WARRINGTON
Borough Council

2020 Air Quality Annual Status Report (ASR)

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

June 2020

Executive Summary: Air Quality in Our Area

Air Quality in Warrington

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

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

Air quality levels in 2019 for nitrogen dioxide (NO_2) has seen a further reduction when compared to the levels observed in 2018. The majority of Warrington has good air quality and meets the national objectives. Concentrations have further reduced at most locations within Air Quality Management Areas (AQMAs) with more locations now meeting the national standards. There still remain some areas though, close to major roads, where NO_2 levels are high and that exceed the national objective limits.

Air quality levels do fluctuate year on year. It is important to assess the longer term trend due to the meteorology before any conclusion can be reached that air quality is significantly improving and emissions are reducing. The longer term trend though, is showing that NO_2 is gradually improving generally. There are now a number of locations within the Warrington AQMA that now meet the national limits, whilst for the Motorway AQMA, monitoring is showing that the distance from the edge of the motorway could be reduced. The Council will consider in the 2020 ASR the trend of improvements and whether to amend the extents of the AQMAs. At this time, as precautionary approach and due to the traffic links of the roads, the Warrington AQMA and the Motorway AQMA, will remain in place and will not be amended at this time. This is particularly important as there are major schemes currently in construction, for example the Centre Park Link Road, that are expected to further influence air quality levels.

[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

Unlike the reduction in NO_2 concentrations though, there has been an increase in particulate levels (PM_{10} and $PM_{2.5}$) during 2019 compared to 2018. For PM_{10}, whilst there has been an increase, levels remain below the national limits. Fine particulates, $PM_{2.5}$, are expected to be adopted within national legislation at the same level as recommended within the World Health Organization (WHO) guideline value. $PM_{2.5}$ levels have slightly increased compared to those observed in 2018 and, similar to 2016 and 2016, exceed the WHO guideline value. The AQAP and related policies have been developed to ensure that measures aimed at reducing NO_2 are complementary to reducing $PM_{2.5}$.

The Air Quality Action Plan (AQAP) was formally adopted in April 2018. The main priority is to try to tackle the exceedances of NO_2 and to improve air quality generally, not just within the AQMAs but across the wider borough. The AQAP sits alongside and inform major new Council policies, specifically the new emerging Local Plan and the updated Local Transport Plan (LTP4). A number of actions have now been completed and the aim is for the AQAP to be reviewed and amended with new measures included by the end of 2020.

The predominant source of pollution at a local level relates to road transport. When considering vehicle miles travelled on Warrington roads from the Department for Transport figures, traffic volumes have remained approximately the same during 2016, 2017 and 2018 for all vehicle types since reaching the peak in 2016. Figures for 2019 have not yet been released. In addition, ambitious growth plans for the borough emphasise the need for longer term action plans to be considered to ensure these are sustainable.

Whilst air quality levels are compared against the national objectives, the Council recognises that health benefits can still be realised by reducing pollution levels below these limits.

Local priorities revolve around a successful economy, reducing deprivation, improving the health inequalities across the wards. The Health and Wellbeing Strategy 2019 sets out the priority "Housing and the environment enable people to make healthy choices" and acknowledges "to be a healthy town, our environment and infrastructure must protect and promote good health and wellbeing considering issues such as air quality".

The Council recognises the need to deliver its ambitious plans for a strong local economy, and the need for new housing provision, within a sustainable environmental framework; and the opportunities and challenges this presents.

The emerging Local Plan will set out the housing and employment need for the borough until 2037. Current evidence indicates that we will require approximately 18,900 new homes and 362 Ha of employment land. The Local Plan growth, and associated increases in traffic, has been assessed for the air quality impacts as part of the AQAP. This concludes that nitrogen dioxide levels are expected to improve due to the increased uptake in low emission vehicles, but that $PM_{2.5}$ concentration will see less of an improvement and will remain of concern.

The Council is committed to working with relevant partners, for example the Highways Agency, to develop actions to further improve air quality, and with Public Health England to gain health evidence and advice of health impacts at a local level.

The current AQMAs, air quality reports and air quality data is available to be viewed at https://www.warrington.gov.uk/airquality

Going forward the Council expects concentrations of NO_2 to continue to improve as long as actions with the AQAP and LTP4 are enacted and emissions from the transport sector are reduced. The same improvements are not expected for $PM_{2.5}$ and the focus will need to change to concentrate on measures to reduce sources of this pollutant.

Actions to Improve Air Quality

The AQAP was formally adopted in 2018. An Air Quality Programme Board to oversee implementation of the AQAP has been set up, chaired by the Director of Public Health, and includes Directors and senior management that oversee planning and transport alongside Portfolio Council members and a representative from Public Health England.

The focus has been on embedding air quality as a major aspect within the emerging Local Plan and the Local Transport Plan (LTP4). Actions have continued to aim at improving traffic flows, increasing cycling and use of travel planning.

Specific actions completed in 2019 are:

- The Local Transport Plan (LTP4) has been adopted with sections on low emissions vehicles, active travel and consideration of air quality through the Plan.
- Warrington Intelligent Transport System along the A49 Winwick Road in the Warrington AQMA has been set up and show improvements in flows and reduced journey time. A mobile phone app is being developed for release in 2020.
- A Temporary Play Street event was successfully held in the summer of 2019. It is planned to expand this with online applications to encourage more events to be held.

A successful bid was made for the Defra 2019/20 Air Quality Grant to run an electric taxi scheme in 2020. This will involve the loan of an electric black cab to taxi operators for them to trial to encourage the uptake of electric taxis. The project will also include producing an electric taxi strategy for the borough to inform Council policies.

Conclusions and Priorities

NO_2 concentrations in 2019 have seen a further reduction compared to those observed in 2018. A number of locations within AQMAs have reduced to below the objective level in 2019. There are though some locations within AQMAs, around the town centre, on Winwick Road, in Latchford and near to the motorway that are close to and exceed the national limits

PM_{10} and $PM_{2.5}$ concentrations have increased during 2019 although remain below national standards. For $PM_{2.5}$ though, as measured as a typical urban background, compared to the WHO guideline value, which is to be adopted into national legislation, this limit is exceeded.

The AQAP was adopted in 2018 and will supplement the emerging Local Plan and the new Local Transport Plan (LTP4). The AQAP will be reviewed in 2020 and revised, where necessary, for actions that have been completed and to consider new measures to be included, if appropriate.

The Council considers that actions contained within the AQAP should be prioritised and implemented in 2020, where possible, to improve air quality in order to meet the national objectives in the longer term. It is also acknowledged that actions to improve air quality have additional positive benefits by improving health and to deliver sustainable growth in the longer term. The focus of the AQAP is to improve air quality within the Warrington AQMA but also to improve concentration across the wider borough. Measures available to the Council to improve air quality though within the Motorway AQMA remain limited without support from Highways England.

2020 has seen the impact of the Covid-19 pandemic. Due to lockdown measures that significantly reduced transport use, NO2 levels significantly reduced. This is an atypical year so will affect trend analysis in the next ASR. It is though hoped, and expected, that lessons can be learnt for changes in travel behaviour and work patterns that could have long term benefits for improving air quality. This will be considered further within next year's ASR.

Local Engagement and How to get Involved

Whilst the Council has a strategic position to improve air quality, there are many actions that can be taken individually by the public to reduce individual emissions. These include cycling and walking, improved driving style to reduce fuel cost and increased use of public transport. All these actions can have the additional benefit of improving health and wellbeing as well as making financial savings.

Additional information is available on the Council Website for Travel Warrington at: https://www.warrington.gov.uk/travelwarrington

Additional information on air quality, including advice on smoke control areas and monitoring data, is available on the Council website at: https://www.warrington.gov.uk/airquality

Further information on air quality and actions that can be taken is available by emailing the Environmental Protection team to: environmental.health@warrington.gov.uk

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

Defra's appraisal of last year's ASR concluded *"The Council has made progress with measures to address air quality in Warrington in 2018, such as adopting the AQAP for both of the AQMAs which includes measures such as the Warrington Intelligent Transport System. The Council have also identified priorities for 2019 including finalising the Local Plan for submission to the Secretary of State in Autumn 2019. On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants."*

The appraisal made some of recommendations, which have been addressed in this years' report:

1. *"QA/QC of the data was considered to be thorough, with annualisation of data carried out, a local bias adjustment factor used for the non-automatic network from local co-location and distance correction performed where required. However, example calculations are not included for distance correction. This is encouraged for future reports."*
2. *"The annualisation calculations would also benefit from use of more than one continuous monitoring site (if appropriate sites are available), as per Box 7.9 of LAQM.TG(16)."*

Summary of progress of measures

Warrington Borough Council has taken forward a number of direct measures during the current reporting year of 2019 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 the AQAP.

www.warrington.gov.uk/airquality

Key completed measures are:

- **Sustainable Transport Strategies (Local Transport Plan 4)**

Following consultation, the Local Transport Plan (LTP4) was formally adopted by the Council in December 2019. This contains a number of policies which will improve air quality which will be further expanded upon in an update of the AQAP.

- **Procurement Strategies**

A new Council Strategy has been adopted in January 2019. This includes a specific consideration for "minimising environmental impact" including use of low and zero emission vehicles and plant.

- **Highways England/TfN Working Group**

Air quality has been set up as a standing item on the agenda for the formal quarterly meetings undertaken with the Transport team. Highways England have confirmed though, that Defra do not require any actions or have any proposals to improve air quality for the Motorway network around Warrington. This remains a major barrier to try to improve air quality within the Motorway AQMNA.

- **Warrington West Railway Station**

The new railway station formally opened in December 2019. The car park serving the new railway station has 14 electric vehicle charging points to encourage uptake in low emission vehicles and significant cycle parking provision.

- **Clean Air Zone Feasibility Study.**

An initial feasibility scoping has been carried out as part of the Transformational Projects Study. At this stage within the LTP4, it is not proposed to take a Clean Air Zone forward due to the implementation cost compared to predicted benefit.

- **Air Quality Webpage**

The updated pages were published in July 2019. This now features interactive maps for Smoke Control Areas and the AQMAs plus information on health and for schools. This action is considered completed, but will remain under continuous review.

Warrington Borough Council expects the following measures to be completed over the course of the next reporting year:

- **Local Plan Review**

The draft Local Plan includes an Environmental Protection policy for air quality and sustainable transport policies. A borough wide air quality assessment has been carried out to assess the air quality impacts from the predicted additional traffic generated by the housing and employment needs for the borough until 2037. This has assessed that air quality will improve over the life time of the Local Plan primarily due to national predicted uptakes in low emission vehicles. Nitrogen dioxide concentrations are expected to reduce by 22% by 2026 with only a minor number of locations exceeding the national objectives. All areas will meet the standards by 2036. Fine particulates, $PM_{2.5}$, have also been assessed and compared against the WHO guideline value. $PM_{2.5}$ is expected to see a 5% reduction in concentrations by 2036 but even in 2036 there is predicted to still be some areas that exceed the guideline value, irrespective of the Local Plan.

The council carried out a nine-week consultation on the Plan between April and June 2019, receiving more than 3,500 representations from the public, businesses, developers and statutory bodies. All of the responses have been carefully reviewed, and the council is now carrying out additional work to respond to these.

The main focus of this work is to ensure the council is able to deliver the necessary social, health, transport and green infrastructure to support Warrington's projected growth. Given the importance of this work, submission of the Local Plan for examination is likely to be delayed until 2020.

- **Environmental Protection SPD**

An early draft of the document had been produced and will be adopted in line with the Local Plan.

- **Warrington Intelligent Transport System**

The main project is completed but further work is required to validate the mobile phone application. Initial results show improvements in traffic flows with journey times on some lengths improved by up to 30%. The scheme is to be considered to be expanded to be used on other major roads within the Warrington AQMA depending upon funding.

- **Chester Road Promenade Route**

This will create a major new cycleway along Chester Road within the Warrington AQMA. Works are due to begin in the summer 2020.

- **Centre Park Link Road**

This is expected to reduce traffic volumes and improve flows within the town centre at Bridgefoot roundabout and improve town centre air quality. Construction work started in June 2019, with expected completion in late 2020.

- **Burtonwood to Omega Shared Pathway**

A proposed shared pedestrian and cycle way linking to a major employment area adjacent to the Motorway AQMA. Consultation has been completed and a public inquiry held in November. Start of works are now programmed for July 2020.

- **Temporary Play Streets**

Application forms and guidance documents have been developed. A trial event has been held during the summer 2019 with no adverse issues. This is to be expanded to online applications by the end of 2020.

Progress on the following measures has been slower than expected:

- **Smoke Control Area Review**

The majority of Warrington is designated as Smoke Control Areas. This is to be reviewed but was delayed awaiting the outcome of the national Clean Air Strategy and the Environment Bill, which are expected to set additional Smoke Control Area requirements. This measure has been postponed to await the outcome of the national guidance.

- **Western Link Road**

This major new road is proposed to significantly reduce traffic in the town centre and within the Warrington AQMA. The proposal is now accepted on the Department of Transport's Programme of Entry schemes. Detailed design and a formal planning application is expected by the end of 2020. Scheme funding and approval remains subject to approval from the Department of Transport.

- **School, Nursery, Care Home Action Group**

No formal group has been set up but meetings have been held with the Council's Schools advisor and travel planning team. Air quality monitoring has been carried out at one primary school as part of lesson plans.

A bid was submitted under the Defra Air Quality Grant 2018 for funding for a major schools project to support this action. Unfortunately this bid was unsuccessful.

An anti-idling campaign outside schools was proposed for May 2020 to coincide with Walk to School Week. This has been postponed due to the Covid-19 outbreak.

- **$PM_{2.5}$ Monitoring**

A bid was submitted under the Defra Air Quality Grant 2018 for funding to trial new sensors. Unfortunately this bid was unsuccessful. At the moment there is no funding allocated for this action and, at this time, the Council is unable to complete this action.

Warrington Borough Council's priorities for the coming year are to revise and update the current AQAP. A number of actions are now completed and the AQAP is consider additional measures to improve air quality.

The principal challenges and barriers to implementation that Warrington Borough Council anticipates facing are funding and resources to complete the actions. In addition there is future uncertainty throughout 2020 and beyond relating to impacts due to the Covid-19 pandemic. Not only does this create uncertainty over future funding but also how transport and travel patterns will change with potential reductions in use of public transport and increased home working that could change future travel patterns.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Warrington Borough Council anticipates that further additional measures not yet prescribed but to be considered in the revised AQAP, will be required in subsequent years to achieve compliance and enable the revocation of the Warrington and Motorway AQMAs.

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 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.

Monitoring data is showing an improvement at the majority of locations, including within current AQMAs, compared to to those measured in 2018. There are though, locations still within current AQMAs that continue to show exceedances , or that have a risk of exceedance (within 10% of the objective limit), in the annual mean objective and confirm the need for these areas to remain designated. The monitoring though is indating that the extent of the AQMAs could be reviewed. Monitoring will continue at locations that previously showed exceedances to assess longer term trends. As per the guidance, it is not proposed to amend the extent of any of the AQMAs at this time, unless there is at least 3 consecutive years of data showing no risk of exceedance. This is also inportant to be able to assess a number of road schemes, principly the Centre Park and Western Link roads, that are expected to affected air quiality.

[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)

There are no locations where there is a measured annual means greater than 60µg/m^3, which would indicate that an exceedance of the 1-hour mean objective could be likely.

Trends

Trend data for NO_2 for roadside, urban background, and rural background is shown in figure A.1 in Appendix A. This shows that there can be significant variations and annual fluctuations in concentrations, concluded to be meteorological conditions that affect dispersion and secondary formation of pollutants. Assessment of the linear trend, between 2007 and 2019 though, does show that concentrations on average over this period have been declining for urban background, rural background and roadside.

An assessment of the trend of all monitoring within AQMAs between 2009 and 2019 indicates that nitrogen dioxide levels at roadside have on average reduced, but the level of this is dependant upon the location.

The longer term trends will continue to be assessed in future ASRs.

Warrington AQMA

Generally there has been a reduction in NO_2 levels within the AQMA and less locations are now showing an exceedance.

As with previous annual reviews there continues to be measured exceedances on Parker Street although the 5 year trends are showing gradual improvement. Diffusion tube DT8, when distance corrected to the nearest resdential property continues to show a slight improvement to 43.8 µg/m^3 but still exceeds the national objective value. The Parker Street real time analyser though shows a slight increase, measuring 41 µg/m^3 and exceeding the objective value, when compared to the 2017 and 2018. This analyser is due to replaced with updated equipment in 2020. Wilson Patten Street diffusion tube, DT9 shows futher improvement compared to previous years to below the objective level. When a distance correction is carried ut to the nearest residential, the concentrations are below where there is a risk of exceedance. Monitoring at these locations will continue for assessment of the impact of the new Centre Park Link Road (AQAP action 11) when it is operational in 2021.

Crosfield Island 2 tube (DT12) has previously measured concentrations above or near to the objective limit but since 2017 has been showing levels below a risk of exceedance. This trend is continuing and showing further marginal improvements.

Baxter Street 1 (DT11), located on a house front on the opposite southern side of Crosfield traffic island to DT12, measures a concentration of 39.1 µg/m^3 , similar 2018 concentrations, and remians a risk of exceeding the objective level.

Chester Road locations (CM3, DT13, DT14 and DT15) all measure further improvements with concentrations now below the objective limit. Chester Road will continue to be monitored in 2020 and will be used to assess the impacts from the Centre Park Link Road.

Along Wildersppol Causeway, NO_2 concentrations have further improved compared to 2018 and are below the objective level. Monitoring though will continue to assist in any amendments to the extent of the AQMA.

On Knutsford Road, between Bridgefoot and Latchford, NO_2 concentrations have marginally improved compared to 2018 and are below the objective level.

In Latchford Village (DT21, DT22 and DT23), concentrations have improved to where levels are now below where there is a risk of exceedance compared to 2018

Mersey Street 1 (DT24) has previously measured concentrations above the objective level but these reduced to just below the limits since 2017 but remained at a level where there was a risk of exceedance at this location. In 2019, concentrations have further reduce to below the risk of exceedance level.

Bewsey Street (DT25) has previously measured levels below the objective limit, but still with a risk of exceedance. In 2019 the concentration measured has reduced further below the risk of exceedance.

Crosfield Street (DT26) had exceeded the objective limits in previous years and was recording a level with a risk of exceedance in 2018. The has now reduced further in 2019 and is belwo the risk value.

Along the A49 Winwick Road concentrations have improved but there remains a locations that have a risk of exceedance. Winwick Road 1 (DT31) is showing further reductions to 30.2 µg/m^3. Winwick Road location 2 (DT32) shows a marginal risk of exceedance whilst Winwick Road 3 (DT33) measure 39.8 µg/m^3 , at the objective limit but has imprioved since 2018.

Motorway AQMA

Manchester Road (DT5) is located adjacent to residential 22m from the M6 motorway and is within the AQMA. The residential is raised approximately 5m above the carriageway. Previous years has seen exceedances in the objective limit and concentrations did increase in 2018 compared to 2017. For 2019 concentrations have fallen further but still record an exceedance with a value of 41 µg/m^3.

DT6 was located in 2018 next to residential just outside the AQMA along the M62, 60m from the M62. This has measured a significant improvement with a concentration of 23.5µg/m^3. This location is planned to be relocated in 2020 next to residential that is closer to the motorway and a major junction

DT7 is located 17m from the M56 within the Motorway AQMA and recorded an annual concentration of 32.5 µg/m^3.

Locations outside AQMAs

The real time analyser at Selby Street (CM1) is part of the AURN and measures concentrations for urban background. In 2019 this recorded a sligh improvement comapred to 2018 from 21.4 to 20.5 µg/m^3.

Risley Moss (DT1) measures concentrations at a rural background site and recorded an avearge of 16.4 µg/m^3 , similar to 2018.

Stockton Heath 3 (DT24) is located near the beginning of the main residential area on London Road and continues to measure levels below the objective limit with a concentration of 25.1 µg/m^3, a slight redcution in the concentration measured in 2018.

Previous assessments have highlighted potential exceedances at locations within the Padgate area and monitoring was expanded in 2018 to assess the extent. Concentrations at all ocation though in 2019 have reduced to below the level where there is a risk of exceedance.

There is no evidence of any locations outside of current AQMAs that might have a risk of exceedance that currently require further investigation.

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.

Particulate matter, PM10, is measure at one site within Warrington to measure typical urban background levels. The Selby Street site was affiliated into the national network (AURN) in 2008. A BAM type analyser is used to measure PM10 concentrations. The site is overseen by Bureau Veritas and Ricardo AEA who carry out all data ratification and analyser servicing and auditing. The site represents typical urban background exposure. There is no exceedance in the annual mean objective, which is consistent with previous years.

Data capture for 2019 is good at 94.1%. For 2019 there was a measured annual average concentration of 17 µg/m^3, which is a significant increase compared to previous years but still below the national objective limit.

The 24 hour mean objective of 50µgm^3 is not to be exceeded more than 35 times a year. This was exceeded five times during 2019, which is an increase on previous years but does continue to meet the annual 24 hour mean objective.

Trend data since 2009 is shown in Figure A.3 (Appendix A). This indicates that since 2009, concentrations of PM_{10} have been reducing for urban background.

3.2.3 Particulate Matter ($PM_{2.5}$)

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

In addition to the PM10 monitoring, the Selby Street site also measure $PM_{2.5}$ using a BAM unit. Data has been ratified as part of the AURN.

The annual mean for 2019 is 11 μg/m^3 but data capture was low at 66.5% so the data has been seasonally adjusted. The lost in data was for the period July to November due to leaking sample valve that was sticking causing a slight leak.

Trend data is shown in Figure A.4 (Appendix A). For 2019 there is a slight increase compared to concentrations in 2018.

The results show that the target level of 25μg/m^3 to be met by 2020 is being achieved for urban background, but the concentration does exceed the guidance level recommended by the WHO which is expected to be adopted into UK legislation.

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)
CM1	Selby Street	Urban Background	359151	388218	NO2, PM2.5, PM10	NO	Chemiluminescent; FDMS/BAM	22m	50m	2.5
CM2	Parker Street	Roadside	360015	387907	NO2	YES (Warrington AQMA)	Chemiluminescent	1m	2 m	1.5
CM3	Chester Road	Roadside	360331	386454	NO2	YES (Warrington AQMA)	Chemiluminescent	1m	2 m	1.5

Notes:

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

(2) N/A if not applicable

Table A.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)
DT1	WA08 Risley Moss	Rural	366949	392004	NO2	NO	n/a	n/a	NO	1.5
DT2	WA22 Selby Street	Urban Background	359152	388218	NO2	NO	n/a	50	YES	2.5
DT3	WA23 Selby Street	Urban Background	359152	388218	NO2	NO	n/a	50	YES	2.5
DT4	WA24 Selby Street	Urban Background	359152	388218	NO2	NO	n/a	50	YES	2.5
DT5	WA111 M6 Manchester Road	Roadside	366102	389214	NO2	YES (Warrington AQMA)	0	16	NO	2
DT6	WA123 M62 Radley Lane	Roadside	361655	391914	NO2	NO (edge of Motorway AQMA)	0	60	NO	2.5
DT7	WA124 M56 Queastybirch	Roadside	360233	381994	NO2	YES (Motorway AQMA)	17	17	NO	1.5
DT8	WA20 Parker St	Roadside	360044	388048	NO2	YES (Warrington AQMA)	2	1.5	NO	2.5
DT9	WA102 Wilson Patten Street	Roadside	360309	387848	NO2	YES (Warrington AQMA)	4.5	1	NO	2.5
DT10	WA67 Crosfield Island 2	Roadside	359509	388235	NO2	YES (Warrington AQMA)	0	14.5	NO	2.5

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)
DT11	WA65 Baxter Street 1	Urban Centre	359452	388111	NO2	YES (Warrington AQMA)	0	2	NO	2.5
DT12	WA85 Old Liverpool Road 4	Roadside	359430	387947	NO2	NO	4	2	NO	2.5
DT13	WA68 Chester Road	Roadside	360648	387388	NO2	YES (Warrington AQMA)	3	3	NO	2.5
DT14	WA87 Chester Road 5	Roadside	360407	386237	NO2	YES (Warrington AQMA)	4	2	NO	2.5
DT15	WA93 Walton Terrace	Roadside	360450	386052	NO2	YES (Warrington AQMA)	3	2	NO	2.5
DT16	WA76 Wilderspool Causeway	Roadside	360880	387247	NO2	YES (Warrington AQMA)	2.5	2.5	NO	2.5
DT17	WA118 Wilderspool Causeway 3	Roadside	361220	386874	NO2	YES (Warrington AQMA)	10	3.3	NO	2.5
DT18	WA94 Wilderspool Causeway 2	Roadside	361319	386508	NO2	YES (Warrington AQMA)	0	2	NO	2.5
DT19	WA90 Stockton Heath 3	Roadside	361470	385981	NO2	NO	3	2	NO	2.5
DT20	WA77 Knutsford Road 1	Roadside	361898	387430	NO2	YES (Warrington AQMA)	0	3	NO	2.5

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)
DT21	WA92 Kingsway South (Latchford)	Urban Centre	362810	387187	NO2	YES (Warrington AQMA)	0	3	NO	2
DT22	WA105 Latchford Village 2	Roadside	362779	387288	NO2	YES (Warrington AQMA)	1	1.5	NO	2.5
DT23	WA115 Latchford Village 3	Roadside	362604	387222	NO2	YES (Warrington AQMA)	55	2	NO	2.5
DT24	WA78 Mersey Street	Roadside	361005	388145	NO2	YES (Warrington AQMA)	2.5	6	NO	2.5
DT25	WA80 Bewsey Street	Roadside	360462	388501	NO2	YES (Warrington AQMA)	0	30 (to train line)	NO	2.5
DT26	WA83 Crosfield Street	Roadside	360040	388406	NO2	YES (Warrington AQMA)	4.5	2.5	NO	2.5
DT27	WA89 King Edward Street	Roadside	362392	389101	NO2	NO	2.5	2	NO	2.5
DT28	WA107 Padgate Lane 1	Roadside	362235	389248	NO2	NO	2.5	1.5	NO	2.5
DT29	WA108 Padgate Lane 2	Roadside	362060	389170	NO2	NO	2.5	2	NO	2.5
DT30	WA125 Steel Street	Roadside	362131	389473	NO2	NO	7	1.5	NO	2.5
DT31	WA95 Winwick Road 1	Roadside	360598	389820	NO2	YES (Warrington AQMA)	5.5	5	NO	2.5

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)
DT32	WA96 Winwick Road 2	Roadside	360484	390416	NO2	YES (Warrington AQMA)	5.5	3	NO	2.5
DT33	WA112 Winwick Road 3	Roadside	360434	390968	NO2	YES (Warrington AQMA)	0	2	NO	2.5

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

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
CM1	359151	388218	Urban Background	Automatic	87.7	87.7	24.4	25	21	21.4	20.5
CM2	360015	387907	Roadside	Automatic	95.4	95.4	**40**	**47**	37.9	38.1	**41**
CM3	360331	386454	Roadside	Automatic	95.3	95.3	37	34	32	30	30
DT1 (WA08 Risley Moss)	366949	392004	Rural	Diffusion Tube	91.7	91.7	25.2	18.8	17.3	16.1	16.3
DT2 (WA22 Selby Street)	359152	388218	Urban Background	Diffusion Tube	100	100	24.4	24.7	21.2	21.4	19.7
DT3 (WA23 Selby Street)	359152	388218	Urban Background	Diffusion Tube	91.7	91.7	25	25.6	21.6	21.3	20.4
DT4 (WA24 Selby Street)	359152	388218	Urban Background	Diffusion Tube	91.7	91.7	24.4	24.4	21.5	21.7	20.2
DT5 (WA111 M6 Manchester Rd)	366102	389214	Roadside	Diffusion Tube	91.7	91.7	**55.5**	**44.2**	39.4	**45.6**	**41**
DT6 (WA123 M62 Radley Lane)	361655	391914	Roadside	Diffusion Tube	91.7	91.7				29.7	23.5
DT7 (WA124 M56 Queastybirch)	360233	381994	Roadside	Diffusion Tube	58.3	58.3				34.2	32.5
DT8 (WA20 Parker St)	360044	388048	Roadside	Diffusion Tube	100	100	**55.2**	**55.7**	**45.2**	**45.9**	**43.8**
DT9 (WA102 Wilson Patten Street)	360309	387848	Roadside	Diffusion Tube	75	75	**47**	**49.5**	**40.7**	39.5	36.1

DT10 (WA67 Crosfield Island 2)	359509	388235	Roadside	Diffusion Tube	83.3	83.3	**41.2**	37.5	32.8	32.19	30.7
DT11 (WA65 Baxter Street 1)	359452	388111	Roadside	Diffusion Tube	83.3	83.3	**51**	**49.9**	**42.1**	39.6	39.1
DT12 (WA85 Old Liverpool Road 4)	359430	387947	Roadside	Diffusion Tube	100	100	**41.1**	**42.3**	37.7	35.5	31.7
DT13 (WA68 Chester Road)	360648	387388	Roadside	Diffusion Tube	100	100	**44.7**	**46.6**	36.2	36.6	34.1
DT14 (WA87 Chester Road 5)	360407	386237	Roadside	Diffusion Tube	100	100	**40.1**	38.4	34.5	34.1	30.7
DT15 (WA93 Walton Terrace)	360450	386052	Roadside	Diffusion Tube	100	100	**45.1**	**40.9**	37.1	34.5	31.4
DT16 (WA76 Wilderspool Causeway)	360880	387247	Roadside	Diffusion Tube	83.3	83.3	39.1	38.7	34.1	31	28.8
DT17 (WA118 Wilderspool Causeway 3)	361220	386874	Roadside	Diffusion Tube	83.3	83.3			31.8	30.1	29.7
DT18 (WA94 Wilderspool Causeway 2)	361319	386508	Roadside	Diffusion Tube	91.7	91.7	**45.6**	**40.4**	34.8	33.7	30.6
DT19 (WA90 Stockton Heath 3)	361470	385981	Roadside	Diffusion Tube	91.7	91.7	35.3	33.4	28.5	27.5	25.1
DT20 (WA77 Knutsford Road 1)	361898	387430	Roadside	Diffusion Tube	91.7	91.7	**40.2**	38	33.1	30.2	29.9

DT21 (WA92 Kingsway South (Latchford))	362810	387187	Roadside	Diffusion Tube	100	100	**42**	**42.2**	36.2	35.2	32.5
DT22 (WA105 Latchford Village 2)	362779	387288	Roadside	Diffusion Tube	100	100	**49.3**	**48.3**	**41.4**	39.9	34.8
DT23 (WA115 Latchford Village 3)	362604	387222	Roadside	Diffusion Tube	100	100	35.4	**42.5**	34.5	33.7	31
DT24 (WA78 Mersey Street)	361005	388145	Roadside	Diffusion Tube	100	100	**45.9**	**43.4**	38.4	37.7	35.3
DT25 (WA80 Bewsey Street)	360462	388501	Roadside	Diffusion Tube	91.7	91.7	36.6	37.7	32.9	32.3	30.6
DT26 (WA83 Crosfield Street)	360040	388406	Roadside	Diffusion Tube	100	100	**45.7**	**41.9**	32.2	36	33.4
DT27 (WA89 King Edward Street)	362392	389101	Roadside	Diffusion Tube	100	100	**45.6**	**47.4**	**42.2**	37.9	35.1
DT28 (WA107 Padgate Lane 1)	362235	389248	Roadside	Diffusion Tube	100	100	**41.4**	**42.1**	38	35.1	32.5
DT29 (WA108 Padgate Lane 2)	362060	389170	Roadside	Diffusion Tube	100	100	**45.8**	**45.3**	37.6	35.1	34.1
DT30 (WA125 Steel Street)	362131	389473	Roadside	Diffusion Tube	100	100				**42.4**	35.9

DT31 (WA95 Winwick Road 1)	360598	389820	Roadside	Diffusion Tube	100	100	39.5	39.9	34.7	32.6	30.2
DT32 (WA96 Winwick Road 2)	360484	390416	Roadside	Diffusion Tube	83.3	83.3	**47.2**	**50**	**44.2**	**40.3**	36.6
DT33 (WA112 Winwick Road 3)	360434	390968	Roadside	Diffusion Tube	91.7	91.7	**52**	**55**	**49.3**	**43.9**	39.8

☒ **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

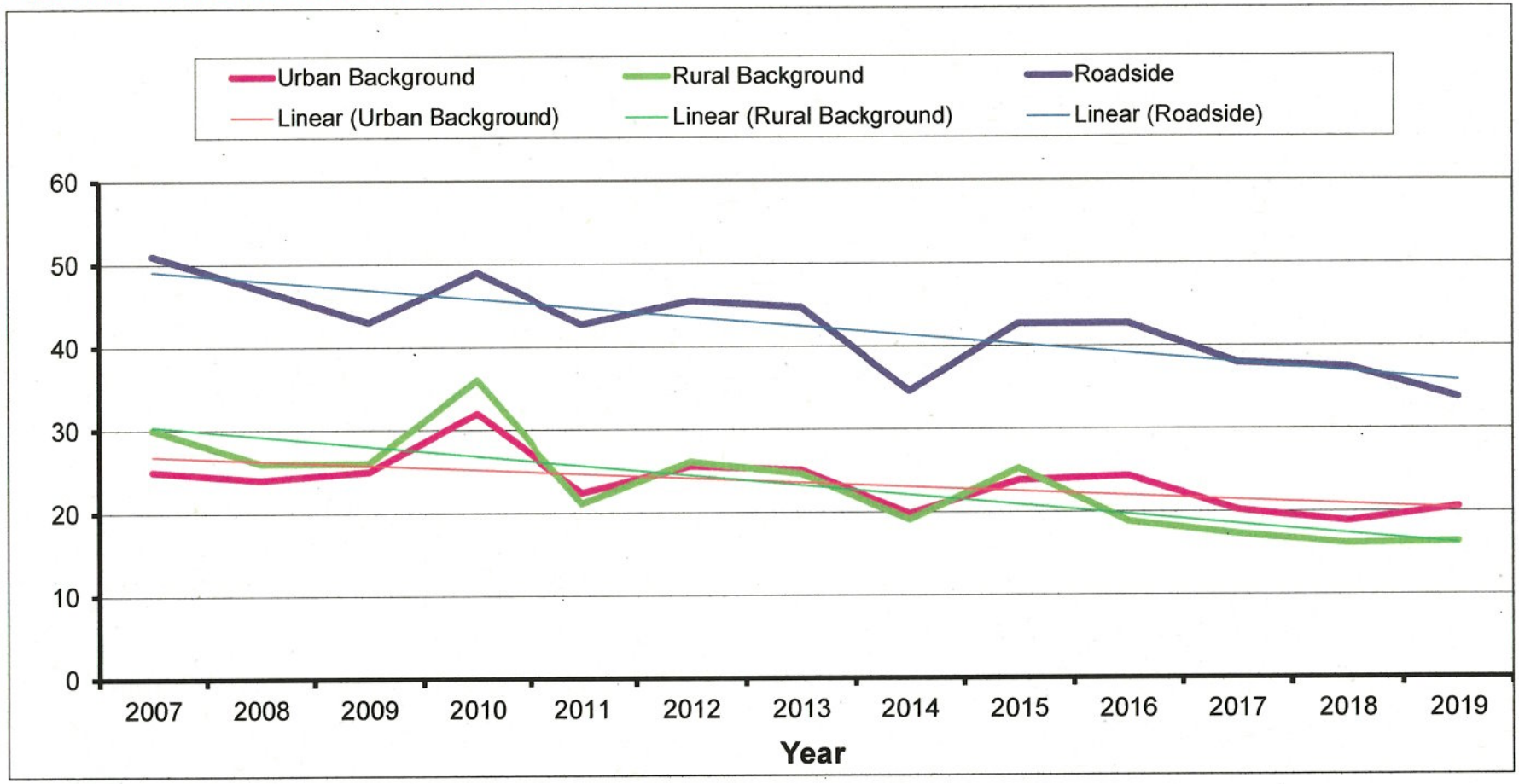

Figure A.2 – Trends in Annual Mean NO_2 Average Concentrations within AQMAs