2015 Air Quality Annual Status Report (ASR)

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

July 2016

Local Authority Officer	Ian Halliday
Department	Environmental Sustainability
Address	St Aldate's Chambers, 109 St Aldate's, Oxford, OX1 1DS
Telephone	01865 252309
E-mail	ihalliday@oxford.gov.uk
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Executive Summary: Air Quality in Oxford

Air pollution remains an invisible killer. It contributes to a range illnesses including heart disease and cancer. It particularly affects the most vulnerable in society: children, older people and those with heart and lung conditions. There is also a strong correlation with poverty because areas with poor air quality are also often in less affluent areas[1] [2].

Sixty years on from the Clean Air Act (1956) and pollution is still affecting people's health. There is an increasing burden on the NHS. It is estimated that in the UK it cost £16M a year to deal with the health impacts of just Particulate Matter (PM)[3].

Oxford, in common with many urban areas throughout the United Kingdom, is subject to poor air quality, particularly close to areas with high levels of road traffic. In Oxford, nitrogen dioxide is the pollutant of most concern.

The whole of the city was declared as an Air Quality Management Area (AQMA) in 2010. An Air Quality Action Plan (AQAP) was adopted by the Council in 2013. More details on the AQMA and AQAP are available here:

https://www.oxford.gov.uk/info/20216/air_quality_management/206/air_quality_management_in_oxford/2

Transport is by far the most significant source of emissions of oxides of nitrogen in the city, accounting for 75% of emissions, 17% of emissions come from commercial and residential heating, 6% from industry and 2% from energy production.

Air quality in Oxford has seen significant improvements but there is far more that needs to be done.

- Ten year trends from our data collection and analysis show that nitrogen dioxide (NO_2) levels have dropped by typically 35% at roadsides in the city centre. This is good news for the environment and for the health of people in Oxford.

[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

- Automatic monitoring station data for nitrogen dioxide continues to show decreases in levels at both High St and St Aldate's, following previous years (2009-2012) of recorded increases.
- The number of diffusion tube locations indicating results above the annual mean objective for nitrogen dioxide of 40µg/m^3 are also reducing.
- There were two exceedences of the hourly objective of 200µg/m^3 measured in St Aldate's. This is well within the 18 exceedences permitted.
- At some monitoring locations we saw small increases in measured levels of NO_2. In general, these were associated with locations were traffic and congestion levels were influenced by events such as long term road works, particularly around Frideswide Square and routes leading to and from it.
- Automatic monitoring station data for Particulate Matter (PM_{10}) shows that the measured annual means were 21µg/m^3 on the High Street and 13µg/m^3 at St Ebbe's. These are well within the objective of 40µg/m^3 .
- Automatic monitoring station data for Particulate Matter ($PM_{2.5}$) shows that the measured annual mean was 10µg/m^3. This compares to an annual mean of 14µg/m^3 measured in 2010.

Air pollution arises from activities we all contribute to, it is a shared problem and therefore the solutions need to be equally shared.

Actions to Improve Air Quality

Oxford's Air Quality Action Plan (AQAP) not only focusses on measures the City Council needs to address, but includes measures that we can influence, or work in partnership with others to deliver.

Effective measures require co-operation from all sectors including transport policy and management, the Council's priorities for new developments, freight management for business and commerce, and daily choices made by all transport users.

Oxford's AQAP recognises that the City Council cannot act in isolation in order to deliver a comprehensive package of measures without engagement and delivery from a wide set of stakeholders.

The following are actions that Oxford City Council has taken to improve air quality in the city:

- Declared the whole of the city an Air Quality Management Area for nitrogen dioxide.
- Developed an Air Quality Action Plan and Low Emission Strategy for the city.
- Introduced the first extensive Low Emission Zone (LEZ) outside of London. This won the prize for Local Authority Air Quality Initiative of the Year at the National Air Quality Awards 2015.
- Launched the Oxfordshire Air Quality website to make historic and real time air quality data more readily accessible to members of the public.
- Increased the number of diffusion tube monitoring locations in the city by nearly 50% from January 2015.
- Launched Oxford Park and Pedal which has seen over 100 cycle parking spaces introduced at two of our park and ride sites.
- Ran the Test Drive the Future event to introduce the public to a range of electric vehicles (EVs) and the financial and environmental benefits of going electric. The event provided an opportunity to test drive vehicles, and outlined the options for driving an electric car 'pay as you go' through one of Oxford's car clubs.

- Engaged with the Oxfordshire Health Improvement Board to ensure that air quality is considered in the context of the Joint Strategic Needs Assessment.
- Commissioned a study into options for a Delivery and Servicing Plan for the Council's city centre premises. Consideration and implementation of the options is now underway.
- We have continued to seek opportunities to work in partnership with our neighbouring District Councils through participation in in the Oxfordshire Air Quality Group.
- Presented on our experiences of implementing our Low Emission Zone to inform Defra's consideration of the most appropriate mechanism for establishing newly proposed Clean Air Zones.

Local Priorities and Challenges

The priorities for the forthcoming year are:

- Continuing our expanded monitoring regime and seeking to expand further, where appropriate.
- Launching the 'Schools Tackling Oxford's Air Pollution (STOP) project. This will install real time, indicative air quality monitors in six schools across the city and provide educational material to integrate the measurements into the national curriculum.
- Working with the County Council to further develop measures from the Oxford Transport Strategy that will have a positive impact on air quality, including options for a Zero Emission Zone.
- Using £800,000 worth of grant funding won through the Go Ultra Low City Scheme to roll out EV charging solutions for properties without dedicated parking spaces.
- Bidding to the Office for Low Emission Vehicles Taxi Scheme for funding to facilitate the installation of electric charging infrastructure to encourage the uptake of electric taxis.

- Developing a Technical Advisory Note setting out our approach to consideration of air quality in the planning process.
- Ensuring that air quality is considered fully during the development of the Oxford Local Plan.
- Reporting annually to the Health improvement Board on the state of air quality across the county and what measures are being taken to improve it.

How to Get Involved

Everyday decisions can have an impact on Oxford's air quality. Do you take the car when you could have cycled? Do you drive your children to school when you could have walked? We all have a huge role to play, and we can all be part of the solution. Encouraging walking and cycling in the city not only has a positive impact on air quality levels, but it also has multiple other benefits, including increasing the health of wellbeing of all those who live, work and visit Oxford.

Full details of air quality monitoring, including real time data on pollutant levels, is available on the Oxfordshire Air Quality Group website (https://oxfordshire.air-quality.info/).

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1 Local Air Quality Management

This report provides an overview of air quality in Oxford during 2015. 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 Oxford 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 C.

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 the objectives.

A summary of AQMAs declared by Oxford 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 https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=193.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
The City of Oxford AQMA	• NO_2 annual mean	Oxford	The whole of the administrative area of Oxford City Council	Air Quality Action Plan 2013 – 2020 https://www.oxford.gov.uk/info/20216/air_quality_management/206/air_quality_management_in_oxford/2

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

Oxford City Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the Action Plan.

Key completed measures are:

- Ensuring that sustainable transport measures developed in the Oxford Area Strategy of the Local Transport Plan (LTP) support the targets of the AQAP.
- Ensuring that walking and cycling strategies within the LTP assist delivery of the AQAP objectives.
- Assisting in the development of bus and park and ride strategies within the LTP which support the AQAP.
- Requiring air quality assessments for all planning applications for major developments.
- Rolling out eco-driving training for our staff.
- Working closely with our County and District colleagues, through engagement with the Oxfordshire Air Quality Partnership.
- Initiating engagement with the Oxfordshire Health Improvement Board.
- Completion of a feasibility study considering the potential to introduce EV charging infrastructure for taxis at strategic locations around the city.
- A report outlining options for a Delivery and Servicing Plan (DSP) for city centre Council sites has been prepared.

Oxford City Council's priorities for the coming year are:

- Continuing our expanded monitoring regime and seeking to expand further, where appropriate.
- Launching the 'Schools Tackling Oxford's Air Pollution (STOP) project. This will install real time, indicative air quality monitors in six schools across the city and provide educational material to integrate into the national curriculum.
- Working with the County Council to further develop measures from the Oxford Transport Strategy that will have a positive impact on air quality, including options for a Zero Emission Zone.

- Using £800,000 worth of grant funding won through the Go Ultra Low City Scheme to roll out EV charging solutions for properties without dedicated parking spaces.
- Bidding to the Office for Low Emission Vehicles Taxi Scheme for funding to facilitate the installation of electric charging infrastructure to encourage the uptake of electric taxis.
- Developing a Technical Advisory Note setting out our approach to consideration of air quality in the planning process.
- Ensuring that air quality is considered fully during the development of the Oxford Local Plan.
- Reporting annually to the Health improvement Board on the state of air quality across the county and what measures are being taken to improve it.

Table 2.2 – Progress on Measures to Improve Air Quality

	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Manage bus emissions through the implementation of the low Emission Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)	OCC	Complete	Ongoing	All local bus services within the streets affected must be operated exclusively by buses whose engines meet the Euro V emission standard	N/A	The Low Emission Zone has been implemented.	Ongoing	
2	Work to ensure sustainable transport measures developed in the Oxford Area Strategy of the LTP support the targets of the AQAP.	Promoting Low Emission Transport	Other	OCC	Complete	Complete	Oxford Transport Strategy includes measures that support delivery of the AQAP	N/A	The Oxford Transport Strategy has been published and includes measures to support the targets of the AQAP	Ongoing	
3	Support walking and cycling strategies within the LTP to ensure they assist delivery of the AQAP objectives.	Promoting Travel Alternatives	Promotion of cycling	OCC	Complete	Complete	Walking and cycling strategies include measures that support delivery of the AQAP	N/A	The Active Healthy Travel Strategy has been published and includes measures to support the targets of the AQAP	Ongoing	
4	Assist in development of bus and park and ride strategies within the LTP which support the AQAP. In particular we will work with the County to promote traffic management and routing measures to reduce bus emissions.	Alternatives to private vehicle use	Bus based Park & Ride	OCC	Complete	Complete	Bus and Park & Ride strategies include measures that support delivery of the AQAP	N/A	The Bus Strategy has been published includes measures to support the targets of the AQAP	Ongoing	

	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	Work with the County and our partners in Low Carbon Oxford to promote travel plans with organisations across the city.	Promoting Travel Alternatives	Workplace Travel Planning	OCC	Ongoing	Not commenced	Travel Plans adopted by organisations in the city	N/A	This measure has not been progressed to date.	TBC	
6	Continue to work with the County and bus operators to reduce bus emissions further, supporting the tightening of emission standards in contracted services and enforcement of the anti-idling policy following implementation of the LEZ.	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	OCC	Complete	Ongoing	TBC	N/A	We have been working in partnership with Oxford Bus Company and the County Council to develop a bid that would introduce inductively charged electric buses onto Park and Ride routes in the city. The outcome of the bid is awaited.	Ongoing	
7	Promote the uptake of electric vehicles by working with our partners to install electric vehicle recharging infrastructure.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	OCC	Ongoing	Ongoing	Charging infrastructure installed	N/A	We completed a feasibility study considering the potential to introduce EV charging points for taxis at strategic locations around the city. Following a successful bid to the Office for Low Emission Vehicles, OCC has obtained £800,000 worth of funding that will be used to evaluate various options for on-street charging, resulting in the installation of 100 new EV charging points in the city.	Ongoing	

	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
8	Investigate the feasibility of developing infrastructure to support emerging low or zero emission vehicle technologies, such as hydrogen fuel cells.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	OCC	Ongoing	Not commenced	TBC	N/A	This measure has not been progressed to date.	TBC	
9	Continue to develop low emission and zero emission vehicles in our own fleet, and seek opportunities to increase the Council's electric vehicle car-pool.	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	OCC	Complete	Ongoing	Number of electric vehicles in Council's fleet	N/A	The number of electric pool vehicles in the Council's fleet continues to increase. Opportunities to replace conventionally fuelled vehicles with electric vehicles are assessed on a case by case basis.	Ongoing	
10	Promote the development of low and zero emission car clubs schemes in the city.	Alternatives to private vehicle use	Car Clubs	OCC	Complete	Ongoing	Number of low/ zero emission car club vehicles available in the city	N/A	We have been working with car club providers to promote the provision of zero emission vehicles in the city	Ongoing	
11	Work with our Low Carbon Oxford Pathfinders to support the introduction of low emission vehicle into their fleets.	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	OCC	Complete	Ongoing	Number of low/ zero emission vehicles in LCO Pathfinder fleets	N/A	A number of Low Carbon Oxford Pathfinder event was held to bring together key organisations, to increase awareness of the impacts of business related travel and transport on the environment and human health.	Ongoing	

	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
12	Support eco-driving through inclusion of eco-driving information in the Low Carbon Hub and other travel information services, and where possible look to support eco-driving schemes with for example taxi companies.	Public Information	via the Internet	OCC	Ongoing	Not commenced	TBC	N/A	This measure has not been progressed to date.	TBC	
13	Explore the impact of alternative and low emission transport on air quality in Oxford.	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	OCC	Not commenced	Not commenced	TBC	N/A	This measure has not been progressed to date.	TBC	
14	Exploring the options available for freight consolidation and management and other schemes to reduce the amount of freight vehicles operating in the city. We will also consider low and zero emission vehicles in relation to the final delivery leg of any such consolidation schemes.	Freight and Delivery Management	Other	OCC	Complete	Ongoing	TBC	N/A	Report has been completed and published https://www.oxford.gov.uk/info/20216/air_quality_management/977/reducing_freight_emissions	Ongoing	
15	Seek to establish a freight quality partnership to promote Eco-driving and anti-idling policies with operators in the city.	Freight and Delivery Management	Freight Partnerships for city centre deliveries	OCC	Not commenced	Not commenced	TBC	N/A	This measure has not been progressed to date	TBC	

	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
16	Support the development of Delivery and Servicing Plans (DSPs) with business across the city to further reduce unnecessary freight movements. The development of such DSP's will need to consider integration with work emerging on freight consolidation.	Freight and Delivery Management	Delivery and Service plans	OCC	Not commenced	Not commenced	TBC	N/A	This measure has not been progressed to date	TBC	
17	Ensure that transport and environmental impact assessments for new developments are adequate to determine what levels of mitigation may be required to offset potential increases in transport activity and emissions.	Policy Guidance and Development Control	Low Emissions Strategy	OCC	Complete	Complete	Air quality assessments undertaken for all major development in the city	N/A	Air quality assessments are now required for all new developments classified as 'major'	Ongoing	
18	Explore opportunities to develop policy measures that require developers to provide investments in and contributions to the delivery of low emission transport projects and plans, including strategic monitoring and assessment activities.	Policy Guidance and Development Control	Low Emissions Strategy	OCC	Ongoing	Not commenced	TBC	N/A	The Oxford Local Plan is currently under review. This measure will be progressed through that process.	TBC	

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	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
19	Seek to ensure that stretching targets are set within travel plans for new developments, and that all new developments are encouraged to adopt Delivery and Servicing Plans to reduce freight movements.	Policy Guidance and Development Control	Low Emissions Strategy	OCC	Ongoing	Not commenced	TBC	N/A	The Oxford Local Plan is currently under review. This measure will be progressed through that process.	TBC	
20	Seek to ensure that new developments make appropriate provision for walking, cycling, public transport and low emission vehicle infrastructure e.g. EV charging points.	Policy Guidance and Development Control	Low Emissions Strategy	OCC	Complete	Ongoing	EV charging points installed at all new major developments	N/A	The Oxford Local Plan is currently under review. This measure will be progressed through that process.	Ongoing	
21	We will encourage the development of voluntary area-wide travel plans for existing developments through the Community Action Groups	Promoting Travel Alternatives	Other	OCC	Ongoing	Not commenced	TBC	N/A	The Oxford Local Plan is currently under review. This measure will be progressed through that process.	TBC	
22	Promote the development of car clubs within new developments.	Alternatives to private vehicle use	Car Clubs	OCC	Ongoing	Ongoing	Number of car clubs in new developments	N/A	Where appropriate, car clubs are considered as part of mitigation measures for air quality impacts in major developments	Ongoing	
23	Develop a low emission vehicle hierarchy to guide the procurement of vehicles within our fleet.	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	OCC	Ongoing	Not commenced	Number of low emission vehicles within Council fleet	N/A	This measure has not been progressed to date	TBC	

	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
24	Continue to assess our fleet operations in terms of mileage management and efficient routing of vehicle movements.	Vehicle Fleet Efficiency	Driver training and ECO driving aids	OCC	Complete	Ongoing	N/A	N/A	Route and mileage management are integrated into business as usual for the fleet.	Ongoing	
25	Maintain and develop our staff travel plan and complement this with Delivery and Servicing Plans (DSP) for key Council sites such as Town Hall.	Freight and Delivery Management	Delivery and Service plans	OCC	Complete	Ongoing	An adopted DSP is in place for the Council's city centre locations.	N/A	A report outlining options for a DSP for city centre Council sites has been prepared and consideration of the options and implementation is ongoing.	Ongoing	
26	Roll out eco-driving training for our staff.	Vehicle Fleet Efficiency	Driver training and ECO driving aids	OCC	Complete	Ongoing	Eco-driving training in place for staff	N/A	Eco-driving training is now in place for staff	Ongoing	
27	Seek to develop a sub-regional approach to air quality monitoring and action planning, working closely with our County and District colleagues, through engagement with the Oxfordshire Air Quality Partnership.	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	OCC	Complete	Ongoing	Attendance at the Oxfordshire Air Quality Group	N/A	Engagement with neighbouring District Councils has been developed through participation in the Oxfordshire Air Quality Group.	Ongoing	
28	Consider the benefit of including wider stakeholders such as transport providers, public health organisations and research and consulting expertise.	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	OCC	Complete	Ongoing	Regular updates on air quality provided to the Health improvement Board	N/A	Engagement with the Health Improvement Board is now in progress.	Ongoing	

	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
29	Improve communication to increase the public's understanding of the main sources and health effects of air pollution emissions.	Public Information	via the Internet	OCC	Complete	Ongoing	County wide Oxfordshire Air Quality Group website launched	N/A	The Oxfordshire Air Quality Group website (https://oxfordshire.air-quality.info/) was launched in October 2015. As well as providing real time and historic monitoring data, the website provides information on the health impacts of air quality and a 'Children's Area'.	Ongoing	
30	Work with the District and County Councils in Oxfordshire to provide a co-ordinated approach to public awareness and education.	Public Information	Other	OCC	Complete	Ongoing	County wide Oxfordshire Air Quality Group website launched	N/A	The Oxfordshire Air Quality Group website (https://oxfordshire.air-quality.info/) was launched in October 2015. As well as providing real time and historic monitoring data, the website provides information on the health impacts of air quality and a 'Children's Area'.	Ongoing	

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.

We measure $PM_{2.5}$ at the St Ebbe's urban background site. In 2010 the annual mean concentration was 14µg/m^3. In 2015 the annual mean concentration was 10 µg/m^3.

Oxford City Council considers that many of the measures designed to reduce levels of nitrogen dioxide set out in the AQAP will also contribute to reducing levels of $PM_{2.5}$.

Oxford City Council considers that the following existing measures contained in the AQAP will contribute to reducing levels of $PM_{2.5}$:

1. Manage bus emissions through the implementation of the Low Emission Zone
2. Work to ensure sustainable transport measures developed in the Oxford Area Strategy of the LTP support the targets of the AQAP.
3. Support walking and cycling strategies within the LTP to ensure they assist delivery of the AQAP objectives.
4. Assist in development of bus and park and ride strategies within the LTP which support the AQAP. In particular we will work with the County to promote traffic management and routing measures to reduce bus emissions.
5. Work with the County and our partners in Low Carbon Oxford to promote travel plans with organisations across the city.
6. Continue to work with the County and bus operators to reduce bus emissions further, supporting the tightening of emission standards in contracted services and enforcement of the anti-idling policy following implementation of the LEZ.
7. Promote the uptake of electric vehicles by working with our partners to install electric vehicle recharging infrastructure.

9. Continue to develop low emission and zero emission vehicles in our own fleet, and seek opportunities to increase the Council's electric vehicle car-pool.

10. Promote the development of low and zero emission car clubs schemes in the city.

11. Work with our Low Carbon Oxford Pathfinders to support the introduction of low emission vehicle into their fleets.

12. Support eco-driving through inclusion of eco-driving information in the Low Carbon Hub and other travel information services, and where possible look to support eco-driving schemes with for example taxi companies.

14. Exploring the options available for freight consolidation and management and other schemes to reduce the amount of freight vehicles operating in the city. We will also consider low and zero emission vehicles in relation to the final delivery leg of any such consolidation schemes.

15. Seek to establish a freight quality partnership to promote Eco-driving and anti-idling policies with operators in the city.

16. Support the development of Delivery and Servicing Plans (DSPs) with business across the city to further reduce unnecessary freight movements. The development of such DSP's will need to consider integration with work emerging on freight consolidation.

17. Ensure that transport and environmental impact assessments for new developments are adequate to determine what levels of mitigation may be required to offset potential increases in transport activity and emissions.

18. Explore opportunities to develop policy measures that require developers to provide investments in and contributions to the delivery of low emission transport projects and plans, including strategic monitoring and assessment activities.

19. Seek to ensure that stretching targets are set within travel plans for new developments, and that all new developments are encouraged to adopt Delivery and Servicing Plans to reduce freight movements.

20. Seek to ensure that new developments make appropriate provision for walking, cycling, public transport and low emission vehicle infrastructure e.g. EV charging points.

23. Develop a low emission vehicle hierarchy to guide the procurement of vehicles within our fleet.

25. Maintain and develop our staff travel plan and complement this with Delivery and Servicing Plans (DSP) for key Council sites such as Town Hall.

26. Roll out eco-driving training for our staff.

In addition we have been seeking opportunities to engage with Public Health colleagues on air quality. We have presented to the Oxfordshire Health Improvement Board on air quality across the county and the roles and responsibilities of public bodies in relation to it. The Board has requested annual updates on developments in air quality, which should link in to the Public Health Outcome Framework $PM_{2.5}$ indicator. We have also been working in partnership with Oxfordshire County Council to ensure that air quality is given the necessary attention in the development of the Joint Strategic Needs Assessment.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Oxford City Council undertook automatic (continuous) monitoring at 3 sites during 2015. Table A.1 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided on the Oxfordshire Air Quality Group website (https://oxfordshire.air-quality.info/). Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix B.

3.1.2 Non-Automatic Monitoring Sites

Oxford City Council undertook non- automatic (passive) monitoring of NO_2 at 70 sites during 2015. Table A.2 in Appendix A shows the details of the sites. This represents a significant increase in the level of monitoring from the 48 locations previously used. The current level of non-automatic monitoring is planned to continue for the foreseeable future.

Maps showing the location of the monitoring sites are provided on the Oxfordshire Air Quality Group website (https://oxfordshire.air-quality.info/). Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix B.

For the purposes of deciding which locations are significant, we consider in the first instance locations where there is relevant public exposure. It is important that assessments focus on locations where members of the public are likely to be regularly present for a period of time appropriate to the averaging period of the objective.

Approximately half of the monitoring locations are within central Oxford at locations where we believe relevant exposure is most likely to be significant. The remainder are used outside of the central area, again being prioritised by locations where relevant exposure is most likely.

Practically speaking we cannot monitor at every location on a continuous basis. To make most efficient use of our resources we rotate a number of monitoring sites every year, ensuring such sites are covered on average every 2 to 3 years.

One important aspect of monitoring is that we are able to demonstrate trends in air quality over long time periods. In order to carry this out, we continue monitoring at a number of the same sites year on year, so that the results we report can provide a strong basis for showing trends that are independent of location.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

The annual mean air quality objective was exceeded at 25 of the 70 diffusion tube monitoring locations across the city. All of these exceedances were within the existing AQMA.

- The most significant area of exceedances continues to be the city centre.
- Ten year trends from our data collection and analysis show that NO_2 levels have dropped by typically 35% at roadsides in the city centre.
- No exceedances were measured at the Green Road roundabout.
- There was one measured exceedance among the 8 monitoring locations in Headington centre.
- There was one exceedance recorded among the 6 monitoring locations along Botley Road.

The graph below shows the long term trend in levels of NO_2. It is apparent that there has been a significant downward trend in measured levels of NO_2 at both the St Aldate's and the High Street monitoring stations. These locations continue to show decreases in measured levels of NO_2, following previous years (2009-2012) of recorded increases. However, levels measured at both of these locations continue to exceed the annual mean objective.

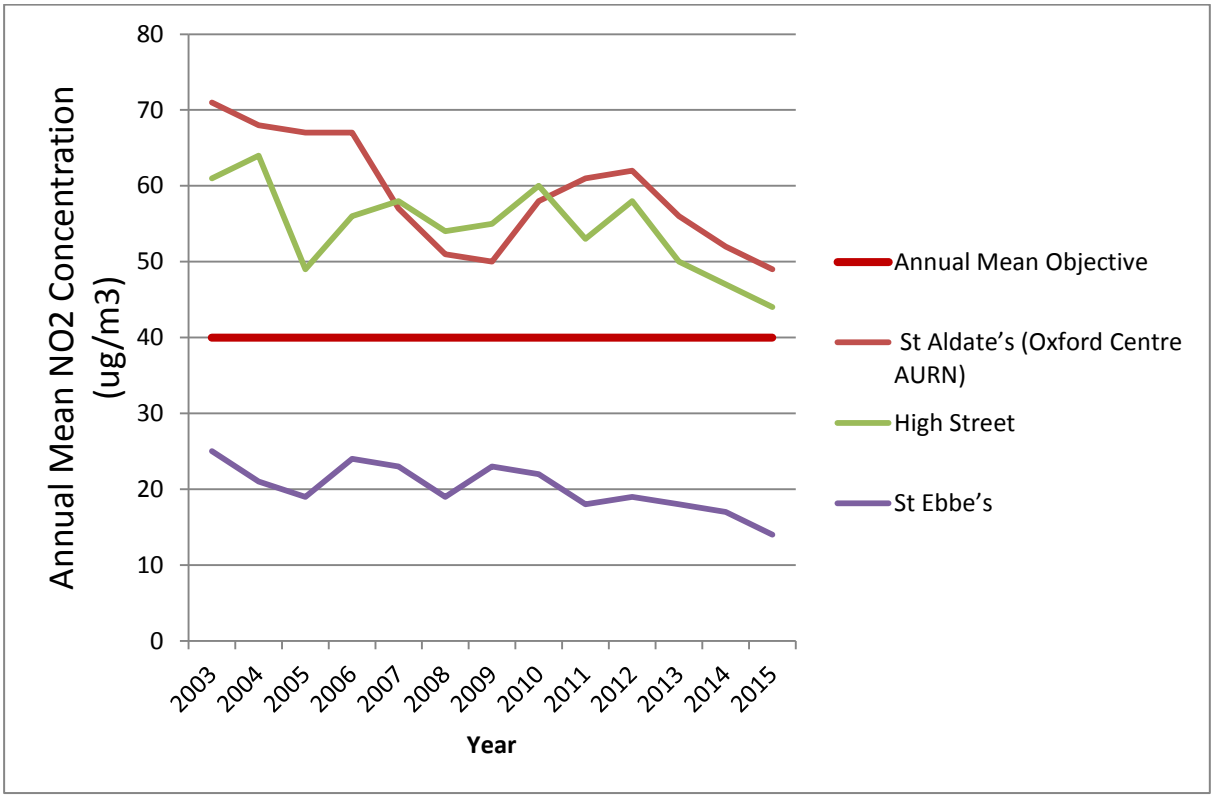

Figure 3.1 – Long Term Trends in Annual Mean Measurements at Continuous Monitoring Stations

The graph below shows the long term trend for levels of measured of NO_2 at a number of diffusion tube monitoring locations. It is apparent that there has been a significant downward trend in measured levels of NO_2 at most of these locations. Ten year trends from our data collection and analysis show that nitrogen dioxide (NO2) levels have dropped by typically 35% at roadsides in the city centre. However, as highlighted above, the annual mean objective was still exceeded at 25 of the 70 monitoring locations.

In 2015 we saw small increases in measured levels of NO_2. In general, these were associated with locations were traffic and congestion levels were influenced by events such as long term road works, particularly around Frideswide Square and routes leading to and from it. It is anticipated that these increases will be short term.

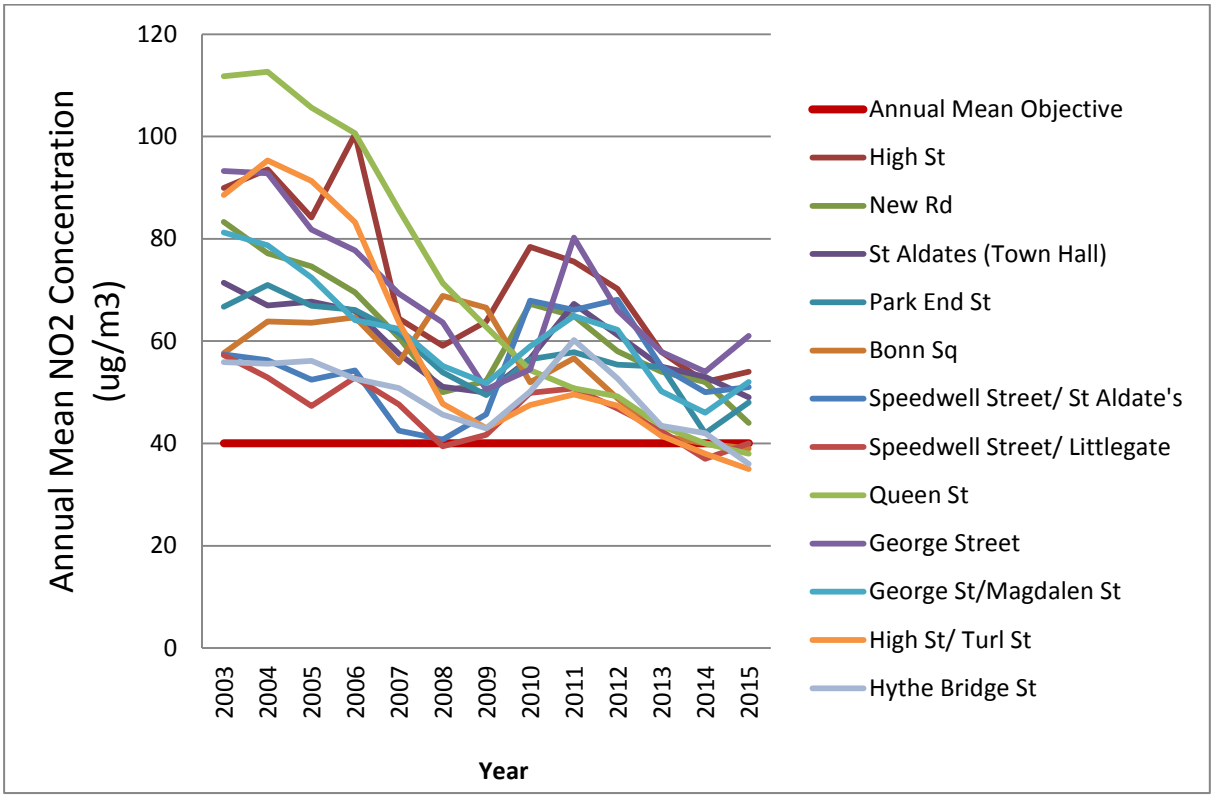

Figure 3.2 – Long Term Trends in Annual Mean Measurements at Diffusion Tube Monitoring Locations

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

The measured annual means were 21µg/m^3 on the High Street and 13µg/m^3 at St Ebbe's. These are well within the objectives.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

There were 6 exceedances of the daily mean at St Ebbe's and 1 on the High Street.There were no exceedances of the air quality objectives for $PM_{10.}$

3.2.3 Particulate Matter (PM2.5)

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

The measured annual mean for $PM_{2.5}$ was 10µg/m^3. This compares to an annual mean of 14µg/m^3 measured in 2010.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	St Aldate's (Oxford Centre AURN)	Roadside	451355	206155	NO_2	Y	Chemiluminescent	1	3	2.5
CM2	High Street	Roadside	451677	206272	NO_2 PM_{10}	Y	Chemiluminescent; Conventional TEOM Gravimetric Equivalent	1	2	1.5
CM3	St Ebbe's	Urban background	451168	205382	NO_2; PM_{10}; $PM_{2.5}$; O_3	Y	Chemiluminescent; FDMS; FDMS; UV absorption	10	2	2.5

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

(2) N/A if not applicable.

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

Site 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)
St Ebbe's	Urban Background	451168	205382	NO2	Y	0	3	Y	3
Roadsign by 10 Weirs Lane	Roadside	451907	204214	NO2	Y	0	2	N	3
Weirs Lane/Abingdon Road Lamp Post 1	Roadside	451922	204203	NO2	Y	2	2	N	3
Lamp Post 52 Abingdon Road	Roadside	451912	204156	NO2	Y	3	2	N	3
Lenthall Road Allotments	Urban Background	452741	203533	NO2	Y	5	N/A	N	1.5
4 The Roundway	Roadside	455601	207380	NO2	Y	0	5	N	3
North Way Lamp Post 9	Roadside	455405	207569	NO2	Y	0	1	N	3
North Way/ Barton Village Road Lamp Post 20	Roadside	455114	207799	NO2	Y	0	0.5	N	3
29 Green Road	Roadside	455595	207315	NO2	Y	0	8.5	N	2.5
67 Green Road	Roadside	455650	207175	NO2	Y	5	2	N	3
Windmill Road E Lamp Post 7	Roadside	454688	206850	NO2	Y	0	2	N	3
Windmill Road E Lamp Post 5	Roadside	454623	206987	NO2	Y	0	2	N	3
Windmill Road W Lamp Post 4	Roadside	454629	206942	NO2	Y	0	2	N	3
Windmill Road W	Roadside	454555	207096	NO2	Y	0	2.5	N	3
London Road / BHF	Roadside	454420	207021	NO2	Y	0	2.5	N	3
London Road / Osler Road	Roadside	454379	207056	NO2	Y	0	1	N	3
London Road - Andrews	Roadside	454519	207132	NO2	Y	0	3	N	3

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)
Estate Agents									
London Road /Holyoake Road	Kerbside	454630	207147	NO2	Y	0	0.5	N	3
Barton Lane Lamp post 2	Roadside	454954	207758	NO2	Y	3	1	N	3
Foxwell Drive Lamp Post 4	Roadside	453785	208376	NO2	Y	2	1	N	3
Marsh Lane/ Dents Close Lamp Post 1	Roadside	453785	208289	NO2	Y	3	2	N	3
York Place	Kerbside	452328	206016	NO2	Y	0	2	N	3
St Clements	Kerbside	452322	205990	NO2	Y	1	1	N	3
Osney Lane/ Hollybush Row	Kerbside	450671	206055	NO2	Y	2	2	N	3
Beckett Street	Roadside	450565	206217	NO2	Y	5	2	N	3
Frideswide Square	Kerbside	450642	206241	NO2	Y	0	1	N	3
Royal Oxford Hotel	Roadside	450673	206265	NO2	Y	0	2.5	N	3
Botley Road/ Mill Street	Roadside	450392	206228	NO2	Y	1	1	N	3
Abbey Road corner	Roadside	450352	206241	NO2	Y	0	1	N	3
Botley Road/ Hillview Road	Roadside	450016	206204	NO2	Y	1	2	N	3
Botley Road South (Corner of Duke Street)	Roadside	449656	206223	NO2	Y	0	2	N	3
Botley Road N (Corner of prestwich place)	Roadside	449659	206241	NO2	Y	0	2	N	3
Duke Street	Urban Background	449653	206158	NO2	Y	0	1	N	3
Pear Tree Park & Ride	Roadside	449515	210720	NO2	Y	10	4	N	3
BP Service Station Woodstock Road	Kerbside	449592	210219	NO2	Y	5	5	N	3
Wolvercote roundabout -	Roadside	449828	210209	NO2	Y	1	1	N	3

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)
78 Sunderland Avenue									
Sunderland Avenue West	Roadside	449810	210164	NO2	Y	1	1	N	3
Sunderland Avenue/ Cutteslowe Roundabout	Roadside	450468	210227	NO2	Y	1	2	N	3
Banbury Road/ Cutteslowe Roundabout	Roadside	450378	210224	NO2	Y	5	2	N	3
Corner of South Parade/ Banbury Road	Roadside	450759	209156	NO2	Y	0	1	N	3
Folly Bridge	Roadside	451429	205567	NO2	Y	0	1	N	3
St Aldate's	Roadside	451355	206155	NO2	Y	0	2	Y	2.5
Queen Street	Roadside	451269	206143	NO2	Y	0	2	N	3
Bonn Square	Roadside	451202	206128	NO2	Y	0	3	N	3
New Road	Roadside	451066	206195	NO2	Y	2	3.5	N	3
Park End Street	Kerbside	450883	206276	NO2	Y	2	1	N	3
Hythe Bridge Street	Roadside	450793	206343	NO2	Y	0	2	N	3
Worcester Street	Roadside	450940	206419	NO2	Y	2	2	N	3
Beaumont Street	Kerbside	451168	206519	NO2	Y	2	1	N	3
George Street/ Magdalen Street	Kerbside	451232	206392	NO2	Y	2	0.5	N	3
George Street	Kerbside	450967	206343	NO2	Y	0	0.5	N	3
Cornmarket street	Urban centre	451325	206230	NO2	Y	0	2	N	3
High Street/ Turl Street	Roadside	451465	206222	NO2	Y	1	2.5	N	3
50 High Street	Roadside	451900	206251	NO2	Y	0	2.5	N	3
Longwall Street	Kerbside	451967	206259	NO2	Y	1	1	N	3
Magdalen Bridge	Roadside	452111	206111	NO2	Y	0	2	N	3
High Street	Kerbside	451574	206231	NO2	Y	2	1	N	3
Speedwell Street/ St	Roadside	451409	205809	NO2	Y	1	3	N	3

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)
Aldate's									
Thames Street	Roadside	451305	205659	NO2	Y	1	3	N	3
New Butterwyke Place/ Thames Street	Roadside	451255	205695	NO2	Y	5	2	N	3
Friars Wharf	Roadside	451209	205706	NO2	Y	0	3	N	3
1 Blackfriars Road	Roadside	451072	205750	NO2	Y	0	3	N	3
Thames Street/ Trinity Street	Roadside	450926	205797	NO2	Y	0	10	N	3
Thames Street/ Oxpens Road	Kerbside	450887	205825	NO2	Y	0	1	N	3
Speedwell Street/ Littlegate	Roadside	451206	205780	NO2	Y	1	2	N	3
36 Faulkner Street	Urban Background	451149	205859	NO2	Y	1	20	N	3
Old Greyfriars Street	Roadside	451149	205947	NO2	Y	5	5	N	3
Norfolk Street	Roadside	451030	205962	NO2	Y	0	1.5	N	3
Paradise Square	Roadside	450982	205973	NO2	Y	0	1	N	3
Castle Street	Roadside	451062	206067	NO2	Y	0	1.5	N	3

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Name	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
					2011	2012	2013	2014	2015
CM1	St Aldate's (Oxford Centre AURN)	Automatic	99.03	99.03	**61**	**62**	**56**	**52**	**49**
CM2	High Street	Automatic	98.29	98.29	**53**	**58**	**50**	**47**	**44**
CM3	St Ebbe's	Automatic	97.64	97.64	18	19	18	17	14
	St Ebbe's	Diffusion Tube	100	100	21	22	20	17	16
	Roadsign by 10 Weirs Lane	Diffusion Tube	92	92	NM	NM	29	31	30
	Weirs Lane/Abingdon Road Lamp Post 1	Diffusion Tube	100	100	NM	NM	35	35	39
	Lamp Post 52 Abingdon Road	Diffusion Tube	92	92	NM	NM	**40**	37	**42**
	Lenthall Road Allotments	Diffusion Tube	92	92	21	19	20	13	15
	4 The Roundway	Diffusion Tube	100	100	**45**	**43**	37	32	32
	North Way Lamp Post 9	Diffusion Tube	100	100	NM	NM	NM	NM	30
	North Way/ Barton Village Road Lamp Post 20	Diffusion Tube	100	100	NM	NM	NM	NM	30
	29 Green Road	Diffusion Tube	83	83	**43**	**40**	34	30	29
	67 Green Road	Diffusion Tube	92	92	**46**	**46**	36	33	34
	Windmill Road E Lamp Post 7	Diffusion Tube	100	100	NM	NM	NM	32	29

Site ID	Site Name	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
	Windmill Road E Lamp Post 5	Diffusion Tube	100	100	NM	NM	NM	25	26
	Windmill Road W Lamp Post 4	Diffusion Tube	100	100	NM	NM	NM	30	31
	Windmill Road W	Diffusion Tube	100	100	NM	NM	NM	**40**	**44**
	London Road / BHF	Diffusion Tube	100	100	NM	NM	NM	36	34
	London Road / Osler Road	Diffusion Tube	100	100	NM	NM	NM	31	34
	London Road - Andrews Estate Agents	Diffusion Tube	83	83	NM	NM	NM	31	29
	London Road /Holyoake Road	Diffusion Tube	25	25	NM	NM	NM	31	30
	Barton Lane Lamp post 2	Diffusion Tube	93	93	NM	NM	NM	NM	31
	Foxwell Drive Lamp Post 4	Diffusion Tube	100	100	NM	NM	NM	NM	22
	Marsh Lane/ Dents Close Lamp Post 1	Diffusion Tube	100	100	NM	NM	NM	NM	20
	York Place	Diffusion Tube	100	100	**50**	39	31	32	30
	St Clements	Diffusion Tube	100	100	**85**	**85**	**70**	**65**	**67**
	Osney Lane/ Hollybush Row	Diffusion Tube	100	100	**40**	35	33	28	32
	Beckett Street	Diffusion Tube	83	83	37	36	36	30	33
	Frideswide Square	Diffusion Tube	50	50	**71**	**64**	**55**	**50**	**52**
	Royal Oxford Hotel	Diffusion Tube	83	83	**57**	**50**	**47**	**41**	**40**
	Botley Road/	Diffusion Tube	100	100	NM	NM	NM	NM	28

Site ID	Site Name	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
	Mill Street								
	Abbey Road corner	Diffusion Tube	100	100	38	36	NM	NM	28
	Botley Road/ Hillview Road	Diffusion Tube	92	92	37	34	NM	NM	**40**
	Botley Road South (Corner of Duke Street)	Diffusion Tube	100	100	**44**	39	NM	NM	34
	Botley Road N (Corner of prestwich place)	Diffusion Tube	100	100	**40**	36	NM	NM	29
	Duke Street	Diffusion Tube	100	100	NM	NM	NM	NM	20
	Pear Tree Park & Ride	Diffusion Tube	100	100	NM	NM	NM	NM	38
	BP Service Station Woodstock Road	Diffusion Tube	83	83	NM	NM	NM	NM	**44**
	Wolvercote roundabout - 78 Sunderland Avenue	Diffusion Tube	100	100	**40**	33	NM	NM	39
	Sunderland Avenue West	Diffusion Tube	75	75	**45**	**43**	NM	NM	34
	Sunderland Avenue/ Cutteslowe Roundabout	Diffusion Tube	75	75	**46**	38	NM	NM	**42**
	Banbury Road/ Cutteslowe Roundabout	Diffusion Tube	83	83	**45**	39	NM	NM	**40**

Site ID	Site Name	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
	Corner of South Parade/ Banbury Road	Diffusion Tube	83	83	NM	NM	NM	NM	25
	Folly Bridge	Diffusion Tube	100	100	NM	NM	NM	NM	**40**
	St Aldate's	Diffusion Tube	100	100	**67**	**61**	**55**	**53**	**49**
	Queen Street	Diffusion Tube	100	100	**51**	**49**	**43**	**40**	38
	Bonn Square	Diffusion Tube	100	100	**57**	**49**	**41**	**40**	39
	New Road	Diffusion Tube	92	92	**65**	**58**	**54**	**47**	**44**
	Park End Street	Diffusion Tube	100	100	**58**	**55**	**55**	**42**	**48**
	Hythe Bridge Street	Diffusion Tube	92	92	**60**	**53**	**43**	**42**	36
	Worcester Street	Diffusion Tube	83	83	**66**	**64**	**54**	**52**	**50**
	Beaumont Street	Diffusion Tube	92	92	**57**	**49**	**42**	**43**	**44**
	George Street/ Magdalen Street	Diffusion Tube	100	100	**65**	**62**	**50**	**46**	**52**
	George Street	Diffusion Tube	83	83	**80**	**66**	**58**	**54**	**61**
	Cornmarket street	Diffusion Tube	100	100	**42**	34	29	29	31
	High Street/ Turl Street	Diffusion Tube	100	100	**50**	**47**	**41**	38	35
	50 High Street	Diffusion Tube	92	92	**66**	**65**	**56**	**47**	**45**
	Longwall Street	Diffusion Tube	83	83	**75**	**63**	**53**	**50**	**50**
	Magdalen Bridge	Diffusion Tube	100	100	NM	NM	NM	NM	27
	High Street	Diffusion Tube	100	100	**76**	**70**	**58**	**52**	**54**
	Speedwell Street/ St Aldate's	Diffusion Tube	92	92	**66**	**68**	**55**	**50**	**51**
	Thames Street	Diffusion Tube	75	75	**45**	**43**	**44**	28	30

Site ID	Site Name	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
	New Butterwyke Place/ Thames Street	Diffusion Tube	100	100	**40**	37	35	**44**	38
	Friars Wharf	Diffusion Tube	100	100	NM	NM	NM	25	25
	1 Blackfriars Road	Diffusion Tube	92	92	NM	NM	NM	NM	26
	Thames Street/ Trinity Street	Diffusion Tube	100	100	26	23	22	19	20
	Thames Street/ Oxpens Road	Diffusion Tube	100	100	34	32	31	27	27
	Speedwell Street/ Littlegate	Diffusion Tube	92	92	**51**	**47**	**42**	37	**40**
	36 Faulkner Street	Diffusion Tube	100	100	**43**	39	32	34	30
	Old Greyfriars Street	Diffusion Tube	58	58	NM	NM	NM	NM	26
	Norfolk Street	Diffusion Tube	100	100	NM	NM	NM	23	30
	Paradise Square	Diffusion Tube	100	100	NM	NM	NM	29	24
	Castle Street	Diffusion Tube	100	100	NM	NM	NM	**42**	**47**

Notes: Exceedances of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

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

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix B for details.

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
CM1	Roadside	Automatic	99.03	99.03	**35**	**55**	11	0	2
CM2	Roadside	Automatic	98.29	98.29	3	3	1	0	0
CM3	Urban Background	Automatic	97.64	97.64	0	3	0	0	0

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

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

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

(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
CM2	Roadside	94.29	94.29	23	22	24	22	21
CM3	Urban Background	88.93	88.93	17	17	20	15	13

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

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

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

(3) All means have been "annualised" as per Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix B for details.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2011	2012	2013	2014	2015
CM2	Roadside	94.29	94.29	1	3	0	0	1
CM3	Urban Background	88.93	88.93	5	5	5	0	6

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

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

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

(3) If the period of valid data is less than 90%, the 90.4th percentile of 24-hour means is provided in brackets.

Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
CM3	Urban Background	89.62	89.62	12	12	14	10	10

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 Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix B for details.

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

Automatic Monitoring Sites

Oxford City Council currently operates three continuous monitoring sites. All routine calibration and maintenance is carried out and recorded in accordance with manufacturers' and Automated Urban Monitoring Network site operators' manuals.

Instrument drift is routinely checked by: -

- a daily internal instrument calibration which is carried out automatically using an electronic calibration check,
- every two weeks a manual external instrument calibration is carried out by Oxford City Council using gas cylinders that can be traced back to reference standards for each pollutant,
- every six months an audit of instrument response is carried out by an external organisation using independent gas calibration standards.

The above checks enable data to be examined subsequently for instrument drift, which is expected, or for faulty data which is usually not expected. Instrument drift is routinely adjusted by means of the 2 weekly external gas calibrations. Scaled data is calculated using the gas calibrations for each analyser.

Data from the continuous monitoring sites is collected and independently validated by Riccardo-AEA.

A dedicated supporting unit is also employed for each site, responding to equipment breakdowns and scheduled maintenance and servicing.

Particulate monitoring data is either FDMS (requires no correction), or has been subject to a gravimetric correction as detailed within the report.

Non-Automatic Monitoring Sites

Diffusion tubes are supplied and analysed by an accredited laboratory (South Yorkshire Air Quality Samplers), using the 50% TEA in Acetone method.

The laboratory is subject to quality assurance testing as part of their accreditation. This involves an independent comparison to other laboratories. The results of inter-comparisons are available for scrutiny.

A bias correction factor can be applied to diffusion tube results to account for laboratory bias and to correct to continuous monitoring results. Oxford City Council carries out a co-location study annually, and has used the results to calculate a locally derived bias adjustment factor for each separate year studied.

In 2015 the bias correction factor derived from the local co-location study was 0.94. The national bias correction factor was 0.84. It is considered most appropriate to use the locally derived factor as this represents the more conservative approach and is considered to be more representative of the local situation.

Appendix C: 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/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
DSP	Delivery and Servicing Plan
EU	European Union
EV	Electric Vehicle
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
LTP	Local Transport Plan
LEZ	Low Emission Zone
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
OCC	Oxford City Council
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