (May 2019) can be found here: https://www.sefton.gov.uk/media/1016/sefton-clean-air-zone-feasibility study.pdf

AECOM's report concluded that given the current and projected make-up of the traffic in the four AQMA areas, a Charging CAZ could deliver more rapid improvements in NO_2 emissions than existing measures, taking account of forecast improvements in the emissions profile of the vehicles on Sefton's roads. The study predicted that in 2020 if no further improvement actions took place there would still be 70-point NO_2 exceedances in the south of the Borough. The key study outcomes indicated the following:

- A CAZ would achieve reduced emissions within the defined zone;
- A CAZ B (HGVs, taxis, buses), including the junction of A5036/A565, would potentially achieve the most significant benefits; and,
- Further analysis would be necessary to identify the type and location of the CAZ.

CAZ Outline Business Case (OBC)

Following on from the Preliminary CAZ feasibility study Sefton's Cabinet gave approval for Officers to progress a detailed Clean Air Plan (CAP) Outline Business Case (OBC) which included consideration of a Sefton Based CAZ, in line with the approach recommended by

DEFRA.

AECOM were commissioned in May 2020 to undertake the additional air quality and transport modelling work needed and prepare a draft OBC in conjunction with Council Officers. The development of the OBC forms part of the Council's wider AQ programme overseen by the AQ Cabinet Member Reference Group.

AECOM's recommendations included:

A HGV charging CAZ Option 2A (key corridors A565 and A5036) has been identified as the preferred and recommended CAZ option for the CAP scheme. It is recommended that Option 2B (key corridors, A565 only) is retained as a reserve option, subject to liaison with JAQU/National Highways regarding the inclusion of the A5036 within a CAZ.

The detailed option assessment process demonstrated that Option 2A features several distinct advantages over alternative CAZ specifications assessed:

Includes all the AQMAs within its boundary, thereby incorporating areas with most prominent and persistent air quality issues and represents a solution focused directly on the problem to be addressed;

- Modelling work demonstrates significant benefits in terms of reduction of NO_2 within the CAZ boundary and wider overall air quality improvements;
- Incorporates areas with some of the highest levels of health deprivation in Sefton, thus delivering benefits to those most vulnerable and at risk from poor air quality;
- Incorporates key routes to the Port of Liverpool, enabling capture of all vehicles bound for or leaving the Port access gates;
- Features the best balance of benefits against costs of all CAZ options assessed (including costs incurred by businesses); and
- Presents the least deliverability barriers to implementation in the shortest time possible of all CAZ options assessed.

The progression of the CAP scheme to the next stage (FBC) will be contingent upon a number of factors for consideration, which include key risks and constraints identified through the course of the OBC work. It is recommended that due consideration be given to all these issues, which can be summarised as follows:

- The need to identify a funding source –the combined capital and operating scheme costs have been estimated at approximately £9m, in addition there would be a probable need for additional funding for mitigation measures and further scheme development funding required to progress an FBC (such as funding for public consultation).
- JAQU/National Highways support is required for Option 2A due to the inclusion of A5036 within the CAZ;
- Ongoing improvements to vehicle emissions due to wider fleet turnover mean that NO_x emissions should decrease over time. However, growth in HGV traffic due to the Port expansion is likely to continue, meaning that numbers of the most polluting vehicle type (HGVs) on key corridors may well increase;
- The high background concentrations of air pollutants in areas close to the Port require liaison on the Port Air Quality Strategy to supplement traffic measures, particularly due to associated exceedances in specific AQMAs i.e., Millers Bridge AQMA;
- The COVID-19 pandemic led to a sharp short-term decrease in traffic levels resulting in temporary air quality improvements. However, traffic count data on the A5036 indicates that by early 2022 traffic flows had already returned to pre-pandemic levels. The pandemic has also impacted on the cost and availability of newer compliant vehicles, the effects of which on the overall fleet composition are still being understood;
- A charging CAZ aimed at non-compliant HGVs would have a financial impact on businesses owning and operating such vehicles; some of these may be smaller, locally based organisations with less financial resilience, and hence there may be a need for financial mitigation through grants towards vehicle upgrades. The cost of this mitigation would clearly be dependent on the level of support provided, but could potentially be comparable with the cost of implementing the CAZ itself;
- There will be a need for formal statutory consultation on the CAZ in order to meet legal requirements for its implementation; this process would need to ensure that all potential voices are heard and may highlight some opposition to the scheme;
- The potential for Liverpool City Council to progress its own Clean Air Plan may have direct impacts of any scheme implemented in Sefton which must be understood and accounted for; and
- Potential to liaise with JAQU/wider Government regarding a funding source; a mandate would likely be required to obtain access to JAQU funding streams.

CLEAN AIR PLAN OBC PROCESS AND KEY OUTCOMES

The Clean Air Plan (CAP) proposal comprises a **CAZ scheme** that **aims to address persistent air quality issues identified within Sefton in the shortest time possible**. The CAZ scheme proposed as the preferred option (referred to as 'Option 2A') features a charging CAZ applied to non-compliant HGV's that cross into a designated section of the Sefton highway network. The CAZ would apply to HGVs only, meaning any goods vehicle with a maximum gross weight of greater than 3.5 tonnes. The daily charge for entering the CAZ is anticipated to be £50 perday for all non-compliant HGVs.

A HGV charging CAZ Option 2A (key corridors A565 and A5036) has been identified as the preferred and recommended CAZ option for the CAP scheme. It is recommended that Option 2B (key corridors, A565 only) is retained as a reserve option, subject to liaison with JAQU/National Highways regarding the inclusion of the A5036 within a CAZ.

Figure 2.2 – Preferred CAZ Option 2A – Two Key Corridors (A565 / A5036)

As part of the Clean Air Plan, an Outline Business Case (OBC) has been prepared in order to make a case for taking forward the CAZ scheme. The OBC has been developed in line with Treasury's advice on evidence-based decision making for investment as set out in the Green Book and uses the DfT's best practice OBC five case model approach

which includes the **Strategic case, Economic case, Financial case, Commercial case and Management case**. Some of the key outcomes from specific elements of the cases are set out below.

Strategic Case – Key Outcomes

The Case for Change:

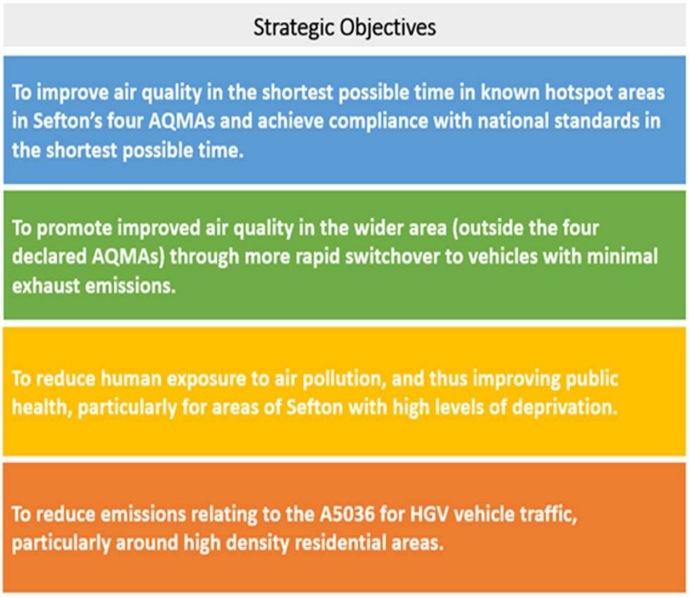
- The key impetus for change is that the Government, and Local Authorities, in accordance with their local air quality management responsibilities, **are required to meet air quality limit values in the shortest possible time**. Within Sefton, this is also **supported by a local desire to go further ('beyond compliance')** to improve air quality and health and well-being. Further to the key driver set out above, the case for change (and benefits of the scheme) is further articulated under several key strands, as follows:
    - **Legal** - Legal drivers and incentives at a national and international level, including EU and UK Government limits and directives leading to mandates issued to local authorities to address air quality exceedances. (*Note – Sefton not currently mandated)*
    - **Environmental** - The Climate Change Emergency declared by Sefton Council in July 2019 underlines the Council's commitment to achieving environmental objectives which include improving local air quality.
    - **Public Health** - Poor air quality has a detrimental impact on public health and the wider economy, contributing to chronic illnesses and disease.
    - **Societal** - There is a disproportionate impact of air pollution in areas of high deprivation within Sefton, in particular among communities in close proximity to the Port of Liverpool and the A565 and A5036 corridors.
    - **Transport** - Road transport is a major source of NO_2 within Sefton. Whilst the overall fleet is improving in terms of emissions and engine technology, increased demand for access to the Port poses significant challenges and may lead to worsening air quality in some locations if not addressed.

Option Identification and Assessment – Preferred Option 2A:

- An Option Assessment Framework was adopted, that included the evaluation of options against the four strategic objectives determined for the study (see below) and a range of six key deliverability criteria (**technical feasibility, affordability, stakeholder acceptability, delivery mechanism, business impacts, and valu**e

for money).

Figure 2.3 – Sefton's Clean Air Plan Strategic Objectives



Following an assessment of a 'long list' of options, the options shortlisted included four alternative CAZ boundary options and specific assumptions on CAZ vehicle classification, charging levels and assumed behavioural responses. The four options include alternative CAZ boundary specifications, based around cordon, corridor and gateway alternatives.

- Based on the option assessment process, **Option 2A** has been determined as the preferred and recommended CAZ boundary option. This option consists of a CAZ including the A565 and A5036 (Part of National Highways SRN) corridors, thus including all of the existing AQMAs and focusing on areas of greatest concern based on the outcomes of the 'Business As Usual' modelling.
- It is also **recommended that Option 2B (A A565 corridor only CAZ) is retained as a reserve option**, contingent upon liaison with JAQU/National Highways regarding the potential inclusion of the A5036 within a CAZ.

<u>Economic Case – Key Outcomes</u>

Economic Appraisal – key points:

- The costs of poor air quality to public health and Sefton's communities cannot all be fully quantified based on the evaluation of the conventional economic, environmental and social benefits (***which are more appropriate for traditional transport/road improvement schemes than for a CAZ)***. The total economic

benefits estimated do not fully reflect the impacts of poor air quality at a local level, nor take into account the particular level of vulnerability of those exposed to it. It is therefore important to recognise that the key imperative in the identification of the preferred option is the **delivery of air quality improvements in Sefton**, in line with the strategic objectives of the. In this context the Economic Case does not drive the decision-making process but seeks to quantify the scheme costs and benefits (as far as possible) for each CAZ boundary option.

- The scope of **economic benefits** considered include:
    - **Health and Environmental impacts** - including air quality impacts and Greenhouse Gas impacts – CAZ has positive economic impact.
    - **Transport User Benefits** – including travel time savings, vehicle operating costs and CAZ charge costs to users CAZ has negative economic impact.
    - **Vehicle Upgrade costs** – including costs of upgrading non-compliant vehicles CAZ has negative economic impact
      Note – Transport User Benefits / Vehicle Upgrade Costs – always lead to dis-benefits for a Charging CAZ scheme as no improvement in de- congestion benefits and incurs cost to upgrade/pay CAZ charge.
    - **Scheme Implementation costs** – including all estimated costs of implementing and maintaining/operating the scheme. CAZ has negative economic impact.

- The economic impact has been assessed relative to a 'Business As Usual' (BAU) scenario without a CAZ intervention. The CAZ scheme has a positive health and environmental impact, but negative impacts for the other elements of the assessment which is a typical outcome for any CAZ scheme. As such, this results in a negative overall **Net Present Value of Benefits (PVB) of -£8.7 million**, as set out in **the table below:**

Analysis of Monetised Costs and Benefits (£m, 2010 prices discounted to 2010)

Measure	Option 2A
Present Value of Benefits (PVB)	**-8.7m**
Present Value of Costs (PVC)	**6.4m**
Net Present Value (NPV)	**-15.1m**

- The **Net Present Value of Costs (PVC)** are calculated based on CAZ scheme costs (total Capital and Operating costs) to enable a 'like' for like' comparison of quantified scheme costs to calculate the **Net Present Value (NPV)** of the scheme of £6.4 million, as set out in **Table 1**. The total NPV for the scheme is -£15.1m.
- **The Economic Appraisal for a typical transport scheme would include a Benefit-Cost Ratio (BCR) to provide a high-level indication of value for money. However, this is not applicable for a CAZ scheme, as an illogical value would be created due to the negative PVB.** A negative PVB value is the normal expectation for a CAZ Charging scheme, since the key objectives are not focussed on delivery of conventional user benefits (such as travel time savings), but on improving local air quality.
- In the case of a scheme such as the Clean Air Plan the measures of success of the scheme lie outside the standard benefits using the conventional DfT appraisal framework and it is not expected to provide an economic return on the investment. Therefore, the NPV does not provide a full measure of value for money. Since Option 2A would deliver against the core strategic objectives of the scheme, which are focused on improving local air quality in the shortest time possible, it is considered that the **preferred scheme option does represent the best value option when balanced against the Option Assessment Criteria**.

Distributional Impact Appraisal – key points:

- The economic appraisal is supplemented by a **Distributional Impacts Appraisal** (DIA), which provides an analysis of the potential differential impacts of the scheme between groups of people or businesses across Sefton. Distributional analysis helps to understand **whether a particular policy/scheme unduly favours or disadvantages particular groups**. This can be used to inform measures to

mitigate the impact of the policy on those groups or the amendment of the policy itself.

- The DIA analysis suggests that the **air quality benefits of the scheme are particularly concentrated in areas that have some of the highest levels of income and health deprivation within Sefton**, therefore benefitting some of the most vulnerable people.
- It should however be recognised that there are many locally registered HGVs that would be potentially subject to the CAZ charges if they are non-compliant with the CAZ, and the operators of these vehicles may require assistance with bringing forwards any upgrades to their vehicle fleet. It should be **noted that the appraisal undertaken at this stage does not capture the potential costs or impacts of any mitigation measures**, for example, to support local SMEs with funding for vehicle upgrades.

FINANCIAL CASE – KEY OUTCOMES

Capital and Operating Costs:

- As the scheme is at the OBC stage, the Financial Case represents the position pre-procurement for the capital and operating costs. This means there is further work required to develop and advance the cost estimates, particularly through further detailed design work and engagement with the market.
- There is some **uncertainty** with specific cost elements at OBC stage, including such elements as CAZ service implementation, staffing requirements, and operating costs. On this basis, costing has used detailed information where available for specific elements and a benchmarking approach for elements with less evidence available.
- **The total capital costs are estimated at £4,101,000, with operating costs of circa £1 million per annum (all in 2021 prices[7]).** Assuming that the CAZ is operational for five years, together with development, implementation and decommissioning costs, the current capital and operating costs across the lifecycle

[7] The estimated scheme costs do not factor in inflation which would need to be included to determine a final funding requirement.

are reported at **£9,227,000 in 2021 prices**[8]. The total costs are summarised in the table below.

Table: Total Scheme Costs (to the nearest thousand £, 2021 prices)

Capital Cost Item	Total Cost (scheme life span)
Total Capital Costs excluding inflation	**£4,101,000**
Total Operating Costs	**£5,126,000**
Total Costs	**£9,227,000**

- The costs presented above do not include some key development related costs that would be incurred in taking the scheme forward. Whilst the above costs include estimated costs relating to the design of the CAZ highway infrastructure, there will also be broader scheme development costs, including further work to develop the Full Business Case (FBC) such as consultation, and associated technical work.
- In addition, no mitigation funding has been included in the OBC modelling at this stage. These are costs that the Council (or for example, JAQU Clean Air Fund) could provide through business grants to help alleviate the financial impacts for required vehicle upgrades. **Estimated mitigation costs based on wider CAZ studies and an estimation on the number of vehicles needing to upgrade could be around c.£10m for a Sefton based CAZ (depending on grant amounts and uptake levels).**

CAP KEY CONCLUSIONS AND CONSIDERATIONS

OBC Evidence-Base Conclusions for implementing Preferred Option 2A CAZ:

- The **aim** of the CAP OBC is to Identify the best value CAZ option to meet the objectives set out by Cabinet. HGV CAZ Option 2A (key corridors A565 and A5036) has been determined as the preferred and recommended CAZ option for the CAP scheme. The Evidence-Base indicates that **significant AQ benefits can be gained**

[8] This value differs from the total costs used in economic appraisal, which are adjusted to 2010 prices and discounted.

within the CAZ Boundary area (Port Routes/AQMAs) and wider AQ improvements (reduced impact) can potentially be gained if proceed to FBC for Option 2A. It is recommended that Option 2B (key corridors, A565 only) is retained as a reserve option, subject to liaison with JAQU/National Highways regarding the inclusion of the A5036 within a CAZ.

- Since Option 2A would **deliver against the core strategic objectives of the scheme** *(i.e., includes all AQMAs, key Port routes, will benefit some of the most health/income deprived areas)*, which are focused on improving local air quality in the shortest time possible, it is considered that the **preferred scheme option does represent the best value option when balanced against the Option Assessment Criteria** i.e., least deliverability barriers to implementation.

Key Considerations for Proceeding to Full Business Case:

- Progression of the CAP scheme to FBC will be contingent upon a number of factors, including key risks and constraints identified through the OBC and the following factors need to be given due consideration, as follows:
    - A **CAZ is not an all-encompassing solution for AQ issues** (requires synergywith ongoing Council policies/initiatives and key stakeholders).
- High **background concentrations** (and associated exceedances) linked to the **Port** require liaison on Peel Port's combined **Air Quality / Carbon Reduction Strategy to supplement traffic measures**
    - particularly due to fact that e**xceedances remain** for Option 2A (and all options in 2023 modelling) even with the CAZ in place (Millers Bridge / A5036).
- **Air Quality Benefits** require consideration **against** significant **funding source** required for **CAZ Costs:**
    - **Benefits:** Evidence for Option 2A - significant AQ benefits in CAZ Boundary area plus wider overall AQ/health improvements
    - **Costs*:* £4.1m capital / £5.2m operating costs - £9.3 million** in 2021 prices (5-year operation)
    - Also estimated **potential mitigation** funding for **business impacts** potentially **c. £10m** and further **scheme development funding** required (e.g., for consultation)
- Expected **natural improvements** in Air Quality within next few years due to fleet. improvements – however, Port-related HGV growth an issue on our key corridors

with existing issues

- **JAQU** – exceedances (particularly at JAQU receptors) would form basis of potential mandate – benefits and risks to consider (further modelling likely required).
- **JAQU** agreement **/ National Highways** support is required for inclusion of A5036.
- **COVID-19 pandemic –** A5036 HGV traffic has returned to pre-pandemic levels **–** however the pandemic has impacted cost/availability of newer compliant vehicles – effect on overall fleet composition still to be realised.

KEY DECISIONS TO BE MADE TO DETERMINE NEXT STEPS –

- Sefton Council's Cabinet are currently considering the potential next steps in the process which are summarised in the table below.

Possible pathways for consideration based on OBC Outcomes (Note funding source to be identified for all options other than Business as Usual):

Do not proceed to FBC for charging CAZ:		
1	**Business As Usual (BAU)**	Due to generally improving air quality situation and likely compliance with national thresholds within the next few years and the significant costs of implementing a charging CAZ. **Maintain current initiatives and monitoring.**
2	**BAU plus Option 2A Corridor focused measures i.e., a Non-Charging CAZ (in AQ hotspots)**	**Focus available resources on additional and targeted measures** to improve air quality in the **proposed CAZ corridors**, for example supporting a vehicle upgrade programme.

2+	**BAU plus Option 2A Corridor focused measures plus wider measures i.e., a Non-Charging CAZ (in AQ hotspots) pluswider area measures**	As for 2 but **allocate additional resources for wider measures** to improve air quality across south Sefton and **expand to include carbon reduction initiatives** targeted at the freight sector.
Proceed to FBC for a charging CAZ along the A565 and A5036:		
3	**FBC for Charging CAZ (if can gain**	Only if JAQU support is gained through exploring/securing funding opportunities based on OBC outcomes i.e., **begin**
	JAQU funding/NH support)	approach for JAQU liaison now – understand current funding position / prepare submission.
4	**FBC for Charging CAZ (Council funded)**	Decision about submission to JAQU to be made at a later date i.e., Council fund FBC. But also need to consider implementation/consultation/mitigation funding needed – recommend funding secured prior to proceeding to FBC.

To assist Cabinet in their decision making process stakeholder engagement with National Highways, DEFRA's Joint Air Quality Unit, Liverpool city Council and Peel Ports has recently been undertaken. In addition to the stakeholder engagement additional technical assessments including updated ANPR study and natural compliance assessment has also been completed .

The results of the stakeholder engagement and technical assessments have been presented to Cabinet members for their consideration . A decision on the pathway to be chosen is imminent.

Further information on Sefton's CAP along with the Cabinet Report and CAP Executive Summary is available via Sefton's Your Sefton Your Say information hub which will be updated regularly as the CAP progresses.

https://yourseftonyoursay.sefton.gov.uk/seftoncleanairplan/

2.24 Millers Bridge Junction Improvements (AQMA 3)

A project aimed at improving congestion in the area around Millers Bridge and the A565 heading into Liverpool commenced in 2019 and is summarised below.

The North Liverpool Key Corridor (NLKC) project is a major joint scheme between Sefton Council and Liverpool City Council which will create a modern fully 'dualled' road link on the A565 Great Howard Street and Derby Road between Sefton and Liverpool.

New and improved cycling routes on Regent Road, reduced congestion, improved local access and better east-west movement will also strengthen the connections between Liverpool and Sefton.

The scheme will also support the development projects being undertaken as part of Liverpool Waters, North Liverpool Regeneration and the SuperPort. As part of this project significant improvements have been made to the Millers Bridge junction which has been designed to improve traffic flow through this area.

The Millers Bridge junction improvement element of the scheme was completed in 2020. But the whole scheme was only completed in 2022. Due to the completion of this intervention during the COVID-19 pandemic which extended into the reporting year of 2021 it has not been possible to assess whether the works have resulted in any quantifiable improvements in air quality due to the ongoing apparent impact of the pandemic . Monitoring will continue in the area, but it may prove difficult to determine whether any improvements have occurred solely because of the redesigned junction as the ongoing impact of COVID-19 on traffic levels and pollution is still unknown.

2.25 Joint Sefton MBC DVSA Emissions Enforcement Project

Project Summary

Following a successful project in 2021 a second joint Sefton / DVSA vehicle emissions enforcement project took place in September 2022 to identify HGVs travelling on the A5036, A595 and Motorway network emitting unacceptable levels of pollution.

During the most recent exercise last September sophisticated air pollution monitoring equipment, funded by Sefton, was installed in two DVSA stop cars and levels of NOx (Oxides of Nitrogen) and PM (Particulate Matter) were monitored in live traffic to detect suspect vehicles emitting higher than expected emissions therefore potentially indicating the presence of an emission cheat device or tampered emissions control system.

The two plume chasing DVSA stop cars followed in excess of 150 vehicles travelling on the A5036, A595 and motorway network.

As a result of high levels of pollution being detected during the plume monitoring activities a number of vehicles were stopped by DVSA officers and subjected to more detailed investigations at the Switch Island inspection site to determine if any faults or cheat devices were present.

The DVSA carried out an initial visual inspection of the vehicle, paying particular attention to the emissions control systems and engine warning lights. Onboard diagnostic (OBD) testing equipment was used to identify any fault codes and to carry out diagnostic tests on

the emissions control system. A Diesel Particulate Filter tester and Diesel Smoke Monitor were also used to carry out an exhaust emissions tailpipe test.

Following the detailed examinations faults were identified in seven vehicles and enforcement action was taken by the DVSA requiring the operators to rectify the faults.

Further joint work is being considered in 2023 potentially using roadside monitoring equipment to detect suspect vehicles.

2.26 Traffic signal upgrade project / incorporation of AQ sensors:

As part of a City Region traffic signal upgrade project, funding for 7 air quality sensors (Earthsense Zephyr) in Sefton was secured and are now operational.

The sensors are located at 7 key traffic light junctions in the Borough and integratedinto Sefton's traffic signal control system (Stratos).

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 outcome of this work will be presented in next year's ASR.

2.27 Co-location Monitoring Project Sefton Council and Liverpool John Moores University (LJMU)

Sefton Council and Liverpool John Moores University (LJMU) are currently undertaking a joint air quality monitoring co-location study to determine how accurate lower cost air pollution sensors are, compared to Sefton's own DEFRA approved automatic monitoring equipment.

The study is underway at our Millers Bridge monitoring site and in collaboration with JMU, 3 lower cost sensors are currently being tested for accuracy.

The 3 sensors being tested are:

- Libelium Smart Cities Plug & Sense (NO_2)
- Aeroqual AQY (NO_2, $PM_{2.5}$ and PM_{10})
- Earth Sense Zephyr (NO, NO_2, PM_1, $PM_{2.5}$ and PM_{10})

Comparison of $NO/NO_2/PM_{10}/PM_{2.5}$ data has commenced with the Earth Sense Zephyr unit showing the most accuracy when compared with the DEFRA approved monitor.

2.28 Low-cost sensor / school streets AQ monitoring project

Figure 2.4 – Earth Sense Zephyr Unit

Officers from Highways and Environmental Health are currently working on a joint air quality monitoring project as part of Sefton's School Streets initiative. (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)

Three low-cost air quality sensors (Earth Sense Zephyr as shown on picture) have been purchased to monitor air quality levels around 3 schools identified as part of the initial phases of the School Streets project. AQ levels will be monitored before and after the School Street initiatives are implemented to assess any reductions inpollution as a result of the measures. Sensors will also be used to determine the different travel methods used (walk /cycle/car).

The monitors were installed in June 2022 to enable Air Quality levels to be monitored before and after the School Street initiatives are implemented to assess any reductions in pollution as a result of the measures. Sensors will also be used to determine the different travel methods used (walk /cycle/car).

Initial analysis of the air quality monitoring results shows noticeable differences between term time and non-term time levels of NO_2 during school drop off/collection times with

short term levels of NO_2 during term-time notably higher than non term times during the morning and afternoon drop off / collection periods.

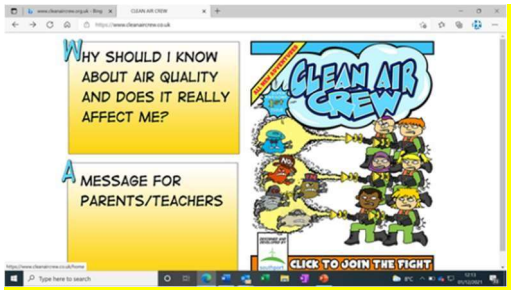
The school streets traffic restrictions have now been implemented (June 2023) for 2 Schools and ongoing review and analysis of air quality data has commenced.

Further details on the School Streets Project can be found here https://www.sefton.gov.uk/parking-roads-travel/sefton-school-streets/southport-school-street-school-neighbourhood-pilot/

2.3 Progress on DEFRA AQ Grants

2.31 Schools Educational Project

Officers from Sefton's Energy and Environmental Management Team supported by Environmental Health were successful in obtaining a DEFRA AQ grant of £122,500 to undertake an educational behaviour change project. The Project commenced in April 2021 and ran until December 2022. Evaluation of the project is currently underway.



The overall aim of this project was to raise awareness of air quality and in turn encourage behavioural changes that will have immediate and long-term positive impacts on air quality in Sefton.

Sefton has 4 AQMA areas and some of the highest levels of childhood asthma and respiratory disease in the country. Therefore, in partnership with Sefton Council's Educational Staff based in the Eco Centre, a termly programme of AQ support and learning was been offered to all Sefton Primary schools (and in turn the wider local community) during the 2021/22 academic year, with a particular focus on schools within or close to one of Sefton's four Air Quality Management Areas (AQMAs).

The educational staff at the Eco Centre have been operating for 19 years and have strong, established and trusted relationships with all schools in Sefton.

The programme consisted of;

• A dedicated Educational officer supporting schools with a termly programme of AQ support and learning, all linking to core national curriculum subjects. This included visits to the Southport Eco Centre (dedicated to Eco Education), providing teachers with lesson plans, activity sheets, homework booklets, campaigns (walk to school, anti-idling), activities and how to guides.

• Expansion of a KS2 air quality resource, with additional focus on KS3/4 (Secondary schools).

• Development of a higher level online AQ resource for parents/teachers/ residents/community groups.

• Installation of a state of the art, digital technology immersive room at the Eco Centre and the development of two bespoke immersive experiences based on AQ learning. This can now be accessed by both schools and community groups. It has become part of the Eco Educational offer at the centre ensuring a legacy of the project for years to come.

• A programme of NO_2 monitoring in participating schools in the borough.

Teachers and parents were introduced to AQ issues and provided opportunity to embed them in core curriculum activity. The above campaigns meant that direct action could be taken immediately by schools, resulting in air quality benefits in the next two years and beyond.

Key achievements include;

- 55 schools participated, including 10 schools in the four AQMA areas.
- 3 campaigns, one launched every school term during the academic year 2021/22.
- 58 School visits to the Eco Centre – where children and teachers received AQ educational activities as part of visit programme, including immersive experiences
- 2,185 children taking part in Immersive AQ experiences
- Positive feedback from evaluation questionnaires as part of education programme at Eco Centre, using bespoke immersive experience to educate on air quality issues.

- KS3/4 resource promoted to 17 secondary schools – one taking part in a bespoke workshop at the Eco Centre - and 213 individual Eco Centre website community subscribers downloading the resource.
- 161 individual teachers signed up to access the Clean Air Crew AQ teaching resources.
- 237 Parents signed up to access the Clean Air Crew AQ teaching resources.
- 13 schools engaged in the NO_2 tubes AQ monitoring programme (Air watch)

Investment by DEFRA in this area has ensured the work initiated will continue through the materials and physical infrastructure. It has also helped to develop networks of schools and communities that have engaged in this work. As mentioned above, the Southport Eco centre now has an additional educational tool in the form of the Immersive room with the associated immersive experiences. It also has the much improved and expanded Clean Air Crew website, which offers a wealth of information and activity for schools (both in the classroom and at home) as well as the associated educational resource suite, which includes new materials on the different facets of AQ.

As a direct result of the knowledge sharing undertaken during the project delivery, Sefton are now working directly with both Liverpool City Council and South Ribble Council, utilising the resources developed to engage with schools in both areas. The projects have recently launched as part of Clean Air Day activities 15 June 2023, and will deliver a suite of education, activities and campaigns all designed to encourage behaviour change and improve AQ locally in those areas.

In addition, the continuing of the Sefton project, delivered through the Eco Centre, aims to dovetail with Sefton's progressive School Streets initiative which entails implementing specific traffic restrictions preventing cars entering a defined area/street during the am and pm school drop off times.

2.32 Defra Funded Domestic Solid Fuel Use Behaviour Change Project

Air Quality Officers from Sefton Council were successful in securing a £100,000 DEFRA AQ grant to fund a domestic solid fuel behaviour change project with the overall goal of reducing Particulate Matter (PM) emissions from the use of domestic solid fuel in the Borough.

The project ran from November 2019 to Early 2022 (extension approved by DEFRA due to the pandemic) and has been reported in detail within last year's annual status report.

A summary of the project and outcomes/conclusion is provided below as a number of actions are continuing as a legacy of the project and relevant in terms of the LA's ongoing duty to reduce $PM_{2.5}$ emissions.

Project Summary

Initially four main project objectives were developed:

- Improve understanding and awareness of the extent and impact of domestic solid fuel use in Sefton – through evidence gathering on number and location of properties using solid fuel and the monitoring of particulate matter.
- Reduce emissions of particulate matter from domestic solid fuel use in Sefton by raising awareness of the issues and by communicating and promoting good practice in partnership with stove suppliers, fuel suppliers and chimney sweeps.
- Improve public health – by reducing exposure to particulate matter from domestic solid fuel use and encouraging behaviour change among users of solid fuel.
- Improve the regulatory measures for control of domestic emissions – through a review and possible extension of Sefton's Smoke Control Areas.

To achieve the overall aims and objectives set out above a comprehensive work activity package was developed along with an ongoing project plan. Project activities included:

- Assess levels of domestic stove/solid fuel use in Sefton.
- Purchase and installation of dual PM_{10}/$PM_{2.5}$ monitor.
- Determination of current $PM_{2.5}$ levels in study area chosen.
- Identification of fuel suppliers/stove suppliers/chimney sweeps in area.
- Surveys /questionnaires used to ascertain the type, frequency and intensity of solid fuel use by targeting suppliers and chimney sweeps.

- Identify information needs of fuel Suppliers, appliance suppliers/Chimney Sweeps in relation to the new Clean Air Strategy and industry best practice standards and codes.
- Develop good practice guides for engagement with local fuel suppliers/appliance suppliers/chimney sweeps.
- Work with Sefton Communications and engagement teams to identify gaps in our knowledge about public beliefs, behaviours, motivations, preferences etc.
- Create/develop Sefton smoke control project website.
- Evaluation of project using monitoring data from actual $PM_{2.5}$ monitoring.

Work Undertaken

Whilst the COVID-19 pandemic had a significant impact on the project the majority of work activities were still completed including:

Stove use mapping/Particulate Monitor installation

As part of the project a dual particulate monitor was to be installed to monitor levels of PM associated with domestic solid fuel use and a suitable location for the monitor needed to be identified. An initial mapping exercise was therefore undertaken to plot the location of wood burning / multifuel stoves already installed in Sefton which were likely to be in use.

Information was provided by Sefton's Building Control team and included stoves installed in the past 5 years which were either installed by a competent person or were signed off by building control. This mapping was then used to inform the location where the monitor should be installed based upon the higher density areas of stove installations with areas of Crosby, Formby and Ainsdale found to have high concentrations of stove installations.

Following a review of the mapping the decision was made to install the monitor in Crosby as this area had the highest concentration and there were a number of suitable locations for the monitor. The chosen monitoring device, a FIDAS Dual $PM_{10}/PM_{2.5}$ monitor, was installed within a high stove use area on Regent Road, Crosby and became operational in September 2020.

Surveys

Three different surveys were created for the project, they were targeted at the three groups listed below with the aim of further understanding public knowledge and habits around solid fuel burning. All surveys were required to pass Sefton Council's internal Consultation and Engagement panel to ensure they were of sufficient quality, relevant, fair and easy to understand.

- SWAA Survey – The Sefton Wood Allotment Association gather their own wood as part of volunteer conservation work for Sefton Council.
- Professionals Survey – To include chimney sweeps, stove retailers, fuel retailers and stove installers.
- Public Survey – Located on the homepage of the project website and promoted through Sefton Council's social media channels.

Website

Significant resource was assigned to developing a website for the project and was launched in November 2020. The website has been designed to act as a communication/information hub with detailed information on all aspects of the project. Targeted towards both residents and professionals, the website contains a large amount of information. This information is provided across many pages and styled to engage the public and industry professional alike with the use of photographs and imagery. There are also videos and interactive features such as the Smoke Control Area postcode look-up which allow ease of use, and updatable areas such as the 'news' page which will encourage users to return.

Communications

Leaflets

A number of leaflets were created for the project and designed in house. The points of focus were:

- Families – Issued by family health services/ nurses/ midwifes to expectant

mothers and families with young children focusing on the impacts of air pollution on children.

- Current Stove owners – Information on stove use, maintenance and fuel choice.
- Prospective Stove owners – a more concise version of the above 'current owners' leaflet, this also includes information on installation.
- Indoor Air Pollution – Focusing on the impacts of pollution from solid fuel burning directly within the home, rather than just what is emitted externally up the chimney.
- Poster – Issued by building control when a new solid fuel burning appliance is installed and registered. This should provide key information on solid fuel burning in an easy to digest form, the poster will also refer the reader to the website for more information.

Particulate Levels

Monitoring of particulate levels ($PM_{2.5}$/PM_{10}) over the project period took place with summer and winter levels compared along with pre and post behaviour change levels reviewed.

Conclusions

Despite the Covid pandemic which impacted on the project significantly a number of conclusions can be drawn/inferred from the project activities and summarised below:

- The study through stove mapping and various questionnaires and surveys has helped us better understand the extent of domestic solid fuel use in Sefton. Monitoring of particulate matter (PM) in the study area has shown that winter levels of $PM_{2.5}$ are greater than levels observed during summer periods. Levels of PM_{10} and $PM_{2.5}$ during winter in the study area were found to be well below National Air Quality Standard objectives and World Health Guideline levels.
- Information obtained from various public and industry surveys has provided key

information on what aspects of solid fuel use to target as part of the behaviour change activities.

- Various tools were used to promote behaviour change to reduce PM emissions including the development of the project website and various leaflets and publicity material.
- Following behaviour change activities comparison of pre-project behaviour change PM levels during the winter of 2020/2021 and post-project PM levels during the following winter of 2021/2022 has shown some reduction in levels.
  It has been difficult however to show this reduction is solely down to the behaviour change activities as a number of other factors including covid and new legislation coming into force may have played a part in the reductions observed.
- Although a reduction in exposure appears to have been achieved in the study area whether this has improved public health is very difficult to prove or disprove. Changes in public health will not be immediately apparent as the positive impact of any reductions in air pollution many take some time to take effect.
- As set out in the project aims a review of Sefton's Smoke Control Areas (SCA) took place. Despite only a small area of Sefton being covered by a SCA very few nuisance type complaints were observed over the last 5 years in the Borough.
  The monitoring of PM levels as part of the project showed that levels of PM do increase during the winter period but are well within national standards.
  New legislation controlling the supply of domestic solid fuel came into force during the project period and in taking these factors into account it was not considered necessary or beneficial to expand Sefton SCA.

In summary whilst it has been difficult to prove the behaviour change activities have led to the reductions in PM observed, we better understand the extent of solid fuel use in the Borough and associated emissions. The project website will remain as a legacy of the study enabling behaviour change to continue. The PM monitor will also

remain in place and future trends can be observed and reported.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	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 SS1	Port Booking System	Freight and Delivery Management	Delivery and Service plans	2015	2017	Peel ports	Private	NO	Funded	£50k - £100k	Completed	No Target pollution reduction set-hard to quantify	Feedback on effectiveness of port booking system via port liaison meetings	vehicle booking system introduced and completed in 2009.New L2 terminal operating autogate technology introduced 2015.	Reduced HGV waiting times on the port will reduce pollutant emissions from the port estate affecting AQMA.
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-19	Awaiting detailed assessment from consultants
AQMA2 SS3	Port expansion mitigation measure No3. Alternative fuels strategy for HGV's and buses	Vehicle Fleet Efficiency	Other	2016	2017	Sefton MBC	DEFRA/LA	YES	Funded	£50k - £100k	Completed	N/A	Results of study to inform decision making process	DEFRA AQ grant For Alt fuels refuelling and infrastructure strategy awarded 2014. Consultant appointed 2015. Report issued 2016.	Main recommendation to undertake further CAZ study being undertaken
AQMA2 SS4	Port expansion mitigation measure No4. HGV parking demand study	Transport Planning and Infrastructure	Other	2015	2015	Sefton MBC	LA	NO	Funded	£50k - £100k	Completed	no Target pollution reduction set-hard to quantify	Robust assessment of HGV parking	Stage 2 report completed. Detailed phase 2 study on preferred HGV parking site underway.	Council to take forward recommendations.
AQMA2 SS5	ECOstars Vehicle fleet recognition scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2015	2021	Sefton MBC	LA	NO	Funded	£10k - 50k	Completed	no Target pollution reduction set-hard to quantify	compliance with target to recruit 25 members completed	Ecostars commenced 2013,funded by DEFRA AQ grant, to run initially for 2 years. Formal launch in 2014. Recruited 50 operators	Mainly 4 and 5 star operators recruited. Benefits in context of port expansion low. Scheme however funded for a further 2 years with aim of recruiting a further 15 members.
AQMA3 SS1	Hurry Call System	Traffic Management	UTC, Congestion management, traffic reduction	2011	2015	Sefton MBC	LA	NO	Funded	£10k - 50k	Completed	No Target pollution reduction set-hard to quantify	Number of activations of hurry call system	Implemented July 2011. Number of activations of the system per hour reviewed and system continues to show that the system is working well.	Difficult to quantify emissions reduction, but number of activations outside of peak hours indicate successful in facilitating HGV passage through traffic lights and reducing NO_x and PM_{10} emissions.
AQMA3 SS2	Control of dust from industry	Environmental Permits	Other	2011	2015	Sefton MBC	N/A	NO	Not Funded	£50k - £100k	Completed	no Target pollution reduction set-hard to quantify	Compliance results from Local Authority and Environment Agency site inspection visits to permitted industrial sites within the Port of Liverpool and the number of exceedances of the PM_{10} daily mean standard when predominantly north westerly winds. Compliance results from Local Authority and Environment Agency site inspection visits to permitted industrial	Meetings with EMR and EA. New EMR dust management plan produced 2010. Number of exceedances of PM_{10} 24-hour mean when wind direction from the direction of the port continues to remain low.	Compliance with PM_{10} AQOs achieved. Improved dust control at EMR & relocation of JMD Haulage has significantly contributed to reducing PM_{10} levels at Millers Bridge.

Measure No.	Measure	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
													sites within the Port of Liverpool and the number of exceedances of the PM10 daily mean standard when predominantly north westerly winds.		
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-19	Awaiting consultant report on options.
AQMA5 SS2	Port expansion mitigation measure No 3 Alternative Fuels Strategy for HGVs & buses	Vehicle Fleet Efficiency	Other	2016	2017	Sefton MBC	DEFRA/LA	YES	Funded	£50k - £100k	Completed	no Target pollution reduction set-hard to quantify	Results of study to inform decision making process	Defra AQ grant for HGV alternative fuels refuelling infrastructure & strategy awarded 2014. Consultant appointed in 2015. Report issued2016.	Main recommendation to undertake further CAZ study being undertaken
AQMA5 SS3	Port expansion mitigation measure No 4 HGV parking demand study	Transport Planning and Infrastructure	Other	2015	2015	Sefton MBC	LA	NO	Funded	£50k - £100k	Completed	No Target pollution reduction set-hard to quantify	Robust assessment of HGV parking	Consultant appointed in 2015 to carryout .project Report issued March 2016.	Council to take forward recommendations.
AQMA5 SS4	ECO Stars fleet recognition scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2015	2021	Sefton MBC	DEFRA/LA	NO	Funded	£10k - 50k	Completed	no Target pollution reduction set-hard to quantify	Compliance with target to recruit 25 operators in the 2 years of scheme operation	ECO Stars commenced 2013, funded by Defra AQ grant, to run initially for two years. Formal launch in 2014. 50 operators recruited.	Mainly 4 & 5 star operators recruited. AQ benefits in context of port expansion low. Scheme now funded for a further 2 years with aim of recruiting a further 15 members.
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 MBC	LA	NO	Funded	£1 million - £10 million	Completed	no Target pollution reduction set-hard to quantify	Compliance with NO_2 objective in AQMA	Junction improvement works now completed – Compliance observed in 2020/2021/2022 consideration being given to revocation of AQMA	Junction improvement works now completed – Compliance observed in 202020/2021/2022- consideration being given to revocation of AQMA
AQMA3 - 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 MBC	LA/CA	NO	Funded	£1 million - £10 million	Completed	no Target pollution reduction set-hard to quantify	Compliance with NO_2 objective in AQMA	Millers Bridge Junction improvement works completed	Works only just completed - Commencing review of monitoring data
GM1	SCOOT	Traffic Management	UTC, Congestion management, traffic reduction	2010	2015	Sefton MBC	LA	NO	Funded	£100k - £500k	Completed	No target pollution reduction set - difficult to quantify	Liaison with Sefton Council Highways Maintenance Manager on optimisation of the SCOOT system	Implemented 2010	SCOOT system is optimised and operating successfully.
GM2	Variable Message Signs(VMS)	Public Information	Via other mechanisms	2013	2017	Sefton MBC	LA	NO	Funded	£10k - 50k	Completed	No target pollution reduction set	Ensure system operating effectively	Implemented 2013	VMS system operational since July 2013 and linked to Sefton Council breathing

Measure No.	Measure	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
												- difficult to quantify			space air quality website to display current levels.
GM3	Work Travel Plans	Promoting Travel Alternatives	Workplace Travel Planning	2010	2015	Sefton MBC	LA	NO	Funded	£10k - 50k	Completed	No target pollution reduction set - difficult to quantify	Number of work place travel plans implemented	implemented 2010	
GM5	Cycling & Walking	Promoting Travel Alternatives	Promotion of cycling	2010	2015	Sefton MBC	LA	NO	Funded	< £10k	Completed	No target pollution reduction set - difficult to quantify	Increase in participation	Implemented 2010	
GM6	Land use planning	Policy Guidance and Development	Air Quality Planning and Policy Guidance	ongoing	2015	Sefton MBC	LA	NO	Funded	< £10k	Completed	No target pollution reduction set - difficult to quantify	Percentage of planning permissions granted where the submitted air quality assessment shows no action was required or the air quality impact of a development was mitigated	ongoing	100% of planning permissions either required no action or the air quality impact of the development mitigated
GM7	Low emissions Strategies	Policy Guidance and Development	Low emissions Strategy	2010	2015	Sefton MBC	LA	NO	Funded	< £10k	Completed	No target pollution reduction set - difficult to quantify	Number of LES measures implemented	Implemented 2010	Increasing number of EV charging points installed.
GM8	Tree planting	Other	Other	2010	2015	Sefton MBC	LA	NO	Funded	< £10k	Completed	No target pollution reduction set - difficult to quantify	Number of trees planted within AQMA. Compliance with the PM_{10} air quality Objectives	Implemented 2010	
GM9	AQ awareness	Public Information	Via other mechanisms	2010	2015	Sefton MBC	LA	NO	Not Funded	< £10k	Completed	No target pollution reduction set - difficult to quantify	Maintenance of Sefton Council air quality website. Number of AQ awareness events	Implemented 2010	
GM10	Freight Quality Partnership (FQP)	Freight and Delivery Management	Other	2010	2015	Merseytravel	CA	NO	Not Funded	< £10k	Completed	No target pollution reduction set - difficult to quantify	Number of meetings held. Number of AQ initiatives undertaken	Implemented 2010	
GM11	Taxi Quality Partnership (TQP)	Promoting Low Emission Transport	Taxi emission incentives	2013	2015	Merseytravel	CA	NO	Not Funded	< £10k	Completed	No target pollution reduction set - difficult to quantify	Number of operators participating	Implemented 2013	
GM - Solid Fossil Fuel Project	Solid Fossil Fuel Project	Other	Other	2018	2022	Sefton MBC	DEFRA/LA	YES	Funded	£50k - £100k	Completed	No target pollution reduction set - difficult to quantify	improvement in levels of $PM_{2.5}$ following implementation of behaviour change solid fossil fuels project	Project Complete as far as possible. Some reductions observed	COVID-19 had significant impact on behaviour change elements
GM-Schools Project	Schools Air Quality project	Other	Other	2017	2019	Sefton MBC	LA	NO	Funded	< £10k	Completed	No target pollution reduction set - difficult to quantify	Number of Schools participating in AQ sessions	AQ session delivered to 15 schools already- currently looking for further funding . Clean Air Crew website launched.	
GM- Sefton Clean Air Plan	Clean Air Plan	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2018	2023	Sefton MBC	LA	NO	Funded	£500k - £1 million	Implementation	No target pollution reduction set - difficult to quantify	reduction in NO_x and PM levels	Outline business case completed -Council considering next steps	
GM-Education Project	Educational Air Quality project	Other	Other	2020	2022	Sefton MBC	DEFRA/LA	YES	Funded	£100k - £500k	Completed	No target pollution reduction set - difficult to quantify	Schools participating, Users of website/users of immersive room	Project now complete in line with objectives. Immersive Room and Clean Air Crew Website will continue to be available for use.	
GM- Joint Sefton /DVSA Emission Enforcement project	Emission Enforcement Project	Other	Other	2021	2023	Sefton MBC/DVSA	Sefton MBC/DVSA	NO	Funded	£10k - 50k	Implementation	No target pollution reduction set - difficult to quantify	Compliance with NO_2 objective in AQMAS	2 Emissions Enforcement Activities now undertaken . Furter planned for 2023	Number of Vehicles identified with Emissions control system issues- DVSA taking follow up action.

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Sefton 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.

These measures that continue to have a positive effect on reducing $PM_{2.5}$ in 2022 include:

- Traffic Signal optimisation/Management measures - SCOOT and Hurry Call systems;
- Ongoing Promotion of Alternative Travel 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;
- Strategic highway and junction improvements to reduce congestion and pollutant emissions specifically at Millers Bridge and Crosby Road North / SouthRoad Junctions; and,

  Addressing particulate matter emissions from construction activities through specific conditions using the land use planning and development control system.

Specific actions to address $PM_{2.5}$ in Sefton

Domestic Solid Fuel Behaviour Change Project

Evidence from ongoing research suggests that the use of domestic fossil fuels can increase local levels of particulates including $PM_{2.5}$.

As reported in last year's ASR Sefton was successful in obtaining a grant through the Local Authority Air Quality grant fund to the sum of £100,000 with the primary aim of

minimising the Particulate Matter (PM) contribution from domestic solid fuel use in Sefton through behaviour change. The project is now complete as far as practicable and the details of the outcomes and conclusions that were able to be drawn are provided within Actions to Improve Air Quality.

Notwithstanding the impact of the pandemic a number of successful elements were completed and will remain as a legacy of the project with the ongoing objective of reducing PM emissions including $PM_{2.5}$.

These are discussed in detail in Actions to Improve Air Quality. but the headline actions are detailed below:

- Development of library of behaviour change publicity material - leaflets, posters, factsheets etc
- Continued engagement with stove suppliers/ installers /chimney sweeps and fuel suppliers in area using comms material produced as part of the project
- Real time ongoing measurement of PM_{10} and $PM_{2.5}$ levels in the Crosby area (high stove use neighbourhood) using a FIDAS dual particulate monitor measuring PM_{10} and $PM_{2.5}$
- Development of public website which contains behaviour change information for householders, businesses, and suppliers on ways to minimise particulate emissions from the use of solid fuelsfor heating. https://smokecontrolsefton.co.uk

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 areas. Residents can easily determine if their property is within a Smoke Control Area by checking on Sefton's mapping system and website:

http://maps.sefton.gov.uk/webmaplayers/?datalayers=Smoke%20Control%20Areas&resolution

https://www.sefton.gov.uk/environment/pests-pollution-and-food-hygiene/pollution/smoke- control-areas/

Compliance in Sefton's smoke control areas is actively enforced and any complaints or allegations of properties breaching the smoke control area 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.

Sefton also have a smoke control website: https://smokecontrolsefton.co.uk/

Particulate Control at Construction/Demolition sites

Through the development control process officers in the Pollution and Air Quality teams are consulted on developments which involve external construction/demolition works likely to give rise to particulate emissions. To proactively control PM emissions from construction works officers recommend the inclusion of formal conditions requiring the submission and approval of a detailed Construction Environmental Management Plan (CEMP) which includes dust control measures. This helps reduce and mitigate the release of particulates during the demolition and future construction phase of a development thus helping to reduce $PM_{2.5}$ emissions from these activities.

Commercial Dust/Smoke complaints

Sefton continues to robustly investigate complaints of commercial dust being emitted from premises along with burning on commercial premises which is giving rise to dark smoke/nuisance smoke. Enforcement action under the Clean Air Act 1993 and/or the Environmental Protection Act 1990 is taken as appropriate to ensure dust/smoke emissions are effectively controlled and emission of dark smoke are prevented.

Control of Industrial Processes under the Local Authority Pollution Prevention Control regime

Sefton ensures that all industrial processes which fall under the Local Authority Regime of the Environmental Permitting Regulations 2016 are issued with a Part B/A2 Environmental Permit as appropriate. All premises holding a LAPPC permit are inspected in line with DEFRA's risk-based inspection programme and any contraventions dealt with in line with our enforcement policy. This ensures all regulated emissions including particulate matter are within permitted limits helping reduce $PM_{2.5}$ emissions from these industrial processes.

Joint Sefton DVSA emissions enforcement project

As detailed earlier in the ASR a successful joint Sefton / DVSA emissions project was undertaken in December 2021 and then in September 2022 to identify vehicles emitting higher than expected emissions including NO_x and PM. A number of vehicles were identified by our monitoring activities and then stopped by DVSA officers. Some of the faults identified included Diesel Particulate Matter (DPF) filter issues which required rectification.

The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020.

The Government has introduced new regulations known as The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 **which are now in force** restricting the supply of certain solid fuels with the aim of reducing air pollution. In particular, they aim to reduce the amount of $PM_{2.5}$ emissions in smoke that can cause long term health problems for humans. Domestic burning of wood and coal has been identified by the Government as a major source of these emissions. Local Authorities are responsible for enforcing these regulations.

A summary of the changes/restrictions is provided below:

- The supply of **traditional house coal (bituminous coal)** has been **phased out**;
- The supply of **wet wood** in units up to 2 cubic metres has been **phased out**;
- **Smoke emissions limits** are introduced for **manufactured solid fuels**.
- **Only dry wood (Moisture content less the 20%)** can be sold in quantities of 2 cubic metres or less and has to show the ready to burn logo:

Air quality officers in Sefton have been engaging with businesses likely to sell solid fuels for domestic purposes and an advisory letter and leaflet has been sent to over 200 businesses in the Borough. Officers from Environmental Health and Trading Standards continue to undertake targeted inspections of the main suppliers to ensure compliance with the new regulations. It is envisaged that with these powers restricting the use of wet wood, phasing out of traditional house coal in preference to smokeless fuel, emissions of $PM_{2.5}$ will further reduce in the Borough.

Further information on the new regulations and the ready to burn scheme can be found on Sefton's smoke control website https://smokecontrolsefton.co.uk and via the HETAS website https://www.hetas.co.uk/

$PM_{2.5}$ Monitoring

Sefton monitored $PM_{2.5}$ at three locations in Sefton in 2022: Millers Bridge, Bootle, Regent Road, Crosby and Princess Way Station. The further expansion of Sefton's $PM_{2.5}$ monitoring capability will allow the determination of any trends across the south of the Borough, and develop site specific measures to work towards reducing emissions of this pollutant.The results of the $PM_{2.5}$ monitoring are discussed in more detail in Section 3.

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

This section sets out the monitoring undertaken within 2022 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 2018 and 2022 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Sefton Metropolitan Borough Council undertook automatic (continuous) monitoring at five sites during 2022. Monitoring at background location CM6 on Crosby Road South had to be decommissioned during 2022 due to the site being redeveloped as a car wash and car sales business. Officers are currently looking at options to relocate the monitoring equipment and this will be reported in future ASRs. Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. The Breathing Space sefton.gov.uk page presents automatic monitoring results for Sefton with general air quality data available via the UK-Air website https://uk-air.defra.gov.uk/.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 84 sites during 2022, this includes the deployment of two new sites in 2022. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

Individual Pollutants

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

3.1.3 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2022 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

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

Automatic Monitoring (NO_2)

All automatic monitoring sites within Sefton continue to show compliance to the AQS objective, additionally, none of the automatic monitoring sites reported 1-hour concentration exceedances more than 18 times/year of 200 µg/m^3.

Sites CM2 (Crosby Road North), CM3 (Millers Bridge) and CM5 (Hawthorne Road) have shown reductions in NO_2 levels compared to those observed in 2021 and currently show no indication that they are returning to pre pandemic levels observed in 2019.

CM4 (Princess Way) is the only site to report an increase from 2021 with concentrations over the past two years showing a rising trend. Notwithstanding this NO_2 levels at this location are still much reduced compared to those observed in 2018 and 2019.

Diffusion Tube Monitoring (NO_2)

During 2022, 78 diffusion tube sites reported a decrease and four reported increases in NO_2 levels when compared to 2021.

Notably there was only one exceedance of the annual mean NO_2 NAQS objective of 40 µg/m^3, this was at site ID BR Derby Road within the Millers Bridge AQMA with a NO_2 level of 41.0 µg/m^3. This was also the maximum concentration reported in 2022. As this site recorded a NO_2 annual mean concentration in exceedance of the air quality objective at a monitoring site which is not representative of public exposure, the concentration at the nearest receptor for this location was estimated using the distance correction via the Defra diffusion tube processing tool. This showed the estimated concentration of 38.6 µg/m^3 just below the NAQS objective.

The remaining sites reported NO_2 concentrations below the NAQS objective.

Four monitoring locations reported annual mean concentrations within 10% of the AQS objective and were subject to fall off with distance calculations:

- Site ID DO Hawthorne Road, Linacre Lane – 36.6 µg/m^3
    - Distance corrected (28.9 µg/m^3)
- Site ID GH A565 Rimrose Road– 38.1 µg/m^3
    - Distance corrected (30.5 µg/m^3)
- Site ID HB Breeze Hill – 36.5 µg/m^3
    - Distance corrected (29.7 µg/m^3)
- Site ID HC Breeze Hill – 36.5 µg/m^3
    - Distance corrected (22.8 µg/m^3)

Figure A.1 – Figure A.8 displays NO_2 concentration trends for the last 5 years, there is a general decreasing trend in all passive monitoring locations from 2018 to 2022. With a decrease in 78 this further supports the declining trend in concentrations and also further supports the positive effect changes in communting habits since COVID-19 has had on traffic concentrations across Sefton. Although there is an overall decrease, there is currently no intention to revoke any AQMA designations due to the COVID-19 affected years of 2020/2021.

No passive monitoring sites reported an annual mean NO_2 concentration greater than 60 µg/m^3 in 2022, 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, as per guidance provided in LAQM.TG(22).

Compliance with National Air Quality Standard objectives in current AQMA's

A summary of each AQMA with regards to NO_2 objective exceedance/compliance is discussed below.

AQMA 2 Princess Way, Seaforth.

- Similar to 2021 no exceedance of the NO_2 annual mean objective was observed in 2022 either at the automatic monitor or any diffusion tube site. All results in 2022 were within the NAQS objective with the highest level of 34.8 µg/m^3 observed at diffusion tube site ID: EY -Lathom Close. Compliance with the 1-hour mean objective was also achieved at this location. Levels in 2022 have decreased compared to 2021 and remain well below those observed pre covid.
- Whilst it is positive to see that current levels in this AQMA are within the NAQS, it is still unclear whether this trend will continue. There is still concern that increases in port related traffic will impact on pollution levels in this area and as such this AQMA is not being considered for revocation in the immediate future. All existing monitoring will continue in this AQMA also.

AQMA 3 Millers Bridge, Bootle.

- An exceedance of the NO_2 annual mean objective occurred in 2022 at 1 diffusion tube Site ID: BR Derby Road, Bootle with an annual mean of 41.0 µg/m^3 . As this site recorded a NO_2 annual mean concentration in exceedance of the air quality objective at a monitoring site which is not representative of public exposure, the concentration at the nearest receptor for this location was estimated using the distance correction via the Defra diffusion tube processing tool. This showed the estimated concentration of 38.6 µg/m^3 which is within the NAQS. All other monitoring locations showed levels of NO_2 below the NAQS in this AQMA.
- Levels in 2022 have fallen compared to 2021 and for the first time since monitoring began in this AQMA NO_2 Levels (when corrected for fall off with distance) were below the NAQS objective. Compliance with the 1 hour mean objective was again achieved at this location. Due to the uncertanties around the port expansion and the fact that this is the first time the NAQS objective has been met, this AQMA is not currently being considered for revocation.

AQMA 4 Waterloo.

- As in previous years no automatic NO_2 monitoring was undertaken within AQMA 4. Diffusion tube monitoring in 2022 has shown compliance with the NAQS objective at all monitoring locations. Overall levels have reduced compared to 2021 and remain well below those observed pre covid. The maximum monitored level in 2022 was Site ID: GM - South Road with an annual mean level of 32.9 µg/m^3
- Sefton is currently giving consideration to revoking AQMA4 due to ongoing compliance with the NAQS.

AQMA 5 Hawthorne Road, Litherland.

- Compliance with the NO_2 annual mean objective and 1-hour mean objective at the automatic monitoring location was achieved in 2022 at the automatic monitoring site. For the third conseutive year all diffusion tube monitoring locations in this AQMA also showed levels in compliance with the NAQS objective in 2022 with levels reducing compared to 2021.The highest level recorded in 2022 in this AQMA was site ID: DD -Hawthorne Road with a level of 34.3 µg/m^3. Due to the ongoing uncertanties around covid and unknown impact the port expansion will have on pollution levels in this area, this AQMA is not being considered for revocation in the immediate future.

3.1.4 Particulate Matter (PM_{10})

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

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

Compliance of both the annual mean PM_{10} AQS objective (40 µg/m^3) and 24-hour PM_{10} AQS objective (no more than 35 24-hourly concentrations greater than 50 µg/m^3) has been achieved in 2022 at all automatic monitoring locations.

Over the last 5 years of annual PM_{10} monitoring, concentrations have remained relatively stable at all monitoring locations. All sites underwent minimal changes from 2021, with a slight increase at CM3 (Millers Bridge), CM5 (Hawthorne Road) and CM7 (Regent Road)

of 0.4 µg/m^3, 2.8 µg/m^3 and 3.4 µg/m^3, and a minor reduction at CM4 (Lathom Close) of 0.4 µg/m^3.

The 24-hour mean PM_{10} monitoring for 2022 shows no exceedances of the 50 µg/m^3 AQS objective, which continues the same trend over the last 5 years of monitoring.

3.1.5 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 2022 all three automatic monitoring sites recorded $PM_{2.5}$ concentrations well below the $PM_{2.5}$ AQS target of 20 µg/m^3. There is a minor increase of 0.1 and 2.2 µg/m^3 from 2021 at CM3 (Millers Bridge) and CM7 (Regent Road), but overall, the annual mean concentrations remain relatively stable and consistent over the last five years. There is currently no LAQM air quality objective for $PM_{2.5}$, however concentrations continue to remain low and consistent.

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	332174.588	398483.273	NO_2; PM_{10}	NO	Chemiluminescence; Beta attenuation	4.49	4.11	1.8
CM3	Millers Bridge, Bootle.	Roadside	333772.36	394602.274	NO_2; PM_{10}; $PM_{2.5}$	YES AQMA 3	Chemiluminescence; FIDAS	6.23	8.68	1.8
CM4	Lathom Close, Princess Way, Seaforth.	Roadside	332648.508	396941.571	NO_2; PM_{10}; $PM_{2.5}$	YES AQMA 2	Chemiluminescence; FIDAS	10.63	3.81	1.8
CM5	Hawthorne Road, Litherland.	Roadside	333811.588	397518.585	NO_2; PM_{10}	YES AQMA 5	Chemiluminescence; Beta attenuation	13.84	7.04	1.8
CM6	Crosby RoadSouth,	Urban Background	332873.66	396549.21	NO_2; SO_2	NO	Chemiluminescence;	N/A	23.50	2.8
CM7	Regent Road	Urban Background	331643.192	399587.690	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

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)
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
DR	Crosby Road North, Waterloo	Roadside	332226	398231	NO_2	Yes AQMA2	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

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)
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
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

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)
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
GI	St Joans Close opp No.40	Roadside	333281	396027	NO_2	No	2.2	1.0	No	2.6
GJ	A565 Liverpool Road - Lighting	Kerbside	332088	399829	NO_2	No	4.0	0.6	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)
	column 120D									
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
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)
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	335394	397282	NO_2	No	10.5	1.9	No	2.5
HE	Ormskirk Road	Roadside	336639	399496	NO_2	No	7.4	0.9	No	2.5

Notes:

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

(2) N/A if not applicable.

Table A.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 2022 (%) (2)	2018	2019	2020	2021	2022
CM2	332175	398483	Roadside	98.3	98.3	37.6	32.8	25.9	30	25.1
CM3	333772	394602	Roadside	99.9	99.9	**41.6**	38.2	33.2	35	32.1
CM4	332649	396942	Roadside	94.2	94.2	**40.5**	**41.6**	31.7	32.9	33.8
CM5	333812	397519	Roadside	94.8	94.8	32.1	33.6	28	27.1	26.4
CM6	332874	396549	Urban Background	N/A	N/A	30.2	28.8	23.6	26	N/A

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

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

Notes:

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

Exceedances of the NO_2 annual mean objective of 40 µg/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 2022 (%) [2]	2018	2019	2020	2021	2022
BB	333510	397186	Roadside	100.0	100.0	28.0	26.6	22.0	24.2	21.4
BO	333847	394461	Roadside	92.3	92.3	32.0	29.9	25.1	27.6	24.6
BQ	333835	394572	Roadside	82.7	82.7	34.0	31.7	28.4	30.3	31.0
BR	333753	394552	Roadside	100.0	100.0	**57.0**	**50.5**	**41.3**	**46.0**	**41.0**
BS	333757	394622	Roadside	92.3	92.3	**43.0**	37.0	34.0	36.9	33.6
BV	333395	400863	Roadside	90.4	90.4	34.0	31.6	25.4	25.7	24.0
BW	332600	397021	Roadside	100.0	100.0	28.0	29.9	24.3	27.6	25.3
CI	333813	397514	Roadside	92.3	92.3	39.0	**40.8**	33.3	34.0	32.2
CJ	332204	398229	Roadside	100.0	100.0	39.0	38.0	32.1	35.0	32.5
CR	332511	397332	Roadside	100.0	100.0	32.0	31.6	24.3	27.1	23.9
CY	332981	396972	Roadside	100.0	100.0	29.0	27.0	23.0	25.4	21.8
DC	334339	395800	Kerbside	100.0	100.0	38.0	36.3	32.2	34.0	30.4
DD	333778	397534	Roadside	100.0	100.0	**44.0**	39.2	35.0	36.4	34.3
DE	333917	397575	Roadside	90.4	90.4	30.0	27.6	23.9	25.3	22.0
DF	333916	397506	Roadside	100.0	100.0	29.0	28.6	22.8	23.4	21.3
DH	332193	398193	Roadside	100.0	100.0	34.0	32.4	27.7	29.3	27.9
DI	332206	398187	Roadside	100.0	100.0	38.0	36.3	28.7	31.5	30.9
DO	334640	396399	Kerbside	92.3	92.3	**45.0**	**43.8**	35.4	38.9	36.6
DP	332793	396974	Kerbside	92.3	92.3	34.0	32.4	28.6	29.8	27.0
DQ	332791	396922	Roadside	82.7	82.7	33.0	29.2	25.7	28.6	25.8
DR	332226	398231	Roadside	100.0	100.0	37.0	34.6	30.2	32.7	30.3
DS	332134	398169	Roadside	76.9	76.9	34.0	31.0	25.7	29.1	27.2
DU	332196	398786	Roadside	100.0	100.0	36.0	33.3	27.3	29.6	28.2
DV	332341	400168	Roadside	80.8	80.8	**40.0**	36.6	29.5	32.9	30.2
DW	334572	397918	Roadside	92.3	92.3	34.0	32.6	25.5	27.9	23.4
DX	334738	395138	Roadside	100.0	100.0	36.0	35.2	28.2	31.8	28.3
DY	332250	398008	Kerbside	100.0	100.0	24.0	24.4	20.8	21.7	21.0
DZ	335394	397282	Roadside	100.0	100.0	35.0	32.7	26.4	28.1	27.1
EA	336639	399496	Roadside	100.0	100.0	29.0	26.3	21.5	23.1	20.7
EB	336592	399453	Roadside	100.0	100.0	36.0	30.4	26.1	28.8	25.1
EC	336539	399477	Roadside	90.4	90.4	37.0	32.4	24.6	27.6	28.5
EE	336572	399524	Roadside	100.0	100.0	35.0	36.0	24.7	29.5	27.2
EK	334782	395189	Roadside	100.0	100.0	35.0	37.0	28.4	31.3	27.9
EL	335265	394968	Kerbside	100.0	100.0	**44.0**	37.5	31.5	35.2	31.4

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
EN	333740	397561	Roadside	84.6	84.6	36.0	30.4	27.6	28.3	28.3
EO	333692	397615	Roadside	100.0	100.0	**40.0**	37.4	28.1	30.7	30.3
EP	333343	397210	Roadside	90.4	90.4	32.0	29.2	22.8	24.8	23.0
EQ	332611	396985	Roadside	80.8	80.8	38.0	32.3	27.4	28.5	27.7
ES	332712	397003	Roadside	100.0	100.0	33.0	30.8	23.6	25.4	24.0
EV	332650	396915	Kerbside	100.0	100.0	**42.0**	36.0	30.3	34.0	29.5
EW	332666	396822	Roadside	100.0	100.0	39.0	34.3	30.0	33.1	29.4
EY	332681	396949	Roadside	84.6	84.6	**42.0**	**40.5**	32.1	35.9	34.8
FB	334017	397317	Roadside	100.0	100.0	38.0	35.8	30.0	31.1	27.4
FC	334217	397663	Roadside	100.0	100.0	25.0	31.2	22.5	23.9	21.3
FD	334242	397713	Roadside	92.3	92.3	29.0	27.3	22.2	23.8	22.0
FE	334642	397923	Roadside	100.0	100.0	32.0	30.0	24.7	27.7	22.3
FF	334978	398171	Roadside	100.0	100.0	39.0	35.1	27.2	28.9	28.3
FH	334962	398134	Kerbside	100.0	100.0	**43.0**	**40.4**	31.9	34.2	31.6
FI	333280	395958	Roadside	100.0	100.0	38.0	38.1	32.0	36.2	31.6
FL	333701	397574	Kerbside	92.3	92.3	36.0	36.2	26.7	29.3	31.1
GA	333431	417166	Roadside	100.0	100.0	34.0	34.3	24.5	26.9	25.2
GB	333704	417415	Roadside	90.4	90.4	33.0	34.3	28.4	27.4	27.7
GC	332296	398268	Roadside	100.0	100.0	21.0	20.5	18.1	22.0	17.6
GD	332210	398338	Roadside	100.0	100.0	29.0	28.1	23.1	26.6	23.9
GE	332206	398369	Roadside	84.6	84.6	29.0	30.0	22.9	26.7	24.8
GF	335347	397500	Roadside	100.0	100.0	35.0	35.5	29.9	30.0	28.5
GG	333270	395967	Roadside	65.4	65.4	39.0	**40.9**	32.7	39.4	33.2
GH	333231	396069	Roadside	84.6	84.6	**48.0**	**47.0**	38.6	**40.6**	38.1
GI	333281	396027	Roadside	30.8	30.8	33.0	30.7	25.5	27.2	25.8
GJ	332088	399829	Kerbside	90.4	90.4	34.0	33.5	26.1	32.1	29.5
GK	333669	394912	Roadside	92.3	92.3	-	37.1	31.6	35.0	32.7
GL	333110	397072	Roadside	92.3	92.3	-	29.2	24.8	26.4	24.0
GM	332189	398210	Roadside	100.0	100.0	-	39.9	33.9	35.2	33.0
GN	333326	400772	Roadside	100.0	100.0	-	31.9	26.1	29.0	26.8
GO	334204	395749	Roadside	92.3	92.3	-	34.6	26.7	32.5	29.2
GP	332681	396776	Roadside	100.0	100.0	-	36.9	28.7	31.2	30.8
GQ	330706	398904	Roadside	92.3	92.3	-	21.7	16.1	18.5	17.7
GR	339201	402503	Roadside	100.0	100.0	-	-	16.7	17.7	16.0
GS	338710	401571	Kerbside	92.3	92.3	-	-	13.7	14.4	14.1
GT	333736	394597	Roadside	90.4	90.4	-	-	36.9	38.2	35.6

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 2022 (%) (2)	2018	2019	2020	2021	2022
GU	333784	394596	Roadside	92.3	92.3	-	-	35.5	36.2	32.9
GV	337537	401542	Roadside	100.0	100.0	-	-	23.7	25.6	22.4
GW	337499	401552	Roadside	92.3	92.3	-	-	22.8	24.2	23.1
GX	340334	401214	Kerbside	92.3	92.3	-	-	19.6	21.3	18.7
GY	329188	406600	Roadside	100.0	100.0	-	-	14.0	18.0	13.1
GZ	332988	415800	Roadside	100.0	100.0	-	-	14.6	15.6	13.8
HA	337295	400874	Roadside	100.0	100.0	-	-	-	19.2	17.8
HB	335137	394996	Roadside	75.0	75.0	-	-	-	**41.5**	36.5
HC	335267	394995	Roadside	100.0	100.0	-	-	-	**40.2**	36.5
HD	335394	397282	Roadside	100.0	100.0	-	-	-	-	21.8
HE	336639	399496	Roadside	100.0	100.0	-	-	-	-	24.4
UK 2	334799	398065	Roadside	100.0	100.0	28.0	27.5	22.2	21.4	20.8
UK 4	332171	398547	Kerbside	100.0	100.0	36.0	34.4	24.8	29.7	26.7
W	332982	397022	Roadside	100.0	100.0	30.0	31.3	27.3	27.9	24.5

☒ **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 40 µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60 µg/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 (Princess Way)

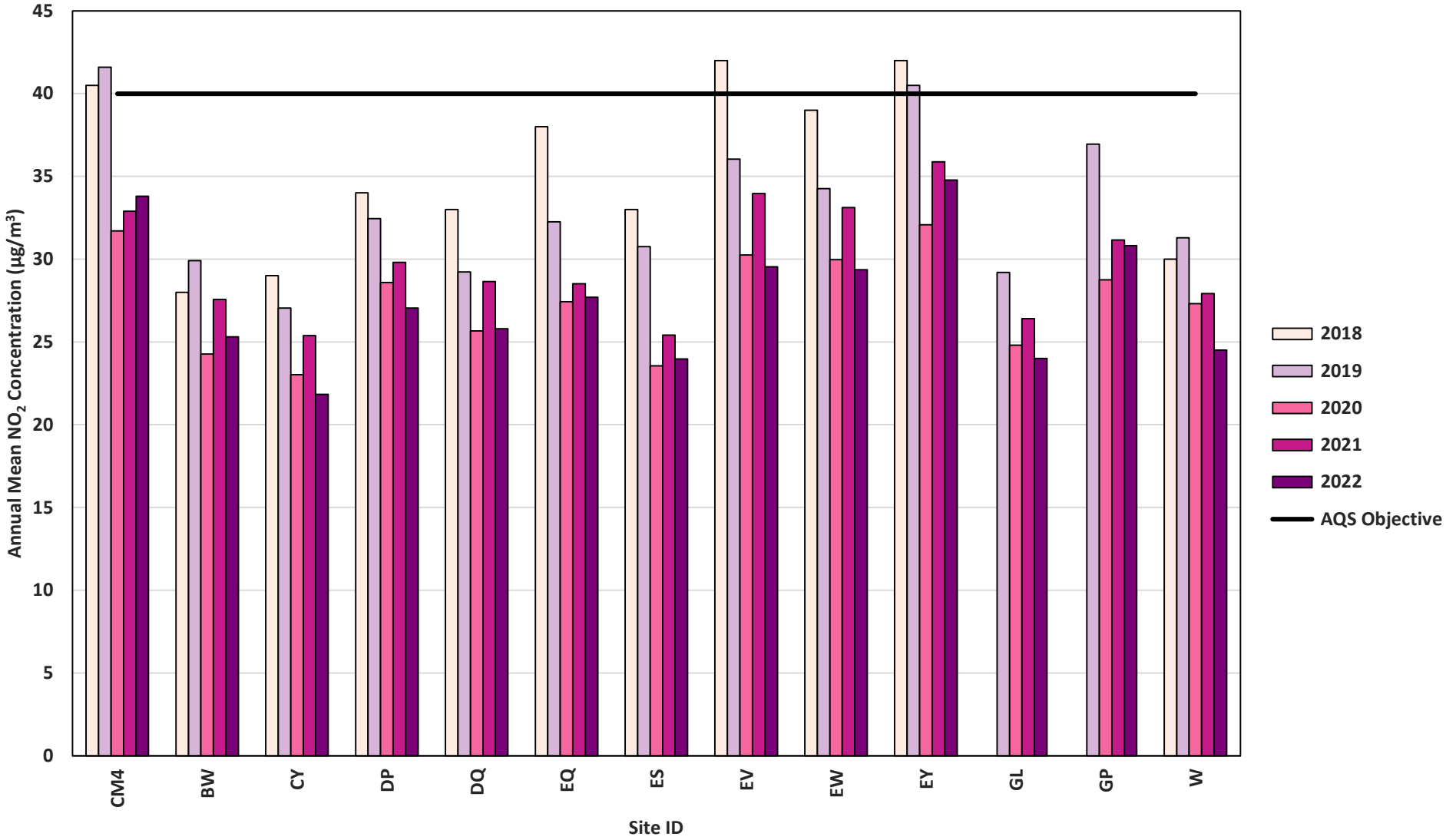


Figure A.2 – Trends in Annual Mean NO_2 Concentrations within AQMA 3 (Millers Bridge)

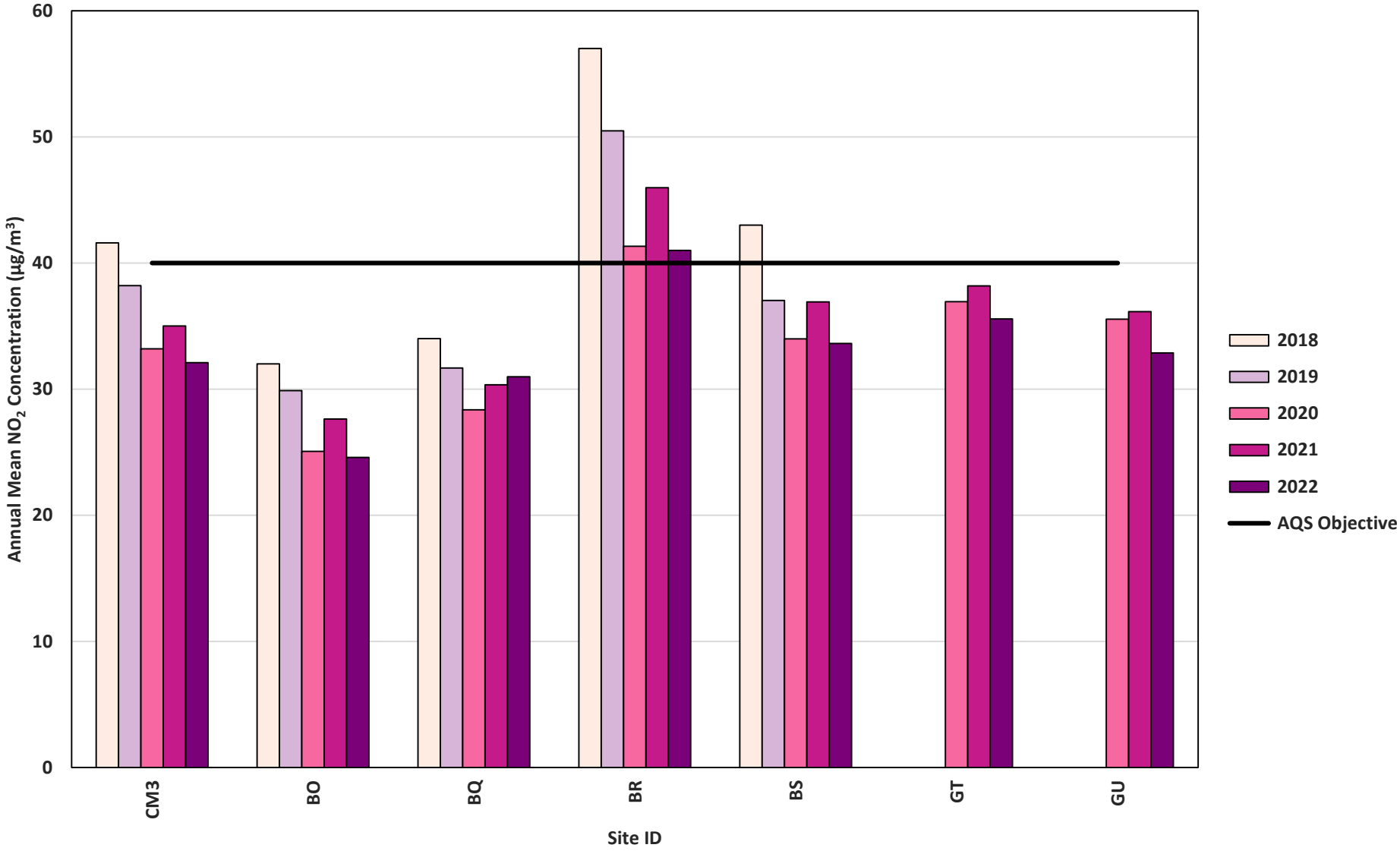


Figure A.3 – Trends in Annual Mean NO_2 Concentrations within AQMA 4 (South Road)

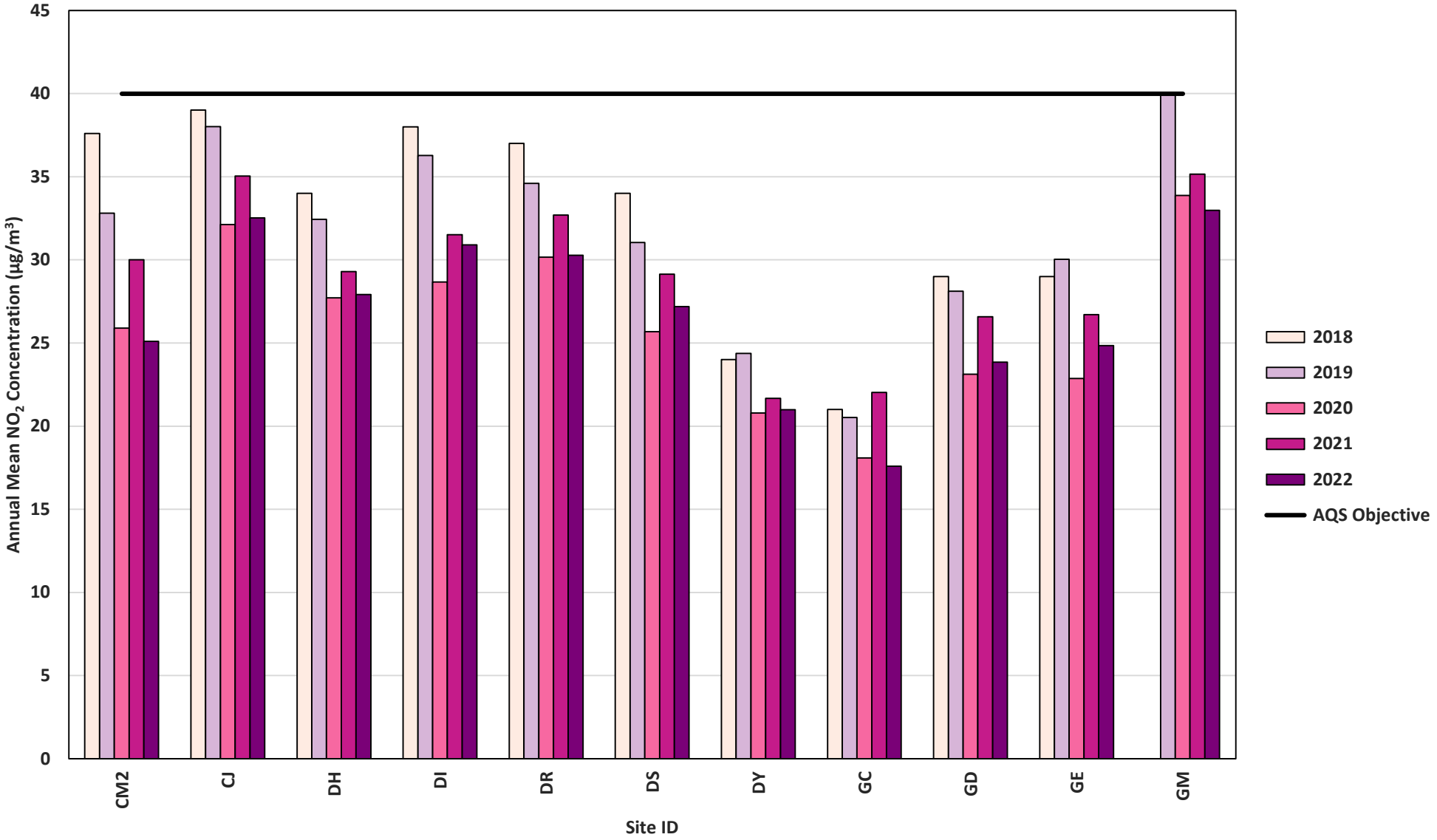


Figure A.4 – Trends in Annual Mean NO_2 Concentrations within AQMA 5 (Hawthorne Road)

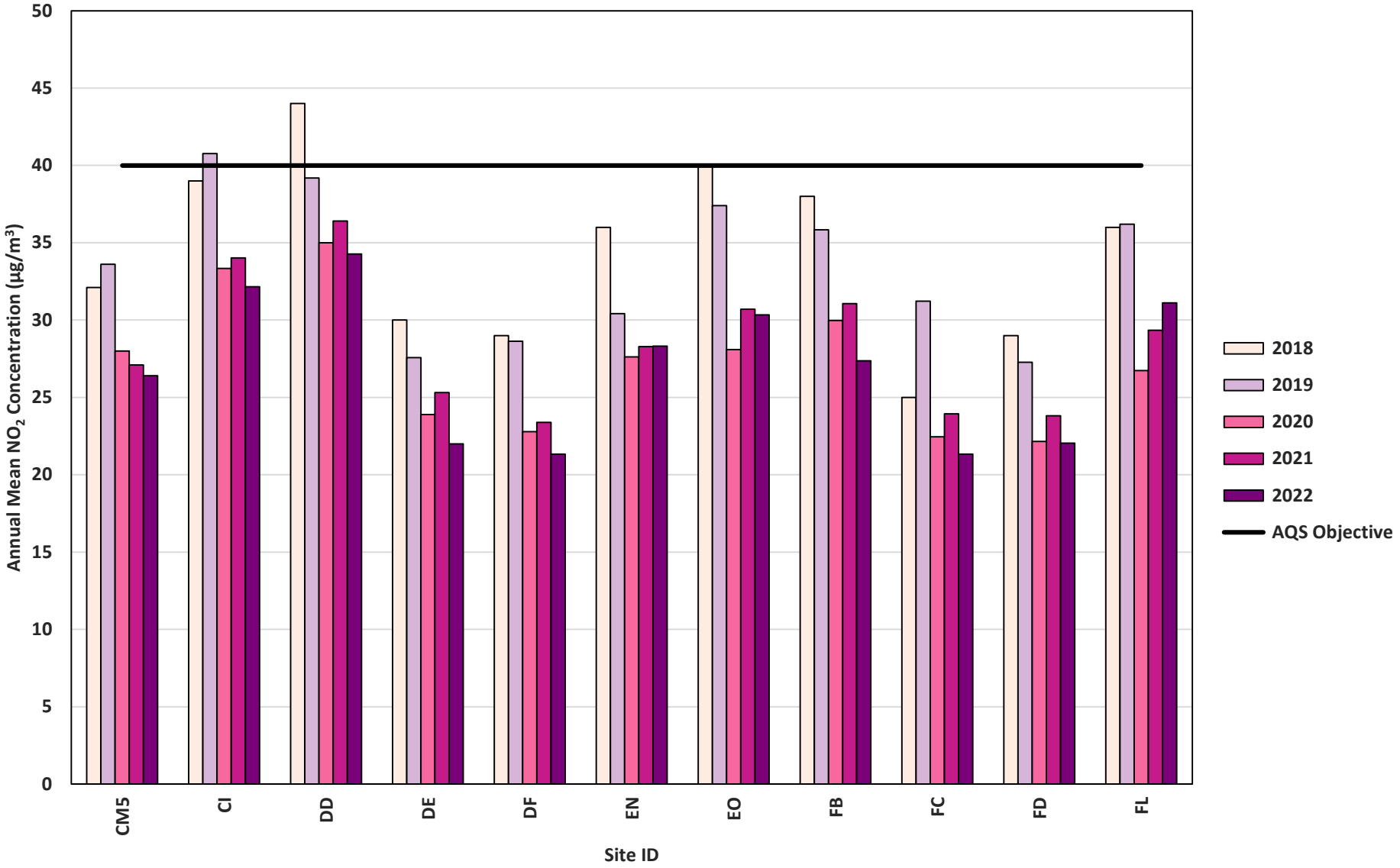


Figure A.5 – Trends in Annual Mean NO_2 Concentrations within Bootle (South Sefton)

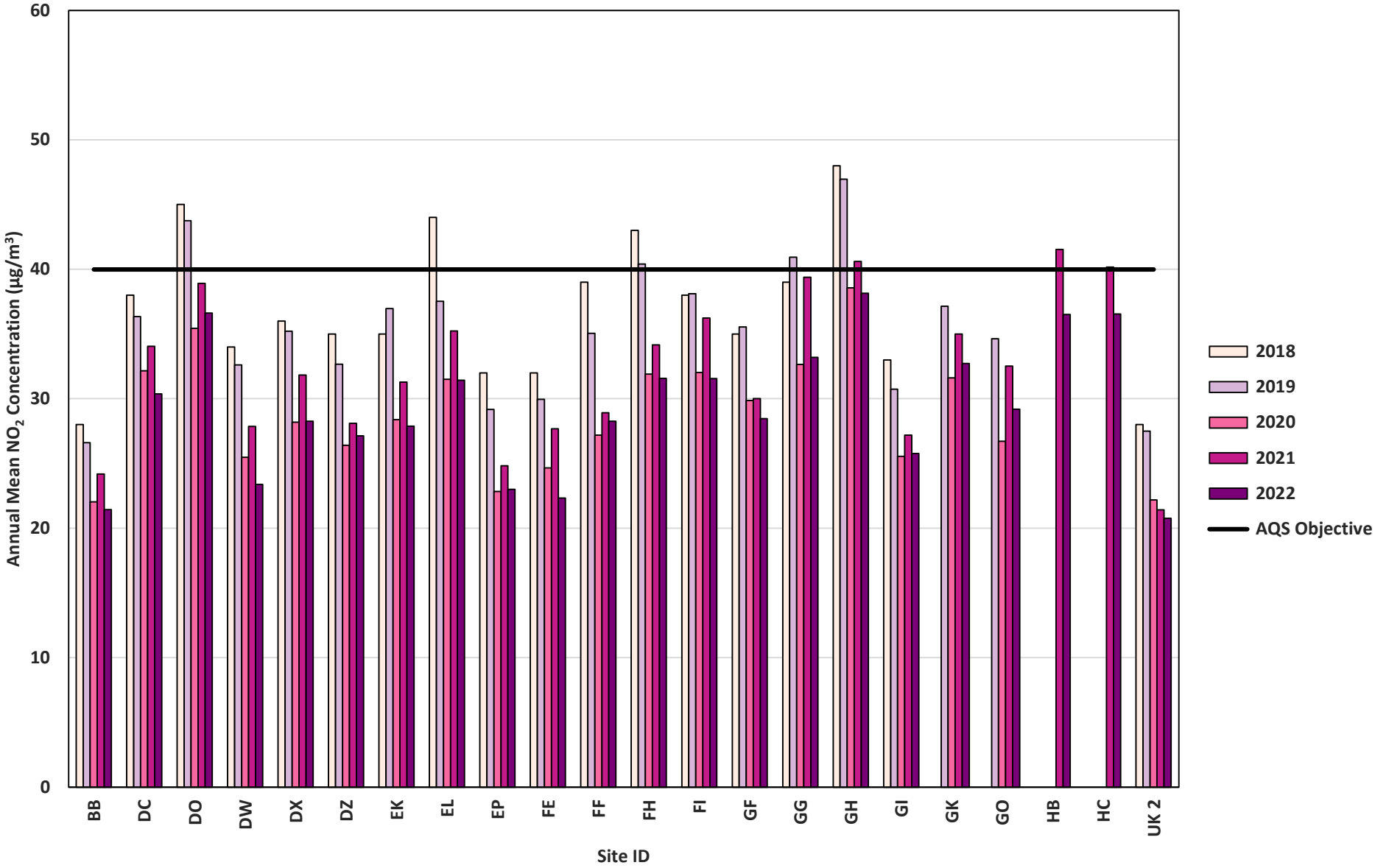


Figure A.6 – Trends in Annual Mean NO_2 Concentrations within Crosby (Central Sefton)

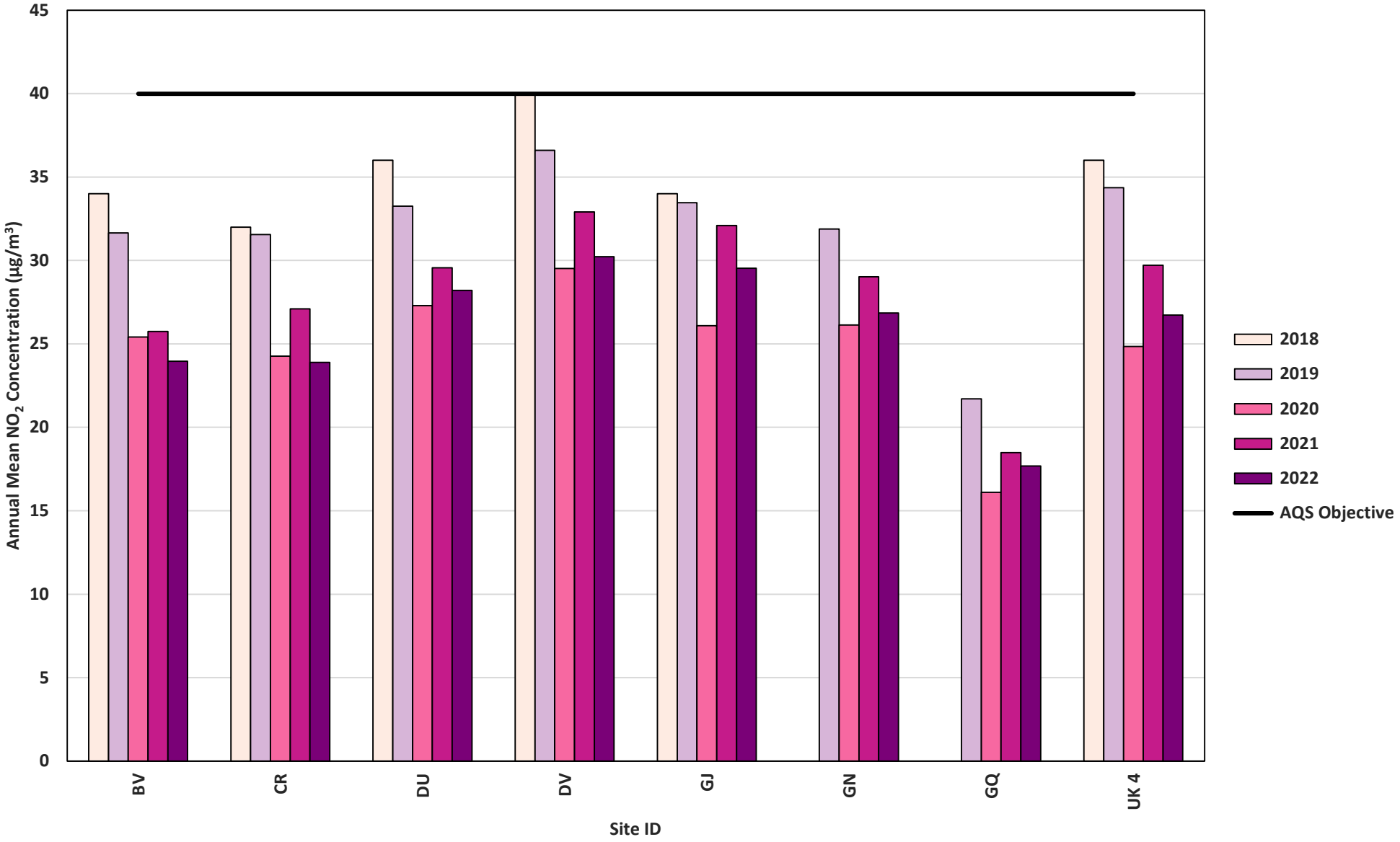


Figure A.7 – Trends in Annual Mean NO_2 Concentrations within Maghull/ Netherton (East Sefton)

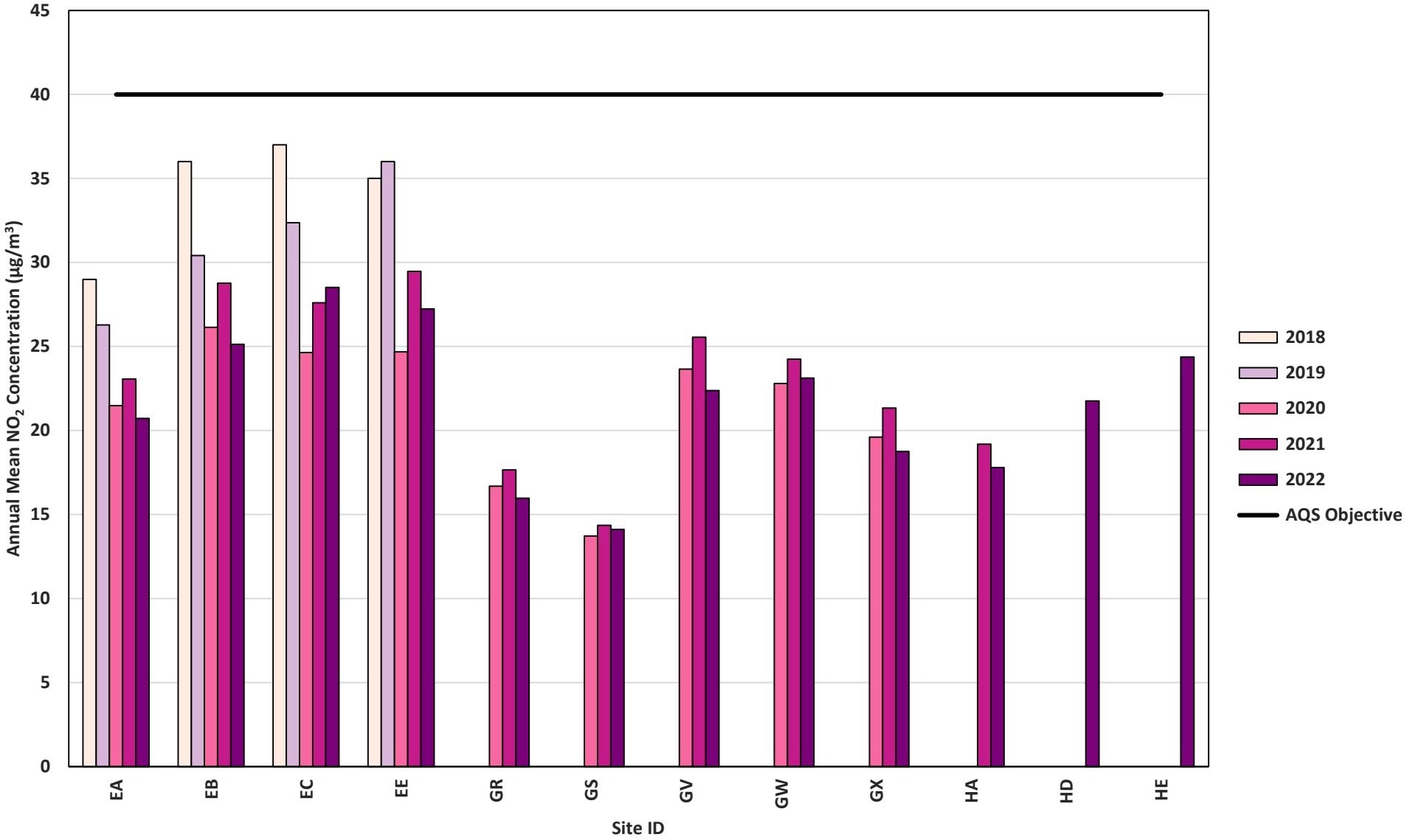


Figure A.8 – Trends in Annual Mean NO_2 Concentrations within Southport/ Formby (North Sefton)

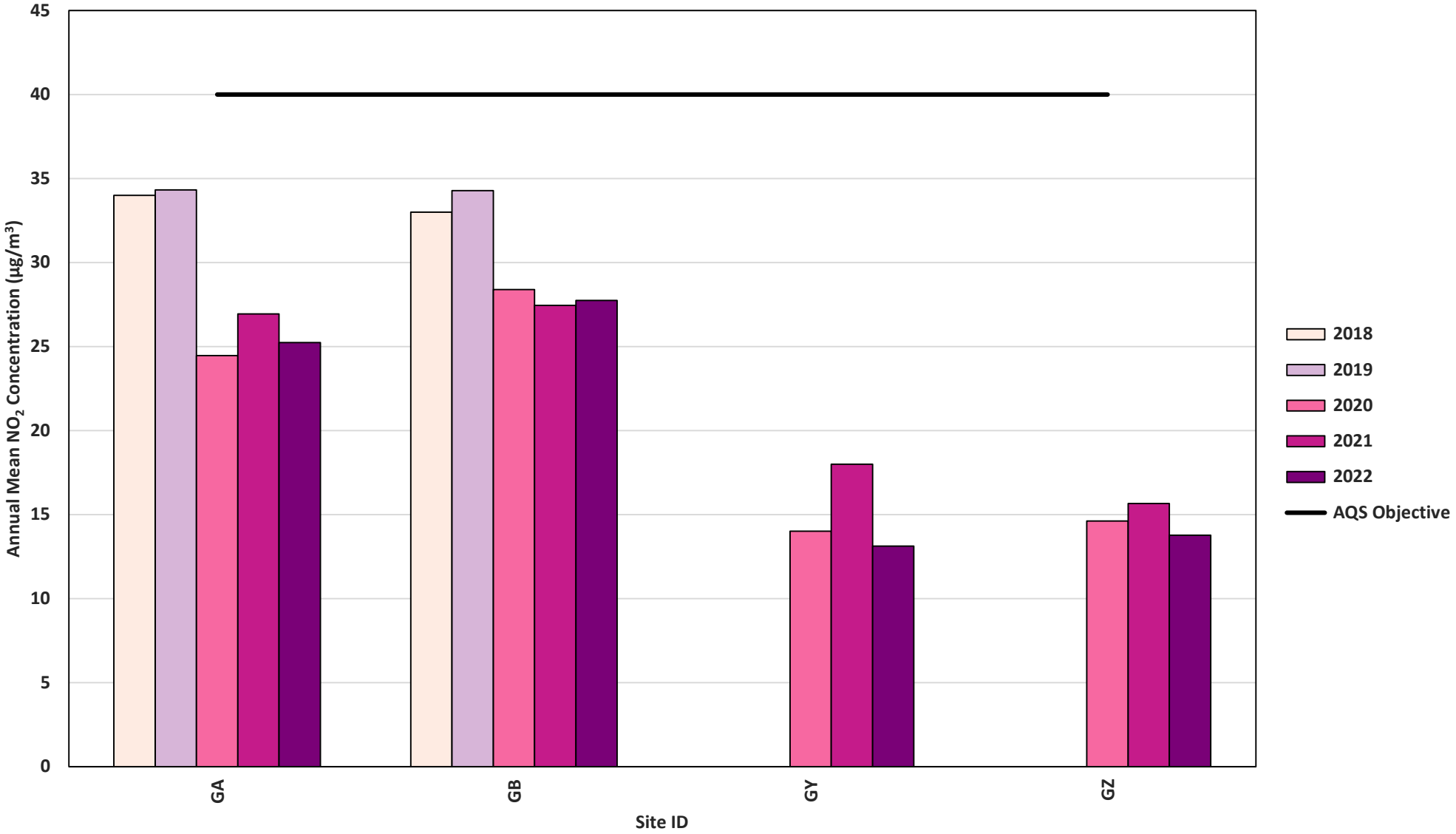


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
CM2	332175	398483	Roadside	98.3	98.3	0(113)	0(127)	0	0	0
CM3	333772	394602	Roadside	99.9	99.9	0	0	0	0	0
CM4	332649	396942	Roadside	94.2	94.2	0	0	0	0	0
CM5	333812	397519	Roadside	94.8	94.8	0(105)	0	0	0	0
CM6	332874	396549	Urban Background	N/A	N/A	0	0	0	0	-

Notes:

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

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

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

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

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

Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
CM2	332175	398483	Roadside	94.6	94.6	19.9	26.2	N/A	N/A	26.5
CM3	333772	394602	Roadside	88.8	88.8	20.1	17.6	16.1	19.5	19.9
CM4	332649	396942	Roadside	66.9	66.9	22.6	16.9	20	17.5	17.2
CM5	333812	397519	Roadside	99.9	99.9	23.7	23.7	20.3	18.7	21.5
CM6	332874	396549	Urban Background	N/A	N/A	21.2	N/A	N/A	N/A	N/A
CM7	331643	399588	Urban Background	93.4	93.4	N/A	N/A	13.2	9.5	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 µg/m^3.

Exceedances of the PM_{10} annual mean objective of 40 µg/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.1 – Trends in Annual Mean PM_{10} Concentrations

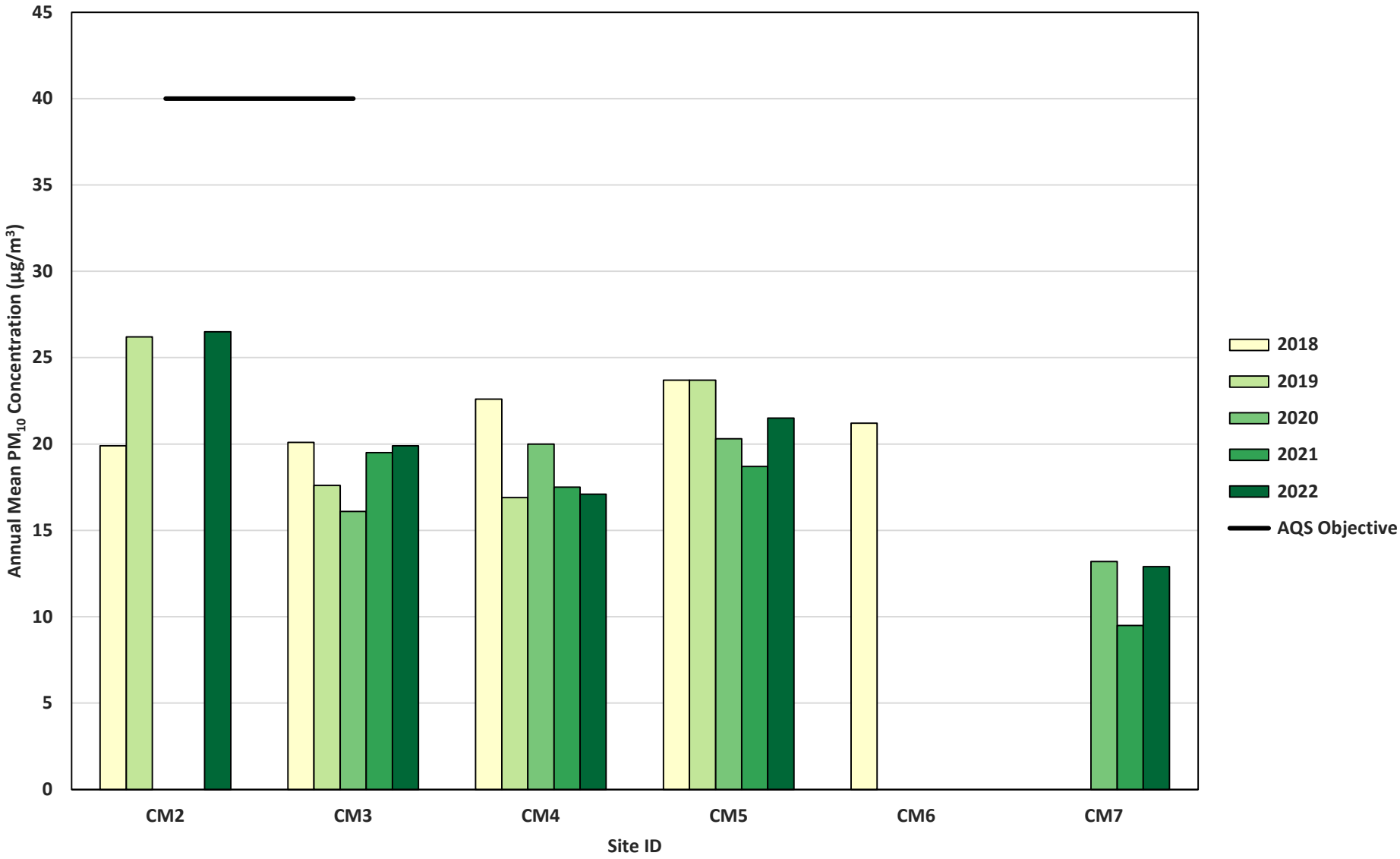


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
CM2	332175	398483	Roadside	94.6	94.6	1(32)	1(35)	-	-	5
CM3	333772	394602	Roadside	88.8	88.8	1(25)	1(27)	2	3	6
CM4	332649	396942	Roadside	66.9	66.9	3	1(28)	1	2	7(29)
CM5	333812	397519	Roadside	99.9	99.9	3(33)	10	1	2	7
CM6	332874	396549	Urban Background	N/A	N/A	6(33)	-	-	-	-
CM7	331643	399588	Urban Background	93.4	93.4	N/A	N/A	0(18)	0	3

Notes:

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

Exceedances of the PM_{10} 24-hour mean objective (50 µg/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.2 – Trends in Number of 24-Hour Mean PM_{10} Results > 50 µg/m³

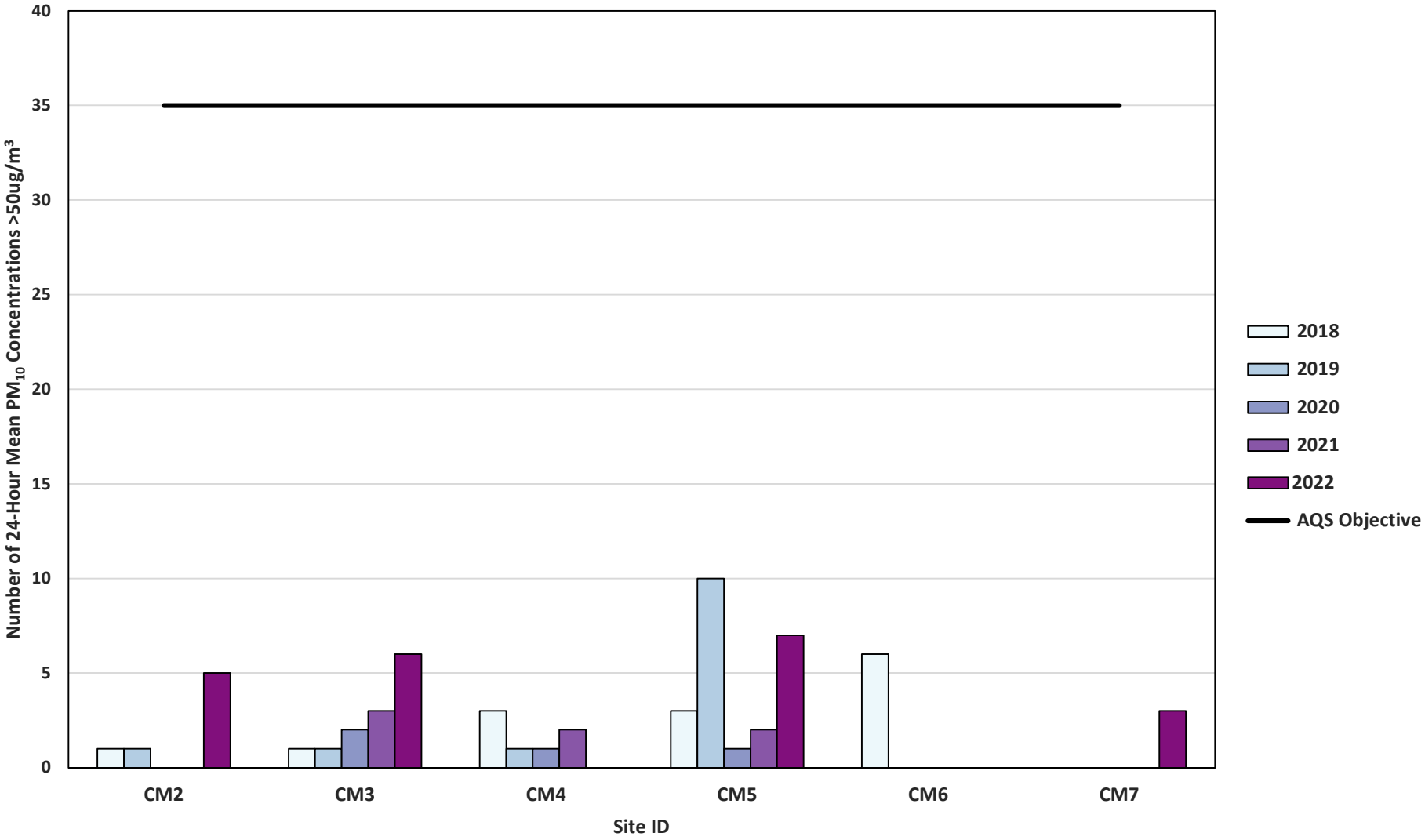


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
CM3	333772	394602	Roadside	88.8	88.8	8.9	10.2	8.3	9.6	9.7
CM4	332649	396942	Roadside	66.3	66.3	N/A	N/A	N/A	N/A	9.5
CM7	331643	399588	Urban Background	94.5	94.5	N/A	N/A	7.3	5.9	8.1

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

Notes:

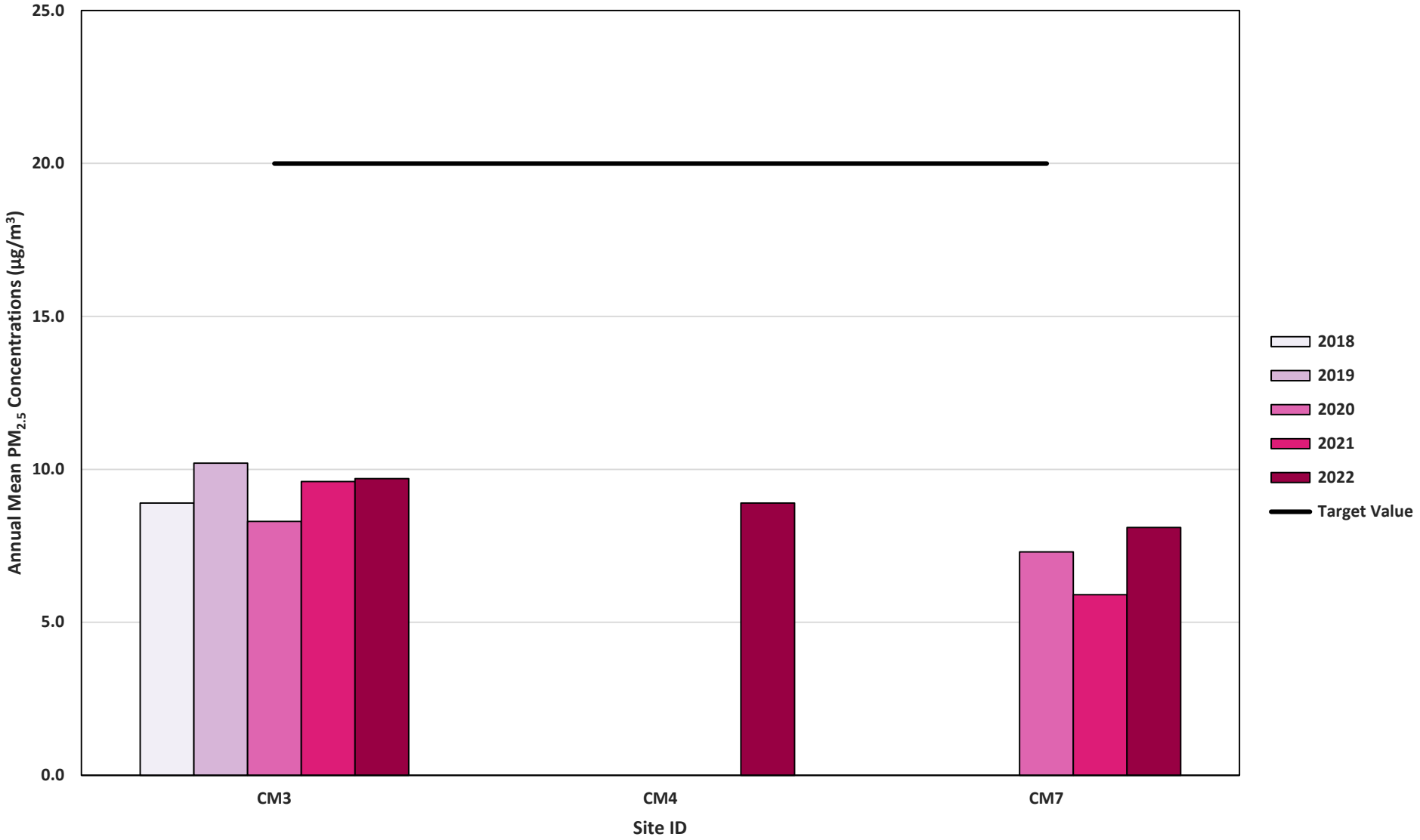
The annual mean concentrations are presented as µg/m^3.

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



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 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	24.3	32.6	24.7	20.3	19.6	23.4	22.0	25.4	25.0	29.9	36.6	26.4	21.4		
BO	333847	394461	39.5	-	34.5	24.0	23.4	25.6	28.1	27.7	28.2	31.0	35.8	35.5	30.3	24.6		
BQ	333835	394572	43.1	32.7	34.7	32.9	-	52.6	-	54.8	29.7	30.0	34.4	37.0	38.2	31.0		
BR	333753	394552	64.6	53.1	49.4	47.3	47.7	51.3	51.7	51.1	48.1	44.5	49.3	48.4	50.5	41.0	38.6	
BS	333757	394622	47.2	-	46.3	41.8	36.7	37.4	40.0	39.0	37.4	42.0	44.6	43.4	41.4	33.6		
BV	333395	400863	36.4	26.0	38.5	-	22.5	21.7	24.2	25.4	28.9	30.5	36.3	34.5	29.5	24.0		
BW	332600	397021	38.7	30.7	37.3	27.6	27.0	24.1	28.4	25.1	26.7	31.4	38.8	38.6	31.2	25.3		
CI	333813	397514	45.7	36.7	48.4	33.8	34.7	31.7	36.9	-	36.0	40.3	46.2	45.7	39.6	32.2		
CJ	332204	398229	45.2	33.3	44.7	39.6	34.4	35.4	34.7	39.0	43.3	40.9	47.1	43.3	40.1	32.5		
CR	332511	397332	39.6	30.3	36.1	22.1	25.0	23.2	25.3	24.5	25.0	29.5	37.8	34.9	29.4	23.9		
CY	332981	396972	34.9	28.2	32.1	25.1	22.8	18.7	22.9	19.8	23.3	26.0	33.9	35.3	26.9	21.8		
DC	334339	395800	46.1	36.0	37.2	34.6	31.3	32.8	34.6	37.9	38.3	37.0	40.1	43.3	37.4	30.4		
DD	333778	397534	45.7	40.1	52.0	34.5	38.2	36.6	38.2	29.9	39.0	47.9	53.6	51.4	42.2	34.3		
DE	333917	397575	34.2	26.8	35.7	23.6	22.1	18.0	22.3	19.1	21.8	-	35.1	39.4	27.1	22.0		
DF	333916	397506	34.5	26.8	32.5	24.1	21.2	19.6	22.9	20.9	22.2	25.4	29.0	36.5	26.3	21.3		
DH	332193	398193	37.5	29.1	43.6	31.0	31.0	27.2	26.8	28.9	30.9	40.5	43.9	42.6	34.4	27.9		
DI	332206	398187	44.3	37.9	41.6	34.6	33.8	34.0	32.2	34.9	35.1	40.3	43.8	44.5	38.1	30.9		
DO	334640	396399	50.7	43.5	46.4	47.1	38.8	-	38.1	40.6	41.7	45.1	51.7	52.6	45.1	36.6	28.9	
DP	332793	396974	42.1	-	43.7	29.7	28.8	25.3	30.1	25.0	26.0	34.3	40.1	41.6	33.3	27.0		
DQ	332791	396922	41.3	-	35.5	27.0		25.8	29.3	29.3	27.7	31.2	31.6	39.5	31.8	25.8		
DR	332226	398231	39.2	36.3	46.4	34.2	33.6	34.4	31.8	30.2	34.9	38.6	44.2	44.0	37.3	30.3		
DS	332134	398169	39.4	27.3	41.4	32.7	24.7	28.2	-	-	-	29.9	36.8	41.3	33.5	27.2		
DU	332196	398786	42.3	32.1	39.9	30.5	28.1	31.0	29.9	31.6	32.3	37.4	41.6	40.3	34.8	28.2		
DV	332341	400168	43.8	31.3	41.3	-	-	30.8	32.5	36.0	38.3	34.2	39.3	45.1	37.3	30.2		
DW	334572	397918	38.6	27.3	40.8	26.7	20.0	18.3	21.2	25.1	27.4	29.7	-	42.0	28.8	23.4		
DX	334738	395138	47.8	31.1	44.6	32.3	29.5	26.4	30.7	29.1	31.2	32.0	39.0	44.5	34.8	28.3		
DY	332250	398008	30.2	20.5	39.2	24.3	18.4	16.5	20.2	22.4	25.7	26.3	32.3	34.6	25.9	21.0		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DZ	335394	397282	43.1	30.4	39.3	36.0	25.7	21.7	26.6	27.5	31.3	35.1	39.9	44.6	33.4	27.1		
EA	336639	399496	35.0	27.6	30.9	21.4	19.5	19.9	22.0	21.4	22.0	25.0	30.5	31.2	25.5	20.7		
EB	336592	399453	32.9	27.8	36.5	29.6	25.6	26.9	28.3	30.7	33.0	27.5	34.8	38.2	31.0	25.1		
EC	336539	399477	34.2	25.2	42.4	-	54.0	19.8	22.6	29.6	30.8	36.9	46.2	45.2	35.2	28.5		
EE	336572	399524	35.1	26.3	45.5	34.8	23.8	21.0	24.5	33.7	30.0	36.6	41.9	49.6	33.6	27.2		
EK	334782	395189	46.1	34.1	43.6	34.9	29.6	26.3	29.0	23.2	24.3	35.6	39.9	45.9	34.4	27.9		
EL	335265	394968	51.2	37.2	40.5	44.1	33.7	36.2	35.8	40.4	37.9	30.6	37.2	40.0	38.7	31.4		
EN	333740	397561	37.9	-	45.3	30.6	28.6	27.4	-	27.2	30.8	35.1	44.0	42.1	34.9	28.3		
EO	333692	397615	40.7	33.9	49.4	37.2	32.2	28.3	32.3	29.6	38.1	40.7	41.9	44.6	37.4	30.3		
EP	333343	397210	25.0	26.2	39.5	26.7	-	19.5	23.2	21.5	22.9	31.3	37.9	38.1	28.4	23.0		
EQ	332611	396985	38.2	33.1	47.7	-	-	18.9	28.6	26.7	28.5	35.1	41.4	43.3	34.1	27.7		
ES	332712	397003	33.6	30.2	36.7	25.0	22.8	26.3	24.7	20.9	22.0	32.5	37.9	42.1	29.5	24.0		
EV	332650	396915	44.6	37.7	44.4	36.2	27.0	32.5	33.4	34.2	32.5	32.3	38.1	44.0	36.4	29.5		
EW	332666	396822	45.3	36.8	43.0	26.0	31.8	27.4	35.3	31.8	34.1	39.1	41.8	41.7	36.2	29.4		
EY	332681	396949	47.3	-	-	65.6	38.6	28.2	38.7	35.5	36.9	43.5	46.8	47.5	42.9	34.8		
FB	334017	397317	43.2	35.7	40.1	26.0	23.6	19.4	30.6	29.0	28.8	37.1	44.0	47.2	33.7	27.4		
FC	334217	397663	33.1	26.6	30.9	23.3	18.6	25.2	21.6	21.5	23.1	24.7	28.9	38.2	26.3	21.3		
FD	334242	397713	33.2	26.7	34.6	24.5	21.1	20.6	21.2	-	21.3	26.6	31.0	38.0	27.2	22.0		
FE	334642	397923	38.6	26.7	30.5	26.9	20.1	35.7	21.1	23.3	22.7	23.3	27.8	33.2	27.5	22.3		
FF	334978	398171	40.5	26.8	46.0	35.4	24.8	37.1	25.5	30.3	28.8	34.6	44.0	44.5	34.8	28.3		
FH	334962	398134	49.3	30.4	43.4	38.9	33.5	31.4	34.1	40.1	38.7	37.6	44.4	45.4	38.9	31.6		
FI	333280	395958	53.5	39.4	40.9	30.7	36.1	37.4	36.7	34.5	35.5	41.8	40.9	39.4	38.9	31.6		
FL	333701	397574	39.7	28.2	48.2	36.2	27.9	22.6	-	50.8	36.6	37.5	43.3	50.8	38.3	31.1		
GA	333431	417166	37.0	26.4	37.6	32.3	27.5	22.5	28.1	30.8	35.8	26.7	31.6	36.9	31.1	25.2		
GB	333704	417415	35.8	31.6	38.5	29.9	30.5	25.8	31.3	30.5	34.9	-	39.1	48.1	34.2	27.7		
GC	332296	398268	33.3	22.7	27.7	18.0	14.9	14.4	15.8	23.0	15.5	21.8	26.6	26.4	21.7	17.6		
GD	332210	398338	35.1	28.2	39.7	26.1	21.0	24.0	23.4	22.9	28.5	31.2	36.9	35.9	29.4	23.9		
GE	332206	398369	32.1	26.0	41.5	28.6	22.2	22.2	-	-	29.2	29.8	37.0	37.6	30.6	24.8		
GF	335347	397500	44.4	34.6	36.9	30.9	30.1	29.6	30.3	30.2	35.3	37.1	39.5	42.1	35.1	28.5		
GG	333270	395967	58.8	41.2	47.5	41.8	-	-	-	32.4	39.7	-	47.6	49.1	44.8	33.2		
GH	333231	396069	63.4	-	48.2	43.8	40.6	43.3	-	41.5	46.8	44.1	46.9	51.4	47.0	38.1	30.5	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
GI	333281	396027	42.2	31.6	33.1	-	-	-	-	-	-	-	36.2	-	35.8	25.8		
GJ	332088	399829	46.7	34.2	40.8	33.8	32.7	32.4	29.8	29.1	36.7	38.5	45.7	-	36.4	29.5		
GK	333669	394912	53.1	36.5	45.1	33.7	36.4	-	35.9	36.1	32.8	41.1	46.3	46.7	40.3	32.7		
GL	333110	397072	38.0	29.7	31.0	27.4	25.4	23.6	26.2	-	23.4	29.3	33.4	37.9	29.6	24.0		
GM	332189	398210	49.0	38.6	49.7	42.2	33.4	34.1	30.4	34.6	37.5	45.8	44.7	47.6	40.6	33.0		
GN	333326	400772	38.5	28.5	39.1	31.4	27.8	25.4	28.2	28.8	34.9	33.5	39.9	41.1	33.1	26.8		
GO	334204	395749	41.5	34.0	44.8	36.8	29.2	25.8	-	29.9	32.6	36.2	39.9	45.0	36.0	29.2		
GP	332681	396776	50.7	37.8	45.5	30.9	34.1	31.7	35.0	32.7	32.4	35.5	46.9	42.6	38.0	30.8		
GQ	330706	398904	24.2	16.4	35.5	17.0	13.0	11.3	16.3	-	16.9	23.0	32.0	34.1	21.8	17.7		
GR	339201	402503	26.0	17.9	25.2	16.0	15.1	11.2	15.2	15.8	17.0	21.7	24.7	30.6	19.7	16.0		
GS	338710	401571	22.0	15.9	26.6	15.3	10.4	8.8	12.8	13.8	15.4	21.8	-	28.7	17.4	14.1		
GT	333736	394597	49.1	41.4	52.9	43.4	31.7	32.7	43.0	39.7	46.3	-	50.4	51.7	43.8	35.6		
GU	333784	394596	49.4	-	44.9	35.9	37.8	36.6	39.6	39.5	35.5	38.9	45.3	42.2	40.5	32.9		
GV	337537	401542	33.0	23.7	29.8	24.9	22.0	23.9	25.3	25.4	26.3	29.6	33.2	34.1	27.6	22.4		
GW	337499	401552	35.3	-	28.6	23.1	25.1	22.8	25.1	24.5	28.4	29.2	35.1	36.4	28.5	23.1		
GX	340334	401214	29.4	19.9	27.2	22.4	16.4	17.1	18.8	21.2	-	23.0	26.7	32.2	23.1	18.7		
GY	329188	406600	22.1	14.5	21.8	17.4	11.2	10.3	14.1	15.9	17.4	16.9	20.3	12.4	16.2	13.1		
GZ	332988	415800	22.3	14.0	22.1	14.8	11.2	8.9	12.9	14.1	15.7	16.8	21.0	29.7	17.0	13.8		
HA	337295	400874	26.1	18.5	32.8	22.4	14.8	12.7	15.0	17.6	17.7	23.7	28.9	33.0	21.9	17.8		
HB	335137	394996	56.4	44.9	54.9	45.2	36.0	40.8	40.4	-	42.1	44.3	-	-	45.0	36.5	29.7	
HC	335267	394995	61.3	45.7	52.4	39.2	39.3	41.3	38.9	38.2	34.5	43.2	56.1	50.3	45.0	36.5		
HD	336691	398032	31.6	21.0	36.1	25.7	18.3	17.3	21.7	23.9	25.6	28.0	33.8	39.0	26.8	21.8		
HE	337091	399333	37.9	28.6	34.2	27.0	25.4	21.5	25.2	24.5	26.5	33.1	38.4	38.4	30.0	24.4		
UK 2	334799	398065	31.6	24.0	34.7	22.2	19.7	16.8	18.9	21.3	21.3	27.1	31.8	37.8	25.6	20.8		
UK 4	332171	398547	35.7	28.4	41.4	32.1	24.0	28.8	29.5	28.0	33.1	32.5	41.1	40.6	32.9	26.7		
W	332982	397022	39.8	35.5	40.2	25.8	22.1	21.4	26.0	21.6	20.9	27.9	38.7	42.6	30.2	24.5		

☒ **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 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

NO_2 annual means exceeding 60 µg/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 2022

Sefton Metropolitan Borough Council has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by Sefton Metropolitan Borough Council During 2022

Sefton Metropolitan Borough Council has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

Sefton 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 in 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 2022 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 GG and GI recorded data captures of 66.7% and 33.3% in 2022, therefore required annualisation. Annualisation was completed using version 2.0 of the 'Diffusion Tube Data Processing Tool'. Four continuous background monitoring locations were used:

- St Helens Linkway;
- Widnes Milton Road;
- Blackburn Accrington Road; and,
- Bradford Mayo Avenue.

All monitoring stations are located outside the 50-mile radius due to no AURN sites within the preferred radius. Four continuous background monitoring sites were applicable to use as they all had >85% data capture and therefore could be used for annualisation. presents the annualisation summary, taken from the 'Diffusion Tube Data Processing Tool'. 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 St Helens Linkway	Annualisation Factor Widnes Milton Road	Annualisation Factor Blackburn Accrington Road	Annualisation Factor Bradford Mayo Avenue	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
GG	0.9130	0.9233	0.9100	0.9109	0.9143	44.8	40.9
GI	0.8331	0.8809	0.8581	0.9796	0.8879	35.8	31.7

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 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 local bias adjustment factor of 0.81 to the 2022 monitoring data as opposed to the national due to locality. A summary of bias adjustment factors used by Sefton Metropolitan Borough Council over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	Local	-	0.81
2021	Local	-	0.87
2020	National	06/21	0.81
2019	National	09/20	0.91
2018	National	06/19	0.93

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4
Periods used to calculate bias	12	12	12	11
Bias Factor A	0.77 (0.71 - 0.84)	0.79 (0.69 - 0.91)	0.91 (0.84 - 0.99)	0.8 (0.74 - 0.87)
Bias Factor B	30% (19% - 42%)	27% (10% - 44%)	10% (1% - 20%)	26% (15% - 36%)
Diffusion Tube Mean (µg/m^3)	32.8	33.3	35.7	42.5
Mean CV (Precision)	3.7%	3.9%	4.0%	3.3%
Automatic Mean (µg/m^3)	25.2	26.3	32.3	33.8
Data Capture	98%	94%	99%	97%

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4
Adjusted Tube Mean (µg/m^3)	25 (23 - 28)	26 (23 - 30)	32 (30 - 35)	34 (31 - 37)

Notes:

A combined local bias adjustment factor of 0.81 has been used to bias adjust the 2022 diffusion tube results.

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 C.4.

Table C.4 – 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	41.0	28.5	38.6	
DO	0.6	5.3	36.6	17.1	28.9	
GH	3.5	15.9	38.1	19.3	30.5	
HB	2.1	9.7	36.5	18.0	29.7	
HC	2.5	50.0	36.5	18.0	22.8	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.

QA/QC of Automatic Monitoring

Sefton 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 SO2 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 2022 Sefton Council used 2 different instrument types to measure PM_{10}

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

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

- Met-One 1020 Beta Attenuation Monitor (BAM) with unheated inlet - divide by 1.2
- FIDAS dual monitor with unheated inlet -$PM_{2.5}$ - 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 2022 for PM_{10} and $PM_{2.5}$, therefore required annualisation. Annualisation was carried out for the annual mean PM_{10} and $PM_{2.5}$ at Lathom Close, Princess Way, Seaforth (with data captures of 66.9% for PM_{10} and 66.3% for $PM_{2.5}$, respectively). Five continuous background monitoring locations were used, the three locations within a 50 mile radius were selected to annualise the data:

- Wigan Centre (PM_{10}, $PM_{2.5}$);
- St Helens Linkway (PM_{10})
- Liverpool Speke (PM_{10}, $PM_{2.5}$); and
- Wirral Tranmere (PM_{10}, $PM_{2.5}$);
- Warrington ($PM_{2.5}$)

NO_2 Fall-off with Distance from the Road

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

Table C.5 – Annualisation Summary for Automatic Monitors for Annual Mean PM_{10}

Site ID	Annualisation Factor Wigan Centre	Annualisation Factor St Helens Linkway	Annualisation Factor Liverpool Speke	Annualisation Factor Wirral Tranmere	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
CM4	0.9866	0.9685	0.9274	0.954	0.9592	17.9	17.2

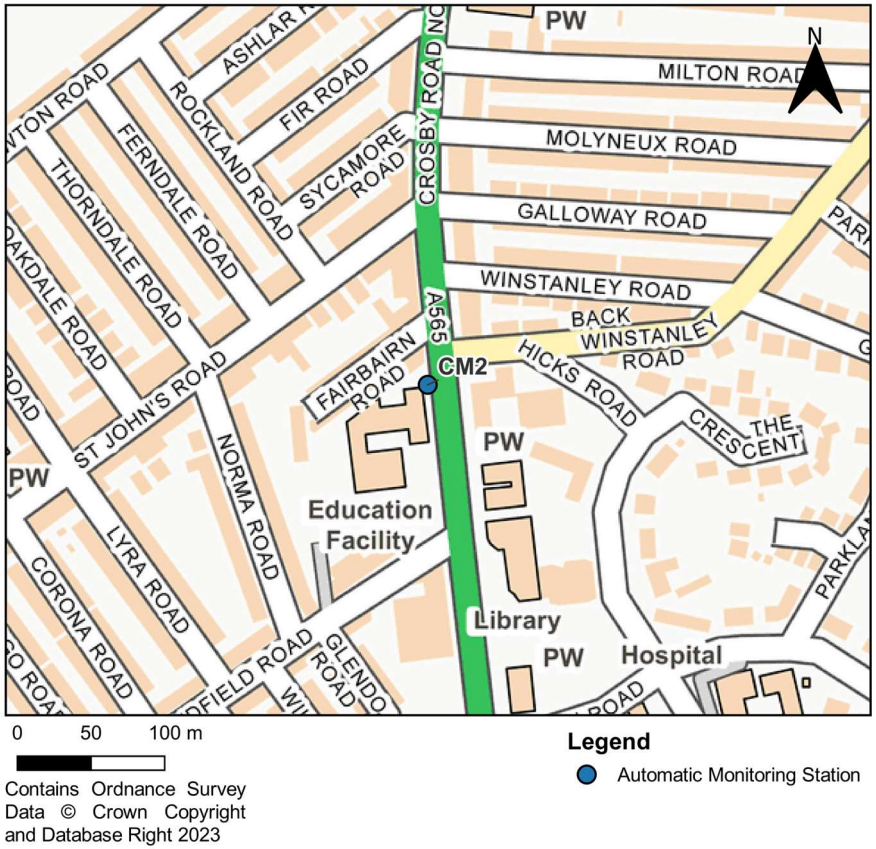
Table C.6 – Annualisation Summary for Automatic Monitors for Annual Mean $PM_{2.5}$

Site ID	Annualisation Factor Wigan Centre	Annualisation Factor Wirral Tranmere	Annualisation Factor Liverpool Speke	Annualisation Factor Warrington	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
CM4	1.0141	0.9625	0.9788	1.013	0.9921	9.5	9.5

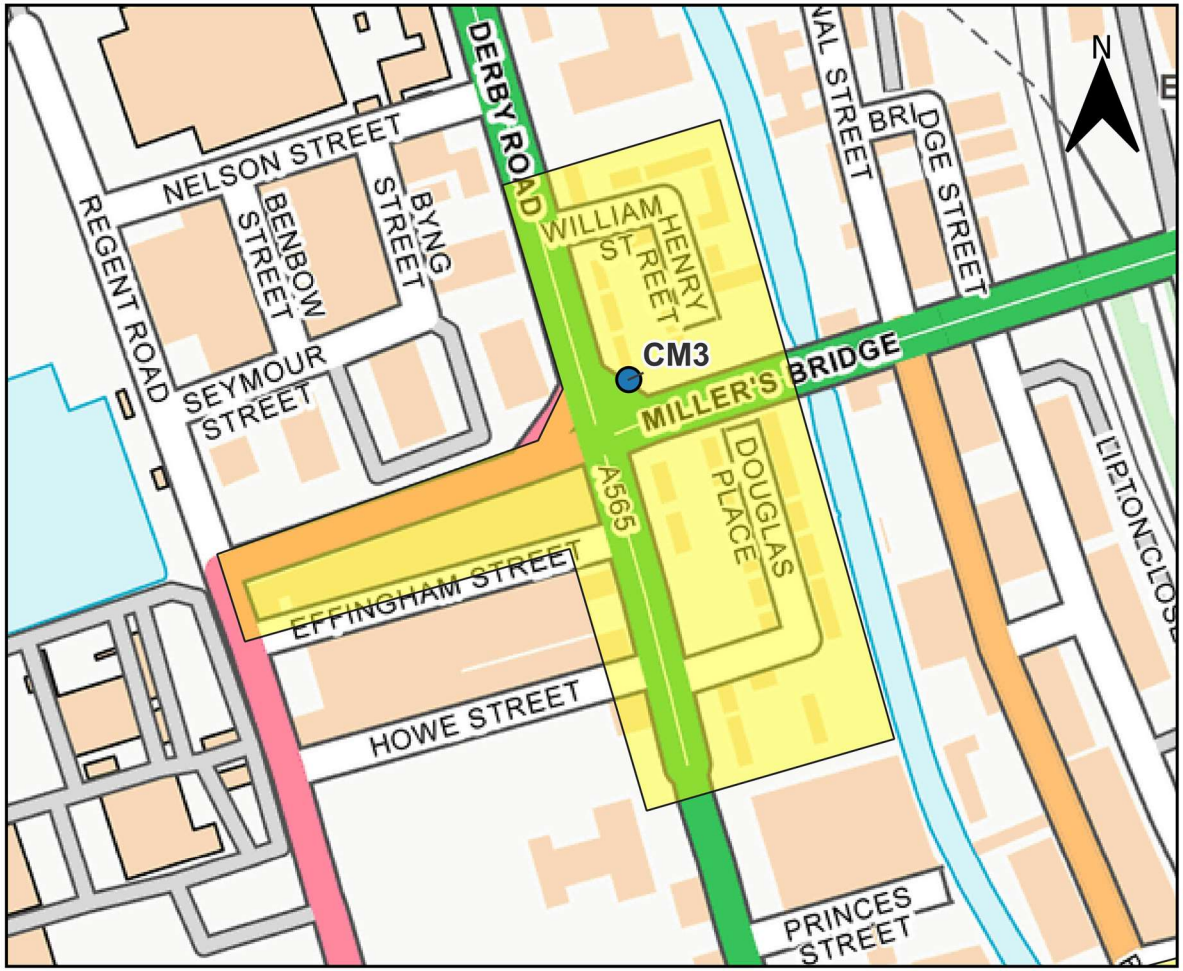
Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Map of Automatic Monitoring Sites

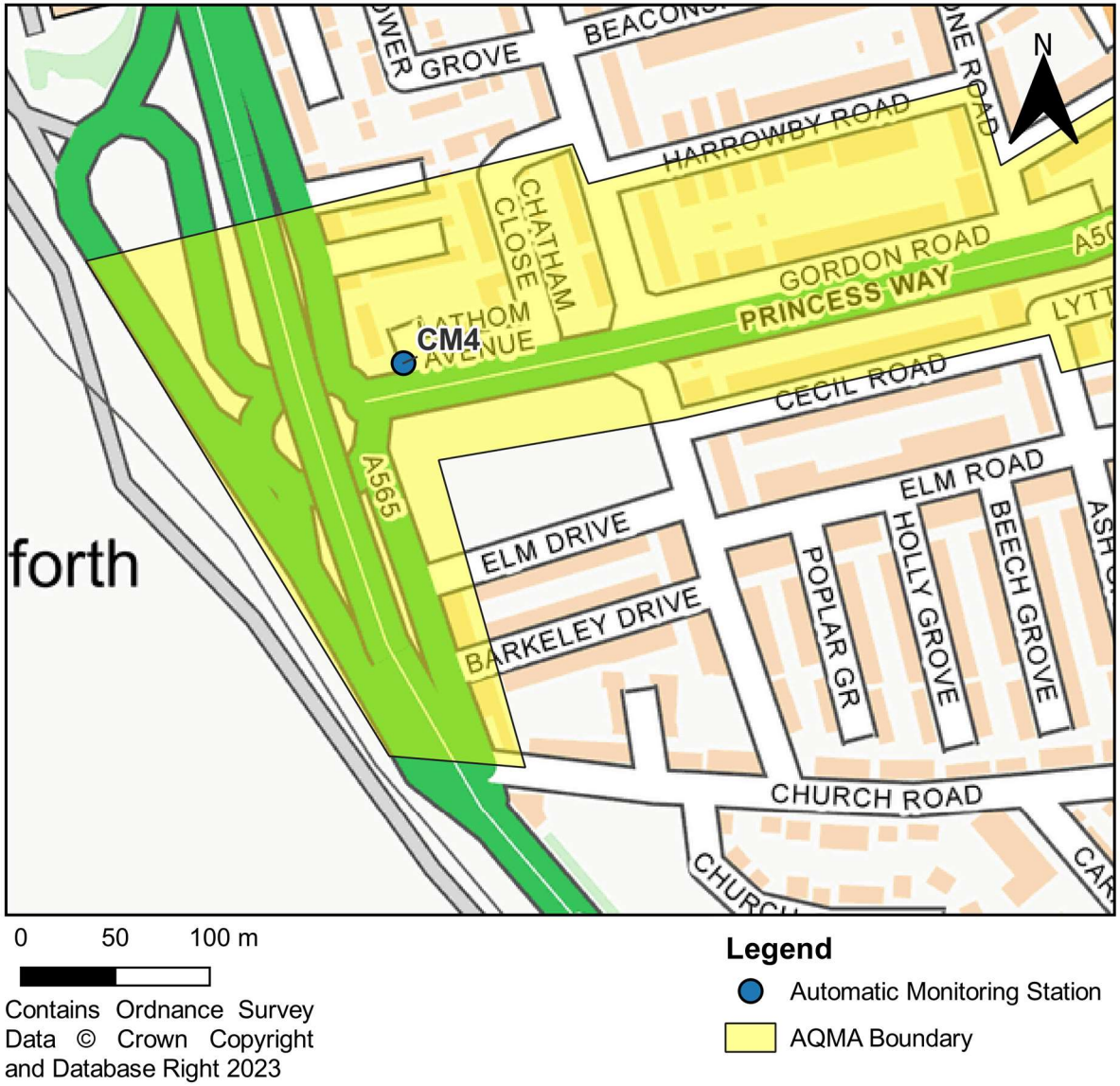
CM2 – Crosby Road North



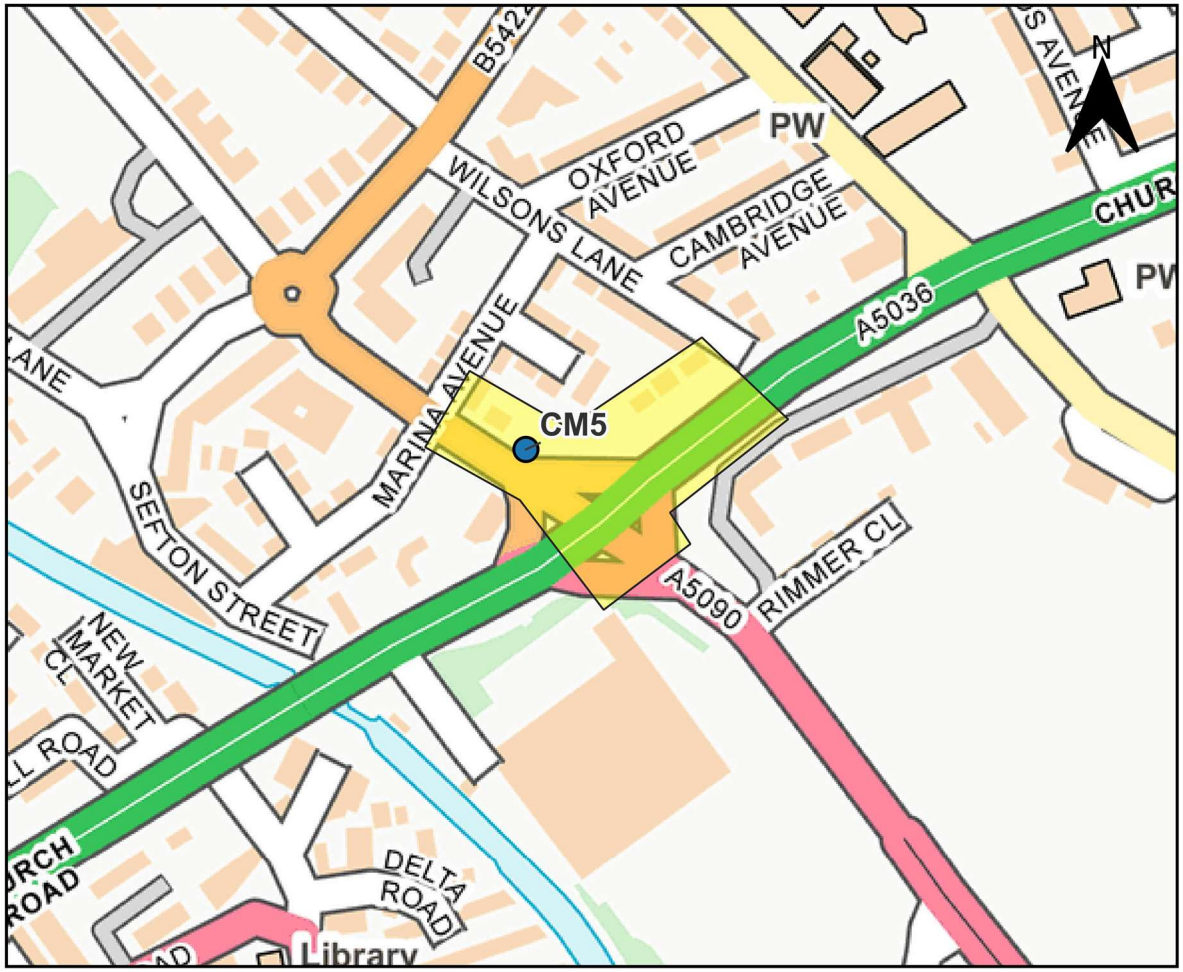
CM3 – Millers Bridge



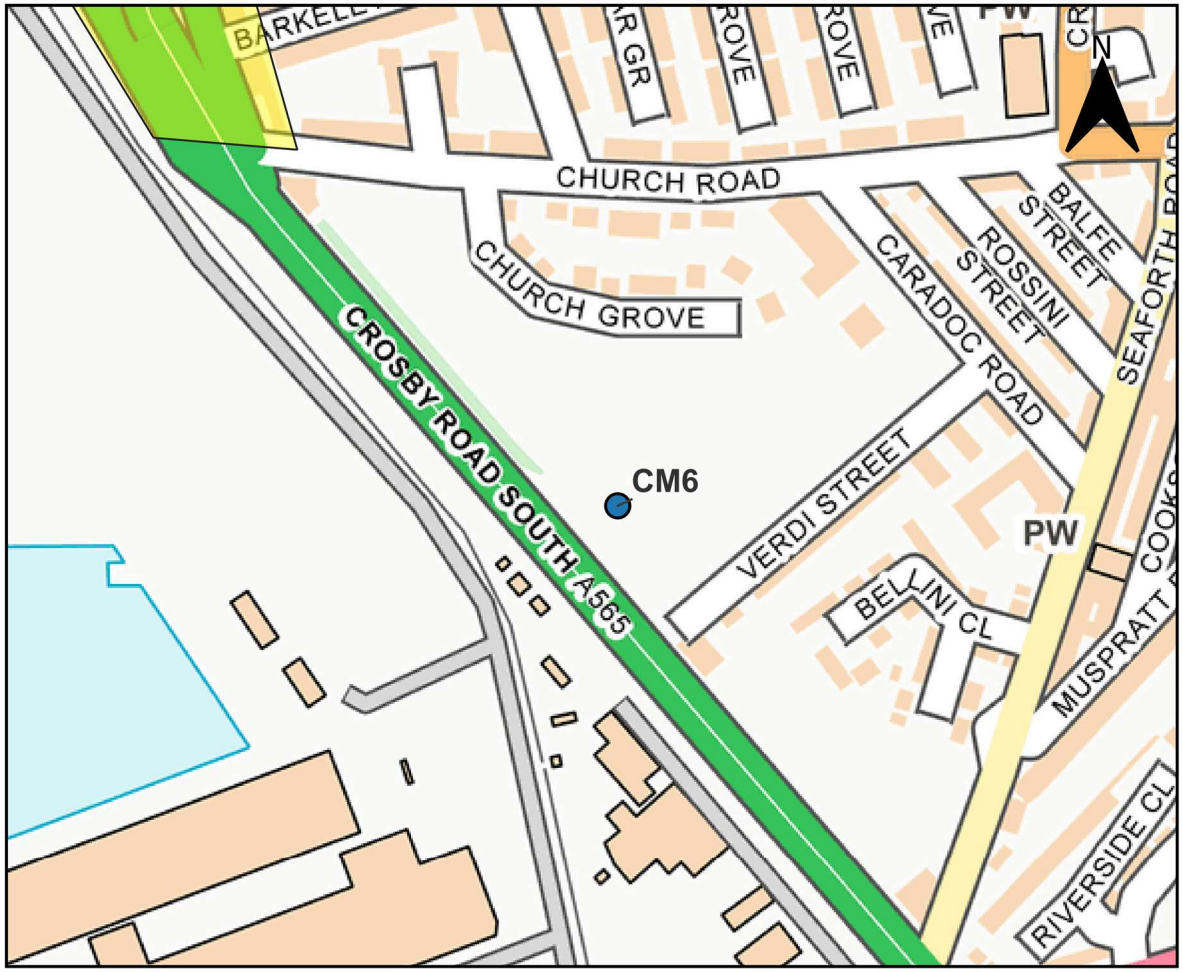
CM4 – Lathom Close



CM5 – Hawthorne Road



CM6 – Crosby Road South



CM7 – Regent Road

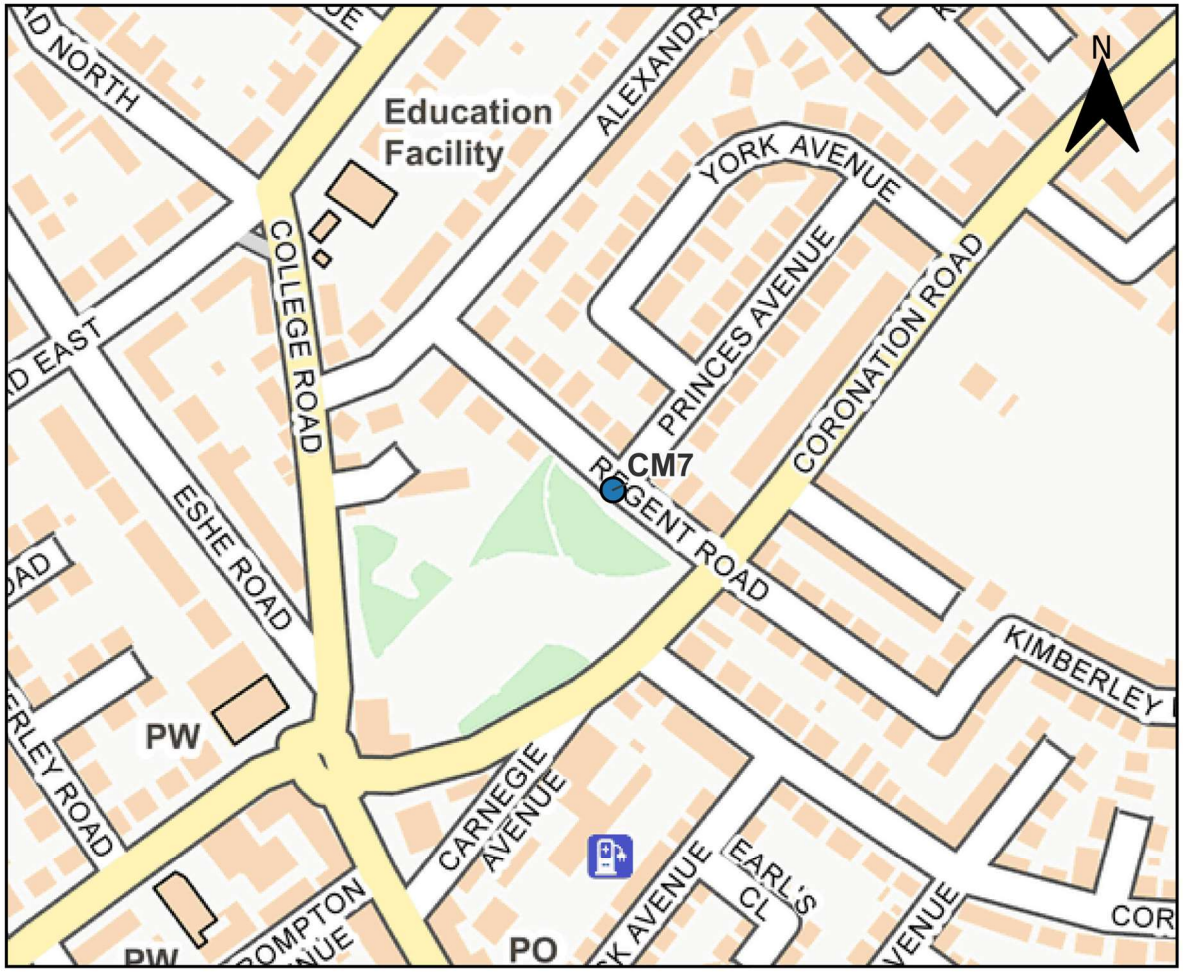


Figure D.2 – Map of Non-Automatic Monitoring Sites within AQMA 2 Princess Way

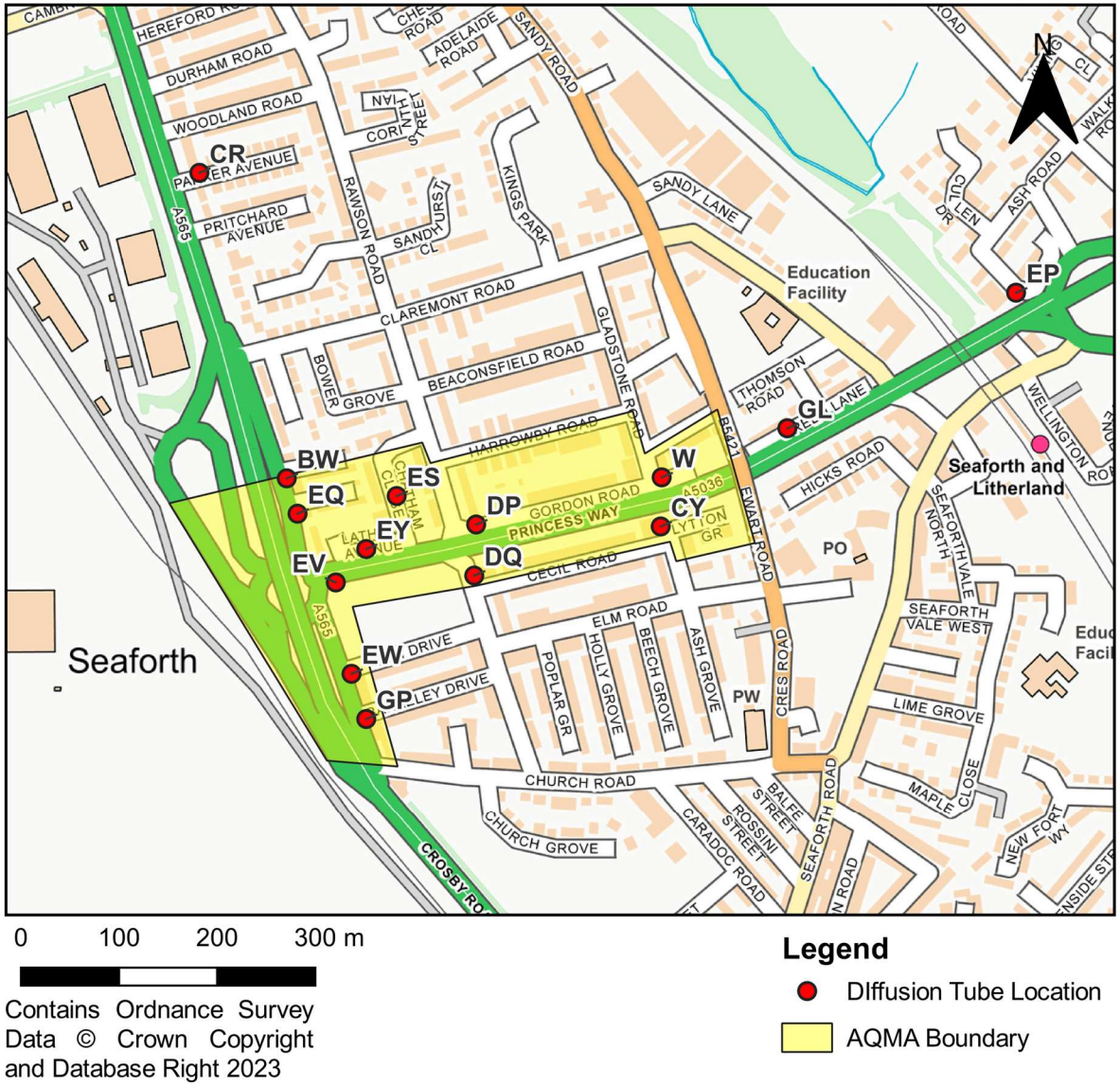


Figure D.3 – Map of Non-Automatic Monitoring Sites within AQMA 3 Millers Bridge

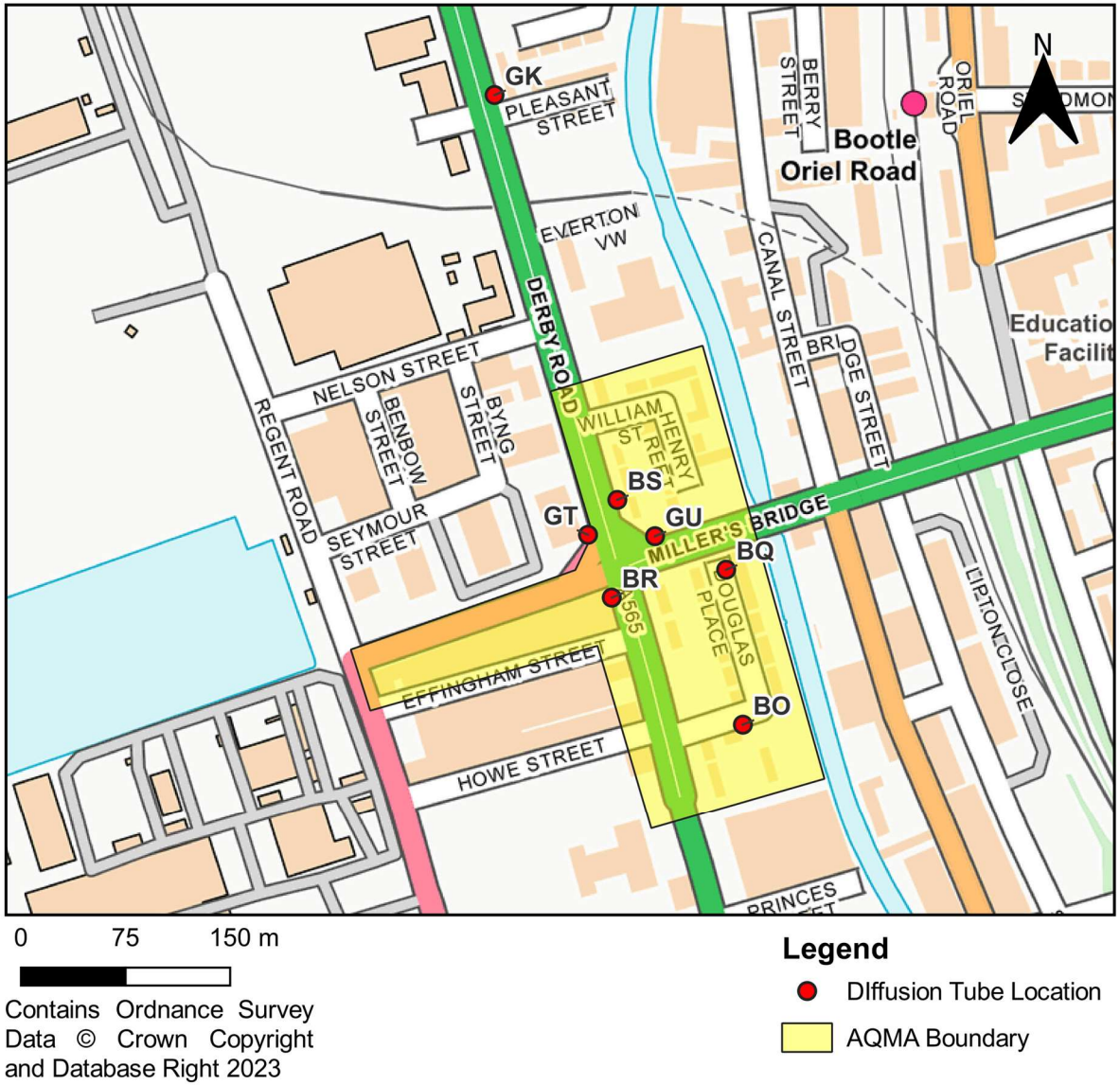


Figure D.4 – Map of Non-Automatic Monitoring Sites within AQMA 4 South Road

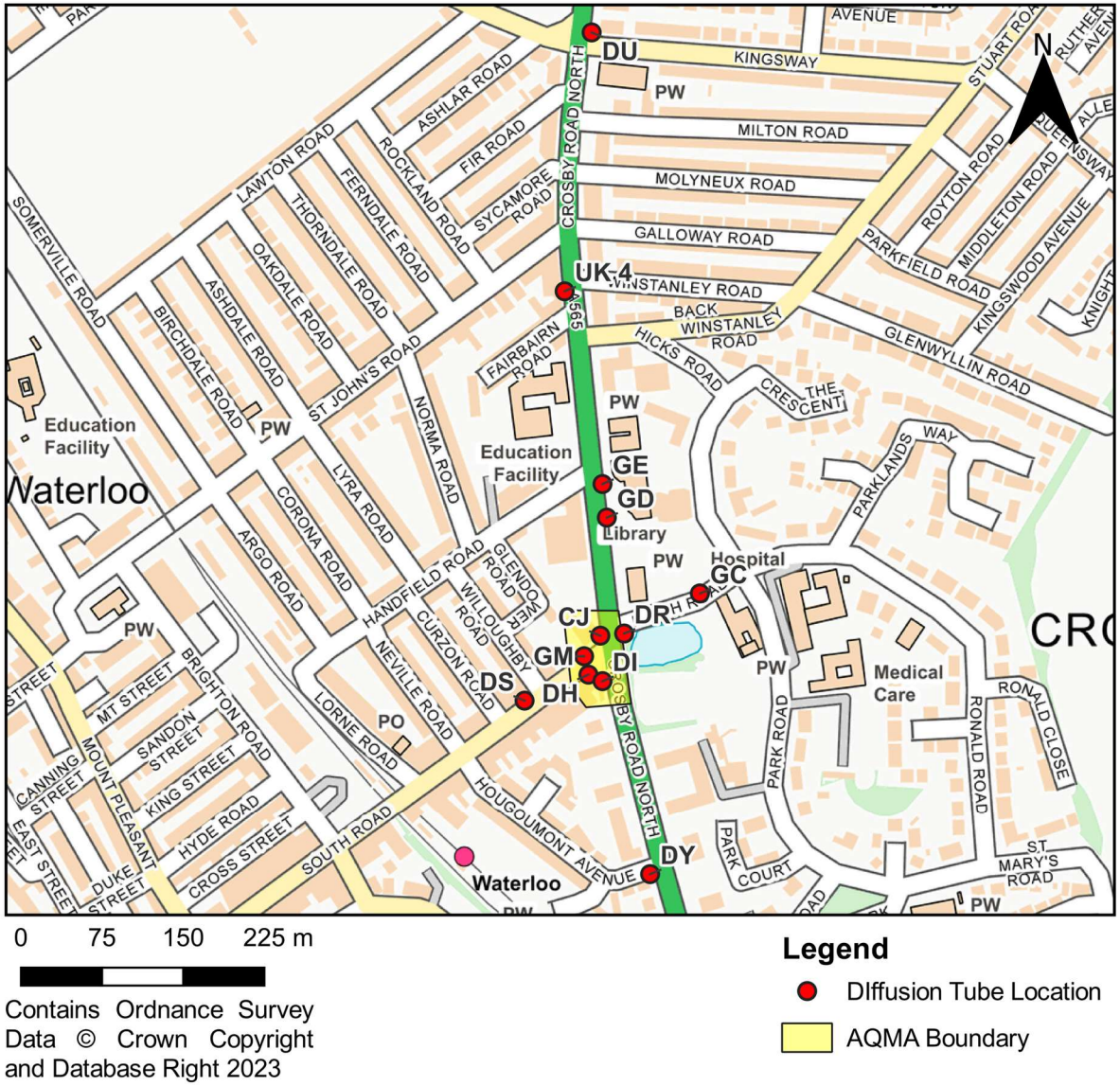


Figure D.5 – Map of Non-Automatic Monitoring Sites within AQMA 5 Hawthorne Road

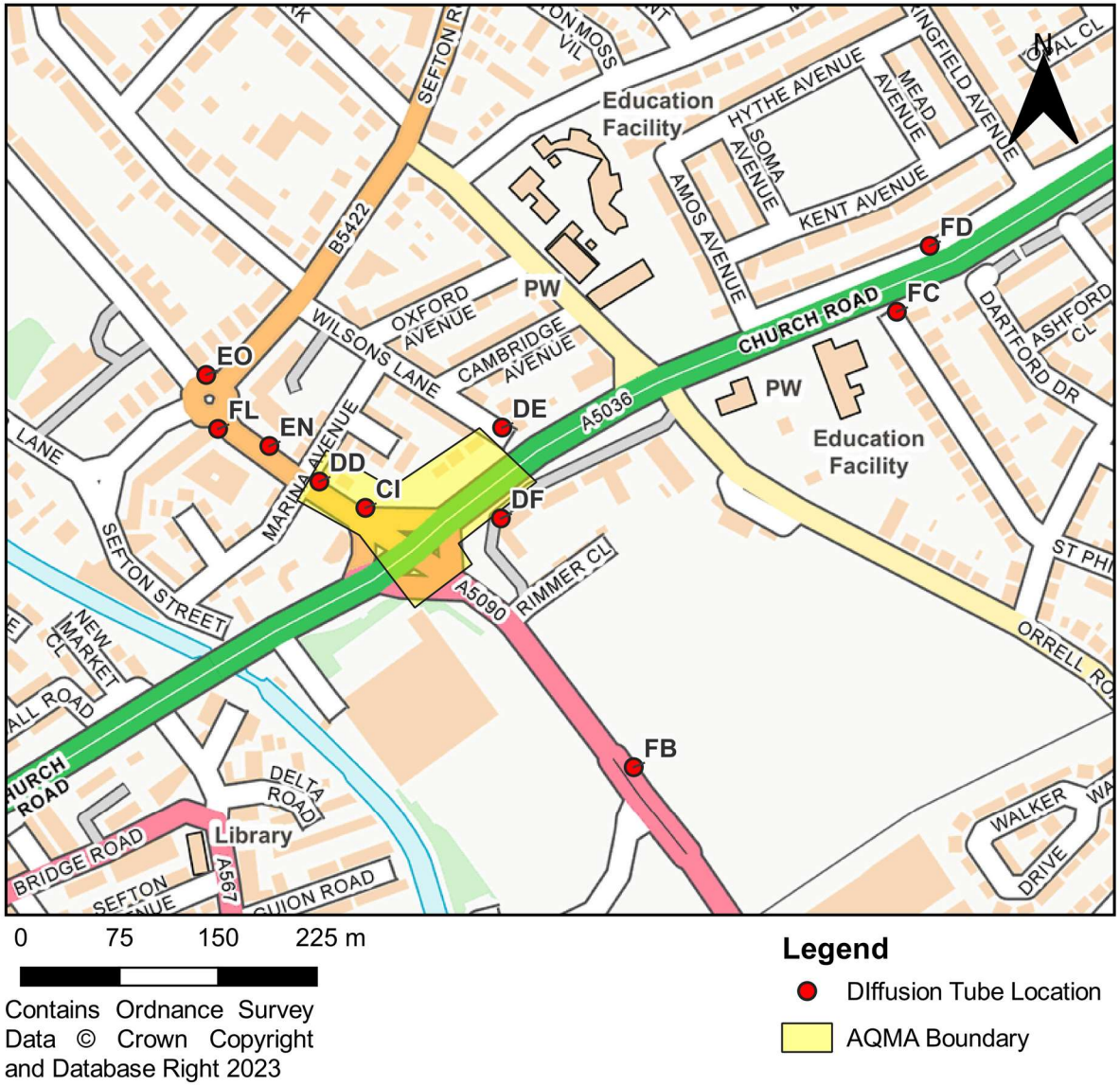
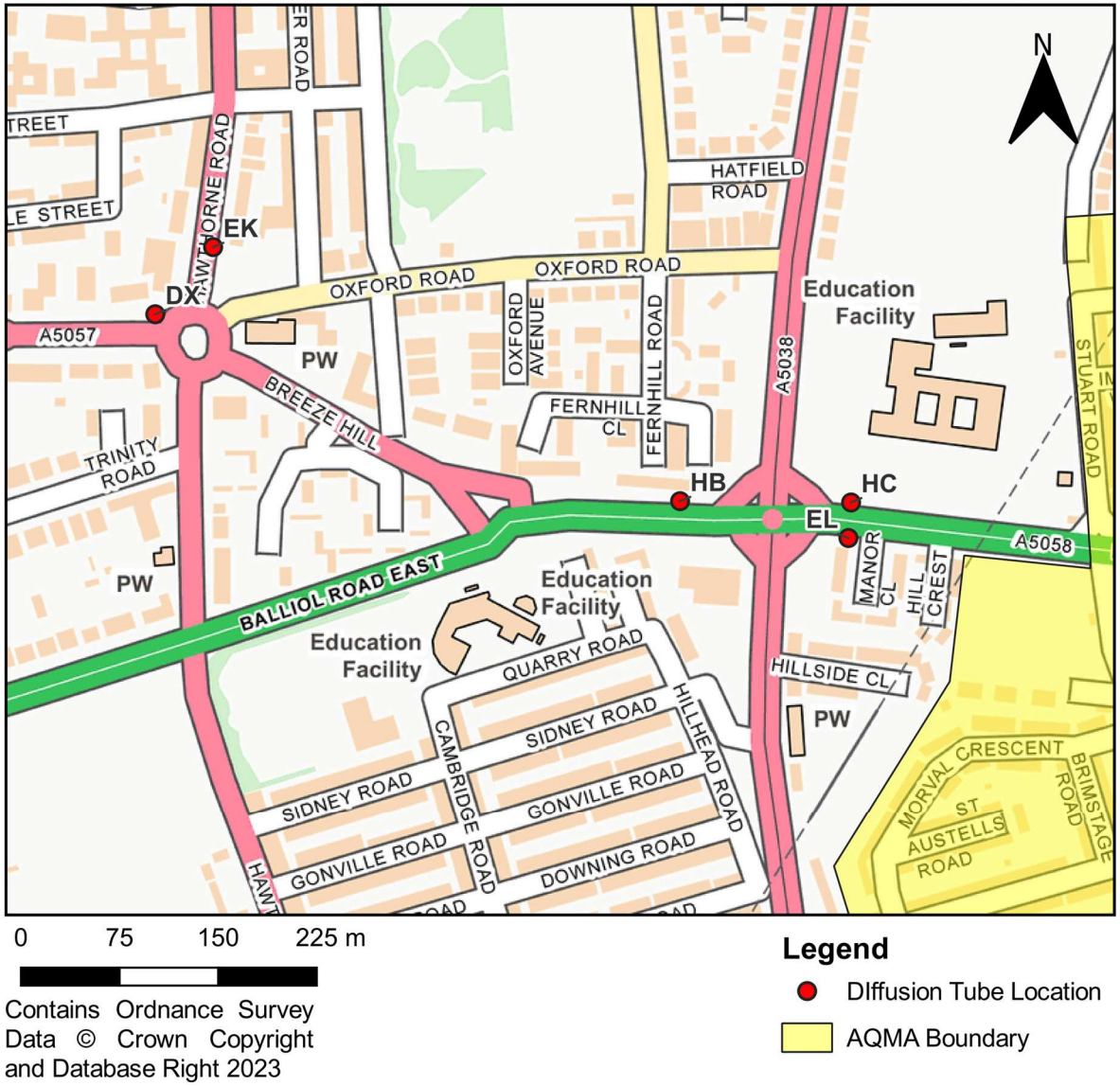


Figure D.6 – Maps of Non-Automatic Monitoring Sites within Bootle



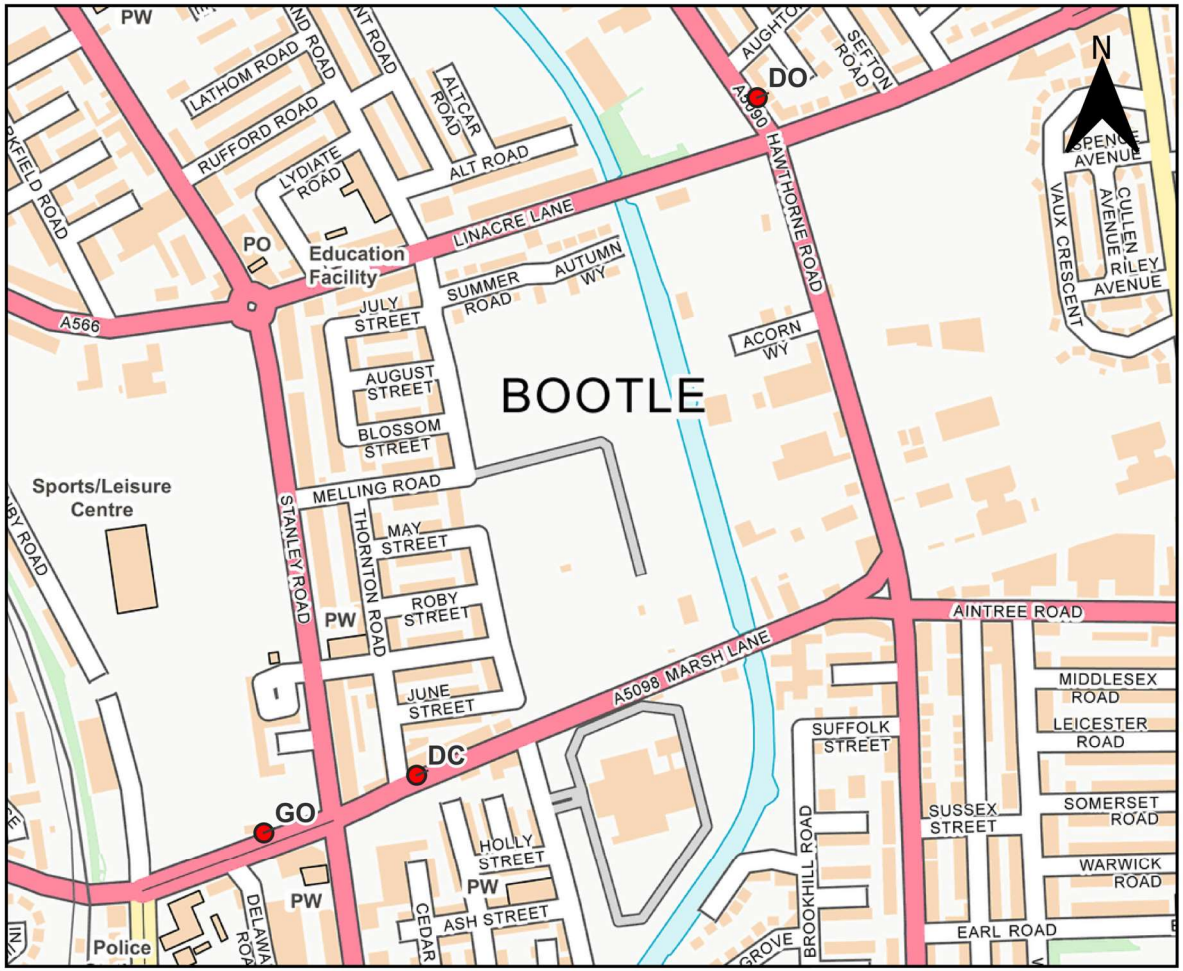
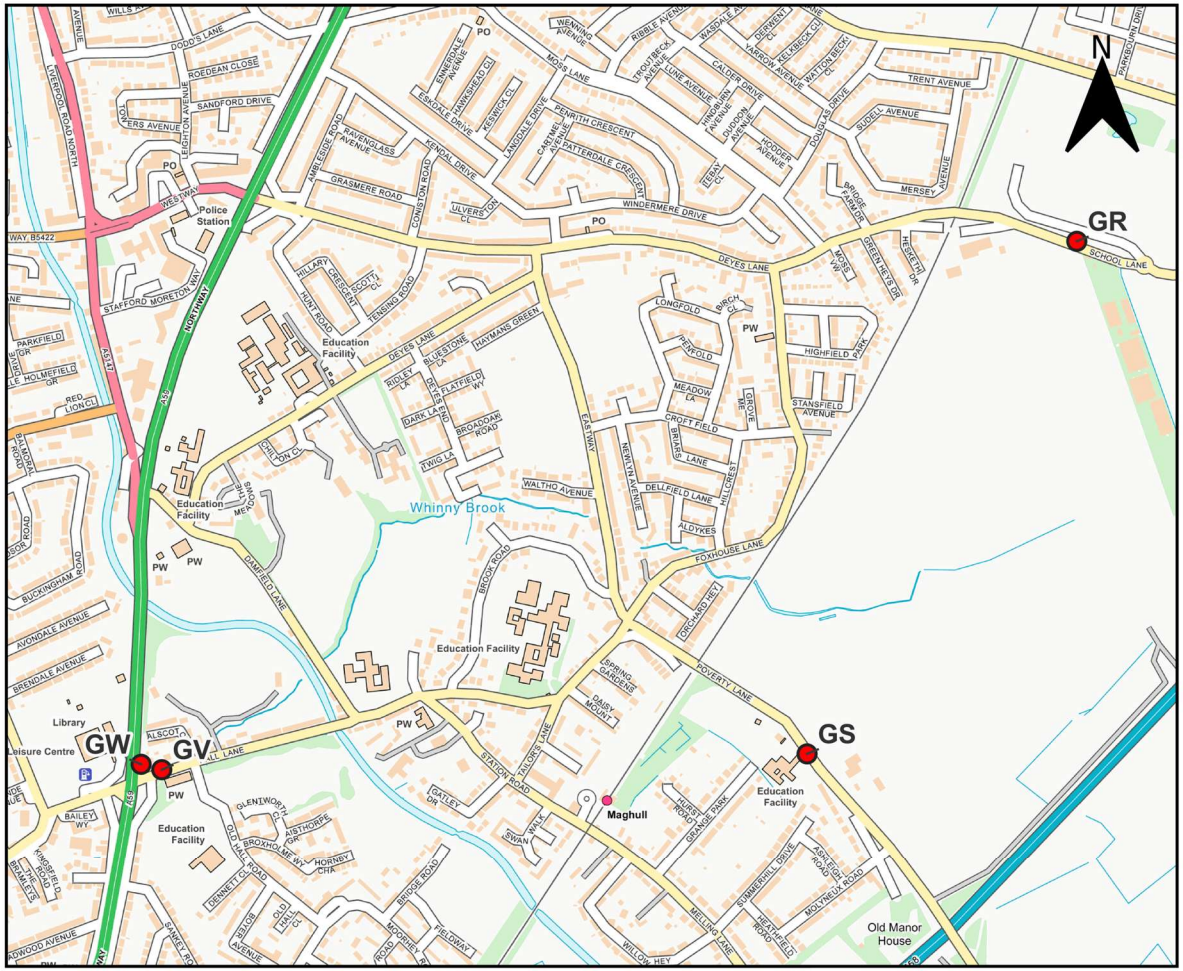


Figure D.7 – Maps of Non-Automatic Monitoring Sites within Maghull



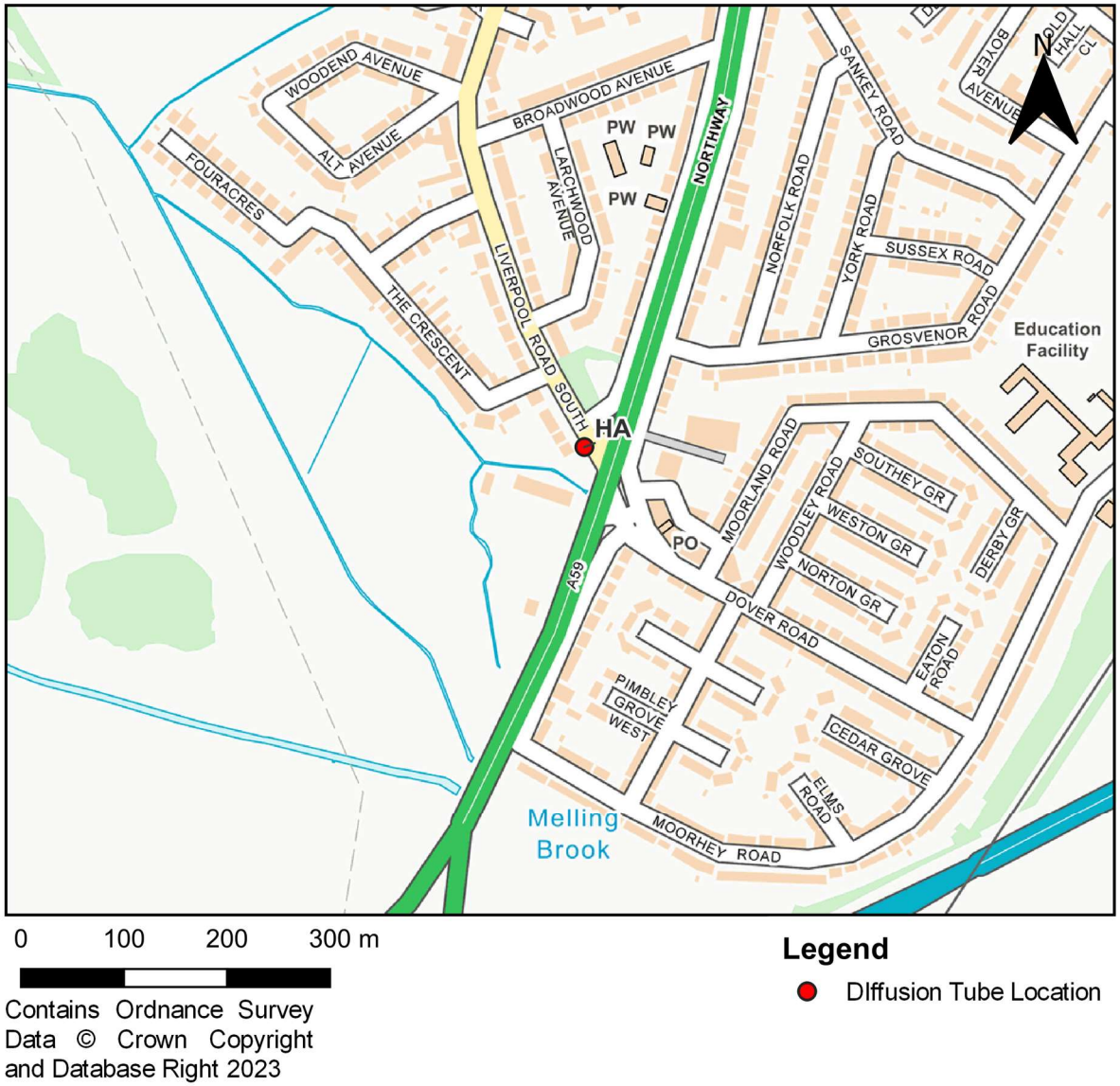

WOODEND AVENUE
ALT AVENUE
BROADWOOD AVENUE
FOURACRES
LARCHWOOD AVENUE
THE CRESCENT
LIVERPOOL ROAD SOUTH
PW
PW
PW
NORTHWAY
SANKEY ROAD
NORFOLK ROAD
YORK ROAD
SUSSEX ROAD
GROSVENOR ROAD
BOTER AVENUE
OLD HALL CL
N
Education Facility
HA
MOORLAND ROAD
WOODLEY ROAD
SOUTHEY GR
WESTON GR
NORTON GR
DERBY GR
PO
A59
DOVER ROAD
EATON ROAD
PIMBLEY GROVE WEST
CEDAR GROVE
ELMS ROAD
Melling Brook
MOORHEY ROAD
0
100
200
300 m
Contains Ordnance Survey Data © Crown Copyright and Database Right 2023
Legend
DIffusion Tube Location

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

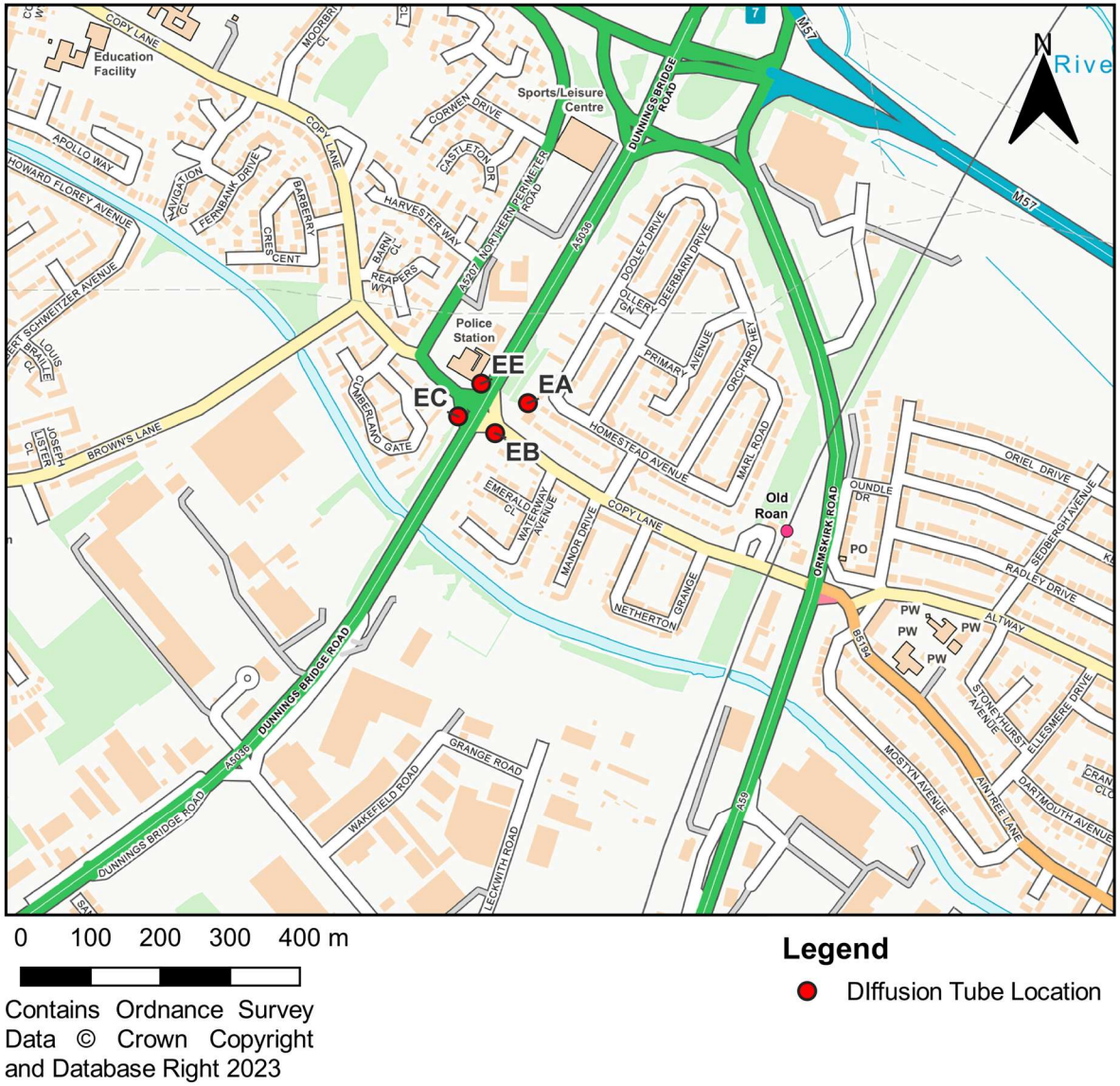


Figure D.9 – Map of Non-Automatic Monitoring Sites within Formby

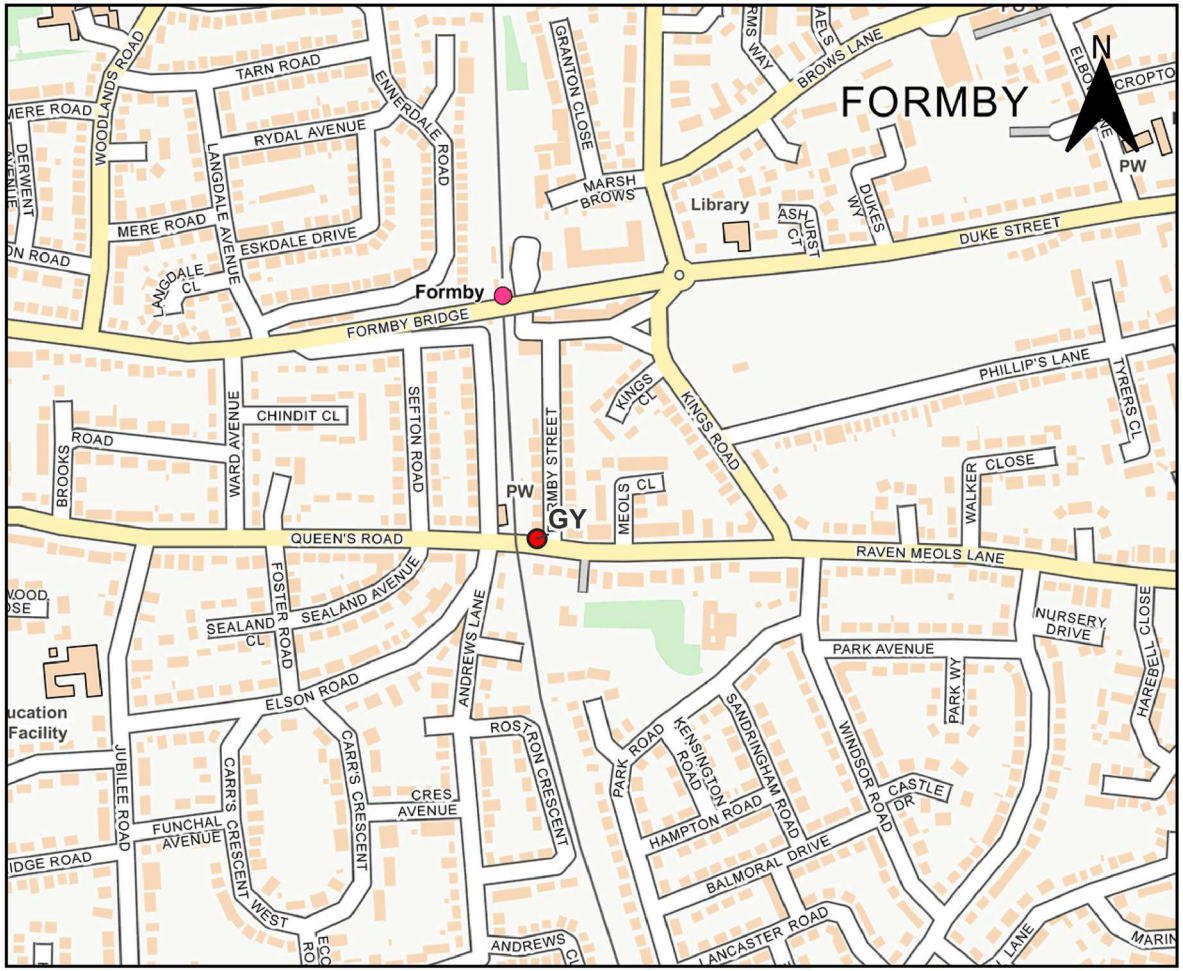


Figure D.10 – Map of Non-Automatic Monitoring Sites within Orrell

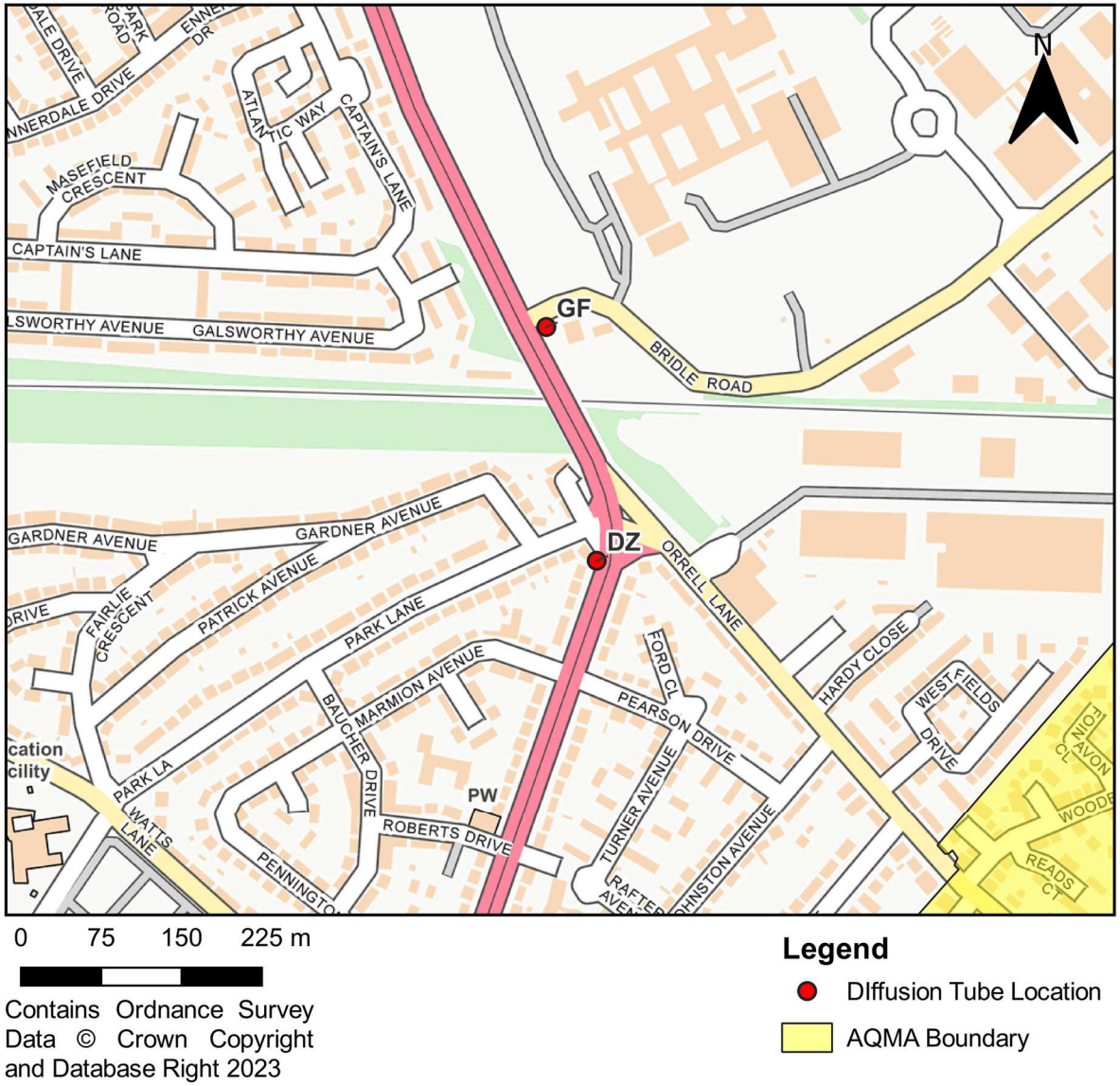


Figure D.11 – Map of Non-Automatic Monitoring Sites within Litherland

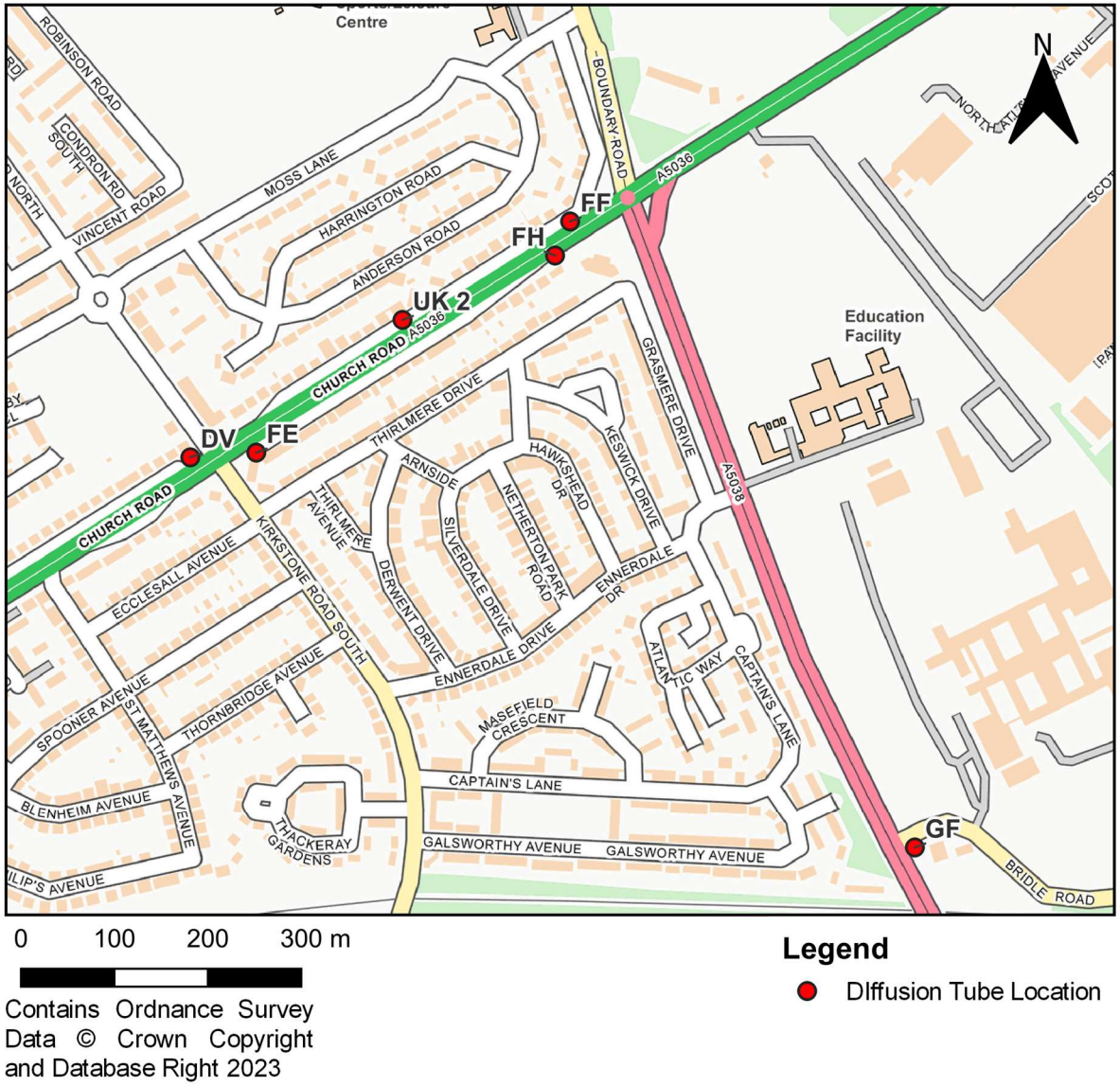


Figure D.12 – Map of Non-Automatic Monitoring Sites within Southport

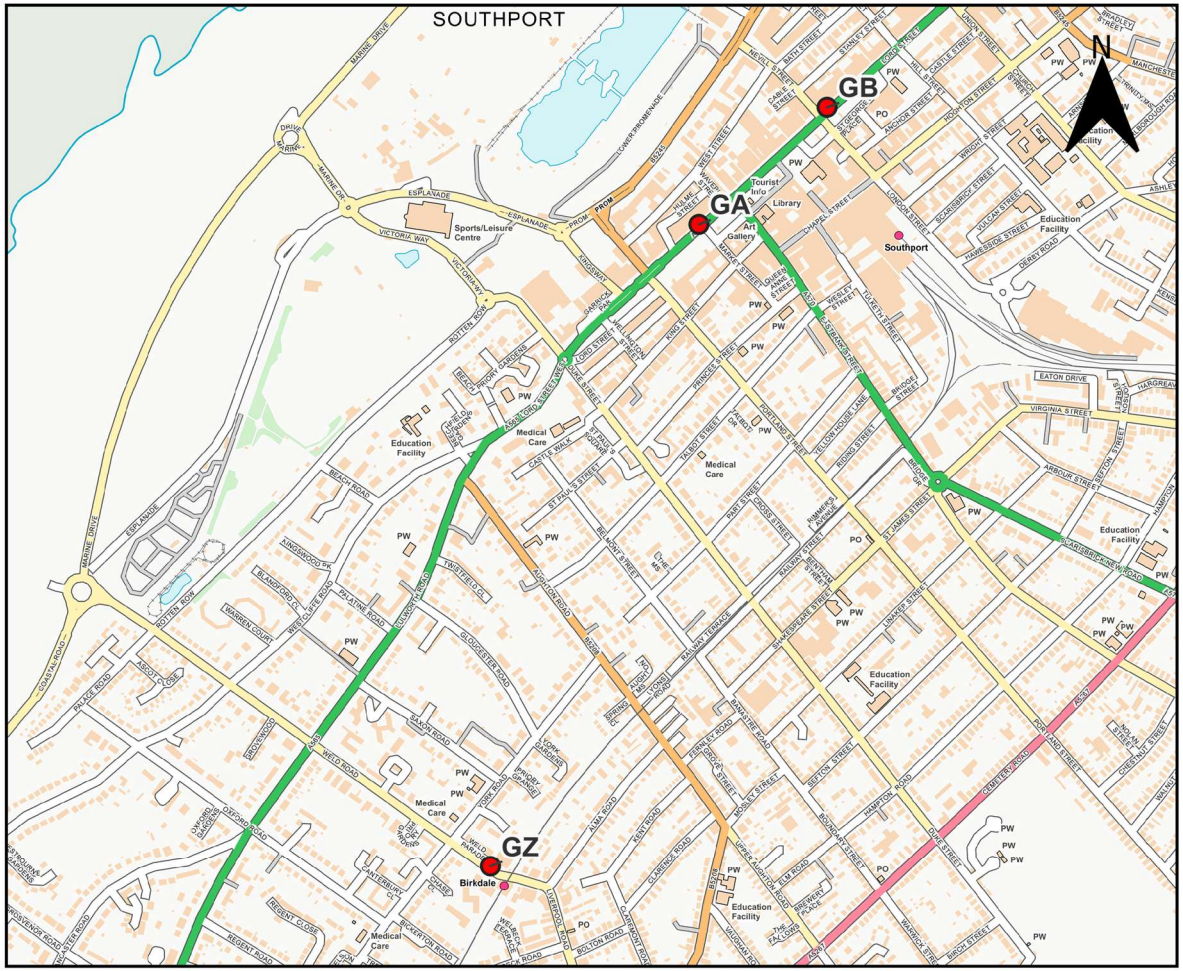


Figure D.13 – Map of Non-Automatic Monitoring Sites within Blundellsands

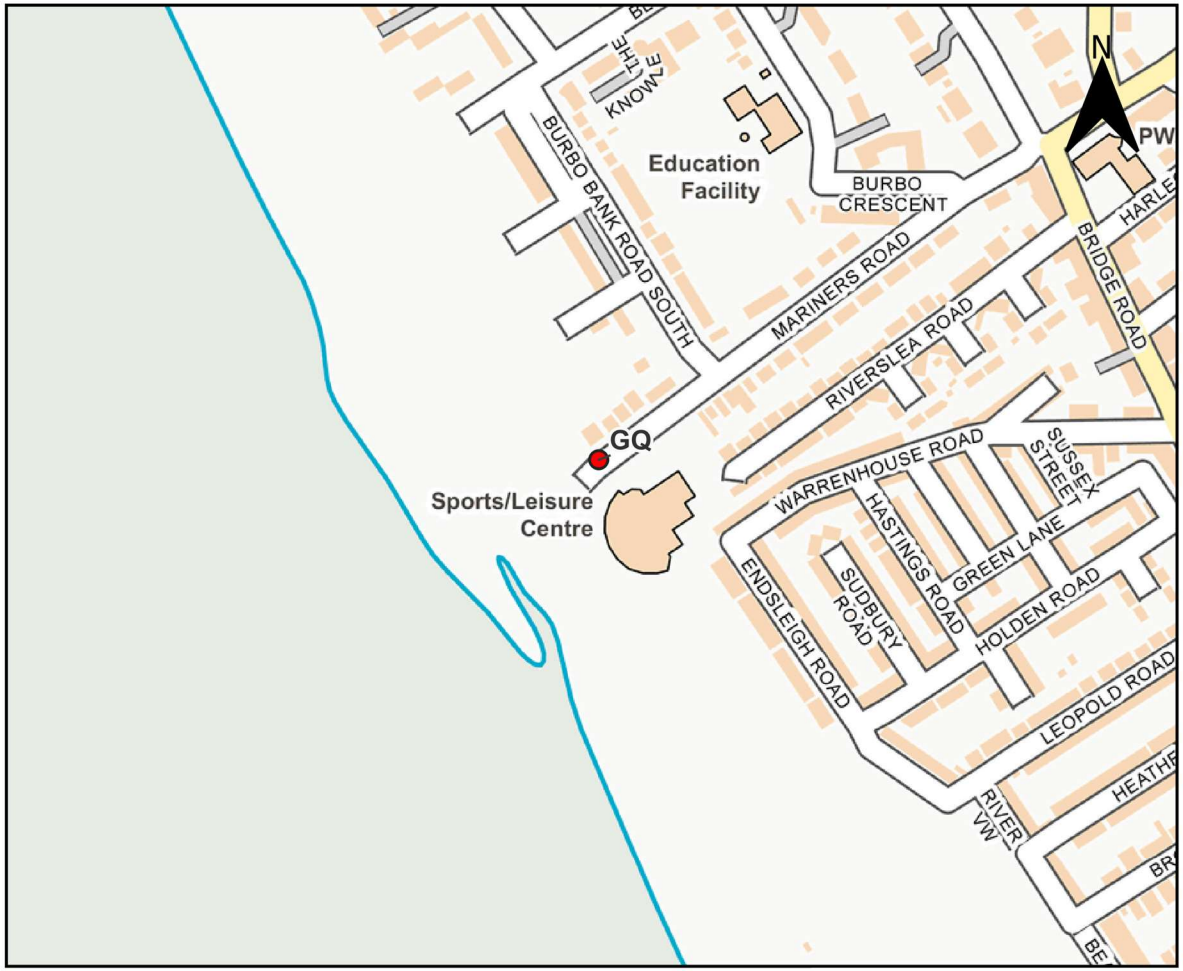
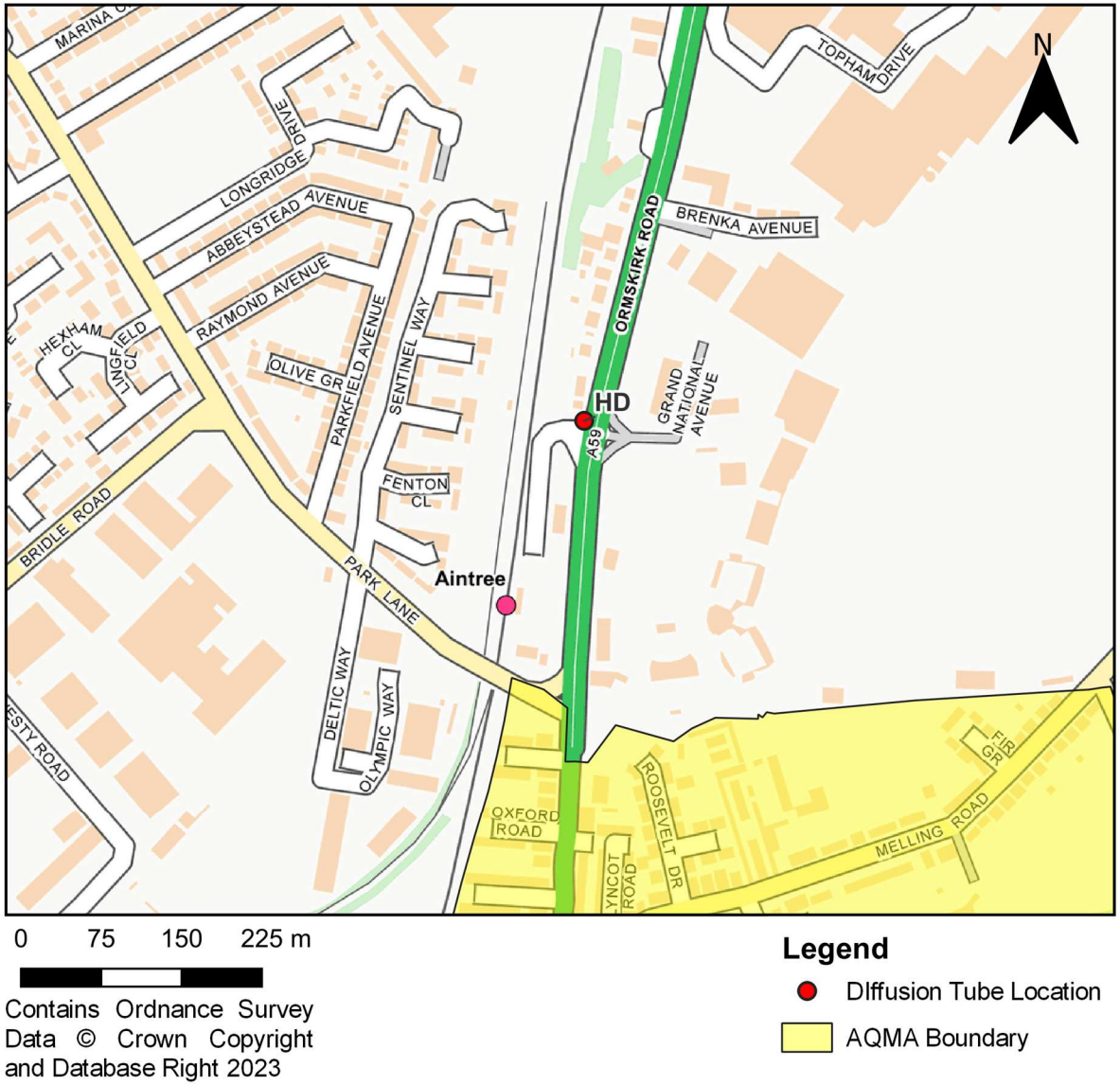


Figure D.14 – Map of Non-Automatic Monitoring Sites within Aintree



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[9]

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
CAP	Clean Air Plan
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
DVSA	Driver and Vehicle Standards Agency
EU	European Union
FDMS	Filter Dynamics Measurement System
HGV	Heavy Goods Vehicle
JMU	John Moores University
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
OBC	Outline Business Case
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
POLAS	Port of Liverpool Access Scheme
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

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- http://breathingspace.sefton.gov.uk/
- https://smokecontrolsefton.co.uk/
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