Sefton Council

2019 Air Quality Annual Status Report (ASR)

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

July 2019

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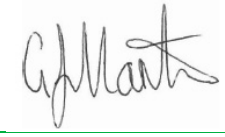
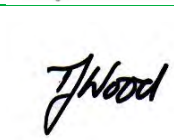
Prepared by	Greg Martin	Principal Environmental Health Officer		20/08/19
Reviewed by	Terry Wood	Environmental Health & Licensing Manager		20/08/19
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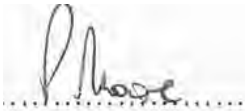
Approved by	Peter Moore	Head of Highways and Public Protection		03/09/19

Forward by Director of Public Health

Sefton Council is committed to improving Air Quality in the Borough and is working to ensure that Sefton will be a place where improved health and wellbeing is experienced by all. This work directly supports Sefton's 2030 vision of a cleaner, greener and healthier Borough.

Poor air quality has a negative impact on public health, with potentially serious consequences for individuals, families and communities. Identifying problem areas and ensuring that actions are taken to improve air quality forms an important element in protecting the health and wellbeing of Sefton's residents.

Air Quality in the Majority of Sefton is of a good standard, however, a small number of areas in the South of the Borough have been identified where additional targeted actions are likely to be required to bring about further air quality improvements.

Improving air quality is often a complex issue, presenting a multi-agency challenge. In response to this Sefton's Strategic Members reference group continues to over-see air quality work in the Borough and ensure internal and external agencies work together, collaboratively, to deliver improvements where they are needed. Sefton's Public Health Annual Report which looks at the health and wellbeing of our population has also focused on the topic of air pollution.

As Director of Public Health for Sefton I endorse this Annual Status Report which sets out the position in Sefton and which will support an on-going work programme to address air quality issues.

Matthew Ashton - Director of Public Health Sefton Council

Executive Summary: Air Quality in Our Area

Air Quality in Sefton

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Sefton Council continues to undertake detailed monitoring using both sophisticated automatic air quality monitoring equipment and an extensive network of passive diffusion tubes to determine the 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 small areas, all in the south of the Borough, where air quality has or is currently exceeding national standards.

The two pollutants for which air quality standard objectives have been exceeded in Sefton are Nitrogen Dioxide (NO_2) and fine Particulate Matter (PM_{10}). The areas where objectives have not been met are generally located around busy road junctions or near busy roads and residents living closest to these junctions and roads are most affected.

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

- Lathom Close, Princess Way, Seaforth (NO_2).
- Millers Bridge/Derby Road junction, Bootle (PM_{10} & NO_2).
- South Road/Crosby Road North junction, Waterloo (NO_2).

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

- Hawthorne Road/Church Road junction, Litherland (NO_2).

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 AQMA, 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 industrial activities within the Port of Liverpool have also historically been identified as a source of PM_{10}.

Current Air Quality levels in Sefton

The latest air quality monitoring in Sefton shows that in relation to Particulate Matter levels in Sefton are well within the NAQS objectives and this pollutant continues to show an overall decline. With regard to NO_2, levels in 2 AQMA's appear to be declining but 2 AQMA's potentially being impacted by increasing port traffic are showing increased levels of this pollutant in 2018. 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

Detailed Air Quality Action Plans (AQAPs) have been developed and are in place to address the areas where pollutant levels are high. The Action Plans contain a number of measures to improve air quality within the AQMAs. A number of other initiatives and actions are also currently underway/under consideration with the aim of further improving air quality.

Sefton Council's air quality 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 consisting of Ward Councillors, Environmental Health, Public Health, Planning, Highways, Economic Development, and Communications teams, oversees the work being undertaken in respect of Air Quality within the Borough.

A Liverpool City Region Air Quality Task Force Group has also recently been convened to support and advise the Liverpool Region Combined Authority in its strategic leadership and advocacy role in order to raise the profile of, and to actively tackle poor air quality across the LCR. This is by harnessing the collective strengths, roles and best practice of the consistent members of group.

Air quality officers regularly work with external partners outside the Council including the Environment Agency, Highways England, Public Health England, Merseytravel and Peel Ports (who operate the Port of Liverpool).

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 also officers from Cheshire East, and Cheshire West and Chester Councils.

Actions to Improve Air Quality

Sefton Council has developed and implemented Action Plans 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 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 AQAPs for Sefton can be viewed at:

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

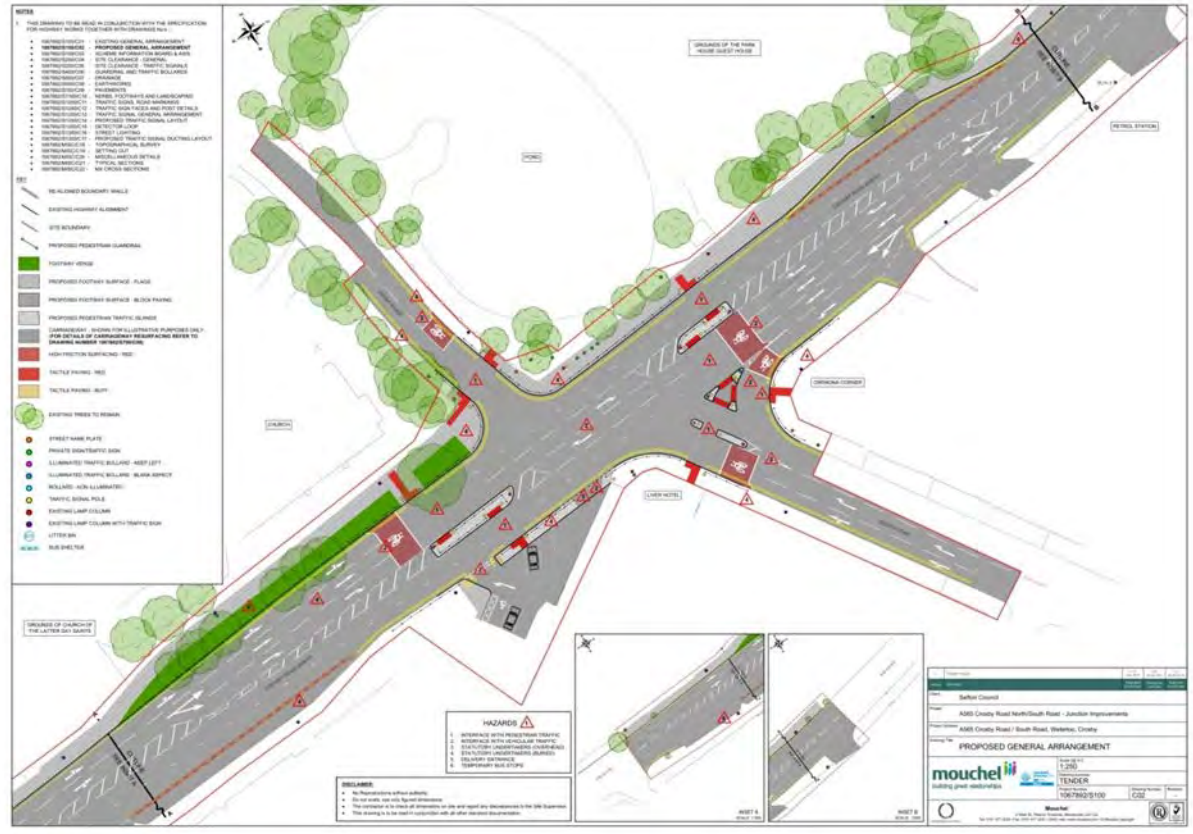
Examples of site specific measures that have been included in the Action Plans include:

- 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 booking system to 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 already been successful in reducing pollutant levels within the AQMAs. 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. Examples of more recent air quality initiatives and interventions are detailed below

South Road/Crosby Road North Junction improvement (AQMA4)

Significant Junction improvement works have been completed to improve traffic flow and associated congestion in the area around the South Road/Crosby Road North/ Haigh Road junction in Waterloo. (AQMA 4 was declared in this area). Levels of NO_2 in 2018 showed compliance with the NAQS objective at all locations in this AQMA. Monitoring will continue in 2019 to ensure continued compliance before any arrangements are made to revoke this AQMA



Millers Bridge Junction Improvement Works (AQMA2)

As part of the North Liverpool Key Corridor scheme (NLKC) significant works to improve traffic flow and reduce congestion in the Millers Bridge and wider area are currently underway. 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 improvements are also to be made to the Millers Bridge junction which will improve traffic flow through this area.

It is anticipated that on completion of these works traffic flow along the road link in question will improve thus having a positive effect on reducing emissions of NO_X and NO_2 at the roadside. The scheme is likely to be completed by the end of 2019. Monitoring will continue in the area to assess the effectiveness of this woks on reducing NO_2 in the AQMA and wider area.

DEFRA GRANT - Domestic Solid Fuel Behaviour Change Project

Sefton successfully obtained a £100,000 grant from DEFRA to undertake a Solid Domestic Fuel behaviour change project.

The primary aim of the 18 months project is to minimise the Particulate Matter (PM) contribution from domestic fuel use in Sefton. The project would employ several interventions and approaches to enable householders, fuel suppliers, appliance suppliers and installers, and maintenance professionals such as chimney sweeps to promote, select and use appliances and solid fuels in ways that sustainably minimise PM release and exposure. The project will include a range of baseline data, evidence and insight activities to characterise the scale, distribution, and root causes of PM emissions caused by domestic burning. An additional $PM_{2.5}$ monitor will be purchased to increase Sefton's $PM_{2.5}$ monitoring capability and provide data on the effectiveness of the study.

Sefton is concerned that the increased use of domestic solid fuel is potentially adding to particulate matter levels in the Borough especially $PM_{2.5}$. Sefton, like all Local Authorities has new duties with regard to $PM_{2.5}$ and the reduction of this particular airborne pollutant. It is considered that this PM reduction project would form an essential part of Sefton's action plans to achieve continuing $PM_{2.5}$ reductions.

Clean Air Zone Feasibility Study

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 Sefton funded Clean Air Zone (CAZ) feasibility study

to assess the feasibility of implementing CAZs in Sefton to reduce traffic related emissions has been completed by consultants AECOM. The study concluded that should no further air quality actions be implemented in Sefton 70 properties in South Sefton would exceed the NAQS objective for NO_2 in 2020. Implementing a TYPE B CAZ would significantly reduce this number of exceedances. The information contained in the study is currently being analysed in detail along with the possibility of needing to declare additional AQMA's. A CAZ project group has also been set up to consider further options for improving air quality in the Borough and AQMA's

$PM_{2.5}$ Monitoring

Although Sefton Council monitors PM_{10} at a number of locations in the Borough, there is now clear evidence that even smaller particles with an aerodynamic diameter of 2.5µm or less, known as $PM_{2.5}$, have a significant impact on human health. A new dual PM_{10}/$PM_{2.5}$ monitor was installed in July 2017 at the Millers Bridge monitoring site with data being used to provide accurate levels of $PM_{2.5}$ in the area to assist in providing data for the Councils new role in reducing levels of $PM_{2.5}$. A further $PM_{2.5}$ monitor is due to be installed in 2019 to monitor levels of this pollutant.

Dual PM_{10}/$PM_{2.5}$ dual particulate monitor

E-Taxi Project

Sefton Council is currently running an E-Taxi Evolve project in conjunction with consultants Electric Blue. The project aims to engage with taxi operators and improve

the uptake and use of electric taxis. The assessment is underway and 50 taxis are currently fitted with tracking devices to assess their suitability for an e-taxi and provide details of the savings likely. The results of the project are due towards the end of 2019.

E-Taxi on display as part of Evolve Project

Clean Air Day

Sefton Council actively participated in Clean Air Day 2019 using social media and local radio to raise awareness.

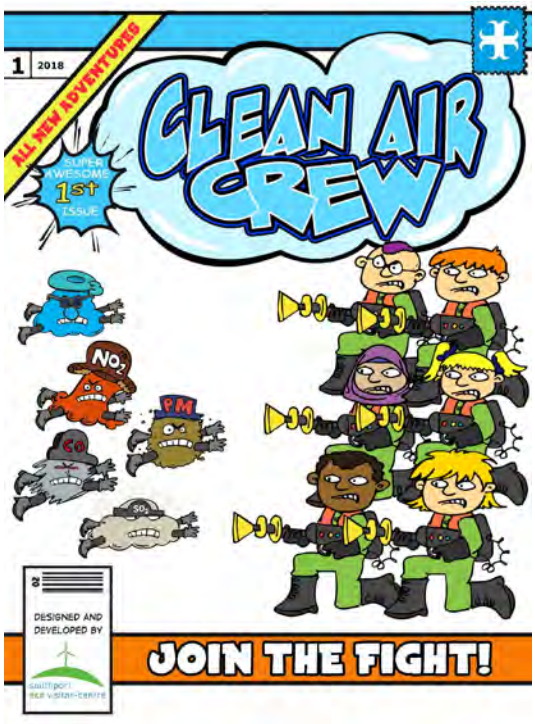
Examples of media releases are provided below.

Schools AQ Day

A schools' air quality event was organised by Sefton's ECO Centre Teachers and officers from the sustainability team. The Event was a great success and 20 pupils from local schools were involved throughout the day undertaking classroom based exercises and quizzes followed by an expert panel Q and A session.

Schools Air Quality Project

The Schools air quality project which commenced in 2017/2018 detailed in last year's ASR was delivered to an additional 6 Schools and the schools interactive website was further developed and launched at the schools air quality event mentioned above. The link to the website is provided here https://www.southportecocentre.com/cleanaircrew



Air Quality Information– Variable Matrix Signs (VMS)

Positive air quality messages and current air pollution levels can now be displayed on the Boroughs variable matrix signs. Positive air quality messages are displayed to encourage behaviour change including making alternative choices which can improve air quality. Daily pollution levels monitored by the Council's automatic monitoring stations are also displayed providing important information to the public. The signs are also used to display important traffic information which can avoid/alleviate traffic congestion. An additional 2 VM signs are currently being procured to improve the current network.

VMS sign -Brooms Cross Road

Conclusions and Priorities

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 in the Borough at the present time, due to the scale of the expansion and the potential for this to impact on air quality in existing AQMAs and also impact on public exposure receptor 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 will bring significant 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.

Highways England are currently progressing a port access improvement project which entails the construction of a new carriageway through the Rimrose Valley, linking to Brooms Cross Road (Thornton to Switch Island Link).

The next stages in the process are

- **Development phase**. Focus at this stage is on the design and environmental assessment of the selected option, taking it through all statutory processes to where the decision to build can be made. This includes preliminary design, community consultation, statutory procedures and powers, construction preparation and commitment to construct.
- **Construction phase**. This stage involves construction of the chosen option, commissioning, handover for operation and opening of the road to traffic.

Highways England has been producing newsletters to keep local Sefton residents updated on progress on this project. Further information on the A5036 road improvements and the latest published newsletters can be viewed at the following link:

http://www.highways.gov.uk/roads/road-projects/a5036-port-of-liverpool-access/

The route improvement work is predicted to start in 2023. This however is still a number of years away and assessing the impact increased traffic flow may have on air quality between now and when the new road opens is also being undertaken by Sefton as part of the ongoing CAZ feasibility work.

Local Engagement and How to get Involved

Sefton's air quality communication plan has been further developed as part of Sefton's 2030 vision of a cleaner, greener and healthier Borough

The overall communications aim is to increase people's knowledge of the importance of air quality, and in doing so encourage less polluting choices.

A key objective throughout the campaign is to encourage behaviour change that will positively impact on Sefton's air quality.

Communications will ensure that key audiences understand the Council's role in protecting air quality across the borough and also educate them on how they as businesses and individuals can contribute towards maintaining a clean, green and beautiful borough.

Sefton also engages with local groups through officers undertaking presentations on Air Quality and Health. Officers also attend local Health and Wellbeing forums.

Sefton has delivered a schools' air quality project where it engaged with primary school children at 16 local schools in close proximity to Sefton's AQMA's.

In late 2018 Sefton held a community engagement event around the Governments Clean air Strategy and used the views and comments from members of the public in attendance to formulate a formal consultation response to the strategy.

Local ward Councillors and officers attend residents' meetings regarding the issues surrounding the port expansion and the proposed road improvement scheme. AQ officers have briefed Councillors on the AQ issues related to these meetings.

Sefton maintains the public Breathing Space website where you can get more information on air quality in Sefton. On Breathing Space you can gain access to the latest results from all the electronic monitoring stations in the Borough, which are updated hourly, and also all historic air quality data that has been carried out using the following link: http://breathingspace.sefton.gov.uk/

The website also contains Local Air Quality Management (LAQM) reports that have been submitted to Defra. These include Air Quality Progress reports, Updating and Screening Assessment reports, Detailed and Further Assessment reports, Air Quality Action Plans and Action Plan Progress reports and will include all future Annual Status Reports. Various air quality Technical reports that have been completed are also included in this section of the website.

Further information on air quality is also available on Defra's air quality website:

https://uk-air.defra.gov.uk/

Public Health Annual Report

The Director of Public Health is required to produce an annual report on the health and wellbeing of their population highlighting key issues. Sefton's Public Health Annual Report (PHAR) for this year takes a closer look at the issue of air quality. The report takes the form of a short animation supported by a fact file. This explains what air pollution is, where it comes from and what happens when we breathe it in. The report also looks at what we are doing as a Council to try and improve air quality along with what individuals can do also.

The link to the PHAR 2018/2019 is found below:

https://www.sefton.gov.uk/public-health/public-health-annual-report.aspx

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.
- 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 example for over 30 seconds switch off your engine to reduce air pollution.

Other things you can do:

- Don’t burn garden or domestic waste. This not only releases pollutants into the atmosphere, 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-recycling/.aspx

- 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.

- 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.

- If you are using a stove or other appliance you can usually use normal wood as well as smokeless fuels. Usually wood that has been kiln dried or seasoned to have a lower moisture content will be much less polluting, as much as 50 per cent less pollution than emitted from burning fresh logs. Drier wood is also more efficient, producing more heat per log.

- Wood that has the Woodsure Ready to Burn label is certified to have a low moisture content, for a full list of suppliers see the list on the Woodsure website. https://woodsure.co.uk/

- You should not burn old pallets, furniture or scrap wood as it may contain contaminants that can be harmful to your health and the environment.

- It is important to store your fuels correctly to make sure your wood does not get damp from the rain or damp in the ground.

- Additional information on the use of solid fuels and how to reduce pollution can be found here. www.burnright.co.uk BurnRight is a national consumer awareness campaign which seeks to address the issue of domestic combustion and unnecessary air pollution. It is particularly concerned with the issues concerning wood burning stoves.

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1 Local Air Quality Management

This report provides an overview of air quality in Sefton during 2018. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Sefton can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=226 – see full list at https://uk-air.defra.gov.uk/aqma/list. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
AQMA2 Princess Way	2009	NO2 Annual Mean	Seaforth	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/m3	39.0 …	µg/m3	Draft Air Quality Action Plan for Sefton Council	2015	http://breathingspace.sefton.gov.uk/AssessRepDocs/Action_Plans/Draft_AQAP_AQMAs_1-5_2015.pdf
AQMA3, Millers Bridge	2009	NO2 Annual mean	Bootle	An area encompassing a number of residential properties around the junction of Millers Bridge (A5058) and Derby Road (A565)	No	60	µg/m3	50.7	µg/m3	Draft Air Quality Action Plan for Sefton Council	2015	http://breathingspace.sefton.gov.uk/AssessRepDocs/Action_Plans/Draft_AQAP_AQMAs_1-5_2015.pdf

AQMA Name	Date of Declaration	Pollutants and Air Quality Objective	City / Town	One Line Description	Is air quality in the AQMA	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
AQMA4, South Road	2012	NO2 Annual mean	Waterloo	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/m3	38.0	µg/m3	Draft Air Quality Action Plan for Sefton Council	2015	http://breathingspace.sefton.gov.uk/AssessRepDocs/Action_Plans/Draft_AQAP_AQMAs_1-5_2015.pdf
AQMA5 Hawthorne road	2012	NO2 Annual mean	Litherland	An area encompassing a number of residential properties around the junction of Hawthorne Road (B5058) and Church Road (A5036).	No	42.6	µg/m3	36.4	µg/m3	Draft Air Quality Action Plan for Sefton Council	2015	http://breathingspace.sefton.gov.uk/AssessRepDocs/Action_Plans/Draft_AQAP_AQMAs_1-5_2015.pdf
AQMA3, Millers Bridge	2009	PM10 24 Hour Mean	Bootle	An area encompassing a number of residential properties around the junction of Millers Bridge (A5058) and Derby Road (A565)	no	46	exceedances	1	exceedances	Draft Air Quality Action Plan for Sefton Council	2015	http://breathingspace.sefton.gov.uk/AssessRepDocs/Action_Plans/Draft_AQAP_AQMAs_1-5_2015.pdf

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

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

DEFRA's Commentary on Sefton's 2018 ASR

Defra's appraisal of last year's ASR is summarised below in bullet points along with actions taken by Sefton in response to these comments ***(in italics and bold)***

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

1. Site NFI (Heman Street) was in exceedance, at 42.0µg/m^3. Previous year's results have shown this site to be compliant, as such no immediate cause is identified. The Council are aware of this site and should results over the next reporting period conclude similar findings the Council should move to declare this area as an AQMA. ***Additional monitoring commenced in 2018 around this location. Results showed that levels in the area were below the NAQS objective and AQMA declaration was not considered necessary in 2018. Monitoring is continuing to ensure levels remain below the NAQS objectives.***

2. The AQAP is very good, containing specific measures targeting AQMAs, dates, KPIs/reduction targets, and discussion of progress/barriers. However nearly all measures have been completed to date. This is a great achievement and has led to improved air quality in the Borough. However, with all measures complete and a number of major developments in progress the Council should look to update their plan accordingly (especially in the context of continued exceedances in AQMAs). For further guidance please refer to LAQM Technical Guidance 16 (TG16). ***Sefton's AQAP's are currently being updated and will be submitted to DEFRA by the end of 2019***

3. It is unclear if annualisation has been applied for sites NCI, NEX, NC14, and NC112. While it is stated that annualisation has been applied, review of data tables indicates that this may not be the case. Future reports should include example calculations and screenshots for all corrections. For further guidance please refer to TG16. ***Annualisation of all monitoring data with less than 85% capture***

(continuous) and 75% capture (for diffusion tubes) has been applied. Supporting evidence of these calculations is provided in the appendices.

4. The report states that the monitoring programme was recently reviewed. However, it appears that only 2 new sites were added in the last reporting period. After corrections have been applied many sites are well below objective limits. In this regard, the Council may wish to consider reviewing their monitoring strategy, ideally redeploying these resources to identify new hotspots or the impact or major developments. For further guidance please refer to TG16. ***A number of monitoring locations have been reviewed and where appropriate monitoring has been relocated.***

5. The Council have a number of measures to address $PM_{2.5}$ issues, alongside appropriate monitoring. The report provides good discussion of $PM_{2.5}$ however future reports should also relate to the Public Health Outcomes Framework. For further guidance please refer to TG16. ***The PHO framework has now been referenced in the section on $PM_{2.5}$***

6. The Council are currently undertaking a Clean Air Zone feasibility study, due to be completed in late 2018. The results of this should be included in the discussion elements of next year's reports. Especially if it is used as a basis to introduce new monitoring locations, AQAP measures. ***The CAZ feasibility study has been completed but later than expected-the results of the study and proposed future actions are discussed in the body of the report***

7. AQMA designations should remain until continual compliance of AQOs is achieved for NO_2 sites. Continual compliance has been achieved for AQMA3 PM_{10} 24-hour mean. As such AQMA 3 should be revoked for PM_{10} 24-hour mean. ***Work is due to commence on the revocation of AQMA3 for PM_{10} 24-hour mean***

8. The Council are undertaking a number of stakeholder engagement activities, which are supported and encouraged. ***These events will continue to be developed and delivered during the forthcoming year***

9. It is encouraging to see the formation of a new strategic air quality steering group (made of relevant stakeholders). The group should be use their expert

and local knowledge to develop and support further AQAP measures. ***The Air Quality steering group has evolved into the Air quality Members reference group. The group continues to steer the Councils efforts in regard to improving air quality in the Borough***

10. Generally, the report is very good and detailed. The Council should continue their hard work and aim to bring areas of concern into compliance as soon as possible.

Specific Air Quality Improvement Actions

Sefton has taken forward a number of direct measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Sefton has also undertaken additional action/measures to further improve air quality – These are discussed in detail below

More detail on these measures can be found in their respective Action Plans

http://breathingspace.sefton.gov.uk/AssessRepDocs/Progress_Reports/AQAP_Progress_Report_2015.pdf

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

Sefton Council Draft Action Plan measures consist of 11 general measures that are applicable to all AQMA's and a number of site specific measures that are applicable to each individual AQMA. General measures GM1 - GM11 have all been implemented.

Please note the AQAP is currently being updated to include the additional air quality improvement measures discussed after the site specific measures detailed below

Key site specific measures that have been completed are as follows:

AQMA 2 Princess Way, Seaforth

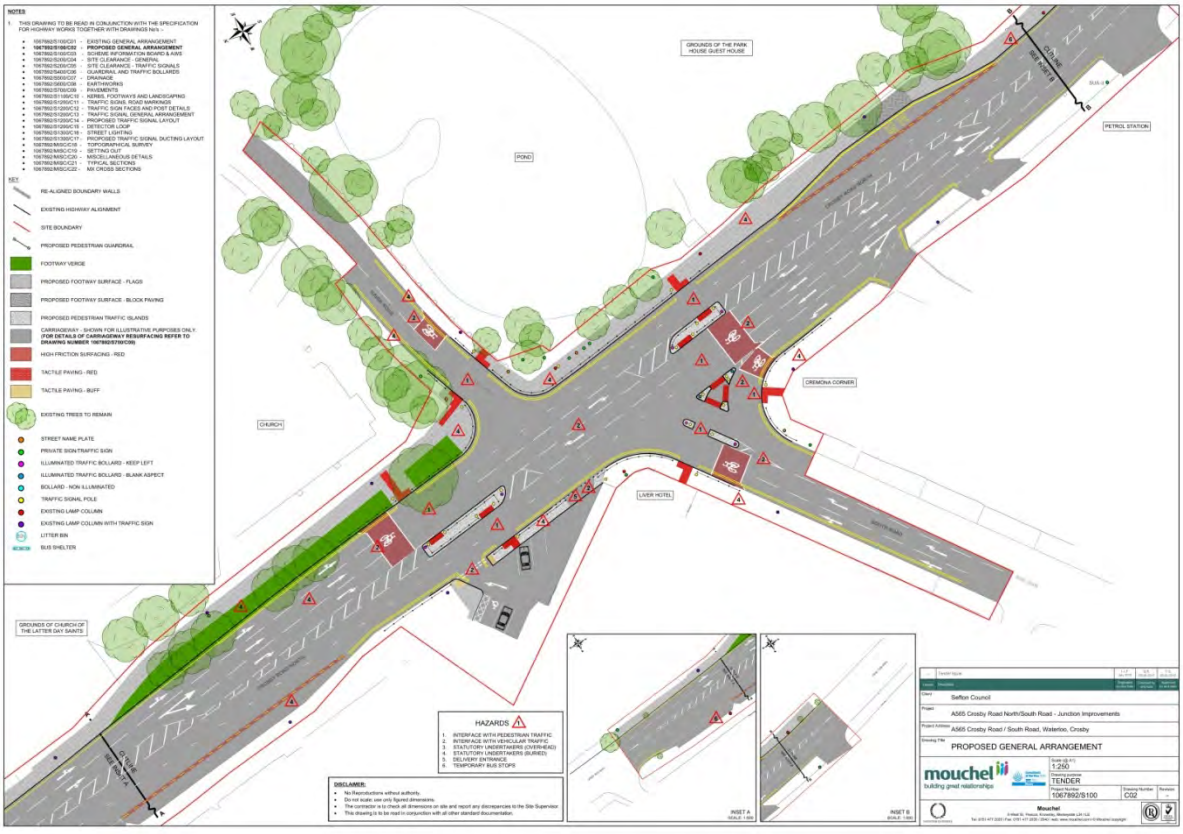
- Port of Liverpool booking system introduced.
- Specialised goods vehicle count to gain information on HGVs travelling to and from the port of Liverpool on the A5036 & A565 completed. Information gained is being used to support further port expansion mitigation measures.
- Port expansion mitigation measures: (i) Highways England port access A5036 road options study - stage 1 completed. (ii) HGV parking demand study stage 2 report completed. (iii) Defra funded alternative fuels strategy (AFS) for HGVs & buses for the Liverpool City Region project completed.
- ECOSTARS fleet recognition scheme funding secured to continue for a further 2 years.
- Port expansion mitigation measures: (i) Highways England port access A5036 road options stage 1 study completed. Offline route option chosen. Further detailed assessment of this option now underway by Highways England and their consultant.

AQMA 3 Millers Bridge, Bootle

- Hurry Call traffic light management system to allow HGVs passage through traffic lights at Millers Bridge during non-peak hours without having to stop/start implemented.
- Improved dust control achieved at industrial installations operating within the Port of Liverpool through the environmental permitting regime, resulting in reduced fugitive dust emissions affecting Millers Bridge.
- Intensive regular pavement/ road washing/cleaning to reduce re-suspended dust implemented. However, measure now discontinued due to funding. Measure was shown to be successful in reducing PM_{10} levels during the drier summer months.
- ECOSTARS fleet recognition scheme funding secured to continue for a further 2 years.

AQMA 4 South Road, Waterloo

- Work on the South Road/ Crosby Road North/Haigh Road junction improvements has been completed (May 2017). A map of the junction improvements is shown below



- With regard to **AQMA4 Waterloo** declared for NO_2 Annual Mean exceedances the junction improvement detailed above works have had a positive effect on reducing levels of NO2 within the AQMA boundary. NO2 Levels at all receptors within the AQMA in 2018 were below the NAQS objective. As there is currently only 1 complete year of monitoring data Sefton intends to continue to monitor in 2019 and review the case for revocation following the analysis of 2019s data.

AQMA 5 Hawthorne Road, Litherland

- As AQMA 2

Additional Air Quality Actions underway/Planned

In addition to those measures detailed above and specified in the AQAPs a number of additional actions and interventions aimed at improving air quality in Sefton are currently underway.

Clean Air Zone CAZ Feasibility Study

A number of air quality actions as detailed above have already been implemented to improve air quality in Sefton's AQMA's. Whilst these have had some success in reducing air pollution there is concern that due to the ongoing expansion of the port and associated additional port traffic levels of air pollution will increase in the existing air quality management areas and could also mean further air quality management areas will have to be declared.

In response to these concerns AECOM environmental consultants were appointed to undertake a detailed study of local air quality, to determine future baseline conditions of both nitrogen dioxide (NO_2) and fine particulate matter ($PM_{10}/_{2.5}$), and to understand the extent of the air quality challenge the Borough faces and the potential improvements required.

The preliminary study also determines how the implementation of a Clean Air Zone (CAZ) could reduce emissions and contribute to improvements in local air quality, health and wellbeing of the local population.

Two types of assessments were undertaken as part of the study:

- An emissions source apportionment study was undertaken to understand which types of vehicles contribute to pollution and to what degree in different key areas of Sefton in 2018, 2020 and 2025. This information is essential when developing CAZ options to understand what types of vehicles need to be targeted.
- Detailed dispersion modelling has been undertaken to determine annual mean NO_2 and PM_{10} concentrations at properties near all modelled roads within the

context of the national objectives. Modelling has been undertaken using ADMS-Roads dispersion modelling software to predict concentrations in 2015, 2020 and 2025 without the CAZ to understand how air quality within Sefton will change in the future.

Predicted Future Pollutant levels In Sefton without a CAZ or other intervention

Nitrogen Dioxide

- Annual mean concentrations of NO_2, in 2020, were predicted at all relevant receptors within 50m of the modelled road network. The concentrations were predicted to be higher in 2020 than 2025 due to projected improvements to the emissions profile through the uptake of newer vehicles and alternative technologies.
- **70 properties in Sefton were predicted to exceed the annual mean NO_2 limit value in 2020**.
- The highest concentrations were predicted to occur near the major junctions on the A5036, predominantly due to vehicles slowing and accelerating. Exceedances were also predicted to occur at the A565 junction with the A5058. The exceedances were very localised and found within existing Air Quality Management Areas and areas currently under review.
- No other areas of exceedances were identified.

Particulate Matter

- Annual mean concentrations of PM_{10} and $PM_{2.5}$ were predicted at all relevant receptors within 50m of the modelled road network.

PM_{10}

- There were no locations where annual or daily mean concentrations were predicted to exceed the respective limit values.

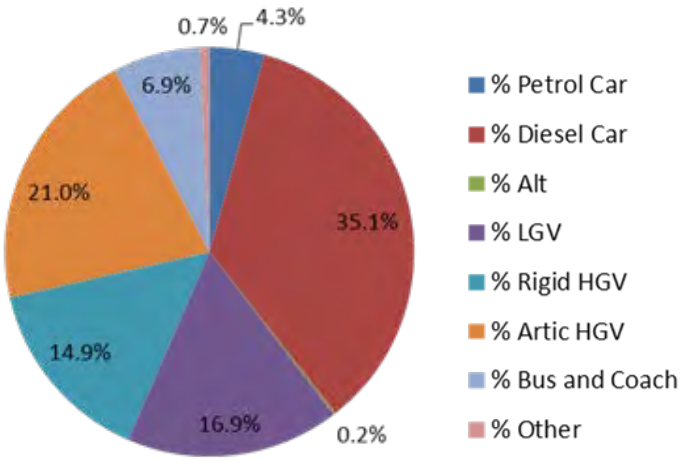
$PM_{2.5}$

- There were no locations where annual mean concentrations were predicted to exceed the annual mean target value of 25 ug/m^3.

Source apportionment

- Understanding which types of vehicles contributing to pollution and to what degree in different key areas was undertaken using Automatic Number Plate Recognition (ANPR) data. This is essential when developing CAZ options to understand what types of vehicles need to be targeted.
- The example graph below shows the source apportionment for oxides of nitrogen on the A5036. As can be seen Heavy goods vehicles and light goods vehicles contribute the majority of NOx emissions with Diesel cars also contributing a significant amount. Detailed source apportionment has been undertaken throughout the study to support the conclusions with regard to the choice of CAZ proposed.

NO_X Emissions Source Apportionment, A5036, 2020



CAZ Emissions Modelling

A Clean Air Zone (CAZ), can have two forms, non-charging or charging, and can be defined as either, (a) a geographical extent for action to improve air quality (non charging), or (b) people are required to pay a charge to enter or to move within the zone if they are driving a vehicle that does not meet the particular standard for their vehicle type in that zone. The latter type of CAZ may also be considered a Low Emissions Zone (LEZ).

- The objective of a charging (or penalty) CAZ is therefore to, (a) reduce overall emissions from vehicles operating within the zone, (b) encourage vehicle operators to consider switching to compliant vehicle types and thus leading to accelerated fleet turnover, and (c) encourage the uptake of alternative modes of travel to transfer people and goods.
- The establishment of a CAZ has been recognised as a possible tool for improving local air quality, but one which will require careful research to identify the economic, social and environmental impacts (positive and negative).

Clean Air Zone Classifications

- The Defra Plan for implementing a CAZ has defined four 'types' of CAZ The Plan also defines the equivalent Euro classification that should be applied as the minimum standard within the CAZ, whereby petrol engines should achieve Euro 4/IV and diesel engines Euro 6/VI, as shown below

The classification groups of CAZ are defined according to the following types of vehicles:

- Type A – Buses, coaches and taxis only
- Type B – Buses, coaches, taxis and heavy goods vehicles (HGVs)
- Type C – Buses, coaches, taxis, HGVs and light goods vehicles (LGVs)
- Type D – Buses, coaches, taxis, HGVs, LGVs and cars

CAZ Vehicle Classification Standards

Vehicle Type	Fuel	Minimum Equivalent Euro Classification
Cars	Petrol	Euro 4
	Diesel	Euro 6
LGV (Light Goods Vehicle, <3.5t)	Petrol	Euro 4
	Diesel	Euro 6
HGVs (Heavy Goods Vehicle > 3.5t,)	Diesel	Euro VI
Buses	Diesel	Euro VI

CAZ Model Scenarios

- AECOM have modelled the impact of implementing each type of CAZ in the Borough to predict the change in emissions that may be achieved based on the operation of a Type A, B, C, or D CAZ across the whole Borough.
- The data in the table below shows the number of properties predicted to exceed the national NO_2 annual average NAQS in 2020 (baseline) and the predicted beneficial effect of introducing each type of CAZ on the numbers of properties exceeding the standard.

Summary of Effects of CAZ Scenarios

Annual Mean NO_2	Baseline	CAZ Scenario 2020							
		CAZ-A		CAZ-B		CAZ-C		CAZ-D	
	2020	Retrofit	Replace	Retrofit	Replace	Retrofit	Replace	Retrofit	Replace
>40 µg/m^3 Properties exceeding NAQS	70	65	66	9	9	4	5	2	2

- The NO_X emissions reduction achieved by targeting buses (CAZ A) and HGVs (CAZ B) mainly affect specific road links where these vehicles types are a dominant emission source, such the A5036. However, the CAZ C and D scenarios have a more dispersed effect and will achieve benefits across the whole Borough.
- With regard to the locations where specifically high annual mean NO_2 concentrations were predicted, the CAZ B option would achieve mostly localised benefits in areas with large HGV flows. Whilst the emissions from diesel cars are similar to HGVs (both rigid and artic) on the A5036, the HGV fleet (and especially the rigid component) is generally older, and achieving Euro VI emission standards would have a greater benefit.
- It was noted that the number of properties exceeding the NO_2 limit decreased significantly between the possible implementation of a CAZ-A and CAZ-B, with relatively marginal gains in CAZ-C and D. This is likely due to the clusters of exceedances locations on the A5036, where HGVs are a major emission source and so improvements to this fleet will have a significant benefit in this area.

Conclusions/ future action CAZ Study

- The study identified key locations in the Borough where levels of Nitrogen Dioxide concentrations are likely to exceed the national standards in 2020 without further air quality interventions. 70 properties have been identified in the south of the Borough around busy junctions along the A5036 and A565 which are predicted to exceed the NO_2 annual standard (40 ug/m^3) .
- The CAZ assessment modelling determined that significant emissions reductions could be achieved in key locations by targeting buses and HGVs (CAZ-B scenario). Further reductions (although less significant) could be achieved throughout the Borough by also targeting LGVs and cars, although this would affect larger areas and be less targeted, and so the effects may be proportional to the area targeted. A non charging CAZ is likely to have little or no effect on reducing vehicle related emissions.
- Due to budget constraints, the modelled CAZ scenarios were applied to the whole of the Sefton study area and did not consider in detail the effects of the redistribution of non-compliant vehicles. It is considered that, for Sefton, a more targeted CAZ(s) focusing on a smaller defined area encompassing our pollution hotspots would be more appropriate than a Borough wide CAZ.

Future Actions

- Following the outcome of the CAZ study officers are currently assessing the exceedance modelling to determine the specific locations of all predicted exceedances and whether further monitoring or indeed AQMA declaration is required. This will be reported fully as part of next years ASR.
- Additionally the Council is looking to undertake further traffic modelling studies to determine the redistribution effects of implementing CAZ(s) in the Borough.

E-Taxi Evolve Project

Sefton has recently commissioned environmental consultants Electric Blue to undertake an E Taxi project with the aim of helping to improve the uptake of Electric Taxis, inform the taxi trade of the options available with regard to EV taxis and provide information regarding the most appropriate locations for taxi EV charging points.

50 taxi's both private hire and Hackney have been fitted with telematic devices by electric blue .

The devices gather the following data from each Taxi vehicle

- Mileage driven and time vehicle was turned on.
- Routes driven.
- Location(s) and times of vehicle idling.
- Location(s) and times when vehicle is turned off.
- Emissions created - Carbon and NOx

The results of the data collection exercise is analysed and used to produce a report which shows whether changing to an EV is feasible and what the expected economic and environmental savings are . The savings are based on a direct comparison of real journeys undertaken in traditional diesel taxi compared to the same journeys undertaken using an E-taxi. Each taxi driver will receive a personalised report and the Local Authority will receive a collated report. A Taxi engagement day is to be arranged to engage with local Taxi firms, present the general results and conclusions from the project and further promote the use pf EV's

The Sefton Evolve project is underway with the telematic devices currently installed and gathering data within the 50 participating taxis . The results are due to be analysed in August 2019 with the results being presented at the taxi engagement event in September / October 2019. The possibility of installing an additional 3 EV charging points for use by EV taxi's is also being investigated.

Millers Bridge Junction Improvements (AQMA3)

Levels of NO_2 within AQMA3-Millers Bridge are still above the annual average NAQS objective. In an attempt to improve congestion in the area work has commenced on improving traffic flow and reducing emissions along this key route as detailed 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 are also to be made to the Millers Bridge junction which is designed to improve traffic flow through this area.

It is anticipated that on completion of these works levels of NO_X and NO_2 within AQMA 3 will reduce . The scheme is likely to be completed by the end of 2019. The Council has an extensive monitoring network around this AQMA so any reductions in NO_2 as a result of the improvement works will be recorded and presented as part of next years ASR.

Intensive Road Washing (AQMA2, AQMA3, AQMA5)

Following recent visual inspections of road and pavement conditions within AQMA2, AQMA3 and AQMA5 it was apparent that large accumulations of debris and road grime have accumulated. Seton undertook a successful intensive road/ footpath cleaning project previously and is in the process of designing a further scheme focusing on the 3 AQMA's above with a view to reducing the level of re-entrained dust particulates. The project is due to start following the completing of the Millers

Bridge junction improvement works and the outcome of the scheme will be detailed in next years ASR.

Joint Work with DVSA

Officers from Sefton are currently looking at opportunities to work jointly with DVSA (Driver and Vehicle Standards Agency) on the detection of HGV emission cheat devices. DVSA undertook an emission cheat device project in 2017/18. Officers from DVSA detected approximately 8% of HGV's stopped had some form of emissions cheat device fitted. These systems bypass the vehicles emissions control systems leading to much higher levels of particulates and NOx being emitted. The possibility of utilising a mobile air pollution monitoring vehicle to assist in the detection of these HGV's is being explored by Sefton's officers in conjunction with DVSA.

Schools Air Quality Project

Sefton Council continues to work closely with schools to ensure that its youngest residents are aware of both the causes and risks of air pollution and the steps they can take to avoid it. A further 6 Schools have participated in the AQ educational sessions. Additionally Southport Eco Center launched it's 'Clean Air Crew' website on Thursday June 20th to co-incide with Clean Air Day, which contains teaching resources and interactive learning opportunities. The site has been developed thanks to active engagement with schools and can be found at www.southportecocentre.com/cleanaircrew

Compliance in Sefton's AQMAs

- Sefton is satisfied that the measures stated above and in Table 2.2 below have achieved compliance in **AQMA 3 Millers Bridge** declared for PM_{10} 24hour mean with consistent ongoing compliance for a number of years. The Council is looking to make the necessary arrangements to revoke this particular AQMA declared for PM_{10} 24hour mean.
- With regard to **AQMA4 Waterloo** declared for NO_2 Annual Mean exceedances the junction improvement detailed above works have had a positive effect on reducing levels of NO_2 within the AQMA boundary. NO_2 Levels at all receptors within the AQMA in 2018 were below the NAQS objective. As there is currently only 1 complete year of monitoring data Sefton intends to continue to monitor in 2019 and review the case for revocation following the analysis of 2019 data.
- Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Sefton anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve ongoing compliance and enable the revocation of **AQMA2 Princess way** (NO_2 Annual Mean), **AQMA3 Millers Bridge** (NO_2 Annual Mean) and **AQMA5 Hawthorne Road** (NO_2 Annual Mean). As a result of the completion of the CAZ feasibility study in spring 2019 a CAZ implementation working group has been formed which has been tasked to explore the possible implementation of 1 or more CAZ(s) within the Borough to tackle the NO_2 annual mean exceedances in these AQMA's. The initial inception meeting has been held with a project plan currently being developed.
- Sefton's Draft Action Plan for AQMAs 1-5 are due to be updated to include the specific findings from the CAZ feasibility study and the other additional AQ actions/interventions currently taking place as detailed above.
- The detailed modelling resulting from the CAZ study is currently being analysed to determine whether any other areas of the Borough need to be declared as AQMA's or additional monitoring needs to be considered.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
AQMA2 SS1	Port Booking System	Freight and Delivery Management	Delivery and Service plans	Peel Ports	2009	2009-15	Feedback on effectiveness of port booking system via port liaison meetings	No Target pollution reduction set-hard to quantify	vehicle booking system introduced and completed in 2009.New L2 terminal operating Autogate technology introduced 2015.	completed	Reduced HGV waiting times on the port will reduce pollutant emissions from the port estate affecting AQMA.
AQMA2 SS2	ANPR Specialised goods vehicle count	Traffic Management	Other	Sefton MBC	2011	2012	Analysis of information and interpretation of data to further inform action plan	N/A	Completed	Completed	Measure was used to gain information on HGV's travelling to and from the port on the A5036 and A565. Information used to support new port expansion mitigation and Eco Stars measures.
AQMA2 SS2	Port expansion mitigation measure No1 Highways England 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	Highways England	2013	2013-2022	Compliance with the NO2 air quality objective. New road built to timescales	No Target pollution reduction set-hard to quantify	Stage1 offline option chosen. Detailed assessment underway by HE consultants	potentially not until 2022 when new road is built	Awaiting detailed assessment from consultants

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
AQMA2 SS2	Port expansion mitigation measure No3. Alternative fuels strategy for HGV's and buses	Vehicle Fleet Efficiency	Other	Sefton MBC	2014	2015-2016	Results of study to inform decision making process	N/A	DEFRA AQ grant For Alt fuels refuelling and infrastructure strategy awarded 2014. Consultant appointed 2015. Report issued 2016.	completed	Main recommendation to undertake further CAZ study being undertaken
AQMA2 SS2	Port expansion mitigation measure No4. HGV parking demand study	Transport Planning and Infrastructure	Other	Sefton MBC	2014	2014-2016	Robust assessment of HGV parking	no Target pollution reduction set-hard to quantify	Stage 2 report completed. Detailed phase 2 study on preferred HGV parking site underway.	end 2016	Council to take forward recommendations.
AQMA2 SS3	ECOstars Vehicle fleet recognition scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Sefton MBC and Transport Research Laboratory	2013	2013-2015	compliance with target to recruit 25 members completed	no Target pollution reduction set-hard to quantify	ECOstars commenced 2013,funded by DEFRA AQ grant, to run initially for 2 years. Formal launch in 2014. Recruited 50 operators	completed/ongoing	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	Sefton MBC	2010-2011	2011	Number of activations of hurry call system	No Target pollution reduction set-hard to quantify	Implemented July 2011. Number of activations of the system per hour reviewed and system continues to show that the system is working well.	completed	Difficult to quantify emissions reduction, but number of activations outside of peak hours indicate successful in facilitating HGV passage through traffic lights and reducing NOx and PM10 emissions.

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
AQMA3 SS2	Control of dust from industry	Environmental Permits	Other	Sefton MBC/Environment Agency	2010-2011	2011	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 PM10 daily mean standard when predominantly north westerly winds. 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 PM10 daily mean standard when predominantly north westerly winds.	no Target pollution reduction set- hard to quantify	Meetings with EMR and EA. New EMR dust management plan produced 2010. Number of exceedances of PM10 24-hour mean when wind direction from the direction of the port continues to remain low.	completed	Compliance with PM10 AQOs achieved. Improved dust control at EMR & relocation of JMD Haulage has significantly contributed to reducing PM10 levels at Millers Bridge.

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
AQMA5 SS1	Port expansion mitigation measure No 3 Alternative Fuels Strategy for HGVs & buses	Vehicle Fleet Efficiency	Other	Sefton MBC	2014	2015-2016	Results of study to inform decision making process	no Target pollution reduction set- hard to quantify	Defra AQ grant for HGV alternative fuels refuelling infrastructure & strategy awarded 2014. Consultant appointed in 2015. Report issued2016.	completed	Main recommendation to undertake further CAZ study being undertaken
AQMA5 SS1	Port expansion mitigation measure No 4 HGV parking demand study	Transport Planning and Infrastructure	Other	Sefton MBC	2014	2015-2016	Robust assessment of HGV parking	No Target pollution reduction set- hard to quantify	Consultant appointed in 2015 to carryout .project Report issued March 2016.	completed	Council to take forward recommendations.
AQMA5 SS2	ECO Stars fleet recognition scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Sefton MBC	2013	2013-2015	Compliance with target to recruit 25 operators in the 2 years of scheme operation	no Target pollution reduction set- hard to quantify	ECO Stars commenced 2013, funded by Defra AQ grant, to run initially for two years. Formal launch in 2014. 50 operators recruited.	completed/ongoing	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	Sefton MBC	2017	2017-2018	Compliance with NO2 objective in AQMA	no Target pollution reduction set- hard to quantify	Junction improvement works now completed – Compliance observed in 2018 -further monitoring to continue in 2019 to assess continued compliance	completed	Compliance with NO2 limit value in AQMA4 achieved in 2018. Continuing to monitor in 2019

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
			vehicle priority, bus priority, high vehicle occupancy lane								
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	Sefton MBC	2018	2018-2020	Compliance with NO2 objective in AQMA	no Target pollution reduction set- hard to quantify	Millers Bridge Junction improvement works currently underway	ongoing	Works ongoing - once completed will review impact new junction has on reducing congestion and emissions
GM1	SCOOT	Traffic Management	UTC, Congestion management, traffic reduction	Sefton MBC	2010	2010	Liaison with Sefton Council Highways Maintenance Manager on optimisation of the SCOOT system	No target pollution reduction set - difficult to quantify	Implemented 2010	Completed	SCOOT system is optimised and operating successfully.
GM2	Variable Message Signs(VMS)	Public Information	Via other mechanisms	Sefton MBC	2010	2010-2013	Ensure system operating effectively	No target pollution reduction set - difficult to quantify	Implemented 2013	Completed	VMS system operational since July 2013 and linked to Sefton Council breathing space air quality website to display current levels.
GM3	Work Travel Plans	Promoting Travel Alternatives	Workplace Travel Planning	Sefton MBC	2010	2010	Number of work place travel plans implemented	No target pollution reduction set - difficult to quantify	implemented 2010	completed	

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
GM5	Cycling & Walking	Promoting Travel Alternatives	Promotion of cycling	Sefton MBC	2010	2010	Increase in participation	No target pollution reduction set - difficult to quantify	Implemented 2010	Completed	
GM6	Land use planning	Policy Guidance and Development	Air Quality Planning and Policy Guidance	Sefton MBC	2010	2010	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	No target pollution reduction set - difficult to quantify	Implemented 2010	Completed	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	Sefton MBC	2010	2010	Number of LES measures implemented	No target pollution reduction set - difficult to quantify	Implemented 2010	Completed	Increasing number of EV charging points installed.
GM8	Tree planting	Other	Other	Sefton	2010	2010	Number of trees planted within AQMA. Compliance with the PM10 air quality Objectives	No target pollution reduction set - difficult to quantify	Implemented 2010	Completed	
GM9	AQ awareness	Public Information	Via other mechanisms	Sefton MBC	2010	2010	Maintenance of Sefton Council air quality website. Number of AQ awareness events	No target pollution reduction set - difficult to quantify	Implemented 2010	Completed	

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
GM10	Freight Quality Partnership (FQP)	Freight and Delivery Management	Other	Merseytravel	2010	2010-ongoing	Number of meetings held. Number of AQ initiatives undertaken	No target pollution reduction set - difficult to quantify	Implemented 2010	Completed	
GM11	Taxi Quality Partnership (TQP)	Promoting Low Emission Transport	Taxi emission incentives	Merseytravel	2011-2012	2013-ongoing	Number of operators participating	No target pollution reduction set - difficult to quantify	Implemented 2013	Completed	
GM - Solid Fossil Fuel Project	Solid Fossil Fuel Project	Other	Other	Sefton MBC and DEFRA grant	2018	2019-2020	improvement in levels of PM2.5 following implementation of behaviour change solid fossil fuels project	No target pollution reduction set - difficult to quantify	Received grant - currently recruiting project officer	ongoing	
GM- E Taxi project	Evolve -E - Taxi project	Promoting Low Emission Transport	Other	Sefton MBC	2018	ongoing	Number of drivers/operators choosing RV taxi	No target pollution reduction set - difficult to quantify	Journey Assessments currently being undertaken by consultant	ongoing	
GM- Schools Project	Schools Air Quality project	Other	Other	Sefton MBC	2018	ongoing	Number of Schools participating in AQ sessions	No target pollution reduction set - difficult to quantify	AQ session delivered to 15 schools already- currently looking for further funding . Clean Air Crew website launched.	ongoing	

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

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

Sefton Council is already taking a number of measures to address $PM_{2.5}$, as many of the existing measures in the current Air Quality Action Plans to reduce PM_{10} also serve in reducing $PM_{2.5}$, see **Table 2.2**. These include:

- Traffic Management measures - SCOOT and Hurry Call systems.
- Promoting Alternative Travel through school and workplace travel plans and encouraging walking and cycling.
- Reducing dust emissions from industry through the 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/South Road Junctions.
- Addressing particulate matter through the land use planning and development control system.

Additional actions likely to reduce levels of $PM_{2.5}$

Domestic Solid Fuel Behaviour Change Project (DEFRA Grant)

Following recent research evidence 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 grant fund to the sum of £100,000. The grant will be utilised to undertake a domestic solid fuel behaviour change project The primary aim of the 18 month project is to minimise the Particulate Matter (PM) contribution from domestic solid fuel use in Sefton. A summary of the main activities to be undertaken is provided below:

- Purchase of dual PM_{10}/$PM_{2.5}$ monitor to be located at one of Sefton's existing AQ monitoring sites. (utilising £10,000 match funding)
- Determination of current $PM_{2.5}$ levels in area chosen. This could include testing to validate extant modelled, larger-scale estimates of PM from domestic fuel burning (would use portion of in house match funding)
- 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. Supportive, early engagement to enable more trusting and effective collaboration
- 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 website to promote good practice in terms of domestic solid fuel use, including storage and choice of fuel, routine use and maintenance of systems, choice of appliance and details of requirements in relation to SCAs.
- Evaluation of project using monitoring data from actual $PM_{2.5}$. monitoring.
- Review on options to expanding Sefton's network of Smoke Control Areas.

The recruitment of the project officer to undertake the study is currently underway along with the procurement of the $PM_{2.5}$ monitor. Further updates will be provided to DEFRA as part of the ongoing monitoring of the overall project. Additionally Meetings have been held with HETAS to explore how we can work collaboratively on this project.

Smoke Control Areas

Large parts 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.

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

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.

Intensive Road Washing

Following recent visual inspections of road and pavement conditions within AQMA2, AQMA3 and AQMA5 it was apparent that large accumulations of debris and road grime have accumulated. Seton undertook a successful intensive road/ footpath cleaning project previously and is in the process of designing a further scheme focusing on the 3 AQMA's above with a view to reducing the level of re-entrained dust particulates. This is also predicted to reduce levels of pm2.5 being re-entrained into the atmosphere. The project is due to start following the completing of the Millers Bridge junction improvement works and the outcome of the scheme will be detailed in next years ASR.

Particulate Control at Construction/Demolition sites

Through the planning process officers in the air quality team recommend the inclusion of formal conditions requiring the implementation of dust control measures for large construction and demolition sites. This helps reduce and mitigate the release of particulates during the construction phase of a development.

$PM_{2.5}$ monitoring

In July 2017 $PM_{2.5}$ monitoring at the existing Millers Bridge air quality station commenced, in light of the clear evidence of the health effects of $PM_{2.5}$ and to monitor this in the context of port expansion.

As part of the domestic solid fuel behaviour change project a further $PM_{2.5}$ monitor is to be installed. This will provide further information and specific data on levels of this pollutant within the Borough

As a greater understanding of the areas and $PM_{2.5}$ emission sources that need to be targeted in Sefton is developed through actual monitoring, further measures to reduce $PM_{2.5}$ may need to be implemented as necessary in consultation with colleagues in Public Health.

Health impacts of fine particulate matter ($PM_{2.5}$) in Sefton

Public Health Outcomes Framework

The Public Health Outcomes Framework (PHOF) includes a modelled estimate of mortality attributable to particulate air pollution (indicator 3.01)[4]. This is one of 161 indicators in this national dataset and is listed under the Health Protection domain. Indicator 3.01 is published annually, and the latest figure is from 2017; it applies to the whole local authority area.

Methodology

The indicator is defined as, 'the fraction (%) of annual all-cause adult mortality attributable to anthropogenic (human-made) particulate air pollution measured as fine particulate matter, PM2.5.' Exposure is determined from 1km x 1km background (Automatic Urban and Rural Network) $PM_{2.5}$ monitoring data supplied by DEFRA with corrections and additional data applied to isolate exposure from man-made $PM_{2.5}$ (in recognition that this is the modifiable component).

The estimated contribution of $PM_{2.5}$ to annual deaths in adults from any cause is calculated by applying a relative risk of 1.06 for each 10 µg/m^3 increment in $PM_{2.5}$ to local mortality rates. This provides an estimate of the added mortality risk above and

[4] https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/3/gid/1000043/pat/6/par/E12000002/ati/102/are/E08000014/iid/30101/age/230/sex/

beyond the contribution from other risk factors, for example smoking, obesity, diabetes, and the multiple effects of poverty. (Differences in exposure to these risks account for differences in small area mortality rates and life expectancy, i.e. health inequalities.) An estimate of deaths attributable is derived by mapping census data onto the 1km^2 grid squares for people aged 30 and over. These small-area calculations are then summed to provide a borough-wide figure for deaths associated with $PM_{2.5}$, which is expressed as a percentage of total annual deaths.

Interpretation

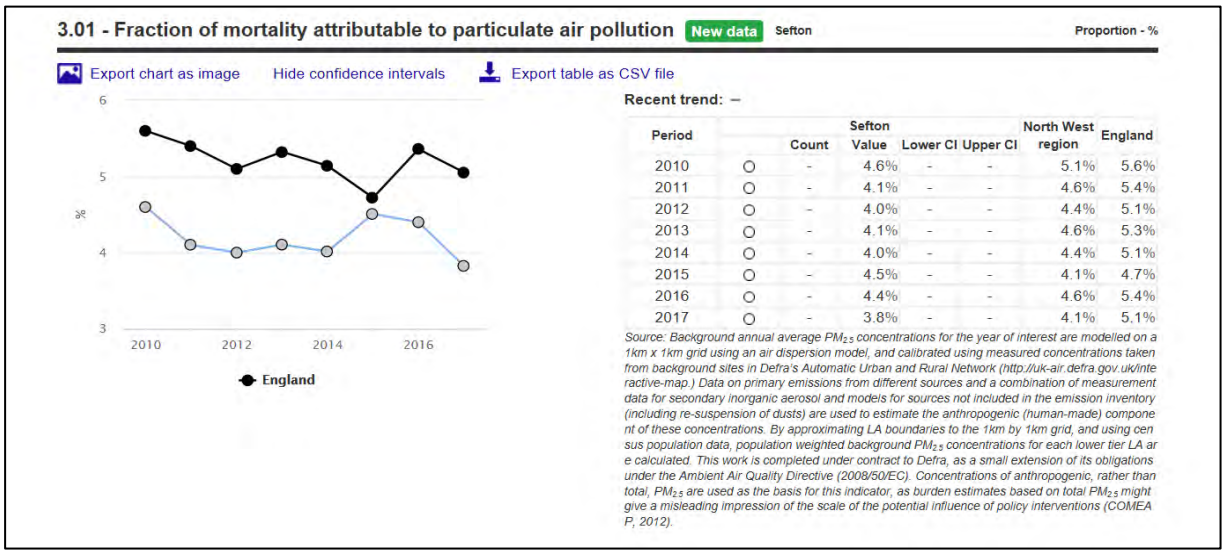
This PHOF indicator is best interpreted as a measure of harm. In reality, the harmful effects of $PM_{2.5}$ fall across a large portion of the population, but there is a greater impact on communities living in places where man-made sources co-occur and concentrations of $PM_{2.5}$ are higher on average.

PHE's Air Pollution Tool [5] uses a cut-off of less than 12.3 µg/m^3 to define 'low exposure'. For Sefton, there is no exposure recorded in the high category (13.5 µg/m^{3}or higher), but approximately 35% of the population in the 30+ age range is exposed to annual mean concentration in the 12.3 to 13.5 µg/m^3 range. Since PHOF indicator 3.01 models rising risk from 10 µg/m^3 we can say that over one third of Sefton's population is at measurable risk from $PM_{2.5}$ exposure. This emphasises the importance of pursuing universal pollution-lowering interventions as well as those that target recognised hotspots.

Mortality attributable to $PM_{2.5}$ in Sefton

In Sefton, the fraction of mortality attributable to $PM_{2.5}$ is 3.8%. This is the lowest figure since the measure was introduced in 2010 (4.6%)

[5] https://www.gov.uk/government/publications/air-pollution-a-tool-to-estimate-healthcare-costs



Sefton is in the lower half of the range of values for North West local authorities ranging from 4.6% to 2.9% and ranks 37th lowest amongst local authorities in England (range: 2.5% to 7.1%).

The PHE Air Pollution Tool estimates that in 2018 health and care costs in adults aged 18 and over associated with the full range of health problems linked to $PM_{2.5}$ (from past and continuing exposure) total £51.9 million and £10.9 million respectively.

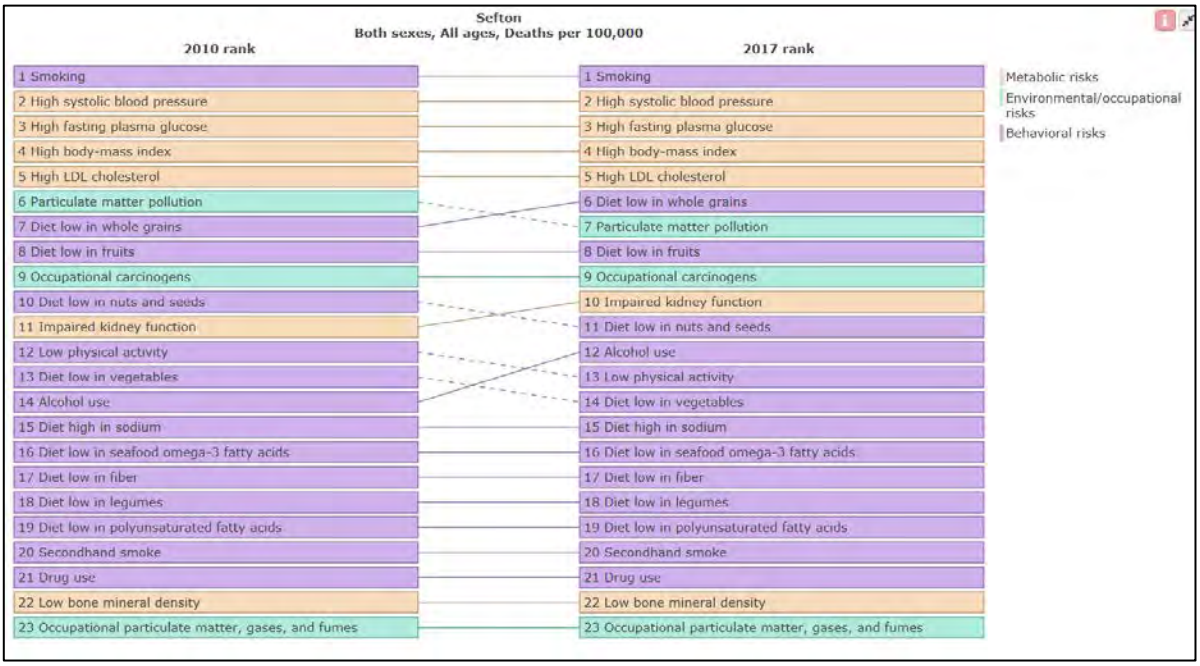
Other epidemiological resources

Global Burden of Disease data has recently been made available in an open-access format at local authority level[6]. A range of graphic representations can be used to show changes in health conditions and deaths associated with $PM_{2.5}$, ozone and occupational exposure to air pollution. The outputs are based on model or 'synthetic' estimates.

The figure below shows that air pollution (predominantly $PM_{2.5}$) now ranks 7th amongst modifiable risk factors, and that this is due an improvement in air quality over time as well as changes in the rankings of other major risks, for example falling smoking rates and rising obesity, notably increased risk from diet low in wholegrains.

Graph Cause of death rates, ranked high to low 2010 and 2017 in Sefton

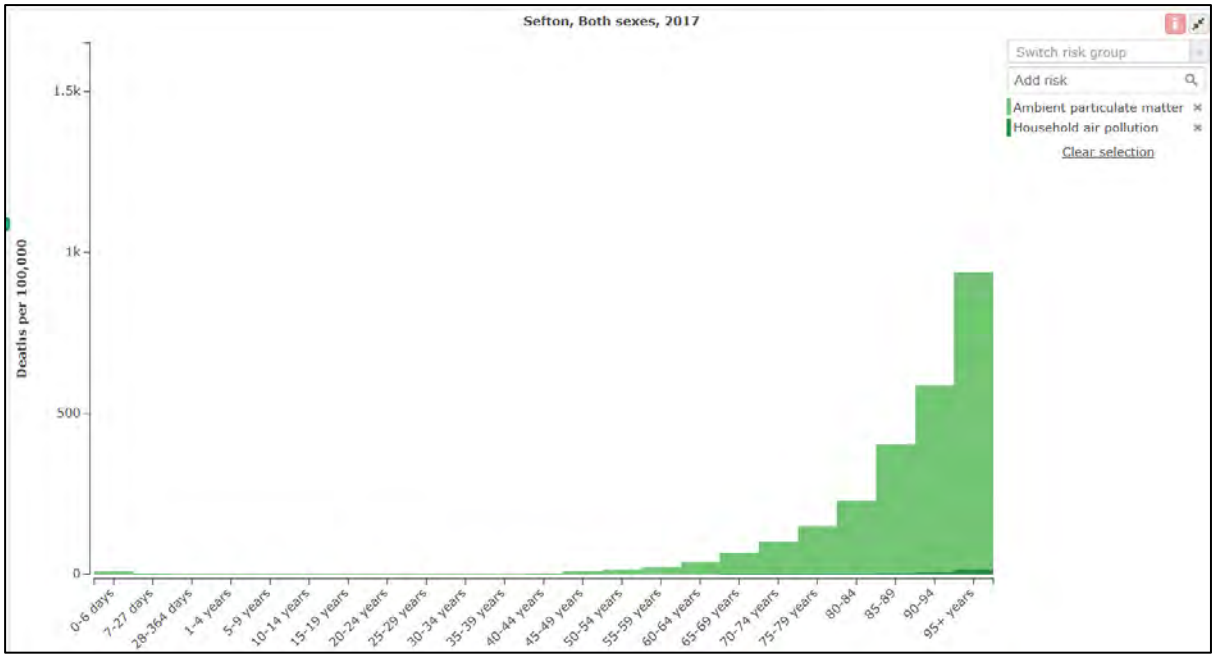
[6] https://vizhub.healthdata.org/gbd-compare/



Source: Global Burden of Disease, GBD Compare

Modelling the impact of $PM_{2.5}$ exposure in Sefton for people of different ages clearly shows that the oldest and youngest members of our communities are most vulnerable to the potentially life-limiting of air pollution. See graph below.

Graph mortality rate attributable to particulate matter and household air pollution in Sefton, by age, 2017



Source: Global Burden of Disease, GBD Compare

The social gradient in health and air pollution

Patterns of health, disease, longevity and premature death are closely patterned on lines of socio-economic advantage and disadvantage. Health determinants include educational attainment, income, housing, quality of local environment (including air quality), networks of support, good quality health and care services. In Sefton, there is a 12 year gap in life expectancy between the most and least disadvantaged communities.

Emissions data shows that $PM_{2.5}$ hotspots are highest in more built-up areas in the south of the borough, close to Sefton's AQMAs, and to a smaller extent in the area of Southport to the north. The populations that live in these areas experience the highest rates of long-term vascular, cancer and respiratory conditions in Sefton, and individuals can be considered more vulnerable to the harmful effects of air pollution. Local sources of $PM_{2.5}$ are commercial and domestic combustion sources, shipping and dockside activity and road transport. Car and vehicle ownership are lower than average in this area (for example car and van ownership is 38% in Linacre ward); however, some residents may be at increased risk through occupational exposure in addition to background $PM_{2.5}$ concentrations, for example through work that involves a lot of driving.

Health impacts

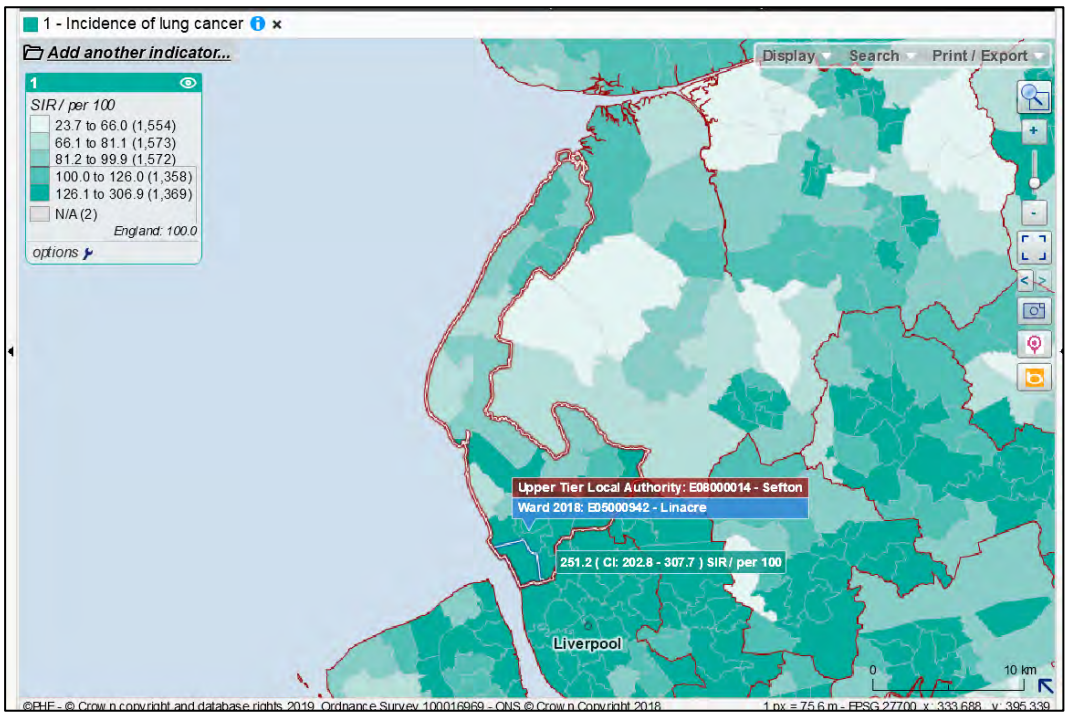
There is good evidence to show that $PM_{2.5}$ exposure is an independent risk factor for cardiovascular disease including stroke, asthma and lung cancer, and growing evidence of an association with diabetes, chronic obstructive pulmonary disease and low birthweight.[7]

It is not possible to routinely measure the distinct effects of $PM_{2.5}$ exposure on the health of individuals. And the evidence base already provides a compelling case to take preventative and protective action. However, it is possible to present the much higher health needs of people living around Sefton's AQMA areas and $PM_{2.5}$ emissions hotspots using mapping tools such as Local Health Profiles[8], which represents relevant health statistics at middle super output area or ward level scale.

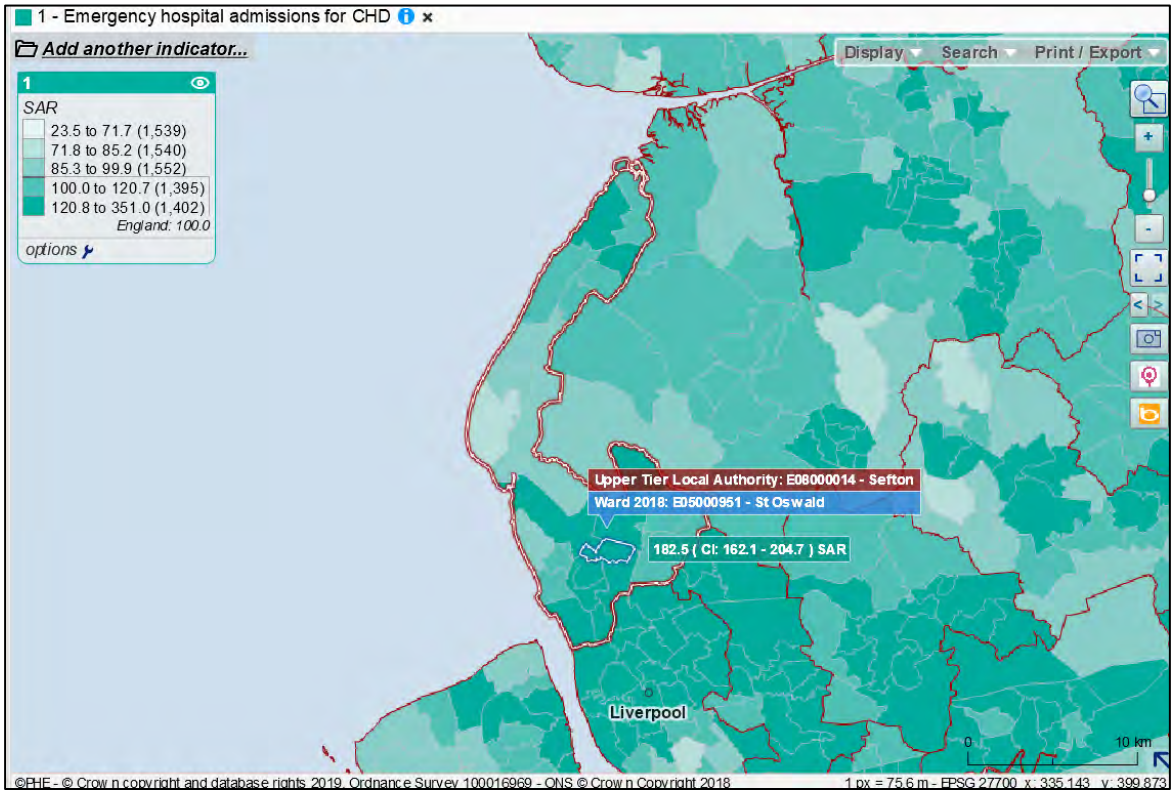
The examples below show ward level rates for new diagnoses of lung cancer, Heart disease and stroke in areas around our AQMA's.

[7] PHE, Health Matters: air pollution https://publichealthmatters.blog.gov.uk/2018/11/14/health-matters-air-pollution-sources-impacts-and-actions/
[8] Local Health http://www.localhealth.org.uk/#l=en;v=map15

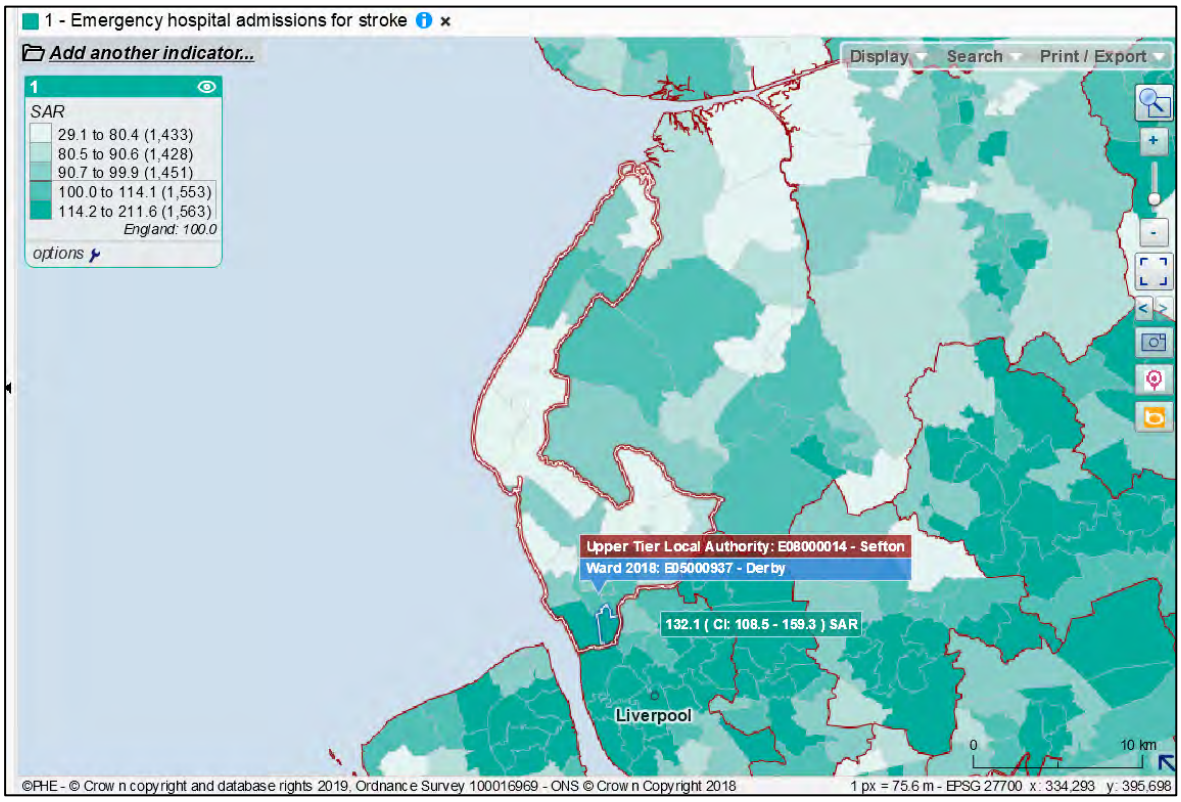
Map: standardised incidence ratio for lung cancer in Sefton, by ward, 2016, showing the highest rate of new lung cancer diagnoses in Linacre ward (2 to 3 times the national rate)



Map: standardised emergency admission ratio for coronary heart disease in Sefton, 2017-18 showing the highest rate of emergency admissions on St Oswald ward (1.5 to 2 times higher than the national rate)



Map: standardised emergency admission ratio for stroke in Sefton, 2017-18 showing the highest rate of emergency admissions in St Derby ward (1.0 to 1.5 times higher than the national rate)



Public Health

Sefton's Public Health teams response is in line with the hierarchy of interventions model promoted by Public Health England in their recent comprehensive review: prevent, mitigate, avoid.[9] Our recent public health annual report set out continuing commitments to prevent air pollution at source, including work on indoor air pollution, and we are mindful that actions aimed at reducing nitrogen dioxide emissions from transport may deliver only a limited reduction in $PM_{2.5}$. In the coming year we will also work with NHS colleagues to support clinical advice-giving to risk groups, explore options for communicating air quality event alerts and health messages, and making best use of NHS Sustainable Development Management Plans to implement pollution reduction recommendations in the NHS Long Term Plan.

[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/795185/Review_of_interventions_to_improve_air_quality.pdf

2.4 Summary of Monitoring Undertaken

2.4.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Sefton undertook automatic (continuous) monitoring at 5 sites during 2018. Table A.1 in Appendix A shows the details of the sites. The pollutants monitored in Sefton include nitrogen dioxide (NO_2) at all five sites, particulate matter (PM_{10}) at all of the sites, sulphur dioxide (SO_2) at one location and $PM_{2.5}$ at one location . Local authorities no longer have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. Previous assessment of these pollutants indicated compliance with the air quality objectives, consequently no monitoring for 1,3 butadiene, benzene, carbon monoxide and lead is carried out in Sefton and the pollutants are therefore not considered further in this report. National monitoring results are available at https://uk-air.defra.gov.uk/data/

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

2.4.2 Non-Automatic Monitoring Sites

Sefton undertook non-automatic (passive) monitoring of NO_2 at 70 sites during 2018. Table A.2 in Appendix A shows the details of the 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.

2.5 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

2.5.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Automatic monitoring

2 of the 5 automatic monitoring sites where NO_2 is monitored, showed exceedance of the NO_2 annual mean objective in 2018 at the monitoring site. This was at the CM2 Princess Way monitor where a NO_2 annual mean of 40.5 µg/m^3 was recorded and at CM3 Millers Bridge monitor where a NO_2 annual mean of 41.5 µg/m^3 was recorded. Site CM2 is within the Princess Way AQMA and site CM3 is within Millers Bridge AQMA. Both these monitors are located a short distance away from relevant exposure as defined in TG 16 and as such the level at the nearest receptor loction

has been estimated using the fall off with distance calculations thus giving a level of 39.0 µg/m^3 and 39.6 µg/m^3 respectively Both are just below the national standard and as traffic levels are predicted to increase due to the port expansion both these AQMA's will remain in place for NO_2

All other monitoring sites showed compliance with the annual NO_2 objective of 40 µg/m^3 .

There were no exceedances of 1-hour mean objective at any of the automatic monitoring sites.

Diffusion tube monitoring

14 non-automatic (passive) diffusion tube monitoring sites showed exceedance of the NO_2 annual mean objective in 2018 at the monitored location.

Millers Bridge/Derby Road Area

Around the Millers Bridge area these were at Site ID: BM Derby Road, Bootle where a NO_2 annual mean of 45µg/m^3 was recorded, Site ID: BR Derby Road, Bootle where a NO_2 annual mean of 57µg/m^3 was recorded , site ID: EM Millers Bridge Bootle where a NO_2 annual mean of 47µg/m^3 was recorded and site ID: BS Derby Road where a NO_2 annual mean of 43µg/m^3 was recorded . All four sites are located within existing AQMA 3 Millers Bridge. As these sites recorded a 2018 NO_2 annual mean concentration in exceedance of the air quality objective at a monitoring site which is not representative of representative exposure, the concentration at the nearest receptor for these locations was estimated using the Defra NO_2 fall off with distance calculator. This showed the estimated concentrations at receptor locations to be 35.8 µg/m^3, 50.7µg/m^3, 32.3µg/m^3 and 36.9µg/m^3 for NBM, NBR, NEM and NBS respectively. Thus Site ID: BR, within AQMA 3, was the only diffusion tube location that showed exceedance of the NO_2 annual mean objective at a relevant public exposure location in this area. AQMA3 will continue to remain in place.

Hawthorne Road/Church Road Area

Around the Hawthorne Road AQMA site ID DD Hawthorne Road, Litherland showed annual average NO_2 level of 44 µg/m^3 . When adjusted for distance the levels at the receptor were estimated to be 36.4 µg/m^3 . This tube is located within AQMA 5 which will continue to remain in force due to concerns regarding the predicted increase in port traffic.

Site ID NFH Church Road showed an annual mean of 43 µg/m^3 in 2018. When adjusted for distance the level at receptor was estimated to be 27.6 µg/m^3 well within the annual standard.

South Road/Crosby Road North Area

Around and within the South Road AQMA no exceedances of the NAQS objective were found in 2018. Results from diffusion tubes within the AQMA are as follows CJ: 39 µg/m^3 (adjusted at receptor 37.7 µg/m^3), CV: 24 µg/m^3 (adjusted at receptor 24 µg/m^3), DH: 34 µg/m^3 (adjusted at receptor 34 µg/m^3), DI :38 µg/m^3 (adjusted at receptor 38 µg/m^3) and DR :37 µg/m^3 (adjusted at receptor 25.1 µg/m^3). Whilst all levels are now below the NAQS objective it is not considered appropriate to revoke AQMA4 at this current time due to only having 12 months post improvement monitoring data. Notwithstanding this it does suggest that the junction improvement works have had a positive effect on reducing levels of NO_2 in this area and AQMA. Monitoring will continue during 2019.

Hawthorne Road/ Linacre Lane

DO Hawthorne Road, Litherland showed annual average NO_2 levels of 45 µg/m^3

When adjusted for distance the levels at the receptor were estimated to be 35.4 µg/m^3

Breeze Hill Area

Site ID EL Breeze Hill showed an annual mean of 44 µg/m^3 in 2018. When adjusted for distance the level at receptor was estimated to be 34.7µg/m^3 well within the annual standard.

Princess Way Area

Site ID EV Princess way showed an annual mean of 42 µg/m^3 in 2018. The tube is located with AQMA 2 but not currently close to any relevant receptors. Site ID EY showed an annual mean of 42 µg/m^3 in 2018. At the nearest receptor levels were estimated to be 33.6 µg/m^3 within the NAQS. Site ID EX Elm Drive was found to have an annual mean of 40 µg/m^3 in 2018 with estimated level of 38.7 µg/m^3 at receptor.

Heman Street

Site ID FI Heman Street showed an annual mean concentration of 42 µg/m^3 in 2017. This tube is installed at a location deemed to be representative of public exposure. Historically annual results have been below the NAQS objective. Additional diffusion tube monitoring in the area commenced in late 2018 in response and to determine if the exceedance was continuing and the extent of the exceedance. Diffusion tube FI Heman street showed levels of 38 µg/m^3 in 2018 within the NAQS and a reduction on 2017 levels. The new Diffusion Tubes in the area GG, GH and GI showed levels of 39 µg/m^3, 48 µg/m^3 and 33 µg/m^3 in 2018. These when corrected for fall off showed levels at the receptor of 35.2 µg/m^3, 37 µg/m^3 and 30.2 µg/m^3 respectively, all within the NAQS, however, monitoring at these locations only commenced in late 2018 with some sites only having 3 months data. The resuts may not be represertative of the full year and annulisation was not considered approprite given the small number of months data present. Whilst the resuts show compliance with the NAQS objective monitoring will continue into 2019 and a further review will take place at the end of 2019 to determine if AQMA declaration is required

All diffusion tube exceedances (when adjusted for distance in line with DEFRAs appoved calculator) were within exisitng AQMA's.

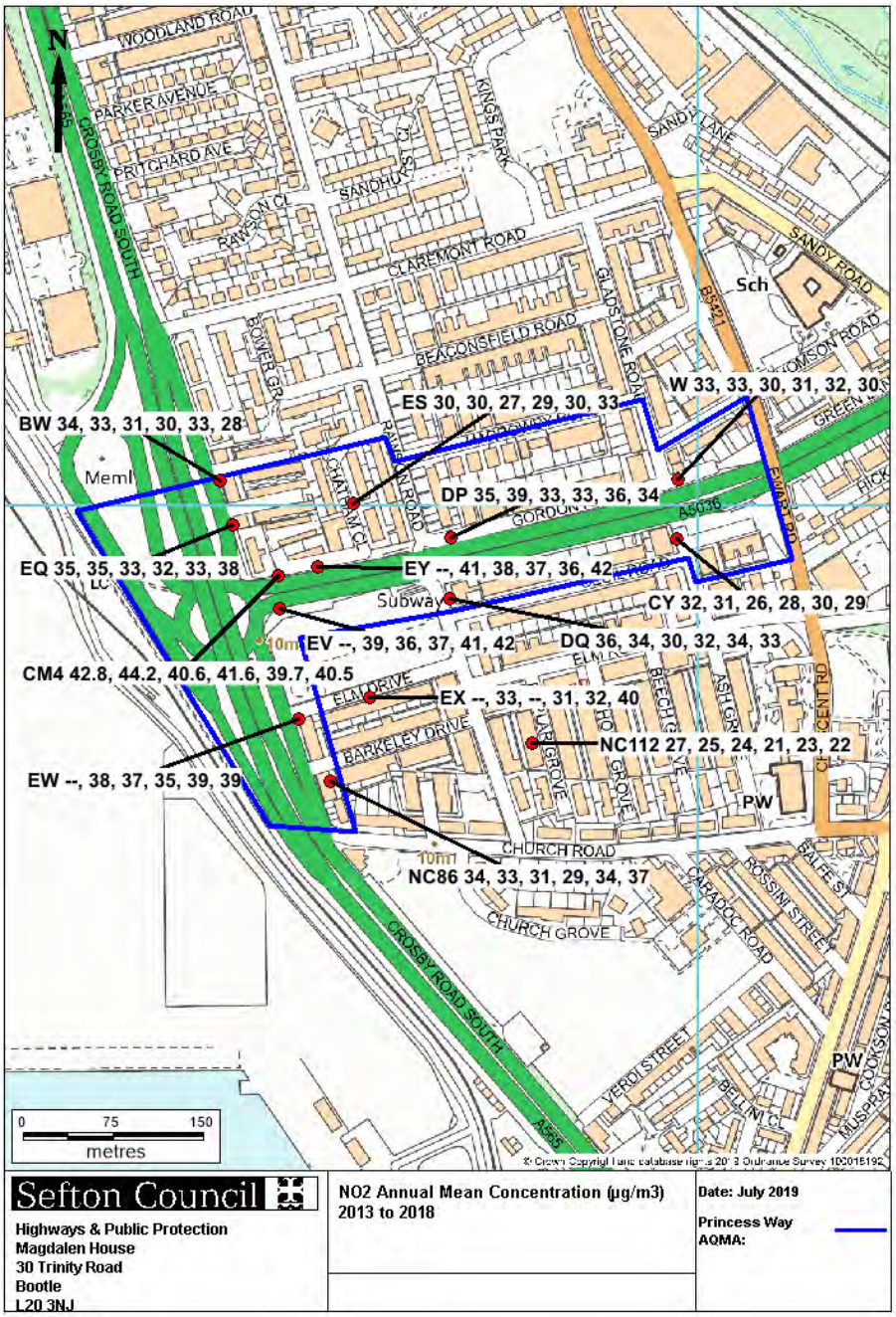
Due to uncertanties in the impact of the port expansion no AQMA's are due to be revoked at this time.

Compliance in AQMA's

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

- **AQMA 2 Princess Way, Seaforth**. Exceedance of the NO_2 annual mean objective at the automatic monitoring location and at 2 diffusion tube sites was observed in 2018, Overall Levels of NO_2 in this AQMA have increased compared to 2017. When the monitoring data has been adjusted for fall off with distance no current receptor exceeded the NAQS, however levels at the closest recepter to princess Way were predicted to be 39 µg/m^3 very close to the NAQS . Compliance with the 1 hour mean objective was achieved at this location. In view of the borderline complinace and the uncertanties surrounding the impact the port expansion will have on pollution levels in this area this AQMA is not being considered for revocation in the immediate future.

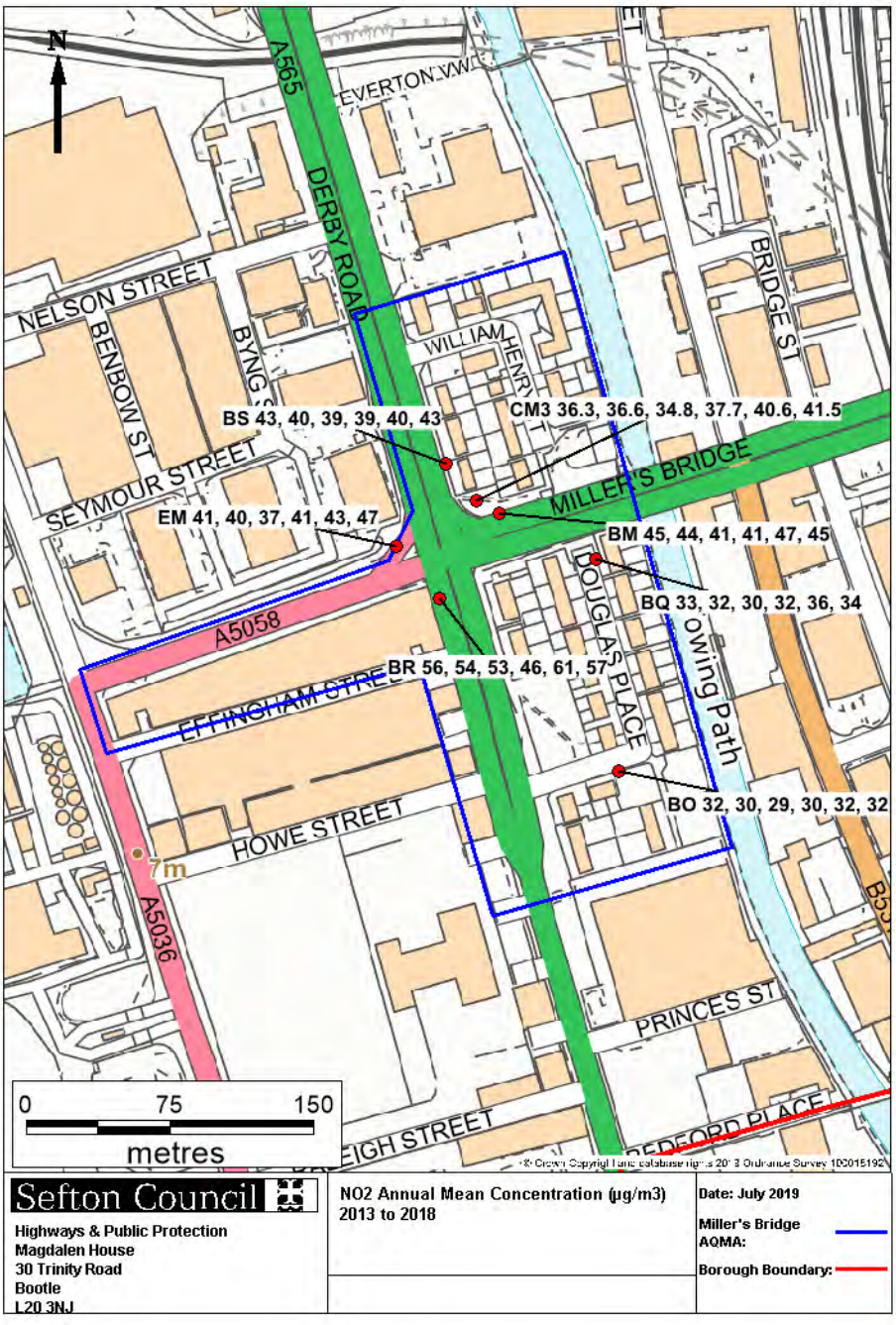
  Map showing details of the monitoring sites and last 5 years results in and around the AQMA.



- **AQMA 3 Millers Bridge, Bootle**. An exceedance of the NO_2 annual mean objective occurred in 2018 at the monitor location –this is the second recorded exceedance since 2009. Diffusion tube monitoring in 2018 at 4 diffusion tube sites shows exceedance of the annual mean objective. Compliance with the 1 hour mean objective was, however achieved at this location. In view of the

levels monitored within the AQMA and exceedances predicted at residential receptors this AQMA is not being considered for revocation.

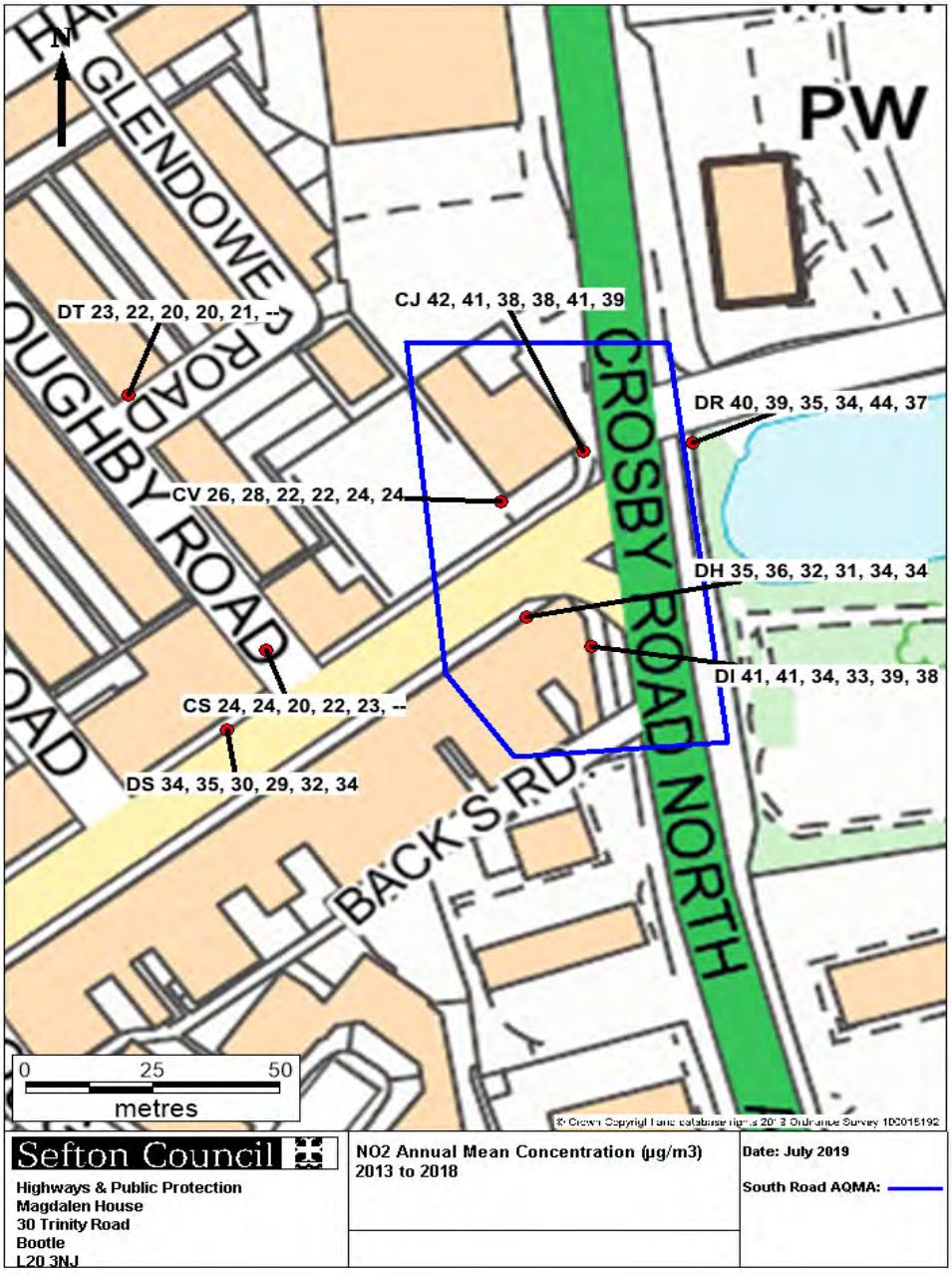
Map showing details of the monitoring sites and last 5 years results within and around the AQMA.



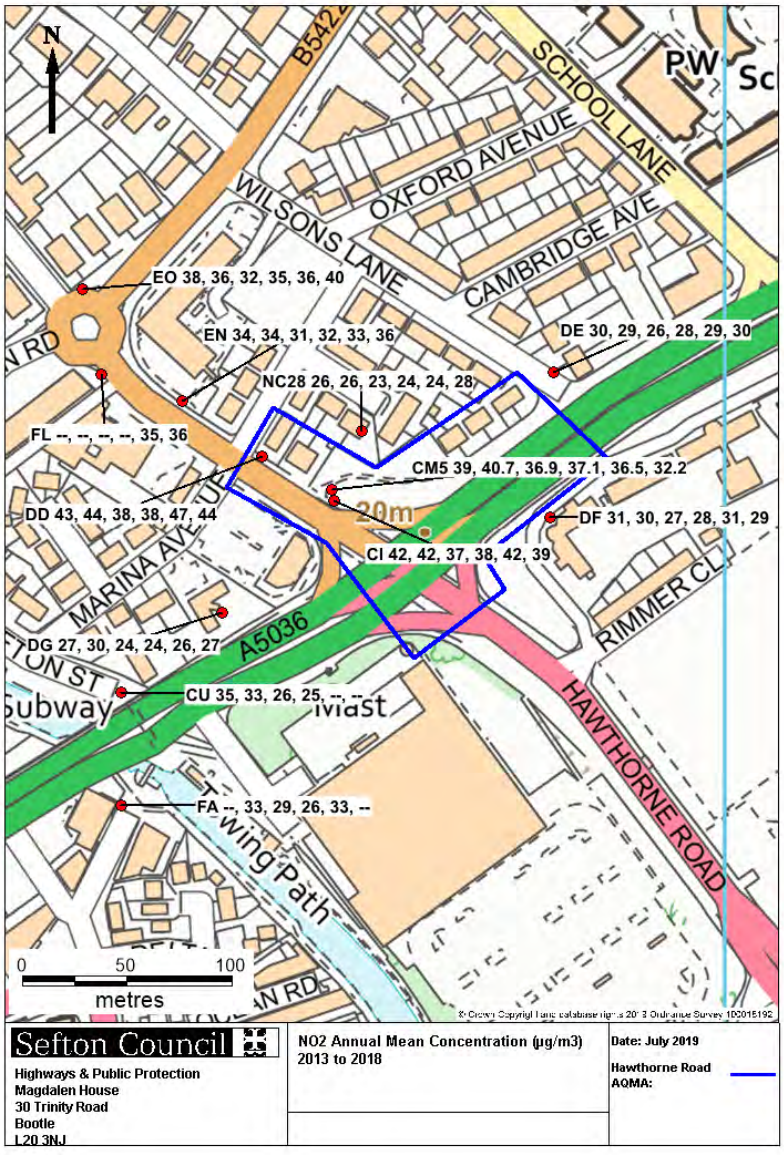
- **AQMA4 Waterloo**. No automatic NO_2 monitoring is carried out within AQMA 4. Diffusion tube monitoring has shown compliance with the NAQS objective at all locations within the AQMA and surrounding area during 2018. Whilst this is

the 1st full year monitoring has taken place since the junction improvement works have been completed, overall levels of NO2 have redued when compared to 2017 . Due to only 1 years post junction improvement monitoring It is intended to monitor for another 12 months prior to any formal revocation being considerd.

Map showing details of the monitoring sites and last 5 years results within and around the AQMA.



- **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 2017 and 2018. 1 diffusion tube did however show an exceedance of the annual standard in 2018. During 2018 connection difficulties continued until April 2018 with the monitoring station and unfortunatley data losses occurred. Whilst the available data has been annualised in accordance with TG 16 there are concerns that NO_2 levels may exceed those predicted. Due to these factors and the uncertanties surrounding the impact the port expansion will have on pollution levels in this area this AQMA is not being considered for revocation in the immediate future.



Trends in automatic monitoring Data

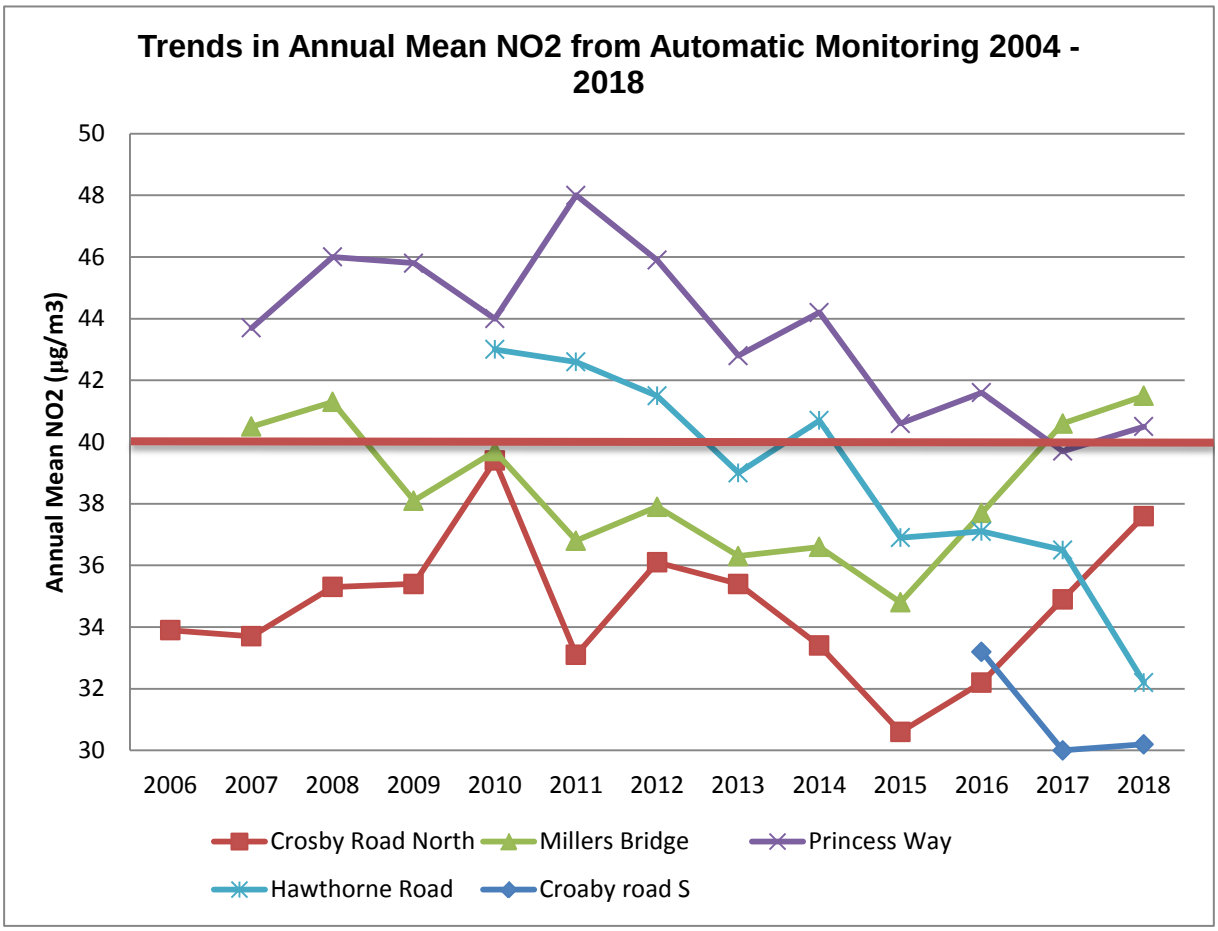


Figure F1 above shows the trends in Annual mean NO2 levels between 2006 and 2018 at each of the continuous monitoring sites.

- Princess Way (CM4) which is located within AQMA 2 showed levels in exceedance of the NO_2 annual mean objective of 40µg/m^3 in 2018 as indicated by the purple line in **Figure F.1**. This represents an increase in levels compared to 2017. Monitoring will continue in this location so future trends can be determined.

- Hawthorne Road (CM5) which is located within AQMA 5 continues to show a downward trend since monitoring commenced in 2010 as indicated by the light blue line in **Figure F.1** and since 2014 showed compliance with the annual objective. Due to the port expansion this monitor is ideally placed to assess any future increases.

- The trend from automatic monitoring at Millers Bridge (CM3) which is located within AQMA 3 has been one of compliance with the annual mean objective from 2009 – 2016, however levels generally appear to be rising since 2015 with exceedances observed in 2017 and again in 2018 against the annual mean standard.

- Trends at Crosby Road North automatic monitoring site (CM2), continue to show compliance with the annual standard, however levels do appear to be increasing again from the lowest level recorded in 2015. This will continue to be monitored closely. This monitor location is not within an AQMA

- Levels at Crosby Road South CM6 were well within the NAQS objective and remain fairly constant.

In summary there does appear to be an indication that levels at 3 of the sites are increasing. Discussions are being held with transport colleagues to determine if significant changes to traffic flows are being observed at these locations which may explain this apparent trend.

Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. Details of any annualisation applied are presented in the appendices.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

No exceedances of either the PM_{10} annual mean objective or the 24-hour mean objective at any of the five sites where PM_{10} is monitored were recorded in 2018. It is also positive to see that the overall downward trend in the annual mean and the exceedances of the 24 hour mean continues in 2018.

AQMA 3 Millers Bridge is the only current AQMA that has been declared for PM_{10}. This was was due to exceedance of the 24- hour mean objective. Compliance with the objective at Millers Bridge has now been met since 2008 (with 2008 showing borderline compliance) and although a Detailed Assessment in 2014 concluded that the PM_{10} declaration could be revoked, the 2015 Air Quality Action Plan Progress Report concluded that the declaration for PM_{10} should remain in place due to the potential future impacts of port expansion on PM_{10} levels at Millers Bridge. **This is currently being reviewed due to continued compliance with the NAQS objective for PM_{10}.**

2.5.2 Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years.

Automatic Monitoring of PM2.5 commenced in July 2017 at the Millers Bridge monitoring site. The results indicate that for the period monitored, levels were 7.1 $\mu g/m^3$ in 2017 and 8.9 $\mu g/m^3$ in 2018 which is significantly below the $PM_{2.5}$ annual mean limit value of 25$\mu g/m^3$.

As part of Sefton's successful AQ grant bid an additional $PM_{2.5}/PM_{10}$ monitor is to be purchased and installed . The location of the new monitor is still to be determined but it is anticipated it will be operational in Autumn 2019.

2.5.3 Sulphur Dioxide (SO_2)

Table A.8 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2018 with the air quality objectives for SO_2.

Sefton Council recommenced automatic monitoring for SO_2 at one location near to the Port of Liverpool at Crosby Road South, Seaforth (Site ID:CM6) in April 2015, due to concerns that SO_2 concentrations from shipping may increase as a result of port expansion. The aim was to establish baseline SO_2 concentrations prior to the new deep water berth becoming operational towards the end of 2016 and to then monitor any increase in SO_2 concentrations that may occur and determine any potential non-compliance with SO_2 air quality objectives.

Discussion of SO_2 Objective Compliance/Exceedance

No exceedances of the 15-minute, 1-hour or 24-hour SO_2 objectives were recorded in 2018 and continued compliance with the standard is observed at this monitoring site

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In 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	332,174.59	398,483.27	NO2; PM10	NO	Chemiluminescene;Beta attenuation monitor (BAM)	4.49	4.11	1.8
CM3	Millers Bridge, Bootle.	Roadside	333,772.36	394,602.27	NO2;PM10;PM2.5	YES	Chemiluminescence;FIDAS	6.23	8.68	1.8
CM4	Lathom Close, Princess Way, Seaforth.	Roadside	332,648.51	396,941.57	NO2;PM10	YES	Chemiluminescence;Beta attenuation monitor (BAM)	10.63	3.81	1.8
CM5	Hawthorne Road, Litherland.	Roadside	333,811.59	397,518.59	NO2,PM10	YES	Chemiluminescence	13.84	7.04	1.8
CM6	Crosby Road South,	Urban Background	332,873.66	396,549.21	NO2;PM10,SO2	NO	Chemiluminescence;TEOM,UV	N/A	23.5	2.8

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
BB	Eaton Avenue, Seaforth	Roadside	333509.906	397186.176	NO2	NO	3	1.9	NO	2.7
BL	Litherland Road/Marsh Lane, Bootle	Roadside	334432	395820	NO2	NO	0	2.3	NO	2.5
BM	Millers Bridge, Bootle	Roadside	333784.302	394595.688	NO2	YES	16.9	5	NO	2.6
BO	Douglas Place, Bootle	Roadside	333846.94	394461.346	NO2	YES	5.2	1.85	NO	2.7
BQ	Douglas Place/Millers Bridge, Bootle	Roadside	333834.762	394572.335	NO2	YES	6.5	1.82	NO	2.8
BR	Derby Road, Bootle	Roadside	333753.201	394551.8	NO2	YES	1.63	1.05	NO	2.6
BS	Derby Road, Bootle	Roadside	333757	394622	NO2	YES	7.19	2.8	NO	2.5
BV	Quarry Road, Thornton	Roadside	333395.37	400862.903	NO2	NO	7.51	1.72	NO	2.5
BW	Crosby Road South/Riversdale Road, Seaforth	Roadside	332600.204	397021.204	NO2	YES	2.05	1.3	NO	2.6
CI	Hawthorne Road, Bootle	Roadside	333812.64	397513.553	NO2	YES	17.89	3.2	NO	2.5
CJ	South Road, Waterloo	Roadside	332204.248	398228.819	NO2	YES	0.65	2.47	NO	2.6
CR	Parker Avenue, Seaforth	Roadside	332510.918	397332.214	NO2	NO	2.46	2.07	NO	2.7
CV	South Road Waterloo	Roadside	332,186.80	398,218.80	NO2	YES	0	10.35	NO	2.2

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
CY	Lytton Grove, Seaforth	Roadside	332980.557	396972.038	NO2	YES	3.66	2.2	NO	2.6
DC	Marsh Lane, Bootle	Kerbside	334339.384	395800.213	NO2	NO	4.05	0.6	NO	2.5
DD	Hawthorne Road, Litherland	Roadside	333777.928	397534.487	NO2	YES	5.63	2.26	NO	2.6
DE	Wilson's Lane, Litherland	Roadside	333917.158	397574.971	NO2	NO	9.4	2.15	NO	2.6
DF	Church Road flats. Litherland	Roadside	333915.796	397505.738	NO2	NO	3.94	12.25	NO	2.6
DG	Marina Avenue, Litherland	Roadside	333759	397460	NO2	NO	0	16.7	NO	2.1
DH	South Road, Waterloo	Roadside	332,193.40	398,192.81	NO2	YES	0	3.59	NO	2.8
DI	Crosby Road North, Waterloo	Roadside	332,205.68	398,186.77	NO2	YES	0	3.62	NO	2.5
DO	Hawthorne Road/ Linacre Lane, Bootle	Kerbside	334639.624	396399.039	NO2	NO	4.68	0.63	NO	2.6
DP	Gordon Road/ Rawson Road, Bootle	Kerbside	332792.503	396973.797	NO2	YES	9.21	0.61	NO	2.7
DQ	Rawson Road, Bootle	Roadside	332791.498	396922.302	NO2	YES	5.55	1.72	NO	2.6
DR	Crosby Road North, Waterloo	Roadside	332225.716	398230.708	NO2	NO	21.1	2.45	NO	2.5
DS	South Road, Waterloo	Roadside	332134.399	398168.805	NO2	NO	2.12	1.36	NO	2.6
DU	Liverpool Road/ Kingsway, Waterloo	Roadside	332196.353	398785.848	NO2	NO	6.93	3.54	NO	2.6

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DV	Moor Lane, Crosby	Roadside	332341.4	400167.903	NO2	NO	4.74	1.4	NO	2.6
DW	Church Road/ Kirkstone Road North	Roadside	334571.851	397918.273	NO2	NO	7.44	7.26	NO	2.6
DX	Merton Road, Bootle	Roadside	334737.802	395137.533	NO2	NO	13.57	5.8	NO	2.6
DY	Hougoumont Avenue/Crosby Road North	Kerbside	332249.794	398008.38	NO2	NO	6.18	0.43	NO	2.4
DZ	Bailey Drive, Bootle	Roadside	335393.977	397281.889	NO2	NO	8.26	2.29	NO	2.6
EA	Copy Lane, Netherton	Roadside	336638.651	399495.675	NO2	NO	10.47	35.1	NO	2.5
EB	Copy Lane, Netherton	Roadside	336591.597	399452.837	NO2	NO	22.67	1	NO	2.6
EC	Copy Lane/ Dunningsbridge Road	Roadside	336539	399477	NO2	NO	25.68	2.71	NO	2.6
EE	Copy Lane Police Station, Netherton	Roadside	336572.016	399523.734	NO2	NO	N/A	3.43	NO	2.6
EK	Hawthorne Road, Bootle	Roadside	334781.591	395188.948	NO2	NO	13.05	1.06	NO	2.3
EL	Breeze Hill, Bootle	Kerbside	335265.082	394968.091	NO2	NO	8.17	0.88	NO	2.6
EM	Millers Bridge Industrial Estate, Bootle	Roadside	333735.786	394597.465	NO2	NO	34.3	3.36	NO	2.6
EN	Hawthorne Road, Litherland	Roadside	333739.853	397561.249	NO2	NO	9.55	3.85	NO	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
EO	Hatton Hill Road, Litherland	Roadside	333692.411	397614.604	NO2	NO	8.37	1.96	NO	2.6
EP	Ash Road, Seaforth	Roadside	333343.422	397209.994	NO2	NO	11.45	1.26	NO	2.6
EQ	Crosby Road South, Seaforth	Roadside	332610.502	396984.604	NO2	YES	3.79	2.3	NO	2.6
ER	Green Lane, Seaforth	Kerbside	333,165.40	397,102.60	NO2	NO	2.81	0.58	NO	2.7
ES	Chatham Close, Seaforth	Roadside	332711.603	397002.599	NO2	YES	7.1	1.33	NO	2.6
EV	Princess Way, Seaforth	Kerbside	332650.169	396914.61	NO2	YES	N/A	0.23	NO	2.6
EW	Crosby Road South, Seaforth	Roadside	332665.744	396821.821	NO2	YES	1.1	1.22	NO	2.7
EX	Elm Drive No 14	Roadside	332722.047	396836.623	NO2	NO	0.9	3.2	NO	2.7
EY	Lathom Avenue, Seaforth	Roadside	332681.302	396949.104	NO2	YES	6.22	1.24	NO	2.7
FB	Hawthorne Road, Litherland	Roadside	334017	397317	NO2	NO	N/A	2.38	NO	2.6
FC	St Phillips Avenue, Litherand	Roadside	334216.953	397662.84	NO2	NO	9.9	2.3	NO	2.6
FD	Church Road, Litherland	Roadside	334242.328	397712.677	NO2	NO	7.94	2.62	NO	2.6
FE	Church Road, Litherland	Roadside	334642.41	397923.332	NO2	NO	6.44	7	NO	2.6
FF	Boundary Road, Litherland	Roadside	334978.217	398170.5	NO2	NO	14.39	1.15	NO	2.6
FH	Church Road, Netherton	Kerbside	334962.072	398134.04	NO2	NO	12.23	0.59	NO	2.6

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
FI	Hemans Street, Bootle	Roadside	333279.77	395957.948	NO2	NO	13.49	8.74	NO	2.6
FL	Hawthorne Road opp 20A Litherland	Kerbside	333701.439	397573.795	NO2	NO	6.8	0.7	NO	2.5
GA	Lord Street	Roadside	333431.41	417165.922	NO2	NO	9.6	1.52	NO	2.6
GB	Lord Street	Roadside	333704.011	417414.806	NO2	NO	9.7	1.81	NO	2.6
GC	Haigh Road - Illuminated Sign	Roadside	332296.398	398267.697	NO2	NO	15.01	1	NO	2.6
GD	Crosby Road North - Lighting Column 46D	Roadside	332209.8	398337.697	NO2	NO	N/A	2.04	NO	2.6
GE	Crosby Road North - Lighting Column 48D	Roadside	332205.76	398368.998	NO2	NO	N/A	1.57	NO	2.6
GF	Bridle Road - Lighting Column 0010	Roadside	335347.053	397500.241	NO2	NO	12.52	1.26	NO	2.6
GG	A565/Hemans Street - Lighting Column 0038	Roadside	333270.041	395967.365	NO2	NO	5.3	3.06	NO	2.6
GH	A565 opp car wash - Lighting Column 0044	Roadside	333230.91	396068.856	NO2	NO	12.38	3.54	NO	2.6
GI	St Joans Close opp No.40	Roadside	333281.122	396027.099	NO2	NO	2.2	1	NO	2.6
GJ	A565 Liverpool Road - Lighting column 120D	Kerbside	332087.963	399829.23	NO2	NO	4	0.56	NO	2.6
UK 2	Church Road,	Roadside	334798.812	398065.228	NO2	NO	7.05	1.68	NO	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
	Litherland									
UK 4	Crosby Road North, Waterloo	Kerbside	332171.362	398546.757	NO2	NO	3.49	0.85	NO	2.6
W	Gladstone Road/Gordon Road, Seaforth	Roadside	332981.851	397022.013	NO2	YES	1.42	2.35	NO	2.6

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018
CM2	Roadside	Automatic	100	65	33.4	30.6	32.2	34.9	37.6
CM3	Roadside	Automatic	100	93	36.6	34.8	37.7	**40.6**	**41.5**
CM4	Roadside	Automatic	100	97	**44.2**	**40.6**	**41.6**	**39.7**	**40.5**
CM5	Roadside	Automatic	100	69	**40.7**	36.9	37.1	36.5	32.1
CM6	Urban Background	Automatic	100	87	-	34.6	33.2	29.6	30.2
BB	Roadside	Diffusion Tube	100	100	31	28	29	28	28
BL	Roadside	Diffusion Tube	100	92	29	29	29	33	29
BM	Roadside	Diffusion Tube	100	100	**44**	**41**	**41**	**47**	**45**
BO	Roadside	Diffusion Tube	100	100	30	29	30	32	32
BQ	Roadside	Diffusion Tube	100	100	32	30	32	36	34
BR	Roadside	Diffusion Tube	100	92	**54**	**53**	**46**	**61**	**57**
BS	Roadside	Diffusion Tube	100	100	**40**	39	39	**40**	**43**
BV	Roadside	Diffusion Tube	100	100	33	31	33	31	34
BW	Roadside	Diffusion Tube	100	83	33	31	30	33	28
CI	Roadside	Diffusion Tube	100	100	**42**	37	38	**42**	39
CJ	Roadside	Diffusion Tube	100	100	**41**	38	38	**41**	39

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
CR	Roadside	Diffusion Tube	100	100	33	30	29	31	32
CV	Roadside	Diffusion Tube	100	100	28	22	22	24	24
CY	Roadside	Diffusion Tube	100	100	31	26	28	30	29
DC	Kerbside	Diffusion Tube	100	100	36	33	33	**40**	38
DD	Roadside	Diffusion Tube	100	100	**44**	38	38	**47**	**44**
DE	Roadside	Diffusion Tube	100	100	29	26	28	29	30
DF	Roadside	Diffusion Tube	100	100	30	27	28	31	29
DG	Roadside	Diffusion Tube	100	100	30	24	24	26	27
DH	Roadside	Diffusion Tube	100	100	36	32	31	34	34
DI	Roadside	Diffusion Tube	100	100	**41**	34	33	39	38
DO	Kerbside	Diffusion Tube	100	100	**47**	38	**40**	**47**	**45**
DP	Kerbside	Diffusion Tube	100	83	39	33	33	36	34
DQ	Roadside	Diffusion Tube	100	100	34	30	32	34	33
DR	Roadside	Diffusion Tube	100	100	39	35	34	**44**	37
DS	Roadside	Diffusion Tube	100	100	35	30	29	32	34
DU	Roadside	Diffusion Tube	100	100	38	33	33	34	36
DV	Roadside	Diffusion Tube	100	100	38	36	36	39	**40**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
DW	Roadside	Diffusion Tube	100	100	39	31	33	34	34
DX	Roadside	Diffusion Tube	100	100	36	33	33	36	36
DY	Kerbside	Diffusion Tube	100	92	28	22	23	28	24
DZ	Roadside	Diffusion Tube	100	92	36	30	33	35	35
EA	Roadside	Diffusion Tube	100	92	29	29	28	30	29
EB	Roadside	Diffusion Tube	100	100	35	34	31	37	36
EC	Roadside	Diffusion Tube	100	100	39	32	32	35	37
EE	Roadside	Diffusion Tube	100	92	39	34	36	36	35
EK	Roadside	Diffusion Tube	100	100	33	30	32	34	35
EL	Kerbside	Diffusion Tube	100	100	39	38	**40**	**42**	**44**
EM	Roadside	Diffusion Tube	100	100	**40**	37	**41**	**43**	**47**
EN	Roadside	Diffusion Tube	100	92	34	31	32	33	36
EO	Roadside	Diffusion Tube	100	92	**36**	**32**	**35**	**36**	**40**
EP	Roadside	Diffusion Tube	100	92	31	27	30	30	32
EQ	Roadside	Diffusion Tube	100	83	35	33	32	33	38
ER	Kerbside	Diffusion Tube	100	75	29	27	24	27	27
ES	Roadside	Diffusion Tube	100	75	30	27	29	30	33

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
EV	Kerbside	Diffusion Tube	100	100	39	36	37	**41**	**42**
EW	Roadside	Diffusion Tube	100	92	38	37	35	39	39
EX	Roadside	Diffusion Tube	100	50	33	-	31	32	**40**
EY	Roadside	Diffusion Tube	100	100	**41**	38	37	36	**42**
FB	Roadside	Diffusion Tube	100	92	38	32	32	39	38
FC	Roadside	Diffusion Tube	100	100	29	27	27	30	25
FD	Roadside	Diffusion Tube	100	100	30	26	26	29	29
FE	Roadside	Diffusion Tube	100	100	33	31	32	36	32
FF	Roadside	Diffusion Tube	100	100	39	32	35	38	39
FH	Kerbside	Diffusion Tube	100	92	**45**	37	39	**44**	**43**
FI	Roadside	Diffusion Tube	100	100	36	34	35	**42**	38
FL	Kerbside	Diffusion Tube	100	100				35	36
GA	Roadside	Diffusion Tube	100	92					34
GB	Roadside	Diffusion Tube	100	100					33
GC	Roadside	Diffusion Tube	100	100					21
GD	Roadside	Diffusion Tube	100	100					29
GE	Roadside	Diffusion Tube	100	100					29

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
GF	Roadside	Diffusion Tube	67	67					35
GG	Roadside	Diffusion Tube	42	25					39
GH	Roadside	Diffusion Tube	42	42					**48**
GI	Roadside	Diffusion Tube	42	33					33
GJ	Kerbside	Diffusion Tube	42	42					34
UK 2	Roadside	Diffusion Tube	100	100	30	27	28	29	28
UK 4	Kerbside	Diffusion Tube	100	100	35	32	31	36	36
W	Roadside	Diffusion Tube	100	92	33	30	31	32	30

☒ **Diffusion tube data has been bias corrected**

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

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

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

(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%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
CM2	Roadside	Automatic	100	65	**0**	0	0	0	0(113)
CM3	Roadside	Automatic	100	93	**0**	0	0	0	0
CM4	Roadside	Automatic	100	97	**0**	0	0	0	0
CM5	Roadside	Automatic	100	69	**0**	0	0	0(120)	0(105)
CM6	Urban Background	Automatic	100	87		0	0(82)	0(91)	0

Notes:

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

(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%).

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

Table A5 -Annual Mean PM10 monitoring results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
CM2	Roadside	100	65	23.6	23.7	17	21.1	19.9
CM3	Roadside	100	52	28.8	28.7	25.4	23.9	20.1
CM4	Roadside	100	88	26.5	26.7	23.8	23.1	22.6
CM5	Roadside	100	69				23.9	23.7
CM6	Urban Background	100	83		25.5	22.4	19.5	21.2

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

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

(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%).

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.5 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2014	2015	2016	2017	2018
CM2	Roadside	100	65	8	4	2	6	1(32)
CM3	Roadside	100	52	14	15	5	17	1(25)
CM4	Roadside	100	88	12	14	6	7	3
CM5	Roadside	100	69				2(29)	3(33)
CM6	Urban Background	100	83		5	2	1(28)	6(33)

Notes:

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

(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%).

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

Table A.6 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) [3]				
				2014	2015	2016	2017	2018
CM3	Roadside	100	88				7.1	8.9

☐ **Annualisation has been conducted where data capture is <75%**

Notes:

(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%).

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.7 – SO_2 Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	Number of Exceedances 2018 (percentile in bracket) [3]		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
CM6	Urban Background	100	89	0	0	0

Notes:

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

(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%).

(3) If the period of valid data is less than 85%, the relevant percentiles are provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2018

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
BB	31.1	37.3	33.7	26.4	27.9	27.7	26.5	21.7	31.4	33.0	34.7	35.7	30.6	28	26
BL	29.2	34.5	35.9	23.6	29.7	31.1	25.7	21.6		35.3	36.7	44.0	31.6	29.0	29.0
BM	50.59	43.66	46.05	42.69	49.15	49.06	49.04	39.54	50.43	47.67	53.27	57.14	48.2	**45.0**	35.8
BO	35.72	33.48	35.11	30.46	33.18	33.84	30.51	27.42	38.23	34.19	40.42	43.65	34.7	32.0	29.6
BQ	37.99	32.79	38.68	29.37	35.48	36.69	32.39	29.75	39.34	36.95	41.2	49.65	36.7	34.0	30.6
BR		53.2	51.41	55.78	56.27	59.58	64.86	52.56	68.8	69.05	63.57	75.53	61.0	**57.0**	**50.7**
BS	40.44	44.11	49.67	43.78	43.38	44.23	47.03	40.29	49.32	44.25	45.74	57.79	45.8	**43.0**	36.9
BV	30.09	40.16	44.14	35.64	39.17	32.9	38.03	26.98	33.96	40.22	38.71	33.33	36.1	34.0	26.3
BW	34.55	35.98	40.46	32.36	29.71	26.9	34.73		0.59		38.28	25.37	29.9	28.0	26.1
CI	40.91	45.14	42.55	45.74	43.5	40.64	41.58	35	41.34	43.76	53.81	28.63	41.9	39.0	29.0
CJ	35.06	43.81	43.44	38.46	47.75	42.36	40.55	34.79	42.11	47.8	49.22	42.15	42.3	39.0	37.7
CR	28.86	34.81	40.62	33.96	31.67	26.9	29.39	25.76	34.24	37.52	44.85	40.16	34.1	32.0	29.5
CV	22.01	32.52	32.92	25.3	25.7	20.09	17.77	16.21	19.34	27.62	39.64	32.39	26.0	24.0	24.0
CY	33.38	31.8	38	27.34	26.89	26.37	24.92	27.24	31	29.7	36.71	37.15	30.9	29.0	26.8
DC	34.99	45.18	47.67	40.58	40.62	39	40.36	36.35	43	44.12	42.82	41.56	41.4	38.0	33.1

Site ID	NO_2 Mean Concentrations (µg/m^3)														
DD	52.41	48	48.65	46.18	43.13	43.77	45.43	37.66	43.39	47.45	54.75	50.93	46.8	**44.0**	36.4
DE	31.93	36.3	37.18	31.21	28.88	26.64	24.1	25.47	32.74	30.52	39.17	39.62	32.0	30.0	25.5
DF	37.59	34.3	37.26	28.2	27.3	25.61	25.9	24.59	33.27	31.55	35.03	36.93	31.5	29.0	27.8
DG	23.9	35.84	32.35	29.09	29.73	28.4	22.85	19.62	25.62	31.27	36.04	38.28	29.4	27.0	27.0
DH	33.91	41.54	43.44	37.71	37.25	32.49	32.96	28.41	31.49	38.93	46.24	40.69	37.1	34.0	34.0
DI	39.7	44.11	45.31	34.69	40.21	37.51	38.78	36.28	40.98	44.88	45.45	41.06	40.7	38.0	38.0
DO	46.09	53.29	53.78	45.18	50.97	48.63	44.91	40.94	44.48	49.86	52.74	51.97	48.6	**45.0**	35.4
DP	42.1	38.37	45.27	35.97	30.99		28.3	25.85		36.08	42.31	40.96	36.6	34.0	26.8
DQ	38.23	39.33	40.58	30.11	33.64	30.55	32.37	28.44	35.82	39.1	34.75	37.57	35.0	33.0	28.7
DR	36.76	48.47	46.5	42.14	22.16	38.35	40.7	34.85	28.37	43.55	45.19	48.65	39.6	37.0	25.1
DS	31.56	42.02	42.97	35.93	39.3	32	32.99	28.33	32.34	38.65	39.75	41.82	36.5	34.0	30.3
DU	38.69	42.6	47.21	37.17	36.25	32.51	36.97	28.98	38.15	38.51	47.24	41.62	38.8	36.0	30.0
DV	38.87	50.86	51.82	42.55	43.44	36.63	40.81	35.43	39.46	44.63	44.39	43.85	42.7	**40.0**	31.2
DW	28.93	42.75	42.64	37.14	37.45	31.51	29.88	28.41	29.69	40.83	46.86	41.74	36.5	34.0	30.3
DX	43.29	42.05	46.48	37.28	35.51	36.34	33.7	32.45	36.53	39.99	42.57	42.85	39.1	36.0	31.8
DY	22.59	34.8	32.24	29.5	30.23	25.7	22.41	18.46	0.57		30.34	31.89	25.3	24.0	20.1
DZ	37.25		50.07	31.45	34.72	33.6	30.54	28.47	35.05	45.31	44.29	43.37	37.6	35.0	28.8
EA	33.64	37.66	40.13	30.99	24.85	16.34	26.63	28.8		30.92	34.86	38.13	31.2	29.0	27.2
EB	34.07	43.93	44.36	35.11	39.84	36.08	38.9	29.4	37.17	40.71	41.57	38.62	38.3	36.0	25.3
EC	32.41	48.45	51.57	36.44	43.65	36.53	32.89	28.29	30.62	43.86	51.58	40.23	39.7	37.0	26.5
EE	37.55		52.39	41.66	38.95	34.36	31.6	25.24	28.76	39.86	44.27	36.63	37.4	35.0	N/A
EK	40.77	43.9	41.99	31.47	35.59	31.63	30.08	32.22	38.39	40.49	42.31	43.52	37.7	35.0	29.7
EL	39.6	51.92	53.1	46.22	56.08	48.12	44.73	38.73	43.61	49.99	44.49	45.5	46.8	**44.0**	34.7
EM	48.02	51.98	57.04	49.08	55.26	49.14	45.17	38.62	43.23	53.33	58.11	51.56	50.0	**47.0**	32.3
EN	42.43		45.54	42.63	36.32	36.42	35.77	31.71	31.02	35.5	41.71	43.44	38.4	36.0	30.1

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
EO	48.25	48.57	47.26	42.25	41.83		34.68	33.64	41.04	46.58	47.36	45.15	43.3	**40.0**	31.8
EP	36.47	39.91	46.78	40.11		29.75	24.08	24.37	29.18	26.37	39.33	36.63	33.9	32.0	25.6
EQ	44.7	46.14	45.33	42.98	35.92	32.94			37.72	40.17	42.98	41.07	41.0	38.0	33.7
ER	34.11	30.34	39	29.27		21.91		17.66	25.8		32.15	34.75	29.4	27.0	24.4
ES	40.64	41.25	38.64		28.68	25.33			29.2	32.66	48.58	37.03	35.8	33.0	27.2
EV	0.38	102.36	52.97	43.04	45.66	45.33	45.13	37.58	47.66	44.14	40.15	43.78	45.7	**42.0**	N/A
EW	44.13	50.91	44	43.14	39.68	39.39	43.8	40.54	44.76	38.81	37.18		42.4	39.0	36.4
EX	40.22	43.37	38.88							42.49	49.83	41.79	42.8	**40.0**	38.7
EY	37.7	48.9	47.93	53.65	42.79	43.18	42.57	39.66	50.98	49.92	42.58	46.07	45.5	**42.0**	33.6
FB	35.8	43.62	40.46	38.74	36.2		38.62	38.25	42.66	44.81	46.12	45.21	41.0	38.0	N/A
FC	33.16	28.29	30.67	27.07	30.77	22.83	25.1	25.95	32.3	34.82	35.34	0.48	27.2	25.0	22.4
FD	33.53	29	31.59	31.63	29.19	25.88	24.14	24.55	31.23	33.92	36.32	37.52	30.7	29.0	25.4
FE	26.59	38.47	43.02	33.9	34.57	34.66	26.75	30.19	32.14	41.81	34.3	36.82	34.4	32.0	29.1
FF	34.56	36.33	51.33	50.37	48.44	39.09	33.89	30.84	31.29	49.97	50.65	47.83	42.0	39.0	26.3
FH		39.79	45.78	51.16	57.45	48.73	48.89	41.69	47.31	47.14	44.27	42.15	46.8	**43.0**	27.6
FI	30.79	33.54	38.98	41.01	31.5	37.94	47.72	41.2	47.7	50.95	37.58	45.55	40.4	38.0	33.5
FL	43.36	40.53	43.55	35.86	41.23	33.93	28.44	26.85	33.41	41.6	43.41	47.47	38.3	36.0	28.4
GA	33.77	39.01	41.77	30.48	34.94	37.22	36.32	28.27	36.18		43.04	41.01	36.5	34.0	23.8
GB	36.44	36.82	43.47	30.3	37.33	39.76	35.03	27.39	32.68	34.1	34.09	43.52	35.9	33.0	23.5
GC	24	27.52	27.23	19.77	17.62	9.7	19.98	17.32	17.67	24.25	33.3	30.29	22.4	21.0	18.0
GD	26.08	35.25	37.59	24.88	29.36	26.19	30.05	23.09	30.05	34.56	36.43	35.15	30.7	29.0	N/A
GE	29.51	33.74	36.98	28.99	28.65	28.15	29.55	24.14	27.81	35.07	36.38	36.13	31.3	29.0	N/A
GF					31.08	33.25	33.91	34.48	41.69	42.64	42.36	43.6	37.9	35.0	26.5
GG								31.12			45.75	47.42	41.4	39.0	35.2
GH								50.19	58.55	50.39	47.44	53.63	52.0	**48.0**	37.0

Site ID	NO_2 Mean Concentrations (µg/m^3)														
GI								28.76		35.4	37.25	38.98	35.1	33.0	30.2
GJ								25.25	37.68	35.48	39.74	46.81	37.0	34.0	26.6
UK 2	26.38	28.89	34.29	32.8	32.07	26.6	25.33	25.38	26.98	37.38	32.04	35.81	30.3	28.0	23.4
UK 4	26.72	37.17	38.79	43.15	42.12	37.51	42.27	31.63	34.67	45.79	40.61	42.64	38.6	36.0	29.5
W	36.14	33.01	35.3	29.83	27	26.82	28.54	24.32	35.17	34.63		44.45	32.3	30.0	28.7

☐ **Local bias adjustment factor used (confirm by selecting in box)**

☒ **National bias adjustment factor used (confirm by selecting in box)**

☒ **Annualisation has been conducted where data capture is <75% (confirm by selecting in box)**

☒ **Where applicable, data has been distance corrected for relevant exposure (confirm by selecting in box)**

Notes:

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

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

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

QA/QC

No new sources of pollution have been identified in 2018, however, a number of minor changes to the diffusion tube monitoring network have taken place in 2018 to assess levels of NO_2 at locations of interest including a number of additional tubes around Hemans Street in Bootle where an exceedance was observed in 2017. A number of the new tubes were only installed towards the end of 2018. In view of the limited number of months data (5 months or less) and the fact that monitoring at these sites will continue for at least 12 months in 2019 this data has not been annualised. Maps detailing the location of all diffusion tubes are provided in appendix D.

CAZ Feasibility Study

The results of the exceedance modelling carried out as part of the CAZ feasibility study is currently being reviewed in detail. This may require further changes to the monitoring network and/or declaration of further AQMA's. This will be reported in full in next year's ASR.

QA/QC for 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 TEOM (VMS corrected) and BAM analysers used for particulates PM_{10}. FIDAS dual Particulate monitor is used for $PM_{2.5}$ PM_{10}

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 (RICARDO) field auditor 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, NO2, 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 (16).

PM_{10} Monitoring Adjustment

In 2018 Sefton Council used 3 different instrument types to measure PM_{10}

- Tapered Element Oscillating Microbalance (TEOM) with heated inlet
- Eberline ESM FH 62 IR Beta Attenuation Monitor (BAM) with heated inlet
- Met-One 1020 Beta Attenuation Monitor (BAM) with unheated inlet
- FIDAS dual monitor with unheated inlet

The UK PM_{10} Objectives and European Union (EU) limit values are based upon measurements carried out using the European reference sampler, which is a gravimetric device where the particle mass is collected onto a filter and subsequently weighed. This method has a number of disadvantages in that only 24-hour mean concentrations are recorded and the data cannot be disseminated to the public in real time and the operation is labour intensive. Historically TEOM analysers have been predominantly used in the UK, however other samplers are also used such as BAM's. A significant problem with instruments using heated inlets is the loss of semi-volatile components when heated to drive off excess moisture. A default correction factor of 1.3 was recommended to be applied to the data of analysers using heated inlets in order to generate a nominal 'gravimetric-equivalent' result. However for TEOM data the guidance is now to use the volatile correction model (VCM) which uses the Filter Dynamics Measurement System (FDMS) 'purge measurement' as an indicator of the volatile component of PM_{10} and is based on the assumption that the volatile component of PM_{10} lost during the heated sampling with a standard TEOM is consistent across a defined geographical area, such that the measurements of this component at one location may be used to correct measurements at another. A VCM

web portal allows local authorities to download geographically specific correction factors to apply to TEOM PM_{10} results.
The technical guidance also recommends that Met-One BAM (with unheated inlets) measured concentrations reported at standard conditions be divided by a factor of 1.2.

The following PM_{10} adjustment factors were used and have been applied to the measured PM_{10} concentrations contained in this report.

- TEOM data pre 2008 – multiplied by 1.3
- TEOM data 2008 onwards – Volatile Correction Model (VCM) used (and x 1.3 factor also used for comparative purposes)
- Eberline Beta Attenuation Monitor (BAM) data – multiplied by 1.3
- Met-One Beta Attenuation Monitor (BAM) data – divided by 1.2

QA/QC for Non - Automatic Monitoring, Nitrogen Dioxide Diffusion Tubes

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.

NO_2 Diffusion Tube Bias Adjustment Factors

Diffusion tubes may exhibit substantial under or over estimation compared with the reference chemiluminescence method, due to factors in the field affecting performance, such as wind induced shortening of the effective diffusive path length, that are not related to the laboratory's preparation or analysis of the tubes.
Sefton utilised the national bias adjustment figures for 2018 – Gradko adjustment was 0.93. This bias adjustment has been applied to all diffusion tubes.

Nitrogen Dioxide Drop Off With Distance Calculations

The results from all Diffusion tubes Sites in 2018 have been adjusted so that the concentration at the nearest receptor is estimated. This has been done in accordance with TG 16 using DEFRA background NO_2 maps and the approved fall off with distance calculator.

Annualisation of results

Where monitoring has taken place with data capture falling below the required 75% capture rate annualisation of these results has been carried in accordance with TG 16 to estimate the likely annual result.

The tables below show a summary of the annualisation that was applied to each data set below the required threshold. Data from Sefton's monitoring sites has been used in the annualisation process as it is considered that these sites are not unduly affected by local conditions and more representative of the changes in monthly levels of air pollution in Sefton.

CM2- Waterloo Annualisation adjustment-NO2

	NO_2 Annual Mean 2015 (A_m)	NO_2 Period Mean (P_m)	Ratio (A_m/P_m)
CM3	41.5	41.1	1.009
CM4	40.5	38.5	1.031
CM6	30.2	29.1	1.037
Average (R_a)			**1.032**

The measured NO_2 concentration at Waterloo CM2 for the period Jan-Sept 18 was 36.6µg/m^3

Estimate of the NO2 annual mean concentration at Waterloo CM2 for 2018 is M x Ra = 36.6 x 1.032 = 37.6µg/m^3.

CM5- Hawthorne Road Annualisation adjustment-NO2

	NO_2 Annual Mean 2015 (A_m)	NO_2 Period Mean (P_m)	Ratio (A_m/P_m)
CM3	41.5	40.3	1.029
CM4	40.5	39.9	1.015
CM6	30.2	28.6	1.056
Average (R_a)			**1.033**

The measured NO_2 concentration at Hawthorne Road CM5 for the period April -Dec 18 was 31.1µg/m^3

Estimate of the NO2 annual mean concentration at Hawthorne Road CM5 for 2018 is M x Ra = 31.1 x 1.033 = 32.1µg/m^3.

CM2-Waterloo Annualisation adjustment PM 10

	PM_{10} Annual Mean 2015 (A_m)	PM_{10}Period Mean (P_m)	Ratio (A_m/P_m)
CM4	22.6	25.2	0.896
CM6	21.2	21.8	0.972
Average (R_a)			**0.934**

The measured PM_{10} concentration at Waterloo CM2 for the period Jan -Sept 18 was 21.4µg/m^3

Estimate of the PM_{10} annual mean concentration at Waterloo CM2 for 2018 is M x Ra = 21.4 x 0.934 = 19.9 µg/m^3.

CM3-Millers Bridge Annualisation adjustment PM_{10}

	PM_{10} Annual Mean 2015 (A_m)	PM_{10}Period Mean (P_m)	Ratio (A_m/P_m)
CM4	22.6	20.9	1.081
CM6	21.2	20.6	1.029
Average (R_a)			**1.055**

The measured PM_{10} concentration at Millers Bridge CM3 for the period June-Dec 18 was 19.0 µg/m^3

Estimate of the PM_{10} annual mean concentration at Millers Bridge CM3 for 2018 is M x Ra = 19.0 x 1.055 = 20.1 µg/m^3.

CM5-Hawthorne Road Annualisation adjustment PM_{10}

	PM_{10} Annual Mean 2015 (A_m)	PM_{10}Period Mean (P_m)	Ratio (A_m/P_m)
CM4	22.6	21.4	1.056
CM6	21.2	21.3	0.995
Average (R_a)			**1.026**

The measured PM_{10} concentration at Hawthorne Road CM5 for the period April-Dec 18 was 23.1 µg/m^3

Estimate of the PM_{10} annual mean concentration at Hawthorne Road CM5 for 2018 is M x Ra = 23.1 x 1.026 = 23.7 µg/m^3.

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

Sefton Council carries out air quality monitoring using continuous automatic monitors for the pollutants nitrogen dioxide (NO_2) and particulate matter PM_{10} and $PM_{2.5}$. Continuous automatic monitoring for sulphur dioxide (SO_2) recommenced at one new site in 2015, due to concerns about this pollutant in relation to shipping and port expansion.

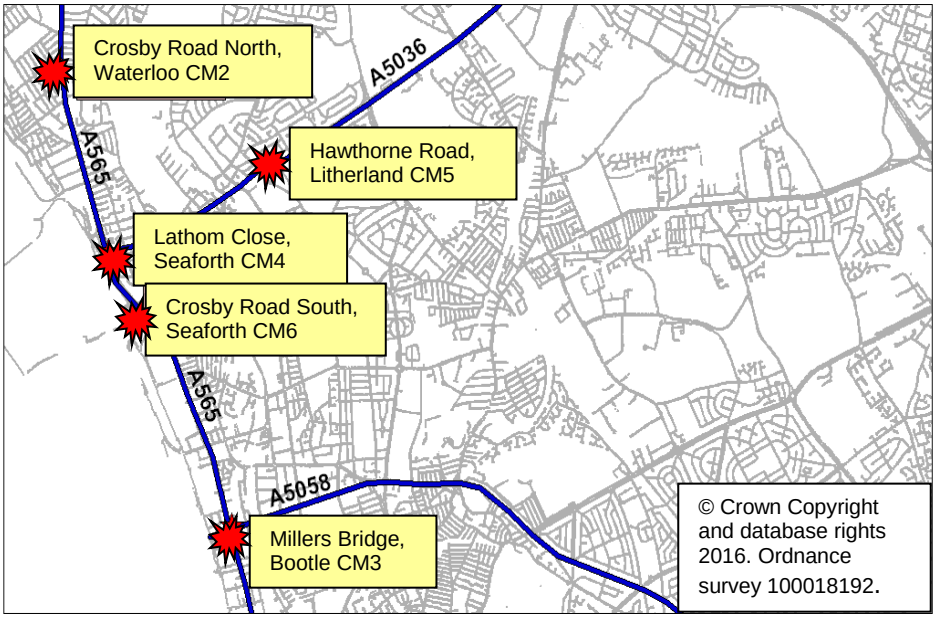
Sefton has five automatic monitoring stations. In 2018 these were located at:

- Waterloo Primary School, Crosby Road North, Waterloo (Site ID: CM2).
- Millers Bridge, Bootle (Site ID: CM3).
- Princess Way, Lathom Close, Seaforth (Site ID: CM4).
- Hawthorne Road, Litherland . (Site ID: CM5).
- Crosby Road South, Seaforth (Site ID: CM6).*

Data obtained since monitoring commenced in 1996 has shown non-compliance with air quality objectives to be in the south of the Borough and as such the automatic monitors are now concentrated in this area of the Borough in the Bootle/ Seaforth/ Litherland and Waterloo areas near too busy junctions at the A565, A5058 and. A5036. The monitoring location positions relative to each other are shown in **Figure D.1**.

Maps of the monitoring locations are shown in **Figures D.2** to **D.11**.

Figure D.1 – Automatic Monitoring Locations in Sefton in 2016



(Note: Monitoring at Crosby Road South, Seaforth site only commenced in April 2015).

Waterloo Primary School, Crosby Road North, Waterloo

Site Type: Roadside. **Within AQMA?** – No.
Grid Reference: 332175, 398475. **Site ID**: CM2.
Location: Next to the busy A565 Crosby Road North Waterloo situated outside Waterloo Primary School, in a residential and shopping area. This section of the A565 carries commuter traffic to and from Liverpool but also a considerable amount of local traffic to offices and shops in the Waterloo area.
Pollutants monitored: Fine particles (PM_{10}) and oxides of nitrogen.
Date Monitoring Commenced: August 2001 to present.

Figure D.2 – Map showing the Location of the Crosby Road North Monitoring Station

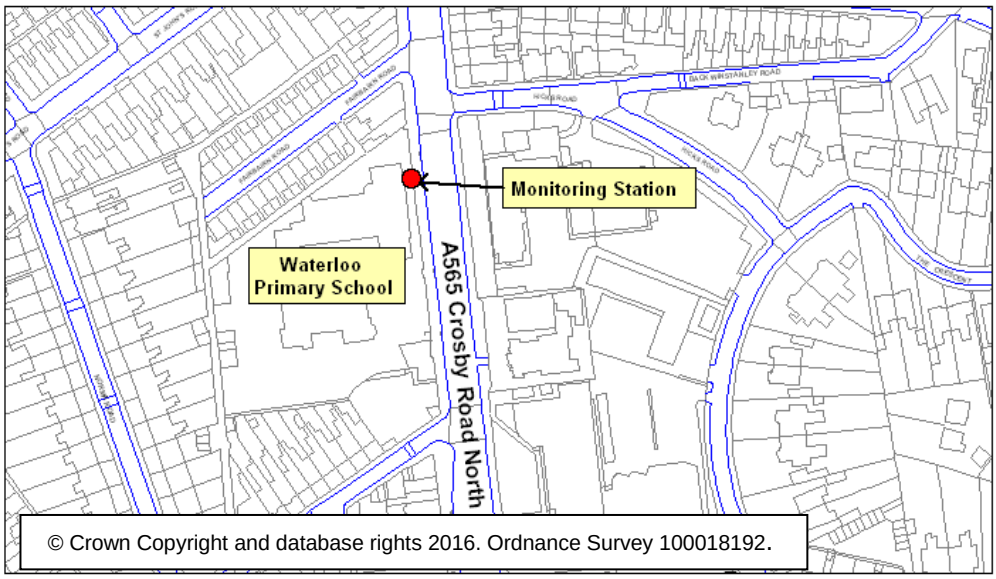
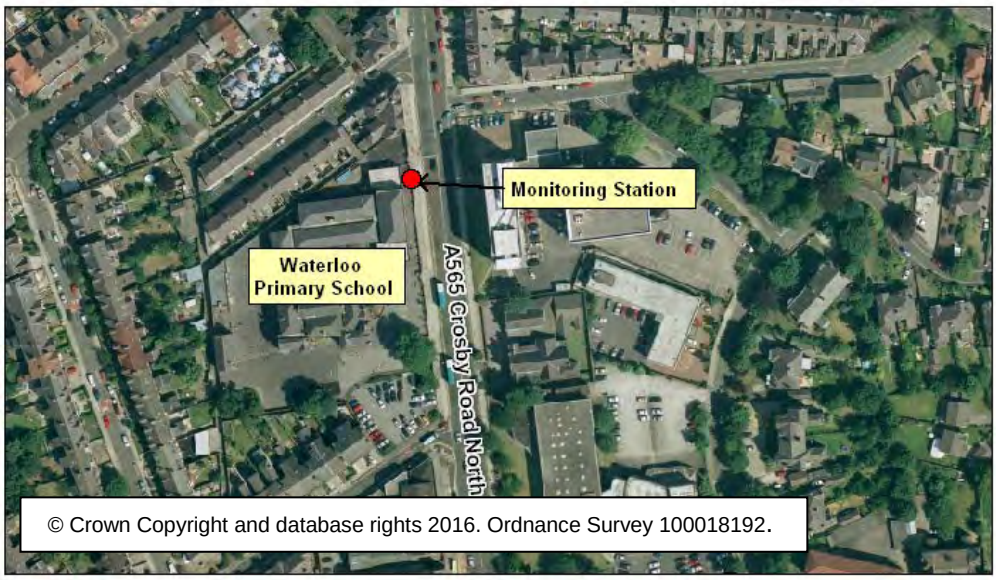


Figure D.3 – Aerial Photograph of the Location of the Crosby Road North Monitoring Station



Millers Bridge, Bootle

Site Type: Roadside. **Within AQMA?** – Yes, declared for both NO_2 **and** PM_{10}.
Grid Reference: 333772, 394603. **Site ID**: CM3.
Location: Situated at the busy junction of Derby Road (A565) and Millers Bridge (A5058) in close proximity to residential property on Derby Road to the north and Douglas Place to the south. The junction is influenced by commuter traffic and high numbers of HGVs. This site is also influenced by fugitive emissions from activities on the Port of Liverpool to the northwest.
Pollutants Monitored: Fine particles (PM_{10}) and oxides of nitrogen.
Date Monitoring Commenced: October 2006 to present.

Figure D.4 – Map showing the Location of the Millers Bridge Monitoring Station

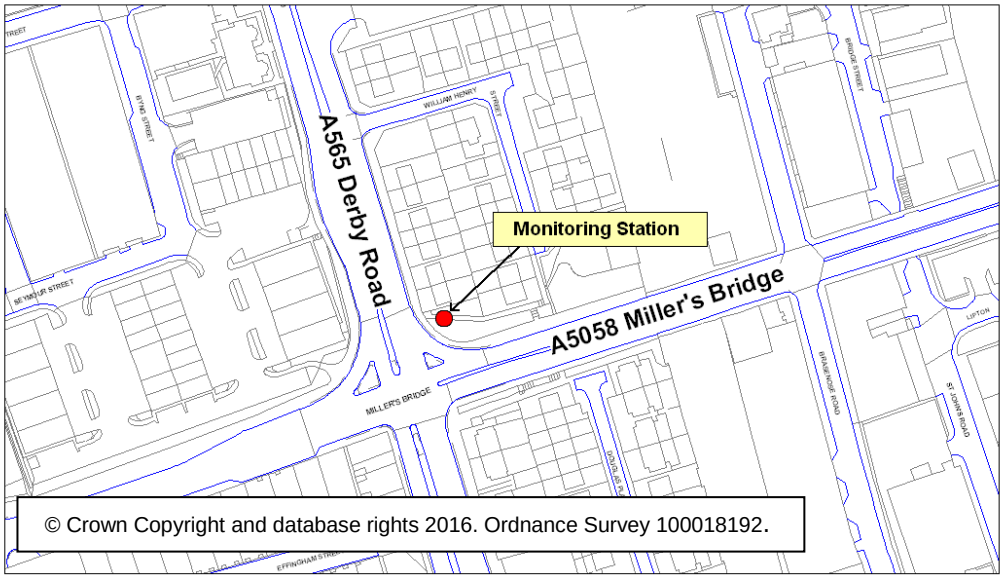


Figure D.5 – Aerial Photograph of the Location of the Millers Bridge Monitoring Station

Lathom Close, Princess Way, Seaforth

Site Type: Roadside. **Within AQMA?** – Yes, declared for NO_2 only.
Grid Reference: 332647, 396940. **Site ID**: CM4.
Location: Situated at Lathom Close, Seaforth next to the roundabout where the A5036 Princess Way meets the A565 Crosby Road South. This site is influenced by the high numbers of HGVs which use the A5036 travelling to and from the Port of Liverpool.
Pollutants monitored: Fine particles (PM_{10}) and oxides of nitrogen.
Date Monitoring Commenced: February 2007 for oxides of nitrogen and February 2008 for PM_{10} to present.

Figure D.6 – Map showing the Location of the Lathom Close, Princess Way, Monitoring Station

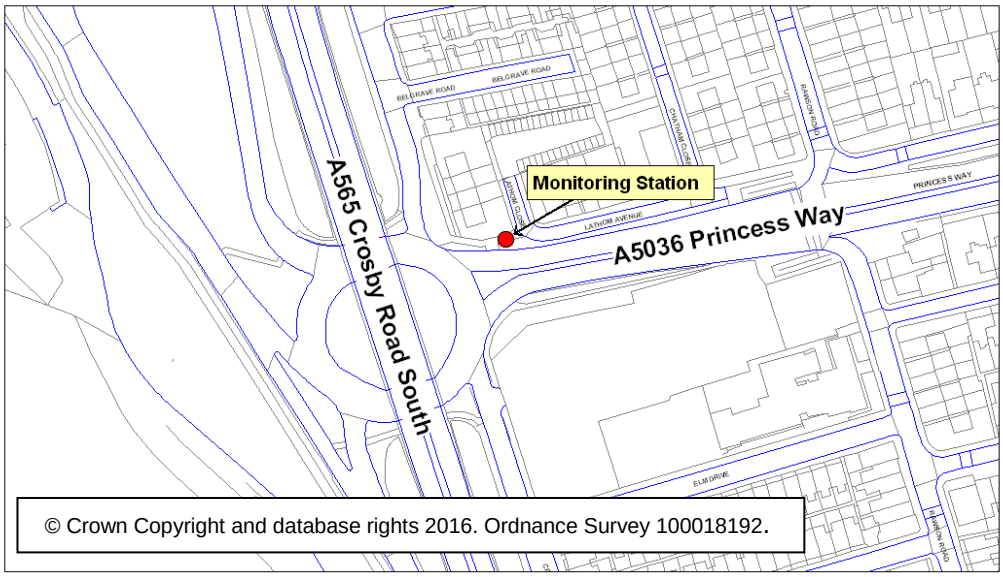


Figure D.7 – Aerial Photograph of the Location of the Lathom Close, Princess Way, Monitoring Station

Hawthorne Road, Litherland

Site Type: Roadside. **Within AQMA?** – Yes, declared for NO_2 only.
Grid Reference: 333821, 397512. **Site ID**: CM5.
Location: Situated at Hawthorne Road, Litherland, at the junction of the A5036 Church Road with the B5422 Hawthorne Road, opposite KFC fast food restaurant and near to a Tesco superstore. The junction is influenced by commuter traffic and high numbers of HGVs.
Pollutants monitored: Oxides of nitrogen only.
Date Monitoring NO_2 Commenced: June 2010 to present.

Figure D.8 – Map showing the Location of the Hawthorne Road, Litherland Monitoring Station

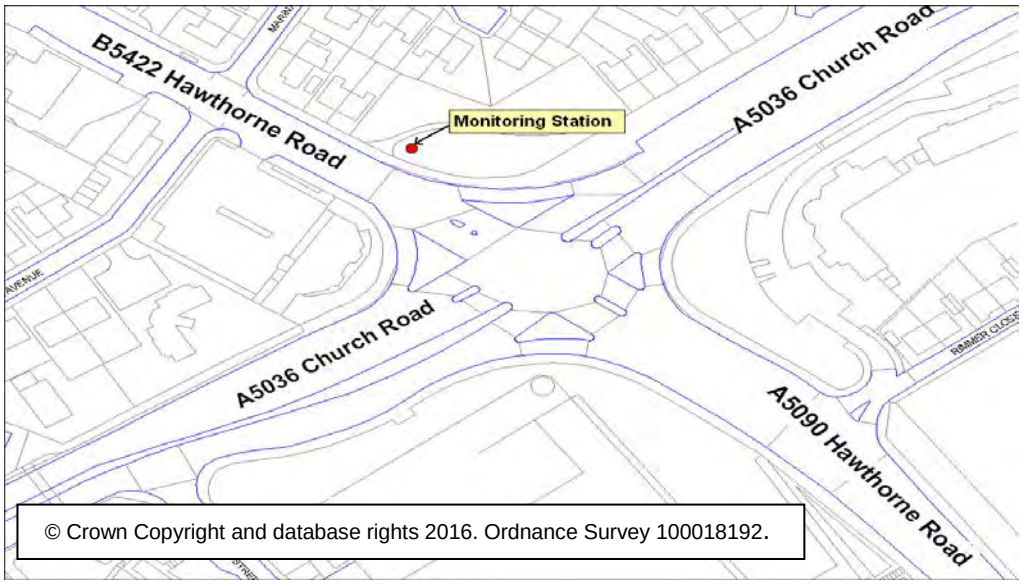
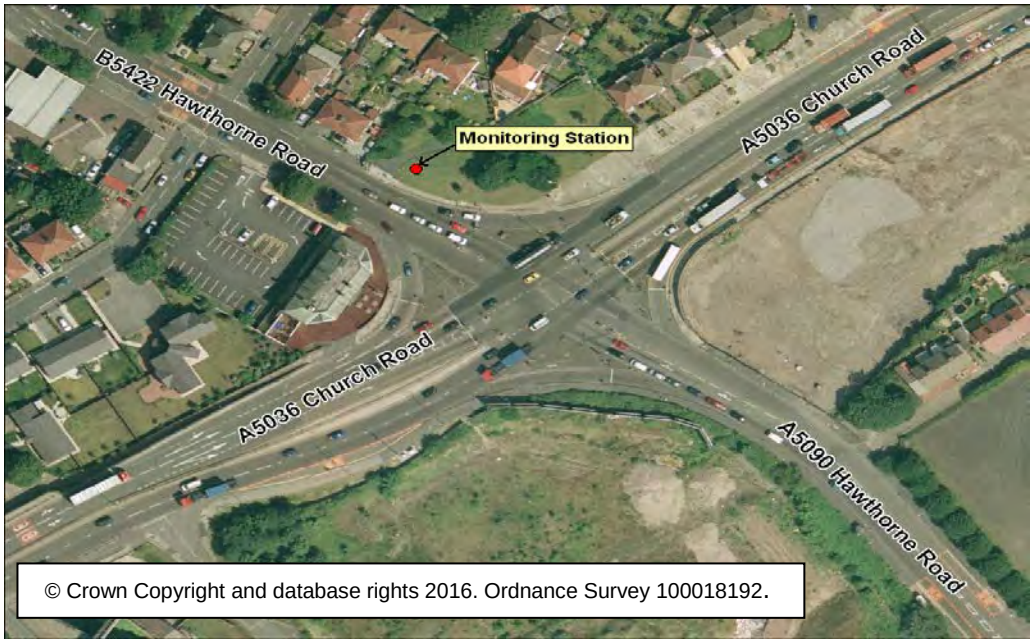


Figure D.9 – Aerial Photograph of the Location of the Hawthorne Road Monitoring Station



Crosby Road South, Seaforth

Site Type: Urban background. **Within AQMA?** – No.
Grid Reference: 332871, 396550. **Site ID**: CM6.
Location: Situated on the A565 Crosby Road South in line with residential property in Verdi Street and opposite the Port of Liverpool with Dacsa Ltd, Seaforth Corn Mills being directly opposite and near the approach to the Seaforth entrance of the port.
Pollutants monitored: Fine particles (PM_{10}), oxides of nitrogen and sulphur dioxide.
Date Monitoring NO_2 Commenced: April 2015 to present.

Figure D.10 – Map showing the Location of the Crosby Road South Monitoring Station

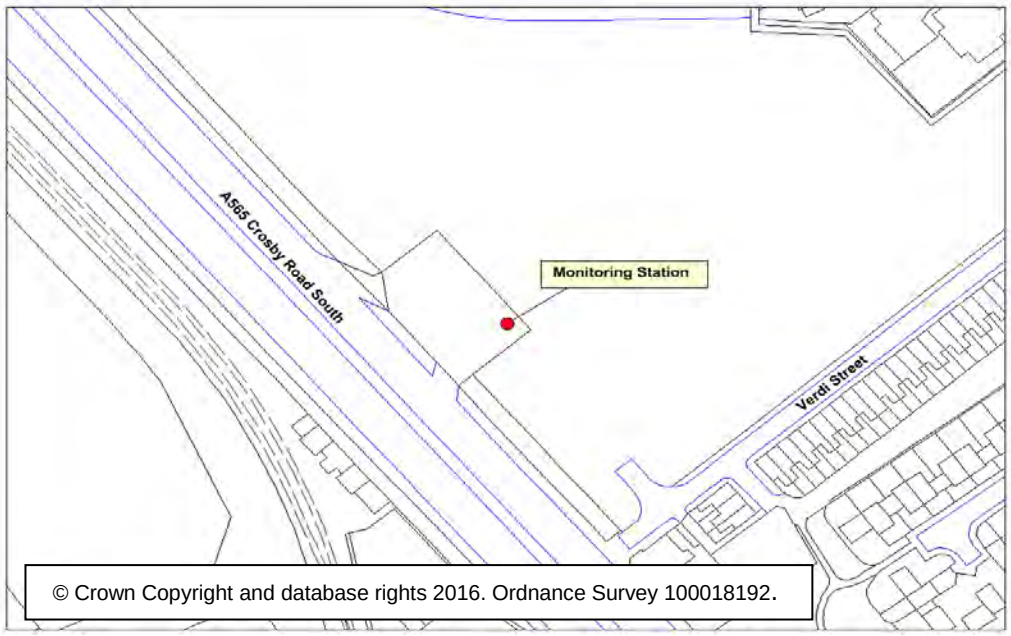
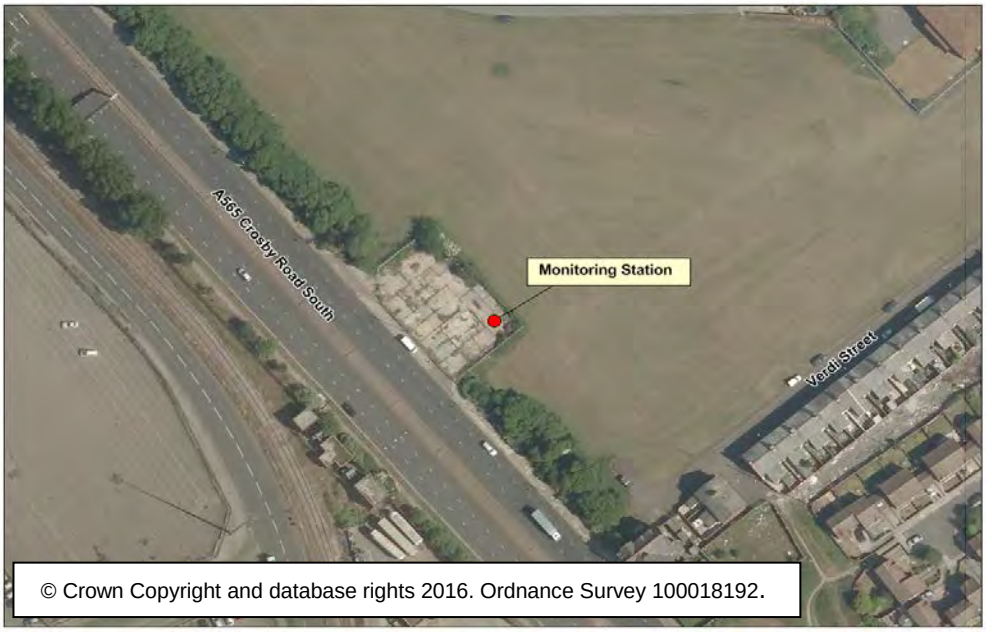
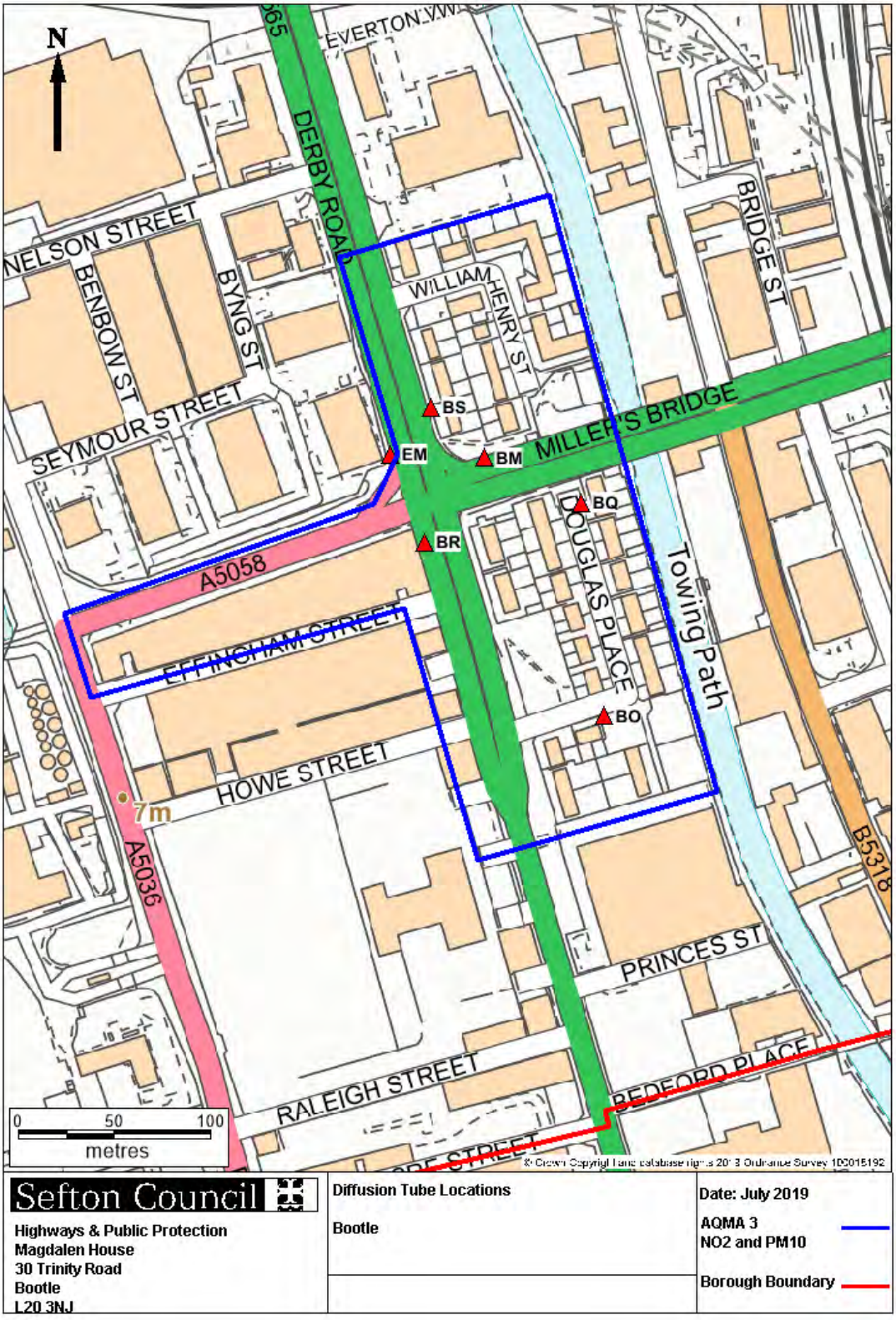


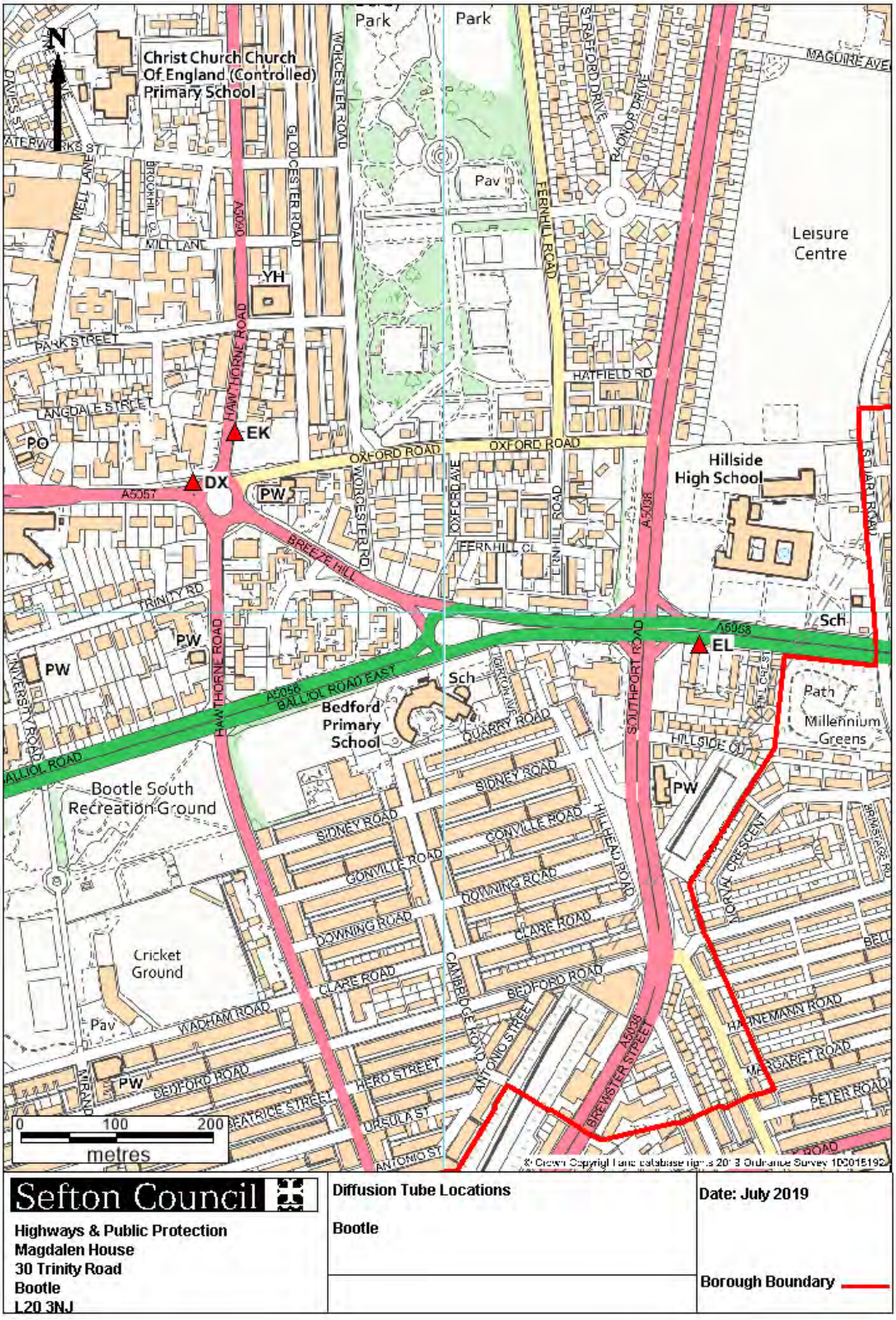
Figure D.11 – Aerial Photograph of the Location of the Crosby Road South Monitoring Station

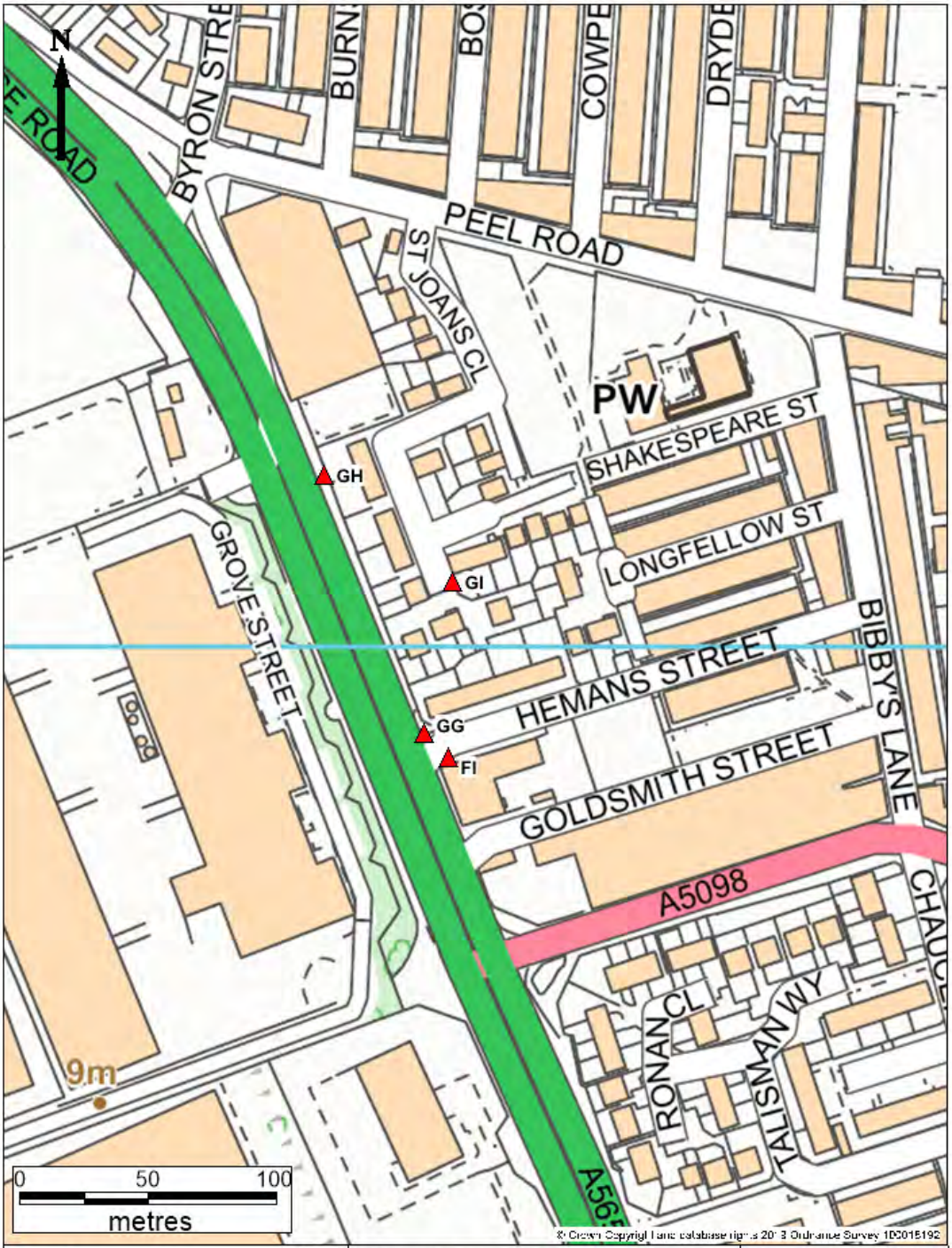


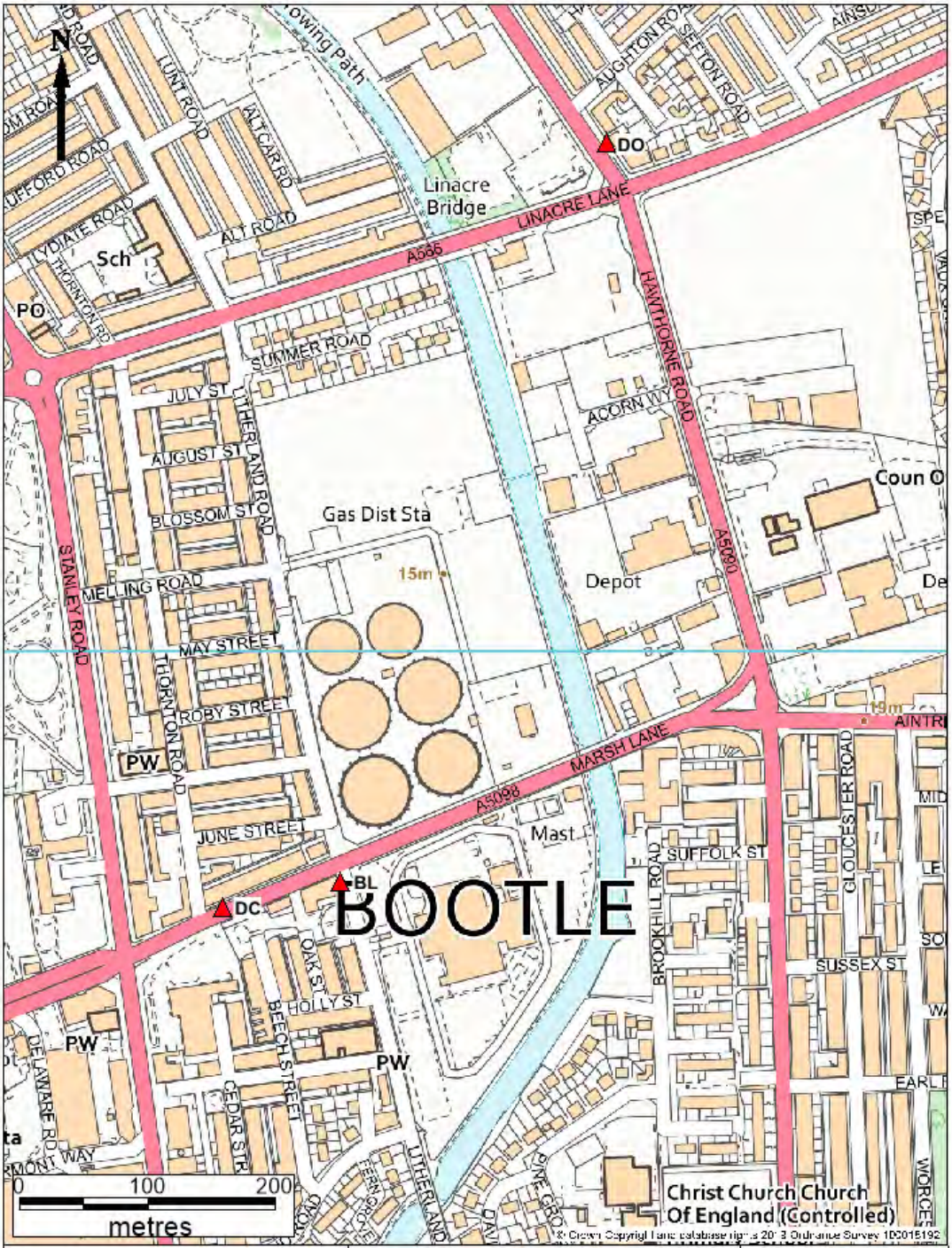
Maps of Diffusion Tube Monitoring Locations

Non-automatic monitoring for nitrogen dioxide using nitrogen dioxide diffusion tubes is also carried out. Sefton Council has approximately 100 diffusion tubes deployed throughout the Borough. These are split between an in-house monitoring programme, co-locations studies and the Community Air Watch scheme. Maps showing the locations of diffusion tubes are shown below.

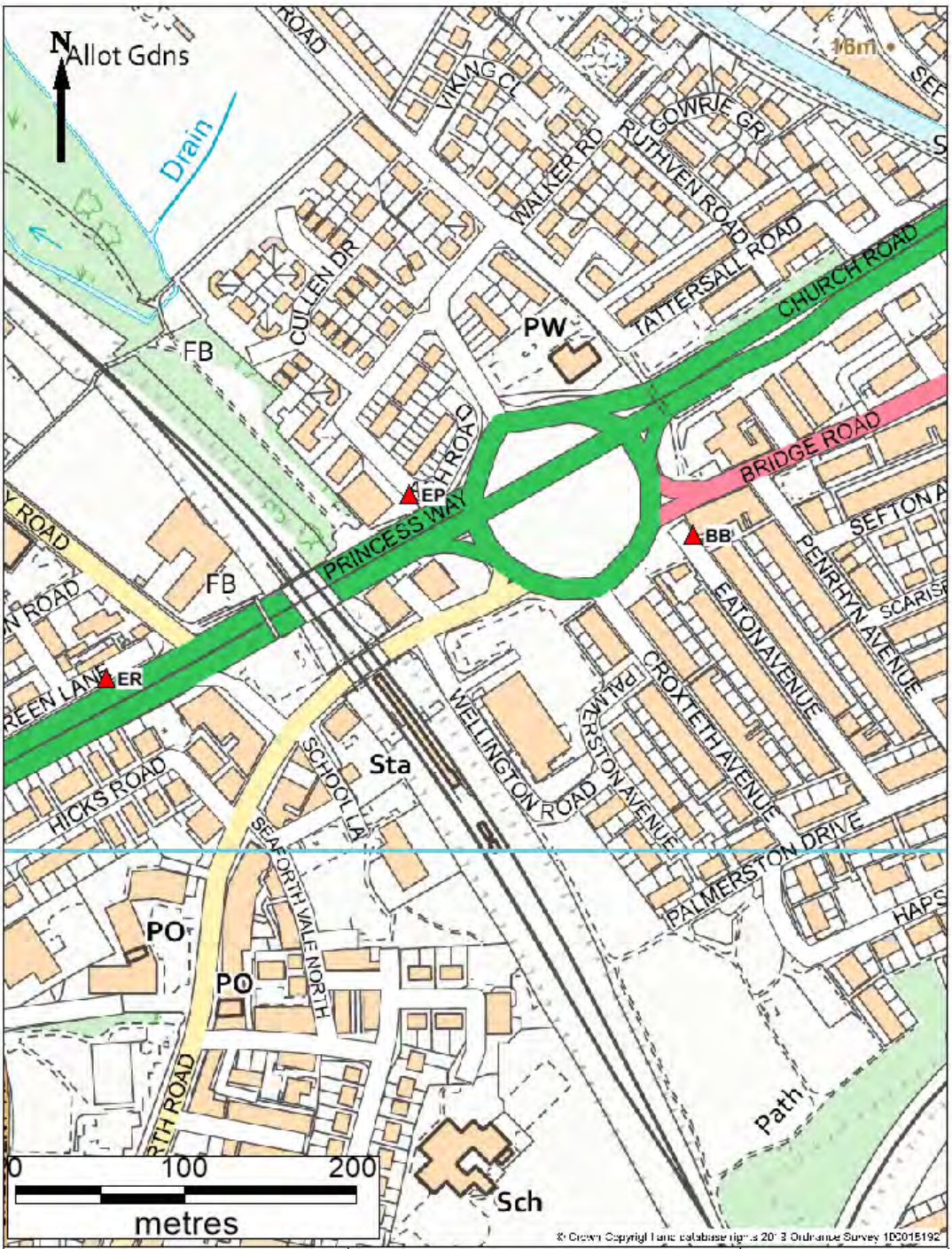

N
EVERTON VW
DERBY ROAD
NELSON STREET
BENBOW ST
BYNG ST
SEYMOUR STREET
WILLIAM HENRY ST
BRIDGE ST
MILLER'S BRIDGE
BS
EM
BM
BQ
BR
A5058
EFFINGHAM STREET
DOUGLAS PLACE
Towing Path
BO
HOWE STREET
7m
A5036
B5318
PRINCES ST
RALEIGH STREET
BEDFORD PLACE
0
50
100
metres
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Bootle
Date: July 2019
AQMA 3
NO2 and PM10
Borough Boundary

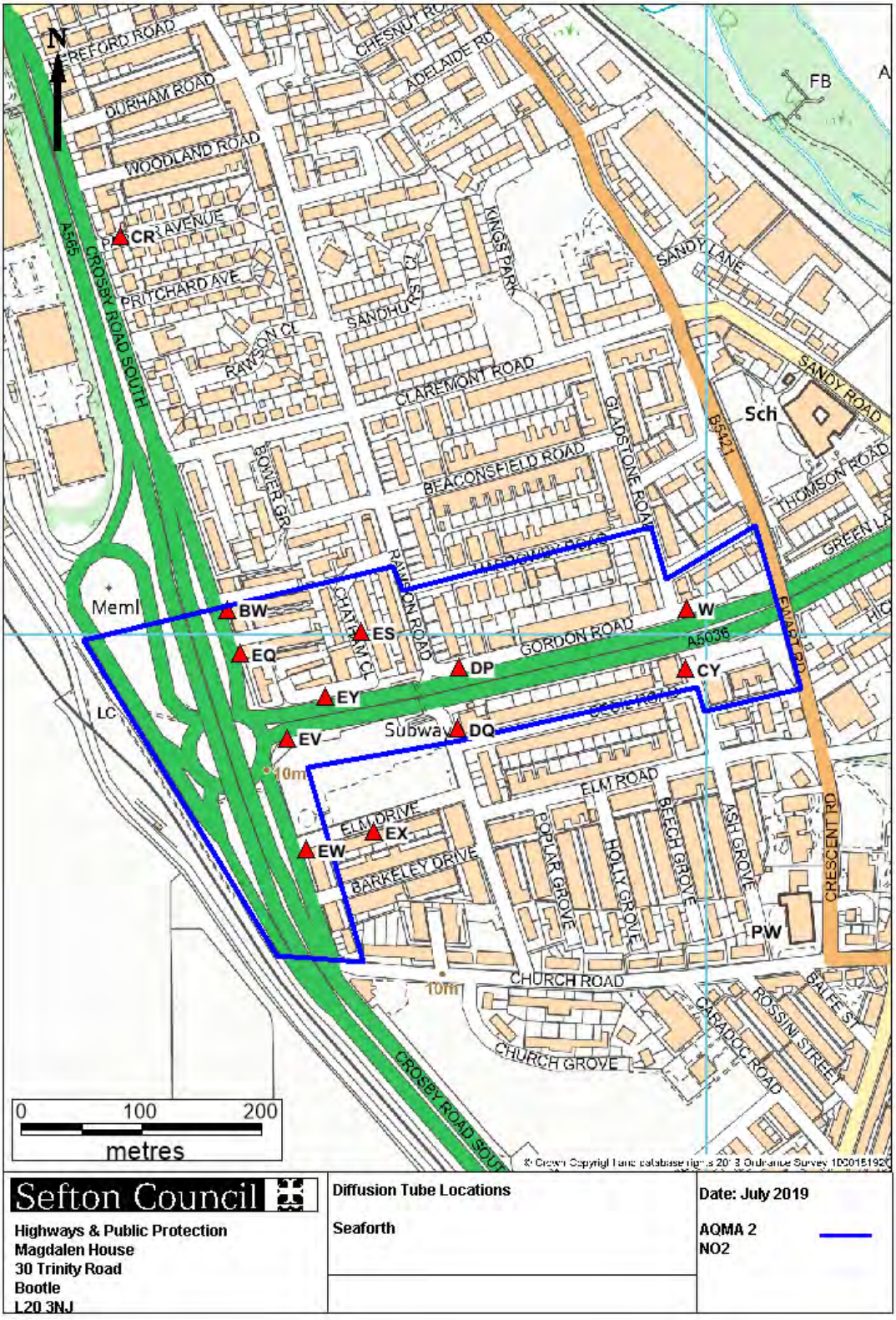

N
Christ Church Church Of England (Controlled) Primary School
Park
Park
Pav
Leisure Centre
Hillside High School
Bedford Primary School
Bootle South Recreation Ground
Cricket Ground
Millennium Greens
Path
Sch
YH
PO
DX
EK
EL
PW
Pav
WORCESTER ROAD
GLOUCESTER ROAD
HAWTHORNE ROAD
OXFORD ROAD
BREEZE HILL
TRINITY RD
BALLIOL ROAD EAST
BALLIOL ROAD
QUARRY ROAD
SOUTHPORT ROAD
SIDNEY ROAD
CONVILLE ROAD
DOWNING ROAD
CLARE ROAD
BEDFORD ROAD
WADHAM ROAD
HERO STREET
DRUSILLA ST
ANTONIO ST
BEATRICE STREET
BREWSTER STREET
HATFIELD RD
FERNHILL ROAD
OXFORD AVE
HILLSIDE CL
MAGUIRE AVE
A5036
A5057
0
100
200
metres
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Bootle
Date: July 2019
Borough Boundary

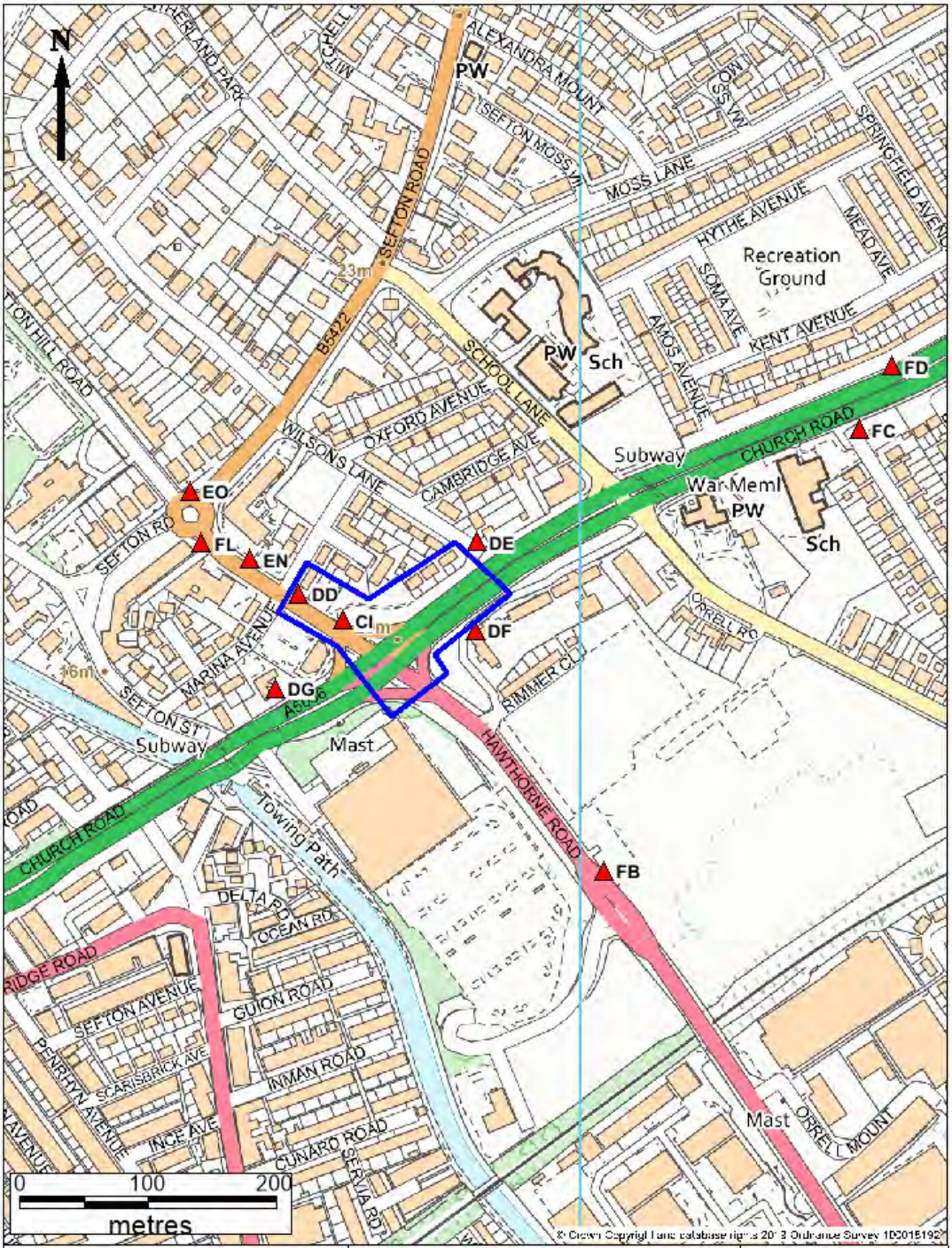

N
BYRON STRE
BURN
COWPE
DRYDE
PEEL ROAD
ST JOANS CL
PW
SHAKESPEARE ST
GH
LONGFELLOW ST
GI
GROVE STREET
BIBBYS LANE
HEMANS STREET
GG
FI
GOLDSMITH STREET
A5098
CHAUCE
RONAN CL
TALISMAN WY
9m
0
50
100
metres
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Bootle
Date: July 2019



Sefton Council **Highways & Public Protection** **Magdalen House** **30 Trinity Road** **Bootle** **L20 3NJ**	**Diffusion Tube Locations** **Bootle**	**Date: July 2019**

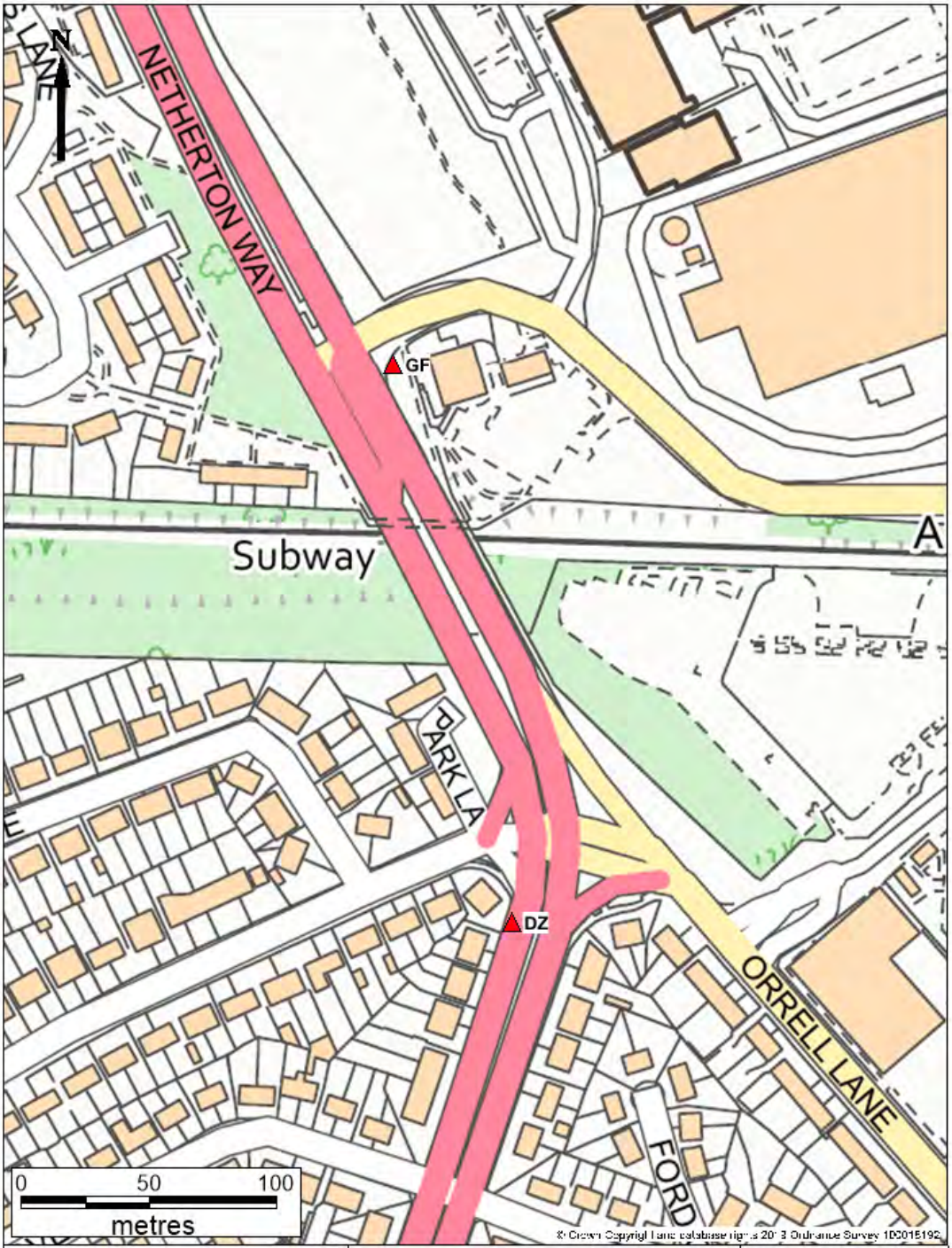

N
Allot Gdns
Drain
ROAD
VIKING CL
WALKER RD
GOWRIE GR
RUTHVEN ROAD
TATTERSALL ROAD
CHURCH ROAD
CULLEN DR
FB
PW
BRIDGE ROAD
EP
PRINCESS WAY
BB
SEFTON A
PENRHYN AVENUE
EATON AVENUE
CROXTETH AVENUE
PALMERSTON DRIVE
ER
Sta
WELLINGTON ROAD
SCHOOL LA
HICKS ROAD
SEAFORTH VALE NORTH
PO
PO
Path
Sch
0
100
200
metres
© Crown Copyright Land database rights 2013 Ordnance Survey 100015192
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Litherland & Seaforth
Date: July 2019


N
REFORD ROAD
DURHAM ROAD
WOODLAND ROAD
AVENUE
PRITCHARD AVE
CROSBY ROAD SOUTH
A565
RAWSON CL
SANDHURST CL
KINGS PARK
CHESNUT RD
ADELAIDE RD
FB
SANDY LANE
SANDY ROAD
B5421
Sch
CLAREMONT ROAD
BEACONSFIELD ROAD
GLADSTONE ROAD
THOMSON ROAD
GREEN LA
BOWER GR
RAWSON ROAD
CHATHAM CL
GORDON ROAD
A5036
ENMARE RD
Meml
BW
ES
EQ
DP
W
CY
EY
LC
EV
Subway
DQ
10m
ELM ROAD
ELM DRIVE
EX
EW
BARKELEY DRIVE
POPLAR GROVE
HOLLY GROVE
BEECH GROVE
ASH GROVE
CRESCENT RD
PW
CHURCH ROAD
10m
CHURCH GROVE
CARADOC ROAD
ROSSINI STREET
BALFE ST
CROSBY ROAD SOUT
0
100
200
metres
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Seaforth
Date: July 2019
AQMA 2
NO2



Sefton Council **Highways & Public Protection** **Magdalen House** **30 Trinity Road** **Bootle** **L20 3NJ**	**Diffusion Tube Locations** **Litherland**	**Date: July 2019** **AQMA 5** **NO2**


N
Sports Ground
Litherland Moss Primary School
Playing Field
CH
MOSS LANE
ANDERSON ROAD
BOUNDARY ROAD
A5036
DUNNINGS BRIDGE
Mast
VINCENT ROAD
HARRINGTON ROAD
FF
FH
UK 2
KIRKSTONE ROAD NORTH
CHURCH ROAD
THIRLMERE DRIVE
KESWICK DR
ARNSIDE
GRASMERE DRIVE
DW
FE
HAWKSHEAD DR
NETHERTON PARK ROAD
KESWICK DRIVE
ENNERDALE DR
ECCLESALL AVENUE
THIRLMERE AVE
DERWENT DRIVE
SILVERDALE DRIVE
KIRKSTONE ROAD SOUTH
ENNERDALE DRIVE
THORNBRIDGE AVENUE
MASEFIELD CRES
CAPTAIN'S LANE
0
100
200
metres
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Litherland
Date: July 2019



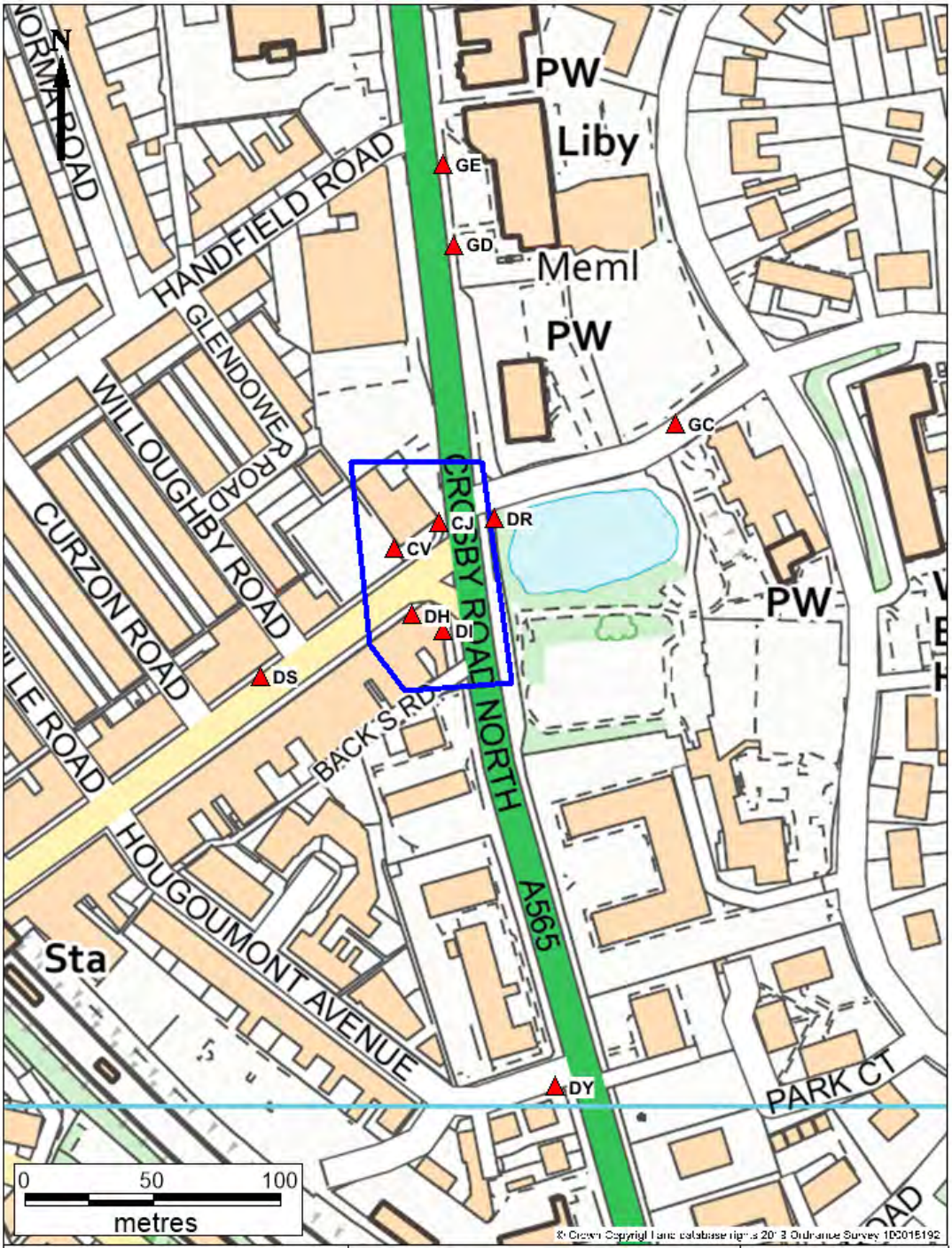
Sefton Council

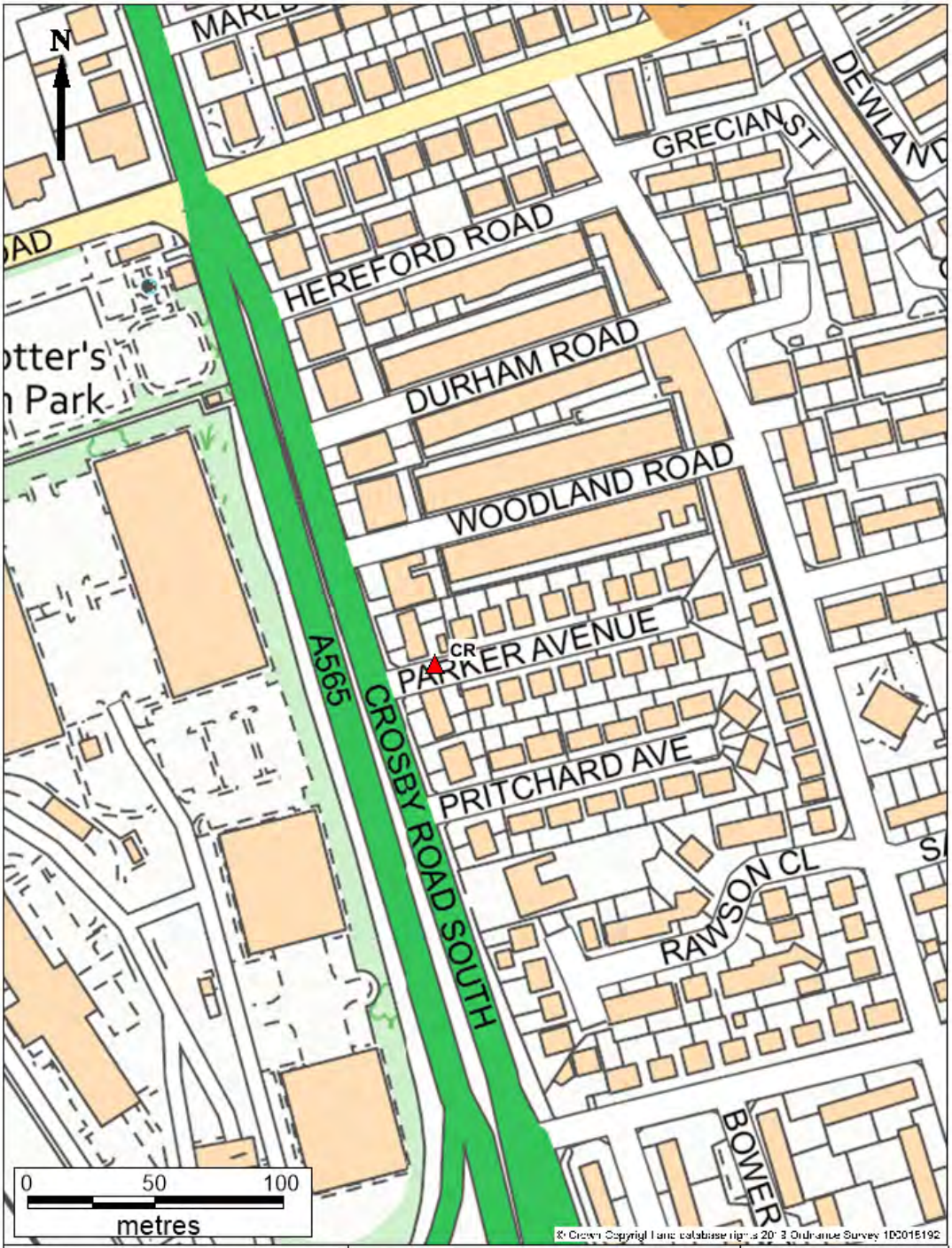
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ

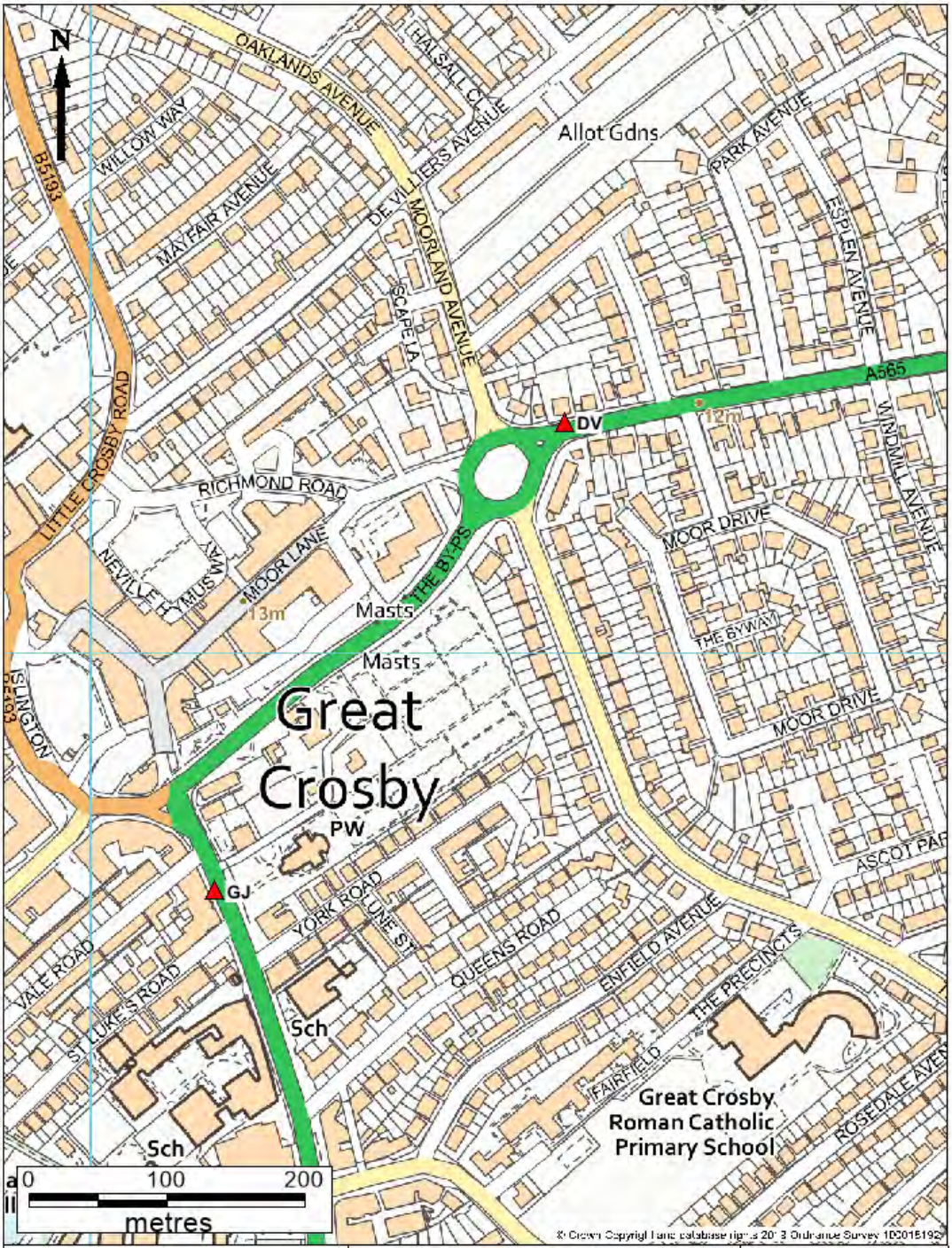
Diffusion Tube Locations

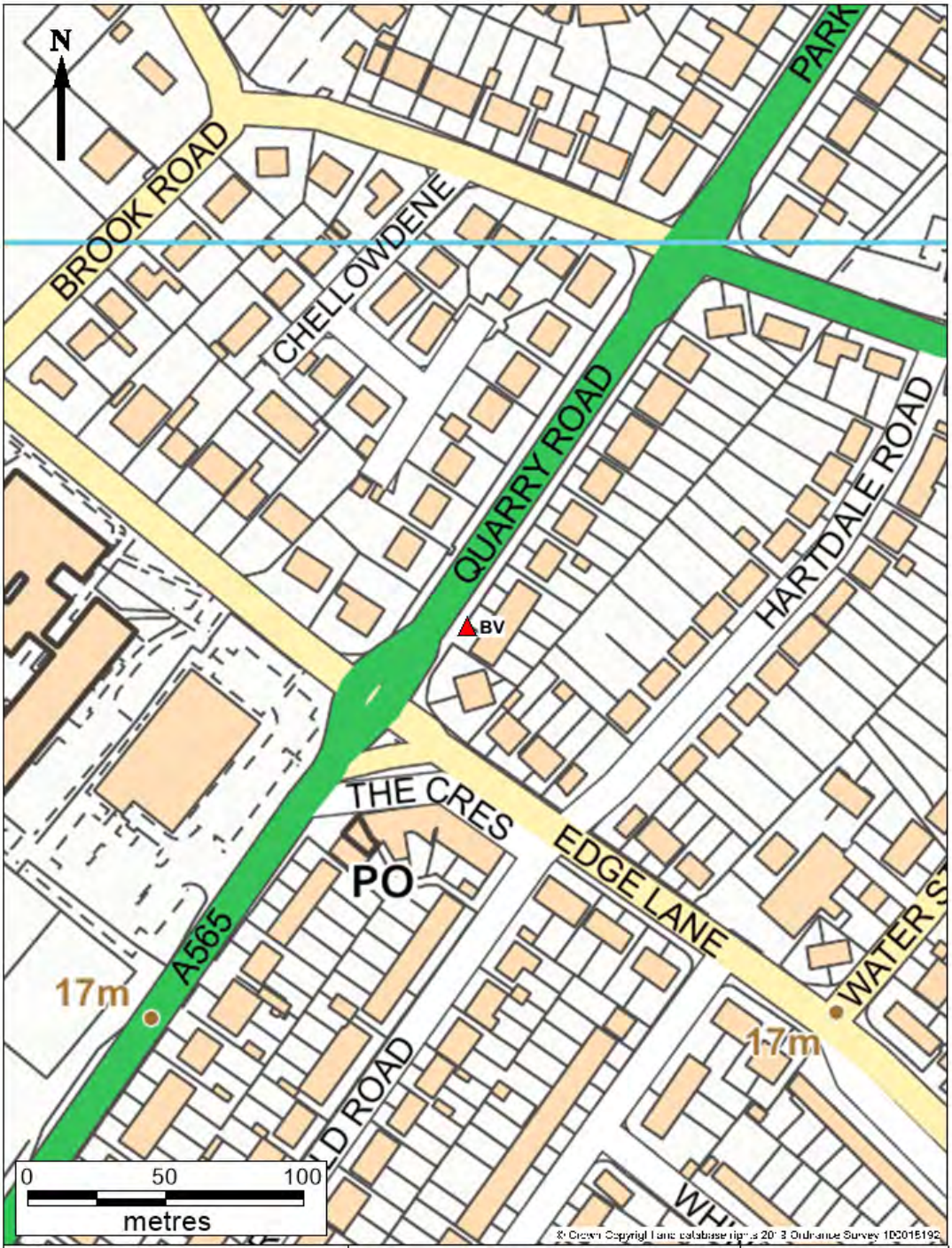
Bootle & Netherton

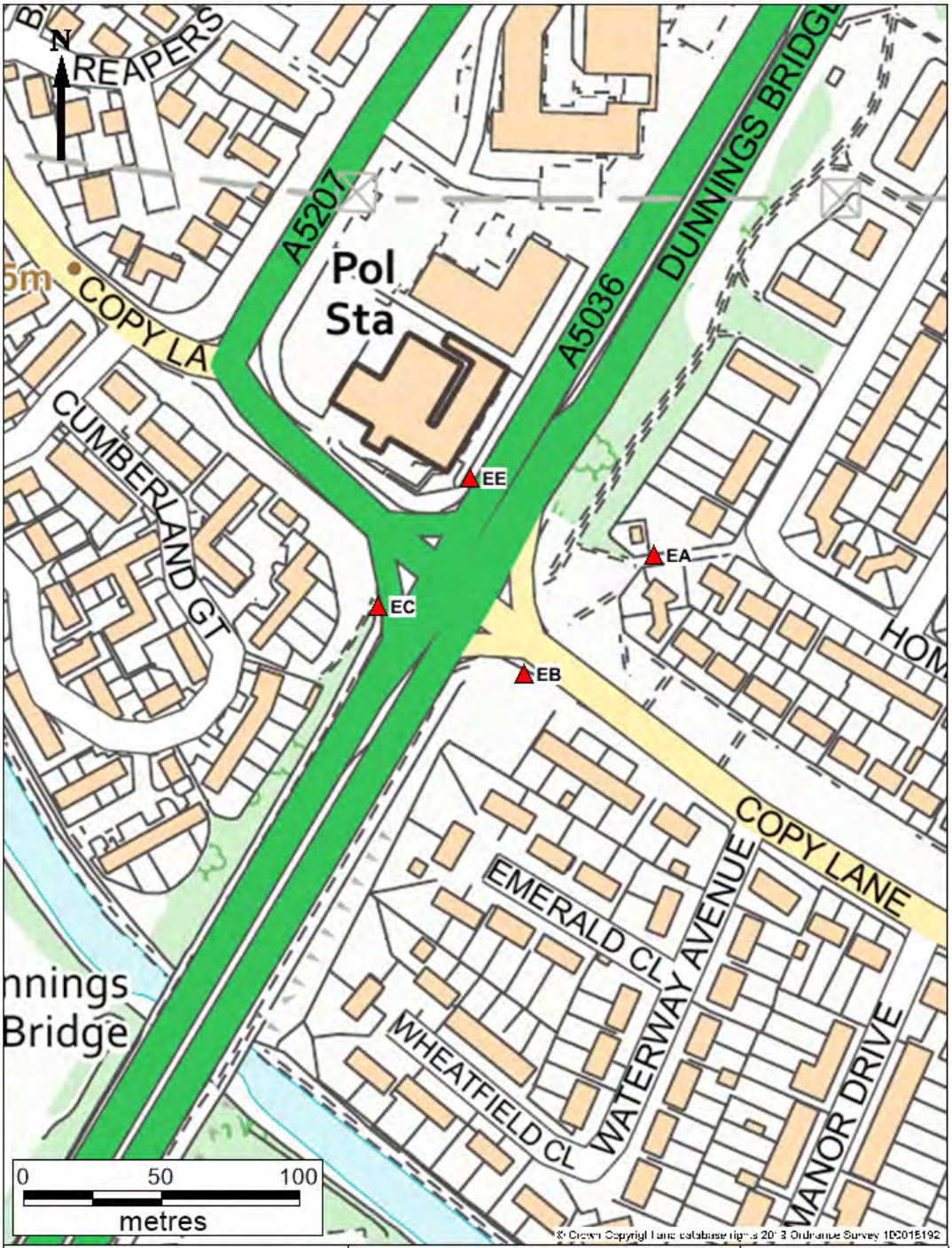
Date: July 2019


N
NORMA ROAD
HANDFIELD ROAD
GLENDOWER ROAD
WILLOUGHBY ROAD
CURZON ROAD
LE ROAD
CROSBY ROAD NORTH
A565
BACK S RD
HOUGOUMONT AVENUE
PARK CT
Sta
PW
Liby
Meml
PW
PW
GE
GD
GC
CJ
CV
DR
DH
DI
DS
DY
0
50
100
metres
© Crown Copyright Land database rights 2013 Ordnance Survey 100015192
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Waterloo
Date: July 2019
AQMA 4
NO2


N
GRECIAN ST
HEREFORD ROAD
DURHAM ROAD
WOODLAND ROAD
PARKER AVENUE
CR
A565
CROSBY ROAD SOUTH
PRITCHARD AVE
RAWSON CL
BOWER
0
50
100
metres
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Seaforth
Date: July 2019


N
OAKLANDS AVENUE
HALSALL CT
DE VILLIERS AVENUE
Allot Gdns
PARK AVENUE
B5193
WILLOW WAY
MAYFAIR AVENUE
MOORLAND AVENUE
SCAPE LA
TISPLEN AVENUE
A565
DV
12m
LITTLE CROSBY ROAD
RICHMOND ROAD
WINDMILL AVENUE
MOOR DRIVE
NEVILLE HUSWAY
MOOR LANE
13m
THE BYPS
Masts
THE 6TH WAY
Masts
ISLINGTON
B5193
Great
Crosby
PW
GJ
YORK ROAD
LINE ST
QUEENS ROAD
ENFIELD AVENUE
THE PRECINCTS
ASCOT PAR
VALE ROAD
ST LUKE'S ROAD
Sch
Sch
FAIRFIELD
Great Crosby
Roman Catholic
Primary School
ROSEDALE AVEN
0
100
200
metres
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Crosby
Date: July 2019


N
BROOK ROAD
CHELLOWDENE
QUARRY ROAD
PARK
HARTDALE ROAD
BV
THE CRES
EDGE LANE
PO
A565
17m
17m
WATER S
0
50
100
metres
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Thornton
Date: July 2019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nnings
Bridge
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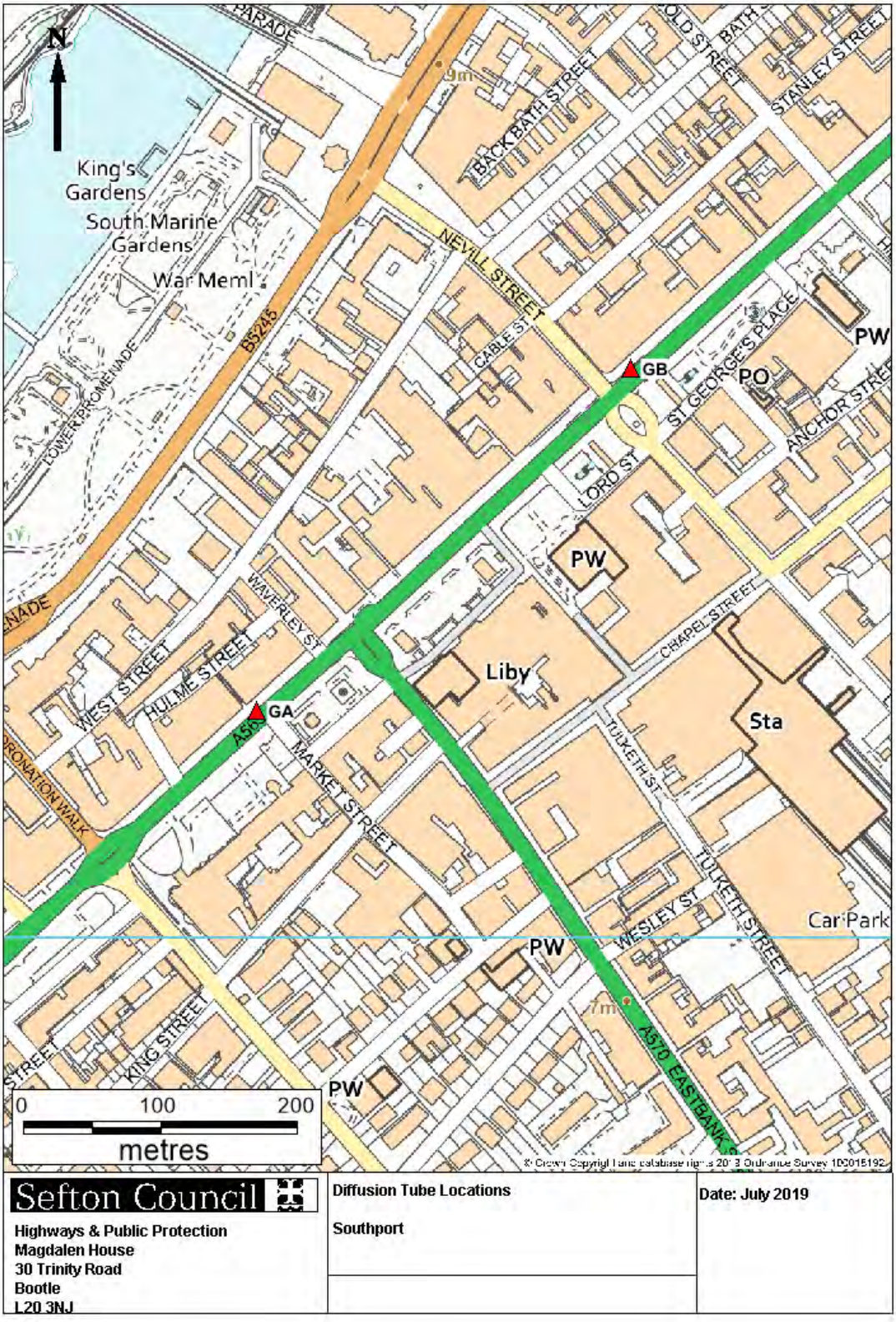
Sefton Council
Highways & Public Protection
Magdalen House
30 Trinity Road
Bootle
L20 3NJ
Diffusion Tube Locations
Netherton
Date: July 2019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South Marine Gardens
War Meml
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GB
PW
PO
ST GEORGE'S PLACE
ANCHOR STREET
LORD ST
CHAPEL STREET
WAVERLEY ST
VIEST STREET
HULME STREET
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MARKET STREET
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TULKETH ST
WESLEY ST
Car Park
A570 EASTBANK
KING STREET
0
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Magdalen House
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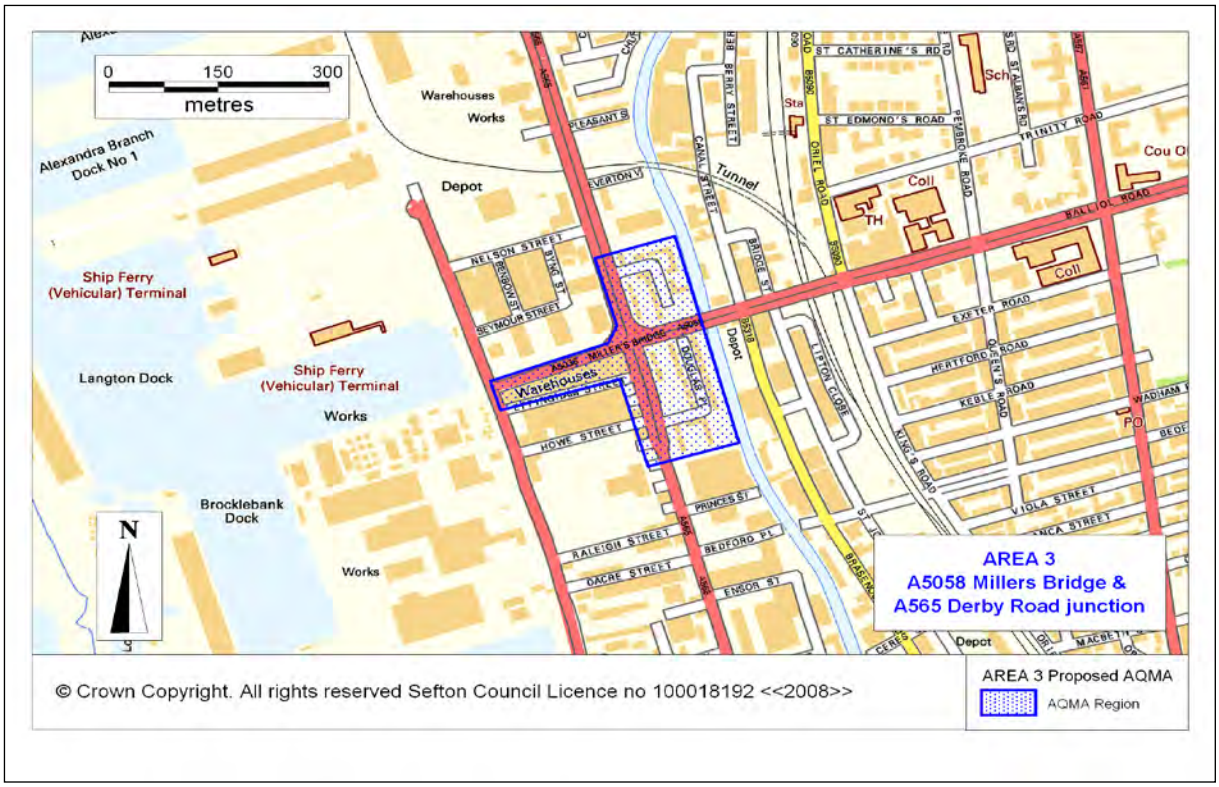
Bootle
L20 3NJ
Diffusion Tube Locations
Southport
Date: July 2019

AQMA2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Warehouses
Works
Depot
Tunnel
Ship Ferry (Vehicular) Terminal
Langton Dock
Ship Ferry (Vehicular) Terminal
Works
Brocklebank Dock
Works
Warehouses
Depot
N
AREA 3
A5058 Millers Bridge &
A565 Derby Road junction
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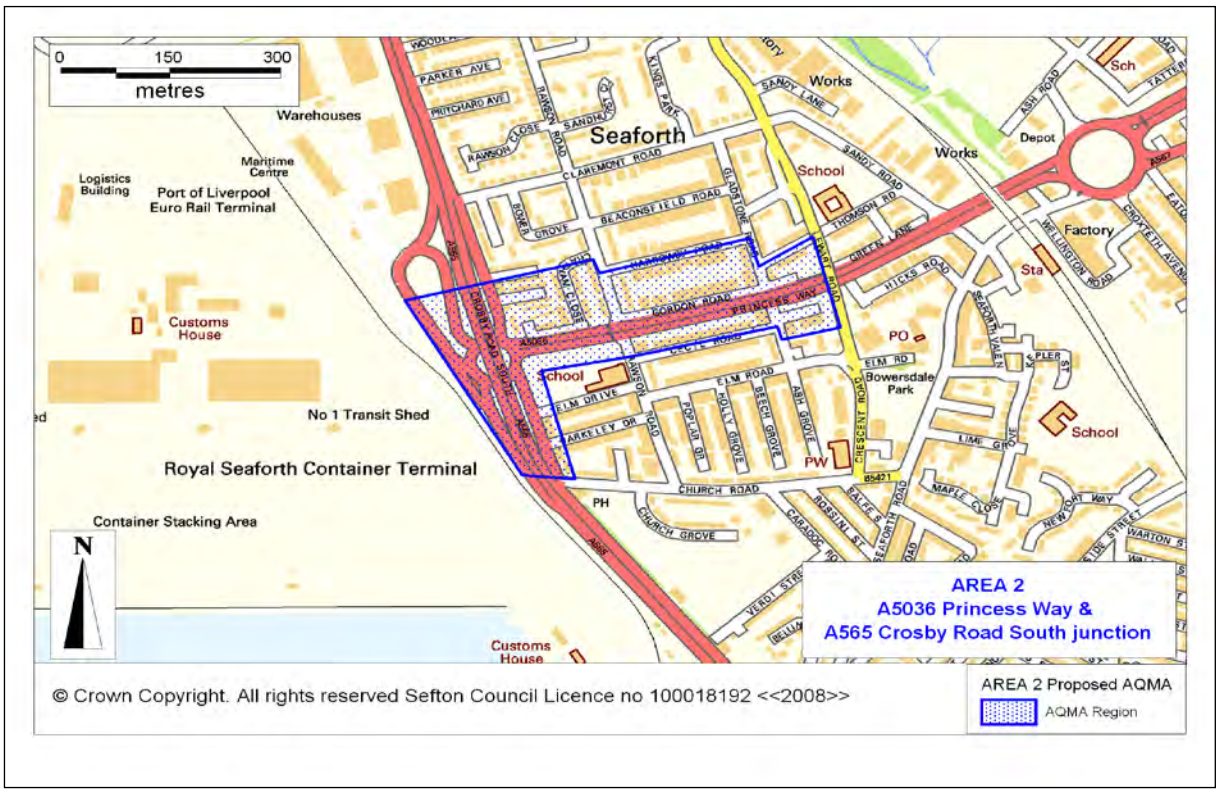
AREA 3 Proposed AQMA
AQMA Region

AQMA3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metres
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Maritime Centre
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No 1 Transit Shed
Royal Seaforth Container Terminal
Container Stacking Area
Customs House
Seaforth
Works
School
Depot
Works
Factory
Sta
PO
Bowersdale Park
School
PW
PH
N
AREA 2
A5036 Princess Way &
A565 Crosby Road South junction
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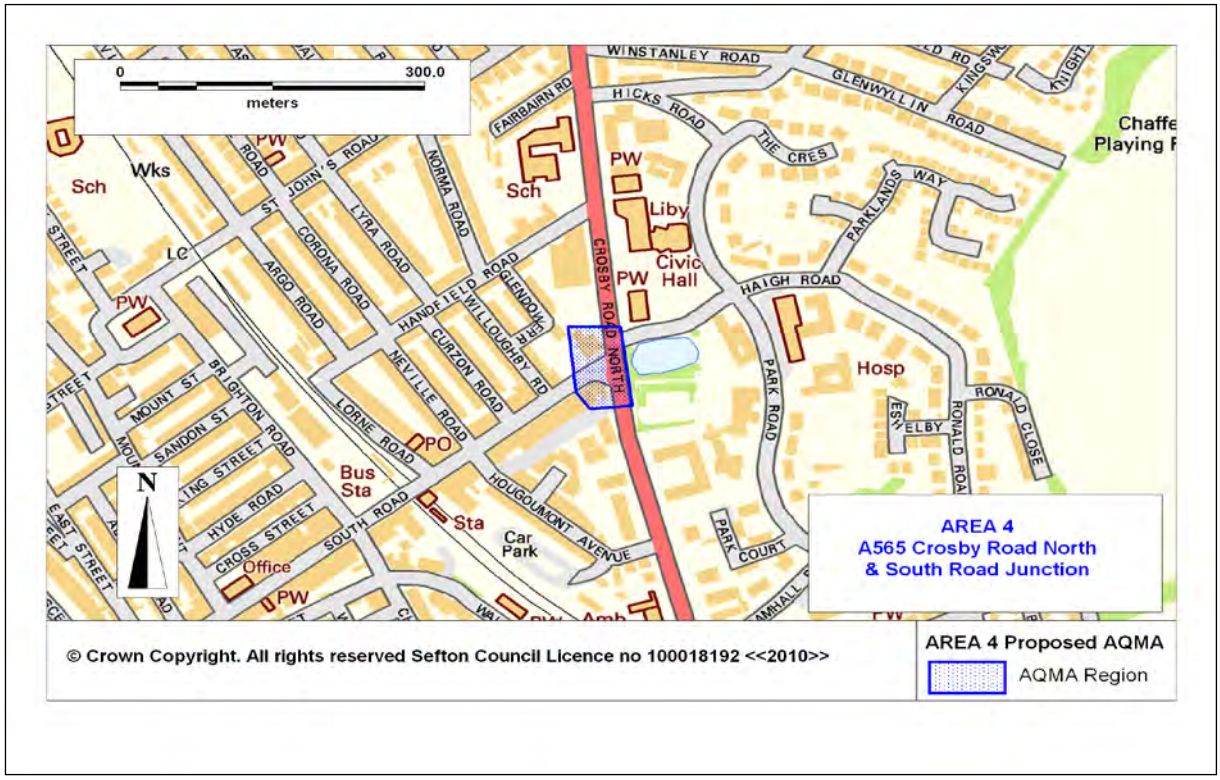
AREA 2 Proposed AQMA
AQMA Region

AQMA4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Civic Hall
CROSBY ROAD NORTH
HAIGH ROAD
Hosp
PARK ROAD
RONALD CLOSE
ELBY
PARK COURT
NORMA ROAD
CORONA ROAD
ARGO ROAD
LYRA ROAD
HANDFIELD ROAD
WILLOUGHBY RD
CURZON ROAD
NEVILLE ROAD
LORNE ROAD
PO
Bus Sta
Sta
Car Park
HOUGOUMONT AVENUE
SOUTH ROAD
HYDE ROAD
CROSS STREET
Office
BRIGHTON ROAD
MOUNT ST
SANDON ST
N
AREA 4
A565 Crosby Road North
& South Road Junction
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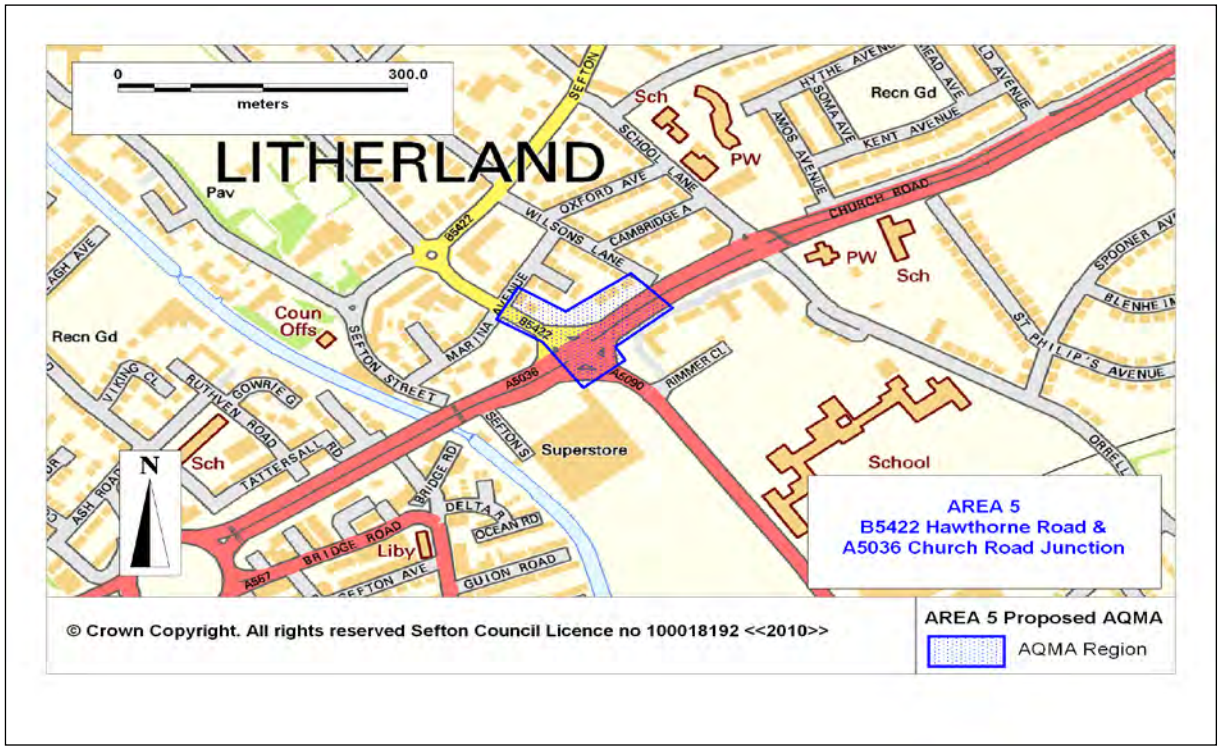
AREA 4 Proposed AQMA
AQMA Region

AQMA5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SOMA AVE
AMOS AVENUE
KENT AVENUE
CHURCH ROAD
Sch
PW
SPOONER AV
ST PHILIP'S AVENUE
Coun Offs
SEFTON STREET
MARINA AVENUE
A5036
RIMMER CL
VIKING CL
RUTHVEN ROAD
GOWRIE G
TATTERSALL RD
Sch
Superstore
School
SEFTON ST
BRIDGE RD
DELTA A
OCEAN RD
BRIDGE ROAD
Liby
A567
GUION ROAD
N
AREA 5
B5422 Hawthorne Road &
A5036 Church Road Junction
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AREA 5 Proposed AQMA
AQMA Region

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

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

[10] 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	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
…	…