

Core Strategy Selective Review Air Quality Background Paper

Publication Draft Leeds Local Plan Development Plan Document February 2018



www.leeds.gov.uk/localplan

BACKGROUND PAPER IN SUPPORT OF CORE STRATEGY REVIEW POLICY EN8 ON ELECTRIC VEHICLE CHARGING POINTS

JANUARY 2018

1. National Policy Context

- 1.1 The 2008 Ambient Air Quality Directive (Directive 2008/50/EC) sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO2). This has been transposed into the UK Air Quality Standards Regulations 2010.
- 1.2 The National Planning Policy Framework states that: 124 Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.
- 1.3 Local planning authorities therefore have a duty to ensure that, when planning for new development, action is taken to reduce the resulting impacts on air quality. This is primarily achieved through the consideration of whether a particular type of development is an acceptable use of the land and in the right location and whether associated impacts can be managed, rather than the control of processes or emissions themselves, which is carried out by other regulatory agencies.
- 1.4 In December 2015 Leeds was identified by DEFRA as one of six locations in England that is not expected to meet air quality standards by 2020. This is before any of the growth arising from the Site Allocations Plan is factored in. DEFRA have stated that they will mandate Leeds to introduce a Clean Air Zone in order to facilitate improvements in air quality. If the UK fails to meet the standards by 2020, it could face huge infraction fines that could be passed down to the relevant local authorities under the Localism Act. As Leeds has been named by DEFRA there is the need to ensure that actions are taken to improve air quality in the city to ensure that we meet air quality standards as enshrined in EU and UK law.

2. Local Policy Context

- 2.1 Air quality problems in the district are mainly attributable to transport (it accounts for a minimum of 60% of all emissions where objective levels are exceeded) and this means that it is necessary for Leeds to implement measures specifically to ensure a reduction in transport emissions.
- 2.2 Leeds City Council carries out air quality monitoring across the district and the results of this can be found in the Annual Status Report (ASR). The latest ASR is included as an appendix to this background paper.
- 2.3 The ASR also identifies strategies employed by Leeds City Council to improve air quality and any progress that has been made. Planning policy has a key role to play in this through a number of policies and mechanisms that interact together, including

the appropriate location of development according to a settlement hierarchy, the inclusion of a choice of sustainable means of travel - so that people are encouraged to choose other means of travel than the private car and through the provision of a network of green infrastructure that can help to mitigate poor air quality.

- 2.4 Policies relating to transport management and accessibility are set out in Core Strategy Policies T1 and T2 and these apply to all development across the district. This includes a car parking policy to ensure adequate provision for shoppers, visitors and commuters whilst supporting sustainable travel measures which are detailed in the Parking Supplementary Planning Document (SPD) and a requirement for the preparation of travel plans for larger development to encourage use of sustainable travel options and reduce car use.
- 2.5 Policy AIR 1 in the adopted Natural Resources and Waste Local Plan 2013, applies to all major development in the district. This states:

AIR 1 THE MANAGEMENT OF AIR QUALITY THROUGH DEVELOPMENT

All applications for major development will be required to incorporate low emission measures to ensure that the overall impact of proposals on air quality (including unpleasant odours) is mitigated.

- 2.6 Applications for major development in Leeds are required to be accompanied by an air quality impact assessment to demonstrate the likely air quality impacts arising from the proposed development and to include measures for appropriate mitigation. Specialist air quality officers within Leeds City Council are consultees on the proposals. They consider the impact of air pollution that would be generated by the proposed development together with accompanying mitigation measures and assess the effect of the existing air quality climate on the proposed development, thereby ensuring that any cumulative effect that could significantly impact on or from a development site is identified.
- 2.7 In December 2015 Leeds City Council's Executive Board endorsed the West Yorkshire Low Emissions Strategy including the West Yorkshire Air Quality & Planning Technical Guide which provides guidance to developers on how they can reduce air quality impacts arising from their development. This guidance is now being used to provide advice to developers on the measures they can use to provide the mitigation required by Policy AIR 1.
- 2.8 In June and July 2017 Leeds consulted on issues and options for a Core Strategy Review. The consultation brought a number of comments regarding air quality and strong public encouragement for the Council to include more specific action on reducing air pollution. The Government has also announced their intention to ban the sale of conventional petrol and diesel cars by 2040 and this has prompted the need for cities to ensure that their infrastructure provision is ready. As a consequence, an electric vehicle charging point policy is being advanced through the Core Strategy Review.

3. Clean Air Zone

- 2.9 Leeds City Council has plans to introduce a Clean Air Zone. This means that the Council will charge buses, HGVs, taxis and private hire vehicles that fail to meet the latest diesel emissions standards when they enter a defined area. This proposed zone would cover all roads within the outer ring road with the M1 and M62 as the south-eastern boundary but would not include vehicles that divert around the outer ring road, motorways, or vehicles which cross the city using the M621. The proposals to charge vehicles would not apply to private cars or vans.
- 2.10 The Government's Clean Air Zone Framework, May 2017 sets out the role of the local planning authority in delivering the Clean Air Zone. This states that where a Clean Air Zone is introduced it should be identified in the local plans and policies and local transport plan at the earliest opportunity to ensure it is consistent with wider ambition. Leeds City Council is not able to do this yet because the Clean Air Zone is in the early stages of its development and is currently at consultation stage.
- 2.11 The Clean Air Zone Framework also states that land use planning can 'encourage more sustainable behaviour, for example in the way people use electric vehicles' (para.42). It also states 'In granting planning permission appropriate mitigation should be considered as set out in the Planning Practice Guidance, including the use of planning conditions and obligations. Options might include steps to support ULEVs in developments in Clean Air Zones; requirements to support parking and recharging of Clean Air Zone compliant vehicles; and design and support for public transport, walking and cycling accessibility' (para. 45). Consequently, the requirement for EVCPs in new development is seen as an approach which is complimentary to the introduction of the Clean Air Zone and which will help the Council ensure that the city is better prepared for a move towards the use of non-polluting forms of transport.

4. Petrol Filling Stations and Motorway Service Areas

- 4.1 The Automated and Electric Vehicles Bill is being debated in Parliament and aims to improve the network of charging points for electric vehicles. It includes a proposal to to require motorway service stations and petrol stations to provide electric vehicle charging points. The Bill passed its Second Reading on Monday 23 October 2017 and was considered in a Public Bill Committee and reported without amendment on Thursday 16 November 2017. It is proposed to go to a Third reading before going to the House of Lords.
- 4.2 The Bill is in response to research which shows that the UK's public charging infrastructure is struggling to keep pace with EV uptake. Alongside private provision, there is also a need to ensure fast charging points continue to be developed throughout the trunk road network, notably between Sunderland and Leeds, and Edinburgh and Newcastle.
- 4.3 Policy EN8 aims to ensure that infrastructure provision is not a barrier to the uptake of electric vehicles by requiring any new facilities to include electric vehicle charging points. Shell and BP have already announced plans to install plug-in points at some of their larger fuel stations.

Appendix 1

Leeds City Council Air Quality Annual Status Report 2017

Appendix 1

Leeds City Council



2017 Air Quality Annual Status Report (ASR)

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

June 2017

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Executive Summary: Air Quality in Our Area Air Quality in Leeds City Council

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 $\pounds 16$ billion³.

Air quality in the majority of the city, its suburbs and surrounding rural areas achieve the objectives contained in the UK AQ Regulations. Although there are six declared Air Quality Management Areas (AQMAs), measured concentrations at these and other locations have generally shown improvements in recent years. The 2016 Annual Status Report (ASR) included proposals to revoke two of the existing AQMAs and identified two areas where it was considered appropriate to declare AQMAs. The order putting these changes in place is due to be enacted on 1 July. The current and proposed AQMAs (shown at Appendix E) can also be seen on-line in Item 15 at: http://democracy.leeds.gov.uk/ieListDocuments.aspx?Cld=102&MId=7525&Ver=4 and the full national list at http://uk-air.defra.gov.uk/aqma/list

Under the different assessment regime of the EU Directive on Air Quality, a part of Leeds not previously assessed under LAQM because of the absence of long-term exposure has led to an obligation on the Council to consider the imposition of a 'Clean Air Zone'.

Despite the ongoing uncertainty of the suitability of the UK Government's National AQ Plan to address the country's failure to comply with the EU Directive, regular discussions with officials of the Joint Air Quality Unit (JAQU) are continuing to determine the extent of measures necessary to achieve a satisfactory outcome to the issues identified.

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

Working with the four other West Yorkshire local authorities and the Public Transport division of the West Yorkshire Combined Authority (WYCA), a West Yorkshire Low Emission Strategy (WYLES) has been introduced. In addition, joint applications through WYCA for OLEV funding have been successful under the ULEV Taxi scheme to provide an EV charging point network and a Low Emission Bus retrofit scheme to reduce emissions.

Leeds City Council has also received a major grant from DEFRA to help tackle highly polluting transport refrigeration units (TRUs) fitted to goods delivery vehicles. This will trial new technology form Dearman, testing zero-emissions refrigeration units that run on liquid nitrogen. It is estimated that in Leeds, TRUs emit 71 tonnes of nitrogen oxide and 9.5 tonnes of particulate matter each year. This project could lead to significant improvements, not just to Leeds air quality, but to other cities around the country.

Actions to Improve Air Quality

Leeds City Council has committed to;

- Improve air quality through the WYLES and Leeds' Air Quality Action Plan.
- Adopt targets for 2020 and 2030 for PM_{2.5}. The current target for PM_{2.5} particulate matter is to attain a concentration of less than 25µg/m³ and to reduce the 3 year rolling average by 15% from 2010 level by 2020. As this has already been achieved across the city, it is suggested that the Council adopt a target to reduce the PM_{2.5} by 20% from 2010 by 2020 and to aspire to meet the World Health Organisation's limit of 10µg/m³ by 2030.
- Support the allocation of free parking spaces for electric vehicles in Council car parks through a 'ULEV parking permit scheme'. This was implemented by the end of the 2015/16 financial year as part of the Cutting carbon and improving air quality breakthrough project.
- Support the enforcement of the planning conditions on new developments to increase charging infrastructure across the City. This is an on-going action that falls under the Chief Officer of Planning's responsibility to monitor for all new developments.

- Support the establishment of walking and cycling friendly infrastructure, using appropriate planning conditions to ensure new developments support alternative modes of transport. Significant work to extend, improve and increase use of cycle infrastructure has been completed with work programmes still ongoing.
- Support further work being carried out to determine the required scope of potential clean air zones within the city to ensure compliance with EU directives is met as a minimum, This work is being carried out in partnership with the JAQU.
- There is a focus on delivering improving public health outcomes for the citizens of Leeds. The Director of Environment and Housing will oversee the delivery of the study and report back to Executive Board on progress as part of the breakthrough project's annual report.

Conclusions and Priorities

Leeds' priorities and an outline of the steps it proposes to take to address the challenges it faces are shown below:

- The seriousness of current air pollution levels and their impact on public health is now much better understood. We are all exposed to air pollution to some extent and this is having a harmful effect on the health of individuals, reducing life expectancy and increasing health inequalities.
- Emissions scandals have raised public awareness about emissions levels and the detrimental effect that diesel vehicles are having on air quality. Volkswagen admitted that almost 1.2m vehicles manufactured by them are in use in the UK and independent tests have shown that many other diesel vehicles on Britain's roads fail to achieve the expected emission standard.
- The scandal has coincided with the release of DEFRA's UK Air Quality
 Improvement Plan which states that Leeds will be one of 5 cities in England that
 will not meet the EU air quality standards by 2020. DEFRA have stated that they
 will mandate Leeds to introduce a Clean Air Zone in order to facilitate
 improvements in air quality. If the UK fails to meet the standards by 2020, it could
 face huge infraction fines that could be passed down to the relevant local
 authorities under the Localism Act. As Leeds has been named by DEFRA there is

the need to ensure that actions are taken to improve air quality in the city to ensure that we meet air quality standards as enshrined in EU and UK law.

- Transport accounts for a minimum of 60% of all emissions where objective levels are exceeded, so there is a need for the Council and other fleet operators within the City to take action to improve air quality across the city.
- Raising public awareness of the risks of poor air quality to health and providing guidance to members of the public about what they can do to help reduce emissions is a fundamental aspect of the work that will continue over the next 12 months.
- There are areas of the city centre that exceed the annual average objective (of 40µg/m³) for nitrogen dioxide (NO₂) contained in the UK air quality regulations. This objective applies where members of the public can be expected to remain for a significant period. However, the latest readings obtained by monitoring at the Corn Exchange, although reducing, still show that the level is 51µg/m³ and diffusion tube monitoring commenced during the year has indicated higher concentrations in more heavily trafficked areas.
- The Council has therefore been exploring opportunities for reducing its own impact on Air Quality as well as considering levers and policies to influence others to make the necessary changes.
- A West Yorkshire Low Emissions Strategy 2016 to 2021 (**WYLES**) has been endorsed and adopted by the Council.
- To support the WYLES, a Leeds' specific action plan has been developed to show what actions need to be taken in order to meet the proposed targets to ensure that Leeds' emissions fall within legal limits and that the public health outcomes for Leeds' citizens are improved. A high level summary of the plan can be found at appendix 1.
- Leeds will be declaring two additional Air Quality Management Areas for annual mean nitrogen dioxide exceedances and is seeking to revoke two where pollutant concentrations have shown consistent compliance with the UK AQ objective

Local Engagement and How to get involved

Clean Air Leeds is the platform for Leeds' air quality behaviour change campaign. The campaign is aimed at three key audiences: residents, schools and businesses. Its objective is to raise awareness of the things these groups can do to improve the quality of air we breathe. Reducing air pollution will require a city-wide effort, and even small anticipated changes in behaviour will have a significant positive impact on air quality.

The campaign has built a following on social media, and was 'launched' alongside the National Clean Air Day campaign on 15 June 2017. There has been engagement with schools through a competition, encouraging children to walk, cycle or 'park & stride' to school, and we are currently developing toolkits with activity packs that can be used by schools. We have been providing businesses with one-to-one briefings to discuss how they can reduce air pollution or emissions through their fleet, supply chain, staff travel and heating. Residents have been communicated with, initially through the National Clean Air Day campaign, which has acted as a precursor to this three year behaviour change campaign.

To stay up to date with the campaign, please follow @CleanAirLeedsCC on Twitter or /CleanAirLeedsCC on Facebook, or alternatively email the team at CleanAirLeeds@leeds.gov.uk

In addition to the advice that can be obtained through CleanAir Leeds, some of the opportunities to tackle the emissions from road transport are outlined below:

Walking – using the 'Walk it' website: <u>https://walkit.com/cities/leeds/</u> to plan your route

Active travel – the healthy option – cycling on the newly created Cycle Superhighway from the East Leeds Outer Ring Road through to Bradford city centre: <u>http://cyclecityconnect.co.uk/downloads/FinalLeafletGeneral.pdf</u>

Car sharing – one car on the road is better than two - <u>https://wy.liftshare.com/</u> for the West Yorkshire car share club

Car Clubs – join one of the car clubs where you can hire a car when you need it for as long as you need it:

http://www.carplus.org.uk/what-is-shared-mobility/car-sharing-clubs/

Leave your car at home (or don't bring it into the city) – for local rail and bus network information: <u>http://www.wymetro.com/</u> including details of Park & Ride sites.

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1 Local Air Quality Management

This report provides an overview of air quality in Leeds City Council during 2016. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Leeds City Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix F

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Leeds City Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <u>https://uk-air.defra.gov.uk/aqma/local-</u> <u>authorities?la_id=143</u>. Alternatively, see Appendix E: Plans of Current and Proposed AQMAs, which provides a map of air quality monitoring locations in relation to the AQMA(s).

The 2016 Annual Status Report (ASR) included proposals to declare two new AQMAs in Pool-in-Wharfedale and at Morley where the annual mean nitrogen dioxide concentrations exceed the objective of $40\mu g/m^3$ contained in the UK AQ Regulations. In addition, it described proposals to revoke the AQMAs at Ladybeck Close and at Queen Street, Morley where the results of monitoring consistently showed pollutant concentrations to be below the objective level. These changes are due to occur on 1 July.

Leeds' AQAP has been prepared not only to address the issues faced in the AQMAs but also to reduce the pollutant concentrations generally, to the benefit of all residents.

Table 2.1 – Declared Air Quality Management Areas

AQMA	Date of	Pollutants and Air	City /	One Line	Is air quality in the AQMA influenced by roads	Level of Exceed monitored/modelle a location of rel	Action Plan (inc. date of	
Name	Declaration	Quality Objectives	Town Description		controlled by Highways England?	At Declaration	Now	publication)
Haslewood Close (AQMA 1/10)	Declared 1 July 2001; Amended 1 July 2010	NO ₂ Annual Mean	Leeds	An area encompassing a number of properties adjacent to the A64 at the eastern end of the Inner Ring Road.	NO	46 μg/m3 (2010)	46 μg/m3 (2015)	See note below
Ladybeck Close (AQMA 2/10)	Declared 1 July 2001; Amended 1 July 2010; to be revoked 1 July 2017	NO ₂ Annual Mean	Leeds	An area encompassing a sheltered housing development close to the A64 at the eastern end of the Inner Ring Road and Regent Street.	NO	52 μg/m3 (2010)	39 μg/m3 (2016)	See note below
Caspar Apartments (AQMA 3/10)	Declared 1 July 2001; Amended 1 July 2010	NO ₂ Annual Mean	Leeds	An area encompassing a block of properties adjacent to the A64 at the eastern end of the Inner Ring Road, surrounded by the slip road access from North Street.	NO	43 μg/m3 (2002) Initial declaration based on modelling	Monitoring ceased as premises vacant	See note below

AQMA	Date of	Pollutants and Air	City /	One Line	Is air quality in the AQMA influenced by roads	Level of Exceed monitored/modelle a location of rel	Action Plan (inc. date of	
Name	Name Declaration (Iown	Description	controlled by Highways England?	At Declaration	Now	publication)
The Normans (AQMA 4/10)	Declared 1 July 2010;	NO ₂ Annual Mean	Kirkstall, Leeds	An area encompassing a small number of properties at the ends of streets perpendicular and immediately adjacent to the A65 Abbey Road.	NO	56 µg/m3 (2010)	44 µg/m3 (2016)	See note below
The Tilburys (AQMA 5/10)	Declared 1 July 2010;	NO ₂ Annual Mean	Leeds	An area encompassing a number of properties adjacent to the eastbound slip road of Junction 2 of the M621 and A653 Ingram Road Distributor	YES	44 µg/m3 (2010)	44 µg/m3 (2014)	See note below
Queens Court, Morley (AQMA 6/10)	Declared 1 July 2010; to be revoked 1 July 2017	NO ₂ Annual Mean	Morley, Leeds	An area encompassing a small number of properties facing a bus stop/lay-over site	NO	45 μg/m3 (2010)	34 μg/m3 (2016)	See note below

AQMA	Date of	Pollutants and Air	City /	One Line	Is air quality in the AQMA influenced by roads	Level of Exceed monitored/modelle a location of rel	Action Plan (inc. date of	
Name	Declaration	Quality Objectives	Town	Description	controlled by Highways England?	At Declaration	Now	publication)
In the process of declaration:								
Main Street, Pool-in- Wharfedale	To be declared 1 July 2017	NO ₂ Annual Mean	Pool-in- Wharfedale	An area encompassing a number of properties in the immediate vicinity of the A658 Main Street	NO	59 μg/m3 (2016)		See note below
Chapel Hill, Morley	To be declared 1 July 2017	NO ₂ Annual Mean	Morley, Leeds	An area encompassing a number of properties adjacent to a narrow, inclined road leading away from Morley town centre	NO	41 μg/m3 (2015)		See note below

☑ Leeds City Council confirm the information on UK-Air regarding their AQMA(s) is up to date

Note: The Council's draft Action Plan is referred to in the text below. With progress on the proposed Clean Air Zone and its implications, the detailed AP to deliver the requirements to achieve compliance with the EU Directive (and indirectly LAQM) will be considered by the City Council's Executive Board later this year.

2.2 Progress and Impact of Measures to address Air Quality in Leeds City Council

Defra's appraisal of last year's ASR concluded that significant measures that had been developed by the City Council over recent years, in conjunction with the West Yorkshire Combined Authority including strategic highway improvements, high occupancy lanes, HGV lanes, bus priority schemes, expanded park & ride sites, guided busways, with the introduction of hybrid buses and bus retrofits that will all have contributed to the improving picture of reductions in air pollution shown by the latest monitoring results.

There were six specific points raised in the commentary provided by Defra, three of which concerned aspects of the Council's Action Plan:

- It appears that although the Council have adopted the draft Action Plan, but it is not clear whether it has not been through the process of public consultation or subject to review by Defra.
- 2. On this basis, the action plan needs to reconsider the prioritisation of measures that can significantly impact on reducing pollution below objective levels on a clear understanding of current and future transport management within the city. The Council should refer to the steps outlined in the new Technical Guidance LAQM TG(16) for further development of the Action Plan.
- 3. It will also be beneficial to review the level of further emissions reductions required at hotspot locations by reference to source apportionment, to achieve the air quality objectives, in order to inform the development of future measures including the Clean Air Zone, within the AQAP.

Leeds' initial AQ Action Plan was published in January 2004 and was subject to informal reviews up to the publication of the draft Action Plan of 2015. In the period since then, extensive regular discussions have taken place with Defra and the JACU. These discussions have come about because of the need to address the requirements of the EU Directive. Alongside this, detailed source apportionment work is being carried out and will underlie the development and introduction of a Clean Air Zone. The outcome will inform the detailed Action Plan being prepared to achieve compliance with those EU requirements and

which must also have beneficial consequences in terms of LAQM. It is anticipated that this will be reported to the Council's Executive Board later in 2017.

The remaining points concerned the presentation of data and observations in relation to the data which have been addressed separately.

Leeds City Council has continued to take forward a number of measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Further information on the current draft AQAP and the West Yorkshire Low Emission Strategy (WYLES) can be found in the report to the Executive Board (October 2015) at Agenda Item 64 of:

http://democracy.leeds.gov.uk/ieListDocuments.aspx?CId=102&MId=7245&Ver=4

(Appendix 1 – AQAP; Appendix 2 – WYLES)

and a further report (November 2016) at Agenda Item 109 of: http://democracy.leeds.gov.uk/ieListDocuments.aspx?CId=102&MId=7525&Ver=4

outlines the proposals for revision of the AQMAs.

In addition to the AQAP and WYLES, the following is a summary of proposals endorsed by the Executive Board:

Leeds City Council has committed to:

- Improve air quality through the WYLES and Leeds' Air Quality Action Plan.
- Adopt targets for 2020 and 2030 for PM_{2.5}. The current target for PM_{2.5} particulate matter is to attain a concentration of less than 25µg/m³ and to reduce the 3 year rolling average by 15% from 2010 level by 2020. As this has already been achieved across the city, it is suggested that the Council adopt a target to reduce the PM_{2.5} by 20% from 2010 by 2020 and to aspire to meet the World Health Organisation's limit of 10µg/m³ by 2030.
- Support the allocation of free parking spaces for electric vehicles in Council car parks through a 'ULEV parking permit scheme'. This was implemented by the end of the 2015/16 financial year as part of the Cutting carbon and improving air quality breakthrough project.

- Support the enforcement of the planning conditions on new developments to increase charging infrastructure across the City. This is an on-going action that falls under the Chief Officer of Planning's responsibility to monitor for all new developments.
- Support the establishment of walking and cycling friendly infrastructure, using appropriate planning conditions to ensure new developments support alternative modes of transport. Significant work to extend, improve and increase use of cycle infrastructure has been completed with work programmes still ongoing.
- Support further work being carried out to determine the required scope of potential clean air zones within the city to ensure compliance with EU directives is met as a minimum, This work is being carried out in partnership with the JAQU.
- There is a focus on delivering improving public health outcomes for the citizens of Leeds. The Director of Environment and Housing will oversee the delivery of the study and report back to Executive Board on progress as part of the breakthrough project's annual report.

Leeds' priorities and an outline of the steps it proposes to take to address the challenges it faces are shown below:

- The seriousness of current air pollution levels and their impact on public health is now much better understood. We are all exposed to air pollution to some extent and this is having a harmful effect on the health of individuals, reducing life expectancy and increasing health inequalities.
- Emissions scandals have raised public awareness about emissions levels and the detrimental effect that diesel vehicles are having on air quality. Volkswagen admitted that almost 1.2m vehicles manufactured by them are in use in the UK and independent tests have shown that many other diesel vehicles on Britain's roads fail to achieve the expected emission standard.
- The scandal coincided with the release of DEFRA's UK Air Quality Improvement Plan which states that Leeds will be one of 5 cities in England that will not meet the EU air quality standards by 2020. DEFRA have stated that they will mandate Leeds to introduce a Clean Air Zone in order to facilitate improvements in air

quality. If the UK fails to meet the standards by 2020, it could face huge infraction fines that could be passed down to the relevant local authorities under the Localism Act. As Leeds has been named by DEFRA there is the need to ensure that actions are taken to improve air quality in the city to ensure that we meet air quality standards as enshrined in EU and UK law.

- Transport accounts for a minimum of 60% of all emissions where objective levels are exceeded, so there is a need for the Council and other fleet operators within the City to take action to improve air quality across the city.
- Raising public awareness of the risks of poor air quality to health and providing guidance to members of the public about what they can do to help reduce emissions is a fundamental aspect of the work that will continue over the next 12 months. Details of 'CleanAirLeeds' are shown under a separate heading below.
- There are areas of the city centre that exceed the annual average objective (of 40µg/m³) for nitrogen dioxide (NO₂) contained in the UK air quality regulations. This objective applies where members of the public can be expected to remain for a significant period. However, the latest readings obtained by monitoring at the Corn Exchange, although reducing, still show that the level is 51µg/m³ and diffusion tube monitoring commenced during the year has indicated higher concentrations in more heavily trafficked areas.
- The Council has therefore been exploring opportunities for reducing its own impact on Air Quality as well as considering levers and policies to influence others to make the necessary changes.
- A West Yorkshire Low Emissions Strategy 2016 to 2021 (**WYLES**) has been endorsed and adopted by the Council.
- To support the WYLES, a Leeds' specific action plan has been developed to show what actions need to be taken in order to meet the proposed targets to ensure that Leeds' emissions fall within legal limits and that the public health outcomes for Leeds' citizens are improved. [This is currently being revised to deliver the requirements of the EU Directive].

- Leeds City Council has also received a major grant from DEFRA to help tackle highly polluting transport refrigeration units (TRUs) fitted to goods delivery vehicles. This will trial new technology form Dearman, testing zero emissions refrigeration units that run on liquid nitrogen. It is estimated that in Leeds, TRUs emit 71 tonnes of nitrogen oxide and 9.5 tonnes of particulate matter each year. This project could lead to significant improvements, not just to Leeds air quality, but to other cities around the country.
- Leeds will be declaring two additional Air Quality Management Areas for annual mean nitrogen dioxide exceedances and is seeking to revoke two where pollutant concentrations have shown consistent compliance with the UK AQ objective

CleanAirLeeds

Clean Air Leeds is the platform for Leeds' air quality behaviour change campaign. The campaign is aimed at three key audiences: residents, schools and businesses. Its objective is to raise awareness of the things these groups can do to improve the quality of air we breathe. Reducing air pollution will require a city-wide effort, and even small anticipated changes in behaviour will have a significant positive impact on air quality.

The campaign has built a following on social media, and was 'launched' alongside the National Clean Air Day campaign on 15 June 2017. There has been engagement with schools through a competition, encouraging children to walk, cycle or 'park & stride' to school, and we are currently developing toolkits with activity packs that can be used by schools. We have been providing businesses with one-to-one briefings to discuss how they can reduce air pollution or emissions through their fleet, supply chain, staff travel and heating. Residents have been communicated with, initially through the National Clean Air Day campaign, which has acted as a precursor to this three year behaviour change campaign.

Further information on the campaign can be seen at @CleanAirLeedsCC on Twitter or /CleanAirLeedsCC on Facebook, or alternatively by emailing the team at <u>CleanAirLeeds@leeds.gov.uk</u>

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Leeds City Council anticipates that further additional measures not yet

prescribed will be required in subsequent years to achieve compliance and enable the revocation of its declared AQMAs and compliance with the requirements of the EU Directive.

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Bus Lanes - linked to Quality Bus Initiatives/ Partnershi ps	Traffic Managem ent	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Leeds City Council + West Yorkshire Combined Authority	2010 - 2012 for A65 QBI. Several other bus priority schemes have been adopted on major Leeds corridors	2010	-	-	A65 QBI is operating well, with reduced journey times & increased patronage	Completed 2014	-
2	Guided busways	Transport Planning and Infrastruct ure	Bus route improvements	Leeds City Council	1995-2008	1996-2010	A total of 3.5 kms of Guideways were built along appropriate sections of the A61, A64 & A63 corridors. The A61 route has benefitted from a fleet of hybrid buses since 2011. All Guideways benefit from other bus priority systems eg. AVL	-	Implementation on- going	Completed 2010	All include AVL & other bus priority measures

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
3	Bus lanes/gate s	Transport Planning and Infrastruct ure	Bus route improvements	Leeds City Council	2010-2012	2010	-	-	As for QBI	Completed 2014	-
4	AVL - priority at traffic lights for buses	Transport Planning and Infrastruct ure	Bus route improvements	Leeds City Council	1995-2014	On-going	Used on most transport corridors in Leeds eg. Guided bus	-	-	On-going	-
5	Quality Contracts/ Partnershi ps	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	West Yorkshire Combined Authority & Leeds City Council	2010 - 2015	Not started	On Going discussions with WYCA & relevant Bus Operators			N/A	
6	Provision of hybrid buses (x35) in Leeds based fleet	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	West Yorkshire Combined Authority	2010 - 2012	2012 - 2014	A total of 35 Hybrid buses are operational in the north & east of Leeds		It is anticipated further Hybrid buses & other technologies will be introduced in Leeds	On Going	
7	Retrofit technologi es - SCRT to 146 WYMetro buses	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	West Yorkshire Combined Authority	2013	2014 - 2015	All Euro III and Euro IV buses retrofitted to meet Euro V+ emission standards		All Euro III buses (119) retrofitted	2015	

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
8	P+R sites	Alternativ es to private vehicle use	Bus based Park & Ride	Leeds City Council	2010	2014	Elland Rd P+R has capacity for 800 cars + 8 EV recharging points with proposal to accommodate further 800 cars Temple Green opened in June 2017 providing 1,000 spaces and EV charging points operating hybrid buses. King Lane has 155 spaces.		Now three operational P+R sites with one more in planning phase		Proposed site on A61 in south Leeds (Stourton) Aspirations to find a suitable location for a P&R site in North Leeds.
9	HOV lanes	Traffic Managem ent	Strategic highway improvements, Re-prioritising road space away from cars, inc Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Leeds City Council	1999 - 2001	2001 & 2011	Leeds set up the first HOV lane on the A647. This was followed by HOV lanes on Roundhay Road and the A63, which links the IRR with the A1/M1 Link road.			N/A	

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
10	HGV lanes	Traffic Managem ent	Strategic highway improvements, Re-prioritising road space away from cars, inc Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Leeds City Council	2008	2010	The A63 HOV lane is also an HGV lane having easy access to the to M1 for the existing Industrial area + the proposed Leeds Enterprise Zone			N/A	
11	City Centre package	Traffic Managem ent	Strategic highway improvements, Re-prioritising road space away from cars, inc Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Leeds City Council	2015 - 2016	2021	Redirecting all vehicles with the exception of buses and taxis away from City Square			2021	

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
12	City Centre North Bank	Traffic Managem ent	Strategic highway improvements, Re-prioritising road space away from cars, inc Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Leeds City Council						2023	
13	A65 / Airport Link road	Transport Planning and Infrastruct ure	Other	Leeds City Council	2014 - 2016		Improved access for users of Leeds Bradford Airport from major road network		Three proposals under consideration		
14	New Rail Stations	Transport Planning and Infrastruct ure	Public transport improvements- interchanges stations and services	West Yorkshire Combined Authority	2010 - 2014	2014 -2015	The construction of 2 new rail stations (Apperly Bridge & Kirkstall Forge) on the electrified Airedale Ime. Will include 2 P&R sites with 400 spaces		Completed in 2016		Proposals being considered for 3 additional rail stations as part of £173m transport fund

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
15	Improved access to rail use	Transport Planning and Infrastruct ure	Public transport improvements- interchanges stations and services	West Yorkshire Combined Authority	2008 - 2014	2010 - 2014	Construction of a new Southern Entrance to Leeds rail station. Northern Rail constructed a cycle point at Leeds, capable of storing up to 300 cycles.		Completed in 2015		
16	HS2/HS3	Transport Planning and Infrastruct ure	Public transport improvements- interchanges stations and services	Leeds City Council, West Yorkshire Combined Authority & Dept for Transport	2012 - 2015, very early feasibility stage	Not known yet	Proposed high speed Leeds to London route, with likely journey time reduced to 1hr 22 mins & speeds designed for 225 mph			Planned for approx 2032	
17	Incentives to promote LEVs + ULEVs	Promoting Low Emission Transport	Other	Leeds City Council	2015 - 2016	2016 - 2021	A range of incentives are being developed to promote EV's & hybrid cars/taxis. Will include reduced parking costs, free EV recharging, etc.		Free parking for ULEVs introduced during 2016		
18	Car Parking charges	Traffic Managem ent	Emission based parking or permit charges	Leeds City Council	2015	2016	As for 17		As for 17		

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
19	Leeds & Bradford City Connect Superhigh way	Transport Planning and Infrastruct ure	Cycle network	Leeds City Council	2012 - 2014	2014 - 2016	£20m Govt. funding for 23kms of segregated cycle & pedestrian tracks, between east Leeds & Bradford CC		Recently awarded another £22m funding to develop further cycle paths & supporting measures across W Yorks,	2016 for CC Superhighway & on going for numerous other schemes	Leeds to Bradford cycle highway open. Leeds to Seacroft cycle highway in progress
20	Cycling & pedestrian routes	Transport Planning and Infrastruct ure	Cycle network	Leeds City Council	2000 onwards	2010 - 2026			Cycle route development in city centre + Pedestrian crossing reviews on going. Cycle lane on Kirkstall Road	On going schemes, funded by LTP & by successful CCAG funding	
21	Travel awarenes s campaign s	Promoting Travel Alternativ es		Leeds CC + W Yorks Districts	2000 - 2015	On Going	A range of initiatives & campaigns take place on an annual basis, managed by a specialist LCC & W Yorks Team			N/A	
22	Bikeability	Promoting Travel Alternativ es	Promotion of cycling	Leeds City Council	Approx 2005 - 2015	On Going	Specialist Team provides cycle training to all primary schools			N/A	
23	Leeds City Car Club - with increasing use of ULEVs	Alternativ es to private vehicle use	Car Clubs	Leeds CC + W Yorks Districts	Approx 2002 - 2005	2005 - 2015	Numerous sites in Leeds. Approx. 50 cars are available to Leeds City Car Club members			On Going	

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
24	Car Sharing	Alternativ es to private vehicle use	Car & lift sharing schemes	Leeds CC + W Yorks Districts	2002 - 2005	2005 - 2015	LCC corporate car sharing + the W Yorks Travel Plan Network have a large & growing database for car sharing			On going	
25	School, workplace and residential travel plans	Promoting Travel Alternativ es	Workplace Travel Planning	Leeds City Council	Approx 2000 - 2015	2001 - 2015	278 schools (98%) of schools have tailored Travel Plans, 49 of which are monitored annually & 15 are 'accredited schools'. Links with Corporate & W Yorks Travel Plans				
26	Personalis ed travel plans	Promoting Travel Alternativ es	Personalised Travel Planning	Leeds City Council	Approx 2005 - 2015	2005 - 2015	Sustrans school officers have developed bespoke Travel plans across various organisations				

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
27	New UTMC system to promote smooth/fre e-flowing traffic	Traffic Managem ent	UTC, Congestion management, traffic reduction	Leeds City Council	2010 - 2012	2012 -2016	A new TMS is now operational that has improved traffic flow & reduced disruption. This system continues to be extended and is backed up with CCTV cameras at over 200 sites		This system is being further improved across Leeds		
28	Intelligent Transport systems (eg Variable message signs)	Traffic Managem ent	UTC, Congestion management, traffic reduction	Leeds City Council	2012 - 2014	2014 - 2015	Have installed 20 VMS's across Leeds at appropriate locations, to advise motorists of disruption		Funding has been approved for an additional 10 VMS's in 2017		
29	Speed Managem ent (Active speed managem ent signs)	Traffic Managem ent	UTC, Congestion management, traffic reduction	Leeds City Council	2010 - 2015	2012 - 2016	50 Vehicle Activated Signs have been set up in appropriate sites across Leeds		Additional VAS's are likely		
30	Exemplar local authority - Liquid gas (CNG/LB M) vehicles; hybrid vans; electric 'panel' vans	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	Leeds City Council	2006 - 2015	2009 - 2025	Number of fleet vehicles switched to LEV / Alternative fuel technology		42 EV, Hybrid and CNG vehicles in Fleet	2025	

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
31	Developm ent of public EV recharging network (fast and rapid)	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	West Yorkshire Combined Authority	2013	2014 - 2015	16 Rapid EV Chargers Installed on strategic WY network, of which 8 will be in Leeds		Work is ongoing to soft market test a West Yorkshire charging network	2017	
32	EV recharging in residential and commerci al premises conditione d through planning	Policy Guidance and Developm ent Control	Other policy	Leeds City Council	2010 - 2011	2012	No. of EV charge points installed on new developments		Around 100 EV charge points installed. Over 1000 EV Charge points conditioned.		
33	Shift of LA Refuse Collection fleet to CNG/LBM ; gas refuelling infrastruct ure	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	Leeds City Council	2013 - 2015	2015 - 2022	No of additional CNG Refuse Collection Vehicles (RCV) entering the fleet		Business case completed for the roll out of CNG RCVs	2022	
34	Hybrid taxi/privat e hire project	Promoting Low Emission Transport	Taxi emission incentives	Leeds City Council/ ITS Leeds University	2013 - 2014	2015	Penetration of hybrid vehicles into licensed fleet		3-fold increase in hybrids since May 2013	2015 + (project completion but ongoing 'education' role)	
35	Developm ent of hydrogen bus feasibility project	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	Leeds City Council	2014 - 2016	2016 - 2017			Agreeing letter of Intent / MoU	2016	
Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
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36	Liquid Air' technolog y applicatio ns & trials on buses & refrigerate d transport units in Leeds	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	Leeds City Council	2014 - 2016	2015 - 2017	The Dearman Engine Company have received Govt. funding to develop & trial zero emission Heat Hybrid bus units & zero emission Transport Refrigeration Units (TRUs), working with local Bus & Supermarket operators in Leeds		A prototype Liquid Air TRU is being trialled at MIRA; it will also be trialled in Leeds. It will replace highly polluting unregulated diesel TRU's. Drive- cycle on bus routes are currently being monitored, prior to trialling Heat Hybrid buses on various routes in Leeds.	2017 & beyond	
37	Eco driving technique s - SAFED courses	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Leeds City Council	2006	2006			Part of continued CPC driver training obligations	Ongoing	
38	Access to and advanced booking of all EV recharging points using Public Transport Smart Card	Promoting Low Emission Transport	Other	West Yorkshire Combined Authority	2015	2016 - 2021			Expression of Interest to participate in the GUL City Bid submitted		
39	Smart EV energy use through dynamic charging system	Promoting Low Emission Transport	Other	West Yorkshire Combined Authority	2015	2016 - 2021			Expression of Interest to participate in the GUL City Bid submitted	2020	Included in the unsuccessful Go Ultra- Low City Bid but remain aspirational

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
40	Scrappag e scheme to incentivise ULEV uptake	Promoting Low Emission Transport	Other	West Yorkshire Combined Authority	2015	2016 - 2021			Expression of Interest to participate in the GUL City Bid submitted	2016	Included in the unsuccessful Go Ultra- Low City Bid but remain aspirational
41	ULEV purchase incentives for employee s	Promoting Low Emission Transport	Other	West Yorkshire Combined Authority	2015	2016 - 2021			Expression of Interest to participate in the GUL City Bid submitted	2016	Included in the unsuccessful Go Ultra- Low City Bid but remain aspirational
42	Free city centre parking	Promoting Low Emission Transport	Priority parking for LEV's	Leeds City Council	2015	2016 - 2021			Expression of Interest to participate in the GUL City Bid submitted	2015 / 2016	Included in the unsuccessful Go Ultra- Low City Bid but remain aspirational
43	Try- before- you-buy' EV fleet to encourage uptake	Promoting Low Emission Transport	Other	West Yorkshire Combined Authority	2015	2016 - 2021			Expression of Interest to participate in the GUL City Bid submitted	2016 / 2017	Included in the unsuccessful Go Ultra- Low City Bid but remain aspirational
44	Expansion of ULEV fleet in Car Club vehicles	Promoting Low Emission Transport	Other	West Yorkshire Combined Authority	2015	2016 - 2021			Expression of Interest to participate in the GUL City Bid submitted		
45	A ULEV apprentice ship programm e to skill vehicle repairers and servicing staff	Promoting Low Emission Transport	Other	West Yorkshire Combined Authority	2015	2016 - 2021			Expression of Interest to participate in the GUL City Bid submitted	2018 / 2019	

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure ^(a)	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
46	West Yorkshire Transport Emissions Group (WYTEG)	Promoting Low Emission Transport	Other	Leeds City Council & West Yorkshire Combined Authority	It was intially set up to advise & write various elements the Strategic Environme ntal Assessme nt for LTP1 in 2001	2011 - 2026, the life span of the W Yorks LTP	WYTEG has continued to provide advice to the W Yorks LTP on Air Quality, Climate Change mitigation & resilience, Noise & ULEVs /fuels etc.		WYTEG currently advises on best practice to enable the W Yorks LTP to control & mitigate all aspects of Transport emissions & issues of climate resilience	On going Task & Finish LTP emission projects	Input from Transport and Health Group led by Public Health England
47	West Yorkshire Low Emission Strategy (WYLES)	Promoting Low Emission Transport	Other	Bradford + all W Yorks Districts + WYCA	2012 - 2013	2014/15	To develop an overarching West Yorkshire Low Emission Strategy. Final draft completed September 2015.		Strategy has been endorsed by West Yorkshire district councils	2015	Work is ongoing to set up a working group to oversee implementation across West Yorkshire.
48	Leeds LEZ Feasibility Study	Promoting Low Emission Transport	Other	LCC & Bradford joint study, funded by DEFRA	2012 - 2013	Feasibility study completed in 2014	Joint working with Bradford provided excellent value for supporting HIA report & for the EcIA report		Numerous scenarios have been assessed, emissions apportionment has identified which vehicle types need greater mitigation eg, Buses inside IRR	Leeds LEZ Feasibility Study report approved by Executive Board Dec 2014.	On-going work across the 5 district for formal adoption as policy.

^(a) In relation to the 'Reduction in Pollutant/Emission from Measure' column, all are intended to have a positive benefit in the Council's efforts to tackle traffic emissions across the whole of the city, reducing the highest pollution levels where they occur and reducing background concentrations elsewhere.

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.

Leeds City Council is taking the following measures to address PM_{2.5}:

There are a number of sources of $PM_{2.5}$ particles, many of which relate to traffic and transportation. Tailpipe emissions from diesel vehicles have been identified as a major source in the past but others, including brake, clutch and tyre wear all contribute to the overall burden as well as re-suspension from the road surface in the wake of a moving vehicle.

Although tyre wear and re-suspension will prove difficult to tackle, hybrid and full electric vehicles deliver reduced emissions from tailpipes and clutch use while also benefiting from regenerative braking systems.

A number of the measures described in Table 2.2 above seek to reduce the more polluting vehicle types, while increasing the proportion of ULEVs, the use of Park & Ride sites and car clubs esp. with ULEVs, the prevalence of car sharing, the smoothing of traffic flows etc. while encouraging the uptake of healthier travel options such as cycling and walking.

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

3.1 Summary of Monitoring Undertaken

In previous years, automatic and diffusion tube monitoring was undertaken to fulfil the LAQM requirements to identify locations at which AQMAs might be have to be declared and on an ongoing basis, where they might be revoked.

Following the issues that have arisen around compliance with the EU Directive and the specific interpretation to avoid exceedances of the 40 μ g/m³ annual mean standard for nitrogen dioxide in locations where the public have access (as opposed to exposure for a relevant period), a number of additional monitoring sites have been established to support this work.

3.1.1 Automatic Monitoring Sites

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

Automatic (continuous) monitoring was undertaken at 11 sites during 2016 in the Leeds City Council district. Nine of the sites were operated exclusively by the city council while one is part of the Automatic Urban and Rural Network (AURN) and the other an affiliated site owned by the city council but with results accepted into the national network. Table A.1 in Appendix A shows the details of all the sites.

National monitoring results are available under the 'Data Archive' tab at <u>https://uk-air.defra.gov.uk/interactive-map</u> where a full data set from the Leeds Centre site is available (monitoring includes NOx/NO₂, PM₁₀, PM_{2.5}, SO₂, CO, O₃ and benzene). Full data from the Headingley Kerbside site (NOx/NO₂, PM₁₀ and PM_{2.5}) is also available on this site.

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

Leeds City Council undertook non-automatic (passive) monitoring of NO₂ at 100 sites during 2016. Table A.2 in Appendix A shows the addresses of the sites together with

a very brief description of the location and a 12-figure National Grid Reference to identify the precise position.

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 40 μ g/m³.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided at Table B.1 in Appendix B.

The measurement locations fall predominantly into three categories: those associated with existing AQMAs; those where concerns have been raised and measurements undertaken to establish whether an AQMA should be declared; and locations where additional data is needed to support the EU Directive compliance work. The majority of annual mean concentrations reported here either remained the same or showed some small decrease.

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 $200\mu g/m^3$, not to be exceeded more than 18 times per year.

There have been no measured exceedances of the 1-hour mean objective at any time although there have been occasions (more than five years ago) when the annual mean at automatic monitoring sites has exceeded 60 μ g/m³. Recent diffusion tube monitoring has identified some new locations where this annual mean has been exceeded and steps have been taken to investigate this by additional automatic monitoring.

3.2.2 Particulate Matter (PM₁₀)

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 40 μ g/m³.

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 50 µg/m³, not to be exceeded more than 35 times per year.

There have been no breaches of of either of these objectives for many years.

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.

Although there are no objectives contained in LAQM regulations for this pollutant, exposure reduction will have health benefits for the whole population. Concentrations have been reducing and are now close to achieving the WHO guideline of 10 μ g/m³ at both sites (Leeds Centre 10 μ g/m³; Headingley Kerbside 11 μ g/m³).

3.2.4 Sulphur Dioxide (SO₂)

Table A.8 in Appendix A compares the ratified continuous monitored SO_2 concentrations for year 2016 with the air quality objectives for SO_2 .

Although air quality issues around SO₂ were confidently dismissed more than ten years ago, monitoring of this pollutant continues at the Leeds Centre site to inform the national network. There have been no breaches of any of the objectives applying to this pollutant.

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)
A1	Leeds Centre (AURN)	Urban Centre	429969	434259	NO ₂ ; PM ₁₀ ; PM _{2.5} ; (+SO ₂ ; CO; O ₃)	NO	Chemiluminescent FDMS	N/A	N/A	2.7
A2	Corn Exchange	Kerbside	430358	433422	NO ₂ ; PM ₁₀	NO	Chemiluminescent TEOM (vcm)	1 (1hr NO ₂)	1	2.7
A3	Headingley (AURN Affiliated)	Kerbside	427989	436045	NO ₂ ; PM ₁₀ ; PM _{2.5}	NO	Chemiluminescent FDMS	1	1	2.7
A6	Haslewood Close	Roadside	431268	433701	NO ₂	YES	Chemiluminescent	0	7	3.3
A7	Queen St, Morley	Roadside	426332	427870	NO ₂	YES	Chemiluminescent	0	5	3
A9	Jack Lane, Hunslet	Roadside	430731	431911	NO ₂	NO	Chemiluminescent	N/A	5	2.7
A12	Norman Row	Roadside	426277	435816	NO ₂	YES	Chemiluminescent	1	2	1.5
A17	Kirkstall Rd	Roadside	427147	434789	NO ₂	NO	Chemiluminescent	N/A	5	2.7
A18	Temple Newsam	Other	435940	432271	NO ₂	NO	Chemiluminescent	N/A	N/A	2.4
A19	Tilbury Terrace	Roadside	428830	431657	NO ₂	YES	Chemiluminescent	1	15	1.5
A20	International Pool	Roadside	429329	433672	NO ₂	NO	Chemiluminescent	1 (1hr NO2)	4	1.5

Notes:

(1) Om 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)
D2 (A3)	Headingley (Affiliated)	Kerbside	427989	436045	NO ₂	NO	N/A	1m	YES	2.7
D6 (A6)	Haslewood Close, Wall corner (R)	Roadside	431268	433701	NO ₂	YES	0	7m (to A64)	YES	3.3
D7 (A6)	Haslewood Close, Wall corner (L)	Roadside	431268	433701	NO ₂	YES	0	7m (to A64)	YES	3.3
D8	Haslewood Close Gable	Roadside	431264	433704	NO ₂	YES	0	8m	NO	2.4
D9	Haslewood Close facing open area	Roadside	431269	433720	NO ₂	YES	0	27m	NO	2.4
D17	19/20 Ladybeck Cl (rear) DP	Roadside	430750	433813	NO ₂	YES	0	13m	NO	2.4
D19	Ladybeck Reception (rear)	Roadside	430695	433835	NO ₂	YES	0	14m	NO	2.4
D20	25 Ladybeck Cl, rear block (side)	Roadside	430727	433834	NO ₂	YES	0	6m (to A64)	NO	2.4
D24	West Street Car Park	Urban Centre	429011	433617	NO ₂	NO	N/A	25m	NO	2.7
D26 (A1)	Leeds Centre AURN (L)	Urban Centre	429969	434259	NO ₂	NO	N/A	30m	YES	2.7
D27 (A1)	Leeds Centre AURN (R)	Urban Centre	429969	434259	NO ₂	NO	N/A	30m	YES	2.7
D28 (A1)	Leeds Centre AURN (M)	Urban Centre	429969	434259	NO ₂	NO	N/A	30m	YES	2.7
D31	Railway Terrace, East Ardsley	Roadside	430151	426388	NO ₂	NO	0	14m (to M62)	NO	2.4

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)
D35	110 Jack Lane, Hunslet	Roadside	430720	431898	NO ₂	NO	0	7m	NO	2.4
D43	82 New Road Side, Horsforth	Roadside	423925	437335	NO ₂	NO	0	1m	NO	2.4
D44	253 New Road Side, Horsforth	Roadside	423269	437505	NO ₂	NO	0	2m	NO	2.4
D45	2 Norman Row, pipe, Kirkstall	Roadside	426276	435820	NO_2	NO	0	2m	NO	2.4
D46	4 De Lacey Mount, Kirkstall	Roadside	426214	435955	NO ₂	NO	0	7m	NO	2.4
D48	2 Haddon Place, Kirkstall	Roadside	427437	434618	NO ₂	NO	0	3m	NO	2.4
D52	78 Selby Rd, Garforth LP	Kerbside	440063	432361	NO ₂	NO	0	2m	NO	2.4
D53	1 Gilbert Mount, Kirkstall	Roadside	426531	435222	NO ₂	NO	0	17m (to A65)	NO	2.4
D59 (A2)	Corn Exchange	Urban Centre	430358	433422	NO ₂	NO	0	1m	YES	2.7
D60 (A17)	Kirkstall Rd/ Woodside Terr.	Roadside	427147	434789	NO ₂	NO	0	5m	YES	2.7
D66	131 Harehills Lane	Roadside	431928	435910	NO ₂	NO	0	7m	NO	2.4
D68 (A9)	Jack Lane GH	Roadside	430731	431911	NO ₂	NO	N/A	5m (to A61)	YES	2.7
D70	Ladysmith Workwear, Easy Road	Roadside	431534	432764	NO ₂	NO	0	7m	NO	2.4

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)
D74	Norman Street, Kirkstall Rd LP	Roadside	426291	435800	NO ₂	NO	0	12m	NO	2.4
D76	302 York Road	Roadside	432569	433764	NO ₂	NO	0	8m	NO	2.4
D78	2 Eyres Terrace	Roadside	427089	433686	NO ₂	NO	0	6m	NO	2.4
D95	High Street LP, Wetherby	Roadside	440442	448133	NO ₂	NO	0	2m	NO	2.4
D96	21 St James St, Wetherby	Roadside	440408	448407	NO ₂	NO	0	1m	NO	2.4
D98	76 Woodhouse Hill Rd	Roadside	431347	430578	NO ₂	NO	0	22m (to M621)	NO	2.4
D105	76 Selby Rd, Garforth	Kerbside	440034	432364	NO ₂	NO	0	4m	NO	2.4
D109	107 Bradford Rd, Otley	Roadside	419598	445168	NO ₂	NO	0	3m	NO	2.4
D110	23 Westgate, Otley	Roadside	420037	445462	NO ₂	NO	0	2m	NO	2.4
D114	8 Main Street, Pool	Roadside	424507	445151	NO ₂	NO	0	2m	NO	2.4
D115	66 North Street, Wetherby	Roadside	440537	448514	NO ₂	NO	0	2m	NO	2.4
D117	15 Ashfield Road, Morley	Roadside	425691	426879	NO ₂	NO	0	2m	NO	2.4
D118	1 Rein Road, Morley	Roadside	426914	426605	NO ₂	NO	0	2m	NO	2.4
D119	109 Bridge Street, Morley	Roadside	426788	426773	NO ₂	NO	0	6m	NO	2.4
D120	2 Chapel Hill, Morley	Roadside	426362	428162	NO ₂	NO	0	2m	NO	2.7

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)
D121	adj 32 Otley Road, Headingley	Roadside	427906	436195	NO ₂	NO	0	2m	NO	2.4
D122	North Street, LS2 (o/s Northern Intelligence)	Roadside	430522	434022	NO ₂	NO	0	2m	NO	2.4
D123	Victoria Avenue	Roadside	432419	433674	NO ₂	NO	0	15m (to A64)	NO	2.4
D124	21 Rein Road, Morley	Roadside	426990	426466	NO ₂	NO	0	4m	NO	2.4
D125	12 Tilbury Terrace	Roadside	428824	431658	NO ₂	YES	0	17m (to M621)	NO	2.4
D126	73 East Park Parade	Roadside	432527	433409	NO ₂	NO	0	2m	NO	2.4
D128	51 Long Row, Horsforth	Roadside	424168	438668	NO ₂	NO	0	1m	NO	2.4
D129	33 Long Row, Horsforth	Roadside	424143	438610	NO ₂	NO	0	4m	NO	2.4
D133	St Wilfrid's Terrace, Main Street, Pool	Roadside	424405	445305	NO ₂	NO	0	1m	NO	2.4
D135	Gotts Road (L)	Roadside	428866	433332	NO ₂	NO	N/A	7m (to A58M)	NO	2.4
D136	Gotts Road (R)	Roadside	428858	433327	NO ₂	NO	N/A	7m (to A58M)	NO	2.4
D137	362 Bradford Rd, Thornbury	Roadside	420612	434359	NO ₂	NO	0	4m	NO	2.4
D144	Railway Terrace, East Ardsley LP	Roadside	430142	426388	NO ₂	NO	0	12m (to M62)	NO	2.4

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)
D145	256 Lingwell Gt Lane	Roadside	431883	425566	NO ₂	NO	0	70m (to M1)	NO	2.4
D149	Tilbury Row new tube	Kerbside	428762	431670	NO ₂	YES	0	35m (to M621 on-slip)	NO	2.4
D150	582 Meanwood Road	Roadside	428630	436940	NO ₂	NO	0	2m	NO	2.4
D151	Sunbeam Terrace, 2 Bradford Road, Tingley	Roadside	428280	426170	NO ₂	NO	0	5m	NO	2.4
D153	3 Oban Terrace, Bradford Road, Tingley	Roadside	427900	426240	NO ₂	NO	0	10m	NO	2.4
D154	The Brambles, Bradford Road, Tingley	Roadside	428080	426220	NO ₂	NO	0	27m	NO	2.4
D155	9 Ladybeck Close	Roadside	430720	433785	NO ₂	YES	0	12m	NO	2.4
D156	368 Dewsbury Road	Roadside	429465	430247	NO ₂	NO	0	6m	NO	2.4
D157	Maple Court	Roadside	428599	430790	NO ₂	NO	0	15m	NO	2.4
D158	69 Jessamine Avenue	Roadside	428817	430464	NO ₂	NO	0	6m	NO	2.4
D159	659 Dewsbury Road	Roadside	428990	429855	NO ₂	NO	0	16m	NO	2.4

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)
D160	79 Faroe (off Gotts Road)	Urban Background	429070	433250	NO ₂	NO	0	N/A	NO	5th Floor
D161	236 Leadwell Lane	Roadside	432556	427356	NO ₂	NO	0	3m	NO	2.4
D162	21 Wesley Street	Roadside	428576	430894	NO ₂	NO	0	20m	NO	2.4
D163	International Pool (co- located)	Roadside	429329	433672	NO ₂	NO	N/A	5m	YES	1.5
D164	International Pool Car Park	Roadside	429260	433639	NO ₂	NO	N/A	5m	NO	2.4
D165	Yorkshire Post	Roadside	428980	433435	NO ₂	NO	N/A	9m	NO	2.4
D166	Gotts Rd Exit	Roadside	428926	433394	NO ₂	NO	N/A	6m	NO	2.4
D167	Graingers Way	Roadside	428779	433252	NO ₂	NO	N/A	6m	NO	2.4
D168	Spence Lane	Roadside	428633	432860	NO ₂	NO	N/A	9m	NO	2.4
D169	Arco	Roadside	428582	432656	NO ₂	NO	N/A	19m	NO	2.4
D170	Canal Place	Roadside	428766	433294	NO ₂	NO	N/A	7m	NO	2.4
D171	Harley Davidson	Roadside	428833	433358	NO ₂	NO	N/A	10m	NO	2.4
D172	Fountain Street	Roadside	429285	433723	NO ₂	NO	N/A	23m	NO	2.4
D173	Central Village GF	Roadside	429696	434327	NO ₂	NO	0	7m	NO	2.7
D174	Central Village 17th	Roadside	429696	434327	NO ₂	NO	0	N/A	NO	17th Floor
D175	Central Village 21st	Roadside	429696	434327	NO ₂	NO	0	N/A	NO	21st Floor
D176	Wattle Syke, Collingham	Kerbside	439487	446158	NO ₂	NO	7m	2m	NO	2.4

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)
D177	Half Moon, Collingham	Kerbside	438758	445935	NO ₂	NO	0	8m	NO	2.4
D178	City Sq TL (SW o/s Queens Hotel)	Kerbside	429839	433401	NO ₂	NO	N/A	1m	NO	2.4
D179	City Sq TL (SW o/s Majestic)	Kerbside	429837	433410	NO ₂	NO	N/A	1m	NO	2.4
D180	City Square (north side)	Kerbside	429905	433473	NO ₂	NO	N/A	1m	NO	2.4
D181	City Sq TL (SE Boar Ln side)	Kerbside	429939	433403	NO ₂	NO	N/A	1m	NO	2.4
D182	City Sq TL (SE o/s Queens Hotel)	Kerbside	429932	433397	NO ₂	NO	N/A	1m	NO	2.4
D183	Neville St TL (NW tunnel exit)	Kerbside	429965	433295	NO ₂	NO	N/A	1m	NO	2.4
D184	Neville St TL (NE tunnel entrance)	Kerbside	429989	433291	NO ₂	NO	N/A	1m	NO	2.4
D186	Neville St Bus Stop (SE tunnel exit)	Kerbside	429965	433173	NO ₂	NO	N/A	1m	NO	2.4
D187	Neville St Pipe (SW tunnel entrance)	Kerbside	429958	433176	NO ₂	NO	N/A	3m	NO	2.4
D189	Kirkstall Lane	Roadside	426580	435685	NO ₂	NO	7m	2m	NO	2.4
D190	8 Carlton Moor Mews, Sharp Ln LP	Roadside	431639	427967	NO ₂	NO	3m	2m	NO	2.4

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)
D191	Skyliner Apartments Rentals	Roadside	430774	433566	NO ₂	NO	13m	1m	NO	2.4
D192	St Peter's Square /Duke St	Roadside	430779	433515	NO ₂	NO	N/A	1m	NO	2.4
D193	LP Opp Millgarth Police Stn site	Roadside	430699	433684	NO ₂	NO	N/A	1m	NO	2.4
D194	5 Wattle Syke, Collingham	Roadside	439524	446143	NO ₂	NO	0	11m	NO	2.4
D195	273 Elland Road	Roadside	428213	431181	NO ₂	NO	0	15m	NO	2.4
D196	120 Park Road , Guiseley	Roadside	418941	441730	NO ₂	NO	0	7m	NO	2.4

Notes:

(1) Om 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

	Oite Turne	Monitoring	Valid Data Capture for	Valid Data	ta NO₂ Annual Mean Concentration (μg/m³) ⁽³⁾					
Site ID	Site Type	Туре	Monitoring Period (%) ⁽¹⁾	2016 (%) ⁽²⁾	2012	2013	2014	2015	2016	
A1	Urban Centre	Automatic		99	36	34	38	31	33	
A2	Kerbside	Automatic		100	55	57	55	54	51	
A3	Kerbside	Automatic		99	44	43	45	40	40	
A6	Roadside	Automatic		20	46	45	45	46	38	
A7	Roadside	Automatic	96	80	41	38	40	39	34	
A9	Roadside	Automatic		99	45	43	47	46	45	
A12	Roadside	Automatic		41				46	44	
A17	Roadside	Automatic		99	32	32	33	30	29	
A18	Other	Automatic		85	20	20	20	20	20	
A19	Roadside	Automatic		100	44	39	44	38	37	
A20	Roadside	Automatic		92					42	
D2 (A3)	Kerbside	Diffusion Tube		100	44	43	40	37	37	
D6 (A6)	Roadside	Diffusion Tube		100	41	37	35	33	34	
D7 (A6)	Roadside	Diffusion Tube		100	43	40	34	35	36	
D8	Roadside	Diffusion Tube		100	40	40	35	34	35	
D9	Roadside	Diffusion Tube		100	39	36	37	31	32	
D17	Roadside	Diffusion Tube		100	38	38	41	36	36	
D19	Roadside	Diffusion Tube		92	40	35	32	33	33	
D20	Roadside	Diffusion Tube		100	44	37	32	34	35	

0:44 10	0:44 7.000	Monitoring	Valid Data Capture for	Valid Data	NO ₂ Annual Mean Concentration (μg/m ³) ⁽³⁾					
Site iD	Site Type	Туре	Monitoring Period (%) ⁽¹⁾	2016 (%) ⁽²⁾	2012	2013	2014	2015	2016	
D24	Urban Centre	Diffusion Tube		100	40	39	39	33	31	
D26 (A1)	Urban Centre	Diffusion Tube		100	39	36	35	32	31	
D27 (A1)	Urban Centre	Diffusion Tube		92	38	34	34	32	33	
D28 (A1)	Urban Centre	Diffusion Tube		100	38	35	36	34	32	
D31	Roadside	Diffusion Tube		100	37	34	35	32	32	
D35	Roadside	Diffusion Tube		100	43	41	39	37	36	
D43	Roadside	Diffusion Tube		100	48	47	47	38	43	
D44	Roadside	Diffusion Tube		92	42	38	35	34	31	
D45	Roadside	Diffusion Tube		83	48	45	39	39	37	
D46	Roadside	Diffusion Tube		92	34	32	30	29	27	
D48	Roadside	Diffusion Tube		83	35	36	35	32	31	
D52	Kerbside	Diffusion Tube		100	45	38	46	37	41	
D53	Roadside	Diffusion Tube		100	28	23	24	22	23	
D59 (A2)	Urban Centre	Diffusion Tube		75	55	55	52	51	49	
D60 (A17)	Roadside	Diffusion Tube		92	33	32	32	28	28	
D66	Roadside	Diffusion Tube		100	40	36	34	29	30	
D68 (A9)	Roadside	Diffusion Tube		100	48	46	42	42	43	
D70	Roadside	Diffusion Tube		100	36	34	32	32	35	

	Valid Data Valid Data NO₂ Annual Mean Concentration (μg/m³) ⁽³⁾)		
Site ID	Site Type	Туре	Monitoring Period (%) ⁽¹⁾	2016 (%) ⁽²⁾	2012	2013	2014	2015	2016
D74	Roadside	Diffusion Tube		75	38	35	34	33	38
D76	Roadside	Diffusion Tube		83	37	36	35	32	29
D78	Roadside	Diffusion Tube		100	38	37	35	31	35
D95	Roadside	Diffusion Tube		100	37	35	33	33	32
D96	Roadside	Diffusion Tube		92	39	36	36	33	32
D98	Roadside	Diffusion Tube		100	39	-	33	31	33
D105	Kerbside	Diffusion Tube		83	54	52	52	41	43
D109	Roadside	Diffusion Tube		92	41	38	36	35	39
D110	Roadside	Diffusion Tube		50	41	43	35	35	36
D114	Roadside	Diffusion Tube		100	<u>62</u>	60	<u>62</u>	52	60
D115	Roadside	Diffusion Tube		100	37	38	37	30	33
D117	Roadside	Diffusion Tube		75	44	39	37	36	32
D118	Roadside	Diffusion Tube		100	49	41	43	42	41
D119	Roadside	Diffusion Tube		83	36	35	33	28	31
D120	Roadside	Diffusion Tube		100	42	42	53	41	39
D121	Roadside	Diffusion Tube		100	47	44	46	39	39
D122	Roadside	Diffusion Tube		100	37	39	38	35	36
D123	Roadside	Diffusion Tube		100	37	30	30	28	29

	0110 7 000	Monitoring	Valid Data Capture for	Valid Data Capture for Capture		NO ₂ Annual Mean Concentration (μg/m ³) ⁽³⁾					
Site ID	Site Type	Туре	Monitoring Period (%) ⁽¹⁾	2016 (%) ⁽²⁾	2012	2013	2014	2015	2016		
D124	Roadside	Diffusion Tube		100	40	35	37	32	33		
D125	Roadside	Diffusion Tube		83	33	32	32	29	32		
D126	Roadside	Diffusion Tube		100	37	35	32	31	32		
D128	Roadside	Diffusion Tube		100	41	38	38	34	35		
D129	Roadside	Diffusion Tube		100	34	32	29	27	29		
D133	Roadside	Diffusion Tube		92	52	46	46	36	45		
D135	Roadside	Diffusion Tube		92	51	45	45	42	44		
D136	Roadside	Diffusion Tube		100	53	46	46	44	47		
D137	Roadside	Diffusion Tube		67		32	32	29	28		
D144	Roadside	Diffusion Tube		92		40	38	31	37		
D145	Roadside	Diffusion Tube		100			25	24	26		
D149	Kerbside	Diffusion Tube		83			31	30	29		
D150	Roadside	Diffusion Tube		100			37	27	27		
D151	Roadside	Diffusion Tube		100				31	30		
D153	Roadside	Diffusion Tube		92				34	34		
D154	Roadside	Diffusion Tube		100				34	36		
D155	Roadside	Diffusion Tube		67				37	36		
D156	Roadside	Diffusion Tube		100				28	33		

	Cito Turno	Monitoring	Valid Data Capture for Construction (µg/m ³) ⁽³⁾		Valid Data NO₂ Annual Mean Concentration (µد)
Site id	Site Type	Туре	Monitoring Period (%) ⁽¹⁾	2016 (%) ⁽²⁾	2012	2013	2014	2015	2016
D157	Roadside	Diffusion Tube		100				23	23
D158	Roadside	Diffusion Tube		100				22	25
D159	Roadside	Diffusion Tube		100				28	30
D160	Urban Background	Diffusion Tube		83				29	27
D161	Roadside	Diffusion Tube		92					32
D162	Roadside	Diffusion Tube		100					20
D163	Roadside	Diffusion Tube		92					45
D164	Roadside	Diffusion Tube		100					40
D165	Roadside	Diffusion Tube		100					53
D166	Roadside	Diffusion Tube		100					49
D167	Roadside	Diffusion Tube		100					50
D168	Roadside	Diffusion Tube		100					46
D169	Roadside	Diffusion Tube		100					38
D170	Roadside	Diffusion Tube		83					44
D171	Roadside	Diffusion Tube	100	58					49
D172	Roadside	Diffusion Tube		92					32
D173	Roadside	Diffusion Tube	100	83					33
D174	Roadside	Diffusion Tube	100	92					32

	0:44 Turns	Monitoring	Valid Data Capture for	Valid Data		NO₂ Annual M	ean Concentra	ation (µg/m³) ⁽³)
Site ID	Site Type	Туре	Monitoring Period (%) ⁽¹⁾	2016 (%) ⁽²⁾	2012	2013	2014	2015	2016
D175	Roadside	Diffusion Tube	90	75					30
D176	Kerbside	Diffusion Tube	100	83					44
D177	Kerbside	Diffusion Tube	90	75					30
D178	Kerbside	Diffusion Tube	90	75					46
D179	Kerbside	Diffusion Tube	100	83					58
D180	Kerbside	Diffusion Tube	100	83					47
D181	Kerbside	Diffusion Tube	90	75					<u>62</u>
D182	Kerbside	Diffusion Tube	90	75					56
D183	Kerbside	Diffusion Tube	100	67					<u>95</u>
D184	Kerbside	Diffusion Tube	90	75					<u>88</u>
D186	Kerbside	Diffusion Tube	70	58					60
D187	Kerbside	Diffusion Tube	80	67					<u>64</u>
D189	Roadside	Diffusion Tube	56	42					39
D190	Roadside	Diffusion Tube	90	75					31
D191	Roadside	Diffusion Tube	90	75					48
D192	Roadside	Diffusion Tube	100	83					60
D193	Roadside	Diffusion Tube	100	83					55
D194	Roadside	Diffusion Tube	100	42					27

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2016 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (μg/m ³) ⁽³⁾					
					2012	2013	2014	2015	2016	
D195	Roadside	Diffusion Tube	100	42					25	
D196	Roadside	Diffusion Tube	100	42					24	

☑ 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 $40\mu g/m^3$ 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.

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

0:44 ID	Site Type	Monitoring	Valid Data Capture for Monitoring Period (%)	Valid Data	NO ₂ 1-Hour Means > 200μg/m ^{3 (3)}					
Site iD	Site Type	Туре	(%) (1)	(%) ⁽²⁾	2012	2013	2014	2015	2016	
A1	Urban Centre	Automatic		99	0	0	0	0	0	
A2	Kerbside	Automatic		100	0	0	0	0	0	
A3	Kerbside	Automatic		99	0	0	0	0	0	
A6	Roadside	Automatic		20	0	1	0	0 (115)	0 (90)	
A7	Roadside	Automatic	96	80	0	0	0	0	0 (105)	
A9	Roadside	Automatic		99	1	0	3	0	0	
A12	Roadside	Automatic		41				0 (117)	0 (124)	
A17	Roadside	Automatic		99	0	0	0	0	0	
A18	Other	Automatic		85	0	0	0	0	0	
A19	Roadside	Automatic		100	17	1	0	3	0	
A20	Roadside	Automatic		92					0	

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 Si	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2016 (%) ⁽²⁾	PI	PM ₁₀ Annual Mean Concentration (μg/m ³) ⁽³⁾						
	one rype			2012	2013	2014	2015	2016			
A1	Urban Centre		97	17	17	18	16	17			
A2 ⁽⁴⁾	Roadside		90	25	24	23	21	20			
A3	Roadside		97	22	22	23	18	19			

\boxtimes Annualisation has been conducted where data capture is <75%

Notes:

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

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

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

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

(4) TEOM data adjusted by volatile correction method

Site ID	Site Type	Valid Data Capture for Monitoring	Valid Data Capture	РМ ₁₀ 24-Hour Means > 50µg/m ^{3 (3)}						
		Period (%) ⁽¹⁾	2016 (%) ⁽²⁾	2012	2013	2014	2015	2016		
A1	Urban Centre		97	7	3	7	5	4		
A2 ⁽⁴⁾	Roadside		90	13	11	12	13	6		
A3	Roadside		97	18	4	15	13	5		

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

Notes:

Exceedances of the PM_{10} 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.

(4) TEOM data adjusted by volatile correction method

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2016 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (μg/m ³) ⁽³⁾						
				2012	2013	2014	2015	2016		
A1	Urban Centre		98	16	14	13	11	10		
A3	Roadside		98	17	n/a	14	13	11		

Table A.7 – PM_{2.5} Monitoring Results

☑ 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.

Table A.8 – SO₂ Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%)	Valid Data Capture 2016	Number of Exceedances 2016 (percentile in bracket) ⁽³⁾			
			(%) ⁽²⁾	15-minute Objective (266 μg/m³)	1-hour Objective (350 μg/m³)	24-hour Objective (125 μg/m³)	
A1	Urban Centre		99	0	0	0	

Notes:

Exceedances of the SO₂ objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

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

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

(3) If the period of valid data is less than 85%, the relevant percentiles are provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO₂ Monthly Diffusion Tube Results – 2016

							NO ₂ Mea	an Conce	ntrations	(µg/m³)					
														Annual Mea	n
Site ID	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Νον	Dec	Raw Data	Bias Adjusted (0.75) and Annualised	Distance Corrected to Nearest Exposure
D2	57	57	48	55	53	45	34	31	40	54	60	52	49	37	37
D6	54	54	46	47	40	31	41	41	43	38	56	48	45	34	34
D7	55	54	54	46	38	31	43	44	42	39	60	62	47	36	36
D8	53	55	51	48	42	37	40	39	39	38	67	54	47	35	35
D9	49	48	46	41	35	31	39	38	41	36	58	56	43	32	32
D17	57	54	51	49	42	39	32	34	41	47	62	64	48	36	36
D19		50	52	42	39	30	30	36	39	41	69	55	44	33	33
D20	58	56	54	43	41	42	30	31	40	39	62	62	47	35	35
D24	49	42	44	43	42	33	28	22	40	41	58	60	42	31	31
D26 (A1)	53	45	47	39	36	29	32	31	39	42	48	60	42	31	31
D27 (A1)	55	48	50	41	38	29	35	37	37		68	51	44	33	33
D28 (A1)	51	56	48	43	34	25	35	29	39	44	57	55	43	32	32
D31	38	50	53	45	46	43	24	30	30	55	51	43	42	32	32
D35	52	62	61	42	48	38	41	33	41	31	68	62	48	36	36
D43	67	55	72	58	55	46	36	40	55	43	98	62	57	43	43
D44		41	44	42	42	32	32	33	34	21	60	66	41	30	30
D45			53	46	25	45	50	46	52	45	69	60	49	37	37
D46		33	44	26	32	34	27	28	33	34	57	47	36	27	27
D48		44	45	45	36	30	33	34	40		63	45	42	31	31
D52	60	65	59	47	45	41	47	41	44	56	88	70	55	41	41
D53	39	36	35	28	25	22	20	22	23	28	45	43	31	23	23
D59 (A2)	69	74	53	56	64				52	61	91	71	66	49	49

	NO₂ Mean Concentrations (μg/m ³)														
														Annual Mea	n
Site ID	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Νον	Dec	Raw Data	Bias Adjusted (0.75) and Annualised	Distance Corrected to Nearest Exposure
D60 (A17)	44	40	37	36	30	28	27	30	31	36	66		37	28	27
D66	52	51	45	43	37	32	26	24	33	36	56	51	41	30	30
D68 (A9)	66	69	71	58	57	39	48	43	51	42	73	64	57	43	43
D70	48	52	49	39	70	32	31	27	40	38	68	58	46	35	35
D74	40	51	40		55			46	56	52	62	58	51	38	38
D76	44			44	36	34	36	34	29	33	55	47	39	29	29
D78	54	47	56	44	40	39	33	31	37	40	59	77	46	35	35
D95	45	52	46	39	40	33	30	35	37	34	64	56	43	32	32
D96		48	42	42	40	35	36	20	35	42	63	59	42	32	32
D98	50	53	50	44	35	26	35	41	34	37	64	60	44	33	33
D105	75	72	67	57		45		55	49	40	87	65	61	46	46
D109	65	65	59	50	44	36	38		46	45	67	61	52	39	39
D110						41	35		41	46	69	53	48	36	36
D114	97	94	80	73	73	56	64		66	66	101	114	80	60	60
D115	44	51	39	47	44	39	29		32	41	58	62	44	33	33
D117			41	52	40		34	34	43	35	42	67	43	32	32
D118	49	62	62	60	50	37	54	35	48	54	74	63	54	41	41
D119	37		82	41	33	33	24	46	33	39		47	42	31	31
D120	56	50	60	54	48	44	32	41	43	55	71	65	52	39	39
D121	47	27	68	67	57	44	42	45	52	50	68	58	52	39	39
D122	57	55	48	43	44	32	40	42	42	41	59	67	48	36	36
D123	50	43	37	38	31	28	27	31	33	38	57	47	38	29	29
D124	50	58	49	45	36	33	37	36	38	41	55	57	45	33	33
D125		48	37	37	34	33	34	33		39	68	57	42	32	32
D126	53	51	47	43	39	35	29	23	38	43	63	45	42	32	32

	NO ₂ Mean Concentrations (μg/m ³)														
														Annual Mea	in
Site ID	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.75) and Annualised	Distance Corrected to Nearest Exposure
D128	57	54	55	43	37	34	36	38	48	34	74	56	47	35	35
D129	51	42	44	38	37	29	27	27	33	24	68	48	39	29	29
D133	55	56	59	65	54	51	36	45	49	59	126		60	45	45
D135	62	67	60	61	57	50	43	42		58	76	69	59	44	44
D136	59	73	68	66	62	51	47	48	47	66	97	62	62	47	47
D137	47	52	41	37				28	32	41		38	40	28	28
D144	46	62	44	57	46	43	25		30	67	71	53	49	37	37
D145	38	43	36	35	30	26	22	21	30	35	52	44	34	26	26
D149		51	27	33	33	31	28	30	34		62	59	39	29	29
D150	37	43	39	39	26	30	26	27	35	38	53	46	37	27	27
D151	39	47	51	46	38	34	36	29	31	32	53	45	40	30	30
D153	42	57	56	48	52	39	41	33	38	38		47	45	33	33
D154	48	60	60	53	45	41	43	32	24	50	67	45	47	36	36
D155		57	49	46				35	51	52	63	54	51	36	36
D156	48	55	53	45	43	31	26	25	32	44	71	55	44	33	33
D157	34	40	42	29	25	22	18	19	22	33	49	41	31	23	23
D158	42	42	41	33	27	24	21	19	22	26	50	45	33	25	25
D159	46	52	51	33	35	24	28	24	31	41	65	51	40	30	30
D160	43	43	38	33	28		22	29	32	35	54		36	27	27
D161	50	55	47	40		34	31	30	36	37	63	52	43	32	32
D162	35	32	34	24	20	21	17	18	20	29	37	40	27	20	20
D163	66	68	68	58	50	41	48		51	58	75	70	59	45	45
D164	65	67	65	52	27	44	36	39	46	53	70	79	54	40	40
D165	86	85	85	77	37	60	52	39	61	72	105	82	70	53	53
D166	81	80	76	64	32	55	60	49	56	64	73	89	65	49	49
D167	69	77	76	70	67	58	46	47	60	63	84	85	67	50	50

							NO ₂ Mea	an Conce	ntrations	(µg/m ³)					
														Annual Mea	in
Site ID	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.75) and Annualised	Distance Corrected to Nearest Exposure
D168	75	70	64	54	57	43	49	52	49	57	84	86	62	46	46
D169	59	60	58	46	48	47	28	34	39	58	74	55	51	38	38
D170	60	67	61	53		70	40		46	57	58	71	58	44	44
D171						57	40	42	56	54	95	92	62	49	49
D172	51	49	48	39	40	32		28	32	38	63	52	43	32	32
D173			40	25	29	40	32	38	43	34	97	64	44	33	33
D174		52	42	30	29	35	36	41	42	34	63	63	42	32	32
D175			33	33	28	34	31		37	39	58	63	40	30	30
D176			55	59	65	50	49	48	57	66	72	64	59	44	35
D177			49	45		29	36	34	29	39	45	54	40	30	30
D178			72	59	55	48	49	48	53	60	110		62	46	46
D179			85	83	75	67	60	60	64	84	104	97	78	58	58
D180			75	71	58	54	52	41	51	65	84	72	62	47	47
D181			82		92	74	65	61	75	96	104	94	83	<u>62</u>	<u>62</u>
D182			105		81	59	64	57	47	74	94	91	75	56	56
D183					139	102	123	102	105	116	151	123	120	<u>95</u>	<u>95</u>
D184			108	115		109	78	74	100	115	121	110	103	<u>78</u>	<u>78</u>
D186			92		84	76			68	78	99	89	84	60	60
D187					97	71	73	68	67	74	100	92	80	<u>64</u>	<u>64</u>
D189				52	45	41		39			62		48	39	33
D190			45		36	32	24	28	36	38	68	64	41	31	30
D191			77	68	61	61	38	52	54	79		88	64	48	39
D192			81	86	77	68	54	64	71	86	111	102	80	60	60
D193			86	77	76	58	31	59	59	77	109	94	73	54	54
D194								35	34	35	47	39	38	27	27
D195								23	28	25	56	49	36	25	25

		NO ₂ Mean Concentrations (μg/m ³)														
													Annual Mean			
Site ID	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.75) and Annualised	Distance Corrected to Nearest Exposure	
D196								26	22	29	57	40	35	24	24	

☑ National bias adjustment factor used

☑ Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of $40\mu g/m^3$ 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) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

Appendix C: Air Quality Monitoring Data QA/QC C.1 QA/QC of Automatic monitoring network and data

The Leeds City Council monitoring network is managed and operated by a team of officers within the Environmental Protection Team (EP Team) of the Communities and Environment Directorate. The combined expertise of this group covers all aspects of the management of the network from routine site procedures through calibration to data ratification. Appropriate training both internal and from external agencies such as EMAQ has been received by officers within the team.

The QA/QC for the Leeds Centre AURN site and the affiliated Leeds Headingley Roadside site is carried out by Ricardo Energy & Environment (E&E). Officers within the EP Team provided LSO support for the Leeds Centre site between 1993 and 2009 and continue in this role at Headingley.

C.1.1 Instrumentation

A combination of API and Monitor Labs instruments is used to monitor oxides of nitrogen (NOx) to establish NO₂ concentrations in the network together with a R&P TEOM to monitor PM_{10} particles.

All stations are air conditioned with the exception of Temple Newsam where the analyser is sited in a large brick-built store room/unused office.

C.1.2 Servicing

Service contracts are in place so that all analysers are serviced every 6 months together with 6 monthly GPT testing of the gas analyser at the Headingley site and annual GPT testing elsewhere. The contract also requires attendance to breakdowns within 48 hours of callout.

All service and breakdown visits by engineers are recorded in the form of engineers' reports and stored within the Department for later use (during data ratification, assessment of long-term analyser performance etc.).

C.1.3 Calibration

Sites are attended fortnightly for manual calibration, routine site checks and maintenance. The procedures for these site visits are documented in internal

guidance documents based on the instrument manufacturers' operation manuals and the AURN Site Operators Manual.

Pre-calibration checks are made which check ancillary equipment such as modems and air conditioning and to record instrument status.

Zero response to clean air is carried out through the use of in-line scrubbers.

Span checks are carried out using nitric oxide calibration gas of known concentration with a certified concentration \pm 5%.

Instrument and TEOM filters are changed if required followed by post-zero and span checks to ensure that everything is operational before leaving site.

All Calibration visits are recorded on calibration forms and on site specific spreadsheets kept within the Department.

C.1.4 Data collection

Automatic data collection from the stations is achieved using the Airviro data administration module. 15-minute un-scaled data is collected from the on-board memory of each analyser.

The data is reviewed daily to determine that the collection protocols are working, that the data looks sensible and to identify faults. This involves viewing and comparing data from different locations.

Should assessment of the data lead to action being taken, this is recorded within a spreadsheet kept by the Department.

C.1.5 Site Audits

A locally operated auditing system for calibration gases is employed in house by the EP Team. Gas cylinders are audited against Air Liquide gases independently analysed by Ricardo E&E.

All audit visits and the results of the audit are kept in site-specific spreadsheets, together with the certificate of analysis for the audit gas.

C.1.6 Data ratification

While this process was carried out in-house, in recent years data ratification has been carried out externally by Air Quality Data Management.

Electronic analysers suffer drifts in their response to the zero (baseline) gas and sensitivity changes with time. Raw data from the NOx instruments are therefore scaled into concentrations using the latest values derived from the manual and automatic calibrations.

The ratification process finalises the data to produce the measurements suitable for reporting. All available information (including fortnightly calibrations, service records and audit reports) is critically assessed so that the best data scaling is applied and all anomalies are appropriately edited. Generally this operates at three, six or twelve month intervals. However, unexpected faults can be identified during the instrument routine services or independent audits which are often at 6-monthly intervals. In practice, therefore, the data can only be fully ratified in 12-month or annual periods. The data processing performed during the three and six monthly cycles helps build a reliable dataset that is finalised at the end of the year.

In addition to overcoming the drift in analyser performance, anomalies in the collected data can occur for a variety of reasons that could result in data being discarded. Instruments and infrastructure can fail in numerous ways that significantly and visually affect the quality of the measurements. These may include:

- ignoring calibrations that were poor e.g. a spent zero scrubber
- closely tracking rapid drifts or eliminating the data
- comparing the measurements with other pollutants and nearby sites
- corrections due to span cylinder drift
- corrections due to flow drifts for the particulate instruments
- · corrections for ozone instrument sensitivity drifts
- eliminating measurements for NO₂ conversion inefficiencies
- eliminating periods where calibration gas is in the ambient dataset
- identifying periods were instruments are warming-up after a powercut
- identification of anomalies due to mains power spikes
- correcting problems with the date and time stamp
- observations made during the sites visits and services
The identification of data anomalies, the proper understanding of the effects and the application of appropriate corrections requires expertise gained over many years of operational experience.

C.1.7 PM₁₀ corrections

Monitoring of PM_{10} (and $PM_{2.5}$) as part of the national AURN is carried out using FDMS (filter dynamics measurement system) equipment. However, the PM_{10} monitor installed in the Corn Exchange monitoring station is an older TEOM (Tapered Element Oscillating Microbalance) instrument. Results from this equipment has been corrected to a 'gravimetric equivalent' (ie the FDMS system) using the TEOM VCM (Volatile Correction Model).

C.2 QA/QC of diffusion tube monitoring

C.2.1 Diffusion tube precision and 'AIR NO₂ PT' performance

The West Yorkshire Analytical Services laboratory (WYAS) supply nitrogen dioxide diffusion tubes to the city council for its investigations. AIR NO₂ PT is an independent analytical proficiency-testing scheme run on behalf of Defra. Performance reports on all analytical laboratories taking part in AIR NO₂ PT are described as satisfactory. In terms of the precision associated with the analysis of multiple tubes, there is no more than one occasion in each of the last three years when the performance of WYAS was described as anything other than 'Good'.

C.2.2 Diffusion tube bias adjustment factors

The preparation method of the nitrogen dioxide diffusion tubes supplied to the city council has been 50% TEA in acetone manufactured by Harwell Scientific Services. A spreadsheet compiled by the National Physical Laboratory reports bias corrections reflecting the difference between results obtained from automatic analysers compared with those obtained from co-located diffusion tubes analysed by individual laboratories. The number of co-located tubes has decreased in recent years but from the six co-located sites, the reported bias correction to be used for this diffusion tube and WYAS as the analyst is 0.75 for 2016.

Image: state state

Appendix D: Maps of Automatic Monitoring Locations

Fig. D.1 – Leeds Centre (Site ID: A1)



Fig. D.2 – Corn Exchange (Site ID: A2)



Fig. D.3 – Headingley Kerbside (Site ID: A3)



Fig. D.4 – Haslewood Close (Site ID: A6)



Fig. D.5 – Queen Street, Morley (Site ID: A7)



Fig. D.6 – Jack Lane, Hunslet (Site ID: A9)



Fig. D.7 – Norman Row (Site ID: A12)



Fig. D.8 – Kirkstall Road (Site ID: A17)



Fig. D.9 – Temple Newsam (Site ID: A18)



Fig. D.10 – Tilbury Terrace (Site ID: A19)



Fig. D.11 – International Pool (Site ID: A20)

Appendix E: Maps of Current and Proposed AQMAs and nearby Monitoring Locations

Current AQMAs:



Fig. E.1 – AQMA 1/2010 Ebor Gardens



Fig. E.2 – AQMA 2/2010 Ladybeck Close (proposed for revocation)



Fig. E.3 – AQMA 3/2010 Caspar Apartments



Fig. E.4 – AQMA 4/2010 The 'Normans'



Fig. E.5 – AQMA 5/2010 The 'Tilburys'



Fig. E.6 – AQMA 6/2010 Queen Street, Morley (proposed for revocation)

Proposed AQMAs:



Fig. E.7 – Main Street, Pool-in-Wharfedale



Fig. E.8 – Chapel Hill, Morley

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁴	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 μg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 μg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 μg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 μg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 μg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

 $^{^{4}}$ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description	
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'	
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives	
ASR	Air quality Annual Status Report	
Defra	Department for Environment, Food and Rural Affairs	
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England	
EU	European Union	
FDMS	Filter Dynamics Measurement System	
JAQU	Joint Air Quality Unit – a team formed from officers at Defra and the Department for Transport	
LAQM	Local Air Quality Management	
NO ₂	Nitrogen Dioxide	
NO _x	Nitrogen Oxides	
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less	
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less	
QA/QC	Quality Assurance and Quality Control	
SO ₂	Sulphur Dioxide	
ТЕОМ	Tapered Element Oscillating Microbalance – a measurement technique for PM_{10} particles	
VCM	Volatile Correction Model – correction tool to adjust TEOM results	
µg/m ³	micrograms per cubic metre (of air)	

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Core Strategy Selective Review

Air Quality Background Paper

Leeds Local Plan Development Plan Document February 2018