



2019 Air Quality Annual Status Report (ASR)

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

June 2019

Warrington Borough Council

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Report Reference number	ASR 2019
Date	June 2019

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 billion³.

Air quality levels in 2018 for NO₂ have marginally improved when compared to the levels observed in 2017. The majority of Warrington has good air quality and meets the national objectives. Concentrations have further reduced at some locations within Air Quality Management Areas (AQMAs) to below the national standards. There remain some areas though, close to major roads, where NO₂ levels are still high and exceed the 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. As a precautionary approach, the Warrington AQMA and the Motorway AQMA, will remain in place and will not be amended at this time.

The Air Quality Action Plan (AQAP) was formally adopted in April 2018. The main priority is to try to tackle the exceedances of NO₂ and to improve air quality generally, not just within the AQMAs but across the wider borough. The AQAP will sit alongside and inform major new Council policies, specifically the new emerging Local Plan and the updated Local Transport Plan (LTP4), which are being developed in 2019.

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

⁴ Public Health Outcomes Framework Indicator 3.01 – Fraction of mortality attributable to particulate pollution, 2017

Whilst fine particulates, known as PM_{2.5}, are not included within the regulations, there is substantial health evidence of the impacts. PM_{2.5} levels have marginally reduced when compared to 2017. Longer term, PM_{2.5} levels have been assessed, as part of the emerging Local Plan, as only seeing minor improvements and there is still concern over levels close to major roads when compared against the non-statutory World Health Organization guideline values. The AQAP and related policies have been developed to ensure that measures aimed at reducing NO₂ are complementary to reducing PM_{2.5}.

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 (Appendix C), traffic volumes have remained approximately the same during 2016, 2017 and 2018 for all vehicle types since reaching the peak in 2016. 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 2015 (to be revised in 2019) sets out the overarching aims of "Working together for stronger neighbourhoods, healthier people, a vibrant and resilient economy and greater equality across all our communities".

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 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>

Actions to Improve Air Quality

The new 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 draft Local Transport Plan (LTP4). Actions have continued aimed at improving traffic flows, increasing cycling and use of travel planning.

Specific actions completed in 2018 are:

- Draft Local Plan has included specific policies drafted to include air quality. A borough wide air quality assessment has been carried out to assess impacts on air quality from the growth plans.
- Draft Local Transport Plan (LTP4) has sections on low emissions vehicles, active travel and consideration of air quality through the Plan. This is expected to be adopted by the end of 2019 subject to consultation.
- Warrington Intelligent Transport System along the A49 Winwick Road in the Warrington AQMA has been set up and initial results show improvements in flows and reduced journey time. A mobile phone app is being developed for release in 2019.
- Air quality is on the agenda for routine meetings with Highways England. Highways England have confirmed though, that at this time they have no proposed measures for the motorway network around Warrington to improve air quality in the Motorway AQMA.

Two bids were submitted for the Defra 2018 Air Quality Grant. The first one was for a schools project and website information, and the second bid for sensor trials and increased PM_{2.5} monitoring. Both of these would have supported actions within the AQAP, but were unfortunately unsuccessful.

The major bus provider in Warrington, Warrington's Own Buses, submitted a grant bid for to support six electric buses to use on routes within Warrington. This bid was also unsuccessful.

Conclusions and Priorities

Air quality levels in 2018 have marginally improved compared to those observed in 2017 for NO₂, PM₁₀ and for PM_{2.5}. Whilst some locations within AQMAs have reduced to below the objective level in 2018, it is important to consider the longer term trend to take into account annual fluctuations due to meteorological conditions. While levels have reduced there remain some locations areas within current AQMAs that still exceed the national objectives for NO₂.

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 2019 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 2019, 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. Measures available to the Council to improve air quality though within the Motorway AQMA remain limited without support from Highways England

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

Defra's appraisal of last year's ASR concluded "*on the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants*" and that "*the report is well structured, detailed, and provides the information specified in the Guidance.*" Two comments were provided to help inform future reports:

1. *The maps provided for diffusion tube locations are unclear. Each site is not referenced. Please ensure maps are referenced with site IDs as used in results tables. Additionally the Council may wish to use larger scale maps, which may require a number of separate maps being used.*

This has been addressed within this report with a number of smaller scale maps used to increase clarity, as shown in Appendix D.

2. *It is noted that diffusion tube sites DT3, 4, and 5 have not been corrected for bias adjustment. While the bias adjustment is close to 1, and these sites experienced low concentrations, please ensure that all future results are adjusted accordingly.*

These tubes are tri-located with the analyser and have been used to calculate the local bias adjustment factor. These results have now also been adjusted using the bias adjustment factor.

Summary of progress of measures

Warrington Borough Council has taken forward a number of direct measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in the AQAP.

www.warrington.gov.uk/airquality

1. 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 World Health Organization 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.

Subject to the outcome of consultation, the draft Local Plan is to be submitted to the Secretary of State in autumn 2019 with an Examination in Public in early 2020.

2. Sustainable Transport Strategies (Local Transport Plan 4)

Consultation has been completed in June 2019. Subject to the consultation, the revised plan is expected to be adopted towards the end 2019.

3. Environmental Protection SPD

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

4. 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.

This action is now completed.

5. Smoke Control Area Review

The majority of Warrington is designated as Smoke Control Areas. This is to be reviewed but due to 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.

6. 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 local motorway network.

This action is now considered to be completed, although the Council will continue to lobby with Highways England to improve air quality in the Motorway AQMA due to emissions from their network.

7. Warrington Intelligent Transport System

This action has been completed for the A49 Winwick Road within the Warrington AQMA. Initial results show improvements in traffic flows with journey times on some lengths improved by up to 30%. The action will be retained within the AQAP to assess ongoing effectiveness. The scheme is to be considered to be used on other major roads.

8. Chester Road Promenade Route.

Will be a major new cycleway along Chester Road within the Warrington AQMA. Consultation on design options expected to take place in 2019.

9. Burtonwood to Omega Shared Pathway

A proposed shared pedestrian and cycle way linking to a major employment area adjacent to the Motorway AQMA. This action has been slightly delayed due to negotiations for land purchase. Expected works are due to begin in 2020.

10. Warrington West Railway Station

Anticipated opening will be in summer 2019, subject to the Office of Rail and Road Approval. The car park serving the new railway station will have 14 electric vehicle charging points.

11. Centre Park Link Road

This is expected to reduce traffic volumes and improve flows within the town centre at Bridgefoot roundabout and the AQMA.

Construction work started April 2019, with expected completion in April 2021.

12. 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. Revised programme for the delivery is to be published in 2019.

13. 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.

The action is considered completed.

14. 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.

Progress has been slower than expected due to staff resources and waiting on the outcome of the grant bid. This action is planned to significantly progress in 2019.

15. Temporary Play Streets

Application forms and guidance documents have been developed. A trial event is proposed to occur during summer 2019.

16. Air Quality Webpage

The pages are drafted and due to be published in July 2019. This will feature interactive maps for Smoke Control Areas and AQMA plus information on health and for schools. This action is expected to be completed in 2019.

17. 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.

Key completed measures are:

- Borough wide air quality modelling has been completed to assess the proposed growth within the emerging Local Plan.
- Air quality is now on the agenda for routine meetings with Highways England and the Council's Transport Team.
- Warrington Intelligent Transport System to improve flows and journey time is fully operational along the A49 Winwick Road within the Warrington AQMA.
- Clean Air Zone initial scoping assessment has been produced.
- Council Procurement now includes air quality within the procurement strategy.

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

- Local Transport Plan (LTP4) to be adopted. This will lead on to further actions.
- Warrington West Rail Station to open at the end of summer 2019.
- Updated Air Quality webpage to improve public engagement to encourage behavioural change. Includes schools information and links to health along with interactive maps showing location of AQMAs and Smoke Control Areas.
- Temporary Play Streets. The first trial event to be in summer 2019, followed by on-line application process.

Warrington Borough Council's priorities for the coming year are to continue to work on the actions set out within the AQAP. Completed actions will be kept within the AQAP to enable post evaluation. The AQAP will be revised, where appropriate, to consider additional actions to replace those completed.

The principal challenges and barriers to implementation that Warrington Borough Council anticipates facing are funding and resources to complete the actions.

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 will be required in subsequent years to achieve compliance and enable the revocation of the Warrington and Motorway AQMAs.

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.

PM_{2.5} impacts on mortality are included within the Public Health Outcomes Framework Indicator 3.01. The most recent figures available are for 2017, which show a reduction to 4.3% from 4.9% in 2016. The figures for 2018 have not yet been released. Figure A.5 in Appendix A shows the trend since 2010 for Warrington, compared to the North West. The Council has used this as part of the health evidence to produce a chapter on Air Quality in the Joint Needs Strategic Assessment (JSNA) Framework that has been adopted in April 2018.

Warrington Borough Council considers that the measures within the AQAP to reduce NO₂ will be complementary in reducing PM_{2.5} emissions.

Action 1 within the AQAP for the Local Plan growth proposals, included a borough wide air quality assessment for PM_{2.5} levels. This concluded that whilst there will be some improvements, there will still remain areas that exceed the World Health Organization guideline value in 2036. It is accepted that further actions, through the LTP4 and other measures, will be required to meet this value.

Action 17 within the AQAP is to carry out PM_{2.5} monitoring to gain further evidence of concentrations within poor air quality areas. Funding for this was sought via the Defra Air Quality Grant, but this was unsuccessful. There remains a gap in funding to carry this action out at this current time. Until funding is secured, this action is unable to be completed.

Regarding Smoke Control Areas, the majority of Warrington has been covered by Smoke Control Orders since the 1970s. The Council is aware though, of a recent increase in domestic wood burning stoves, which even with Defra approved appliances, will still result in result in increased fine particulate and NO_x emissions. There are some outlying wards that are not covered by Smoke Control Orders. It is proposed within the AQAP to assess whether the whole of Warrington should be

included under one order, although this action has been delayed to await the outcome of the draft Environment Bill and subsequent guidance for local authorities on new legislative powers.

Planning applications for new developments are screened for air quality and, if considered necessary, include PM_{2.5} impacts and exposure. The Environmental Protection Supplementary Planning Document will be updated as a measure within the AQAP in line with the new emerging Local Plan update.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Warrington Borough Council undertook automatic (continuous) monitoring at 3 sites during 2018. Table A.1 in Appendix A shows the details of the sites.

Monitoring data from the Selby Street AURN site is available at

<https://uk-air.defra.gov.uk/networks/network-info?view=aurn>

The data for Chester Road and Parker Street roadside sites is available from the UK Air Quality website at

<http://www.ukairquality.net/>

The links can be accessed through the Council air quality webpage at

<https://www.warrington.gov.uk/airquality>

Alternatively the data can be provided by the Council on request.

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

Warrington Borough Council undertook non- automatic (passive) monitoring of NO₂ at 42 sites during 2018. Table A.2 in Appendix A shows the details of the sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

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

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

Monitoring data shows similar levels to those measured in 2017, whilst some sites show marginal improvements, there are some locations that are marginally worse.

The number of locations showing an exceedance in the annual mean objective has slightly reduced. There are though, locations still within current AQMAs that continue to show exceedances, or 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. 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.

There are no locations where there is a measured annual means greater than 60µg/m³, which would indicate that an exceedance of the 1-hour mean objective could be likely.

Trends

Trend data for NO₂ 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 2018, does indicate 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 2017 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

As with previous annual reviews there continues to be measured exceedances on Parker Street with concentrations similar to 2017. DT9 shows an exceedance of $41.9\mu\text{g}/\text{m}^3$ when distance corrected to the nearest residential property. The Parker Street real time analyser though records $38.1\mu\text{g}/\text{m}^3$ which while below the objective still remains a risk of exceedance. Wilson Patten Street diffusion tube DT10 shows a marginal improvement to $39.5\mu\text{g}/\text{m}^3$. When distance correction is applied, the 2018 concentration is below the objective level. 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, similar to 2017, records a concentration of $32.2\mu\text{g}/\text{m}^3$, below the objective levels. It should be noted though that the data collection for DT12 is low due to the tube going missing on site as occurred in 2017, therefore a seasonal correction has been applied increasing the uncertainty.

Baxter Street 1 (DT13), located on a house front on the opposite side of Crosfield traffic island, measures a concentration of $39.6\mu\text{g}/\text{m}^3$, at the objective level. This is a slight improvement on the exceedance in 2017 but is still of concern.

Chester Road locations (DT17, DT18 and DT19) all show concentration below the objective limit. DT17 records a slight risk of exceedance of $36.6\mu\text{g}/\text{m}^3$ similar to 2017. DT18 shows a significant reduction to $31.6\mu\text{g}/\text{m}^3$ compared to the risk of exceedance on 2017 although there no evidence for this lower level at this location compared to the other sites, it is likely to be due to freer flowing traffic. DT18 though, has been seasonally adjusted due to low data collection which will increase the

uncertainty. The data at this location is supported by the Chester Road analyser (CM3) concentration of $30\mu\text{g}/\text{m}^3$. DT19 measure $34.1\mu\text{g}/\text{m}^3$, below the objective level and similar to the level in 2017. is below the objective level compared to previous years, which had showed a risk of exceedance. DT20 at Walton Terrace, immediately south of the Chester Road swing bridge, shows a reduction in concentrations since 2017 to $34.5\mu\text{g}/\text{m}^3$. Chester Road will continue to be monitored in 2019 and will be used to assess the impacts from the Centre Park Link Road.

Along Wildersppol Causeway, NO_2 concentrations have improved and are below the objective level. Wilderspool Causeway (DT21) has a reduced concentration of $31\mu\text{g}/\text{m}^3$ where previously had recorded levels as a risk of exceedance close to the objective level. Wilderspool Causeway 3 (DT22) was placed to assess levels by a childrens' nurse on a junction between Wilderspool Causeway and Gainsborough Road. This recorded a level of slightly reduced level compared ot 2017 of $30.1\mu\text{g}/\text{m}^3$. Wilderspool Causeway 2 (DT23) has previously recorded concentrations that exceed the objective level, but similar to 2017, has reduced to a level of $33.7\mu\text{g}/\text{m}^3$.

Monitoring at these locations will continue in 2019.

On Knutsford Road, between Bridgefoot and Latchford, NO_2 concentrations have improved and are below the objective level. Knutsford Road (DT25) has previously recorded concentrations that exceed, or have a risk of exceedance, of the objective level. This has reduced further in 2018 to record a level of $30.2\mu\text{g}/\text{m}^3$. Knutsford Road 2 (DT26) has previously shown levels with a risk of exceedance, but this significantly reduced in 2017 and levels in 2018 remain similar at $28.3\mu\text{g}/\text{m}^3$.

In Latchford Village, concentrations have improved but some locations show a risk of exceedance and remain of concern. Kingsway South (DT27) has previously recorded concentrations above the objective limit, but in 2017 this reduced and in 2018 shows further but slight improvements with a concentration of $35.2\mu\text{g}/\text{m}^3$. Latchford Village 2 (DT28) records a marginal improvement will a concentration of $39.9\mu\text{g}/\text{m}^3$. Latchford Village 3 (DT29) recorded an exceedance in 2016, but this to below the objective limit in 2017 and records further marginal reductions to $33.7\mu\text{g}/\text{m}^3$. Latchford Villlage 4 (DT30) was placed out during 2017 to assess concentration outside the entrance to the Thomas Boteler High School. This shows similar levels to 2017 with an average of $29.8\mu\text{g}/\text{m}^3$.

Mersey Street 1 (DT31) has previously measured concentrations above the objective level but these reduced to just below the limits in 2017. For 2018 there is a further marginal improvement to $37.7 \mu\text{g}/\text{m}^3$ and there remains a risk of exceedance at this location. Napier Street (DT32) was located to assess the drop off in concentrations from DT31 and the extent of the AQMA. This continues to measure a concentration below the objectives and sees a significant reduction in concentration to $24 \mu\text{g}/\text{m}^3$ although monitoring at this location ceased in 2018 and the data has been seasonally corrected. James Lee House (DT33) has previously measured exceedances. In 2017, there was a reduction to below the objective limit. In 2018, DT33 further reduces to $36.2 \mu\text{g}/\text{m}^3$ still showing a risk of exceedance, but has been seasonally corrected due to low data collection as the tube was missing from site, which increases the uncertainty.

Bewsey Street (DT34) has previously measured levels below the objective limit, but still with a risk of exceedance. In 2018 this shows concentrations of $32.3 \mu\text{g}/\text{m}^3$, similar to those in 2017.

Crosfield Street (DT36) had exceeded the objective limits in previous years. In 2017, this level has reduced significantly below the objective limit, but recorded a concentration slightly higher in 2018 of $36 \mu\text{g}/\text{m}^3$. Monitoring at this location will continue in 2018 to assess the trend.

Along the A49 Winwick Road concentrations have improved but there remains a location that exceeds the objective. Winwick Road 1 (DT42) reduced in 2017 to below the the objection limit. In 2018 this saw a further improvement to $32.6 \mu\text{g}/\text{m}^3$. Winwick Road locations 2 (DT43) and 3 (DT44) are improved compared to 2017, but continue to show exceedances above the objective limit in 2018. DT43 measures $40.3 \mu\text{g}/\text{m}^3$, which when distance corrected to the nearest residential is $37.7 \mu\text{g}/\text{m}^3$. DT44 measured $43.9 \mu\text{g}/\text{m}^3$ which represents the closest residential to roadside and confirms the requirement for the AQMA.

Motorway AQMA

Manchester Road (DT6) 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 but in 2017

there was a reduction measuring a concentration of $39.4 \mu\text{g}/\text{m}^3$, although data capture was low. In 2018 data capture was improved with the measured concentration now being $45.6 \mu\text{g}/\text{m}^3$ showing an exceedance and confirming the requirement for the AQMA.

To assess motorway emissions further, new monitoring was set up in May 2018 by the M62 and the M56. Both locations also had a number of months where the tubes were missing on site which further reduced the data capture. Due to the short monitoring period, both tubes have been seasonally adjusted, which does increase the uncertainty. DT7 is located next to residential just outside the AQMA, 60m from the M62. This recorded an annual concentration of $29.7 \mu\text{g}/\text{m}^3$. DT8 is located 17m from the M56 within the Motorway AQMA and recorded an annual concentration of $34.2 \mu\text{g}/\text{m}^3$. These locations will continue to be monitored during 2019.

Locations outside AQMA

The real time analyser at Selby Street (CM1) is part of the AURN and measures concentrations for urban background. For 2018, this measured $21.4 \mu\text{g}/\text{m}^3$, similar to the level in 2017. Bruche Avenue (DT2) is located to represent urban background levels. For 2018, this has measured a concentration of $16.6 \mu\text{g}/\text{m}^3$, lower than in previous years. It must be noted that monitoring was ceased during the year to allow other locations to be assessed, therefore the data has been adjusted which will increase the uncertainty.

Risley Moss (DT1) measures concentrations at a rural background site and recorded a concentration of $16.4 \mu\text{g}/\text{m}^3$ in 2018. Data capture though was low at the site due to the tube going missing, therefore the data has been adjusted accordingly.

Winmarleigh Street (DT11) is located within the town centre outside of the AQMA to assess drop off from the main Wilson Patten Street and town centre levels. This is located at worse case location next to residential apartments by the Museum Street junction. Levels have been close to but below the objectives in previous years. Monitoring at this location ceased in 2018 to allow other locations to be assessed, therefore the data has been adjusted. For 2018, the measured concentration is reduced compared to 2017 with a concentration of $26.9 \mu\text{g}/\text{m}^3$.

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 $27.5 \mu\text{g}/\text{m}^3$, a slight reduction in the concentration measured in 2017.

Tanners Lane (DT35) was located in 2017 just outside the Warrington AQMA by a medical and health care centre immediately adjacent to a busy junction. This was to gain evidence of air quality levels that may affect people with existing health problems that would use the centre. This measured a significant reduction compared to 2017 with a concentration of $32.4 \mu\text{g}/\text{m}^3$. Monitoring at this location ceased during 2018 and the data has been adjusted accordingly.

Previous assessments have highlighted potential exceedances at locations within the Padgate area and monitoring was expanded in 2018 to assess the extent. King Edward Street (DT37) measured $37.9 \mu\text{g}/\text{m}^3$ in 2018, a reduction compared to the 2017 levels. When this is distance corrected to the nearest property, the concentration reduces to $34.8 \mu\text{g}/\text{m}^3$, below the level where there could be a risk of exceedance. Padgate Lane 1 (DT38) a concentration of $35.1 \mu\text{g}/\text{m}^3$ has been measured, similar to the level in 2017. Padgate Lane 2 (DT39), has previously measured exceedances which are close to the objective limits, which reduced in 2017. In 2018 a concentration of $35.1 \mu\text{g}/\text{m}^3$, below the objective limit. Additional, new locations have been monitored during 2018 at Steel Street (DT40) and Manchester Road (DT41). DT40 measures a concentration of $42.4 \mu\text{g}/\text{m}^3$, but when a distance calculation had been applied to the nearest residential, a concentration of $37.8 \mu\text{g}/\text{m}^3$ is calculated, below the objective level but still with a risk of exceedance. DT41 measures a concentration of $32.4 \mu\text{g}/\text{m}^3$, below the objective value when seasonally adjusted. Due to the levels being close to the limits in previous years, monitoring will be continued during 2019.

3.2.2 Particulate Matter (PM₁₀)

Table A.5 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

Table A.6 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

The Selby Street site was affiliated into the national network (AURN) in 2008. As a result of this, particulate monitoring is carried out using FDMS type B/C, which meets the EU equivalence criteria, for PM₁₀ and PM_{2.5} measurement. A BAM type analyser replaced the FDMS analyser in November 2018 as part of the national network upgrade. 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 objective, which is consistent with previous years.

Data capture for 2018 is poor at 69.8% due to various issues with the FDMS analyser, which resulted in erroneous data being completely removed for January and February and reduced capture rates in May and July. For 2018, when seasonally corrected, there was a measured annual average concentration of 13 µg/m³, which is a slight increase when compared to 2017 concentrations.

The 24 hour mean objective of 50µg/m³ is not to be exceeded more than 35 times a year. This was exceeded once during 2018 and continues 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 PM₁₀ 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.

Similar to the PM₁₀, PM_{2.5} was measured using the TEOM FDMS system which was then replaced by a BAM unit in November as part of the AURN at the Selby Street monitoring site. Data has been ratified as part of the AURN.

The annual mean is 9 µg/m³ with data capture at 89%. This is a marginal improvement on the 2017 concentration. Trend data is shown in Figure A.4 (Appendix A).

The results show that the proposed target level of 25 by 2020 is being met at urban background, but the concentration remains close to the guidance level recommended by the World Health Organization.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
CM1	Selby Street	Urban Background	359151	388218	NO ₂ , PM _{2.5} , PM ₁₀	NO	Chemiluminescent; FDMS/BAM	22m	50m	2.5
CM2	Parker Street	Roadside	360015	387907	NO ₂	YES	Chemiluminescent	1m	2 m	1.5
CM3	Chester Road	Roadside	360331	386454	NO ₂	YES	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	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
DT1	WA08 Risley Moss	Rural	366949	392004	NO2	NO	n/a	n/a	NO	1.5
DT2	WA14 Bruche Avenue	Urban Background	362792	389503	NO2	NO	5	28	NO	2
DT3	WA22 Selby Street	Urban Background	359152	388218	NO2	NO	n/a	50	YES	2.5
DT4	WA23 Selby Street	Urban Background	359152	388218	NO2	NO	n/a	50	YES	2.5
DT5	WA24 Selby Street	Urban Background	359152	388218	NO2	NO	n/a	50	YES	2.5
DT6	WA111 M6 Manchester Road	Roadside	366102	389214	NO2	YES	0	16	NO	2
DT7	WA123 M62 Radley Lane	Roadside	361655	391914	NO2	NO	0	60	NO	2.5
DT8	WA124 M56 Queastybirch	Roadside	360233	381994	NO2	YES	17	17	NO	1.5
DT9	WA20 Parker St	Roadside	360044	388048	NO2	YES	2	1.5	NO	2.5
DT10	WA102 Wilson Patten Street	Roadside	360309	387848	NO2	YES	4.5	1	NO	2.5
DT11	WA114 Winmarleigh Street	Roadside	360243	387932	NO2	NO	2	2	NO	2.5
DT12	WA67 Crosfield Island 2	Roadside	359509	388235	NO2	YES	0	14.5	NO	2.5

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DT13	WA65 Baxter Street 1	Urban Centre	359452	388111	NO2	YES	0	2	NO	2.5
DT14	WA85 Old Liverpool Road 4	Roadside	359430	387947	NO2	NO	4	2	NO	2.5
DT15	WA30 Old Liverpool Rd	Roadside	358867	387672	NO2	NO	3	3	NO	2.5
DT16	WA86 Old Liverpool Road 5	Roadside	357765	387908	NO2	NO	2	3	NO	2.5
DT17	WA68 Chester Road	Roadside	360648	387388	NO2	YES	3	3	NO	2.5
DT18	WA72 Chester Road 3	Roadside	360513	387048	NO2	YES	5.5	3	NO	2.5
DT19	WA87 Chester Road 5	Roadside	360407	386237	NO2	YES	4	2	NO	2.5
DT20	WA93 Walton Terrace	Roadside	360450	386052	NO2	YES	3	2	NO	2.5
DT21	WA76 Wilderspool Causeway	Roadside	360880	387247	NO2	YES	2.5	2.5	NO	2.5
DT22	WA118 Wilderspool Causeway 3	Roadside	361220	386874	NO2	YES	10	3.3	NO	2.5
DT23	WA94 Wilderspool Causeway 2	Roadside	361319	386508	NO2	YES	0	2	NO	2.5
DT24	WA90 Stockton Heath 3	Roadside	361470	385981	NO2	NO	3	2	NO	2.5
DT25	WA77 Knutsford Road 1	Roadside	361898	387430	NO2	YES	0	3	NO	2.5

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DT26	WA103 Knutsford Road 2	Roadside	361019	387.633	NO2	YES	5	7	NO	2.5
DT27	WA92 Kingsway South (Latchford)	Urban Centre	362810	387187	NO2	YES	0	3	NO	2
DT28	WA105 Latchford Village 2	Roadside	362779	387288	NO2	YES	1	1.5	NO	2.5
DT29	WA115 Latchford Village 3	Roadside	362604	387222	NO2	YES	55	2	NO	2.5
DT30	WA116 Latchford Village 4	Roadside	362465	387249	NO2	YES	2.5	2	NO	2.5
DT31	WA78 Mersey Street	Roadside	361005	388145	NO2	YES	2.5	6	NO	2.5
DT32	WA100 Napier Street	Roadside	361005	388106	NO2	NO	0	35 (to Mersey Street)	NO	2.5
DT33	WA99 James Lee House	Roadside	361097	388459	NO2	YES	0	3	NO	2.5
DT34	WA80 Bewsey Street	Roadside	360462	388501	NO2	YES	0	30 (to train line)	NO	2.5
DT35	WA117 Tanners Lane	Roadside	360361	388657	NO2	NO	4	3	NO	2.5
DT36	WA83 Crosfield Street	Roadside	360040	388406	NO2	YES	4.5	2.5	NO	2.5
DT37	WA89 King Edward Street	Roadside	362392	389101	NO2	NO	2.5	2	NO	2.5

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DT38	WA107 Padgate Lane 1	Roadside	362235	389248	NO2	NO	2.5	1.5	NO	2.5
DT39	WA108 Padgate Lane 2	Roadside	362060	389170	NO2	NO	2.5	2	NO	2.5
DT40	WA125 Steel Street	Roadside	362131	389473	NO2	NO	7	1.5	NO	2.5
DT41	WA126 Manchester Road	Roadside	362375	389033	NO2	NO	6	2	NO	2.5
DT42	WA95 Win Rd 1	Roadside	360598	389820	NO2	YES	5.5	5	NO	2.5
DT43	WA96 Win Rd 2	Roadside	360484	390416	NO2	YES	5.5	3	NO	2.5
DT44	WA112 Win Rd 3	Roadside	360434	390968	NO2	YES	0	2	NO	2.5

Notes:

- (1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).
 (2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
CM1	Urban Background	Automatic	92.2	92.2	20.5	24.4	25	21	21.4
CM2	Roadside	Automatic	93.5	93.5	53.8	40	47	37.9	38.1
CM3	Roadside	Automatic	82.1	82.1	32.2	37	34	32	30
DT1 (WA08 Risley Moss)	Rural	Diffusion Tube	58.3	58.3	19.1	25.2	18.8	17.3	16.1
DT2 (WA14 Bruche Avenue)	Urban Background	Diffusion Tube	100	33.3	19.1	23.3	23.6	19.3	16.6
DT3 (WA22 Selby Street)	Urban Background	Diffusion Tube	100	100	20.3	24.4	24.7	21.2	21.4
DT4 (WA23 Selby Street)	Urban Background	Diffusion Tube	100	100	20.5	25	25.6	21.6	21.3
DT5 (WA24 Selby Street)	Urban Background	Diffusion Tube	100	100	20.7	24.4	24.4	21.5	21.7
DT6 (WA111 M6)	Roadside	Diffusion Tube	91.7	91.7	41.7	55.5	44.2	39.4	45.6
DT7 (WA123 M62)	Roadside	Diffusion Tube	62.5	41.7					29.7
DT8 (WA124 M56)	Roadside	Diffusion Tube	75	50					34.2
DT9 (WA20 Parker St)	Roadside	Diffusion Tube	100	100	47.6	55.2	55.7	45.2	45.9
DT10 (WA102 Wilson Patten Street)	Roadside	Diffusion Tube	100	100	41.1	47	49.5	40.7	39.5
DT11 (WA114 Winmarleigh Street)	Roadside	Diffusion Tube	100	33.3	29.5	40.1	39.4	31.7	26.9

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DT12 (WA67 Crosfield Island 2)	Roadside	Diffusion Tube	66.7	66.7	33.8	41.2	37.5	32.8	32.19
DT13 (WA65 Baxter Street 1)	Roadside	Diffusion Tube	91.7	91.7	40	51	49.9	42.1	39.6
DT14 (WA85 Old Liverpool Road 4)	Roadside	Diffusion Tube	100	100	34.7	41.1	42.3	37.7	35.5
DT15 (WA30 Old Liverpool Rd)	Roadside	Diffusion Tube	75	33.3	33.4	41.4	40.6	37	31.6
DT16 (WA86 Old Liverpool Road 5)	Roadside	Diffusion Tube	100	33.3	30.1	36.6	36.8	34.9	27.2
DT17 (WA68 Chester Road)	Roadside	Diffusion Tube	100	100	35.7	44.7	46.6	36.2	36.6
DT18 (WA72 Chester Road 3)	Roadside	Diffusion Tube	66.7	66.7	34.2	39.9	39.2	37.6	31.6
DT19 (WA87 Chester Road 5)	Roadside	Diffusion Tube	100	100	30.1	40.1	38.4	34.5	34.1
DT20 (WA93 Walton Terrace)	Roadside	Diffusion Tube	100	100	33.2	45.1	40.9	37.1	34.5
DT21 (WA76 Wilderspool Causeway)	Roadside	Diffusion Tube	100	100	30.4	39.1	38.7	34.1	31
DT22 (WA118 Wilderspool Causeway 3)	Roadside	Diffusion Tube	91.7	91.7				31.8	30.1
DT23 (WA94 Wilderspool Causeway 2)	Roadside	Diffusion Tube	100	100	31.8	45.6	40.4	34.8	33.7
DT24 (WA90 Stock Heath 3)	Roadside	Diffusion Tube	100	100	29.5	35.3	33.4	28.5	27.5

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DT25 (WA77 Knutsford Road 1)	Roadside	Diffusion Tube	100	100	31.9	40.2	38	33.1	30.2
DT26 (WA103 Knutsford Road 2)	Roadside	Diffusion Tube	100	100	28.2	36	34.9	29.8	28.3
DT27 (WA92 Kingsway South (Latchford))	Roadside	Diffusion Tube	100	100	33.6	42	42.2	36.2	35.2
DT28 (WA105 Latchford Village 2)	Roadside	Diffusion Tube	100	100	43.7	49.3	48.3	41.4	39.9
DT29 (WA115 Latchford Village 3)	Roadside	Diffusion Tube	100	100		35.4	42.5	34.5	33.7
DT30 (WA116 Latchford Village 4)	Roadside	Diffusion Tube	83.3	83.3				30.5	29.8
DT31 (WA78 Mersey Street)	Roadside	Diffusion Tube	100	100	37.1	45.9	43.4	38.4	37.7
DT32 (WA100 Napier Street)	Roadside	Diffusion Tube	100	25	27.7	38.1	37	34.7	24
DT33 (WA99 James Lee House)	Roadside	Diffusion Tube	66.7	66.7	30.3	43.5	42.1	38.3	36.2
DT34 (WA80 Bewsey Street)	Roadside	Diffusion Tube	91.7	91.7	31.6	36.6	37.7	32.9	32.3
DT35 (WA117 Tanners Lane)	Roadside	Diffusion Tube	100	33.3				42.5	32.4
DT36 (WA83 Crosfield Street)	Roadside	Diffusion Tube	91.7	91.7	33.3	45.7	41.9	32.2	36
DT37 (WA89 King Edward Street)	Roadside	Diffusion Tube	83.3	83.3	38.8	45.6	47.4	42.2	37.9

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DT38 (WA107 Padgate Lane 1)	Roadside	Diffusion Tube	100	100	31	41.4	42.1	38	35.1
DT39 (WA108 Padgate Lane 2)	Roadside	Diffusion Tube	91.7	91.7	33.9	45.8	45.3	37.6	35.1
DT40 (WA125 Steel Street)	Roadside	Diffusion Tube	100	66.7					42.4
DT41 (WA126 Manchester Road)	Roadside	Diffusion Tube	100	66.7					32.4
DT42 (WA95 Winwick Road 1)	Roadside	Diffusion Tube	91.7	91.7	32	39.5	39.9	34.7	32.6
DT43 (WA96 Winwick Road 2)	Roadside	Diffusion Tube	100	100	45.8	47.2	50	44.2	40.3
DT44 (WA112 Winwick Road 3)	Roadside	Diffusion Tube	100	100	40	52	55	49.3	43.9

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 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.

Figure A.1 – Trends in Annual Mean NO₂ Concentrations

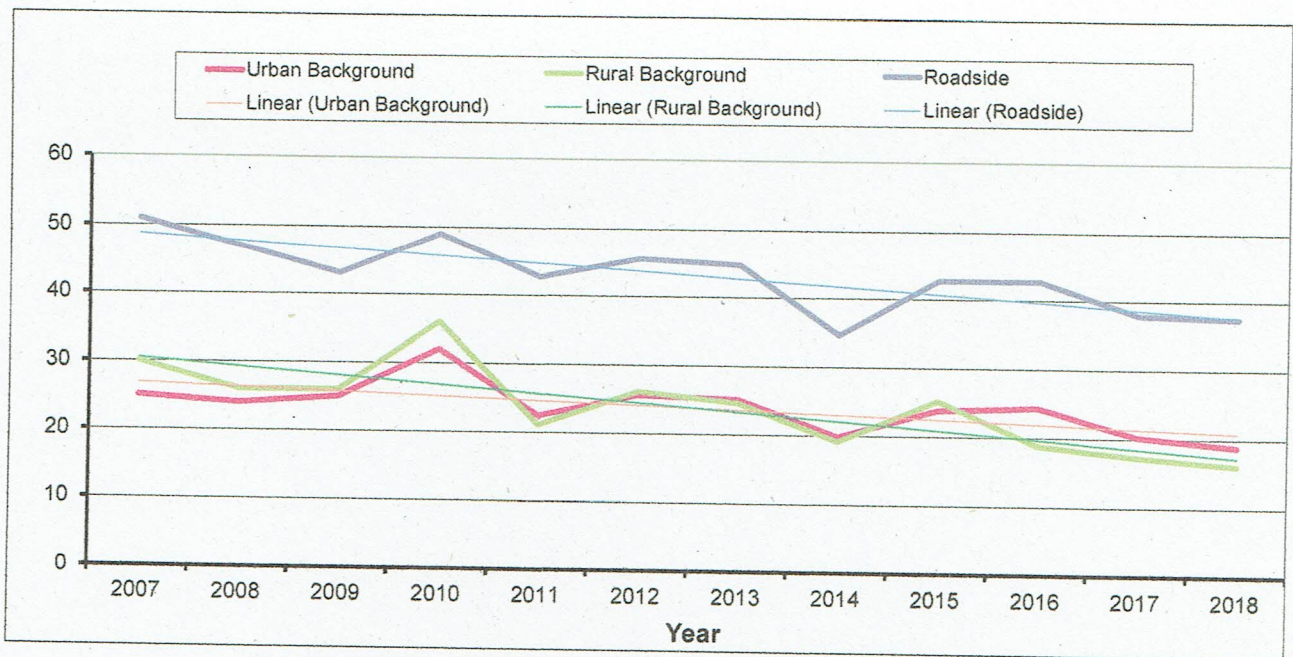


Figure A.2 – Trends in Annual Mean NO₂ Average Concentrations within AQMAs

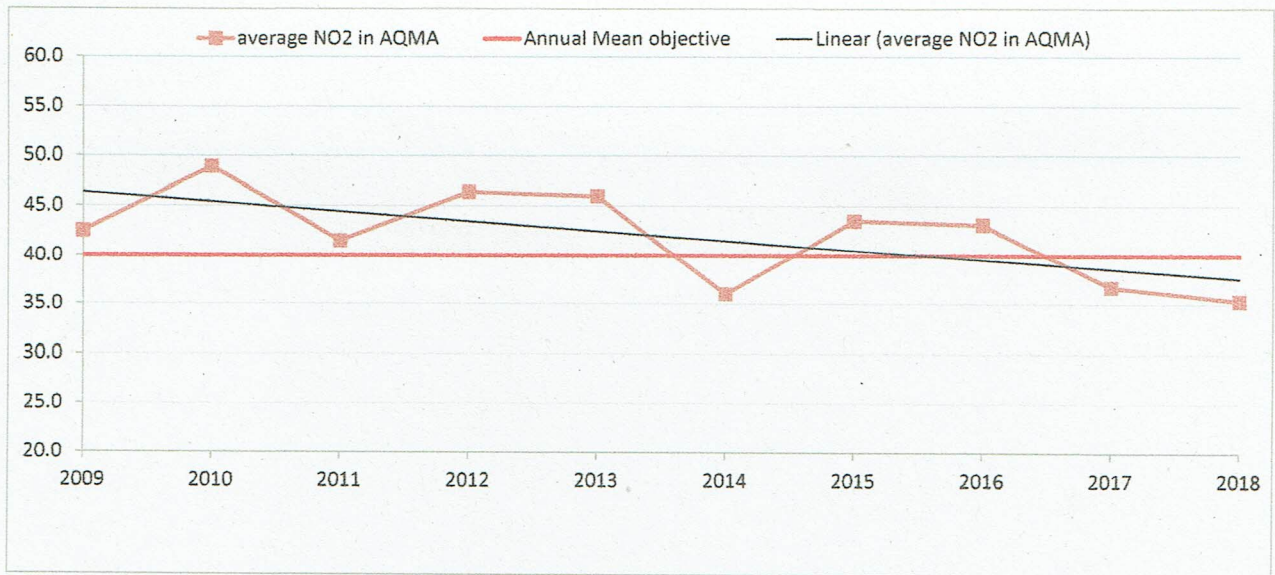


Table A.4 – 1-Hour Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2014	2015	2016	2017	2018
CM1	Urban Background	Automatic	92	92	0	0	0	0	0
CM2	Roadside	Automatic	93.5	93.5	0 (138 µg/m ³)	0 (118 µg/m ³)	0 (130 µg/m ³)	0 (119 µg/m ³)	2
CM3	Roadside	Automatic	82.1	82.1	0	0	0	0	0 (113 µg/m ³)

Notes:

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

Table A.5 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
CM1	Urban Background	69.8	69.8	16	15	16	12	13

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

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

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

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

Figure A.3 – Trends in Annual Mean PM₁₀ Concentrations

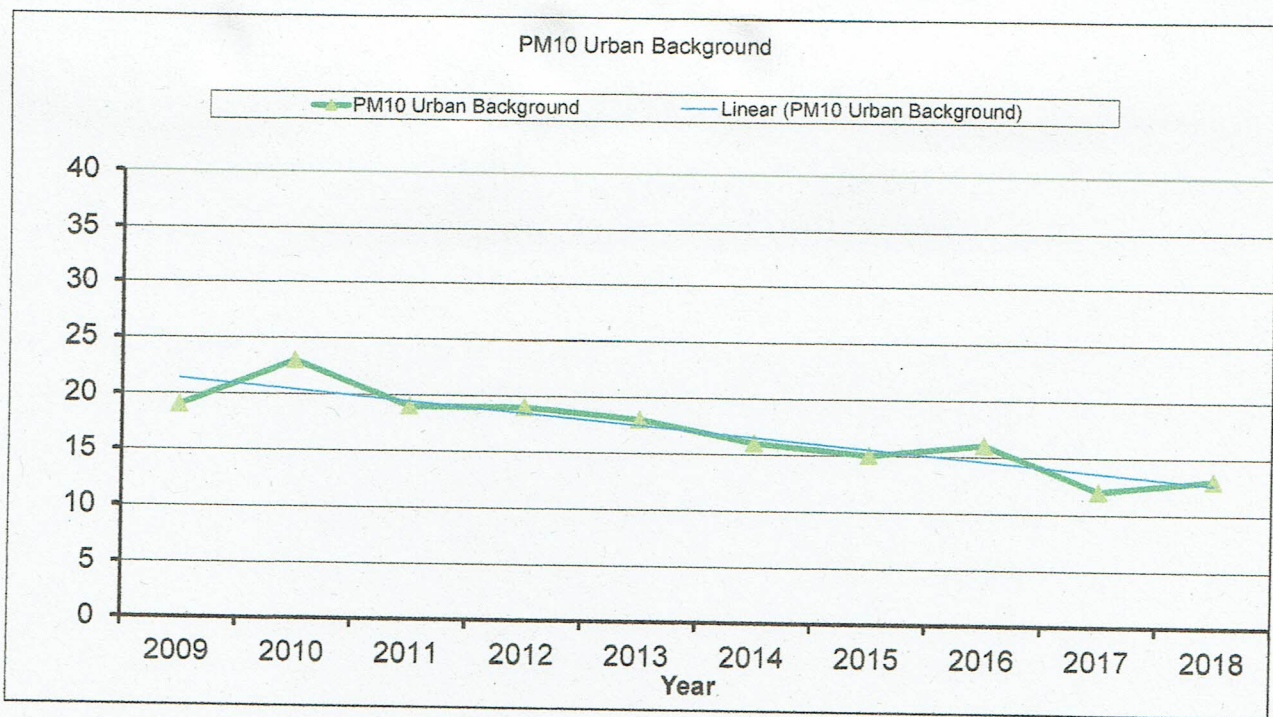


Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
				2014	2015	2016	2017	2018
CM1	Urban Background	69	69	5	2	0	3	1

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

Table A.7 – PM_{2.5} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2014	2015	2016	2017	2018
CM1	Urban Background	89.9	89.9	14	11	11	10	9

Annualisation has been conducted where data capture is <75%

Notes:

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

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

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

Figure A.4 – Trends in Annual Mean PM_{2.5} Concentrations

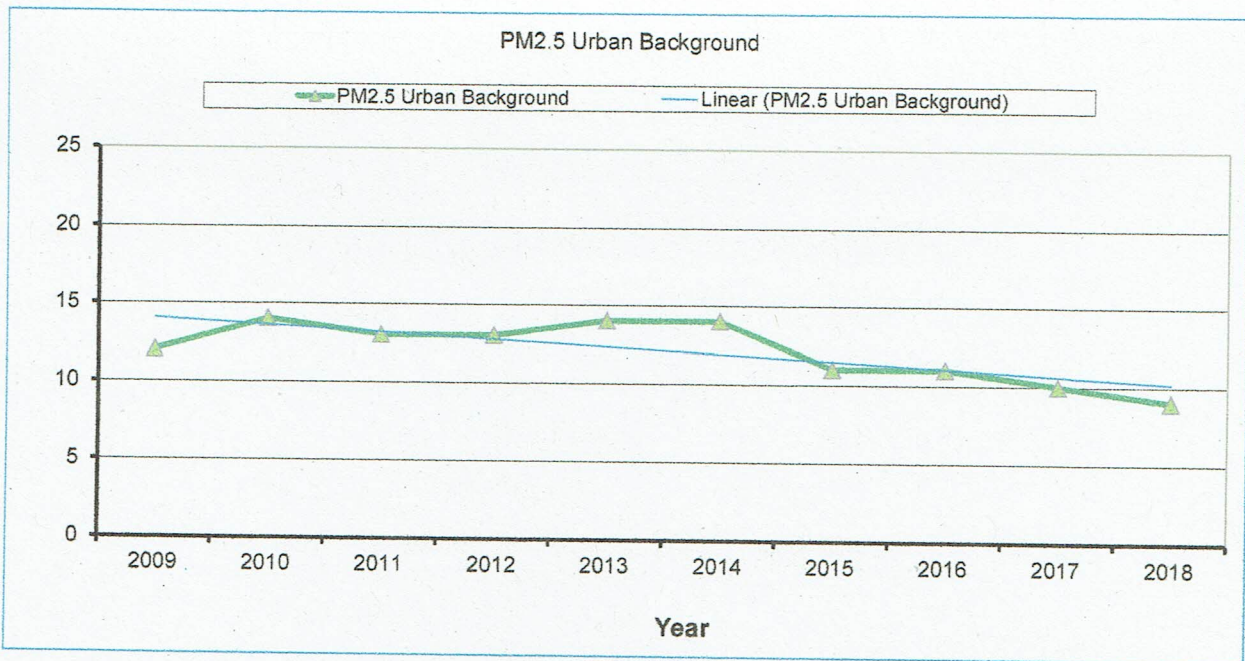


Figure A.5 – Trend of PHOF indicator 3.01 - Fraction of mortality attributable to particulate air pollution

