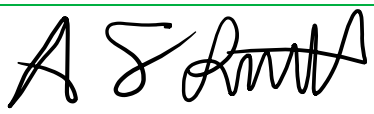
St.Helens Council

2020 Air Quality Annual Status Report (ASR)

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

July 2020

Local Authority Officer	Lucy Northey
Department	Place Services
Address	Wesley House, Corporation Street, St Helens, WA10 1HE
Telephone	01744 676351
E-mail	lucynorthey@sthelens.gov.uk
Report Reference number	STC/ASR/2020
Reviewed by	 Regulatory Services Manager
Reviewed by	 Director of Public Health
Date	August 2020

Executive Summary: Air Quality in Our Area

Air Quality in St Helens

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[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].

St Helens is a metropolitan borough of Merseyside and covers an area which includes the settlements of Sutton, St Helens, Earlestown, Rainhill, Rainford, Eccleston, Clockface, Haydock, Billinge and Newton-le-Willows.

St Helens consists of large areas of agricultural land and some industry, having a long association with glassmaking. There are two motorways that run within the Borough, the M6 and M62. The predominant source of pollution within the Borough is nitrogen dioxide from traffic.

St Helens monitors nitrogen dioxide using four continuous monitors and 33 passive diffusion tubes. Particulate matter is measured at one location via a continuous monitor.

The general overall trend within St Helens is decreasing levels of nitrogen dioxide and particulate matter over the last 5 years. Three of the four AQMAs now have levels of nitrogen dioxide below the national objective at the closest sensitive receptors.

St Helens work with other Local Authorities and key stakeholders through groups such as the Merseyside and Cheshire air quality group, Cheshire and Merseyside Public Health Collaborative (CHAMPS) and the newly formed Liverpool City Region (LCR) air quality task force.

[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

St Helens has declared four air quality management areas (AQMAs) which can be viewed using the following link https://www.sthelens.gov.uk/business/environmental-health/environmental-protection/air-quality/ . There have been no new AQMAs declared since 2011 and there are no further areas which have been identified as requiring declaration.

A preliminary options study for the Liverpool City Region was completed in February 2019 and identified and prioritised key interventions for the LCR. Many of these are being taken forward in 2020.

Actions to Improve Air Quality

Highways Improvement Schemes

A580 Pewfall junction improvement scheme

The scheme is being funded by the Liverpool City Region Combined Authority's Local Growth Fund through a £2.6m investment, with local developers contributing £500,000. St. Helens Council will fund the remaining balance to help support economic growth and employment opportunities in the borough. The scheme aims to reduce traffic queuing on Liverpool Road, benefiting residents living nearby. A dedicated pedestrian and cycle crossing will also be put in place across the East Lancashire Road.

A57 Sherdley Roundabout improvement scheme (www.sthelens.gov.uk/news/2020/february/04/a570-sherdley-roundabout-scheme-to-get-underway-this-month/)

Funded by £4.95m from the Local Growth Fund, awarded to the Liverpool City Region Local Enterprise Partnership (LEP) and invested through the Liverpool City Region Combined Authority's Strategic Investment Fund, the scheme will provide toucan crossing facilities for pedestrians and cyclists, widened footways and widened lane widths to improve traffic flows. The speed limit will be reduced to 30mph on all approaches.

A57 Warrington Road safety improvement scheme

The work – funded by the Department for Transport safer road fund - will bring a number of benefits along A57 Warrington Road, and at its junctions with School Lane and A569 Clock Face Road, including pedestrian and cycling facilities.

Sustainable Urban Development scheme (www.sthelens.gov.uk/news/2020/february/06/college-street-desilting-works-to-start-this-monday/)

The scheme has been funded from the Liverpool City Region (Transforming Cities Fund) and European Regional Development Fund (ERDF). Starting with de-silting works at Gerards Bridge, College Street in February 2020, the scheme will be delivered over the next two years and will provide off-road cycling routes.

Sustainable Transport Enhancement Package

St. Helens Council is continuing to deliver cycling and walking improvements through the Local Growth Fund STEP programme, including a new toucan crossing on Boardmans Lane and completing the off-road route from Parr Stocks Road to Sutton Brook Greenway.

Liverpool City Region Hydrogen Bus Project (https://www.liverpoolcityregion-ca.gov.uk/liverpool-city-region-launches-6-4m-hydrogen-bus-project/)

The Liverpool City Region Combined Authority is part of a consortium that was awarded £6.4m in March 2019 from the Office for Low Emission Vehicles to trial hydrogen buses. The bid includes the creation of a new hydrogen refuelling station at the BOC plant in St Helens, which produces hydrogen for industrial customers in the region and further afield. Up to 25 hydrogen-powered buses will be funded with the first trial expected to take place in 2020. The buses emitting nothing but water, so will contribute to improving air quality and a zero carbon economy.

Cycling and Walking Activities

Active St. Helens campaign (https://www.sthelens.gov.uk/public-health-and-wellbeing/campaigns/active-st-helens/)

This public health campaign aims to encourage people who live, work and study in

St. Helens to be more active. The campaign promotes cycling, walking and running. As well as cycle maps to download, it provides information on walking and cycling, with case studies to highlight the benefits through social media.

Living Streets

The charity funds an officer dedicated to working in the City Region to encourage walking and active travel in general. The Walk To School Outreach project includes supporting WOW at all schools involved, doing extra activities with any schools that are keen to do more and completing 2 or 3 intensive activities like school route audits which identify barriers to walking and are given to the council. There are 8 schools in St Helens taking part in WOW. St Helens Planning Department identified Bleak Hill Primary to be a WOW school, to help deliver active travel aims written into their School Travel Plan. St Thomas of Canterbury is nearby, and both these schools, alongside the Federation of St Mary's Infant and Junior schools in Newton-le-Willows, started WOW in January 2020. St Mary's Blackbrook started WOW in October. Schools in St Helens have increased active modes of travel to school from 48% to 64%. St Mary's Catholic Primary, Blackbrook have really embraced WOW with a staff-pupil team who coordinate extra activity. They have bought their own mini Striders which are awarded to the Travel Tracker class of the month to look after – a coveted achievement! Their active trips have leapt from 47% to a brilliant 72% during the term.

Led bike rides

There are numerous led bike rides available across St Helens to encourage the take up of cycling, including Pedal Power (a community group of volunteers offering free, fun and social bike rides for all people across the borough), the Healthy Living Team (provide weekly cycling sessions called 'Wheels for All' for those with additional needs, be that physical or learning needs), Woollybacks Mountain Bike Club and St Helens Cycle Racing Club. St Helens Road Safety Team promote cycling safety and support children and young people to cycle.

Bikeability cycle training

National Standard on-road cycle training available to young people and children in Merseyside through the national cycle training programme. Organised through

schools, Year 5, 6 and 7 pupils are offered Level 2 training which equips children with important skills to help them cycle on quiet roads. Year 7, 8 and 9 in High schools are offered Level 3 training which builds on level 2, and is more advanced giving skills in dealing with busier roads and roundabouts. Training is free and offered to every school in Merseyside. Between April 2019-March 2020, 999 children and young people were trained in St Helens - with 856 children receiving Level 2 training, 47 SEN training and 96 Level 3 training. Additional training and bike rides were given to 181 children and young people through the Bikeability Plus programmes.

Merseyside Cycle Monitoring

St Helens has 8 automatic cycle counters included in this monitoring report which is used as evidence for the cycling target in the Merseyside Local Transport Plan. Overall across Merseyside, there has been a 1.8% decrease in cycle usage from April 2018 to March 2019 so that the LTP3 based overall indicator is 35%. For St Helens, recorded cycle trip rates dropped by 5.5%, giving an overall indicator of -12.5%.

Planning

A list of major applications determined in 2019 is outlined in Appendix F, applications were screened for air quality impacts and no applications were deemed to have a significant impact after mitigation

Fleet Management

The planned fleet management renewal program has continued with Euro VI vehicles replacing Euro III.

In September 2019 cabinet approved an additional £2,891m for fleet replacement over the next 3 years.

Public Information

Two new air quality websites were launched in November 2019. One a public information website for the Liverpool Region, and another was an educational

website for schools and parents. These can be found at www.letsclearttheairlcr.co.uk and www.kids.letsleartheairlcr.co.uk

The Council has an initiative called Liveable Streets aimed at improving streets for walking and cycling to encourage uptake. Comments on problem areas and improvements can be left and are used to inform funding bids and works aimed at improve walking/cycling infrastructure improvements.

Conclusions and Priorities

The general trend in NO_2 over the last five years has been a slow downward trend. In AQMA 1 all results are now below 40µg/m^3, with the exception of the Southworth Road analyser which is in a kerbside location and not representative of the concentrations at the façade of the closest property. All concentrations at properties in this AQMA are below the national objective for annual mean NO_2.
In AQMA 2 annual mean concentrations of NO_2 have slowly reduced and are all below the measured concentrations in 2015. There are no measured exceedances within AQMA 2 at any location.

The monitored results from AQMA 3 (Borough Road) show a plateau and not a downward trend, this is probably due to the local conditions (large incline and street canyon) as the exceedances are only seen where terraced houses line either side of the street. The increases and decreases over the past 5 years are likely due to the influence of weather and not interventions. More local targeted interventions are required in this area to secure improvements in air quality.

The general trend is downwards in AQMA 4 and all monitored data in AQMA 4 is below the national objective for annual mean NO_2. The monitored levels of Nitrogen dioxide in this location have been below the national objective for five years, however due to works to implement a pedestrian/cycle crossing in October 2020 within the AQMA which could affect traffic flow and therefore it is proposed to maintain the AQMA until 2021.

The main priority for reducing air quality in St Helens will be minimising impacts from new developments and providing targeted interventions to reduce Nitrogen dioxide in

AQMA 3 (Borough Road). The challenge will be finding innovative solutions to improve air quality in AQMA 3 and implementing all the projects in the draft action plan with limited budget and resources.

Local Engagement and How to get Involved

An educational air quality website for children and schools was launched in 2019. A launch event with schools and key decision makers was held in Liverpool. Packs were sent out to all schools within the Liverpool City Region and a programme for schools to undertake their own air quality assessments using diffusion tubes was launched at the beginning of 2020. It is hoped that the website will enhance the learning and engagement around air quality issues in schools. The website can be found at www.kids.letscleartheairLCR.co.uk

An air quality website for the public within the Liverpool City Region was also launched, this can be found at www.letscleartheairLCR.co.uk and contains information and publications relating to air quality within the LCR. Local air quality information can also be found on the councils dedicated web pages at https://www.sthelens.gov.uk/business/environmental-health/environmental-protection/air-quality/

A steering group was established to update the air quality action plan. A draft air quality action plan has been drawn up with engagement from all key stakeholders including Highways England. It should be noted, however, that due to the Coronavirus pandemic and its potential impact on funding streams, that some of the proposed actions listed in Table 2.2 may need to be adjusted once the financial position post pandemic is clearer.

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1 Local Air Quality Management

This report provides an overview of air quality in St Helens during 2019. 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 St Helens Council 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 St Helens Council 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=256. 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	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
					At Declaration		Now		Name	Date of Publication	Link
AQMA 1 M6 Motorway	23rd April 2009	NO2 Annual Mean	St Helens	An area encompassing the M6 running its entire length through the Borough	YES	65	31[1]	µg/m3	Action Plan	2013	In draft
AQMA 2 Newton le Willows High Street	23rd April 2009	NO2 Annual Mean	St Helens	Residential properties along High Street Newton le Willows (A49) between the junctions of Ashton Road and Church Street	NO	40.1	31	µg/m3	Action Plan	2013	In draft
AQMA 3 Borough Road	25th November 2011	NO2 Annual Mean	St Helens	An area encompassing residential properties along Borough Road between the junctions of Westfield Street and Prescot Road, including 5-9	NO	64*	44.8[2]	µg/m3	Action Plan	2013	In draft

				Alexandra Drive and 1-17 Prescot Road							
AQMA 4 Linkway	25th November 2011	NO2 Annual Mean	St Helens	Residential development adjacent to the Linkway (A570)	NO	42.11	33	µg/m3	Action Plan	2013	In draft

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

[1, 2] Average of diffusion tube results – situated on façade of properties.

2.2 Progress and Impact of Measures to address Air Quality in St Helens

Defra's appraisal of last year's ASR determined that all conclusions reached were all acceptable for all sources and pollutants. Additional points raised were to make reference to the Public Health Outcomes Framework, and the local indicator for $PM_{2.5}$ in the district, to include calculations for distance correction and to include larger labels on maps.

St Helens Council has taken forward a number of direct measures during the current reporting year of 2020 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. Key completed measures are:

- Delivery of public facing and educational air quality websites.
- Delivery of cycle and walking improvements through the Local Growth Fund STEP programme, including a new toucan crossing on Boardmans Lane and off-road route from Parr Stocks Road to Sutton Brook Greenway.
- St Helens active campaign encouraging residents to be more active.
- Living Streets walk to school project, with 8 WOW schools in St Helens signed up to undertake extra activities.
- There are several initiatives offering led cycle rides, encouraging the uptake of cycling across the Borough, including Pedal Power, Healthy Living Team and local cycle clubs.
- Bikeability cycle training provided to schools. Between April 2019 and March 2020, 999 children and young people were trained in St Helens.
- Merseyside cycle monitoring includes 8 cycle counters in St Helens which showed a 1.8% decrease in cycle usage from April 2018 to March 2019
- Cycle to work scheme – the council offers this to all employees to enable them to purchase a bike through the scheme. Dedicated cycle parking and lockers are also available onsite.

- Rolling out agile working across the council. All Managers have been offered the facility for their team to work from home if their work allows. This was piloted in October 2018 with teams in Environmental Health and has since rolled out to more teams across the council.

St Helens Council expects the following measures to be completed over the course of the next reporting year:

- Pewfall junction improvement scheme aims to reduce traffic queuing in addition to dedicated cycle and pedestrian crossing.
- A57 Sherdley Roundabout improvement scheme will provide toucan crossing facilities widened footways and widened lane widths to improve traffic flows.
- A57 Warrington Road safety improvement scheme to smooth flow and provide pedestrian and cycling facilities.
- Sustainable Urban Development scheme will be delivered over two years and provide off-road cycling routes
- Liverpool City Region Hydrogen Bus Project including the creation of a new hydrogen refuelling station at the BOC plant in St Helens and up to 25 hydrogen powered buses with first trial to take place in 2020.

St Helens' priorities for the coming year are to take the completed action plan to members and get endorsement for the propose actions. Continue to upgrade problem junctions and improve cycle routes within the Borough.

The principal challenges and barriers to implementation that St Helens Council anticipates facing are funding and resource challenges.

Progress on the following measures has been slower than expected due to:

- Upgrade to smart motorway on M6 between junctions 22 and 24 due to delays from Highways England.

St Helens Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in the following AQMAs:

- High Street, Newton
- M6/Southworth Road
- St Helens Linkway.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, St Helens Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Borough Road and M6.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
											St Helens Council
1	Acoustic/AQ barrier on M6 flyover	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Planning phase	Highways England	HE	Monitored NO2 levels	Emissions dispersed	In planning phase	2021/2022	In discussion – dependent on results of planning phase
2	Use of hard shoulder running (M6 J21a to J24)	Traffic Management	UTC, Congestion management, traffic reduction	Planning phase	Highways England	HE	Monitored NO2 levels	Reduced congestion	In planning phase	2021/2022	Other studies have shown hard shoulder running to increase pollutants at close by receptors, needs to be done in conjunction with mitigating measures. Dependent upon HE.
3	Anti-idling campaign	Traffic Management	Anti-idling enforcement	2018	St Helens Council	Local Authority	Reducing background emissions	<1%	To adopt legislation and authorise key services to enforce anti-idling legislation	Soft approach ongoing, second phase planned	None
4	Optimise flow on key routes (SCOOT)	Traffic Management	UTC, Congestion management, traffic reduction	2016	St Helens Council	Complete	Reducing emissions on key routes. Reduction of between 2.1-3.3ug/m3 at key receptors over last 5 years.	2-3ug/m2	Phase 1 complete on A580 phase 2 ongoing	2020	Length of works
5	Travel awareness campaign	Promoting Travel Alternatives	Promotion of walking	2017	St Helens Council, Living Streets	Ongoing	Number of children walking to school/work	Implementation ongoing	Participate in Arrive Happy and Living Streets campaigns.	Ongoing	Funding streams for future years.
6	Cycling promotion	Promoting Travel Alternatives	Promotion of cycling	2019	Local Authority transport dept.	STEP funding	Number of people using cycle hubs and purchasing bikes through the cycle to work scheme.	Ongoing	Off road cycle programme extended. Cycle hub in Sherdley Park. Participants in cycle to work scheme.	Ongoing	Funding streams for future years.
7	Major Junction Improvements at Windle Island, Pewfall and St Helens Junction	Traffic Management	UTC, Congestion management, traffic reduction	2019	Local Authority Transport dept.	Local Authority	Queue times, NO2 reduction	Reduced queue times	Implementation ongoing	Implementation ongoing	Funding streams for future years.
8	Eco driving	Vehicle Fleet Efficiency	Driver training and ECO driving aids	2017	St Helens Council	Energy Saving trust/Defra funding	Fuel efficiency	Improved fuel efficiency of between 10 and 30%	Completed	Complete	None
9	Fleet Efficiency improvements	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2017	St Helens Council	Local Authority	Fuel efficiency	Fuel useage	Ongoing	Ongoing	Funding streams for future years.
10	Green the taxi fleet	Promoting Low Emission Transport	Taxi Licensing conditions	2021	Local Authority Licensing dept with other Merseyside LAs	Local Authority.	Reduce emissions on major routes	<1%	Dependent upon licensing policy	2021	Planning phase
11	Supplementary planning guidance	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2020	Local Authority Planning dept	Local Authority	Mitigation measures, more sustainable development	More sustainable development	Planing policy upgraded to include references to EVs and offsetting	2024	Planning policy still in draft pending review.
12	Inspection of regulated processes. Finding unpermitted activities	Environmental Permits	Other measure through permit systems and economic instruments	2020	Local Authority Environmental Health Dept	Local Authority	Number of permitted activities. Setting of emission limits	Number of permitted activities/ changes in emissions	Ongoing	Ongoing	Resource restraints
13	Investigation of air pollution complaints	Other	Other	Ongoing	Local Authority Planning Dept.	Local Authority	Response times met	<1%	Ongoing	Ongoing	Resource restraints

14	Linking air quality monitoring to Siemens Stratos system signalling	Traffic Management	UTC, Congestion management, traffic reduction	2020	Local Authority Transport Dept.	2020	Reduce congestion, reduce NO2 on affected routes	0.5-1ug/m2	Planning phase	2021	Implementing technology changes
15	Invest in new portable monitoring equipment	Promoting travel alternatives	Other	2020	Liverpool City Region	LCR funding	Identify new hotspots, reroute traffic		Tender phase	2021	Unforeseen delays
16	Review SPD 'Ensuring a choice of travel'	Transport planning and Infrastructure	Other	2020	Local Authority Transport Dept.	Local Authority	Completion of review	Up to date advice on infrastructure planning	Planning phase	2021	Resource challenges
17	Delivery of the Local Cycling and walking infrastructure Plan	Transport planning and Infrastructure	Other	2020	Local Authority Transport Dept.	Local Authority	Completion Of the review	Successfully progressing the 10-year programme in accordance with the delivery plan	Planning phase	2029	Resource challenges
18	Newton le Willows Interchange	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2019	St Helens Council and Merseytravel		Increase use of bus/ train	Reduction in NO2 within St Helens and other Boroughs	Completed	Complete	n/a
19	Procurement policies updated to include air quality indicators	Policy guidance and development control	Sustainable procurement guidance	2020	St Helens Council	Local Authority	Development and implementation of suitable tests	Reduced emissions from procurement	Planning phase	2020	Resource restraints
20	Ensure JSNA effectively communicates AQ impacts	Public Information	Via other mechanisms	2020	St Helens Council Public Health	Local Authority	To raise the issue of AQ within a topic based report at the Peoples board	Raise awareness	Planning phase	2020	Resource restraints
21	Develop and implement a communications strategy to highlight AQ initiatives and campaigns	Public Information	Via the internet	2020	St Helens Council Marketing and communications	Local Authority	Develop a plan to be updated quarterly	Raise awareness	Draft phase	Ongoing	Resource restraints
22	Actively participate in national and regional AQ campaigns (including Clean Air day and Car free day)	Public Information	Via the internet/ Via other mechanisms	2020	St Helens Council Marketing and communications	Local Authority	To deliver high profile campaigns through the year	Raise awareness	Ongoing	Ongoing	Resource constraints
23	Develop and implement a Council Travel Plan	Promoting travel alternatives	Workplace Travel Planning	2021	St Helens Council Human Resources	Local Authority	Establish a working group with the aim of developing a travel plan	Reduce car dependence and employee mileage	Ongoing	2022	
24	Regulate the sale of coal and wet wood for domestic use. Promote cleaner fuels	-	-	2020	St Helens Council Environmental Health	Local Authority	To monitor changes in regulation and promote cleaner domestic fuels	Awareness raising	Ongoing	2023	Resource challenges
25	Hydrogen Bus Project	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2020	Liverpool City Region consortium		Service user uptake	Reduction in background emissions and along major arterial routes	Planning phase	2021	User uptake

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.

The Public Health Outcome Framework for PM2.5 is considered as part of St Helens' JSNA Report. This outcome indicator is the percentage of mortality in adults over 30 attributed to particulate air pollution. It is a modelled estimate based on the relative risk incurred per 10 µg/m3 increase above local average background levels. The attributable fraction in England in 2018 was 5.2%, whilst for the North West this is lower, at 4.3%. In St Helens the attributable fraction is 4.8%.

St Helens Council is taking the following measures to address $PM_{2.5}$:

Some of the measures within the action plan will address PM2.5 emissions, however additional measures put in place to specifically tackle emissions from PM2.5 are the enforcement of the Smoke control areas within St Helens. Most of the Borough is designated as a Smoke Control area. Officers give out advice and information to residents on DEFRA approved exempt appliances and the correct fuels to use.

Raise awareness of the correct disposal routes for waste, not to burn waste, also to compost green waste and we provide a green waste collection service.

Each year we have operation Good Guy to remove combustible materials, waste and bonfire materials from all public space, open ground and gardens to limit the number of bonfires. We advertise this and residents are able to report build ups of waste to the council for removal.

We respond to complaints about commercial premises using burning as a method of waste disposal and also respond to nuisance complaints about neighbours consistently burning waste under the Environmental Protection Act 1990.

St Helens Council actively promotes eco-driving which include the reduced braking and tyre wear which is a cause of PM2.5.

All permitted premises and planning applications are encouraged to utilise gas fired boilers instead to diesel powered boilers to reduce the PM2.5 and PM10 emissions.

As a statutory consultee on planning applications we ask for dust management plans to limit the amount of dust on site, and to stop burning of any waste arisings.

Information is available on the council website and is included in the new educational website aimed at children and schools.

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.

St Helens Council undertook automatic (continuous) monitoring at four sites during 2019. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.ukairquality.net/home/map.

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

3.1.2 Non-Automatic Monitoring Sites

St Helens Council undertook non- automatic (passive) monitoring of NO_2 at 33 sites during 2019. Table A.2 in Appendix A shows the details of the sites.

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

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[4], “annualisation” (where the data capture falls below 75%), and distance correction[5]. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. Note that the concentration data presented in Table A.3 represents the concentration at the location of the monitoring site, following the application of bias adjustment and

[4] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[5] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.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.

All monitoring results were below the annual mean for nitrogen dioxide with the exception of the Southworth Road analyser (SR) in AQMA 1 and the two diffusion tubes (T19 and T24) located at Borough Road in AQMA 3. No exceedances were found to be above the 60µg/m^3 indicating that there are no exceedances of the 1-hour mean objective.

AQMAs 2 (High Street) and 4 (Linkway) had no exceedances of the annual mean objective. There are no exceedances of the daily or annual mean objective in any of the other monitored locations.

3.2.2 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.

The monitored annual mean concentration for 2019 at the Linkway analyser (LW) was 20 µg/m^3. There were no exceedances of the PM_{10} daily mean.

Appendix A: Monitoring Results

Table A.1 - Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
LW	St Helens Linkway	Roadside	350815	395260	NO2; PM10	YES (AQMA 4)	Chemiluminescent; BAM	165	5.35	2.44
SR	St Helens Southworth Road	Roadside	360045	395643	NO2	YES (AQMA 1)	Chemiluminescent	10	3.2	2
HS	St Helens High Street	Roadside	358975	395804	NO2	YES (AQMA 2)	Chemiluminescent	1.06	3.65	2
BR	St Helens Borough Road	Roadside	350403	394961	NO2	YES (AQMA 4)	Chemiluminescent	23	2.5	1.48

Notes:

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

(2) N/A if not applicable

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

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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)
T1	170 Southworth Road	Roadside	360109	395661	NO2	NO	0	16.3	NO	1.95
T2	1 Skitters Grove	Roadside	356549	399577	NO2	YES	0	22.8	NO	2.02
T3	Taylor Park	Urban Background	349485	394766	NO2	NO	32.15	N/A	NO	2.44
T4	27 Syston Avenue	Suburban	352451	396735	NO2	NO	0	12.85	NO	1.74
T5	151 West End Road	Suburban	353891	396714	NO2	NO	0	4.5	NO	1.93
T6	Parkside	Suburban	359498	394646	NO2	NO	45.35	1.65	NO	2.36
T7	160 Southworth Road	Roadside	360055	395638	NO2	YES	0	11.1	NO	1.9
T8	157 High Street	Roadside	358774	395880	NO2	YES	0	10.6	NO	1.91
T9	3 Waterworks Cottages	Roadside	359915	395639	NO2	YES	0	11.5	NO	1.83
T10	160 Southworth Road	Roadside	360055	395638	NO2	YES	0	11.1	NO	1.9
T11	Southworth Road Lamp post 11	Roadside	360065	395653	NO2	NO	0	4.6	NO	1.88
T12	24 Norlands Lane	Roadside	350239	389824	NO2	NO	0	12.8	NO	1.98
T13	22 Union Bank Lane	Roadside	352391	390301	NO2	NO	0	7.55	NO	1.83
T14	19 High Street	Roadside	359147	395705	NO2	YES	0	5.9	NO	2.43

T15	2 Parkside Cottages	Roadside	358220	397077	NO2	YES	0	27.4	NO	1.74
T16	297 Liverpool Road	Roadside	354377	397475	NO2	NO	0	14.3	NO	2.06
T17	446 Liverpool Road	Roadside	354403	397561	NO2	NO	0	7.9	NO	1.76
T18	Linkway Monitor	Roadside	350815	395265	NO2	NO	165	5.35	YES	2.35
T19	55 Borough Road	Roadside	350438	395005	NO2	YES	0	2.55	NO	2.33
T20	33 Langholm Road	Suburban	355322	399625	NO2	NO	0	2.6	NO	2.34
T21	24 Greenfield Road	Roadside	350135	396128	NO2	NO	0	6.2	NO	1.79
T22	Linkway Monitor	Roadside	350815	395265	NO2	YES	165	5.35	YES	2.34
T23	19 High Street	Roadside	359147	395705	NO2	YES	0	5.9	NO	2.43
T24	55 Borough Road	Roadside	350438	395005	NO2	YES	0	2.55	NO	2.33
T25	High Street Monitor lamppost	Roadside	358975	395804	NO2	YES	1.1	3.65	YES	2.6
T26	33 Blackbrook Road	Roadside	353129	396240	NO2	NO	0	6.4	NO	1.88
T27	51 Carr Mill Road	Roadside	352336	397653	NO2	NO	0	13.6	NO	1.1
T28	206 Borough Road	Roadside	350156	394848	NO2	YES	0	6.4	NO	1.93
T29	25 Prescot Road	Roadside	350456	395135	NO2	NO	0	1.9	NO	2.43
T30	4 Union Bank Lane	Roadside	352262	390226	NO2	NO	0	7.5	NO	1.94
T31	160 Southworth Road	Roadside	360055	395638	NO2	YES	0	11.1	NO	1.9
T32	High Street Monitor lamppost	Roadside	358975	395804	NO2	YES	1.1	3.65	YES	2.6

T33	Warrington Road	Roadside	350386	389936	NO2	NO	5.1	11.9	NO	1.88

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
LW	350815	395260	Roadside	Automatic	100	84	38	38	34	33	33
SR	360045	395643	Roadside	Automatic	100	98.6	**53**	**51**	**50**	**45**	**43**
HS	358975	395804	Roadside	Automatic	100	91.5	33	38	31	35	31
BR	350403	394961	Roadside	Automatic	100	99.8	38	39	29	30	29
DT1	360109	395661	Roadside	Diffusion Tube	100	83	32.77	29.2	26.5	25	24.9
DT2	356549	399577	Roadside	Diffusion Tube	100	100	35.8	30.5	25	25.9	24.7
DT3	349485	394766	Urban Background	Diffusion Tube	100	83	13.6	14.9	13.5	13.2	14.3
DT4	352451	396735	Suburban	Diffusion Tube	100	100	22.8	22.8	22.6	20.5	20.9
DT5	353891	396714	Suburban	Diffusion Tube	100	100	24.2	23.5	21.9	22.3	22.5
DT6	359498	394646	Suburban	Diffusion Tube	100	100	23.6	24.3	23.6	21.3	21.5
DT7	360055	395638	Roadside	Diffusion Tube	100	100	**40.3**	36.4	37.6	33.16	30.7
DT8	358774	395880	Roadside	Diffusion Tube	100	100	26.5	25.5	22.5	24.1	23.0
DT9	359915	395639	Roadside	Diffusion Tube	100	100	24.1	24.1	20.9	21.8	21.7
DT10	360055	395638	Roadside	Diffusion Tube	100	100	**41.7**	37.3	37.9	33.6	31.0
DT11	360065	395653	Roadside	Diffusion Tube	100	91					34.0

DT12	350239	389824	Roadside	Diffusion Tube	100	100	24.1	25.3	23.5	22.8	23.8
DT13	352391	390301	Roadside	Diffusion Tube	100	100	26.1	25.1	24.6	24.4	22.2
DT14	359147	395705	Roadside	Diffusion Tube	100	100	34.9	33.3	33.3	31.3	32.5
DT15	358220	397077	Roadside	Diffusion Tube	100	100	32.8	32.3	31.4	28.4	27.1
DT16	354377	397475	Roadside	Diffusion Tube	100	100	24.5	23.7	22.3	22.2	20.7
DT17	354403	397561	Roadside	Diffusion Tube	100	100	28.9	31.4	29.3	27.5	28.4
DT18	350815	395265	Roadside	Diffusion Tube	100	100	31.5	35.6	35.1	30.5	29.3
DT19	350438	395005	Roadside	Diffusion Tube	100	100	**41.3**	**48.9**	**45.1**	**46.7**	**45.3**
DT20	355322	399625	Suburban	Diffusion Tube	100	91					15.0
DT21	350135	396128	Roadside	Diffusion Tube	100	100	22.7	25.1	23.7	23.4	23.8
DT22	350815	395265	Roadside	Diffusion Tube	100	100	29.8	33.5	33.9	30.4	30.7
DT23	359147	395705	Roadside	Diffusion Tube	100	100	34.1	33.7	33.3	31.6	30.7
DT24	350438	395005	Roadside	Diffusion Tube	100	100	**42.1**	**46.8**	**42.9**	**48.1**	**44.3**
DT25	358975	395804	Roadside	Diffusion Tube	100	100	32.5	34.2	31.4	30.8	29.8
DT26	353129	396240	Roadside	Diffusion Tube	100	100	27	29.4	27.2	27.5	25.0
DT27	352336	397653	Roadside	Diffusion Tube	100	100				19.5	22.2
DT28	350156	394848	Roadside	Diffusion Tube	100	100	25.5	25.8	25.9	25.7	25.2
DT29	350457	395165	Roadside	Diffusion Tube	100	100	24.5	26.5	25	25.5	25.6

DT30	352262	390226	Roadside	Diffusion Tube	100	100	23.5	22.6	22.8	20.7	19.8
DT31	360055	395638	Roadside	Diffusion Tube	100	100	39.8	34.7	37.7	34.9	31.4
DT32	358975	395804	Roadside	Diffusion Tube	100	100	32	32.59	30.7	31.5	30.0
DT33	350386	389936	Roadside	Diffusion Tube	100	100	36.7	33.1	30.2	33.4	30.7

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

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

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

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.**

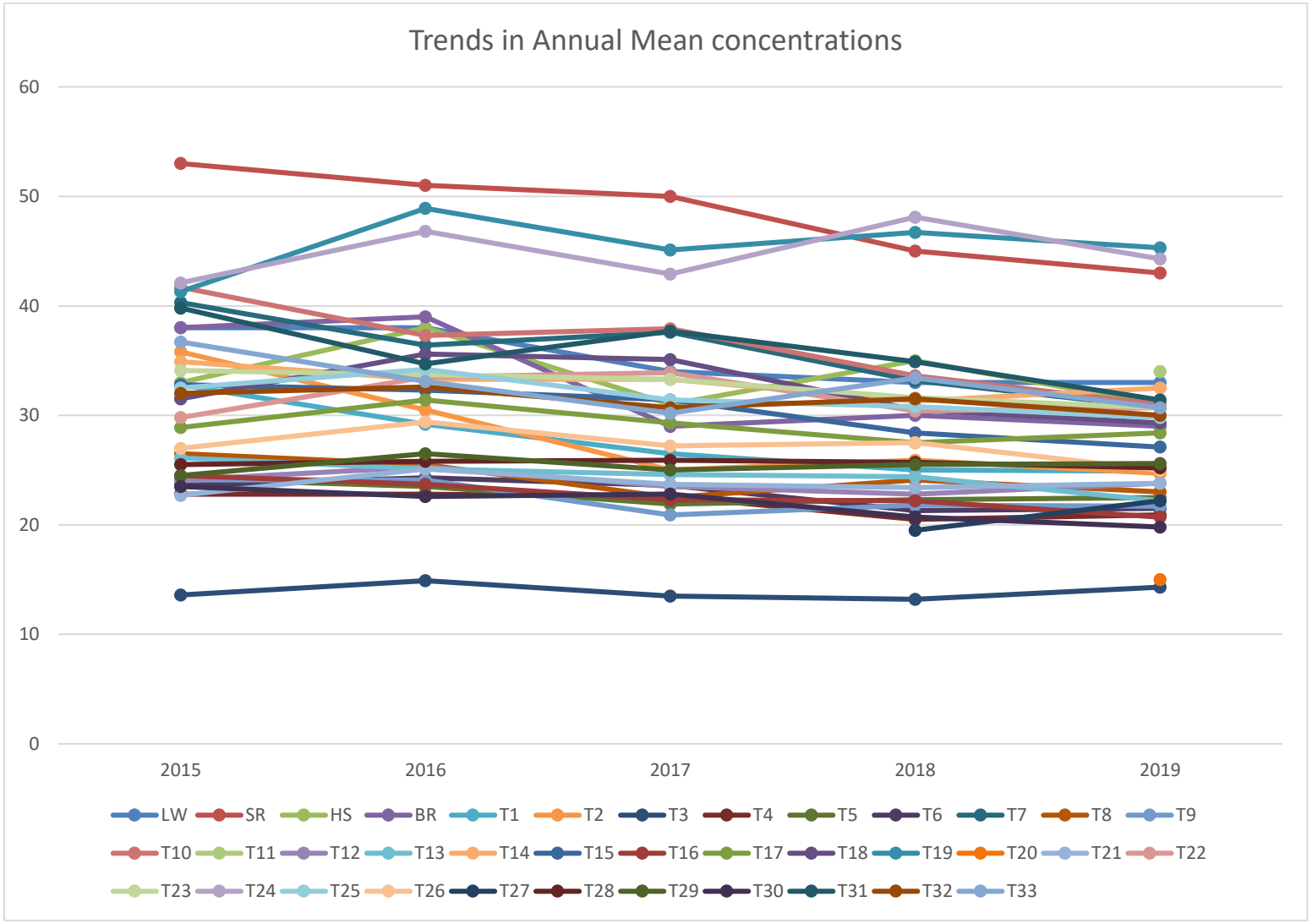
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

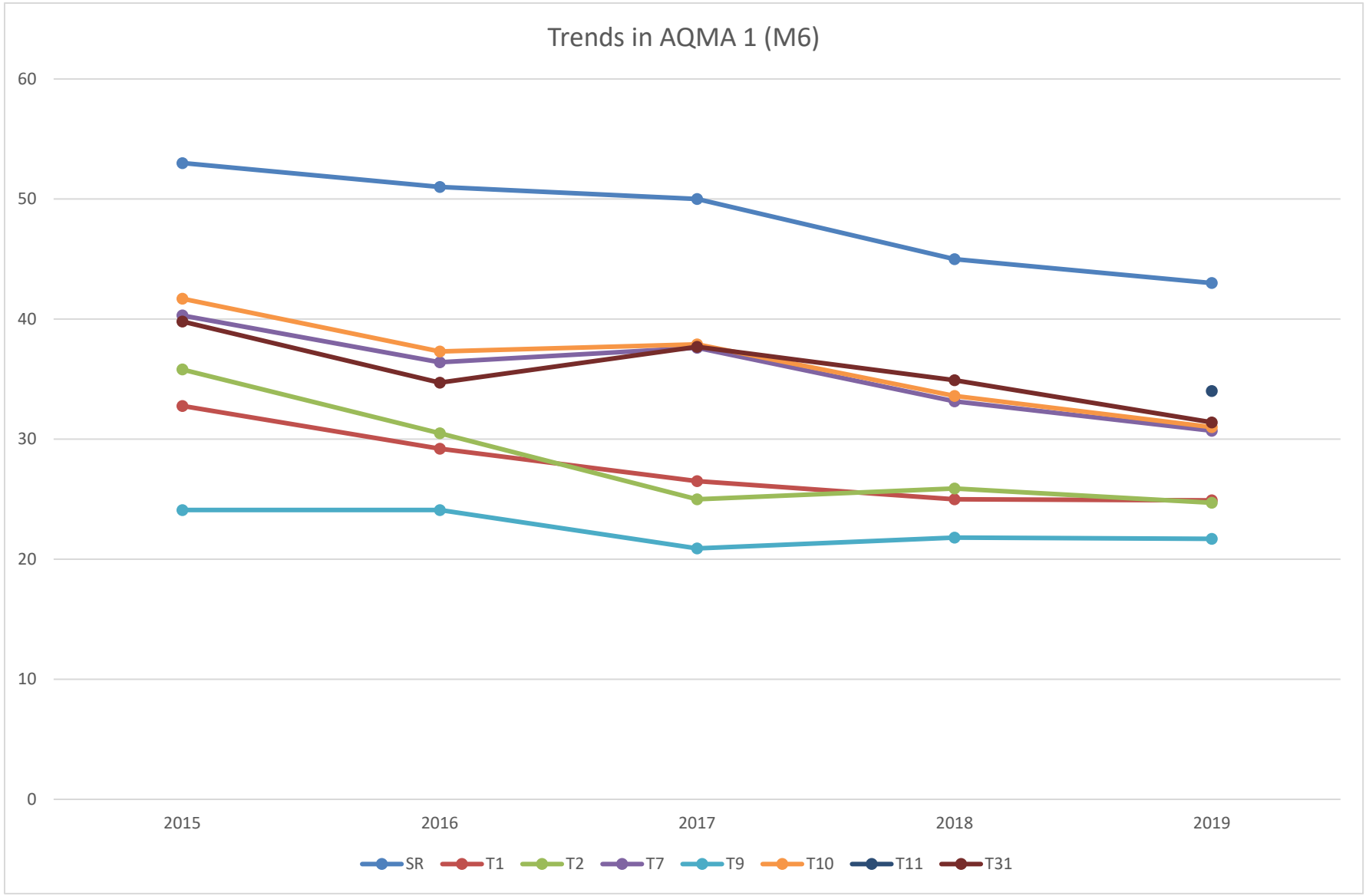
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

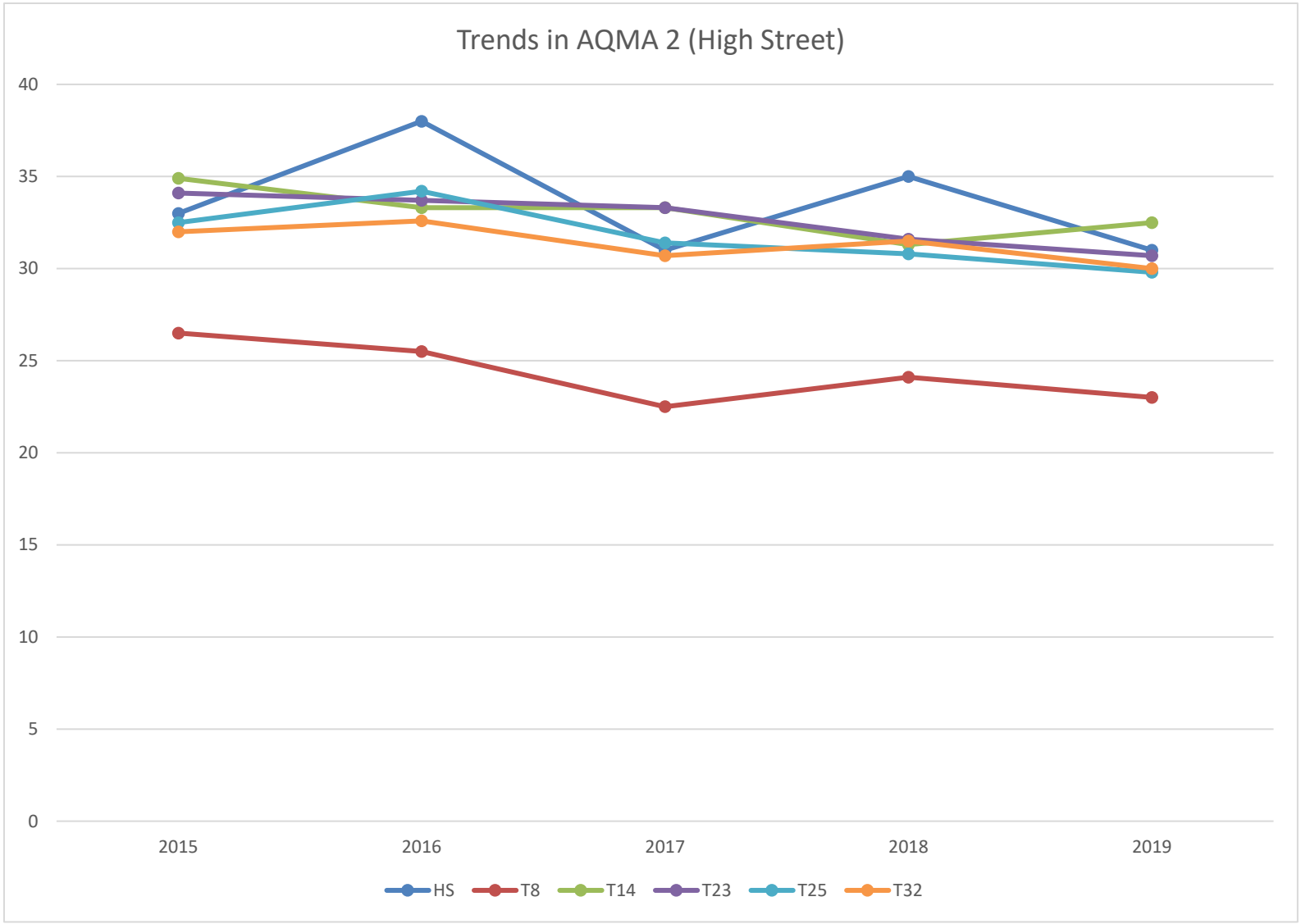
(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

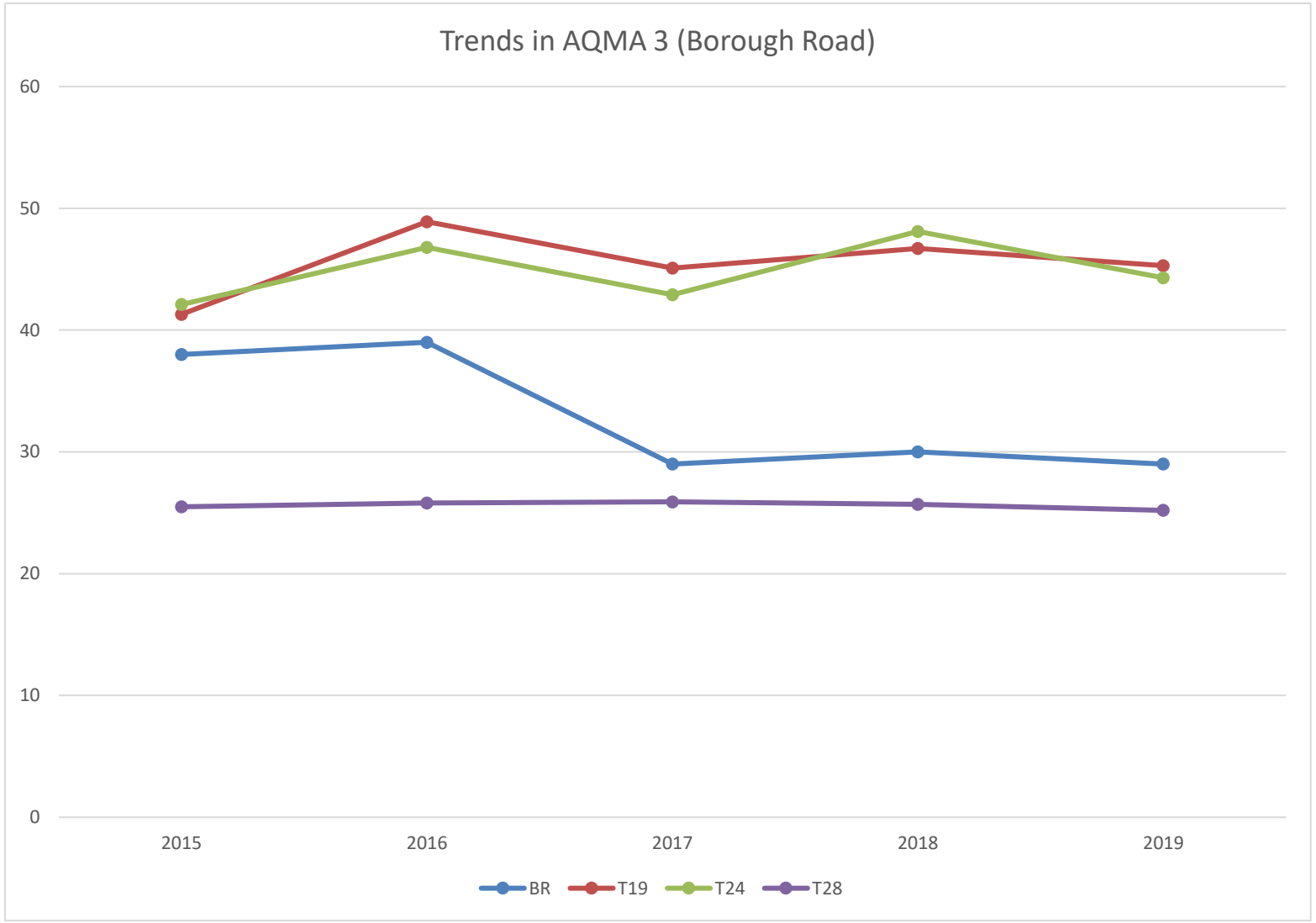
(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations




Trends in AQMA 1 (M6)
60
50
40
30
20
10
0
2015
2016
2017
2018
2019
SR
T1
T2
T7
T9
T10
T11
T31


Trends in AQMA 2 (High Street)
40
35
30
25
20
15
10
5
0
2015
2016
2017
2018
2019
HS
T8
T14
T23
T25
T32


Trends in AQMA 3 (Borough Road)
60
50
40
30
20
10
0
2015
2016
2017
2018
2019
BR
T19
T24
T28

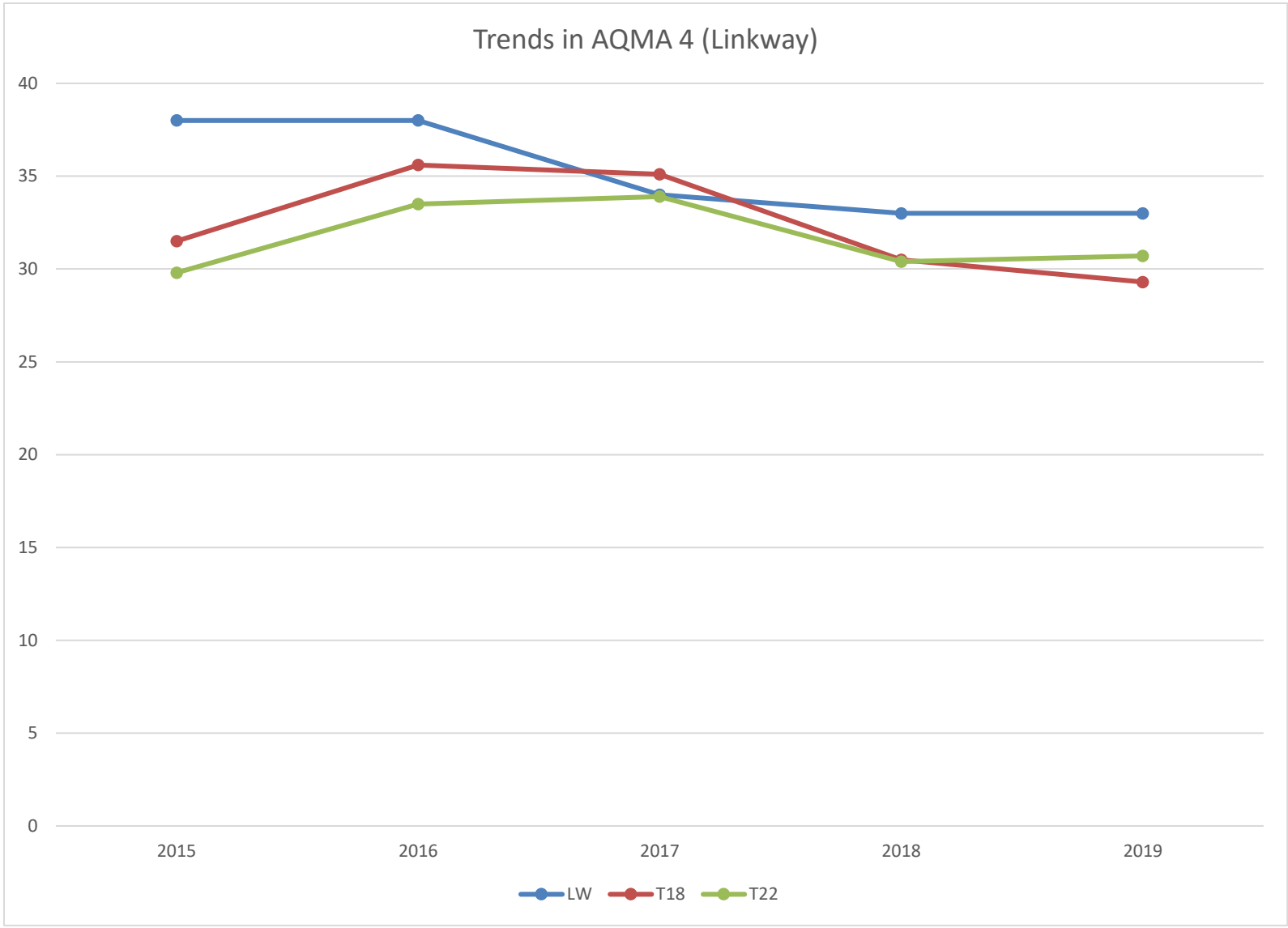

Trends in AQMA 4 (Linkway)
40
35
30
25
20
15
10
5
0
2015
2016
2017
2018
2019
LW
T18
T22

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
							2015	2016	2017	2018	2019
LW	350815	395260	Roadside	Automatic	100	84	0	0	0	0	0
SR	360045	395643	Roadside	Automatic	100	98.6	0	3	3	0	0
HS	358975	395804	Roadside	Automatic	100	91.5	0	0	0	0	0
BR	350403	394961	Roadside	Automatic	100	99.8	0	0	0	0	0

Notes:

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

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

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

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

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

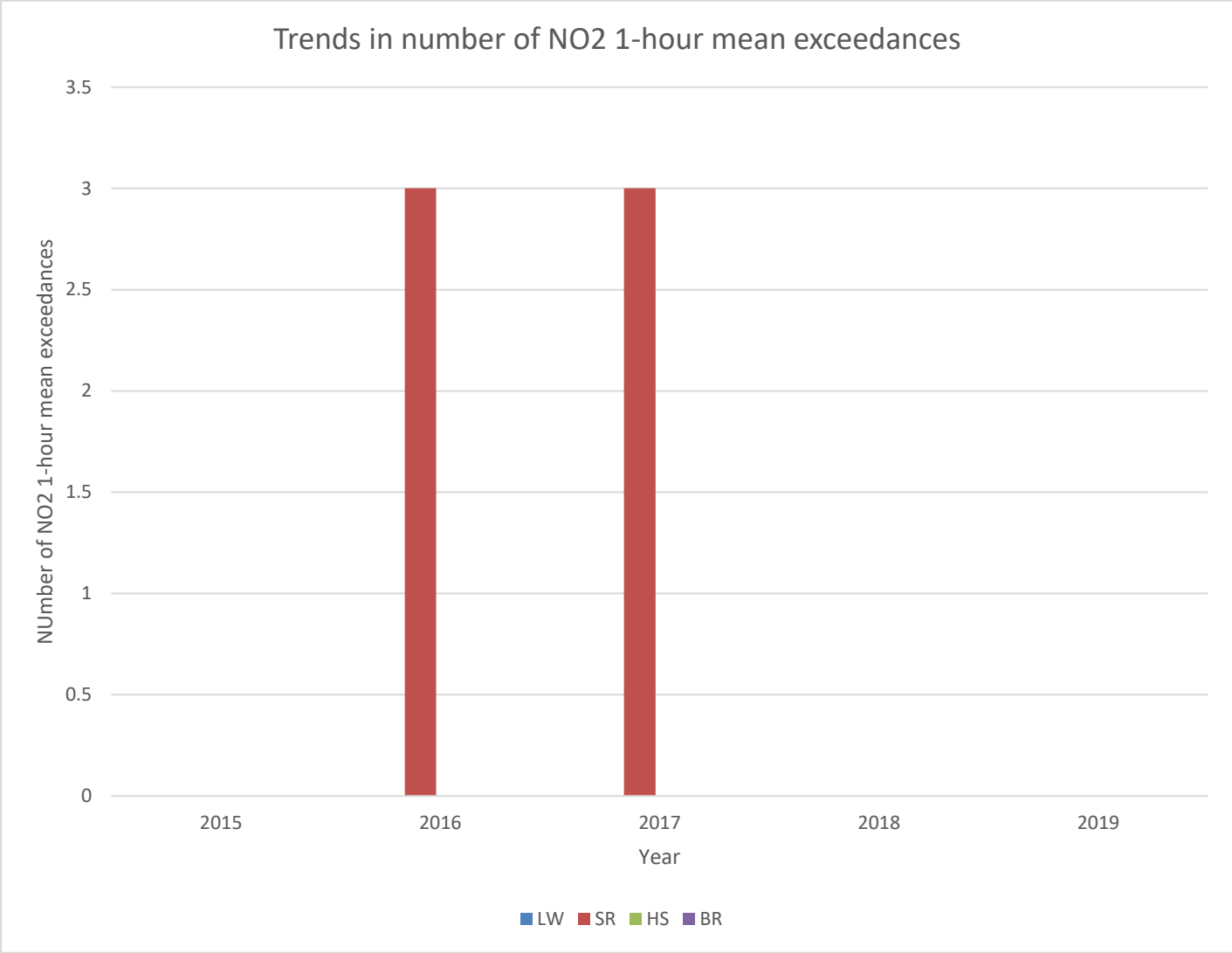


Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
						2015	2016	2017	2018	2019
AN1	350815	395260	Roadside	100	79	19	19	16	18	20

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

Notes:

Exceedances of the PM_{10} annual mean objective of 40µg/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.

Figure A.3 – Trends in Annual Mean PM_{10} Concentrations

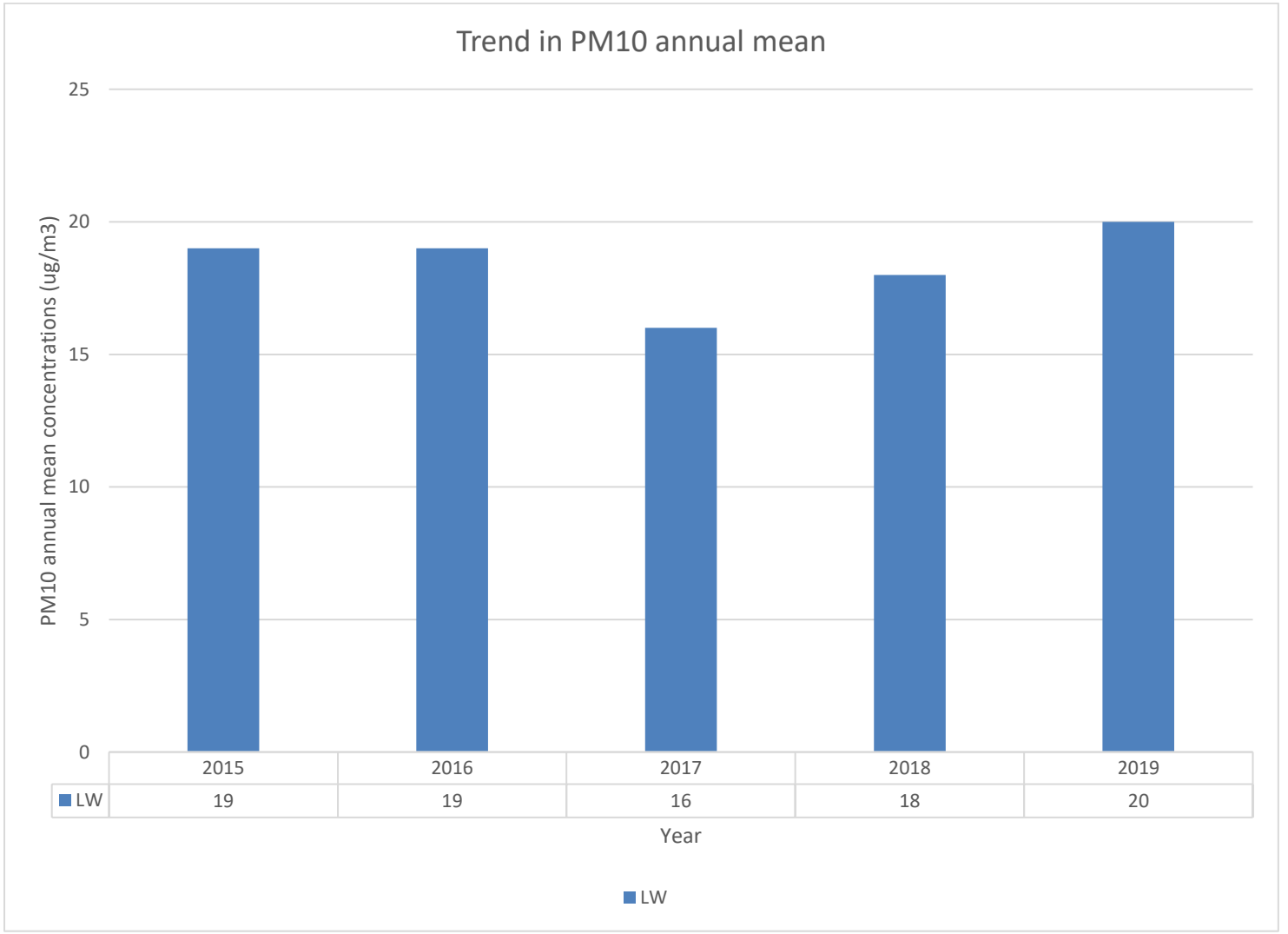


Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
						2015	2016	2017	2018	2019
LW	350815	395260	Roadside	100	79	**8**	**3**	**0**	**1**	0

Notes:

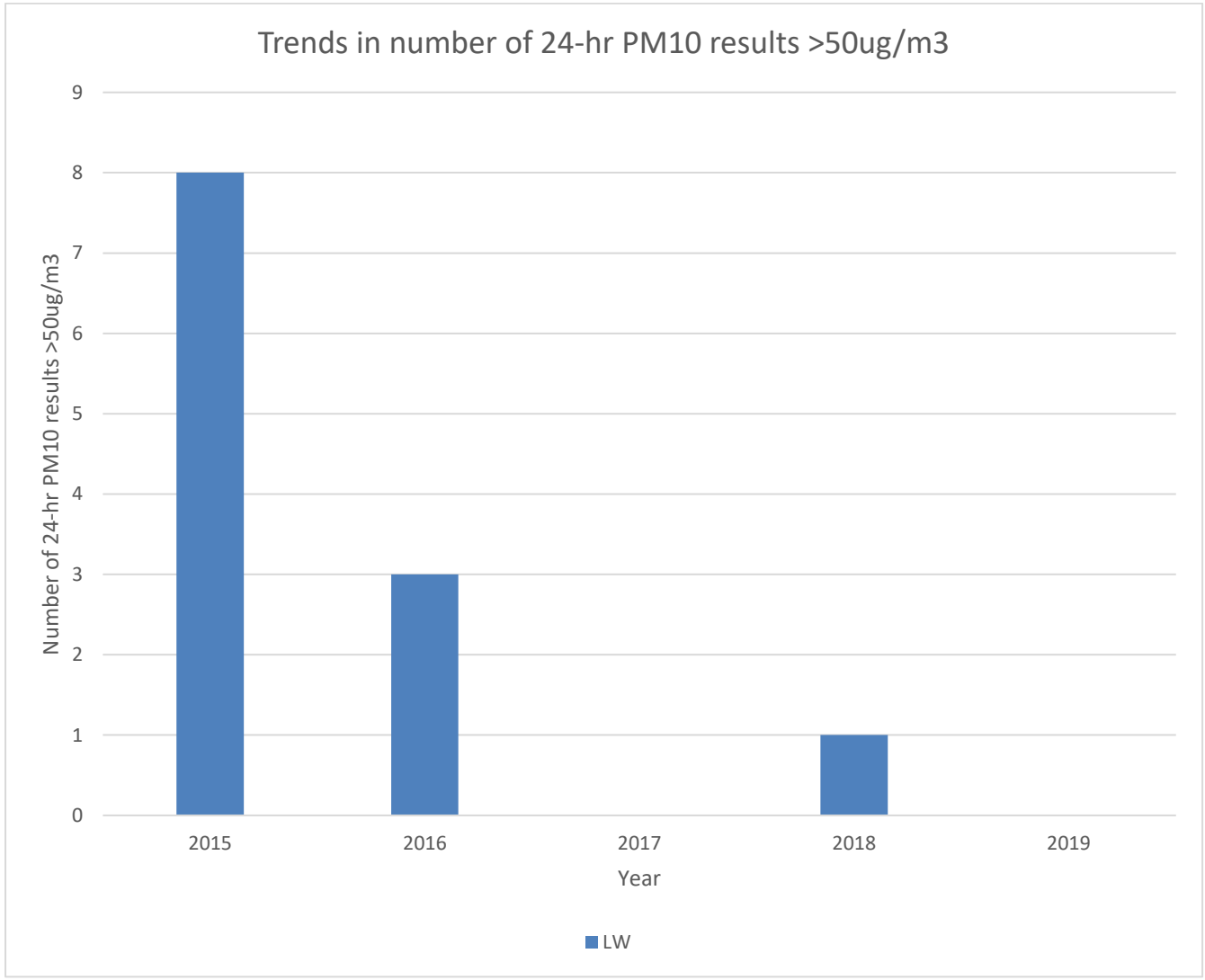
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

(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.

Figure A.4 – Trends in Number of 24-Hour Mean PM_{10} Results >50µg/m^3



Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations ($\mu g/m^3$)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.75) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DT1	360109	395661	38.4	41.9	-	-	28.0	26.7	25.8	31.2	30.5	33.0	36.8	40.1	33.2	24.9	
DT2	356549	399577	34.6	33.8	19.9	61.5	28.5	29.4	18.2	20.3	32.4	37.2	48.1	31.9	33.0	24.7	
DT3	349485	394766	24.9	23.2	14			14.2	11.4	12.3	17.8	21.2	30.8	20.3	19.0	14.3	
DT4	352451	396735	43.8	31.1	31.9	26	20.6	19.5	16.6	19.8	21.2	30.9	40.3	31.9	27.8	20.9	
DT5	353891	396714	37.1	37.8	25.7	31.1	23.8	22.4	19.7	24.3	28.6	33.9	38.1	36.8	29.9	22.5	
DT6	359498	394646	44.7	34.4	27.7	22	21.7	23	18.7	23.2	28.7	29.1	40.8	29.5	28.6	21.5	
DT7	360055	395638	47.2	51.2	48.7	29.2	41.9	36.2	38.1	45.7	40.2	39.9	37.8	35.5	41.0	30.7	
DT8	358774	395880	40.7	34.5	26.8	30.1	24.6	26.8	21.3	25.6	29	31.9	44.2	31.9	30.6	23.0	
DT9	359915	395639	35.1	32.4	23.9	32.7	23.9	25	19.5	21.8	29.4	32.5	40.9	30.1	28.9	21.7	
DT10	360055	395638	49.2	52.5	46.2	27.5	40.3	37.8	37	43.1	40.4	40.8	35.8	46.1	41.4	31.0	
DT11	360065	395653		58.5	44.9	30.6	42.7	40.3	39.6	50	38.8	50.3	46.9	56.4	45.4	34.0	
DT12	350239	389824	39.1	45.3	22.1	36.6	23.5	23.7	20.7	25.9	28.1	37.5	40.6	37	31.7	23.8	
DT13	352391	390301	40.2	25.9	30.3	29.8	27.1	29.9	23	24.4	29	29.1	39.5	27.1	29.6	22.2	
DT14	359147	395705	54.7	51.1	44.7	34.7	36.7	36	33.4	37.7	38.9	46.3	51.6	54	43.3	32.5	
DT15	358220	397077	43	47.4	42.4	24.3	29.3	28.1	27.3	36.7	33.2	35.7	43.6	42.5	36.1	27.1	

DT16	354377	397475	36.2	27.7	29.8	25.1	26	22.5	20.2	22.3	25.5	28.6	38	29.7	27.6	20.7	
DT17	354403	397561	44.1	51.8	30.7	44.2	28.6	28.2	26	30.2	34.7	40.4	49.3	46	37.9	28.4	
DT18	349107	397197	51.3	50	28.6	36.5	33.3	31.6	33	34.3	37.8	40.1	46.5	45	39.0	29.3	
DT19	350438	395005	66.6	61.2	55	72.5	52.2	45.1	41.6	52.8	60.9	72.2	78.9	65	60.3	**45.3**	
DT20	355322	399625		25.9	19.1	20	13.2	13.8	9.9	14.8	17.6	24.3	35.7	26.2	20.1	15.0	
DT21	350135	396128	41.4	39.8	26.2	35.9	23	23.5	19.6	21.8	33.6	36.1	41	39.1	31.8	23.8	
DT22	350815	395265	46.2	49.3	41.4	31.6	28.3	30.3	31.3	36.3	40.5	39.7	47.6	68.8	40.9	30.7	
DT23	359147	395705	38	52.8	41.1	41.1	37.4	30.8	33.5	37.8	38.8	45.2	50.8	43.9	40.9	30.7	
DT24	350438	395005	72.1	73.4	43.5	67.4	52.5	46.5	42.1	51.1	64.9	69	63.7	62.7	59.1	**44.3**	
DT25	358975	395804	42.4	43.7	33.1	45.9	33.2	35.1	28.5	31	39	45.1	59.8	40.2	39.8	29.8	
DT26	353129	396240	22.2	43.6	31.9	36.6	27.6	30.4	24.7	30.3	33.7	36.1	44.9	38.1	33.3	25.0	
DT27	352336	397653	27.5	37.5	25.8	42.8	24.7	23.6	17.8	20.9	26.5	31.4	41.4	35.9	29.7	22.2	
DT28	350156	394848	43.9	34.9	34.9	34.2	29.7	26.5	22.8	25.4	33.4	36.1	47.9	34.2	33.7	25.2	
DT29	350457	395165	40.6	41.4	27.1	51.2	25.9	28.1	19.9	23.8	31.8	38.6	45.7	36	34.2	25.6	
DT30	352262	390226	36.3	26.2	28.2	24.1	23	20.9	18.6	21.1	25.8	28.9	41.4	22.9	26.5	19.8	
DT31	360055	395638	46.8	57.4	36.8	29.8	38.7	35.3	38.3	46.3	39.3	43	37.8	52.7	41.9	31.4	
DT32	358975	395804	48.2	43.7	36	45	36	34.4	26.8	29.6	37.5	39.7	59.8	43.6	40.0	30.0	
DT33	350386	389936	42.4	51.3	40.1	50.7	31.7	35.2	27.7	33.9	38.9	46.8	43.1	50	41.0	30.7	28.8

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

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

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

Diffusion Tubes (Nitrogen Dioxide)

- Diffusion tubes are supplied and analysed by Socotec (formerly ESG Scientifics). The tubes are prepared using a 50% Triethanolamine : 50% Acetone solution. The tubes are exposed on site for one month before being returned for laboratory analysis.

- The laboratory is UKAS accredited and is required to take part in other proficiency schemes. ESG Scientifics participate in a number of QA/QC monitoring systems to demonstrate satisfactory performance:

- AIR NO2 PT forms an integral part of the UK NO2 Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). With consent from the participating laboratories, LGC Standards provides summary proficiency testing data to the LAQM Helpdesk for hosting on the web-pages at http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html . This information will be updated on a quarterly basis following completion of each AIR PT round.

- The monthly field inter-comparison exercises with other laboratories enable assessment of bias and precision undertaken by HSL on behalf of NETCEN.

- An external QC scheme to check solutions run by NETCEN.

Below is the information sheet provided by ESG Scientifics.

Information Sheet – NO_2 Diffusion Tubes

50% TEA:50% Acetone (Blue Cap) Alternate Holder

20% TEA:80% Water (Black Cap)

50% TEA: 50% Acetone –

Overview;

It has been shown (*Palmes et al 1976*) that the principle of molecular diffusion can be utilised for the indicative measurement of ambient nitrogen dioxide in the atmosphere. Using this research, a cost effective passive sampler was developed for the diffusive monitoring of NO_2.

Diffusion Tube Performance:

Uncertainty: Under European guidelines, diffusion tubes are considered an indicative method, and as such the uncertainty is defined as <20%. (In field intercomparisons Scientifics' diffusion tubes perform at <10% uncertainty.)

Analytical Repeatability: ± 1.9%

LOD: 0.03µg NO_2 on the tube. Over a 4-week exposure this would equate to 0.6µg/m^3, or 0.3ppb

Shelf-life: Tubes should be analysed within 4 months of manufacture

Storage: Ideally, tubes should be stored in a fridge. A cool dark location is an acceptable alternative.

Exposure: 2-6 Weeks

Diffusion Coefficient: 0.1361cm^2s^{-1} at STP (*Massman 1998*)

Quality Assurance:
- The manufacture and analysis of NO_2 diffusion tubes is covered by our UKAS accreditation

- The method meets the requirements laid out in DEFRA's "Diffusion Tubes For Ambient NO2 Monitoring: Practical Guidance."

- Laboratory summary performance for AIR NO2 PT rounds AR0024, 25, 27, 28, 30, 31, 33 and 34 (Jan 2018-Nov 2019): SOCOTEC participated in recent AIR NO2 PT rounds were subsequently determined to be **satisfactory** based upon a z-score of ± 2.

Manufacture:

Description: Two stainless steel grids coated in the absorbent are located within a coloured polyethylene end cap. The cap is placed on a polypropylene tube and the open end sealed with a white polyethylene cap.

Quality Control: 2% of manufactured tubes are analysed to check the tubes are free from contamination.

Tubes:	Material:	Natural Polypropylene
	Internal Diameter:	10.8 ± 0.2 mm
	Outer Diameter:	13.8 ± 0.4 mm

Length: 71.0 ± 1.0 mm

Stainless Steel Grids: Type: 304

Diameter: 12mm
Weave: Plain
Mesh Number: 100
Wire Diameter: 0.112mm
Aperture: 0.142mm
Open Area: 31.3%
Weight: 0.62 kg/m^2

End Caps (Grid End): Material: LDPE (Low Density Polyethylene)
Colour: Blue or Black
Internal Diameter: 13.70mm ± 0.25mm
Height: 14.99mm ± 0.25mm

End Cap: Material: LDPE (Low Density Polyethylene)

Colour: White

Absorbent: 50% Triethanolamine : 50% Acetone Dipping Method
(Blue Caps) 20% Triethanolamine : 80%
Ultrapure Water Pipette Method (Black Caps)

Dispatch:

- Each tube is labelled with a unique ID, and each batch placed in an airtight bag before being dispatched to the customer.
- An exposure sheet, pre-printed with the tube IDs and manufacturing lot number, is included with each batch of tubes.
- Site names can be pre-printed on the exposure sheet on request.
- Each bag of tubes is marked with a use by date.
- Tubes will normally be dispatched 7 days prior to the changeover date.
- Upon receipt the tubes should be checked, and then left in the airtight bag prior to use.

Exposure:

- A monitoring site should be selected that best meets current guidelines.
- Clips or similar should be used to position the tubes, so that they are approximately 5cm from any flat surface, and ideally 1.5m from the ground. However, it is not uncommon practice to position the tubes higher to prevent vandalism.
- To begin exposure, remove the white end cap, and position the tube perpendicular to the ground with the open-end facing down.

- Note the time and date in the 'On Time' column of the exposure sheet.
- If required, a brief description of the tube location should be entered in the 'Site' column.
- Once the exposure is complete the process should be reversed – Remove the tube, replace the white cap, and note the date and time in the 'OFF time' column. Return the tube to the airtight bag.
- Where applicable, additional observations should be annotated on the exposure sheet e.g. spider in tube, water in tube etc,
- The tubes should then be returned to the laboratory for analysis as soon as possible.

Note 1: Insects should be removed before the white cap is replaced.

Note 2: The tubes should be put out for exposure no later than the use-by date given on the tubes.

Analysis:

Analytical Technique:	Colorimetric
Instrument:	Continuous Flow Auto-analyser
Principle:	Nitrite ions react with Sulphanilamide to form a diazonium compound. In acidic conditions, this couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a purple azo dye. Utilising spectrophotometric analysis at 540nm, the NO_2 concentration is calculated by quantification of the colour change in comparison to that produced by known standards.
Extraction:	To ensure complete, homogeneous extraction, a vortex mixer is used.
Quality Control:	A quality control sample of known concentration is run every 10 samples. The data generated is compared to acceptable limits as determined statistically using a Shewhart Chart control system. The laboratory takes part in inter-comparison schemes, to monitor data accuracy.

Reporting & Calculations:

- Data is imported directly from the analytical software, eliminating the possibility of transcription errors
- As per current guidelines, air volumes are calculated assuming an average exposure temperature of 11^{o}C, and a pressure of 101.3kPa
- Final results are converted to an equivalency at 20^{o}C, to allow direct comparison to EU guidelines
- The report lists;
    - The amount of the Nitrite (NO_2) on the tube in µg. This is the analytically derived value.

- The µg/m^3 of gaseous NO_2 at the sampling location. Knowing the tube dimensions and gas diffusion coefficient, the sampling rate of the tube can be calculated. In turn, knowing the sampling rate, the length of exposure and the total µg of NO_2 on the tube allow the µg/m^3 of NO_2 to be calculated.
- Parts Per billion (ppb) NO_2. The ppb levels are calculated from the µg/m^3 value, using the known relationship that

  ppb = 24.04 x Concentration (µg/m^3) / Molecular Weight . For NO_2, 1ppb = 1.91 µg/m^3, or 1 µg/m^3 = 0.52ppb (at 20^{o}C, 101.3kPa)

- A soft copy of the report is emailed to the customer (for ease of data handling), and a signed hardcopy is posted.

NOTE: The reported values are NOT bias adjusted. The guidance is for the end user to select and use the bias factor best suited to their monitoring program.

Contact Details:

Contact:	Andy Parish	Address:	Diffusion Tube Laboratory Unit 12, Moorbrook
Direct Tel:	+44 (0) 1235 750733		Southmead Industrial Estate, Didcot,
Switchboard:	+44 (0) 1235 750730		Oxfordshire. OX11 7HP
Fax:	+44 (0) 1235 750739		
Email:	andy.parish@esg.co.uk		
Group Email:	HarDiffusionTubes@esg.co.uk		

Discussion of Choice of Factor to Use

The bias adjustment factor used is 0.75 based on 50% TEA : 50% Acetone from Socotec based on 38 co-location studies, as provided by version 06/20 of the National Diffusion Tube Bias Adjustment Spreadsheet available on the Review and Assessment Helpdesk website http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

It has been decided to use the nationally derived bias adjustment factor, in the absence of a locally derived bias adjustment factor.

QA/QC of Diffusion Tube Monitoring

According to the summary of precision results for Nitrogen dioxide collocation studies available via the DEFRA website. 100% of the results from the collocations studies on 50:50 TEA in Acetone for SOCOTEC found ‘Good’ precision.

According to Table 1: Laboratory summary performance for AIR NO2 PT rounds AR0019, 21, 22,24, 25, 27, 28 and 30, SOCOTEC were found to be Satisfactory based upon a z score of +/- 2.
https://laqm.defra.gov.uk/assets/laqmno2performancedatauptofebruary2019v1.pdf

QA/QC of Automatic Monitoring

- All of the Council's automatic continuous analysers are of the approved type as recommended in LAQM TG1 (00) Review and Assessment; Monitoring Air Quality and LAQM TG4 (00) Review and Assessment; Pollutant specific Guidance.
- The Council's automatic monitoring stations are operated and run by officers trained in all aspects of the monitoring processes including routine site operations, field calibrations and data ratification. All instruments used have a daily automatic calibration within the operating system, which is serviced every six months under a contract from ESU 1 to ensure correct operation. Data is collected and ratified by Geoff Broughton at Air Quality Data Management.

Routine Site Operations

- The Council's monitoring sites have a program of routine operational checks and programmed fortnightly site visits which include: -

✓ Daily communications checks on lines, data transfer and analyser operation;
✓ Daily checks of data quality;
✓ Repairs of faulty equipment under arrangements with the equipment suppliers;
✓ Fortnightly site inspections of the equipment's operational status, site safety, security and calibration checks;
✓ Planned six monthly servicing and re-calibration of all analysers by equipment suppliers under contract to the council.

- All analysers are maintained in accordance with the manufacturers' instructions. The six monthly full service and re-calibration is conducted under servicing contracts with ESU 1. Results of the servicing, calibrations and repairs are fully documented and stored centrally. Routine maintenance of equipment is also conducted during regular two-weekly site visits where all associated equipment such as sample lines, modem, and the electrical system are examined and sample inlet filters are changed. Any faults, repairs or changes made to the equipment are also recorded and stored centrally.

Calibration Methods

- The calibration procedures for the councils NO_2, continuous analysers include a two point zero/span calibration check being performed at regular fortnightly intervals. The methodology for the calibration procedure is derived from the suppliers and manufactures handbooks and is as follows:

✓ Pre-calibration check – the site condition and status of the analyser is recorded prior to the zero/span check being conducted;

- ✓ Zero check – the response of the analyser to the absence of the gas being monitored;
- ✓ Span check – the response of the analyser to the presence of the gas of a known concentration;
- ✓ Post calibration check – the site condition and status of the analyser upon completion of all checks.

- Each analyser's zero/span check is fully documented with records being kept centrally. The documentation then forms a record of analyser response over time and is used for data ratification and for scaling the data gathered for zero and span drift

- The gases used for calibration checks are purchased from Air Liquide UK and BOC. Both are traceable through European Accreditation DIN EN 45001 & DIN EN ISO 9001. The tolerances of the nitrogen dioxide and nitric oxide mixes being typically + or – 5%. Due to high usage rates it is normal for the gases to be exhausted well before their respective stability time limits are reached, the bottles being changed when pressure falls below 300 psi. The TEOM analyzer is operated and calibrated in accordance with the manufacturers and supplier information.

Data Validation and Ratification

- All data collected is thoroughly scrutinised by visual examination to ensure that there are no spurious and unusual measurements. The dedicated software used for handling the data allows data to be edited but ensures that raw data is always maintained. Air Quality Data Management team also check the information to ensure no errors occur.

BUREAU VERITAS

Enter data into the pink cells

Step 1	**How far from the KERB was your measurement made (in metres)?**	12.6	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	16.7	metres
Step 3	**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	14.3	µg/m^3
Step 4	**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	30.7	µg/m^3
Result	**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	28.8	µg/m^3

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

2020 DT maps\AQ map 1.pdf

2020 DT maps\AQ map 2.pdf

2020 DT maps\AQ map 3 revA.pdf

2020 DT maps\AQ map 4.pdf

2020 DT maps\AQ map 5.pdf

2020 DT maps\AQ map 6.pdf

2020 DT maps\AQ map 7.pdf

2020 DT maps\AQ map 8.pdf

2020 DT maps\AQ map 9.pdf

2020 DT maps\AQ map 10.pdf

2020 DT maps\AQ map 11.pdf

2020 DT maps\AQ map 12.pdf

2020 DT maps\AQ map 13 revA.pdf

2020 DT maps\AQ map 14.pdf

2020 DT maps\AQ map 15.pdf

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[6]	
	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

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

Glossary of Terms

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

References

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