Knowsley Council

Annual Status Report 2021

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Contact Details		
Company Name	Bureau Veritas UK Limited	Knowsley Council
Contact Name	Hannah Smith	Ian Gaskell
Position	Principal Consultant	Senior Officer – Environmental Health
Address	5th Floor 66 Prescot Street London E1 8HG	Knowsley Metropolitan Borough Council, Municipal Buildings, Archway Road, Huyton, L36 9YU

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Prepared By	C Danby	Graduate Consultant	
Approved By	H Smith	Principal Consultant	

2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: December 2021

Information	Knowsley MBC Details
Local Authority Officer	Ian Gaskell
Department	Environmental Health
Address	Knowsley Metropolitan Borough Council Municipal Buildings Archway Road, Huyton L36 9YU
Telephone	0151 443 4712
E-mail	environmental.health@knowlsey.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in Knowsley

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

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

The main sources of air pollution in Knowsley, as identified from previous air quality review and assessments and work carried out in the Merseyside Atmospheric Emissions Inventory, are from vehicle emissions and industrial activities. Knowsley is an important location for employment in the Liverpool City Region (LCR) and is home to a wide range of industrial and commercial developments. Large industrial bases are located across the borough, mainly on Knowsley Business Park (situated in Kirkby), Huyton, Kings and Prescot Business Parks (situated in the centre of Knowsley), and the Jaguar Land Rover car plant (situated in Halewood). Air quality within the borough is also impacted by industrial activity in neighbouring authorities; for example, the shell oil refinery and petro-chemical complex to the south-west in Ellesmere Port, and a glass manufacturing site to the north-east in St. Helens.

The movement of traffic also affects the air quality in Knowsley. The borough has a variety of road communication links, in particular the M57 which is the ‘backbone’ of the borough (running north-west to south-east). The M62 and A580 (East Lancashire Road) join the

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

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

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

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

M57 and cut through the borough from east to west. A network of smaller roads connect to the motorway and main A-roads to link individual towns and villages across the borough. The air quality in Knowsley is therefore impacted by both industrial and vehicle activity.

Automatic monitoring within the borough (in Huyton, Halewood and Kirkby) demonstrates long-term compliance with the air quality objective (AQO) for NO_2, PM_{10} and $PM_{2.5}$. Likewise, at all sites across the diffusion tube network, the AQO is rarely exceeded and, thus, Knowsley MBC have not introduced any air quality management areas (AQMAs).

In 2020, the measured concentration of NO_2 reduced across the borough. This is believed to be a result of the impacts of the COVID-19 pandemic, where the volume of road traffic was observed to have decreased across the UK in urban areas in response to the Government's measures to control the pandemic. Therefore, the reductions that occurred during the reporting year of 2020 should be interpreted with caution, with the pollution concentration likely to increase as the volume of traffic returns to a pre-pandemic level.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of AQMAs are designated due to elevated concentrations heavily influenced by transport emissions.

To improve the air quality in the borough, Knowsley MBC continues to work with the LCR local authorities, Merseytravel, Environment Agency and a range of other partners. The LCR Combined Authority Air Quality Group has been established to identify opportunities in the LCR to improve air quality and, of equal importance, the associated benefits to health and well-being, whilst supporting the growth and development of the region.

[5] Defra. Clean Air Strategy, 2019

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

Key completed measures in Knowsley are:

- Regular Air Quality Technical Group meetings.
- Worked with the planning system to embed the role of air quality in sustainable development.
- Developed local supplementary planning documents, to mitigate air quality impact.
- Established a LCR Air Quality Website.
- Introduced active travel measures.
- Constructed cycle ways/walkways in the borough.
- Improved the efficiency of road junctions and signals.

Conclusions and Priorities

During 2020, the annual mean concentration of NO_2 declined at every site across the diffusion tube network, with all but one site recording an annual mean concentration below the AQO of 40µg/m^3. However, following the application of the fall-off with distance calculation, this site demonstrated compliance with the AQO. Across all sites within the diffusion tube network, the annual mean NO_2 concentration was 15% lower than that recorded in 2019. This is a significant reduction from the previous reporting year and is likely reflective of the impact of the COVID-19 pandemic on the level of vehicle activity.

All three automatic monitoring sites demonstrated compliance with the AQO for NO_2, PM_{10} and $PM_{2.5}$ between 2016-2019. However, owing to the failure to validate against the volatile correction model, the data for 2020 from the Huyton and Halewood sites (which use TEOMS to measures PM_{10} and $PM_{2.5}$) is not presented. At the Kirkby Site, where PM_{10} is measured by BAMS, the 24-hour mean of 50µg/m^3 was exceeded on 35 occasions – equivalent to the number of times the AQO states not to exceed per year.

Knowsley MBC will continue to work alongside partners such as Liverpool John Moores University to produce our own air quality strategy. Another key priority is to raise awareness and understanding of air pollution, primarily through participating in the national clean air day and securing funding wherever possible. Progress has been made on the priorities for the previous reporting year, with schools in Knowsley having free access to the Clean Air Crew website – an interactive website to learn about the impacts of air quality. Knowsley MBC will also continue to work with the public and local businesses to explore ways in which individual action can help to reduce the impact on air quality across the borough.

Local Engagement and How to get Involved

The public can help improve air quality in Knowsley by:

- Reducing the use of cars by walking, cycling, car-sharing, or using public transport instead. Two-thirds of all journeys in the LCR are less than 5km, yet around 50% of these journeys are still taken by car[7].
- Considering electric or hybrid vehicles when buying a new car.
- Not leaving vehicles idling; turning off the engine instead and using the stop-start technology in newer vehicles where available.
- Avoiding burning waste on bonfires and only using wood burners with the correct fuels. Household waste should instead be disposed using the waste collection service or by visiting a recycling centre (Wilson Road, Huyton and Depot Road, Kirkby).
- Using the Energy Savings Trust website for advice on saving energy in the home and businesses.
- Providing responses to planning applications that may impact on air quality, and in doing so this will challenge the applications at a time when design can change and air quality impacts could be reduced as much as possible.

[7] Liverpool City Region Combined Authority. (2021). Active Travel – A Plan for Walking and Cycling in the Liverpool City Region.

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1 Local Air Quality Management

This report provides an overview of air quality in Knowsley during 2020. 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 Knowsley MBC to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

Knowsley currently does not have any declared AQMAs.

In 2019, an area of concern was identified and the possibility of declaring an AQMA discussed due to an exceedance of the annual limit for NO_2 (40µg/m^3). However, after correcting for distance to relevant exposure, the reported concentration decreased to 39.5µg/m^3, which is below the AQO. Likewise, in 2020 the NO_2 concentration that was recorded at this potential hotspot (Whitefield Lane) was 42.2µg/m^3, reducing to 35.3µg/m^3 after the fall-off with distance correction. Therefore, Knowsley MBC do not believe there is a need to declare an AQMA at present. However, due to the caveat of the COVID-19 pandemic, this area will be closely monitored and an AQMA declared if necessary.

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

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

"The Council are commended on the expansion of their monitoring network in 2019, with the addition of 20 passive monitoring sites and one continuous monitoring station".

- Knowsley MBC kept the same number of diffusion tubes and automatic monitoring stations for the reporting year of 2020. The monitoring network was well maintained with a minimum data capture of 85% on the diffusion tubes and 86% on the automatic monitors.

"The Council have opted to apply the local bias adjustment factor to their 2019 monitoring data; this factor is higher and therefore more conservative than the national factor, and its application is therefore considered appropriate. Supporting evidence/calculations are provided for both national and local factors, which is commended and encouraged for future reports".

- As the diffusion tubes co-located with the Huyton automatic monitoring station had 100% data capture for 2020, a local bias adjustment factor was derived. This local factor (0.89) is a more conservative calculation than using the national bias adjustment factor of 0.76.

"The report draws clear links to the PHOF and fraction of mortality attributable to $PM_{2.5}$ emissions, which is commended. The inclusion of this information is encouraged in all future reports".

- The 2021 ASR refers to the percentage of mortality within the borough that is attributable to $PM_{2.5}$ and, more importantly, how this compares to that of the LCR, the north-west, and England.

"Monitoring location mapping is comprehensive and clearly demonstrates the extent of the Council's monitoring network".

- Maps produced to display the extent of the monitoring network.

"The Council have provided an overview of the measures they intend to take to improve air quality within their jurisdiction. Priorities have also been identified for the current reporting

year, which are considered to be appropriate. The inclusion of a detailed progress update is expected in next year's ASR".

- An update is provided on progress with the priorities outlined in the 2020 ASR.

Knowsley MBC have taken forward a number of direct measures during the current reporting year of 2020 in pursuit of improving local air quality:

- **Cycle and Pedestrian Upgrades:** Improve infrastructure/facilities to encourage less use of cars. Key areas include the Sustainable Transport Enhancement Package (STEP), upgrading the A580 Eastbound and Westbound routes. Raised zebra crossing upgrades were completed in Kirkby (Bewley Drive) and Halewood (Leathers Lane), to facilitate a more active form of travel.
- **Active Travel Measures:** An Active Travel Fund for Cherryfield Drive Cycles and 20mph zones in Kirkby, encouraging less use of cars.
- **Junction Improvements:** Improved signal efficiency at St Kevins Drive Junction and Headbolt Lane Boyes Brown Junction in Kirkby. Toucan crossing installed at Ormskirk Road (Knowsley) and upgraded at Melling Drive (Kirkby). This measure indirectly improves air quality by promoting active travel across the borough.

The following documents provide a wider context of the measures Knowsley MBC are taking to improve local air quality:

Sustainable Transport Enhancements Package (STEP): A series of sustainable transport infrastructure measures that are key to the growth plan and strategic economic plan of the LCR. Four interrelated strategic packages are involved in STEP, which include: transport investment and growth, sustainable access to employment and opportunity, transport and low carbon opportunities, and travel for the visitor economy. As a result of the scheme, the Environmental Impact Assessment concludes that there is likely to be a slight beneficial impact on not only local, but also regional air quality.

Joint Strategic Needs Assessment (Environment): A joint report prepared by Knowsley MBC and Knowsley Clinical Commissioning Group (CCG) which contributes to Knowsley's Joint Strategic Needs Assessment (JSNA). Its purpose is to provide an analysis of the environment, including the impact on local people and whether this can be reduced through local action. The report therefore provides the foundation for developing the Knowsley Partnership's 'Strategy for Knowsley'.

Knowsley MBC have also implemented a range of policies, including local supplementary planning documents, in an attempt to address air quality both directly and indirectly. These

primarily relate to infrastructure improvements and development processes, and include the following:

- **Knowsley Local Plan Core Strategy:** Policy CS2 Development Principles (designing to reduce travel and mitigate air quality impact of traffic, encouraging sustainable transport). Policy CS7 Transport Network (designing out air quality impacts and improving infrastructure). Policy CS3 Renewable and Low Carbon Infrastructure (supporting low carbon and renewable energy initiatives which don't impact air quality).
- **Supplementary Planning Document – Ensuring Choice of Travel:** A range of initiatives to be implemented through the development process (i.e. air quality assessments, travel plans and electric vehicle charging infrastructure).
- **New Residential Development Supplementary Planning Document:** Criteria for minimum numbers and standards of electric vehicle charging points in new housing developments, sustainability, and energy efficiency of new homes.
- **Area-Specific Supplementary Planning Documents:** For example, Halsnead and East of Halewood Masterplan SPD's ensures cycling and pedestrian links are provided as part of larger developments, along with travel plans where feasible.

There are also a range of policies relating to public health which can positively impact air quality in Knowsley:

- **Knowsley Healthy Weight Plan 2019-2022:** The overweight and obesity rate is high in the borough. Therefore, this plan aims to understand the reasons behind the low level of active travel. By encouraging active travel, air quality will be improved.
- **Reducing Health Inequalities:** Ensures access to open spaces that are of good air quality by decreasing or slowing down traffic in neighbourhoods around schools as children are particularly vulnerable to air pollution. Promoting walking and cycling will correspond with being active and improving air quality as those living in less affluent areas are at greater risk to air pollution and are likely to be of poorer health.
- **Joint Health and Wellbeing Strategy 2020-2025:** Existing health inequalities were expanded during COVID-19. Knowsley MBC recognise the contribution of air quality to poorer health of the most vulnerable, and declared a climate emergency in 2020 to mitigate the impacts of the social and environmental detriments on health.

Key completed measures in Knowsley are:

- Regular Air Quality Technical Group meetings.

- Worked with the planning system to embed the role of air quality in sustainable development.
- Developed local supplementary planning documents, to mitigate air quality impact.
- Established a LCR Air Quality Website.
- Established a LCR Educational Website ('Lets Clear the Air LCR')
- Introduced active travel measures.
- Constructed cycle ways/walkways in the borough.
- Improved the efficiency of road junctions and signals.

Despite the disruption of the COVID-19 pandemic, Knowsley MBC have made significant progress on the priorities listed in the 2020 ASR. On 17th June 2021, the Environmental Health Team participated in Clean Air Day – the UK's largest air pollution campaign. This involved numerous strategies, ranging from taxi companies sharing massages not to idle vehicles to lesson plans and school assembly talks. Knowsley MBC therefore fulfilled the priority of engaging in national air quality events that raise awareness and improve public understanding. Another key priority was to identify funding and support grants. During the previous reporting year, all schools in Knowsley (including parents) have had free access to the subscription only sections of the Clean Air Crew website – an initiative funded by the LCR Combined Authority's Community Environment Fund. It is hoped that the website will raise awareness and encourage more engagement from teachers, children, and families.

Knowsley MBC expects the following measure to be completed over the course of the next reporting year:

- **Smart Green Things:** Knowsley MBC will continue to work with Liverpool John Moores University to install air quality sensors across the borough, and the wider LCR. The data is available via a mobile phone app and web-based dashboard, which provides access to live air quality information. This measure aims to increase awareness and understanding of air pollution levels in the borough and, more importantly, encourages individuals to take a more active form of travel.

Knowsley MBC's priorities for the coming year are:

- Continue to monitor levels of NO_2 around the area of concern in Huyton.
- Work alongside partners to produce an air quality strategy for Knowsley.
- Participate in the national Clean Air Day to raise awareness of air quality issues.
- Ensure air quality is considered as part of major developments through:

- *Environmental Health Regulatory Functions:* Knowsley MBC will ensure prompt enforcement responses to issues which impact air quality (as part of the Clean Air Act 1993). Addressing air quality issues through planning consent and regulating emissions of industrial processes remains a priority.
- *Tree Policy:* Knowsley MBC operates a policy where for every tree lost to development, two trees must be provided (on site or financial contribution).
- *Planning:* An air quality assessment will be requested for any major development within areas of concern in the borough.

The principal challenges and barriers that Knowsley MBC anticipates facing in relation to implementing air quality projects and services include significant budget cuts from central government. It is also anticipated that there will be a significant increase in the number of new housing and commercial developments within the borough. These Sustainable Urban Extensions will increase and decrease the amount of urban and rural land, respectively, across the borough. The associated increase in road traffic is likely to have a negative impact on air quality, however the extent of the impact will need to be assessed via the planning system. The COVID-19 pandemic has provided a significant challenge and, as a result, has delayed the implementation of some measures to improve air quality.

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.

Long-term exposure to particulate pollution is understood to be one of the leading causes of death from cardiovascular and respiratory conditions and from lung cancer. The Public Health Outcomes Framework (PHOF) for England provides an indicator of the fraction of adult mortality that is attributable to long-term exposure to particulate pollution. Based on the latest available data[8], the attributable fraction in England is 5.1%, whilst for the north-west region this is slightly lower at 4.5%. However, the value for Knowsley is higher than the north-west average at 4.9%, meaning that of the six local authorities in the LCR, the attributable fraction in Knowsley is joint second highest behind Liverpool (5%).

Knowsley MBC is taking the following measures to address $PM_{2.5}$:

- Any monitoring station added to the network as part of future expansion will include $PM_{2.5}$ monitoring.
- Identify any developments that have the potential to increase $PM_{2.5}$ levels through the planning regime and environmental permitting, and where necessary use conditions or enforcement to secure improvements. $PM_{2.5}$ will be the focus of new planning applications and environmental permitting.
- Establish whether any measures already in place can help with reducing $PM_{2.5}$.

[8] Public Health England. 2021. Public Health Outcomes Framework.

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

This section sets out the monitoring undertaken within 2020 by Knowsley MBC and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Knowsley MBC undertook automatic (continuous) monitoring at three sites during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The wecare4air page presents automatic monitoring results for Knowsley, with automatic monitoring results also available through the UK-Air website.

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

3.1.2 Non-Automatic Monitoring Sites

Knowsley MBC undertook non- automatic (i.e. passive) monitoring of NO_2 at 32 sites during 2020. Table A.2 in Appendix A presents the details of the non-automatic sites. Each site had a duplicate, resulting in 64 diffusion tubes being deployed across the borough. Diffusion tubes H1a, H1b are co-located with the automatic monitoring station in Huyton.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

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

Figures A.2 - A.4 illustrate how the trends in annual mean concentrations have continued to decrease in 2020 at all diffusion tube sites. It is likely that the reduction in traffic flows as a result of the COVID-19 lockdown measures has had an impact, with a 15% reduction in NO_2 observed on average across the borough. With respect to the annual mean, the AQO of 40µg/m^3 was only exceeded at one diffusion tube site, located on Whitefield Lane in Huyton (H3b) – a reduction from the three sites in the previous year. However, following the fall-off with distance correction, the concentration reduced to below the AQO, recording 35.3µg/m^3. Therefore, after all diffusion tubes (where applicable) were corrected for distance to relevant exposure, the AQO was not exceeded at any diffusion tube site in 2020.

Based on the data captured by the three automatic monitoring sites, the 1-hour mean was not exceeded in 2020, maintaining the trend overserved over the last five years. In terms of the annual mean, the NO_2 concentration at the Huyton site has been consistently above 36µg/m^3 (excluding 2020 due to the potential impact of COVID-19). In contrast, the

concentration at Halewood is gradually decreasing. Despite the Kirkby site having only two years data causing no long-term trend to be identified, it is noted that the annual mean concentration in 2020 was slightly above that in 2019. Therefore, considering the reduction in traffic due to COVID-19 lockdown measures, this site should be closely monitored in the future to assess the NO_2 concentration as road traffic gradually increases and returns to the pre-pandemic level.

3.2.2 Particulate Matter (PM_{10})

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

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

The PM_{10} concentration measured at the Halewood site was decreasing from 2016-2018, then increasing slighlty in 2019, whilst the concentration recorded at the Huyton site has remained relatively stable between 2016-2019. Owing to the failure to validate against the volatile correction model (as there were no FDMS instruments within 130km of the sites), the PM_{10} data for 2020 at these two sites is not reported. At the automatic montioring site in Kirkby, the measured concentration is below the AQO but is high in comparison to the other monitoring stations (2019: 37.6µg/m^3, 2020: 33.3µg/m^3). This is reflected in the number of times the 24-hour mean was above 50µg/m^3; in 2020, this was equal to the AQO, exceeding the 24-hour limit on 35 occasions.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

From the two automatic stations that measure $PM_{2.5}$ (Huyton and Halewood), it is evident that the concentration in previous years has remained relatively stable, fluctuating by 1µg/m^3 at around 9µg/m^3. As with the PM_{10} results, $PM_{2.5}$ data for 2020 is not available due to failing to validate against the volatile correction model.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
Huyton	Cronton Road, Huyton	Roadside	345552	389413	NO_2, $PM_{2.5}$*, PM_{10}*	No	Chemiluminescent, TEOMS*	18	2	2
Halewood	Higher Road, Halewood	Roadside	345213	384691	NO_2, $PM_{2.5}$*, PM_{10}*	No	Chemiluminescent, TEOMS*	10	2	2
Kirkby	Old Rough Lane, Kirkby	Roadside	341414	398991	NO_2, PM_{10}	No	BAMS	15	1	2.4

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.

(3) The TEOMS particular matter data (*) for 2020 was unable to be validated against the volatile correction model and is therefore not reported.

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
H1a, H1b	Station co-location	Roadside	345552	389413	NO_2	No	3.6	2.2	Yes	2.5
H2a, H2b	Outside 2 Whitefield Lane	Roadside	345537	389407	NO_2	No	1.5	1.2	No	2.4
H3a, H3b	Outside1 Whitefield Lane	Kerbside	345563	389399	NO_2	No	2.8	0.8	No	2.3
H4a, H4b	Opp Smithford Walk	Roadside	345517	389329	NO_2	No	3.8	1.3	No	2.4
H5a, H5b	Sevenoak Grove	Roadside	345676	389366	NO_2	No	1.4	1.5	No	2.3
H6a, H6b	Wilson Rd Jct	Roadside	345878	389437	NO_2	No	-	2.3	No	2.4
H7a, H7b	Tarbock Island	Roadside	345996	389471	NO_2	No	21.0	2.2	No	2.4
H8a, H8b	Natruscot	Roadside	345301	389479	NO_2	No	2.5	1.0	No	2.3
H9a, H9b	Outside 29 Southford Walk	Suburban	345598	389183	NO_2	No	4.0	0.9	No	2.3
H10a, H10b	Outside 9 Ribchester Way	Suburban	345424	389325	NO_2	No	4.9	1.6	No	2.2
H11a, H11b	Outside 12 Windy Arbor Brow	Suburban	346329	389782	NO_2	No	3.1	1.9	No	2.2
H12a, H12b	Halsnead development	Roadside	346425	389669	NO_2	No	-	2.4	No	2.5
K1a, K1b	LC056A Junction of M57 and Valley Road.	Roadside	340355	397795	NO_2	No	15.9	1.6	No	2.3
K2a, K2b	LC006 Outside Kirkby C of E School, Hall Lane	Roadside	341165	398953	NO_2	No	13.5	6.4	No	2.4
K3a, K3b	LC005 outside 12 Hall Drive	Roadside	341317	399000	NO_2	No	8.1	1.6	No	2.4

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
K4a, K4b	LC021 to rear of 12 Brakenhurst Grove	Roadside	341464	398998	NO_2	No	10.1	3.0	No	2.4
K5a, K5b	LC091 Junction of Old Rough Lane and County Road	Roadside	341407	398988	NO_2	No	20.3	3.2	No	2.4
K6a, K6b	LC085 On County Road near 18 Kelday Close	Roadside	341426	398922	NO_2	No	8.9	1.1	No	2.4
K7a, K7b	LC067 Corner of County Road and Webster	Roadside	341581	398650	NO_2	No	6.6	1.4	No	2.4
K8a, K8b	LC002 Outside Webster Drive	Roadside	341386	398560	NO_2	No	10.6	1.3	No	2.4
K9a, K9b	LC 017 on Cherryfield Drive	Roadside	341387	398504	NO_2	No	5.4	0.9	No	2.4
K10a, K10b	Outside 19 Moorgate Road (A5207)	Roadside	342421	397755	NO_2	No	1.4	6.9	No	2.4
P1a, P1b	LC227 Near Liverpool Road	Roadside	345796	392654	NO_2	No	6.9	3.5	No	2.4
P2a, P2b	LC003 Outside 50 Derby Street	Roadside	346165	392801	NO_2	No	0.6	2.0	No	2.4
P3a, P3b	LC014 Adjacent 2 Stanley Crescent	Roadside	346389	392884	NO_2	No	5.6	3.0	No	2.4
P4a, P4b	Stop sign on Leyland St junction with High St	Roadside	346668	392876	NO_2	No	0.6	2.2	No	2.4
P5a, P5b	LC010 Outside 49 High Street	Roadside	346765	392918	NO_2	No	0.4	1.9	No	2.4

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
P6a, P6b	LC 004 Outside 31 St Helens Road	Roadside	346831	393006	NO_2	No	4.6	1.6	No	2.4
P7a, P7b	LC005 Oliver Lyme Road near Tinling Close	Roadside	347115	392724	NO_2	No	4.5	2.7	No	2.2
P8a, P8b	LC070 Outside 81 Warrington Road	Roadside	347092	392569	NO_2	No	6.6	1.8	No	2.2
P9a, P9b	Traffic signal Outside 53 Kemble Street	Roadside	346788	392648	NO_2	No	0.6	1.3	No	2.4
P10a, P10b	LC008 Outside Greenall Court, Sewell Street	Roadside	346583	392611	NO_2	No	2.6	2.8	No	2.4

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Huyton	345552	389413	Roadside	98.3	98.3	38.8	36.2	37.4	37.6	29.5
Halewood	345213	384691	Roadside	99.1	99.1	32.3	27.8	30.3	24.3	18.2
Kirkby	341414	398991	Roadside	96.6	96.6	-	-	-	24.8	25.8

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

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

Notes:

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

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
H1a, H1b	345552	389413	Roadside	100	100	-	**40.0**	37.5	37.4	29.5
H2a, H2b	345537	389407	Roadside	100	100	-	39.9	**41.0**	**40.8**	35.1
H3a, H3b	345563	389399	Kerbside	100	100	-	**47.7**	**49.3**	**48.0**	**42.2**
H4a, H4b	345517	389329	Roadside	100	100	-	26.7	29.8	31.4	25.3
H5a, H5b	345676	389366	Roadside	100	100	-	25.1	26.8	27.4	21.4
H6a, H6b	345878	389437	Roadside	100	100	-	29.2	30.0	32.1	28.6
H7a, H7b	345996	389471	Roadside	100	100	-	36.2	36.8	37.2	33.9
H8a, H8b	345301	389479	Roadside	100	100	-	26.7	26.6	29.3	22.7
H9a, H9b	345598	389183	Suburban	100	100	-	26.3	25.0	26.4	20.6
H10a, H10b	345424	389325	Suburban	100	100	-	22.9	23.3	23.9	19.1
H11a, H11b	346329	389782	Suburban	100	100	-	28.6	26.4	28.9	23.3
H12a, H12b	346425	389669	Roadside	100	100	-	35.5	33.5	32.8	27.2
K1a, K1b	340355	397795	Roadside	100	100	-	-	-	**45.4**	38.0
K2a, K2b	341165	398953	Roadside	100	100	-	-	-	26.9	22.1
K3a, K3b	341317	399000	Roadside	100	100	-	-	-	25.3	22.5
K4a, K4b	341464	398998	Roadside	84.6	84.6	-	-	-	27.1	26.9
K5a, K5b	341407	398988	Roadside	100	100	-	-	-	32.1	30.9
K6a, K6b	341426	398922	Roadside	100	100	-	-	-	35.3	28.1
K7a, K7b	341581	398650	Roadside	100	100	-	-	-	29.6	24.1
K8a, K8b	341386	398560	Roadside	100	100	-	-	-	32.4	28.7
K9a, K9b	341387	398504	Roadside	92.3	92.3	-	-	-	29.4	27.7
K10a, K10b	342421	397755	Roadside	100	100	-	-	-	29.4	24.1
P1a, P1b	345796	392654	Roadside	100	100	-	-	-	26.8	22.6
P2a, P2b	346165	392801	Roadside	100	100	-	-	-	26.9	22.4

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
P3a, P3b	346389	392884	Roadside	100	100	-	-	-	29.6	26.4
P4a, P4b	346668	392876	Roadside	100	100	-	-	-	29.7	25.7
P5a, P5b	346765	392918	Roadside	100	100	-	-	-	35.8	32.0
P6a, P6b	346831	393006	Roadside	100	100	-	-	-	24.7	21.0
P7a, P7b	347115	392724	Roadside	100	100	-	-	-	24.2	20.0
P8a, P8b	347092	392569	Roadside	100	100	-	-	-	27.4	23.0
P9a, P9b	346788	392648	Roadside	100	100	-	-	-	23.5	19.5
P10a, P10b	346583	392611	Roadside	100	100	-	-	-	24.9	20.5

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Diffusion tube data has been bias adjusted.**

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

Notes:

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

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

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

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

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations (Automatic Monitors)

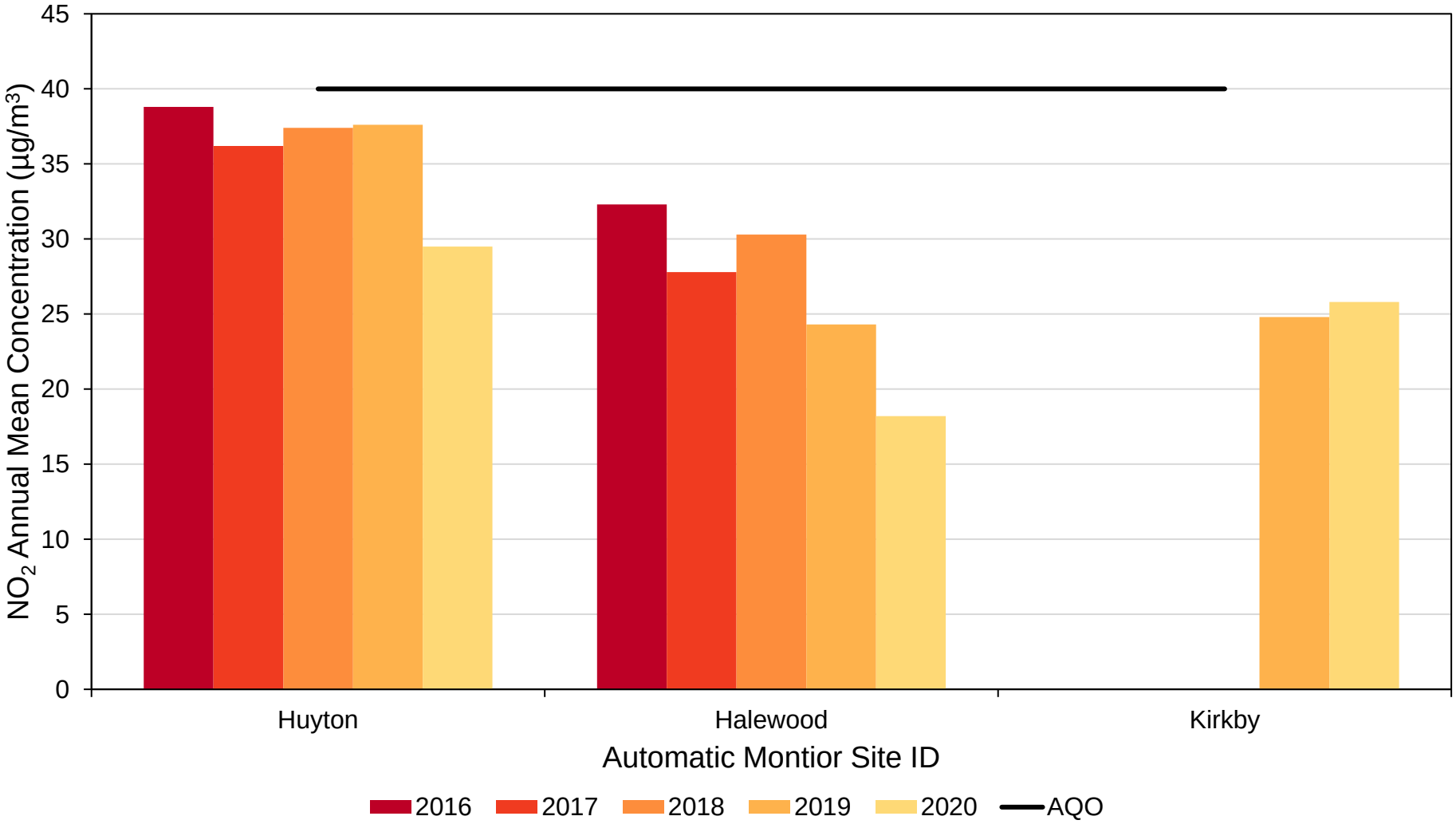


Figure A.2 – Trends in Annual Mean NO_2 Concentrations (Diffusion Tubes: Huyton)

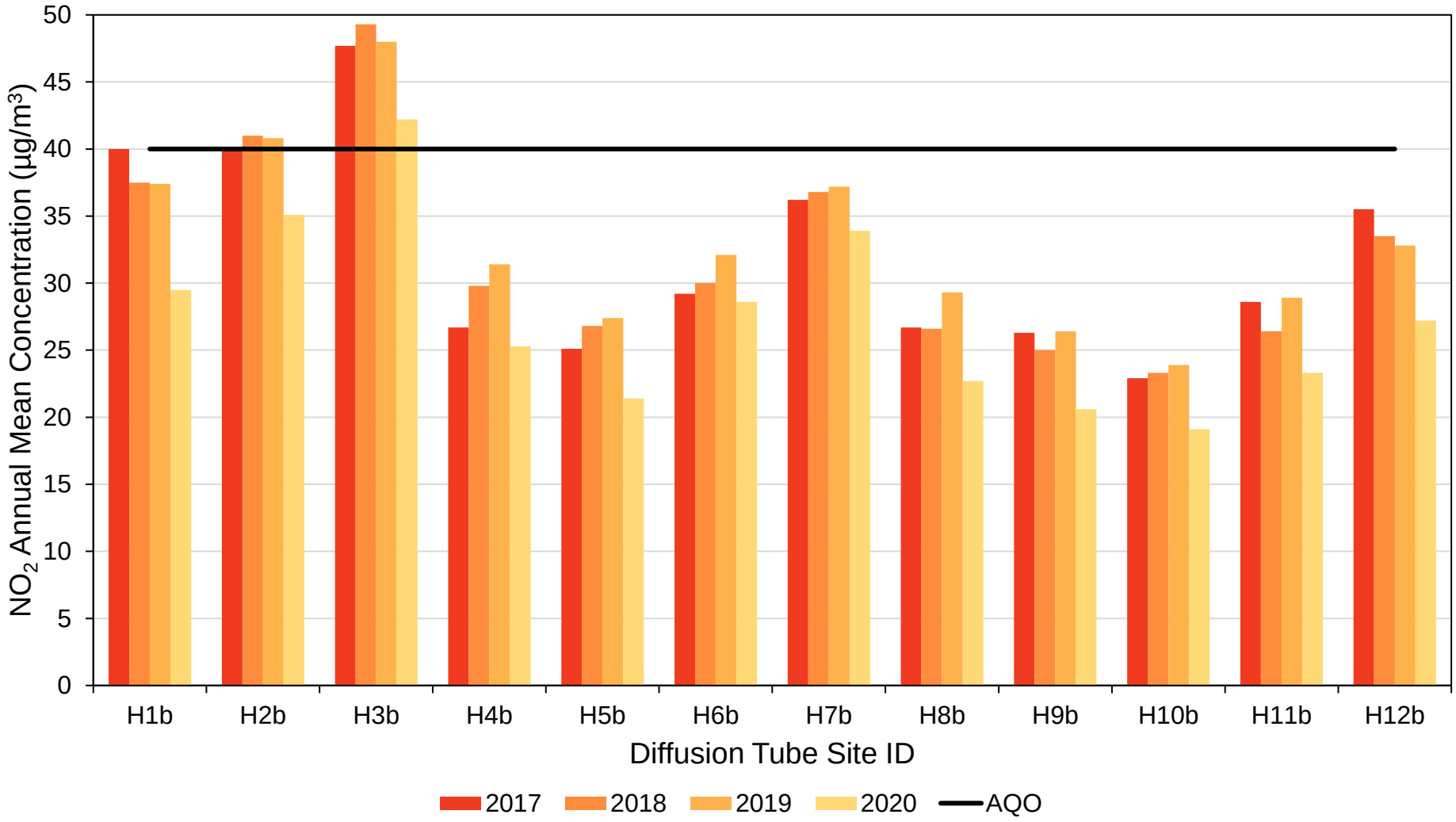


Figure A.3 – Trends in Annual Mean NO2 Concentrations (Diffusion Tubes: Kirkby)

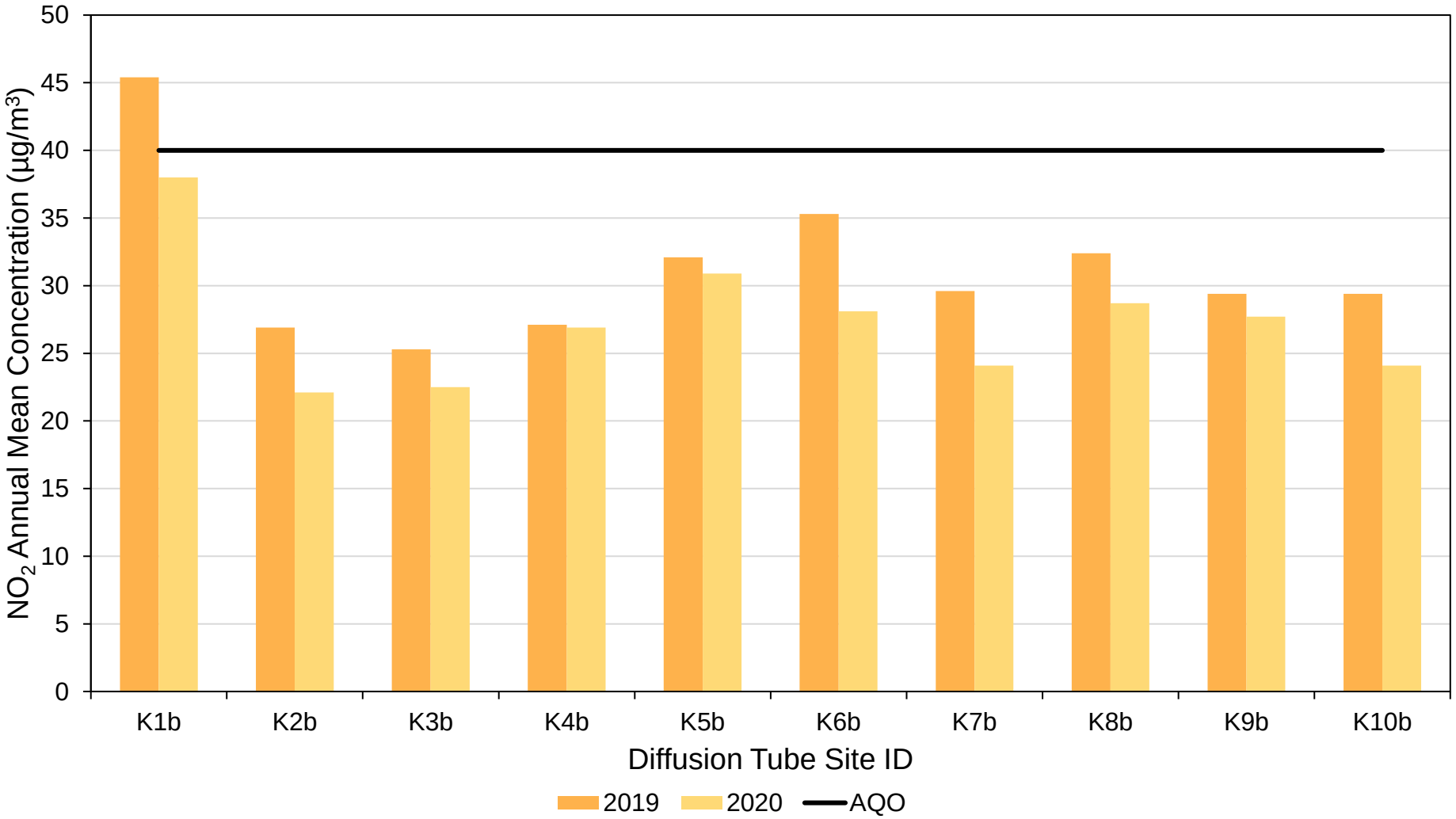


Figure A.4 – Trends in Annual Mean NO2 Concentrations (Diffusion Tubes: Prescot)

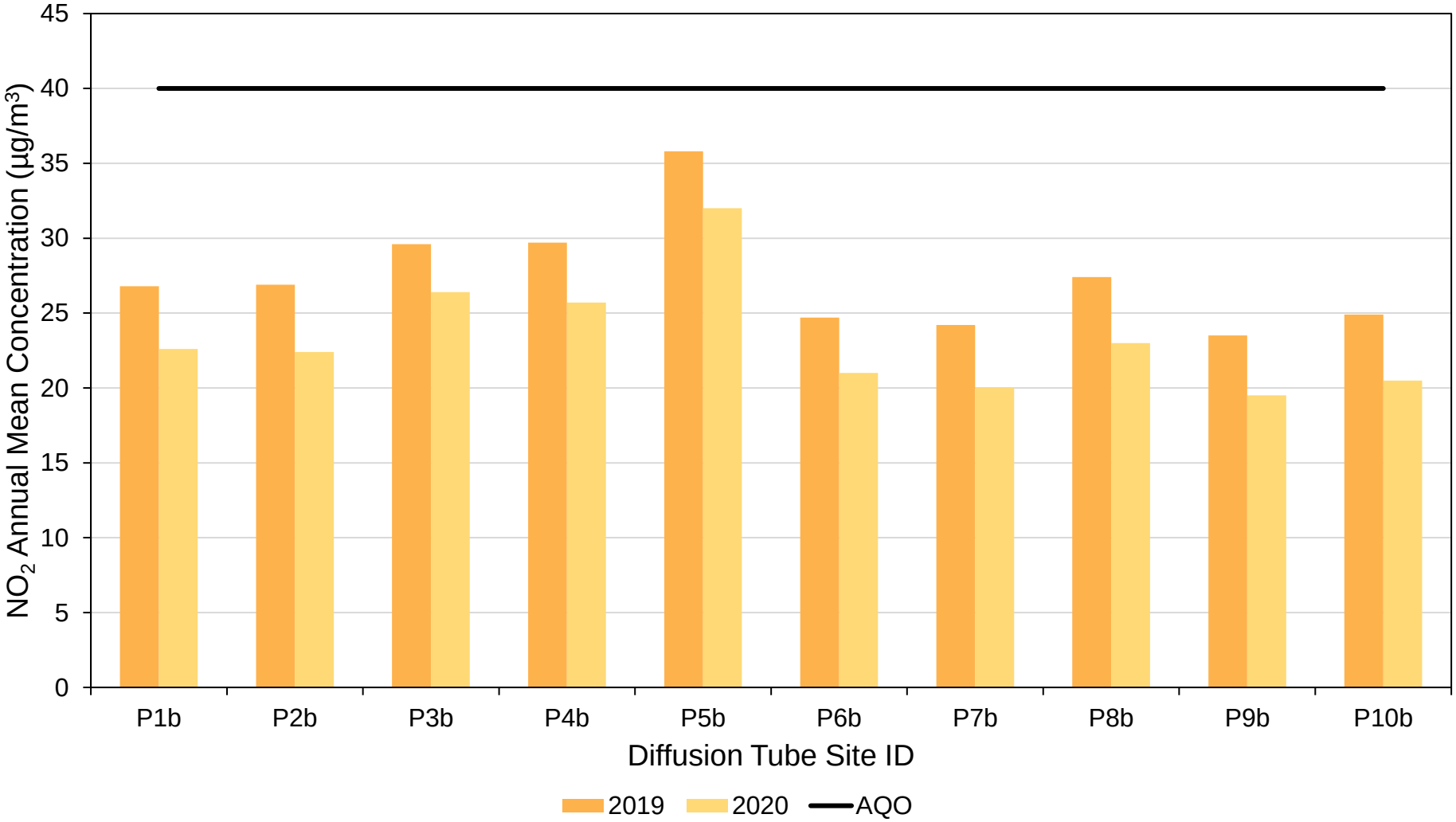


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Huyton	345552	389413	Roadside	98.3	98.3	0(130.4)	0	0	0	0
Halewood	345213	384691	Roadside	99.1	99.1	0 (117.0)	0	0	0	0
Kirkby	341414	398991	Roadside	96.6	96.6	-	-	-	0	0

Notes:

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

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

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

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

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

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Huyton	345552	389413	Roadside	96.5	96.5	20.0	22.5	21.8	22.9	-
Halewood	345213	384691	Roadside	96.9	96.9	24.8	20.8	16.8	19.9	-
Kirkby	341414	398991	Roadside	85.8	85.8	-	-	-	37.6	33.3

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

Notes:

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

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

Figure A.5 – Trends in Annual Mean PM_{10} Concentrations

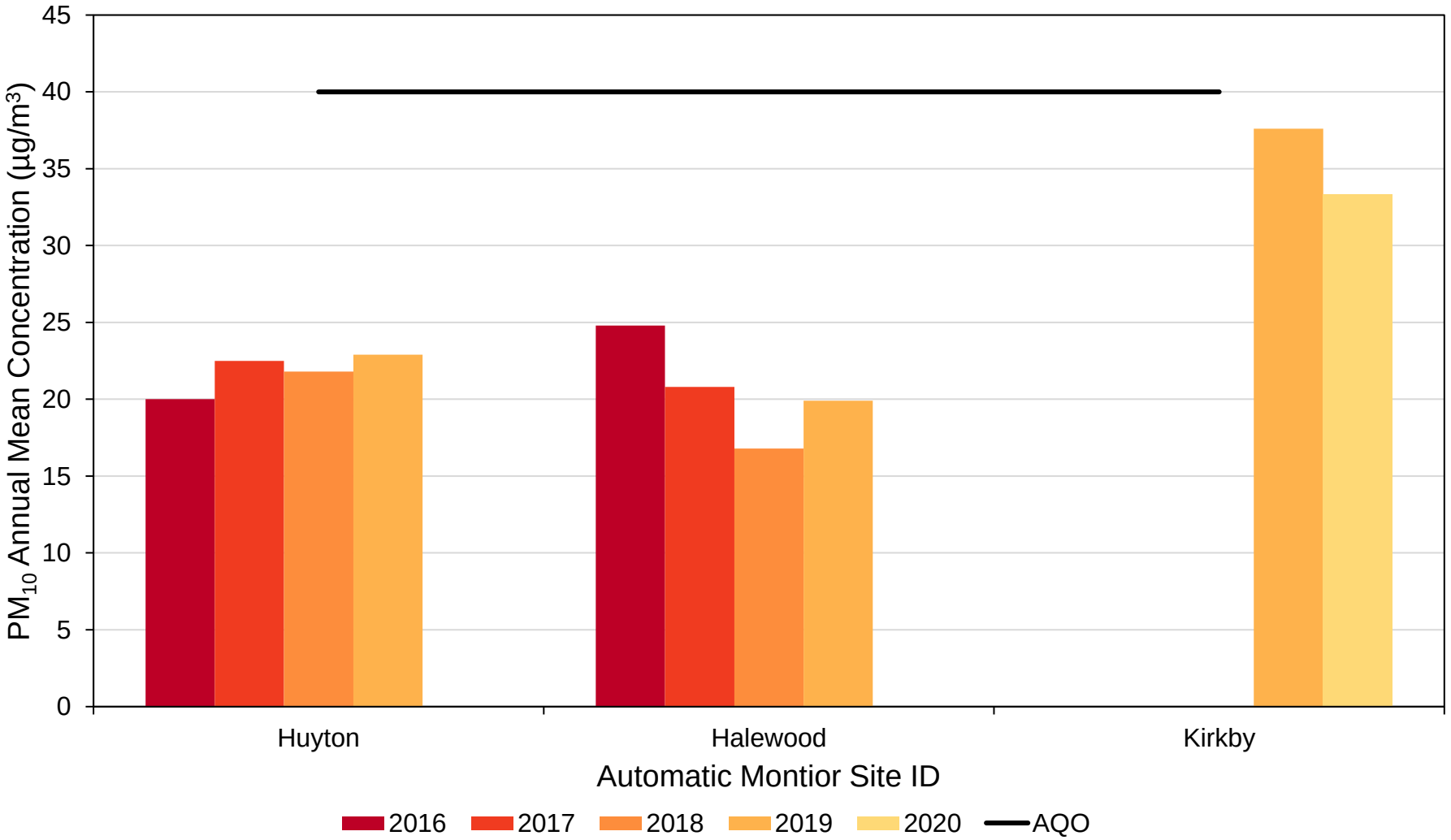


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Huyton	345552	389413	Roadside	96.5	96.5	2 (32.9)	5	1	2	-
Halewood	345213	384691	Roadside	96.9	96.9	8 (43)	5	3	2	-
Kirkby	341414	398991	Roadside	85.8	85.8	-	-	**-**	9	35

Notes:

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

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

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

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

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

Figure A.6 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

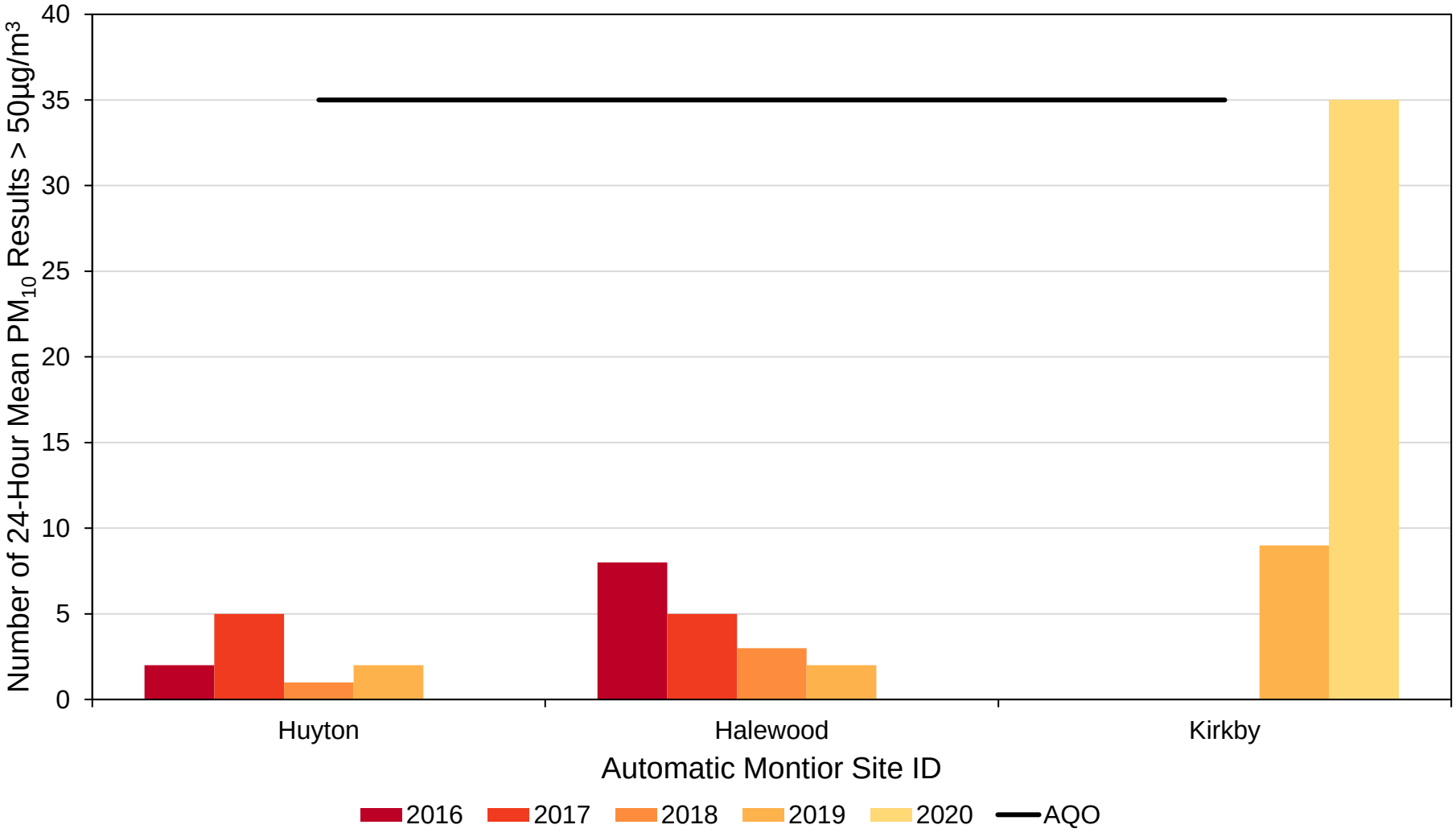


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
Huyton	345552	389413	Roadside	99.1	99.1	10.1	9.5	9.1	10.8	-
Halewood	345213	384691	Roadside	99.5	99.5	11.1	8.6	9.2	9.2	-

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

Notes:

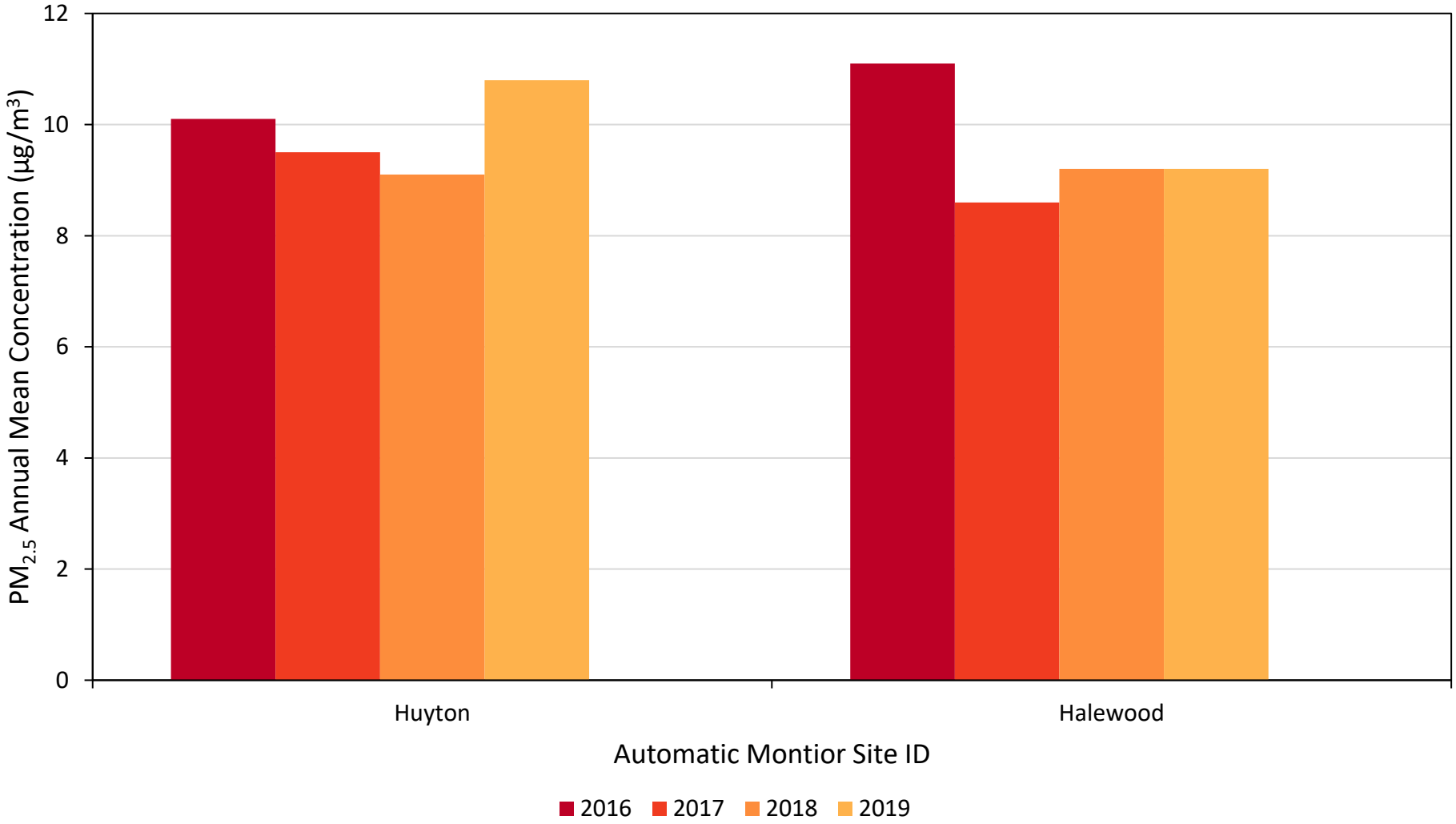
The annual mean concentrations are presented as $\mu g/m^3$.

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

Figure A.7 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.89)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
H1a	345552	389413	54.9	35.6	26.3	24.0	23.3	29.5	26.6	29.2	36.9	37.6	39.2	33.0	-	-	-	Duplicate Site with H1a and H1b - Annual data provided for H1b only
H1b	345552	389413	52.7	37.8	27.0	24.4	26.8	31.1	28.4	29.6	36.3	38.7	38.1	29.5	33.2	29.5	-	Duplicate Site with H1a and H1b - Annual data provided for H1b only
H2a	345537	389407	58.4	40.6	30.2	31.5	33.8	41.1	27.8	37.6	41.7	43.0	42.3	47.7	-	-	-	Duplicate Site with H2a and H2b - Annual data provided for H2b only
H2b	345537	389407	55.6	32.2	30.5	30.5	30.9	49.6	28.2	36.9	39.8	44.5	42.5	50.1	39.5	35.1	-	Duplicate Site with H2a and H2b - Annual data provided for H2b only
H3a	345563	389399	66.0	47.2	39.2	37.6	36.8	44.0	31.5	44.4	50.4	54.7	58.7	56.9	-	-	-	Duplicate Site with H3a and H3b - Annual data provided for H3b only
H3b	345563	389399	64.8	48.5	47.1	36.6	36.1	45.7	34.3	46.0	47.0	49.4	56.7	57.9	47.4	**42.2**	35.3	Duplicate Site with H3a and H3b - Annual data provided for H3b only
H4a	345517	389329	40.9	28.3	22.7	20.3	18.1	26.7	17.0	22.7	30.6	33.7	33.1	43.1	-	-	-	Duplicate Site with H4a and H4b - Annual data provided for H4b only
H4b	345517	389329	40.6	28.1	25.4	21.6	18.0	23.3	16.8	25.4	30.8	31.9	38.7	44.6	28.4	25.3	-	Duplicate Site with H4a and H4b - Annual data provided for H4b only
H5a	345676	389366	33.9	23.0	19.3	19.6	17.4	23.8	17.3	21.2	25.7	28.5	30.9	34.9	-	-	-	Duplicate Site with H5a and H5b - Annual data provided for H5b only
H5b	345676	389366	35.1	21.6	17.1	19.7	19.1	20.9	17.1	19.9	25.0	27.0	27.3	32.7	24.1	21.4	-	Duplicate Site with H5a and H5b - Annual data provided for H5b only
H6a	345878	389437	44.0	27.4	30.6	25.4	23.1	30.6	18.9	30.1	37.5	25.5	47.2	45.1	-	-	-	Duplicate Site with H6a and H6b - Annual data provided for H6b only
H6b	345878	389437	36.8	30.1	28.7	25.7	24.6	28.0	19.4	31.2	36.5	34.3	45.9	43.8	32.1	28.6	-	Duplicate Site with H6a and H6b - Annual data provided for H6b only
H7a	345996	389471	56.8	39.9	30.6	35.1	24.0	38.4	24.2	31.3	35.3	42.2	46.3	46.9	-	-	-	Duplicate Site with H7a and H7b - Annual data provided for H7b only
H7b	345996	389471	53.2	39.2	36.8	26.9	27.2	37.1	26.0	33.7	41.0	42.0	53.0	48.1	38.1	33.9	-	Duplicate Site with H7a and H7b - Annual data provided for H7b only
H8a	345301	389479	40.0	24.5	27.6	19.4	16.5	21.6	17.8	19.6	27.8	28.1	34.2	36.1	-	-	-	Duplicate Site with H8a and H8b - Annual data provided for H8b only
H8b	345301	389479	35.0	22.2	18.3	20.0	12.7	20.2	15.7	23.1	28.2	30.4	34.8	37.5	25.5	22.7	-	Duplicate Site with H8a and H8b - Annual data provided for H8b only
H9a	345598	389183	37.0	25.8	20.6	15.6	15.2	20.1	15.8	20.1	23.5	27.0	33.0	34.7	-	-	-	Duplicate Site with H9a and H9b - Annual data provided for H9b only
H9b	345598	389183	37.7	26.6	15.5	16.9	15.0	18.9	16.0	19.4	24.7	27.2	33.7	16.1	23.2	20.6	-	Duplicate Site with H9a and H9b - Annual data provided for H9b only
H10a	345424	389325	35.5	23.8	9.6	17.9	12.1	17.1	14.2	17.1	23.6	25.9	30.7	36.0	-	-	-	Duplicate Site with H10a and H10b - Annual data provided for H10b only
H10b	345424	389325	36.9	23.9	10.7	15.2	12.9	15.8	13.5	16.4	21.7	22.6	28.0	33.5	21.4	19.1	-	Duplicate Site with H10a and H10b - Annual data provided for H10b only
H11a	346329	389782	47.2	36.6	25.3	13.6	14.3	14.7	14.1	17.5	25.2	32.8	32.8	43.1	-	-	-	Duplicate Site with H11a and H11b - Annual data provided for H11b only
H11b	346329	389782	44.8	42.6	17.7	13.6	13.9	14.1	13.8	18.3	25.6	30.0	31.6	44.1	26.1	23.3	-	Duplicate Site with H11a and H11b - Annual data provided for H11b only
H12a	346425	389669	53.5	36.0	28.4	17.6	20.8	22.7	24.3	24.1	34.3	39.7	40.5	40.8	-	-	-	Duplicate Site with H12a and H12b - Annual data provided for H12b only
H12b	346425	389669	33.4	37.8	33.5	18.8	20.4	22.1	23.8	3.7	35.2	41.7	37.9	42.0	30.5	27.2	-	Duplicate Site with H12a and H12b - Annual data provided for H12b only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.89)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
K1a	340355	397795	61.5	43.9	32.2	30.5	31.9	38.5	33.3	36.8	47.3	44.3	58.7	45.7	-	-	-	Duplicate Site with K1a and K1b - Annual data provided for K1b only
K1b	340355	397795	68.1	45.9	27.1	28.4	33.7	32.9	32.5	37.7	52.6	46.7	58.3	56.9	42.7	38.0	27.0	Duplicate Site with K1a and K1b - Annual data provided for K1b only
K2a	341165	398953	35.3	25.0	15.3	20.4	16.3	19.8	14.6	20.4	29.7	25.0	43.0	33.0	-	-	-	Duplicate Site with K2a and K2b - Annual data provided for K2b only
K2b	341165	398953	36.9	18.6	15.4	19.3	16.7	20.3	14.3	22.6	26.3	22.4	46.1	40.0	24.9	22.1	-	Duplicate Site with K2a and K2b - Annual data provided for K2b only
K3a	341317	399000	34.9	24.6	24.6	18.4	16.1	19.8	12.9	22.0	27.5	24.4	41.2	39.7	-	-	-	Duplicate Site with K3a and K3b - Annual data provided for K3b only
K3b	341317	399000	35.3	24.2	19.7	17.3	15.3	19.2	13.7	22.0	28.8	23.8	43.2	38.6	25.3	22.5	-	Duplicate Site with K3a and K3b - Annual data provided for K3b only
K4a	341464	398998	-	29.7	-	19.2	19.5	24.6	23.6	24.6	-	34.9	51.5	51.3	-	-	-	Duplicate Site with K4a and K4b - Annual data provided for K4b only
K4b	341464	398998	23.9	28.4	-	21.1	18.2	22.8	24.8	24.6	-	35.3	49.1	52.9	30.2	26.9	-	Duplicate Site with K4a and K4b - Annual data provided for K4b only
K5a	341407	398988	24.4	35.2	25.6	23.4	23.2	30.8	29.5	27.1	45.0	38.9	52.1	54.1	-	-	-	Duplicate Site with K5a and K5b - Annual data provided for K5b only
K5b	341407	398988	28.2	35.2	27.2	25.5	23.5	32.7	31.2	32.0	45.1	34.6	56.0	53.4	34.7	30.9	-	Duplicate Site with K5a and K5b - Annual data provided for K5b only
K6a	341426	398922	26.4	34.3	23.6	25.2	20.2	31.7	28.8	29.7	43.0	26.0	47.8	43.0	-	-	-	Duplicate Site with K6a and K6b - Annual data provided for K6b only
K6b	341426	398922	27.8	31.9	20.0	24.7	23.6	30.0	27.3	32.7	43.2	32.5	45.0	38.6	31.5	28.1	-	Duplicate Site with K6a and K6b - Annual data provided for K6b only
K7a	341581	398650	26.7	25.3	21.8	19.0	16.4	20.6	17.7	18.7	31.3	27.5	45.7	42.0	-	-	-	Duplicate Site with K7a and K7b - Annual data provided for K7b only
K7b	341581	398650	40.4	27.2	21.9	21.1	16.2	20.6	18.1	22.3	35.3	27.0	42.9	42.9	27.0	24.1	-	Duplicate Site with K7a and K7b - Annual data provided for K7b only
K8a	341386	398560	53.0	32.7	32.3	18.9	20.2	25.2	20.8	31.0	37.7	32.8	46.5	43.9	-	-	-	Duplicate Site with K8a and K8b - Annual data provided for K8b only
K8b	341386	398560	49.6	31.3	26.4	22.3	20.6	26.6	20.9	29.7	-	33.1	41.6	39.8	32.3	28.7	-	Duplicate Site with K8a and K8b - Annual data provided for K8b only
K9a	341387	398504	27.4	37.9	32.7	21.7	16.4	26.2	21.8	29.7	40.8	39.3	-	51.7	-	-	-	Duplicate Site with K9a and K9b - Annual data provided for K9b only
K9b	341387	398504	30.0	35.8	28.4	21.2	17.3	24.6	25.9	28.6	39.0	37.9	-	50.3	31.1	27.7	-	Duplicate Site with K9a and K9b - Annual data provided for K9b only
K10a	342421	397755	37.2	26.0	23.4	20.7	17.2	22.1	18.0	20.6	28.7	28.0	43.4	40.0	-	-	-	Duplicate Site with K10a and K10b - Annual data provided for K10b only
K10b	342421	397755	38.4	23.6	25.2	20.8	17.9	25.7	18.1	11.5	29.6	28.4	44.6	40.9	27.1	24.1	-	Duplicate Site with K10a and K10b - Annual data provided for K10b only
P1a	345796	392654	39.2	-	15.4	19.3	17.6	18.7	20.3	20.5	28.0	30.3	33.8	32.6	-	-	-	Duplicate Site with P1a and P1b - Annual data provided for P1b only
P1b	345796	392654	43.0	34.4	19.8	17.9	15.7	18.4	21.3	21.9	28.4	28.3	17.6	33.1	25.4	22.6	-	Duplicate Site with P1a and P1b - Annual data provided for P1b only
P2a	346165	392801	39.1	26.4	17.2	20.4	17.0	17.5	19.4	21.4	27.3	28.7	33.6	33.9	-	-	-	Duplicate Site with P2a and P2b - Annual data provided for P2b only
P2b	346165	392801	38.7	29.3	16.8	17.7	15.8	20.7	20.2	20.0	28.5	28.3	34.2	31.6	25.2	22.4	-	Duplicate Site with P2a and P2b - Annual data provided for P2b only
P3a	346389	392884	45.2	34.9	25.7	23.0	18.0	22.1	23.7	23.1	30.4	30.5	42.9	36.1	-	-	-	Duplicate Site with P3a and P3b - Annual data provided for P3b only
P3b	346389	392884	45.0	36.3	25.0	22.3	17.4	22.8	22.0	25.4	30.4	31.7	41.7	37.0	29.7	26.4	-	Duplicate Site with P3a and P3b - Annual data provided for P3b only
P4a	346668	392876	42.3	33.2	17.1	21.2	20.0	23.5	22.7	26.1	33.8	31.7	34.9	34.4	-	-	-	Duplicate Site with P4a and P4b - Annual data provided for P4b only
P4b	346668	392876	42.0	36.1	21.6	21.6	20.4	23.6	25.5	26.7	33.8	31.6	35.3	-	28.9	25.7	-	Duplicate Site with P4a and P4b - Annual data provided for P4b only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.89)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
P5a	346765	392918	48.0	39.5	23.0	28.4	27.3	29.8	31.8	34.9	38.3	42.4	40.5	44.5	-	-	-	Duplicate Site with P5a and P5b - Annual data provided for P5b only
P5b	346765	392918	47.8	40.0	28.1	27.5	25.9	30.3	30.0	34.9	45.7	-	37.0	44.9	36.0	32.0	-	Duplicate Site with P5a and P5b - Annual data provided for P5b only
P6a	346831	393006	34.9	28.3	20.1	18.0	15.0	17.9	16.1	17.4	23.5	27.8	31.6	35.4	-	-	-	Duplicate Site with P6a and P6b - Annual data provided for P6b only
P6b	346831	393006	34.2	28.0	18.5	17.4	15.8	17.2	16.6	19.2	21.2	24.5	35.3	32.8	23.6	21.0	-	Duplicate Site with P6a and P6b - Annual data provided for P6b only
P7a	347115	392724	33.7	28.0	12.4	17.2	13.5	17.2	14.8	18.7	21.1	27.9	32.1	32.1	-	-	-	Duplicate Site with P7a and P7b - Annual data provided for P7b only
P7b	347115	392724	29.9	25.2	18.5	18.2	13.5	19.2	15.4	17.1	21.6	25.7	32.3	32.8	22.4	20.0	-	Duplicate Site with P7a and P7b - Annual data provided for P7b only
P8a	347092	392569	42.3	30.5	16.2	16.3	16.5	20.7	18.4	22.8	25.3	30.1	35.4	38.0	-	-	-	Duplicate Site with P8a and P8b - Annual data provided for P8b only
P8b	347092	392569	40.3	31.8	18.8	17.6	15.2	19.0	17.9	20.1	26.4	31.1	34.3	34.8	25.8	23.0	-	Duplicate Site with P8a and P8b - Annual data provided for P8b only
P9a	346788	392648	30.4	22.0	16.9	16.2	14.7	19.5	15.5	17.5	24.2	29.4	31.3	27.7	-	-	-	Duplicate Site with P9a and P9b - Annual data provided for P9b only
P9b	346788	392648	29.4	23.4	12.8	16.1	14.3	16.0	17.6	18.8	25.1	30.0	28.2	28.2	21.9	19.5	-	Duplicate Site with P9a and P9b - Annual data provided for P9b only
P10a	346583	392611	35.1	23.3	19.0	16.5	13.3	18.9	17.0	19.0	23.9	26.1	33.3	30.1	-	-	-	Duplicate Site with P10a and P10b - Annual data provided for P10b only
P10b	346583	392611	35.8	26.8	16.0	16.3	13.2	18.4	16.9	18.2	25.7	25.3	31.9	32.9	23.0	20.5	-	Duplicate Site with P10a and P10b - Annual data provided for P10b only

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

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Local bias adjustment factor used.**

☐ **National bias adjustment factor used.**

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

☒ **Knowsley MBC confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Knowsley During 2020

Knowsley MBC have identified the following planning applications as having the potential to impact air quality:

19/00569/REM – 24 January 2020: Reserved matters application pursuant to outline permission 19/00089/OUT for installation of three combined heat and power units together with associated infrastructure and demolition of existing pipes and infrastructure.

- Location: Getrag Ford, Speke Boulevard, Halewood, Knowsley, L24 9LE.

19/00520/FUL – 14 February 2020: Erection of 5,377m^2 industrial unit with a flexible b1(c)/b2/b8 use, together with car parking, service areas, landscaping, and associated works.

- Location: Plot B, Image Business Park, Acornfield Road, Kirkby, L33 7UF.

19/00337/OUT – 26 February 2020: Outline planning application for the demolition of weighing station and the erection of five industrial units (use class b1(c)/b2/b8) and drive-through unit (use class a1/a3/a5) together with car parking and associated works.

- Location: Academy Business Park, Lees Road, Kirkby, L33 7SA.

20/00124/FUL – 15 May 2020: Erection of B8 warehouse/distribution centre including Mezzanine floor, ancillary office, and welfare floorspace, truckers' facilities plus gatehouse, access, parking, and servicing areas together with associated works and infrastructure.

- Location: Former Sonae site, Moss Lane, Kirkby, L33 7XQ.

20/00193/FUL – 24 July 2020: Residential development, comprising of the erection of 266 dwellings together with construction of vehicular/pedestrian access, substation, car parking, landscaping, and associated works.

- Location: Land off Valley Road/Whitefield Drive, Westvale, Kirkby, L32 4UP.

19/00511/REM – 2 October 2020: Reserved matters application pursuant to planning permission 17/00301/HYB for erection of petrol filling station and associated kiosk

containing two food retailing units and one coffee shop with one drive-through lane (use class A3) together with car parking, landscaping, and associated works.

- Location: Coppice Lane (between Cronton Road and M62 Junction 6), Tarbock.

20/00099/FUL – 23 October 2020: Demolition of existing redundant buildings to Hillside Road to allow for residential development over two sites comprising a total of 131 two-, three- and four-bedroom dwellings (52 dwellings northern parcel, Knowsley Lane and 79 dwellings southern parcel, Astley Road).

- Location: Former Astley House site, Astley Road/Knowsley Lane/Primrose Drive, Huyton, L33 8HY.

20/00400/KMBC1 – 11 November 2020: Erection of a three storey building for use as a multi-screen cinema and three food and drink units (for use as cafes, restaurants, pubs or drinking establishments), outdoor seating area, service yard, car parking area, revised access to service yard and car parking area, hard and soft landscaping, and other associated works.

- Location: Kirkby Town Centre, L32 2AA.

19/00684/FUL – 18 December 2020: Erection of 227 dwellings together with vehicular/ pedestrian access, landscaping, and associated infrastructure.

- Location: Whitakers Garden Centre, Liverpool Road, Prescot, L34 3LX.

The following permits were also granted, which may impact air quality in the borough:

B/0192/6.6/1: Permit to operate a Part 'B' Installation granted to DAMS Furniture Limited.

- Process Type: Timber PG6/2 Section 6.6 & Timber Combustion PG 1/12 Section 1.1.
- Fuel Type: Wood waste.
- Process Description: Chipboard is cut to the desired specification on a range of wood working machines. The sawdust waste is then fed into a 900kW MWE Talbott Biomass heat system – emissions vent through an eight metre chimney.

Additional Air Quality Works Undertaken by Knowsley MBC During 2020

Knowsley MBC has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes are supplied and analysed by SOCOTEC Didcot using the 50% triethanolamine (TEA) in acetone preparation method. For the 2020 reporting year, based on 24 studies, a national bias adjustment factor of 0.76 was derived from the national bias adjustment calculation spreadsheet (version number 09/21).

SOCOTEC Didcot, a UKAS accredited laboratory, participate in the AIR-PT scheme for NO_2 diffusion tube analysis and the Annual Field Intercomparison Exercise. These provide strict criteria relating to performance that participating laboratories must meet, thereby ensuring that the reported NO_2 concentrations are of a high calibre. In the latest AIR-PT results, AIR-PT AR036 (January – February 2020) and AIR-PT AR040 (September – October 2020), SOCOTEC were awarded a score of 100% - the percentage score is an indication of the results deemed satisfactory based upon the z-score of $<\pm 2$. The AIR-PT rounds from May – June (AR037) were however cancelled as a result of the COVID-19 pandemic. For all observations in 2020, the precision of the NO_2 diffusion tubes supplied by SOCOTEC Didcot was classified as ‘good’. The precision is an indication of the laboratory’s performance and consistency in the preparation, analysis, and handling of the diffusion tubes. All diffusion tubes were collected in line with the monitoring calendar.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Knowsley recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Knowsley MBC have applied a local bias adjustment factor of 0.89 to the 2020 monitoring data. This local bias adjustment factor was used instead of the national factor as 12

months of co-location diffusion tube data (H1a, H1b) was available with the Huyton automatic monitoring site. This local factor is also higher than the national factor (0.76), therefore is a more conservative approach, providing the worst-case scenario.

Table C.1 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	12
Bias Factor A	0.89 (0.79 – 1)
Bias Factor B	13% (0% - 26%)
Diffusion Tube Mean (µg/m^3)	33.2
Mean CV (Precision)	3.5%
Automatic Mean (µg/m^3)	29.4
Data Capture	100%
Adjusted Tube Mean (µg/m^3)	30 (26 – 33)

Notes:

A single local bias adjustment factor has been used to bias adjust the 2020 diffusion tube results.

A summary of bias adjustment factors used by Knowsley MBC over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	Local	-	0.89
2019	Local	-	0.81
2018	Local	-	0.79
2017	National	03/18	0.77
2016	-	-	-

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

The annual mean NO_2 concentration was corrected for distance to relevant exposure at two diffusion tube sites (H3b, K1b). These diffusion tubes were subject to the fall-off with distance correction as the annual mean concentration was greater than 36µg/m^3 and the site is not located at a point of relevant exposure. After the calculation, the concentration reduced from 42.2µg/m^3 to 35.3µg/m^3 (H3b) and from 38.0µg/m^3 to 27.0µg/m^3 (K1b).

QA/QC of Automatic Monitoring

The Kirkby station uses Beta Automatic Mass (BAM) monitors to measure PM_{10}. As per TG.16, the BAM meets the equivalence criteria for monitoring providing the results are corrected for slope. The data in this report has had the correction factor applied so it can be compared to the National Air Quality Objectives. Both PM_{10} and $PM_{2.5}$ are recorded at the Huyton and Halewood sites using TEOMS. All three sites have NO_2 monitors installed. Data from the analyser is stored as 'raw' or 'uncorrected' data on the logger and therefore needs to be corrected or validated. To validate the data, the NO_2 analyser needs to be checked against a referenced standard of 'zero' air and 'span' gas. Data is corrected using either daily or monthly calibration checks to verify that the analyser is corrected for any response change.

A regular manual calibration check is performed on all three automatic monitoring stations. For the NO_2 analyser, this check is performance to verify the response of the analyser in reference to 'zero' and 'span' by introducing a high concentration of NO gas. These results provide a validation of the NO_x analyser in the automatic monitoring station.

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

PM_{10} and $PM_{2.5}$ data is corrected using the volatile correction model. However, in 2020 the TEOMS measurements at the Halewood and Huyton monitoring station were unable to be validated against the volatile correction model.

Automatic Monitoring Annualisation

All automatic monitoring locations within Knowsley recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within Knowsley required distance correction during 2020.

Table C.3 – NO_2 Fall off With Distance Calculations (concentrations presented in $\mu g/m^3$)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor
H3a, H3b	0.8	3.6	42.2	18.5	35.3
K1a, K1b	1.6	17.5	38.0	17.4	27.0

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Map of Automatic Monitoring Stations in Knowsley

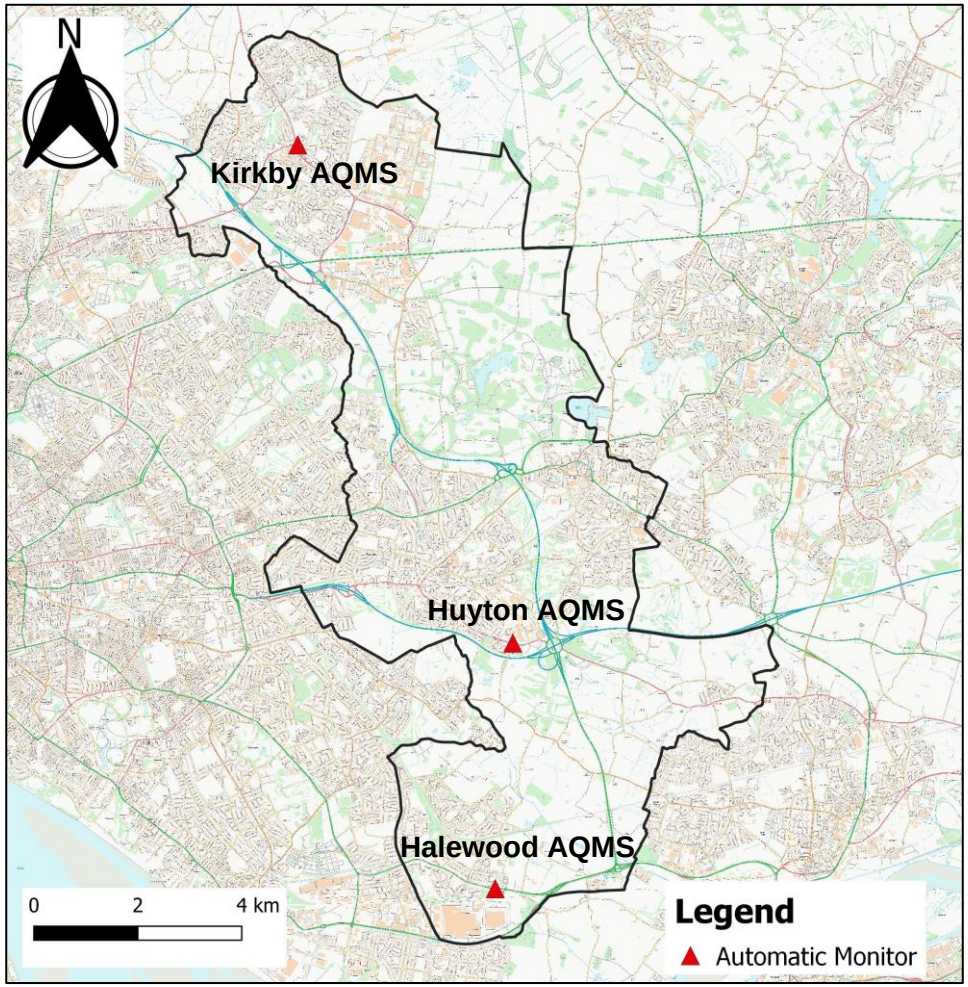


Figure D.2 – Map of Kirkby Automatic Monitoring Station (Old Rough Lane)

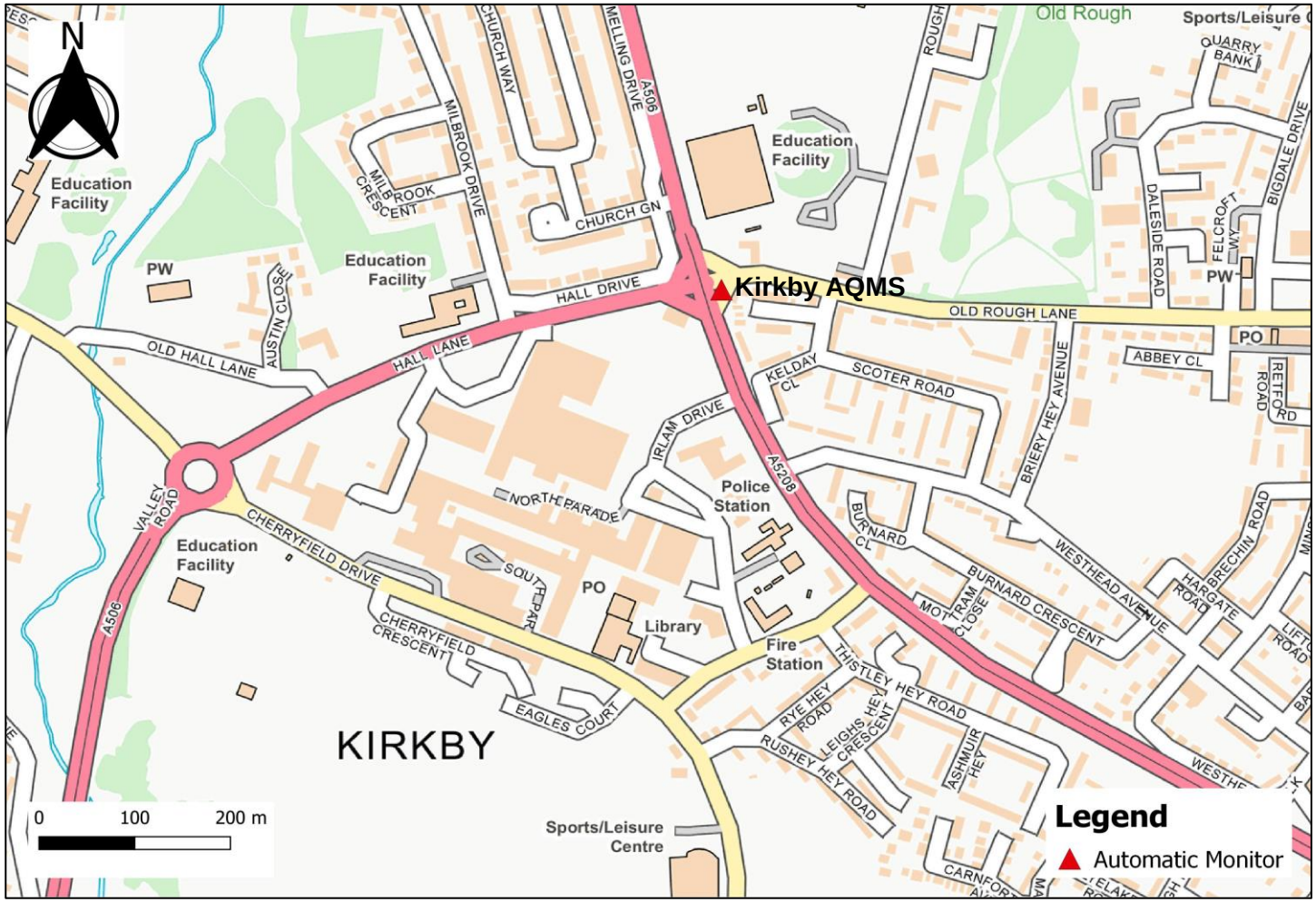


Figure D.3 – Map of Huyton Automatic Monitoring Station (Cronton Road)

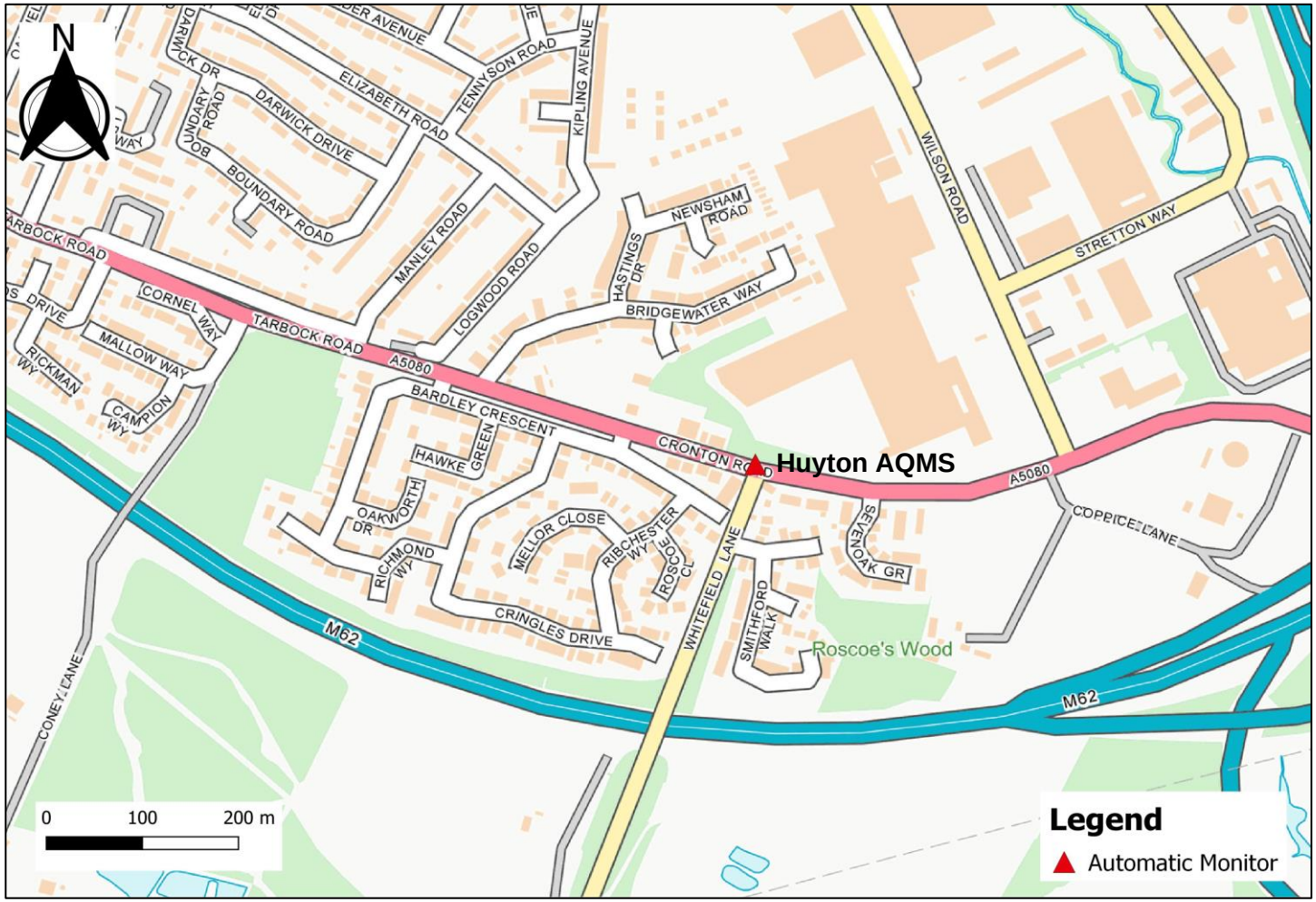


Figure D.4 – Map of Halewood Automatic Monitoring Station (Higher Road)

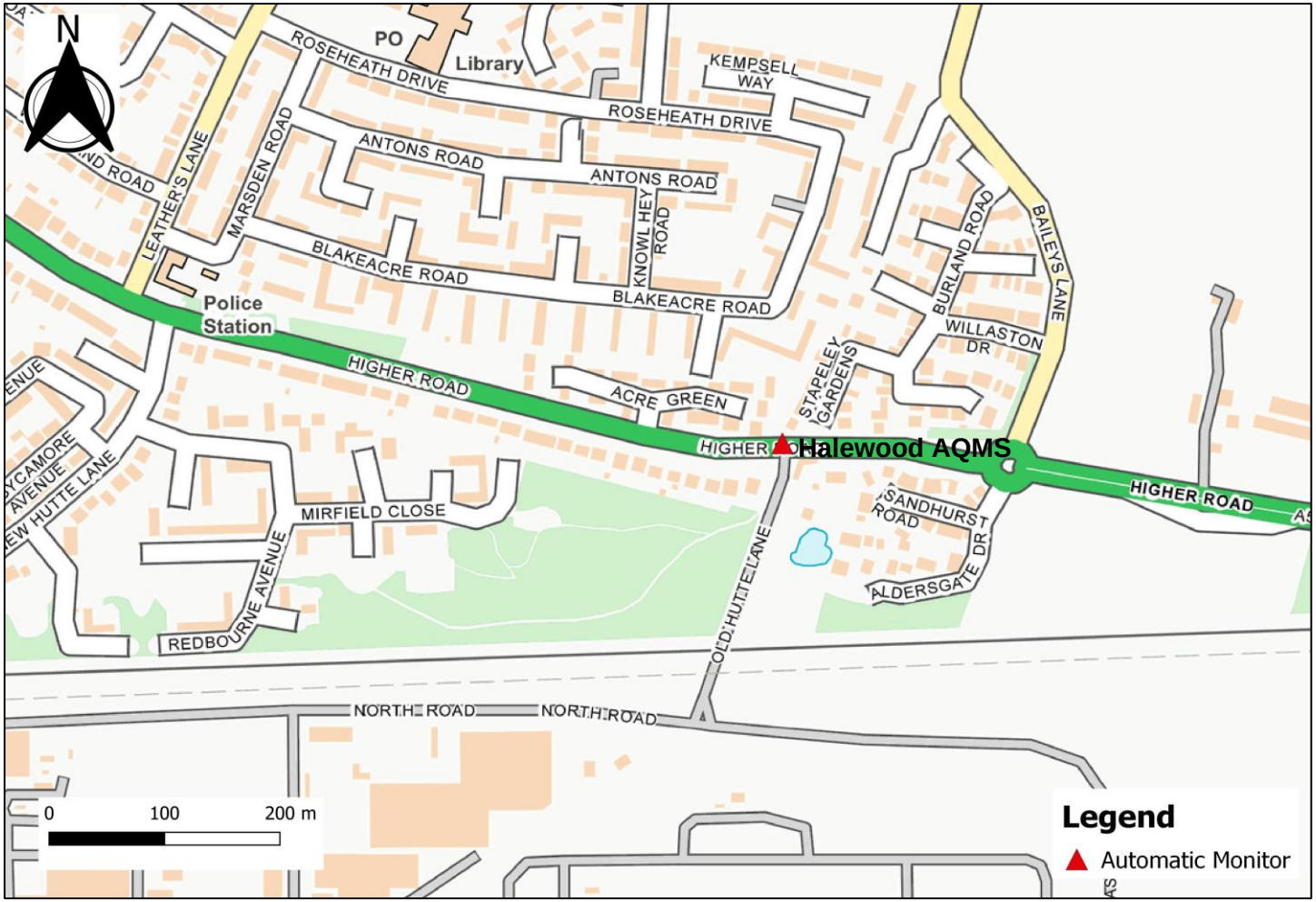


Figure D.5 – Map of Non-Automatic (Diffusion Tube) Sites in Huyton

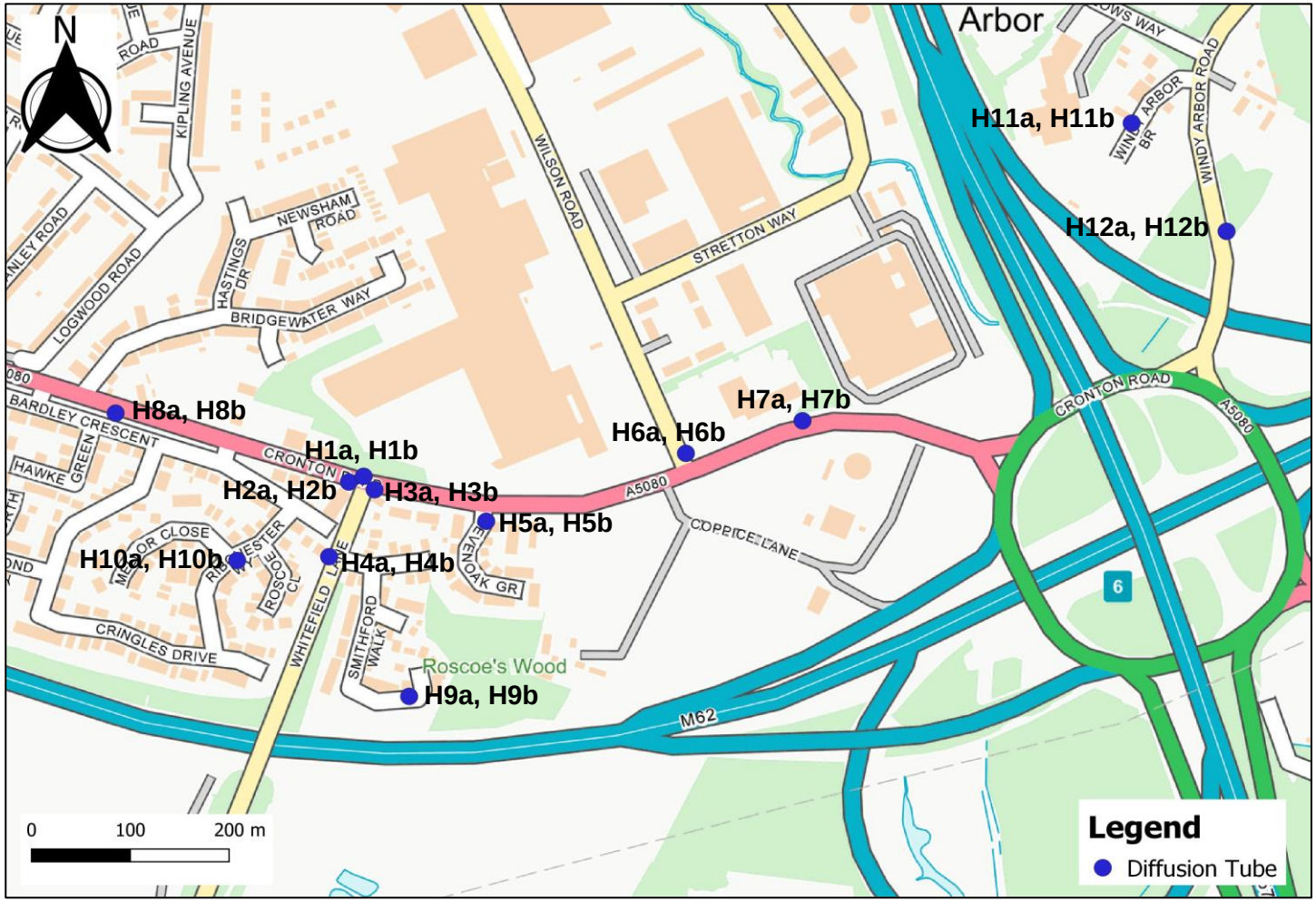


Figure D.6 – Map of Non-Automatic (Diffusion Tube) Sites in Kirkby (M57 Junction 6)

Figure D.7 – Map of Non-Automatic (Diffusion Tube) Sites in Kirkby (Town Centre)

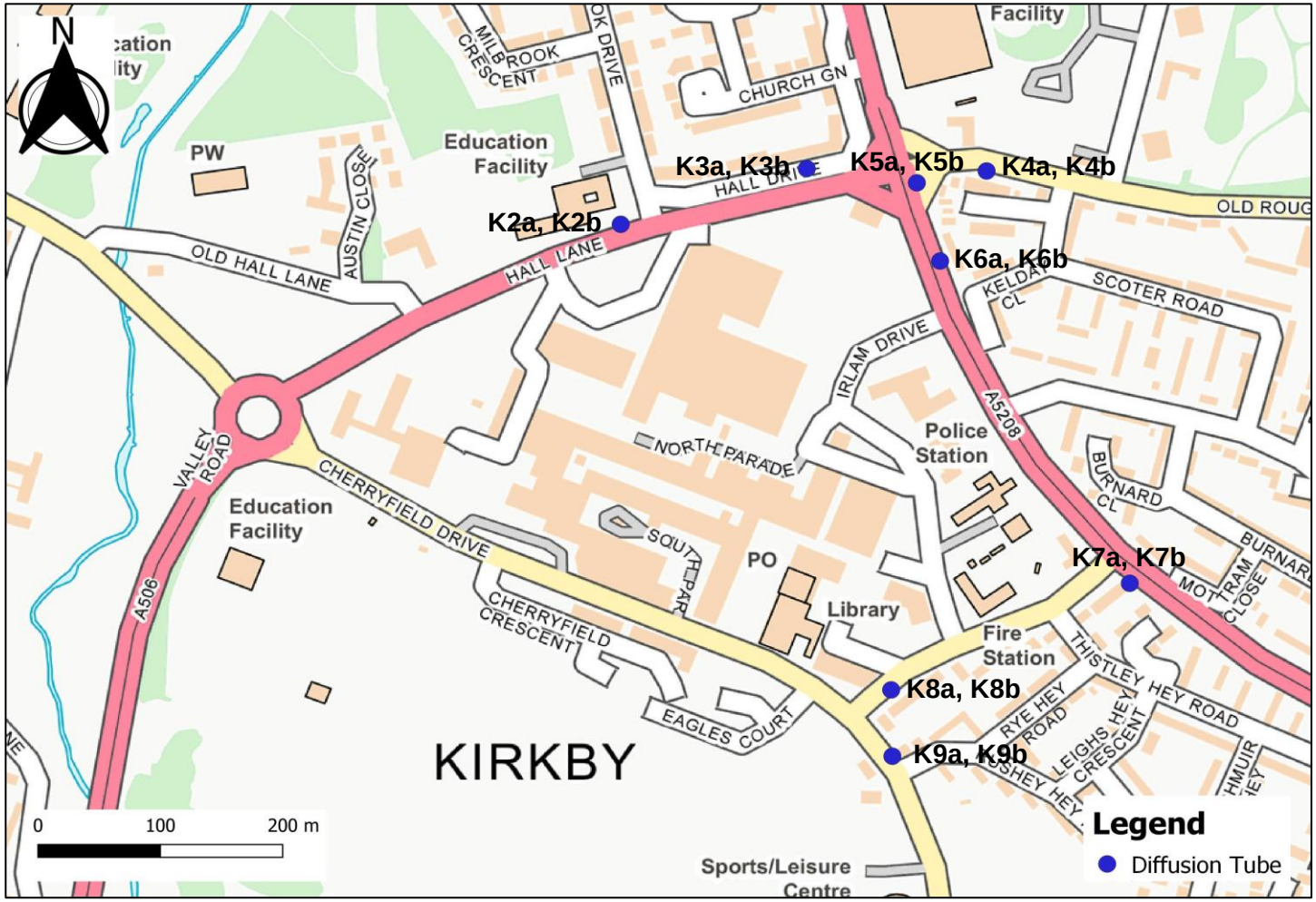
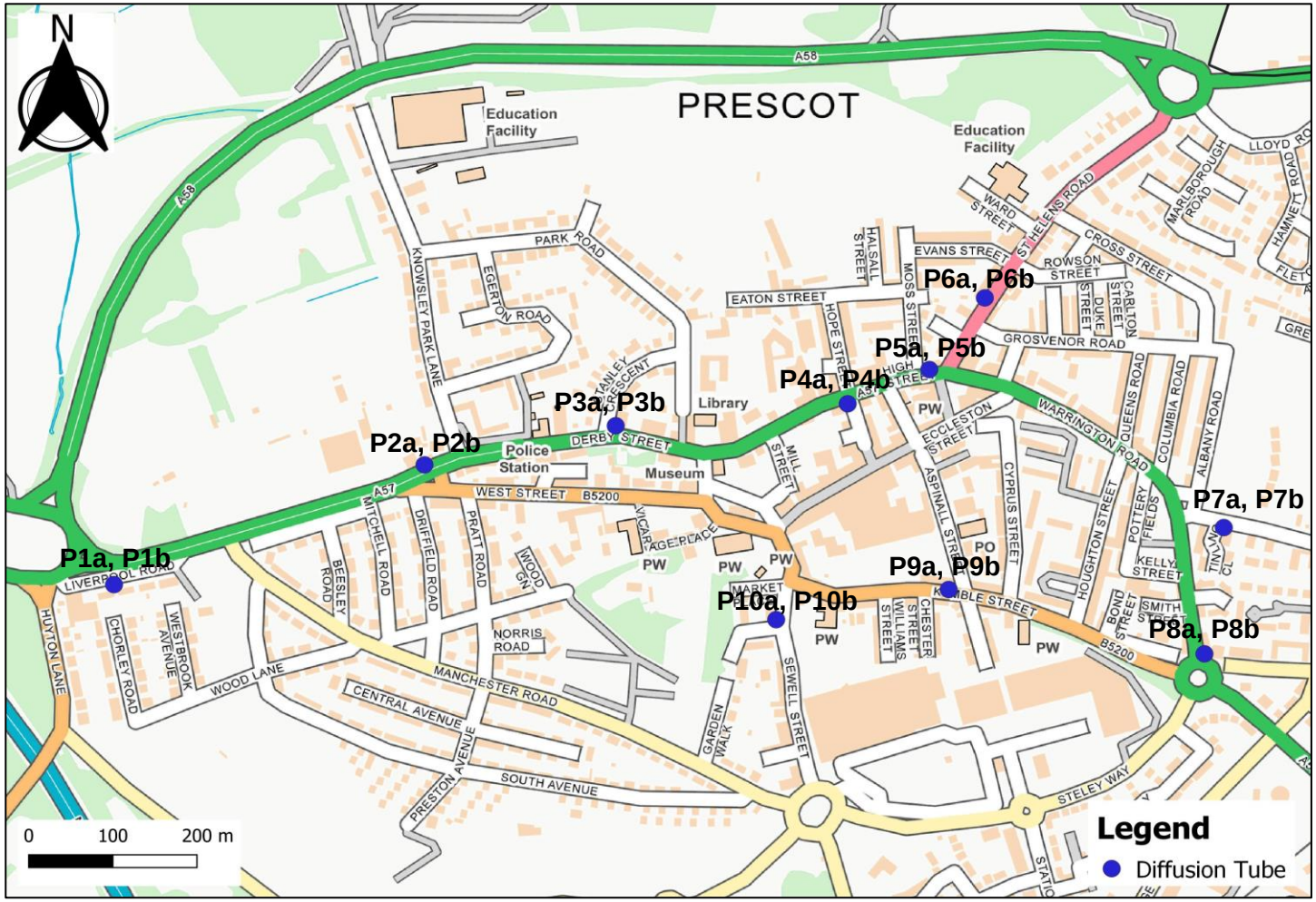


Figure D.8 – Map of Non-Automatic (Diffusion Tube) Sites in Kirkby (Moorgate Road)

Figure D.9 – Map of Non-Automatic (Diffusion Tube) Sites in Prescot



Appendix E: Summary of Air Quality Objectives in England

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

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional, and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[10] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[11] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[10] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[11] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Knowsley

During 2020, the NO_2 annual mean decreased at every diffusion tube site, with the average concentration 15% lower than that in 2019. Based on the annual average of the 12 diffusion tubes present in 2018 (32.2µg/m^3) and that of the sites in 2019 (30.7µg/m^3), the concentration of NO_2 decreased by 5% between 2018 and 2019. Therefore, the decrease in 2020 was threefold that observed in the previous reporting year, and is likely a result of the reduction in road traffic as a result of the COVID-19 pandemic. Indeed, Knowsley was subject to both national and local lockdowns, with restrictions reimposed on multiple occasions in the borough. During 2020 there was a notable reduction in the total miles driven in the borough, with the number of miles driven dropping to 0.98 billion from 1.15 billion in 2019[12] – equating to a 15% reduction in vehicle activity within the borough.

Opportunities Presented by COVID-19 upon LAQM within Knowsley

Knowsley MBC have made numerous infrastructure improvements during 2020 to promote walking/cycling and encourage less use of private vehicles. Some of these improvements were part of the Sustainable Transport Enhancements Package (STEP), which are a set of sustainable transport infrastructure measures integral to the LCR. Improvements were also made to road junctions (e.g. Headbolt Lane Boyes Brow, Kirkby) by upgrading the efficiency of signals. Knowsley MBC also introduced a range of active travel measures.

[12] Department for Transport. (2021). Road Traffic Statistics.

In 2020, the COVID-19 pandemic had a profound impact on Knowsley, exacerbating the gap of existing health inequalities. The Joint Health and Wellbeing Strategy (2020-2025), which aims to address matters in underperforming areas, has therefore become of greater importance. As a result of expanding the gap in the health inequalities within the borough, the COVID-19 pandemic provided evidence of the need to reduce inequalities by taking active measures, which indirectly benefit air pollution levels within these specific areas.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Knowsley

Data collection of the passive diffusion tubes was not impacted by COVID-19. However, some of the strategies aimed at raising awareness of, and reducing, air pollution were halted due to the pandemic. Knowsley MBC were unable to engage with local schools on the issues with air quality, owing to school closures and social distancing measures.

Table F.1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

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
AQMS	Air Quality Monitoring Station
ASR	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 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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