Sefton Council

2018 Air Quality Annual Status Report (ASR)

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

July 2018

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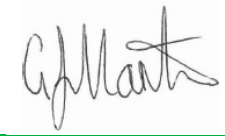
Prepared by	Greg Martin	Principal Environmental Health Officer		11.07.18
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Foreword by
Sefton Council Director of Public Health

Sefton Council continues to be committed to working with partners to ensure that Sefton will be a place where improved health and wellbeing is experienced by all.

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 action 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 Air Quality Steering group continues to over-see air quality work in the Borough and ensure internal and external agencies work together, effectively, to deliver improvements where they are needed.

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 has made dealing with poor air quality in its Borough a priority and recognises the serious health impacts poor air quality can have on residents and visitors to the Borough alike.

Sefton invests significant resources to assess air quality in its Borough, Identify areas where air quality is a concern and implement actions to improve air quality in these areas.

Through improving air quality, the short term and long term effects on people's health can be reduced and will have particular benefits to those who may find their conditions are made worse through exposure to air pollution, for example people with heart or lung conditions or breathing problems.

To assess levels of air pollution in Sefton, the Council undertakes 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

[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

where objectives have not been met are all 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).
- Hawthorne Road/ Church Road junction, Litherland (NO_2).

Areas of high pollution 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 link:

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) and light goods vehicles (LGVs). Emissions from industrial activities within the Port of Liverpool have also been identified as a source of PM_{10}.

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.

Sefton Council's air quality officers work closely with a number of internal and external partners to improve air quality in the Borough. A Strategic Air Quality Group consisting of Local Councillors, Environmental Health, Public Health, Planning, Highways, Economic Development, and Communications teams, oversees the work being undertaken in respect of Air Quality in Sefton.

Air quality officers also 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 Councils 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 Council's.

The latest air quality monitoring in Sefton shows that in some areas levels of air pollution has reduced from that observed in previous years whilst in other locations slight increases have occurred. 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

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/AssessRepDocs/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. An HGV parking demand study.

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 in this area as detailed below.

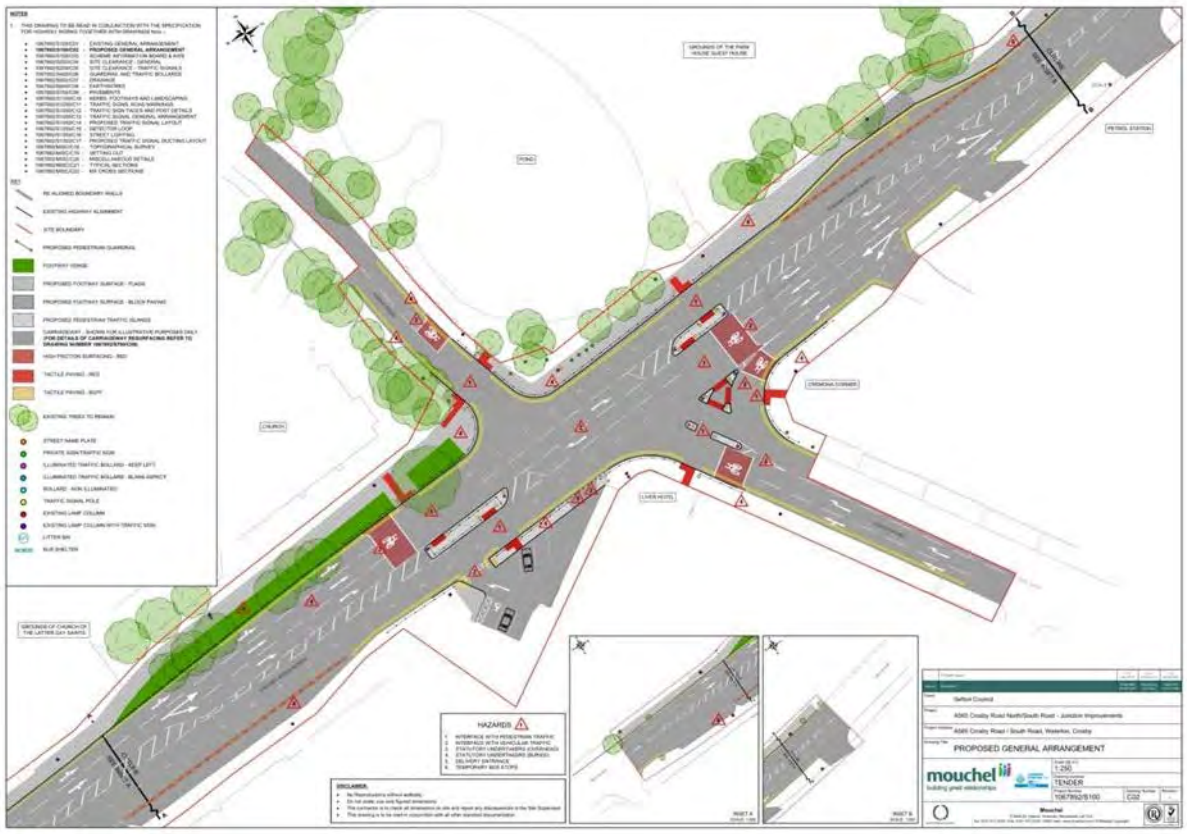
ECO Stars

Sefton Continues to fund the ECO Stars Fleet Recognition Scheme. This free to join scheme provides a review of an operator's fleet and their operations to award an initial star rating. Advice to operators is given on how to make further improvements to both save fuel & money and on how to improve operator environmental performance to increase their star rating and thus reduce emissions of vehicles travelling through Sefton and improve air quality.

58 operators have now been recruited to the Sefton Scheme with in excess of **3500** vehicles included.

South Road/Crosby Road North Junction improvement

Significant Junction improvement works have been completed to improve the South Road/Crosby Road North/ Haigh Road junction in Waterloo. Monitoring is currently taking place to assess the effectiveness of these measures in reducing congestion and air pollution in this location.



Use of Low emission Vehicles

Sefton Council encourages and promotes the use of low emission vehicles and is currently leading by example by using them within the Council. Sefton Council continues to operate two Nissan Leaf electric pool cars based at Bootle Town Hall for

use by Sefton Council employees when out on Council business throughout the Borough. The Mayors official car is also an electric Leaf and Cleansing services utilise an electric leaf to undertake Council business.

Seftons AQ officers using Nissan Leaf to undertake AQ duties.

Sefton Council also use five Nissan NVe200 electric vans (two postal vans, two Leisure Services vans and one Coastal Management van) for delivering Council services. Cleansing Services also now use seven small electric tipping trucks (under 3.5t) for picking up street cleansing. The tipper trucks average around 10,500 miles per annum each and the vans have an average mileage of 12,500 per annum each. The pool car mileage has still to be assessed. However, the total mileage using Council electric vehicles that would otherwise have been driven using Council trucks/vans or private cars running on diesel or petrol is in excess of 150,000 miles per annum, thus reducing air pollution in the Borough.

Strategic AQ Steering Group

Sefton has recently re introduced a Strategic AQ steering group which acts as the main strategic forum for Air Quality Matters in the Borough, its purpose is summarised below:

- To develop a Sefton One Council approach to air quality that includes an air quality strategy/position statement and overarching action plan.
- To act as the main forum for strategic discussions about air quality, including receiving and responding to consultations, approaches to work jointly with other organisations, and ideas for local action.
- To contribute to and develop the Local Air Quality Management Policy including ongoing oversight of:

  - The content of the Annual Status Report
  - Declaration, action plans and revocations of Air Quality Management Areas

- To commission pieces of work in line with the action plan, as appropriate.

- To assign responsibility for operational issues and delivery of elements of the action plan, with the formation of task and finish groups as appropriate.

- To develop an appropriate communications strategy that will engage with the public and communicate accurate and effective messages in relation to local air quality.

Clean Air Zone Feasibility Study

Through the steering group Sefton has recognised that there are still challenges ahead with regard to reducing levels of NO_2 in some of Seftons AQMAs particularly those impacted by traffic entering and leaving the Port of Liverpool. Sefton has commissioned Environmental consultants AECOM to undertake a Clean Air Zone (CAZ) feasibility study to assess the feasibility of implementing CAZs in Sefton to reduce traffic related emissions. The study is well underway with findings to be released in late 2018. **The results from this will be used to develop further targeted action plans.**

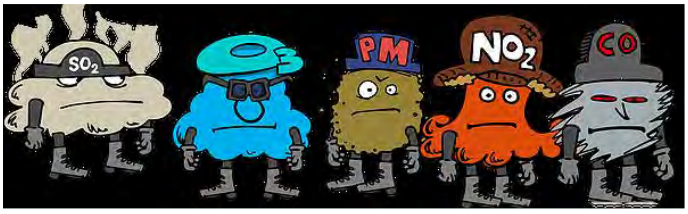
$PM_{2.5}$ Monitoring

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 $PM_{2.5}$.

The previous PM_{10} monitor has been relocated to our Hawthorne road station extending our PM_{10} monitoring capabilities further.

New dual PM_{10} / $PM_{2.5}$ Monitor at Millers Bridge AQ Station

Schools Air Quality Project



During 2017/18, staff from the Energy & Environmental Management Team along with ECO Centre Staff developed and delivered an air quality educational resource for 10 schools within or near to Sefton's AQMAs. This was to improve awareness

and knowledge of air quality issues and contribute to a range of work undertaken as part of the AQMA action plans.

The educational resources that were developed included;

- Air Quality Website containing;
    - information on the gases (sulphur dioxide, carbon monoxide, ozone, carbon dioxide and nitrogen dioxide) which have all been characterised according to the features of each gas.
    - Individual pages for each of the schools we have worked with allowing them to showcase their work.
    - Activities for children which can be shared with parents etc. at home.
    - Lesson Plans for teachers
    - Links to further information e.g. Clean Air day 2018 resources, BBC 'so I can breathe' videos, Sefton's Breathing Space web site etc.
- Eco Day activities for schools including;
    - Activities such as making pollution catchers, creating travel towers (how children travel to school) and playing air quality games.
    - Power point presentation & images that can be used for assemblies.
    - Lesson plans showing National Curriculum links.

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.

Work is being carried out by Highways England to better understand the potential effects of port expansion on air quality in Sefton and to produce measures to address any negative impacts on air quality and the road network resulting from port expansion. Sefton will continue to review and assess any proposals and assessments presented by Highways England .

The route improvement option currently being progressed by Highways England is the offline option which entails Building a new carrigeway 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/

Local Engagement and How to get involved

A communications strategy has been developed as an output from the strategic Air Quality Steering group. 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 healthy borough.

Recent examples include press and social media releases advertising Clean Air Day and encouraging members of the public to make a Clean Air Pledge and report Smokey vehicles using the following links.

www.gov.uk/report-smokey-vehicle.

www.sefton.gov.uk/taxi

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 10 local schools in close proximity to Seftons AQMA's.

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 every Local Air Quality Management (LAQM) report that has 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/

Simple Actions that can reduce 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.

    - Avoiding unnecessary idling of your car engine.

    - 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 waste. This not only releases pollutants into the atmosphere, it can also cause a nuisance to your neighbours.

- Should I burn wood? Solid fuels such as wood, wood chips and pellets (sometimes referred to as biomass) are renewable fuels with lower carbon dioxide emissions than gas, coal or electricity; however they still have a negative impact on air quality and public health. This is through the emissions of NO_2 and particulates even when burnt in an 'exempt appliance'. The increasing popularity of the installation of wood burning stoves / biomass boilers etc. may actually lead to deterioration in Sefton's air quality, which is something you should think about if you are considering burning wood/ biomass.

- 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 woodburning stoves.

- Guidance issued by DEFRA has also been released proving further information on how to minimise pollution associated with solid fuels https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1712041200_171010_open_fires_wood_burning_stoves_FINAL.pdf

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1 Local Air Quality Management

This report provides an overview of air quality in Sefton during 2017. 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.. 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
2 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	39.7	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
3 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)	Yes	60	µg/m3	59.2	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

3 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)	YES	46	Exceedances	17	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
4 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	42.6 µg/m3	µg/m3	41.0	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
5 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).	yes	42.6 µg/m3	µg/m3	40.4	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

☒ **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 appraisal of last year's ASR concluded the report was well structured and provided the information required as specified in the Guidance, using the latest report template.

Specific comments were as follows;

1. The 2017 ASR report continues to highlight that Sefton Council are developing a strategic approach to local air quality management, which is welcomed.

2. Further assessments of port development options, the options for considering a Clean Air Zone in conjunction with Liverpool City Council provide the focus for future work on air quality action plan development.

3. The formation of the strategic air quality steering group will be a key factor in developing a co-ordinated approach to air quality across the region. Future ASR reports should continue to report on the outcome of the various options assessments currently under consideration, to ensure the AQAP measures are updated accordingly.

4. We concur with the recommendation that the AQMA4 for nitrogen dioxide, and AQMA3 for 24hr mean PM10, can be considered for revocation in the near future, and the remaining AQMAs should continue despite meeting the AQ objectives in most cases.

5. The outcome of the options assessments should also be used to inform the future development of the monitoring strategy, which should be reviewed in light of the outcomes of these studies, particularly in relation to port development options and potential compliance with the future requirements of a CAZ.

6. The current monitoring has identified only two sites of exceedance in AQMA2 and AQMA3, with no sites in exceedance outside of an AQMA. Based upon the potential developments that are likely to impact on future air quality, further monitoring sites should be considered outside of current AQMAs.

7. We note that the draft Action Plan for all AQMAs is awaiting the outcome of the CAZ feasibility study, before being updated. The development of the final Action Plan should progress once the CAZ study is completed, and progress reported within the next ASR report.

Following last years ASR Sefton continues to take 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.

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.

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.

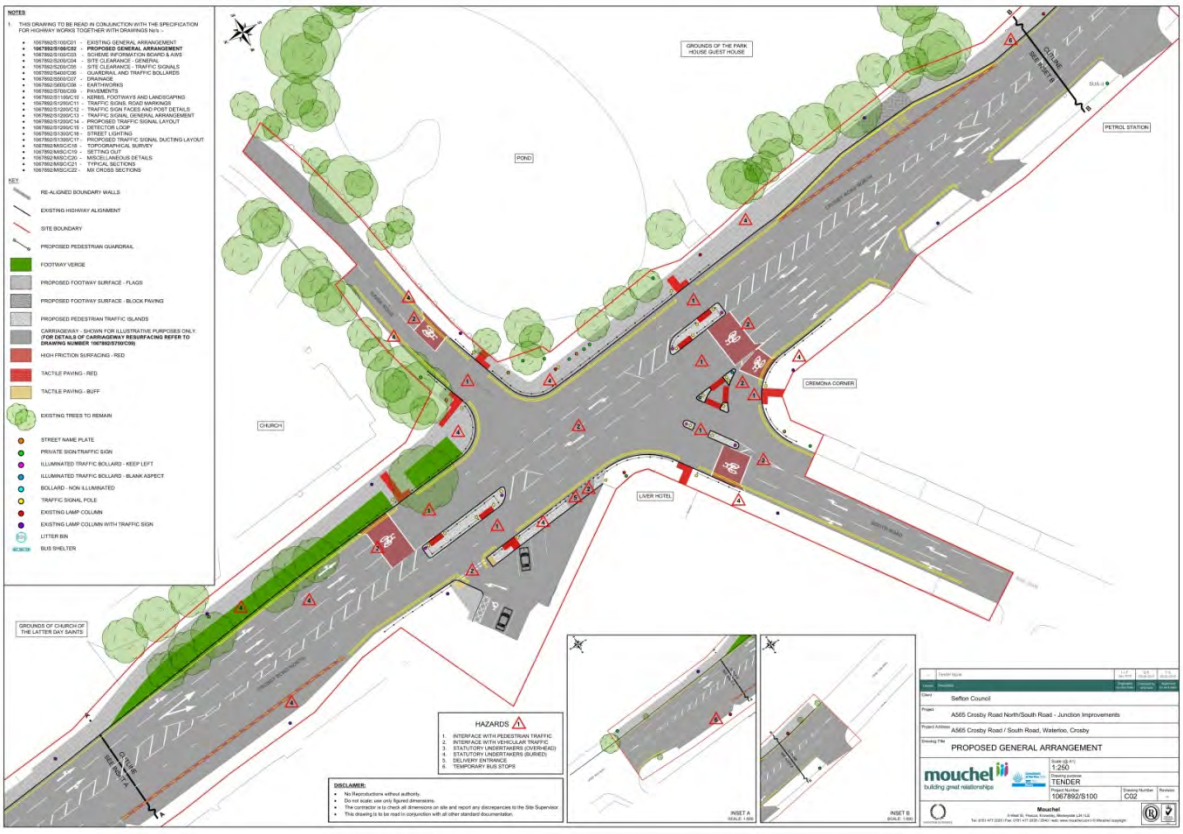
- ECOSTARS fleet recognition scheme funding secured to continue for a further 2 years.
- Port expansion mitigation measures: (i) Highways England port access A5036 road options stage 1 study completed. Offline route option chosen. Further detailed assessment of this option now underway by Highways England 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



Monitoring is now taking place to assess the effectiveness on reducing congestion and the improvements in relation to traffic related emissions.

AQMA 5 Hawthorne Road, Litherland

- As AQMA 2

Further action/measures being taken to improve air quality in Sefton

1. A new strategic air quality steering group has been set up with attendees from Planning, Public health, Environmental Health, Highways , Economic Development all in regular attendance. The group considers air quality at a

strategic level and focuses and directs the Council priorities in terms of Air quality.

2. In January 2018 Sefton appointed Environmental consultants AECOM to undertake a detailed Clean Air Zone feasibility study specifically in Sefton to determine whether the creation of a CAZ(s) in Sefton's AQMAs would bring about improvements in air quality and control any future increases in emissions as a result of traffic increases due to the port expansion. The study is well underway and milestones being actively managed. It is envisaged that the report will be completed by winter 2018.

3. $PM_{2.5}$ monitoring at the existing Millers Bridge station has 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. This will also enable a locally derived $PM_{2.5}/PM_{10}$ ratio to be determined to use and apply to PM_{10} monitoring results in Sefton, rather than using the nationally derived ratio, and gain a more accurate assessment of $PM_{2.5}$ levels in the Borough.

4. Staff from the Energy & Environmental Management Team (Eco Centre and additional staff) have developed and delivered an air quality educational resource for schools within or near to Sefton's AQMAs. This was to improve awareness and knowledge of air quality issues in school children and to promote behavioural change. Additional internal funding has been found to further develop the AQ electronic education resource.

5. A communications strategy has been developed as an output from the strategic Air Quality Steering group. A key objective throughout the campaign is to encourage behaviour change that will positively impact on Sefton's air quality. A number of campaigns have already been delivered through the press and social media and will continue to be developed under the stewardship of the Air Quality Steering group.

6. Officers in the air quality team continue to vigorously review all planning applications that may have an impact on air quality in the Borough. Detailed air quality assessments are often required to support planning applications. These are robustly assessed and where appropriate recommendations applied to mitigate the air pollution effects.

7. A New Supplementary Planning Policy Document Sustainable Travel and Development SPD June 2018 has been issued by Sefton requiring the installation of Electric Vehicle charging points as part of all residential and commercial developments. Thus assisting in the promotion and the use of low emission vehicles and to a certain degree future proofing these developments.

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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.

- With regard to **AQMA4 Waterloo** declared for NO_2 Annual Mean exceedances it is anticipated that compliance will be achieved as a result of the junction improvements. However as the improvements were only completed in May 2017 a full years diffusion monitoring will be required to assess compliance with the NAQS and possible revocation of the AQMA

- 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 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). It is likely that the findings of the CAZ study will provide a focus for further targeted actions that may be implemented that will bring about improvements in air quality in these areas.
- Seftons Draft Action Plan for AQMAs 1-5 will be updated following the findings of the CAZ feasibility study which is underway and due out at the end of 2018.

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 liason 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 Specilised goods vehicle count	Traffic Management	Other	Sefton MBC	2011	2012	Analysis of information and interpretation of data to further infrom 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	Ongoing	Potentially 2019-2025	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 2025 when new road is built	Awaiting detailed assessment from consultants

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 specific 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 58 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.
AQMA3 SS2	Control of dust from industry	Environmental Permits	Other	Sefton MBC/Environment Agency	2010-2011	2011	Compliance results from Local Authority and	no Target pollution reduction set-hard to quantify	Meetings with EMR and EA. New EMR dust management	completed	Compliance with PM10 AQOs achieved. Improved dust

							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 exceedences of the PM10 daily mean standard when predominantly north westerly winds.		plan produced 2010. Number of exceedences of PM10 24-hour mean when wind direction from the direction of the port continues to remain low.		control at EMR & relocation of JMD Haulage has significantly contributed to reducing PM10 levels at Millers Bridge.
AQMA4 SS1	A565 Route Management Strategy RMS action plan	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective	Sefton MBC	2009-2016	2017	Compliance with the NO2 air quality objectives. RMS actions implemented to timescale	no Target pollution reduction set-hard to quantify	SouthRoad/ Crosby Road North/Haigh Road junction improvement elements of RMS to benefit AQMA 4 now	completed	NO2 monitoring underway to assess improvements and compliance with NAQS objective.

			vehicle priority, bus priority, high vehicle occupancy lane						completed		
AQMA5 SS1	Port expansion mitigation measure No 1 Highways England A5036 Road options study	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Highways England	2013	2013-2025	Compliance with the NO2 air quality Objectives... New road built to timescale.	No Target pollution reduction set-hard to quantify	Stage 1 offline option chosen. Detailed assessment underway by HE consultants	Potentially not until 2025 when new road built	Awaiting consultant report on options.
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	2 015-2016	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 recognitio n 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. 58 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.
GM1	SCOOT	Traffic Managem ent	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(VM S)	Public Informatio n	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 Alternativ es	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	
GM4	School travel plans	Promoting Travel Alternativ es	School Travel Plans	Sefton MBC	2010	2010	Percentage of schools in Sefton with a travel plan	No target pollution reduction set - difficult to quantify	Implemented 2010	Completed	
GM5	Cycling & Walking	Promoting Travel Alternativ es	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	
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	

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.
- Addressing particulate matter through the land use planning and development control system.

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

Smoke Control Areas

Following recent research evidence suggests that the use of domestic fossil fuels can increase local levels of particulates including $PM_{2.5}$.

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.

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 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. On completion of a full 12 calendar months monitoring a locally derived $PM_{2.5}/PM_{10}$ will be determined to use and apply to PM_{10} monitoring results in Sefton, rather than using the nationally derived ratio, and gain a more accurate assessment of $PM_{2.5}$ levels in 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.

CAZ Feasibility Study

A CAZ feasibility study has been commissioned by Sefton to look at further ways of reducing traffic related pollution in Sefton. $PM_{2.5}$ is to be specifically considered and modelled within the study and any findings used to target further action to reduce $PM_{2.5}$ levels.

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

3.1 Summary of Monitoring Undertaken

3.1.1 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 2017. 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 D1. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Sefton undertook non-automatic (passive) monitoring of NO_2 at 90 sites during 2017. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D2. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

Individual Pollutants

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

3.1.3 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 2017 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.

Discussion of NO_2 Objective Compliance/Exceedance

Automatic monitoring

1 of the five automatic monitoring sites where NO_2 is monitored, showed exceedance of the NO_2 annual mean objective in 2017. This was at the CM3 Millers Bridge monitor where a NO_2 annual mean of 40.6 µg/m^3 was recorded. This site is located within AQMA 3 at Millers Bridge. 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

Fifteen non-automatic (passive) diffusion tube monitoring sites showed exceedance of the NO_2 annual mean objective in 2017.

Millers Bridge/Derby Road Area

Around the Millers Bridge area these were at Site ID: NBM Derby Road, Bootle where a NO_2 annual mean of 47µg/m^3 was recorded, Site ID: NBR Derby Road, Bootle where a NO_2 annual mean of 61µg/m^3 was recorded , site ID: MEM Millers Bridge Bootle where a NO_2 annual mean of 43µg/m^3 was recorded and site ID: NBS

Derby Road where a NO_2 annual mean of 40 µg/m^3 was recorded . All four sites are located within existing AQMA 3 Millers Bridge. As these sites recorded a 2017 NO_2 annual mean concentration in exceedance of the air quality objective at a monitoring site which is not representative of public exposure, the concentration at the nearest receptor for these locations was estimated using the Defra NO_2 fall off with distance calculator. This showed the estimated concentrations at receptor locations to be 37.9 µg/m^3, 59.2µg/m^3, 32.1µg/m^3 and 36.0µg/m^3 for NBM, NBR, NEM and NBS respectively. Thus Site ID: NBR, 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.

Site ID NCZ Pleasant street had to be relocated closer to the kerbside due to tubes consistently missing in 2016. It showed an annual mean of 43 µg/m^3 in 2017 mainly due to having to relocate closer to the carrigeway. When adjusted for distance the level at receptor was estimated to be 33.8 µg/m^3 well below the national standrad.

Site ID NCD Marsh Lane showed an annual mean of 40 µg/m^3 in 2017. When adjusted for distance the level at receptor was estimated to be 35.7 µg/m^3 . This tube will continue to be closly monitored.

Hawthorne Road/Church Road Area

Around the Hawthorne Road AQMA site IDs NCI and NDD Hawthorne Road, Litherland showed annual average NO_2 levels of 42 µg/m^3 and 47 µg/m^3 respectivly. When adjusted for distance the levels at the receptor were estimated to be 33.9 µg/m^3 and 40.4 µg/m^3 . Both these tubes are located within AQMA 5 which will continue to remain in force.

Site ID NDO Hawthorne Road showed an annual mean of 47 µg/m^3 in 2017. When adjusted for distance the level at receptor was estimated to be 37.9 µg/m^3 close to the annual standard. This tube is not witin an AQMA and will continue to be closly monitored.

Site ID NFH Church Road showed an annual mean of 44 µg/m^3 in 2017. When adjusted for distance the level at receptor was estimated to be 29 µg/m^3 well within the annual standard.

South Road/Croaby road North Area

Around the South Road AQMA site IDs NCJ South Road and NDR Crosby Road North showed annual average NO_2 levels of 41 µg/m^3 and 47 µg/m^3 respectivly. When adjusted for distance the levels at receptor were estimated to be 41 µg/m^3 and 37.9 µg/m^3 . Both these tubes are located within AQMA 4 where significant junction improvements work took place during 2017. Whilst these works were ongoing the area suffered high levels of congestion and it is thought this impacted on the levels of NO_2 in the area during 2017.

Breeze Hill Area

Site ID NEL Breeze Hill showed an annual mean of 42 µg/m^3 in 2017. When adjusted for distance the level at receptor was estimated to be 33.9µg/m^3 well within the annual standard.

Princess way Area

Site ID NEV Princess way showed an annual mean of 41 µg/m^3 in 2017. The tube is located with AQMA 2 but not close to any relevant receptors.

Heman Street

Site ID NFI 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. There are no obvious reasons for the exceedance and as a result of this, additional diffusion tube monitoring is to take place in the area, along with a targetted modelling study. Following this modelling/montoring an informed decision will be made whether or not to declare a Air Quality Management Area in this location.

Diffusion Tubes close to the NAQS objective

Four diffusion tube monitoring sites had annual mean NO_2 concentrations that were close to the objective (between 38-40µg/m^3) in 2017. These were at Site ID: NDI Crosby Road South Waterloo (within AQMA 4), NDV Moor Lane Crosby ,NEW Elm Drive (within AQMA 2) and NFB Hawthorne Road Litherland and will continue to be closley monitored.

All but one diffusion tube exceedance (when adjusted for distance in line with DEFRAs appoved calculator) were within exisitng AQMA's. The exceedance at Heman street is to be investigated further which may result in the declaration of a new AQMA.
Due to uncertanties in the impact of the port expansion no AQMA's are due to be revoked at this time.

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

- **AQMA 2 Princess Way, Seaforth**. Borderline compliance with the NO_2 annual mean objective at the automatic monitoring location occurred in 2017, this is the first year since moniroring began that this has occurred and follows The general trend in NO_2 levels declining.The most recent result when corrected for fall off with distance indicates the public exposure in this AQMA is again below the NAQS objective. Compliance with the 1 hour mean objective was also achieved at this location. Notwithstanding this however due to 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.

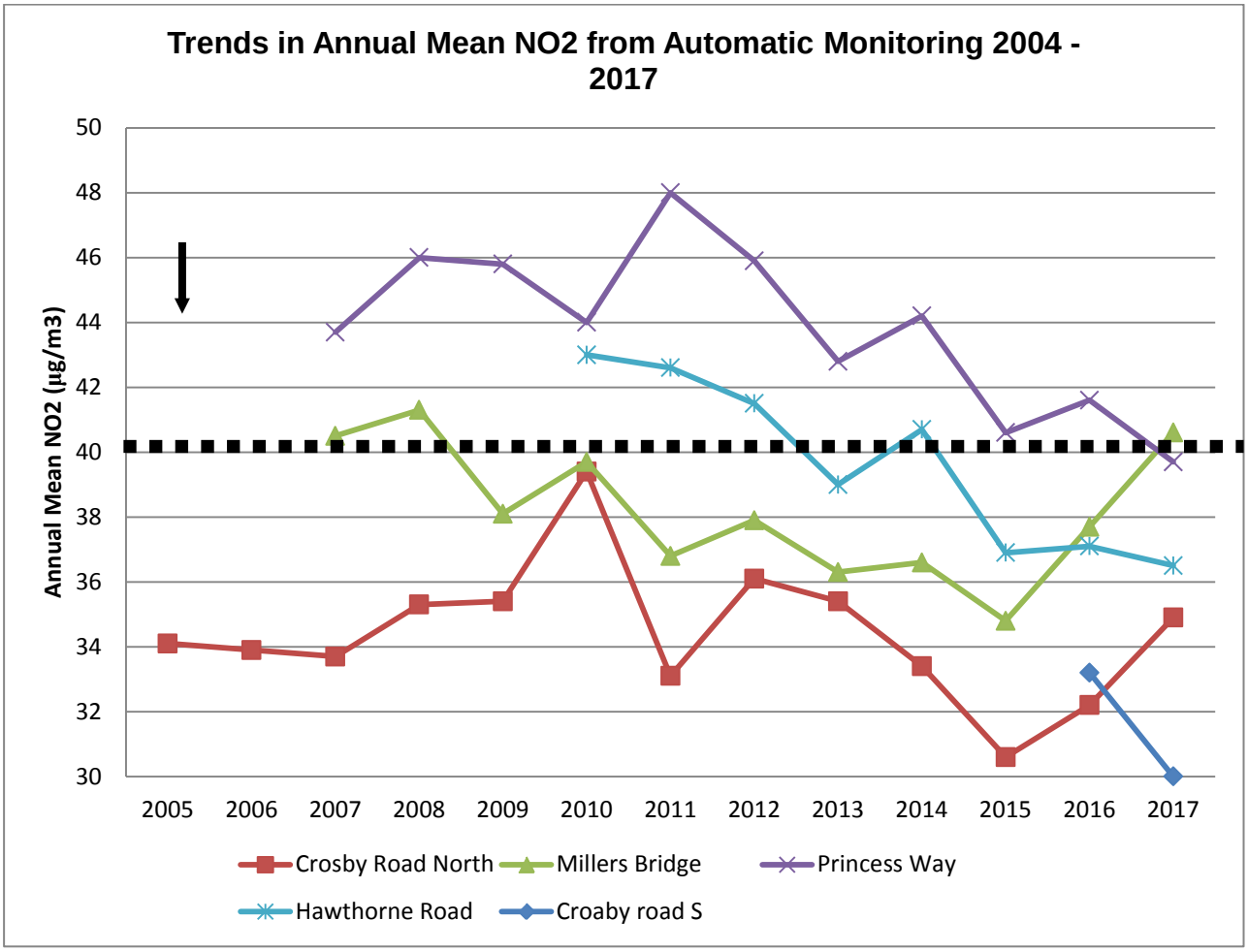
- **AQMA 3 Millers Bridge, Bootle**. A slight exceedance of the NO_2 annual mean objective occurred in 2017 at the monitor location –this is the first recorded exceedance since since 2009. Diffusion tube monitoring in 2017 also still shows exceedance of the annual mean objective. Compliance with the 1 hour mean objective was, however achieved at this location.

- **AQMA4 Waterloo**. No automatic NO_2 monitoring is carried out within AQMA 4. Diffusion tube monitoring showed 1 exceedance with the annual objective in 2017. It is thought that this is due to additional congestion associated with the construction of the new juction which was completd in May 2017. Monitoring will continue to assess the effectivness of the revised junction.

- **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 2016 and 2017. 1 diffusion tube did however show an exceedance of the annual standard. During 2017 connection difficulties arose 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.

Figure F.1 – Trends in Annual Mean NO_2 from Automatic Monitoring



Princess Way (CM4) which is located within AQMA 2 showed borderline compliance with the NO_2 annual mean objective of 40µg/m^3 in 2017 as indicated by the purple line in **Figure F.1**. There has been a downward trend in the years following a peak of 48.0µg/m^3 in 2011.

Hawthorne Road (CM5) which is located within AQMA 5 has shown 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 rose in 2017 to a slight exceedance of 40.6 $\mu g/m^3$.

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.

3.1.4 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.

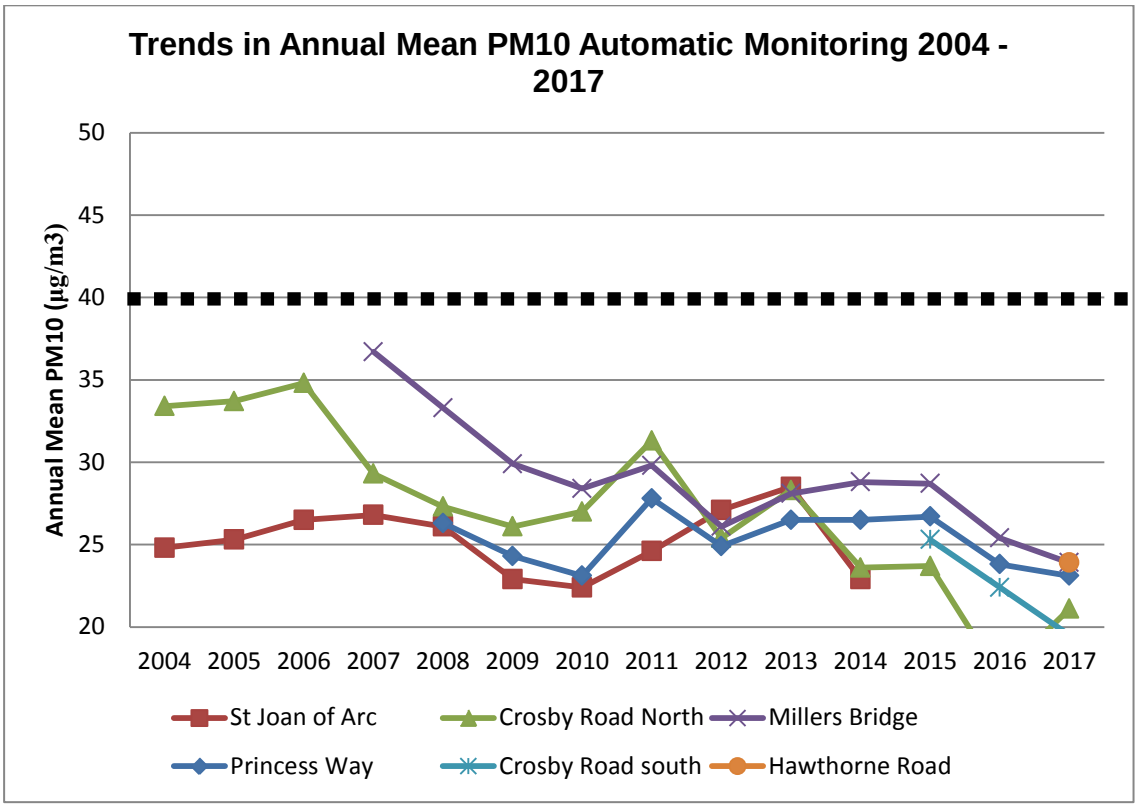
Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

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 2017. It is also positive to see that the overall downward trend in the annual mean and the exceedces of the 24 hour mean continue in 2017.

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}.**

Trends in PM_{10} from Automatic Monitoring



Trend analysis shows compliance with the PM_{10} annual mean objective at all sites since 2006 and since 2012 the annual mean PM_{10} concentration has been below 30ug/m3 at all sites, well within the objective. Overall levels of PM 10 continue to fall.

3.1.5 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 station. The results indicate that for the period monitored levels were 7.1 µg/m^3 which is significantly below the $PM_{2.5}$ annual mean limit value of 25µg/m^3 . This data has not been annualised as there is no comparative data available but indicates levels of this

pollutant appear to be well within the limit value. In view of this, however, this data will not be used to work out a local ratio of $PM_{2.5}$ to PM_{10} at this time. This will be carried out in 2018 when a full years data is available.

3.1.6 Sulphur Dioxide (SO_2)

Table A.8 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2017 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 2017 and continued compliance with the standard is observed.

Appendix A: Monitoring Results

Table A.8 – 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	332175	398475	NO_2; PM_{10}	No	Chemiluminescene;Beta attenuation monitor (BAM)	3.5	4	1.8
CM3	Millers Bridge, Bootle.	Roadside	333772	394603	NO_2;PM_{10};$PM_{2.5}$	Yes	Chemiluminescence;FIDAS	5.5	9.5	1.8
CM4	Lathom Close, Princess Way, Seaforth.	Roadside	332647	396940	NO_2;PM_{10}	Yes	Chemiluminescence;Beta attenuation monitor (BAM)	8.5	6	1.8
CM5	Hawthorne Road, Litherland.	Roadside	333821	397512	NO_2,PM_{10}	Yes	Chemiluminescence	8	6	1.8
CM6	Crosby Road South,	Urban Background	332871	396550	NO_2;PM_{10},SO_2	No	Chemiluminescence;TEOM,UV	0	25	2.8

Table A.9 – 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)
NW	Gladstone Road/Gordon Road, Seaforth	Roadside	332978	397021	NO2	YES	3	4	NO	2.6
NAG	Lydiate Lane, Thornton	Roadside	334039	400808	NO2	NO	2	1.5	NO	2.6
NAN	Strand Road, Bootle	Kerbside	333399	395251	NO2	NO	1.5	1	NO	2.6
NAW	Balliol House, Bootle	Roadside	334459	394781	NO2	NO	4	3	NO	2.8
NBB	Eaton Avenue, Seaforth	Roadside	333510	397184	NO2	NO	2	2	NO	2.7
NBL	Litherland Road/Marsh Lane, Bootle	Kerbside	334432	395820	NO2	NO	0	1.5	NO	2.5
NBM	Millers Bridge, Bootle	Roadside	333785	394594	NO2	YES	10	2.5	NO	2.6
NBO	Douglas Place,	Roadside	333828	394457	NO2	YES	3	1.5	NO	2.7
NBQ	Douglas Place/Millers Bridge, Bootle	Roadside	333834	394570	NO2	YES	1.5	1.5	NO	2.8
NBR	Derby Road, Bootle	Roadside	333751	394553	NO2	YES	0.5	2.2	YES	2.6
NBS	Derby Road, Bootle	Roadside	333757	394622	NO2	YES	5	3	NO	2.5
NBU	Hougoumont Avenue/South Road, Waterloo	Kerbside	332083	398113	NO2	NO	N/A	0.5	NO	2.7
NBV	Quarry Road, Thornton	Roadside	333386	400851	NO2	NO	7	2	NO	2.5
NBW	Crosby Road South/	Kerbside	332599	397021	NO2	NO	2	1	NO	2.6
NCI	Hawthorne Road, Litherland	Roadside	333821	397512	NO2	YES	10	4	NO	2.5
NCJ	South Road, Waterloo	Roadside	332204	398230	NO2	YES	0	1.5	NO	2.6

NCR	Parker Avenue, Seaforth	Roadside	332507	397330	NO2	NO	2	1.5	no	2.7
NCS	Willoughby Road, Waterloo	Kerbside	332142	398186	NO2	NO	3	0.5	no	2.5
NCU	Sefton Street, Litherland	Roadside	333711	397422	NO2	NO	2	6	no	2.7
NCV	South Road, Waterloo	Roadside	332188	398218	NO2	YES	0	15	no	2.2
NCY	Lytton Grove, Seaforth	Roadside	332976	396977	NO2	YES	3	1.5	no	2.6
NCZ	Pleasant Street, Bootle	Kerbside	333667	394916	NO2	YES	10	1	no	2
NDC	Marsh Lane, Bootle	Kerbside	334328	395797	NO2	NO	2	0.5	no	2.5
NDD	Hawthorne Road, Litherland	Roadside	333773	397535	NO2	YES	4	2.5	no	2.6
NDE	Wilson's Lane, Litherland	Roadside	333913	397574	NO2	NO	3	2	no	2.6
NDF	Church Road, Litherland	Roadside	333909	397497	NO2	NO	1	15	no	2.6
NDG	Marina Avenue, Litherland	Roadside	333759	397460	NO2	NO	0	20	no	2.1
NDH	South Road, Waterloo	Roadside	332191	398194	NO2	YES	0	4	no	2.8
NDI	Crosby Road Waterloo	Roadside	332205	398190	NO2	YES	0	4	no	2.5
NDM	Chapel Terrace, Bootle	Roadside	333656	395005	NO2	NO	3	2	no	2.7
NDN	Queens Road, Bootle	Roadside	334225	394710	NO2	NO	4	2	no	2.6
NDO	Hawthorne Road,Bootle	Kerbside	334647	396388	NO2	NO	4.5	1	no	2.6
NDP	Gordon Road, Seaforth	Kerbside	332786	396975	NO2	NO	5	0.5	no	2.7
NDQ	Rawson Road, Seaforth	Roadside	332788	396932	NO2	YES	4	2	no	2.6
NDR	Crosby Road North, Waterloo	Roadside	332216	398236	NO2	YES	15	2.5	no	2.5
NDS	South Road, Waterloo	Kerbside	332142	398176	NO2	YES	2	1	no	2.6
NDT	Glendower Road, Waterloo	Kerbside	332115	398241	NO2	YES	2	0.5	no	2.4
NDU	Liverpool Road, Waterloo	Roadside	332196	398788	NO2	NO	7	3	no	2.6

NDV	Moor Lane, Crosby	Kerbside	332327	400168	NO2	NO	5	0.5	no	2.6
NDW	Church Road, Litherland	Roadside	334577	397923	NO2	NO	8	6	no	2.6
NDX	Merton Road, Bootle	Roadside	334734	395138	NO2	NO	10	6	no	2.6
NDY	Hougoumont Avenue, Waterloo	Kerbside	332248	398008	NO2	NO	4	0.5	no	2.4
NDZ	Bailey Drive, Bootle	Roadside	335394	397291	NO2	NO	6	3.5	no	2.6
NEA	Copy Lane, Netherton	Roadside	336635	399491	NO2	NO	4	40	no	2.5
NEB	Copy Lane, Netherton	Kerbside	336607	399446	NO2	NO	15	0.5	no	2.6
NEC	Dunnings Bridge Road, Netherton	Roadside	336539	399477	NO2	NO	25	3	no	2.6
NED	Cumberland Gate, Netherton	Urban Background	336492	399455	NO2	NO	6	1.5	no	2.6
NEE	Copy Lane, Netherton	Roadside	336574	399525	NO2	NO	N/A	4	no	2.6
NEF	Copy Lane, Netherton	Roadside	336476	399553	NO2	NO	15	5	no	2.6
NEG	Dooley Drive,	Roadside	336672	399574	NO2	NO	0	30	no	2.6
NEK	Hawthorne Road, Bootle	Kerbside	334781	395193	NO2	NO	10	1	no	2.3
NEL	Breeze Hill, Bootle	Kerbside	335259	394977	NO2	NO	8	1	no	2.6
NEM	Millers Bridge, Bootle	Roadside	333735	394594	NO2	YES	25	3	no	2.6
NEN	Hawthorne Road, Litherland	Roadside	333725	397573	NO2	YES	10	2.5	no	2.5
NEO	Hatton Hill Road, Litherland	Kerbside	333690	397615	NO2	NO	7	0.5	no	2.6
NEP	Ash Road, Seaforth	Roadside	333343	397217	NO2	NO	17	10	no	2.6
NEQ	Crosby Road South, Seaforth	Kerbside	332612	396982	NO2	YES	4	1	no	2.6
NER	Green Lane, Seaforth	Kerbside	333174	397112	NO2	YES	2	1	no	2.7
NES	Chatham Close, Seaforth	Kerbside	332712	397000	NO2	YES	7	0.5	no	2.6
NET	Moorhey Road, Maghull	Roadside	337547	400475	NO2	NO	8	2.5	no	2.6

NEU	Moorhey Road, Maghull	Roadside	337250	400580	NO2	NO	5	2.5	no	2.7
NEV	Princess Way, port end, Seaforth	Roadside	332650	396919	NO2	YES	N/A	1.2	no	2.6
NEW	Elm Drive junction with Crosby Rd Sth, Seaforth	Roadside	332662	396824	NO2	YES	1.5	2	no	2.7
NEX	Elm Drive, Seaforth	Kerbside	332725	396840	NO2	YES	3	0.7	no	2.7
NEY	Lathom Avenue, Seaforth	Kerbside	332682	396952	NO2	YES	4.5	0.7	no	2.7
NFA	Bridge Road, Red Lion Pub, Seaforth	Kerbside	333711	397368	NO2	YES	1.7	0.6	no	2.5
NFB	Hawthorne Road opposite Tesco, Litherland	Roadside	334017	397317	NO2	YES	N/A	3	no	2.6
NFC	Church Road Junct with St philips road	Roadside	334218	397673	NO2	NO	6	2	no	2.6
NFD	Church Road, opp Bellway Development	Roadside	334480	397737	NO2	NO	8	2.3	no	2.6
NFE	Church Road Kirkstone Rd/ Road South, Litherland	Roadside	334617	397917	NO2	NO	6	7	no	2.6
NFF	Boundary Road, Netherton	Kerbside	334984	398177	NO2	NO	12	1	no	2.6
NFG	Sandiways Avenue, Netherton	Roadside	335997	398790	NO2	NO	3	2.5	no	2.6
NFH	Church Road Netherton Pub, Netherton	Kerbside	334963	398131	NO2	NO	11.5	0.8	no	2.6
NFI	Hemans Street, Bootle	Roadside	333281	395957	NO2	NO	0	10	no	2.6
NFJ	Our Lady of Walsingham Church, Dunnings Bridge Road, Netherton	Roadside	335815	398723	NO2	NO	0	20	no	2
NC10	Sandfield Road. Bootle	Roadside	334855	394959	NO2	NO	0	5	no	2
NC11	Sandfield Road. Bootle	Roadside	334796	395034	NO2	NO	0	5	no	2
NC14	Viola Street, Bootle	Roadside	334262	394305	NO2	NO	0	5	no	2

NC28	Marina Avenue, Litherland	Roadside	333823	397545	NO2	NO	0	5	no	2
NC47	Coronation Drive, Crosby	Roadside	332080	399336	NO2	NO	0	5	no	2
NC51	Apollo Way, Netherton	Roadside	335928	399882	NO2	NO	0	5	no	2
NC52	Green Lane, Thornton	Roadside	333489	400980	NO2	NO	0	5	no	2
NC74	Deyes Lane, Maghull	Roadside	338682	402476	NO2	NO	0	5	no	2
NC82	Fernhill Way, Bootle	Roadside	335147	395002	NO2	NO	0	5	no	2
NC83	Sandiways Avenue, Netherton	Roadside	336067	398710	NO2	NO	0	5	no	2
NC86	Crosby Road South, Seaforth	Roadside	332685	396768	NO2	NO	0	5	no	2
NC107	Norton Street, Bootle	Roadside	333571	396173	NO2	NO	0	5	NO	2
NC108	Wango Lane, Aintree	Roadside	338567	398342	NO2	NO	0	5	NO	2
NC112	Poplar Grove, Bootle	Roadside	332889	396811	NO2	NO	0	5	NO	2
UK2	Church Road, Litherland	Roadside	334781	398054	NO2	NO	6	1.5	NO	2.5
UK4	Crosby Road North, Waterloo	Roadside	332170	398538	NO2	NO	N/A	0.5	NO	2.6
NEZ	Hicks road seaforth	Roadside	333199	397058	NO2	NO	5	0.3	NO	2.6
NC124	Bartons Close , Southport	Roadside	337593	420294	NO2	NO	0	11.6	NO	2
NFL	Hawthorne Road Bootle	Roadside	333687	397578	NO2	NO	4	2	NO	2.5

Table A.10 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2013	2014	2015	2016	2017
CM2	Roadside	Automatic	Full Year	99	35.4	33.4	30.6	32.2	**34.9**
CM3	Roadside	Automatic	Full Year	98	36.3	36.6	34.8	37.7	40.6
CM4	Roadside	Automatic	Full Year	97	**42.8**	**44.2**	**40.6**	**41.6**	**39.7**
CM5	Roadside	Automatic	Full Year	39	39	**40.7**	36.9	37.1	36.5
CM6	Urban Background	Automatic	Full Year	59	-	-	34.6	33.2	29.6
NW	Urban Centre	Diffusion Tube	Full Year	100	33	33	30	31	32
NAG	Roadside	Diffusion Tube	Full Year	discontinued	21	21	18	17	
NAN	Kerbside	Diffusion Tube	Full Year	92	34	33	30	31	34
NAW	Roadside	Diffusion Tube	Full Year	92	37	35	33	30	33
NBB	Roadside	Diffusion Tube	Full Year	75	33	31	28	29	28
NBL	Kerbside	Diffusion Tube	Full Year	92	31	29	29	29	33
NBM	Roadside	Diffusion Tube	Full Year	100	**45**	**44**	**41**	**41**	**47**
NBO	Roadside	Diffusion Tube	Full Year	83	32	30	29	30	32
NBQ	Roadside	Diffusion Tube	Full Year	100	33	32	30	32	36

NBR	Roadside	Diffusion Tube	Full Year	100	**56**	**54**	**53**	**46**	**61**
NBS	Roadside	Diffusion Tube	Full Year	83	**43**	**40**	39	39	**40**
NBU	Kerbside	Diffusion Tube	Full Year	92	29	26	25	26	25
NBV	Roadside	Diffusion Tube	Full Year	75	35	33	31	33	31
NBW	Kerbside	Diffusion Tube	Full Year	100	34	33	31	30	33
NCI	Roadside	Diffusion Tube	Full Year	75	**42**	**42**	37	38	**42**
NCJ	Roadside	Diffusion Tube	Full Year	100	**42**	**41**	38	38	**41**
NCR	Roadside	Diffusion Tube	Full Year	100	33	33	30	29	31
NCS	Kerbside	Diffusion Tube	Full Year	100	24	24	20	22	23
NCU	Roadside	Diffusion Tube	Full Year	discontinued	35	33	26	25	**NA**
NCV	Roadside	Diffusion Tube	Full Year	92	26	28	22	22	24
NCY	Roadside	Diffusion Tube	Full Year	100	32	31	26	28	30
NCZ	Kerbside	Diffusion Tube	Full Year	75	37	38	34	32	**43**
NDC	Kerbside	Diffusion Tube	Full Year	100	38	36	33	33	**40**
NDD	Roadside	Diffusion Tube	Full Year	92	**43**	**44**	38	38	**47**
NDE	Roadside	Diffusion Tube	Full Year	100	30	29	26	28	29
NDF	Roadside	Diffusion Tube	Full Year	100	31	30	27	28	31
NDG	Roadside	Diffusion Tube	Full Year	100	27	30	24	24	26

NDH	Roadside	Diffusion Tube	Full Year	100	35	36	32	31	34
NDI	Roadside	Diffusion Tube	Full Year	100	**41**	**41**	34	33	39
NDM	Roadside	Diffusion Tube	Full Year	100	33	35	31	30	33
NDN	Roadside	Diffusion Tube	Full Year	100	32	34	29	29	33
NDO	Kerbside	Diffusion Tube	Full Year	100	**44**	**47**	38	**40**	**47**
NDP	Kerbside	Diffusion Tube	Full Year	100	35	39	33	33	36
NDQ	Roadside	Diffusion Tube	Full Year	83	36	34	30	32	34
NDR	Roadside	Diffusion Tube	Full Year	83	**40**	39	35	34	**44**
NDS	Kerbside	Diffusion Tube	Full Year	100	34	35	30	29	32
NDT	Kerbside	Diffusion Tube	Full Year	92	23	22	20	20	21
NDU	Roadside	Diffusion Tube	Full Year	100	38	38	33	33	34
NDV	Kerbside	Diffusion Tube	Full Year	100	**43**	38	36	36	39
NDW	Roadside	Diffusion Tube	Full Year	100	37	39	31	33	34
NDX	Roadside	Diffusion Tube	Full Year	100	37	36	33	33	36
NDY	Kerbside	Diffusion Tube	Full Year	100	26	28	22	23	28
NDZ	Roadside	Diffusion Tube	Full Year	100	39	36	30	33	35
NEA	Roadside	Diffusion Tube	Full year	92	28	29	29	28	30
NEB	Kerbside	Diffusion Tube	Full Year	100	39	35	34	31	37

NEC	Roadside	Diffusion Tube	Full Year	100	**40**	39	32	32	35
NED	Rural	Diffusion Tube	Full Year	92	26	25	21	21	23
NEE	Roadside	Diffusion Tube	Full Year	100	**41**	39	34	36	36
NEF	Roadside	Diffusion Tube	Full Year	100	32	32	27	28	28
NEG	Roadside	Diffusion Tube	Full Year	83	30	29	26	26	30
NEK	Kerbside	Diffusion Tube	Full Year	92	33	33	30	32	34
NEL	Kerbside	Diffusion Tube	Full year	100	**43**	39	38	**40**	**42**
NEM	Roadside	Diffusion Tube	Full Year	100	**41**	**40**	37	**41**	**43**
NEN	Roadside	Diffusion Tube	Full Year	100	34	34	31	32	33
NEO	Kerbside	Diffusion Tube	Full year	100	38	36	32	35	36
NEP	Roadside	Diffusion Tube	Full year	100	28	31	27	30	30
NEQ	Kerbside	Diffusion Tube	Full Year	92	35	35	33	32	33
NER	Kerbside	Diffusion Tube	Full Year	75	29	29	27	24	27
NES	Kerbside	Diffusion Tube	Full year	100	30	30	27	29	30
NET	Roadside	Diffusion Tube	Full Year	100	21	22	20	22	24
NEU	Roadside	Diffusion Tube	Full Year	100	24	25	22	24	26
NEV	Roadside	Diffusion Tube	Full Year	100	-	39	36	37	**41**
NEW	Roadside	Diffusion Tube	Full Year	100	-	38	37	35	39

NEX	Kerbside	Diffusion Tube	Full Year	75	-	33	-	31	32
NEY	Kerbside	Diffusion Tube	Full Year	100	-	**41**	38	37	36
NEZ	Kerbside	Diffusion Tube	Full year	100	-	28	25	26	26
NFA	Kerbside	Diffusion Tube	Full Year	92	-	33	29	26	33
NFB	Roadside	Diffusion Tube	Full Year	100	-	38	32	32	39
NFC	Roadside	Diffusion Tube	Full Year	100	-	29	27	27	30
NFD	Roadside	Diffusion Tube	Full Year	100	-	30	26	26	29
NFE	Roadside	Diffusion Tube	Full Year	100	-	33	31	32	36
NFF	Kerbside	Diffusion Tube	Full Year	100	-	39	32	35	38
NFG	Roadside	Diffusion Tube	Full Year	100	-	28	26	27	30
NFH	Kerbside	Diffusion Tube	Full Year	100	-	**45**	37	39	**44**
NFI	Roadside	Diffusion Tube	Full Year	100	-	36	34	35	**42**
NFJ	Roadside	Diffusion Tube	Full Year	83	-	25	23	24	25
NC10	Roadside	Diffusion Tube	Full Year	83	25	24	21	23	26
NC11	Roadside	Diffusion Tube	Full Year	discontinued	24	25	22	22	**NA**
NC14	Roadside	Diffusion Tube	Full Year	75	23	22	20	21	22
NC28	Roadside	Diffusion Tube	Full Year	83	26	26	23	24	24
NC47	Roadside	Diffusion Tube	Full Year	75	19	18	15	17	8

NC51	Roadside	Diffusion Tube	Full year	75	15	14	14	14	16
NC52	Roadside	Diffusion Tube	Full Year	83	28	25	22	21	22
NC74	Roadside	Diffusion Tube	Full Year	92	21	20	20	21	19
NC82	Roadside	Diffusion Tube	Full Year	83	31	31	28	21	30
NC83	Roadside	Diffusion Tube	Full Year	92	22	23	20	19	22
NC86	Roadside	Diffusion Tube	Full Year	75	34	33	31	29	34
NC107	Roadside	Diffusion Tube	Full Year	93	25	23	23	21	25
NC108	Roadside	Diffusion Tube	Full Year	93	21	20	18	18	20
NC112	Roadside	Diffusion Tube	Full Year	58	27	25	24	21	23
UK2	Roadside	Diffusion Tube	Full Year	100	32	30	27	28	29
UK4	Roadside	Diffusion Tube	Full Year	100	38	35	32	31	36
NC124	Roadside	Diffusion Tube	Full Year	93					19
NFL	Roadside	Diffusion Tube	Full Year	100					35

CLICK HERE THEN PASTE COMPLETED DATA ROWS FROM EXCEL TEMPLATE

☒ **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.11 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2013	2014	2015	2016	2017
CM2	Roadside	Automatic	Full Year (99)	99	1	0	0	**0**	**0**
CM3	Roadside	Automatic	Full Year (98)	98	0	0	0	**0**	**0**
CM4	Roadside	Automatic	Full Year (97)	97	0	0	0	0	0
CM5	Roadside	Automatic	Full Year (39)	39	0	0	0	0	0(120)
CM6	Urban Background	Automatic	Full year (59)	59	-	-	**0 (82)**	0	0(91)

CLICK HERE THEN PASTE COMPLETED DATA ROWS FROM EXCEL TEMPLATE

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 A.12 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2013	2014	2015	2016	2017
CM2	Roadside	Full Year (95)	95	**28.3**	**23.6**	**23.7**	**17**	**21.1**
CM3	Roadside	Full Year (92)	92	28.1	28.8	28.7	25.4	23.9
CM4	Roadside	Full Year (95)	95	26.5	26.5	26.7	23.8	23.1
CM5	Roadside	5 months (36)	15					23.9
CM6	Urban Background	Full Year (59)	59	-	-	25.3	22.4	19.5

CLICK HERE THEN PASTE COMPLETED DATA ROWS FROM EXCEL TEMPLATE

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

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.13 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2013	2014	2015	2016	2017
CM2	Roadside	Full Year	95	17	8	4	2	6
CM3	Roadside	Full Year	92	17	14	**15**	5	17
CM4	Roadside	Full Year	95	12	12	14	6	7
CM5	Roadside	5 Months (36%)	15					2(29)
CM6	Urban Background	Full Year	59			5	2	1(28)

CLICK HERE THEN PASTE COMPLETED DATA ROWS FROM EXCEL TEMPLATE

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.14 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
				2013	2014	2015	2016	2017
CM3	Roadside	100% (6 Months)	50%					7.1

CLICK HERE THEN PASTE COMPLETED DATA ROWS FROM EXCEL TEMPLATE

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

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.15 – SO_2 Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) [1]	Valid Data Capture 2017 (%) [2]	Number of Exceedances 2017 (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	Full Year	59	0(15)	0(7)	0(3)

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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 2017

Table B.2 – NO_2 Monthly Diffusion Tube Results - 2017

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 and Annualised (1)	Distance Corrected to Nearest Exposure (2)
NW	50.6	44.1	48.4	28.5	32.2	31.9	23.2	31.1	30.7	36.7	33.8	33.5	35.4	32	29.9
NAG															
NAN	54.2	43	50.5	32.5	37.4		25.1	28.7	35.7	34.7	39	34.4	37.8	34	32.2
NAW	57.1	39.4	47	32.1	33.6	29.2	26.8	29.9		56.7	21.4	36.7	37.2	33	31.0
NBB		34.8	42.1		26.3		25.3	25.7	30.4	30.5	38.2	33	31.8	28	26.5
NBL	50.6	35.3	55.5		29.7	31.2	25.8	29.1	33.8	34.2	37.9	39.8	36.6	33	33.0
NBM	70.3	49	76.5	46.1	48.1	49.5	41.4	41.7	45.4	48.8	73.2	49.4	53.3	**47**	37.9
NBO			48.4	35.3	31.9	33.4	31.9	29.2	37.5	35.5	43	37.5	36.3	32	30.1
NBQ	53.4	39.7	50	41	36.7	34.7	32.2	33.8	40.9	37.9	41.3	39.2	40.1	36	34.2
NBR	86.1	52.9	83.8	67.7	56.7	63.1	59.5	56.7	72.8	65.2	91.5	68.6	68.7	**61**	**59.2**
NBS			67.9	43.2	47.5	44.3	36.4	41.8	46.4	45.6	30.1	49.7	45.3	**40**	36.0
NBU		28.9	43	24.5	24.4	25.3	19.6	22.4	27.8	24.6	31	31.9	27.6	25	25.0
NBV				29.8	38.3	34	27.8	28.8	35.8	30.1	38	46.2	34.3	31	24.9
NBW	58.8	37.8	47.4	35.4	33	31.5	27.2	29.4	36.3	34.3	41.5	33.6	37.2	33	29.8
NCI	64.9		59.4	42.7			26.9			39.9	49.1	50.5	47.6	**42**	33.9

NCJ	60.5	37.4	66.7	41.6	42.9	39.7	37.3	40.6	42.7	41.7	46.6	52.1	45.8	**41**	**41.0**
NCR	48.2	35	48.5	30.1	26.8	31.4	28	28.6	34.4	36.4	39.1	38	35.4	31	28.7
NCS	45.7	25.8	36.3	19.7	21.5	21.3	16.3	20.5	24.1	24.9	26.6	31.6	26.2	23	20.5
NCU															
NCV	46.2	26.2	41.2		26	20.8	17.3	19.2	24	20.2	24.5	30.7	26.9	24	24.0
NCY	46.9	37.9	43.5	30.1	25.5	29.7	26.3	27.5	32	29.4	37.4	35.7	33.5	30	27.5
NCZ			60	45.4	40.7	40.4	40.1	39.6	48.8		74.2	45.5	48.3	**43**	33.8
NDC	52.4	36.4	60.8	32.5	38.2	38.5	32.3	35.5	42.3	38.3	76.3	51.9	44.6	**40**	35.7
NDD	74.3	50.9	59.9	43.8	41.2	43	38.4	36.4		49	93.2	46.7	52.4	**47**	**40.4**
NDE	50.4	35.1	45.5	22.2	30	25.3	23.5	26.8	30.5	39.2	33.8	35.4	33.1	29	26.8
NDF	60	40.9	40.2	29.4	29.2	32	25.8	27.7	32.7	29.5	38.5	33.6	34.9	31.0	30.7
NDG	46.5	33.3	39.5	20.6	25.8	24.6	22.1	21.8	25.9	26.1	28.9	32.4	29.0	26.0	26.0
NDH	54.7	35	51.9	28.9	36.4	37.9	28.9	29.4	36.1	38.6	37.2	43.8	38.2	34.0	34.0
NDI	52.2	53.2	55.1	37.5	40.6	41.4	35.6	34.2	41.1	37.6	46.5	47.5	43.5	39.0	39.0
NDM	47	38.7	45.2	21.9	30.5	38.6	29.3	33	37.2	38.8	42.1	36.4	36.5	33.0	31.2
NDN	58.3	40.1	47.3	34.7	30.4	31.3	23.6	25.5	36.7	34.4	42.3	35.5	36.7	33.0	30.6
NDO	65.6	51.1	57.8	42.6	44.2	46.4	40.3	39.3	47.4	49.3	95.9	50.5	52.5	**47.0**	37.9
NDP	55.4	49.5	55.1	32.7	34.5	38.3	28.9	30.5	36.4	42.1	38.8	36.9	39.9	36.0	29.1
NDQ	54.9		43.3	35.1		33.1	29.4	33.2	37.4	36.5	43.4	38	38.4	34.0	30.4
NDR	53.7		59.3	37.1	33.2	42.4		37.4	37.3	44.2	96.1	48.6	48.9	**44.0**	30.3
NDS	46.2	32.5	48.6	31.2	31.8	33.4	30.1	28.7	33.7	36.3	41.8	42.4	36.4	32.0	28.4
NDT	47.6	24.6	37	15.9	18.3	16.9	13.1	15.9	21.9	21.7	23.9		23.3	21.0	19.5
NDU	58.5	41.8	52.4	33.8	32.3	39.8	31	32.4	38.6	34.7	23.9	43.1	38.5	34.0	28.3
NDV	57.5	43.3	59.3	42.8	27.3	43.2	36.9	38.3	37.2	37.5	49.6	56.7	44.1	39.0	27.8
NDW	56.5	43.4	56.4	26.6	30.1	31.9	28.1	25.4	34.6	34.8	38.8	47.4	37.8	34.0	29.9
NDX	55.2	44.9	49.6	34.9	35.4	35.1	27.8	31.4	45.5	42.9	45.2	43.6	41.0	36.0	32.6
NDY	92.4	27.9	40	22.2	26.5	23.4	15.4	13.1	27.4	27	28.5	32.4	31.4	28.0	23.2

NDZ	57.2	43.9	55.1	30.2	31.9	35.3	29.6	30.2	32.8	38.3	43.4	48.9	39.7	35.0	30.5
NEA	39.9	35.5	39.5	29.2	25.4		27.7	29.9	31.7	24.4	43.5	44.3	33.7	30.0	29.2
NEB	56.5	39	48.1	40.3	30.8	35.8	36.2	36.8	42.3	38.1	49.9	43.9	41.5	37.0	26.2
NEC	63.6	36.8	56.9	27	38.3	33.2	26.5	31.2	35.5	40.8	37.6	41.1	39.0	35.0	25.9
NED	43.4		37.7	15.9	25.4	19.5	16	17.3	21.7	28	27.7	35	26.1	23.0	21.7
NEE	70.7	47.4	60.4	26.6	33.5	35.3	27.1	27.2	32.7	41.7	40.2	44.8	40.6	36.0	36.0
NEF	56.1	34.1	43.5	21.7	30.2	24.4	20.4	21.6	32.7	26.9	29.6	36.4	31.5	28.0	24.4
NEG	60.9	33.5	45.7	25.4	24.7	28.8	25.3	25.1	31.4	33.6			33.4	30.0	30.0
NEK	61.3		47	31.6	33.6	32.8	27	27.6	39.1	39	40.1	42.2	38.3	34.0	29.6
NEL	54.4	38.9	58.2	46.9	51.1	42	38.2	35.4	44.2	36.1	71.4	46.1	46.9	**42.0**	33.9
NEM	72.1	52	57.4	43.2	56.3	42.4	35.5	37.2	50.3	40.1	46.2	40.4	47.8	**43.0**	32.1
NEN	53.1	44.9	48.7	28.5	39.9	27.3	24.1	31.6	35.8	32.1	37	38.4	36.8	33.0	27.4
NEO	56.5	47.1	46.6	34.8	42.5	35	30	33.3	39.9	37.4	42	39.4	40.4	36.0	27.8
NEP	53.5	38.5	42.4	24.6	39.2	29.3	23.7	25.4	32	30.9	31.4	33.5	33.7	30.0	25.8
NEQ		41.4	45.6	34.1	34.3	35.8	29.1	34.1	40.8	36.5	42	38.5	37.5	33.0	28.7
NER	44.5	37.8	42.3	22.2	29.6	13.3		23.6			31.4	32.1	30.8	27.0	25.2
NES	52.3	38.1	48.8	29.8	31.3	22.7	23.8	27.8	34.8	31.9	32.9	32.5	33.9	30.0	25.1
NET	42.8	28.7	40.2	17.6	20.5	20.6	16.9	20.4	23.2	23.8	32.7	36.4	27.0	24.0	21.2
NEU	40.3	31.8	38.1	20.7	19	22.7	20.3	22.9	26.8	27	35.8	42.9	29.0	26.0	23.3
NEV	69.2	46.4	53.4	47.5	43.8	43.7	36.1	37.5	41.9	37.7	47.7	45.3	45.8	**41.0**	**N/A**
NEW	55.3	43.6	52	39.3	43.7	43.3	35.1	38.6	48.4	39.3	44.4	39.3	43.5	39.0	36.5
NEX		43.3	45	36.4		35.7	29.3	28.8	35.5			32.7	35.8	32.0	28.2
NEY	50.3	51.5	0.2	34.8	47.5	46.8	33.8	37.7	49.5	41.8	45	47.2	40.5	36.0	29.9
NEZ	42	35.1	36.7	21.1	28.1	21.8	20.5	24.9	25.5	28.9	32.6	31.3	29.0	26.0	22.7
NFA	82	38.5	43.4	23.6		28.9	22.9	28.4	32.7	32.5	37.7	34.9	36.9	33.0	29.5
NFB	79.5	43.4	44.3	36.7	38	39.3	32.4	35.6	41.7	37.3	45.7	47.3	43.4	39.0	N/A
NFC	45.3	37.5	42.9	25.2	31	30.2	25.9	24.7	32.4	28.8	37.7	39.6	33.4	30.0	26.3

NFD	48.3	39.9	46.8	21.8	30.3	22.1	21.1	24.2	30.6	31.7	36.8	34.5	32.3	29.0	25.2
NFE	54.6	37.7	54.1	32	34.8	37.8	32.4	35.5	38.1	34.2	41.7	47.6	40.0	36.0	32.4
NFF	70.2	47.9	62.8	30	45.2	37.5	30	31.8	31.2	36.8	38.1	51.6	42.8	38.0	26.4
NFG	40	33.6	44.8	27.1	27.4	31.3	26	28.3	32.6	29.7	38.2	42.2	33.4	30.0	27.5
NFH	57.6	44	61.3	45.7	47.6	47.9	40.4	38.4	46.4	40.8	71.7	54.8	49.7	**44.0**	29.0
NFI	59.3	44.8	62.7	42.3	34.3	38.3	38.6	35.5	43.1	40.9	72.3	54.8	47.3	**42.0**	**42.0**
NFJ	44.3	30.7	42.1	13.7	38.2	24.3	17.1	21.7	27	27			28.6	25.0	25.0
NC10	39.8	35.3	39	23.2	18.1	24.2	20.8			26.6	35.8	28.2	29.1	26.0	26.0
NC11															
NC14		32.9	35			14.8	19.7	20.3	24.8		21.7		24.2	22.0	22.0
NC28	38.6	37.8	38	21.6		9.9	20.8	20.3	26.7	23.1	30.2		26.7	24.0	24.0
NC47	0.6	0.9	1.7	0.5		10.2	10.4	11.5			18.7	22.6	8.6	8.0	8.0
NC51	28.5	21.2	22.2		23.6		5.3	13.1	13.1	15.6	16.5		17.7	16.0	16.0
NC52	35.8	30.4	34.3	21.1		19.3	17.8	18.4	22.7	21.9	27		24.9	22.0	22.0
NC74	38	27.3	14.3	0.3	35.4	11	16.3	16	23.9	21.2		30.5	21.3	19.0	19.0
NC82	46.6	41.7	43.9	29.7	35.6	16.1	28.5	25.9	33.6		35.2		33.7	30.0	30.0
NC83	34.7	30.7	31	17.9	18.9	33.2	16.1	18.6	23.3	21.3	29.5		25.0	22.0	22.0
NC86	48.2	44.8	37.6	37.7		35	29.5			32.5	43.6	32.7	38.0	34.0	34.0
NC107	41.9	33.1	38.5	24.8	19.7	8.4	18.7	16.9	28.7	26.2		53.9	28.2	25.0	25.0
NC108	40.1	26.7	28.2	16.6	18.8	15.1	14.8	16.3	21.7	19.6		27.6	22.3	20.0	20.0
NC112	31.9			25.7	28.8	14.3		21.9	28.5		29.6		25.8	23.0	23.0
UK2	47.9	36.5	47.7	21.5	22.7	36.2	24.4	25.9	27	29.9	33.9	41.5	32.9	29.0	24.2
UK4	58	39.6	53.2	40	35	25.3	28.8	30.2	44.5	28.9	45.8	49.7	39.9	36.0	36.0
NC124	32.4	26.9	28.4	19.4	16.8	16.7	16.1	20.3	20.7	18.2	23.9		21.8	19.0	19.0
NFL	64.5	43.9	48.7	28.2	43.3	35.3	27	30.3	37.1	33.3	40.5	42.8	39.6	35.0	30.8

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☐ **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

INSTRUCTIONS

Please include here any additional information required to support the ASR. This may include:

- Indication, if necessary, of any significant changes to sources, and therefore any screening assessment of identified new or changed sources of pollution based on DMRB, biomass and industrial screening tools, etc (see Chapter 7 in Technical Guidance LAQM.TG16). Outline whether this has resulted / will result in any change to monitoring or a Fast Track AQMA declaration.
- Reporting of any detailed dispersion modelling of emissions, or results of monitoring campaigns carried out to determine whether an AQMA needs to be declared, amended or revoked.
- A summary of any additional evidence gathered or being gathered in support of measures for Action Plans and links to any final reports.
- QA/QC on monitoring data, including bias adjustments, annualisation and distance correction, as appropriate. **Distance correction is an important point to consider if your monitoring sites are not representative of public exposure (e.g. if located at roadside or kerbside, but with façades of nearest properties set back further from the road).**
- Discussion on the choice of bias correction factor applied for diffusion tubes, giving due consideration to the discussion in Box 7.11 of LAQM.TG16.
- Discussion on the annualisation process, which is given in Boxes 7.9 and 7.10 of LAQM.TG16.
- Details of distance correction using the NO_2 fall-off with distance calculator available on the LAQM website and discussed in Paragraphs 7.77-7.79 of LAQM.TG16.

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Add required additional information here.

C.1 Supporting Technical Information

During 2017 there have been no significant changes to existing pollutant sources in Sefton and no changes to the diffusion tube network were made. A number of recent changes have, however, been made to the diffusion tube monitoring network in 2018 to take into account both new and proposed residential developments and the diffusion tube exceedance at Hemans street. The detail of this will be fully reported as part of the ASR 2019. The exceedance at Heman street is to be investigated

further using monitoring and modelling which may result in the declaration of a new AQMA in this location.

Other than Heman Street no further areas requiring AQMA declaration have been identified and there is no need at present to revoke or amend any AQMAs.

Nitrogen Dioxide Drop Off With Distance Calculations

The results from all Diffusion tubes Sites 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.

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 2017 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 2017 – Gradko adjustment was 0.89. This bias adjustment has been applied to all diffusion tubes.

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.

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.

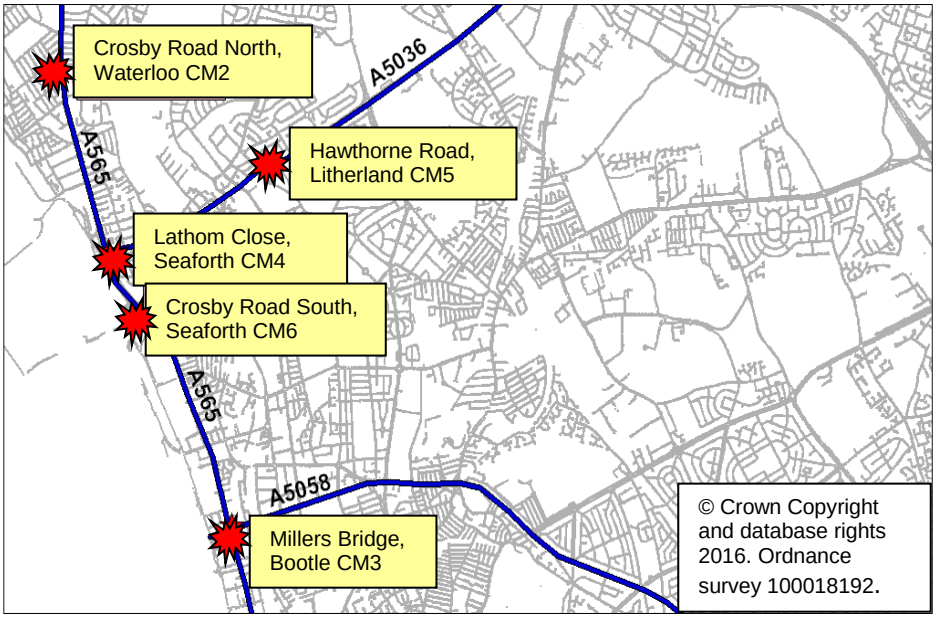
Sefton has five automatic monitoring stations. In 2016 these were located at:

- 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).*

*Note: the former St Joan of Arc, Bootle site (Site ID: CM1) was discontinued early in 2015 due to planning approval for a housing development on this site and the station was consequently moved and relocated to a new site at Crosby Road South, Seaforth (Site ID: CM6) in April 2015.

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 to 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

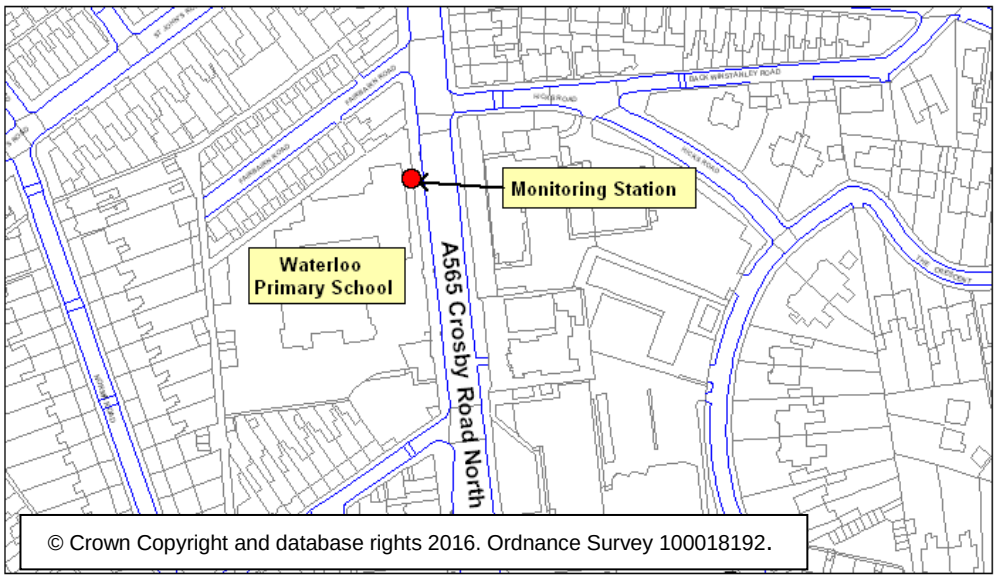
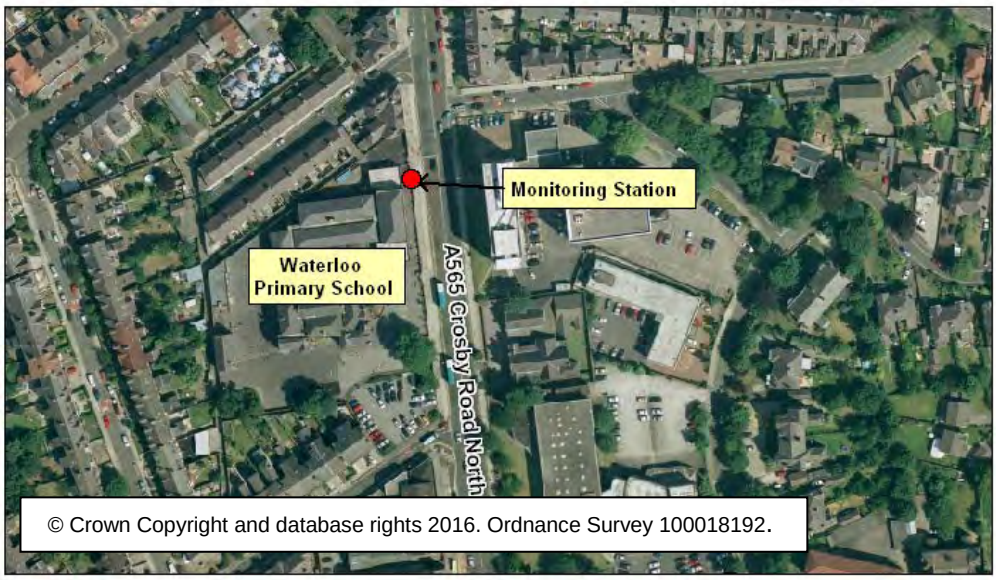


Figure D.3 – Aerial Photograph of the Location of the Crosby Road North Monitoring Station



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

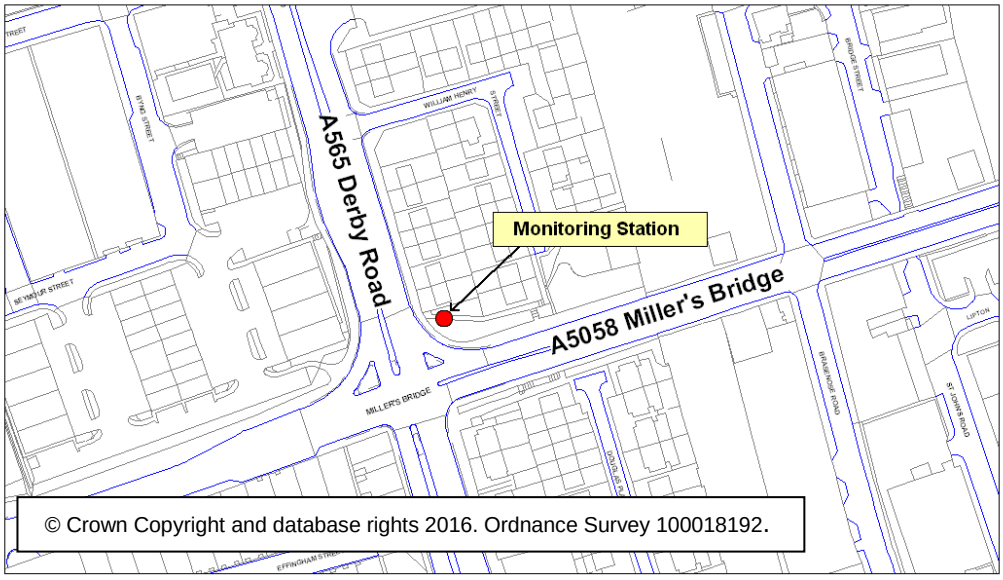


Figure D.5 – Aerial Photograph of the Location of the Millers Bridge Monitoring Station

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

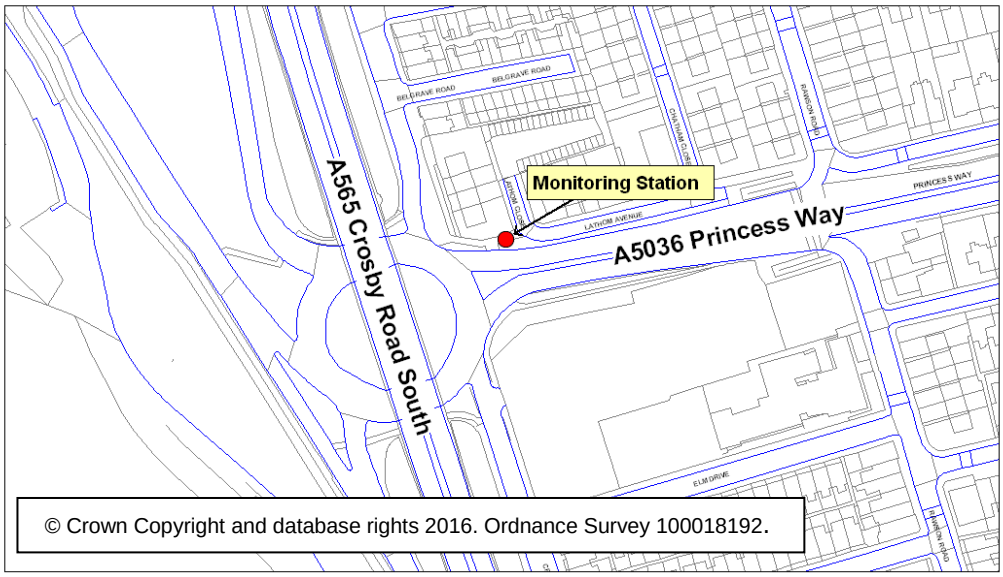


Figure D.7 – Aerial Photograph of the Location of the Lathom Close, Princess Way, Monitoring Station

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

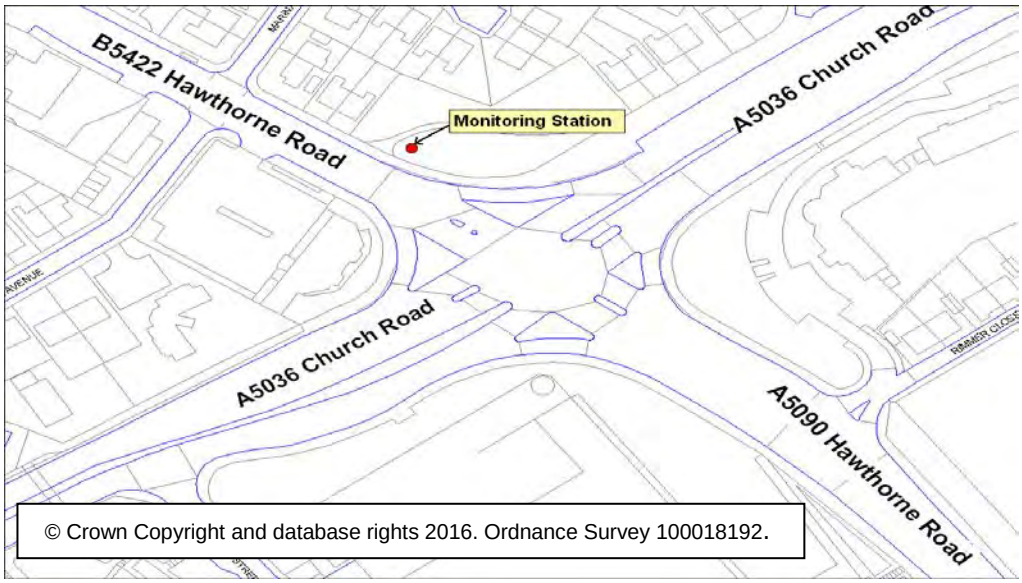
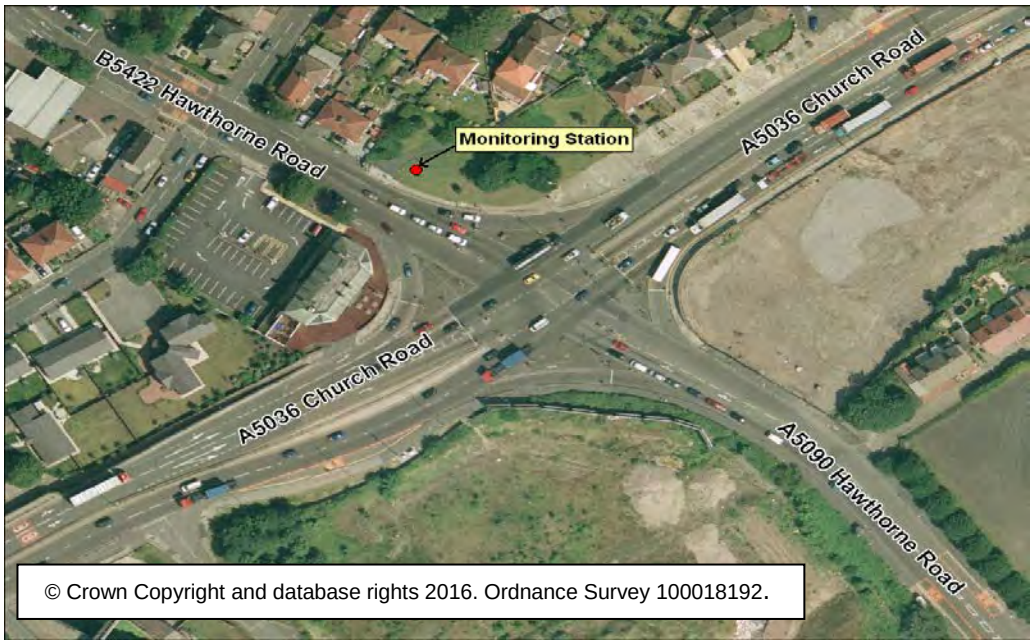


Figure D.9 – Aerial Photograph of the Location of the Hawthorne Road Monitoring Station



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

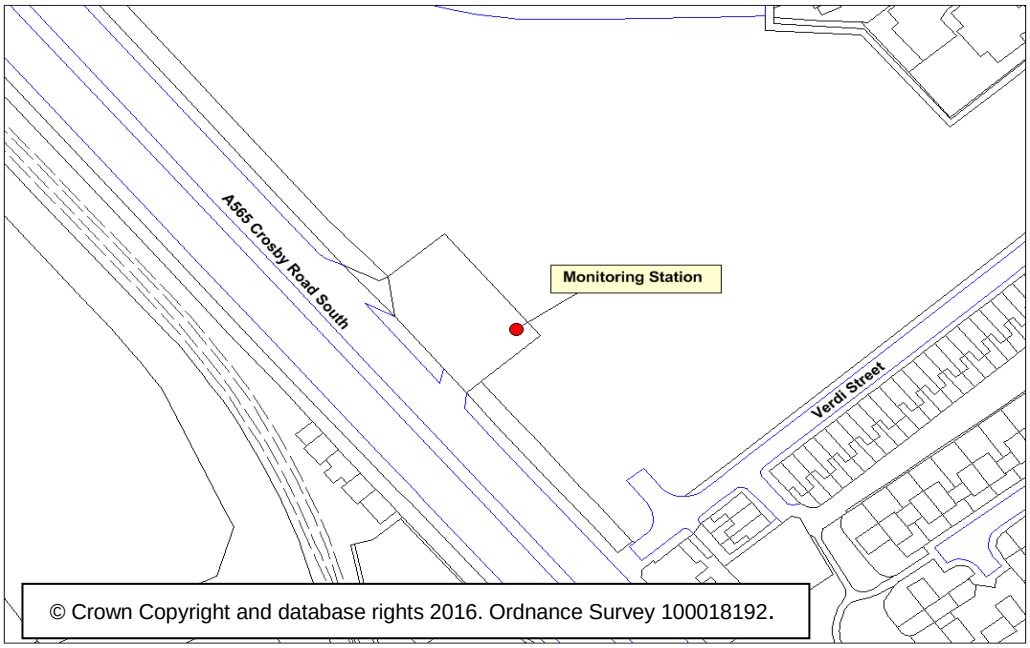
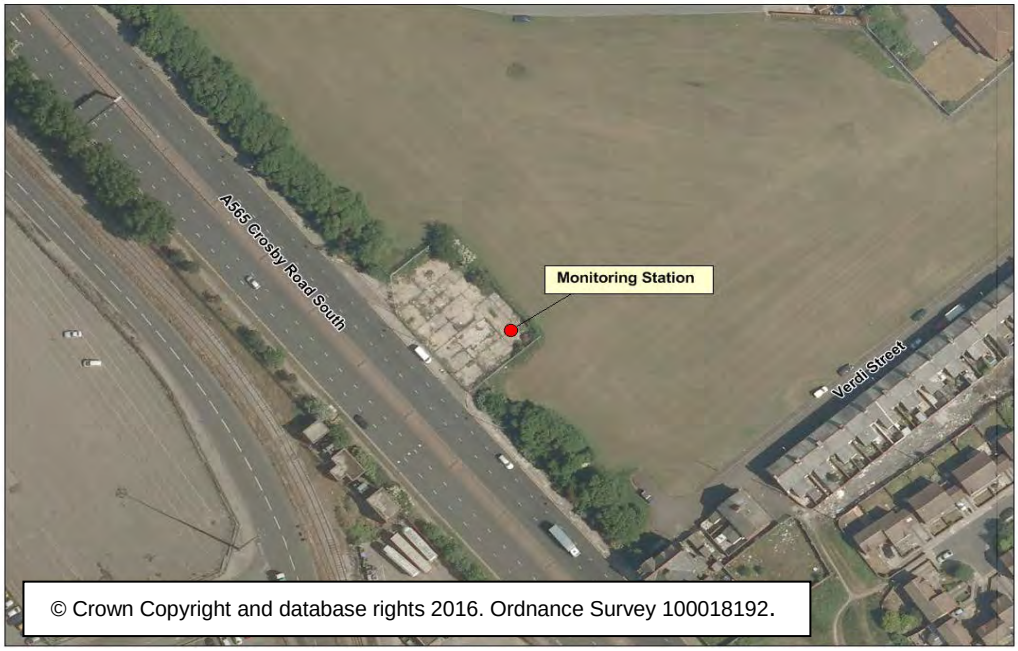


Figure D.11 – Aerial Photograph of the Location of the Crosby Road South Monitoring Station



D.2 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 in **Figures D.12** to **D.28**.

Figure D.12 – Diffusion Tube Locations Bootle. SIte ID:NDX, NEK, NEL, NC10, NC11 & NC82

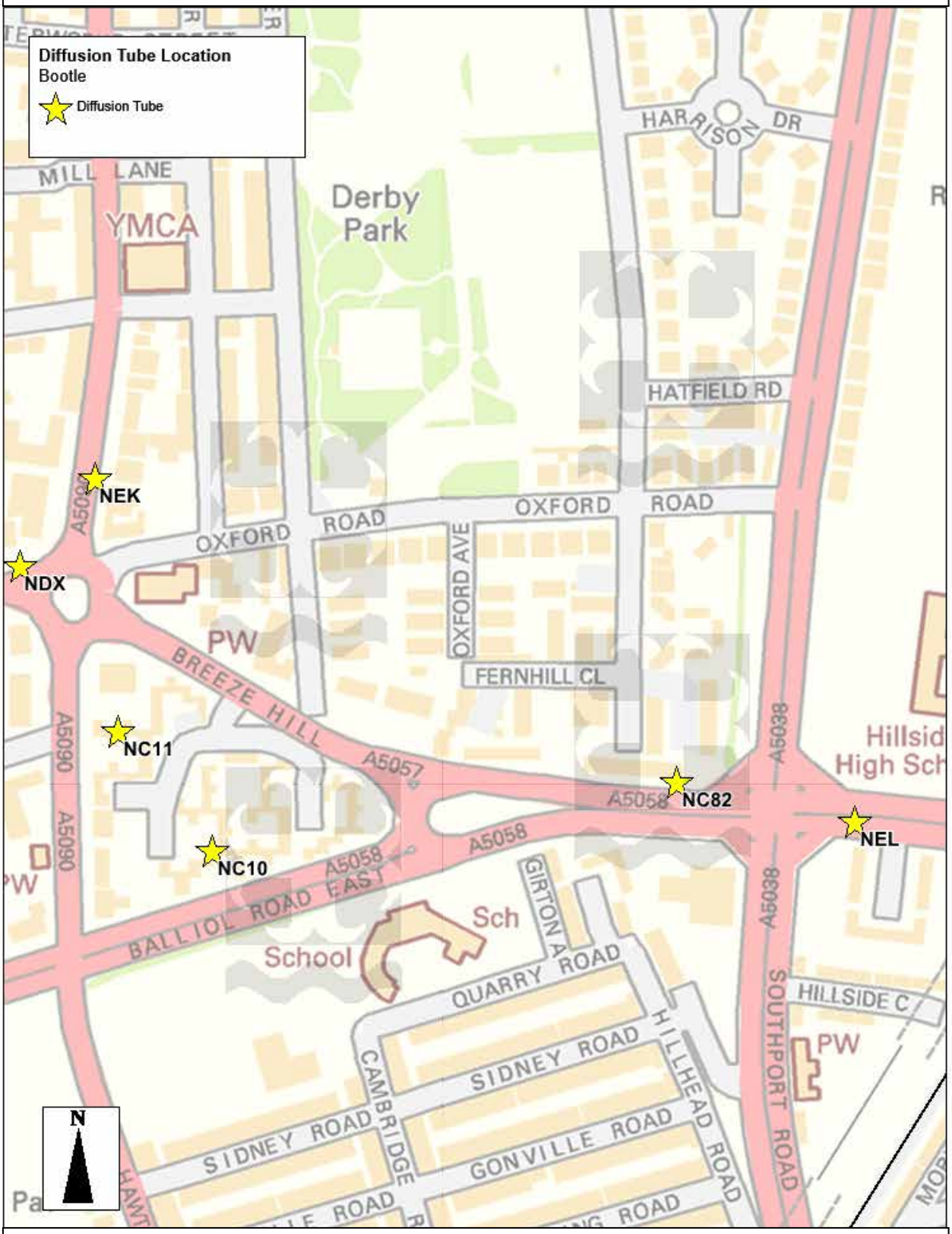


Figure D.13 – Diffusion Tube Locations Bootle. Site ID: NAW, NDN, & NC14

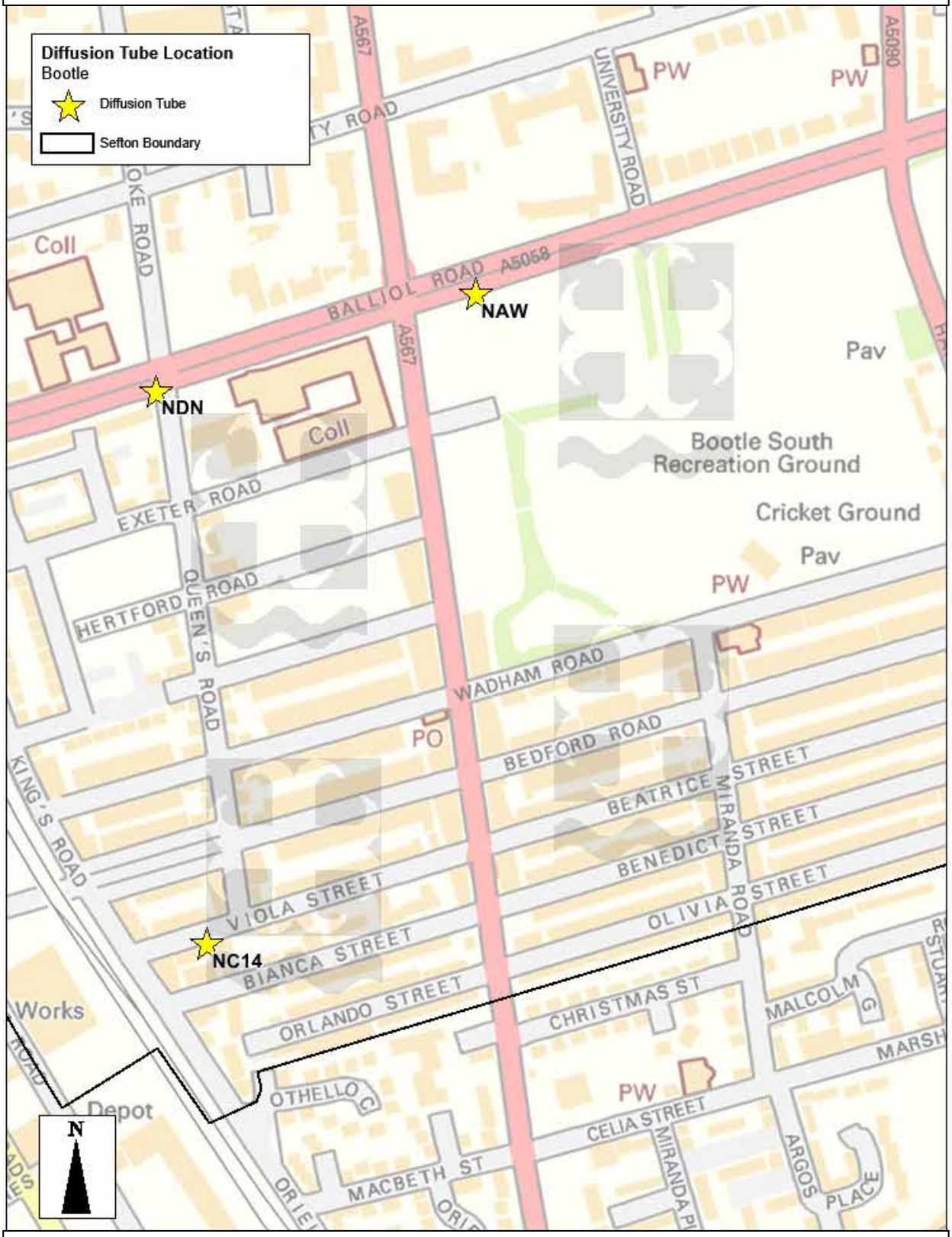


Figure D.14 – Diffusion Tube Locations Bootle. Site ID: NBM, NBO, NBQ, NBR, NBS, NCZ, NDM & NEM

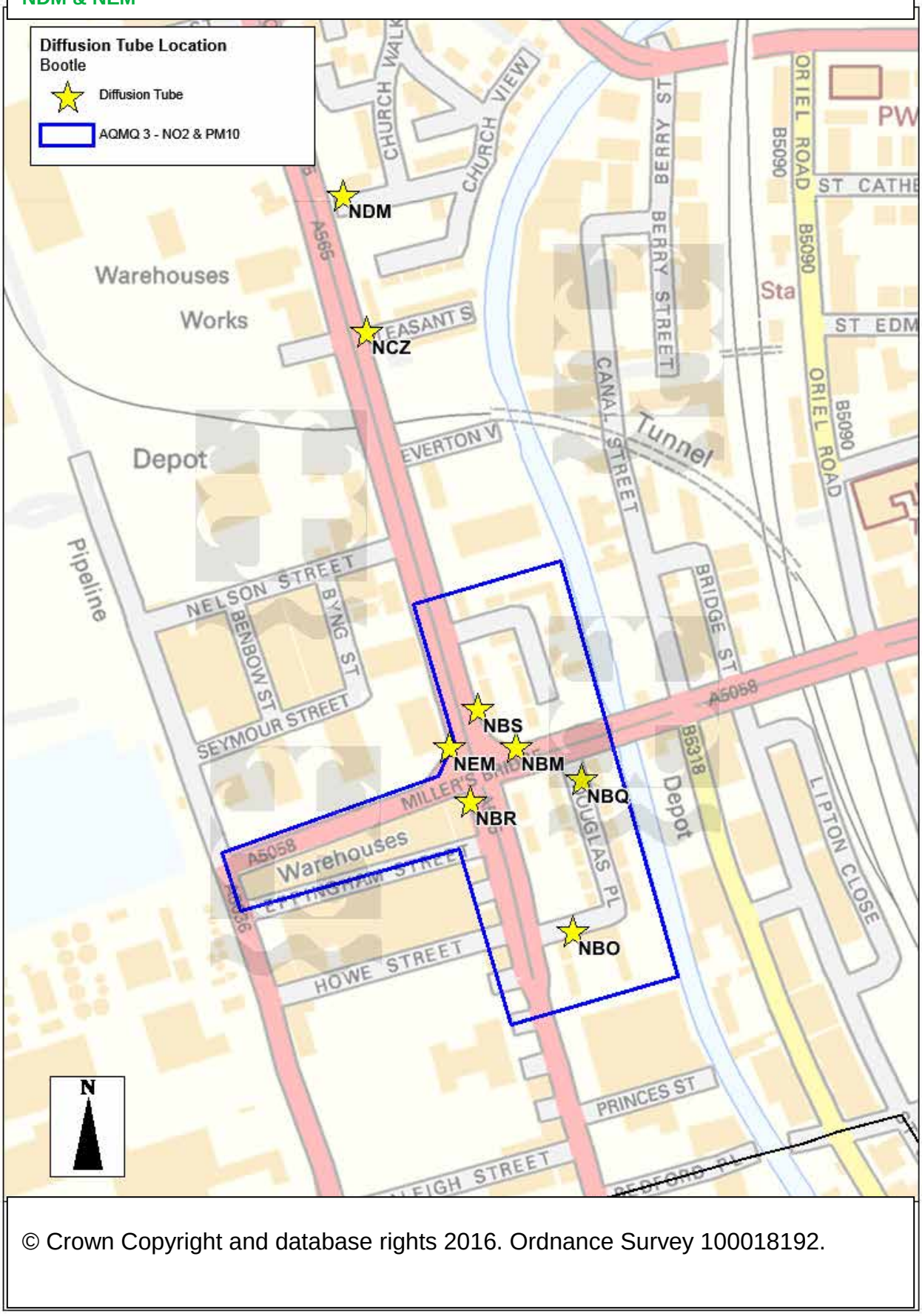


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Figure D.15 – Diffusion Tube Locations Bootle. Site ID: NBL & NDC

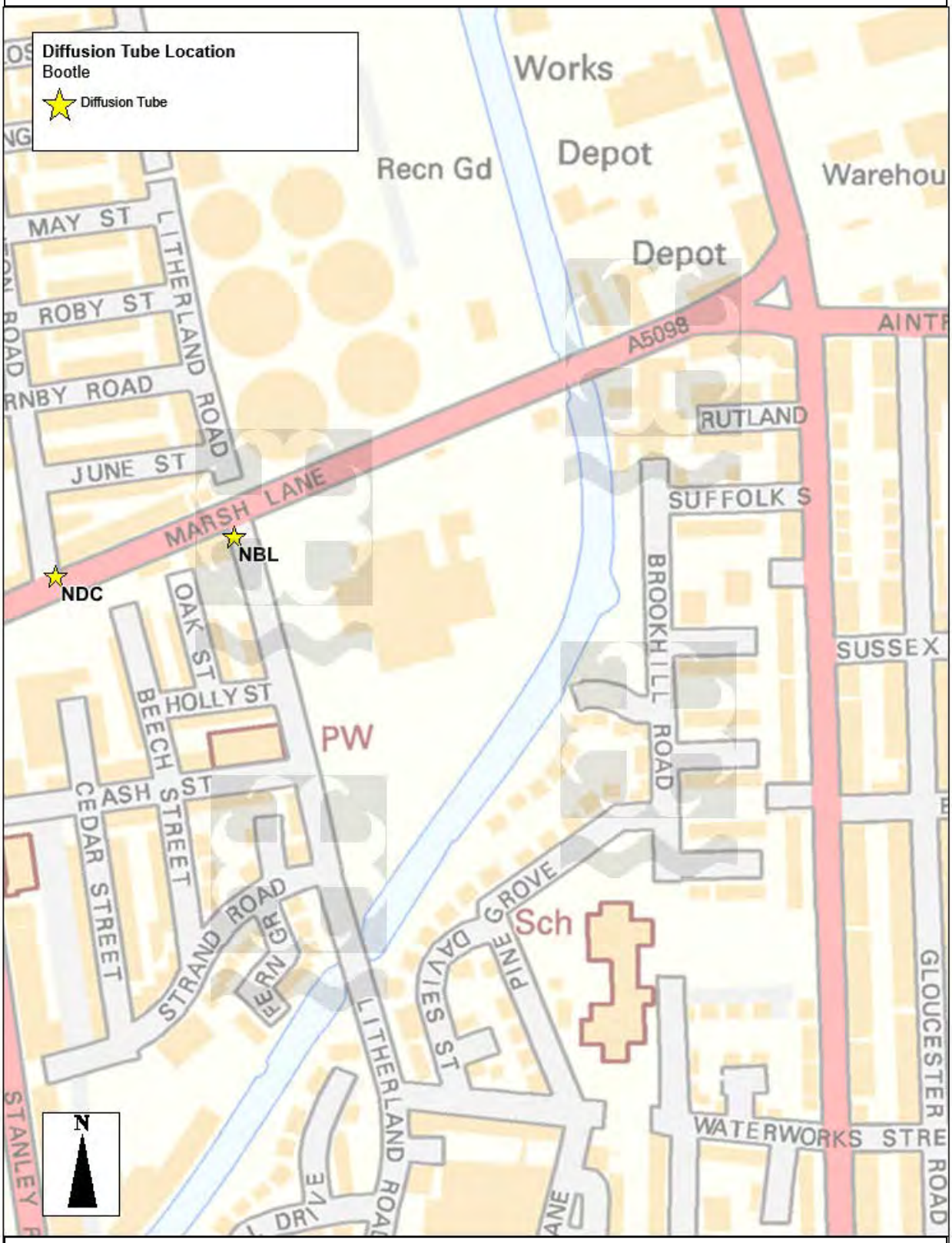


Figure D.16 – Diffusion Tube Locations Bootle. Site ID: NDO

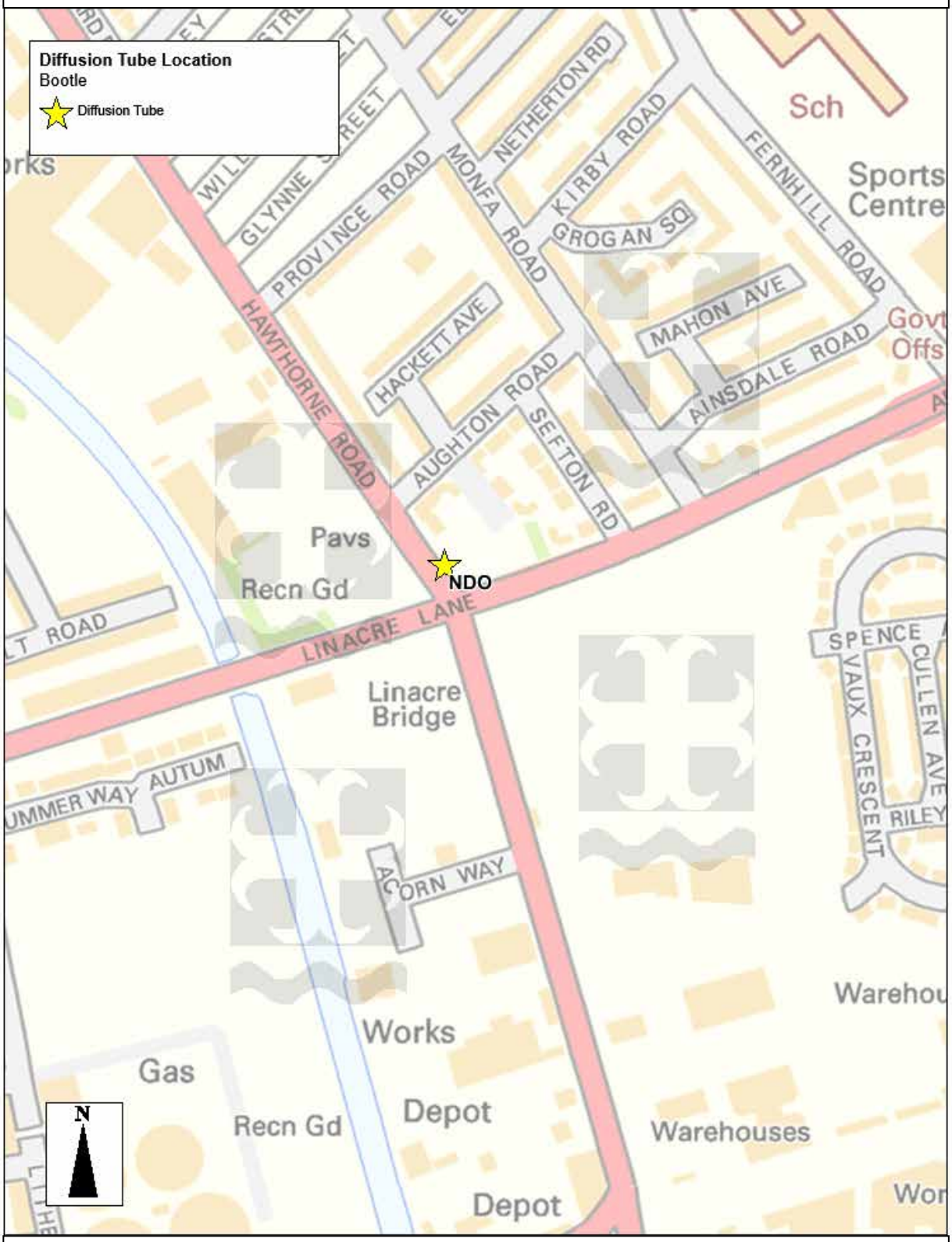


Figure D.17 – Diffusion Tube Locations Seaforth. Site ID: NW, NBW, NCR, NCY, NDP, NDQ, NER, NES, NEV, NEW, NEX, NEY, NEZ, NC 86 & NC112

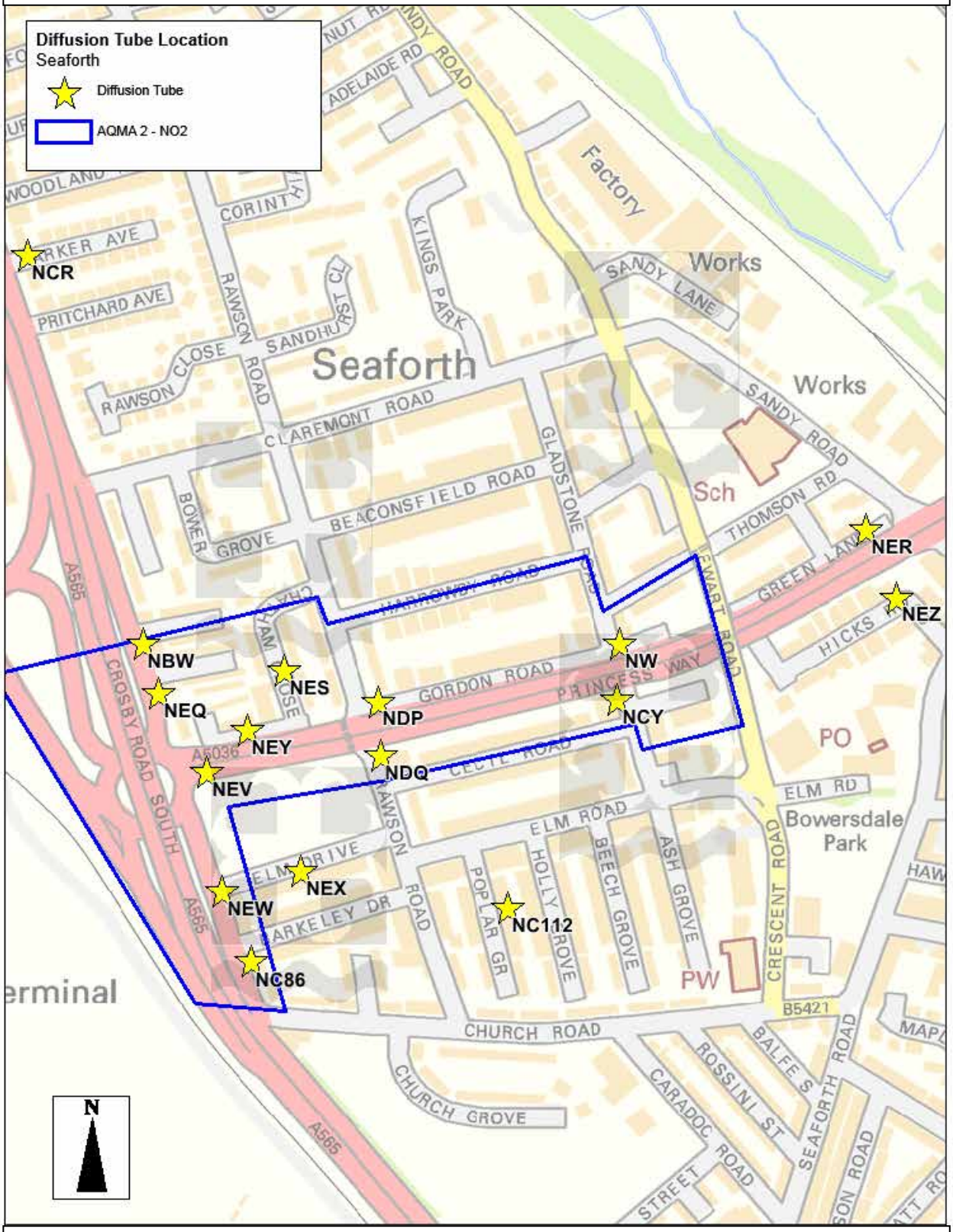


Figure D.18 – Diffusion Tube Locations Litherland. Site ID: NBB, NCI, NCU, NDD, NDE, NDF, NDG, NEN, NEO, NEP, NFA & NC28

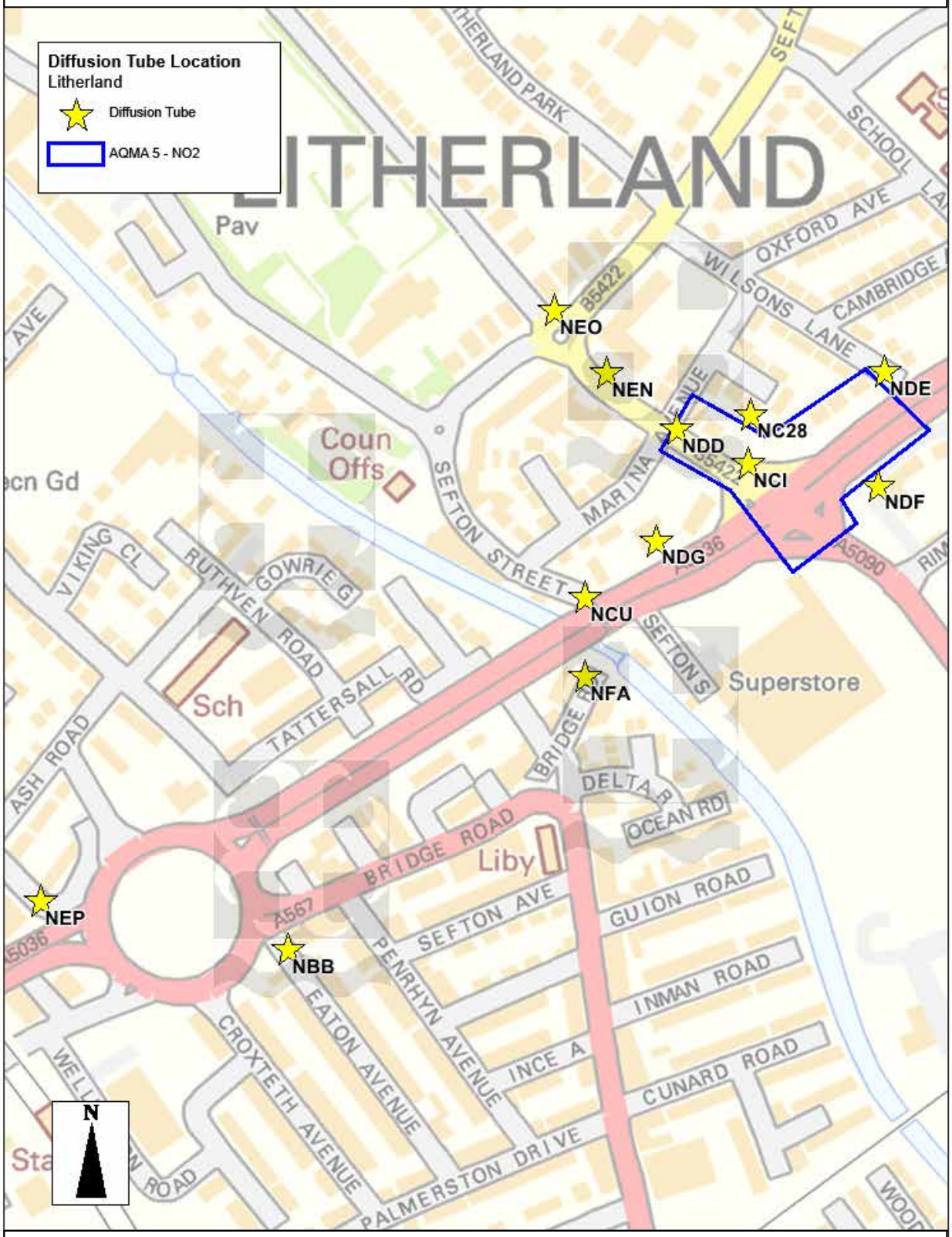


Figure D.19 – Diffusion Tube Locations Litherland/Netherton. Sire ID: NDW, NDX, NFB, NFC, NFD, NFE, NFF, NFH, NFJ & UK2

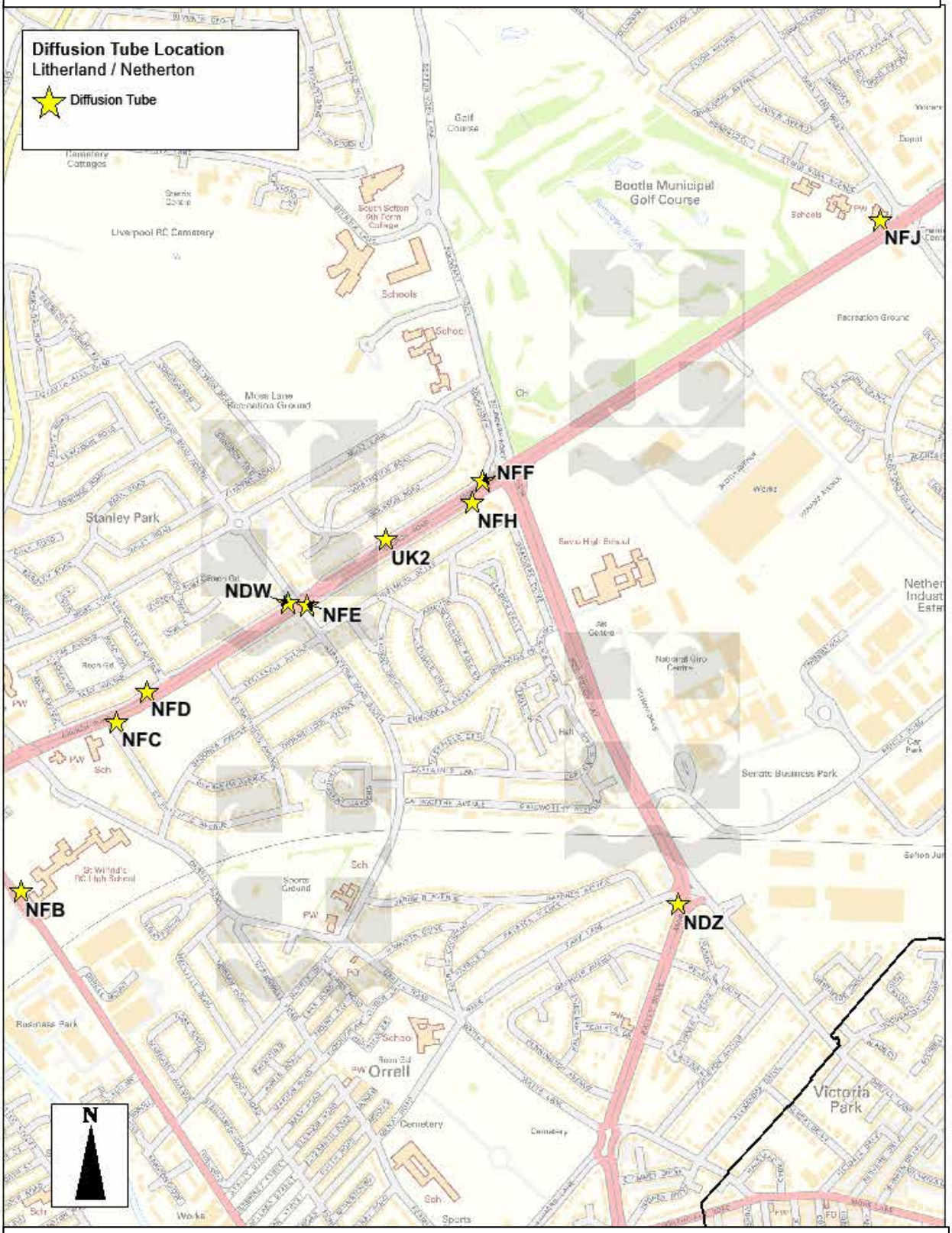


Figure D.20 – Diffusion Tube Locations Netherton. Site ID: NFG, NFJ & NC83

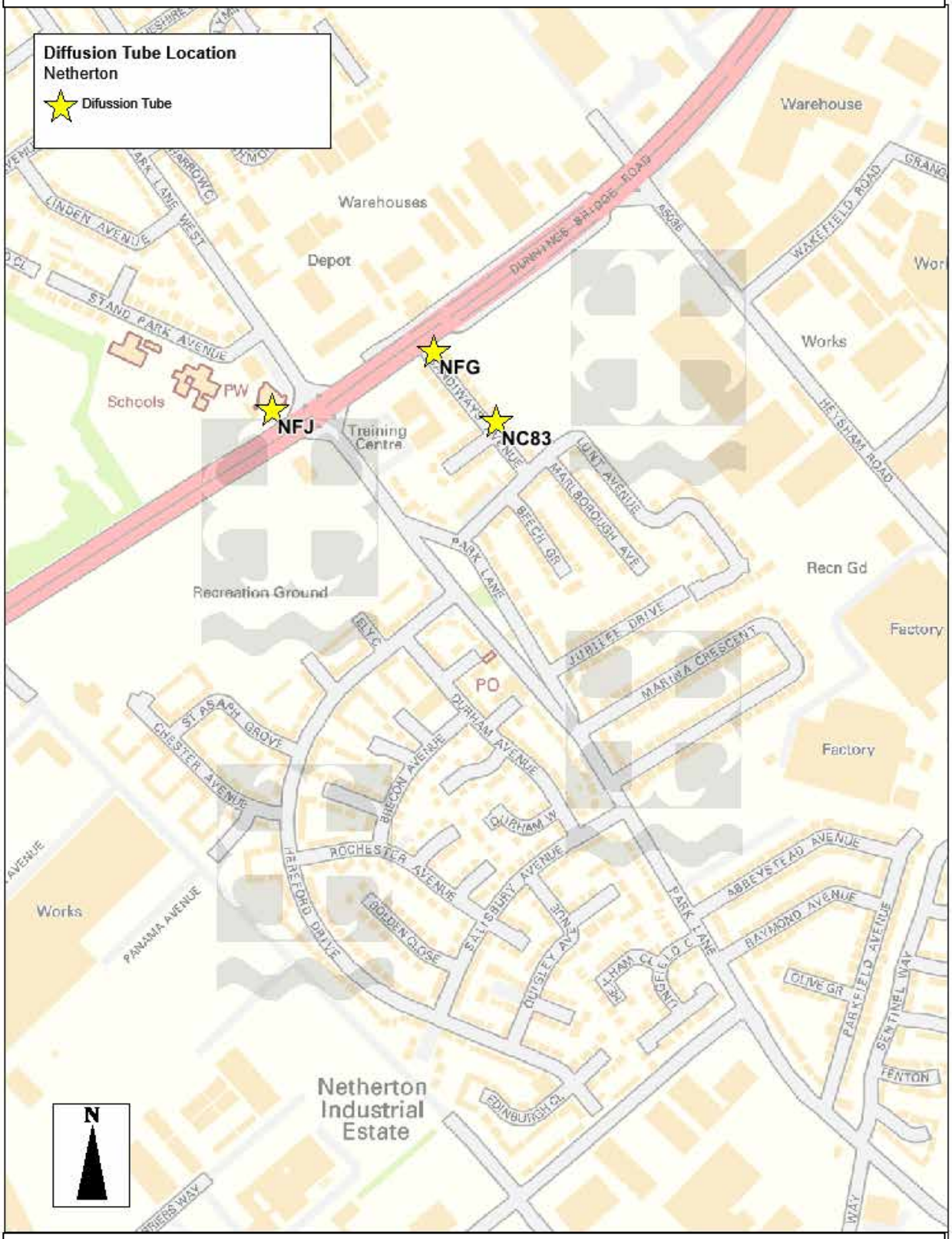


Figure D.21 – Diffusion Tube Locations Netherton/Old Roan. Site ID: NEA, NEB, NEC, NED, NEE. NEF & NEG

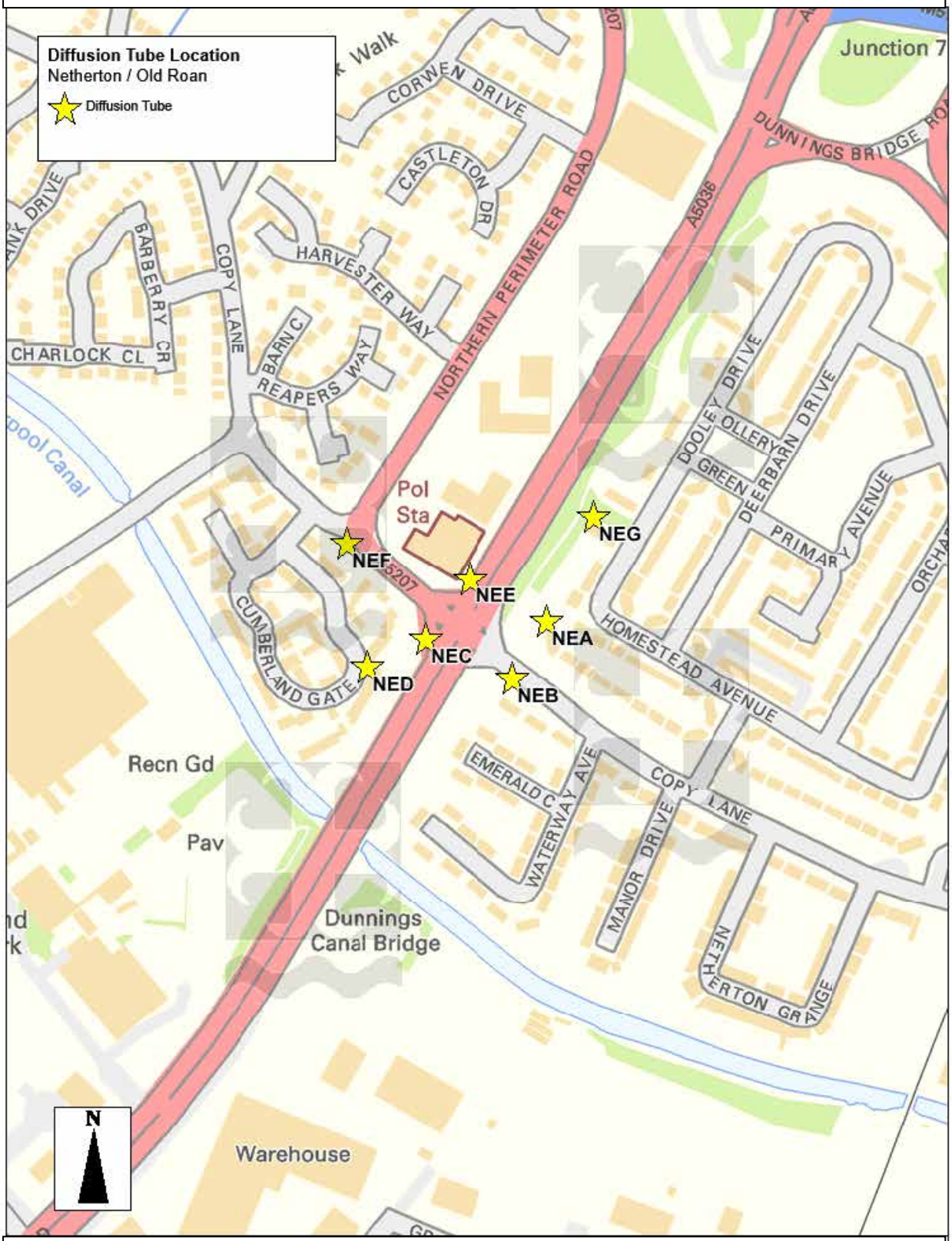


Figure D.22 – Diffusion Tube Locations Netherton. Site ID: NC51

Figure D.23 – Diffusion Tube Locations Crosby. Site ID: NDV

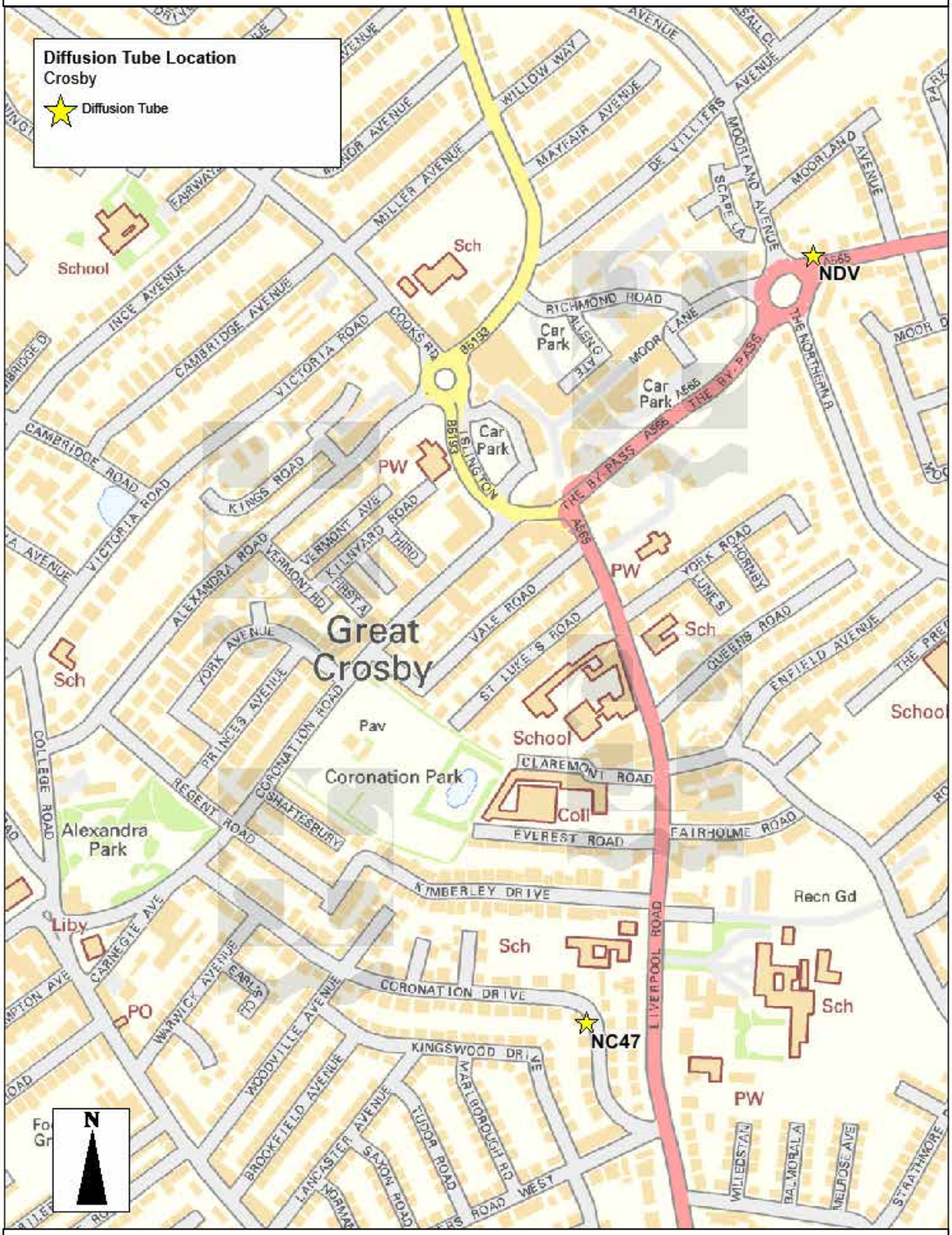


Figure D.24 – Diffusion Tube Locations Waterloo. Site ID: NDR, NDT, NDU & UK4

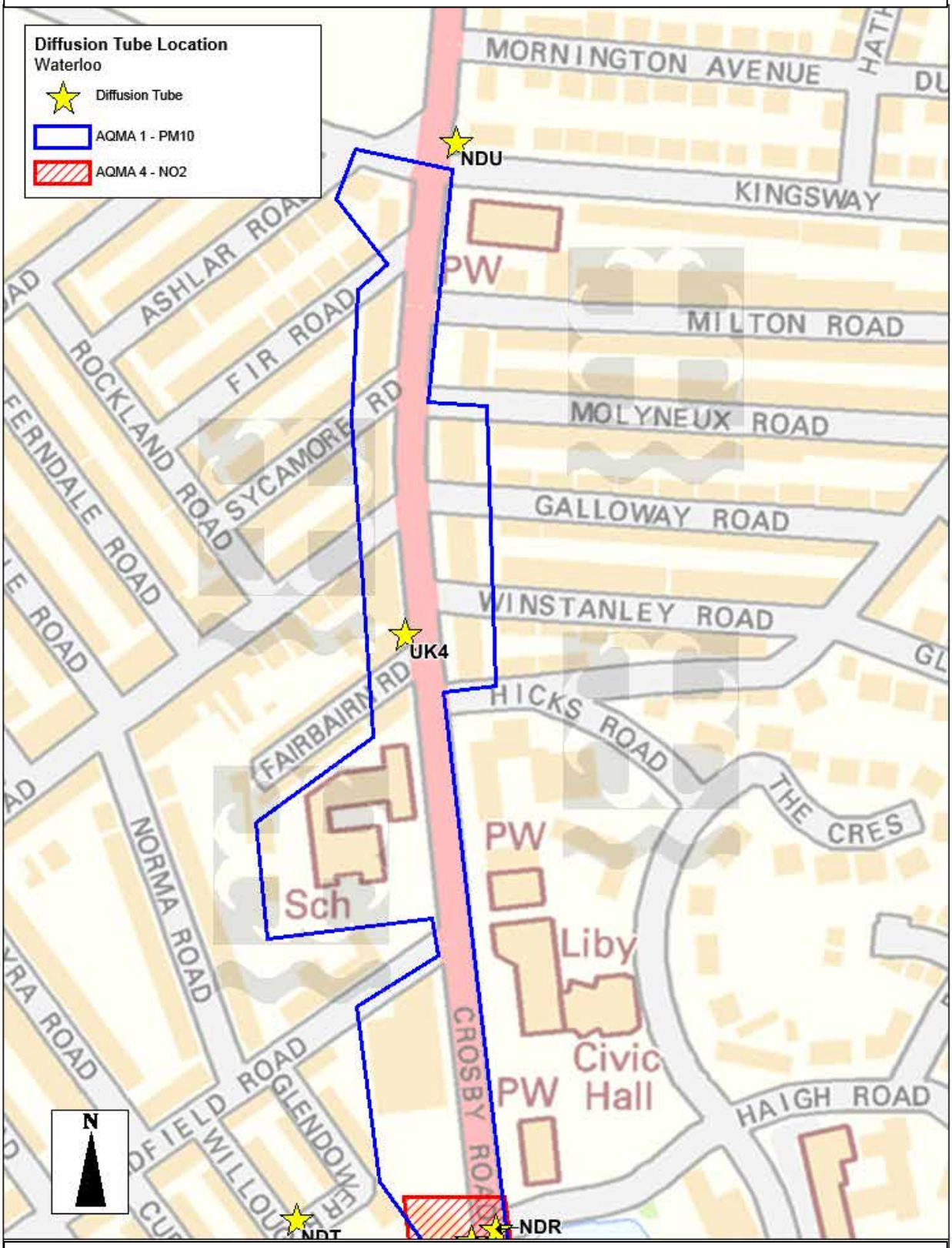


Figure D.25 – Diffusion Tube Locations Waterloo. Site ID: NBU, NCJ, NCS, NCV, NDH, NDI, NDR, NDS, NDT & NDY

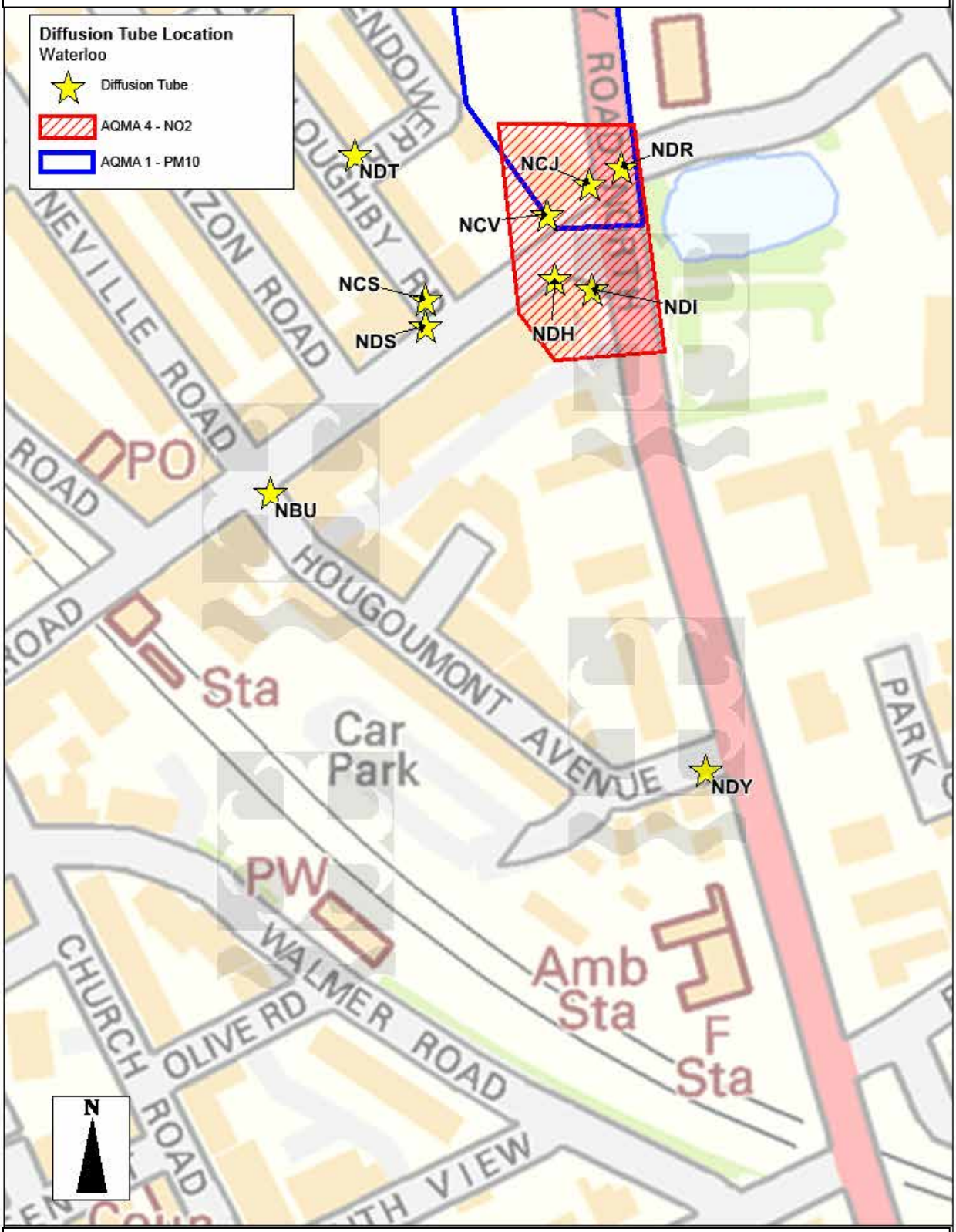


Figure D.26 – Diffusion Tube Locations Thornton. Site ID: NAG, NBV & NC52

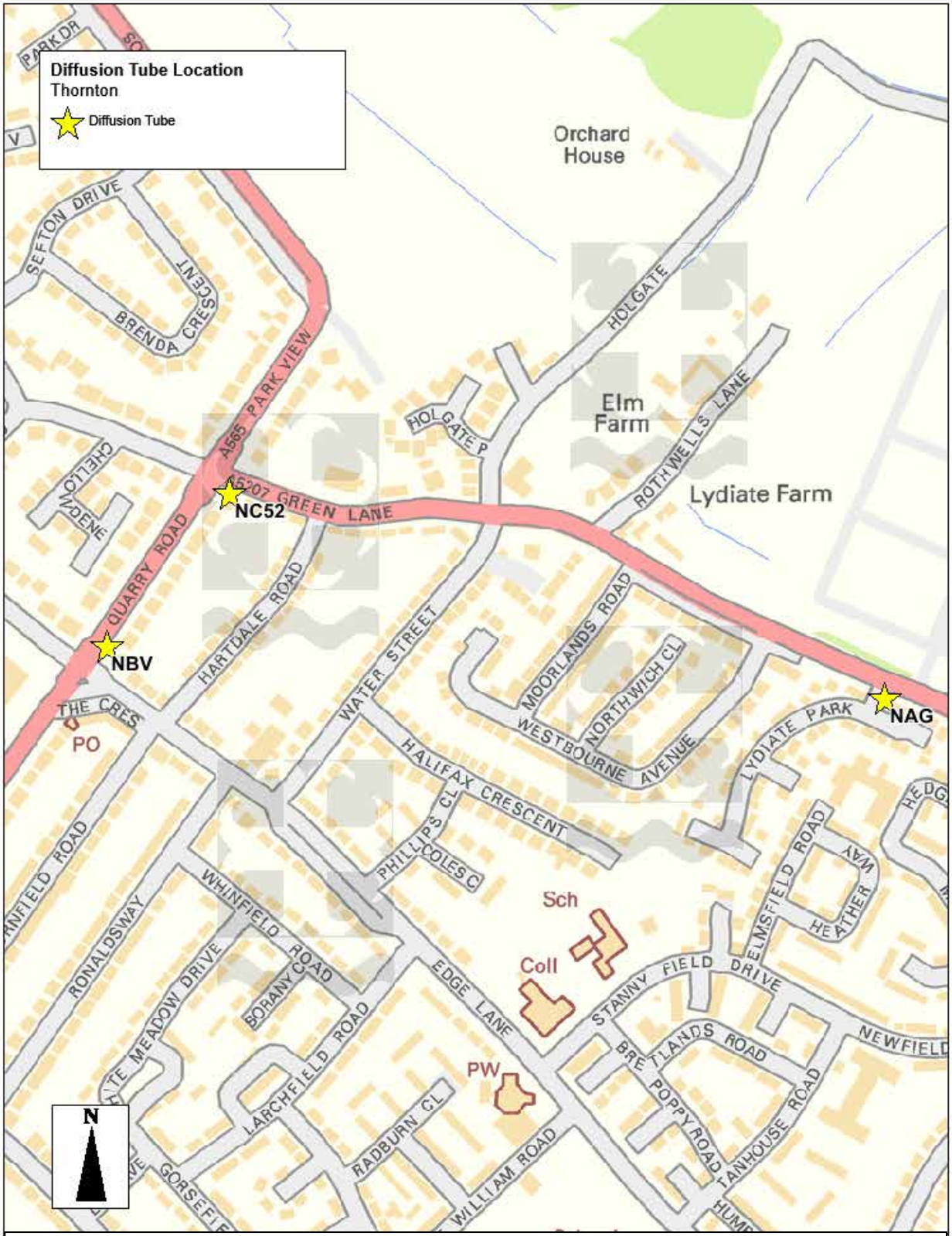


Figure D.27 – Diffusion Tube Locations Aintree. Site ID: NC108

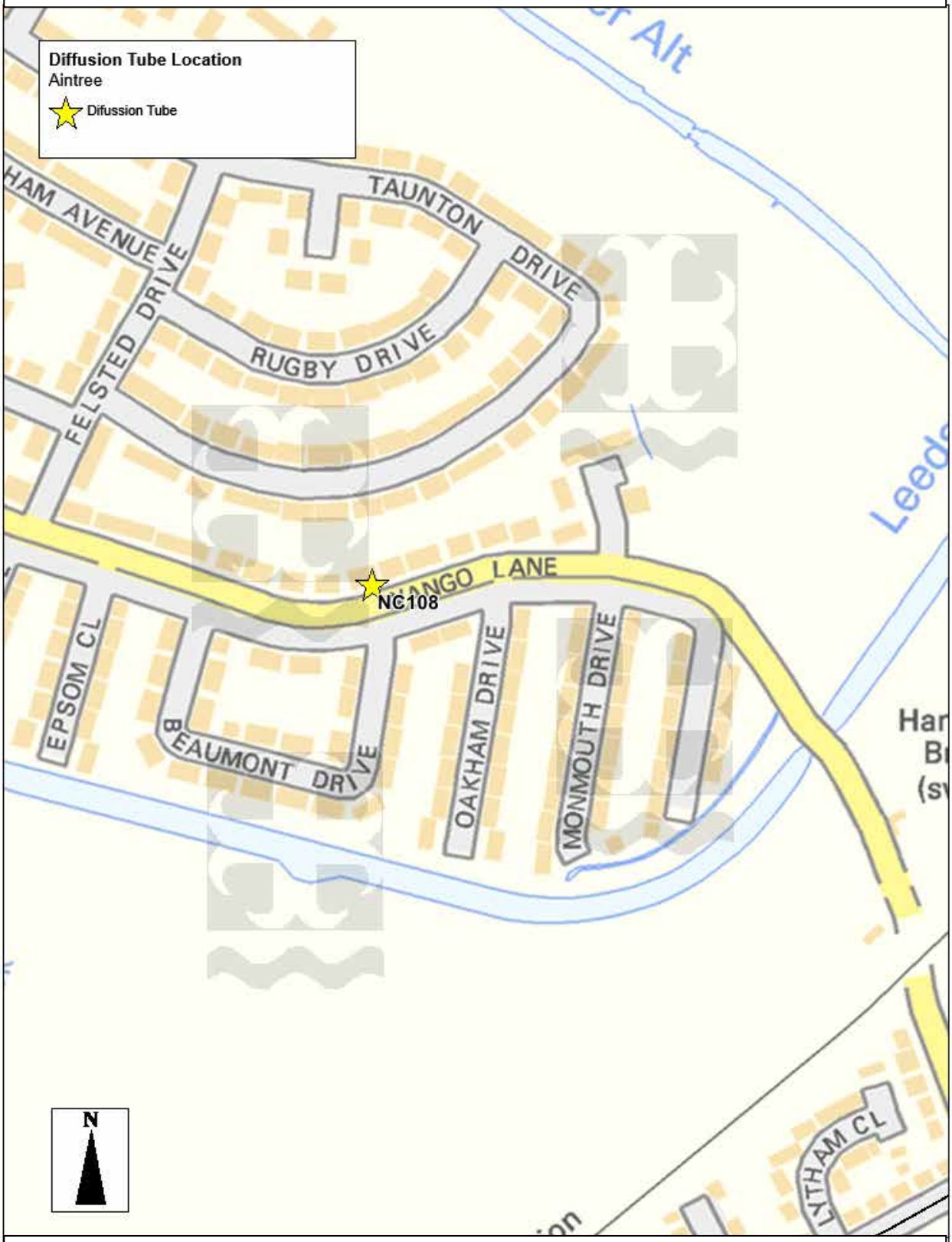
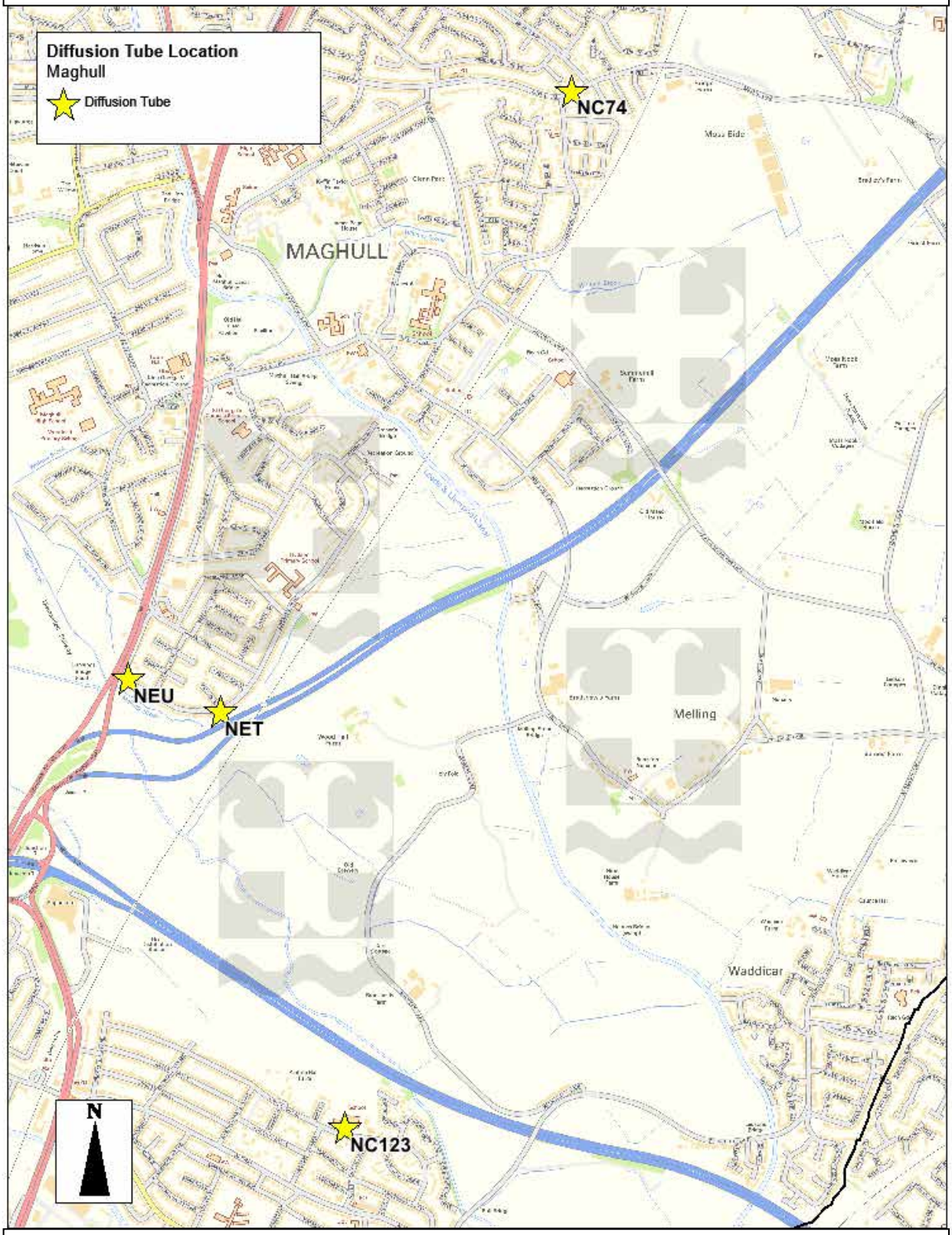


Figure D.28 – Diffusion Tube Locations Maghull. Site ID: NEU, NET, NC74 & NC123



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	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

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

Glossary of Terms

Abbreviation	Description
AFS	Alternative Fuels Strategy
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
AQO	Air Quality Objective
AQS	Air Quality Standard
ANPR	Automatic Number Plate Recognition
ASR	Air Quality Annual Status Report
BAM	Beta Attenuation Monitor
CAZ	Clean Air Zone
CM	Continuous Monitor
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EA	Environment Agency
EMR	European Metal Recycling Limited
EU	European Union
EV	Electric Vehicle
FDMS	Filter Dynamics Measurement System
FQP	Freight Quality Partnership
GM	General Measure in the Air Quality Action Plan
HGV	Heavy Goods Vehicle

JSNA	Joint Strategic Needs Assessment
LAQM	Local Air Quality Management
LCR	Liverpool City Region
LES	Low Emissions Strategy
LEZ	Low Emission Zone
L2	Liverpool 2 (Peel Ports new deep water container terminal)
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PHOF	Public Health Outcomes Framework
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
RIS	Road Investment Strategy
SCOOT	Split Cycle Offset Optimisation Technique
SGVC	Specialised Goods Vehicle Count
SS	Site Specific Measure in the Air Quality Action Plan
SSNA	Sefton Strategic Needs Assessment
TEOM	Tapered Element Oscillating Microbalance
TQP	Taxi Quality Partnership
TSP	Total Suspended Particulates
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
VCM	Volatile Correction Model
VMS	Variable Message Sign

References

Public Health England (2014). Estimating Local Mortality Burdens Associated with Particulate Air Pollution.

Defra (2016).Local Air Quality Management Policy Guidance (PG16).

Defra (2016). Local Air Quality Management Technical Guidance (TG16).