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

Overview of Air Quality in Milton Keynes

The main findings and conclusions of this report are that in 2016, air quality objectives were achieved at all monitoring locations throughout the Borough, including those within the Olney Air Quality Management Area (AQMA), for the second year running. If the annual mean objective for nitrogen dioxide continues to be met in future years the process of revocation of the AQMA can be considered. This is very encouraging, however much depends on continued improvements of emissions from vehicles and on meteorology throughout the calendar year, which has a strong influence on air quality; monitored concentrations in 2016 were slightly higher on average when compared with 2015 levels.

Significant progress has been made with the Go Ultra Low Cities programme run by the Department for Transport (DfT) and the Office for Low Emission Vehicles (OLEV). The website http://www.mkgoultralowcity.com/ has more information on this developing new scheme in Milton Keynes. The Electric Vehicle Experience Centre is scheduled to open in Milton Keynes Shopping Centre in summer 2017. It's the UK's first brand neutral showroom for electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) providing education and advice on choosing and using Ultra Low Emission Vehicles (ULEVs). There will be a range of vehicles available to be booked for a short-term test drive with an "EV Guru" or for a 7-day test period.

Milton Keynes already has one of the largest electric vehicle charging point networks in the country and this has expanded and improvements made in 2016 to add more rapid charging points.

The No 7 bus route (Wolverton – Bletchley) uses wirelessly charged electric buses and has proved very successful in reducing emissions from the bus fleet. Plans are progressing for a second electric bus route funded by a grant awarded from OLEV's Low Emission Bus Scheme. The new buses will also be charged wirelessly and advances in technology will mean that fewer charge points will be required on the chosen bus route.

The council's "get cycling" program has a wealth of information on cycle routes and Redways, training (including adults), local groups and clubs, parking and changing

facilities, cycle hire including adapted bikes. MK Council has partnered with cycling technology company See.Sense, BT Smart Hub and the Open University on an innovative project to collect crowdsourced data from cyclists, initially those using the Redways. Participants will be given a state of the art intelligent and connected See.Sense ICON cycle light providing advanced lighting and at the same time collecting anonymised data on the ride (using a smart phone app) that can be used to improve the Redway network.

The MK Futures 2050 Commission has identified sustainable mobility, tackling congestion and improving accessibility as project four of its "Six Big Projects". The Local Transport Plan 3 (LTP3) is currently being reviewed and refreshed in line with Plan MK future developments and other plans to create a Mobility Strategy.

Figure 1 Two-tier cycle racks MK rail station.

Figure 2 FalcoSafe cycle lockers (156 in total) MK rail station.

Figure 3 Electric vehicle charging at Civic Offices

Air Quality in Milton Keynes

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

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

The main source of oxides of nitrogen and particles is from road traffic emissions. An Air Quality Management Area (AQMA) was declared in 2008 in High Street South and Bridge Street, Olney because the annual mean nitrogen dioxide objective was being exceeded. There is a slight downward trend in the annual mean NO_2 and PM_{10}

[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

concentrations measured over the last 15 years at the Civic Offices automatic monitoring station. This improvement is mirrored at the two other automatic monitoring stations located in Newport Pagnell and in Olney. In 2015 and 2016, the annual mean objective for NO_2 was not exceeded at any monitoring location throughout the Borough, including within the AQMA.

In Milton Keynes Council (a unitary authority) air quality is managed jointly by Environmental Health, Transport Policy, Development Control, Public Health and Sustainability Departments. The council also works in partnership with other local authorities in Buckinghamshire as a member of the Buckinghamshire Air Quality Management Group (BAQMG) and with the Environment Agency (East Anglian Region).

Actions to Improve Air Quality

Congestion has been eased along the A421 (Standing Way H8) at Kingston towards junction 13 of the M1. The road has been widened into a dual carriageway from Fen Farm roundabout to Eagle Farm North roundabout. At the same time Kingston roundabout was improved with new underpasses and signalling. Works were completed in summer 2015. The next stage is dualling of the A421 to junction 13 and this will be undertaken by Central Bedfordshire Council.

East West Rail is a scheme to re-establish a rail link between Cambridge and Oxford. The Western Section of the route (Oxford to Bedford and Milton Keynes to Princes Risborough) will be upgraded and disused sections reinstated. The scheme is being funded by the Department for Transport, with contributions from local councils. It is being delivered by Network Rail and could be operational in the early 2020s.

The Oxford to Bedford line runs through Bletchley and the “Fixing the Links” project aims to maximise the benefits of East West Rail by improving the quality of the pedestrian links between the station and town centre and creating a more efficient transport interchange. The project was completed in spring 2017.

Local Priorities and Challenges

Priorities for the coming year are to continue promoting the use of ultra-low emission vehicles (ULEVs) and the initiatives in the MK Go Ultra Low City scheme. Encouraging the use of public transport, cycling and walking and making full use of

the extensive (325 km) Milton Keynes Redway system. Upgrades are planned for 13 cross city routes to provide Super Routes with improved signage, lighting and path surfaces.

How to Get Involved

The public can get involved by reducing their car usage; signing up to the Car Share scheme, changing to a car with lower emissions, walking and cycling and by using public transport.

There are lots of biking opportunities for all abilities and ages in Milton Keynes, including guided cycle rides, training for children and adults and the widely available Santander hire bikes.

More information on sustainable forms of travel can be found on the council's Smarter Choices web pages including the "Get Smarter Travel in Milton Keynes" campaign.

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1 Local Air Quality Management

This report provides an overview of air quality in the Borough of Milton Keynes 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 Milton Keynes 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 E.

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 Milton Keynes 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=165.

Alternatively, see **Appendix D: Map(s) of Monitoring Locations and AQMAs** which provides for a map of air quality monitoring locations in relation to the AQMA.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan (inc. date of publication)
						At Declaration	Now	
Olney AQMA	Declared December 2008	NO2 Annual Mean	Olney	An area in Olney encompassing all properties fronting Bridge Street and High Street South, and also including part of Market Place.	NO	43.2 µg/m3	36.9 µg/m3	Olney Action Plan http://www.milton-keynes.gov.uk/assets/attach/12676/Olney_Action_Plan_Oct12.pdf

2.2 Progress and Impact of Measures to address Air Quality in Milton Keynes

Milton Keynes Council has taken forward a number of measures during the current reporting year of 2016 in pursuit of improving local air quality both within the AQMA and throughout the Borough. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on AQMA measures can be found in the Olney Action Plan.

Key completed measures are:

- Expansion of the electric vehicle charging network, especially rapid charge points.
- Securing £9m funding from the Office for Low Emission Vehicles (OLEV) for Milton Keynes Council's Go Ultra Low City Scheme.
- Successfully bidding for a grant of £1.8m from the OLEV Low Emission Bus Scheme for 11 wirelessly charged electric buses and supporting infrastructure.
- Dualling of the A421 and improvements to Kingston roundabout.
- Introducing free Green Parking Permits for ULEVs using standard (purple) bays.

Milton Keynes Council expects the following measures to be completed over the course of the next reporting year:

- Opening of the Electric Vehicle Experience Centre
- Completion of the Bletchley "Fixing the Links" scheme.

Milton Keynes Council's priorities for the coming year are:

- Encouraging the continued uptake of ULEVs following the MK Go Ultra-Low City scheme.
- Promoting the Get Smarter Travel Campaign, part of the Smarter Choices initiative.
- Upgrading a Redway route into a Super Redway
- Keeping the air quality monitoring network operational

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	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	Expansion of EV charging network	Promoting low emission transport	Procuring alternative refuelling infrastructure to promote low emission vehicles. Electric vehicle recharging	MK Council	Ongoing	Ongoing	Number of recharging events No of charge points	n/a	170 standard and 56 rapid charge points installed	Ongoing	
2	Go Ultra Low City Scheme	Promoting low emission transport	Promoting uptake of low emission vehicles	MK Council	2015	2016-2020	ULEV ownership per capita	n/a	Funding confirmed 25/1/16	2020	
3	Low Emission Bus Scheme – grant awarded for a further 11 buses	Promoting low emission transport	Public vehicle procurement – prioritising uptake of low emission vehicles	MK Council/Arriva	2015	2016/7		n/a	Successful bid	2018	
4	Santander bike hire	Promoting low emission transport	Promoting uptake of low emission vehicles	Santander /nextbike	2015	2016/17	Number of hires	n/a	500 bikes 60 docking stations	2017	
5	Real time passenger information (RTPI) – bus routes	Transport planning and infrastructure	Bus route improvements	MK Council	2012	2014 - ongoing		n/a	Most routes now have RTPI	ongoing	
6	Bletchley – Fixing the Links	Traffic management	Strategic highway improvements	MK Council	2015	2016		n/a	ongoing	Spring 2017	

Measure No.	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
7	A421 Dualling	Traffic management	Strategic highway improvements	MK Council	2008 - 15	2016		n/a	completed	completed	
8	Smarter travel choices	Promoting travel alternatives	Promotion of cycling and walking	MK Council	2011	ongoing	various	n/a	ongoing	ongoing	
9	Sustainable Modes of Travel Strategy (SMOTS)	Promoting travel alternatives	School travel plans	MK Council	2015	2015		n/a	completed	Annual requirement	
10	East West Rail	Promoting travel alternatives	Promote use of rail	East West Rail Consortium / Network Rail	Western section Phase 2	ongoing		n/a		2024 (estimated for western section)	
11	Cycling information, events and opportunities	Public Information	Via leaflets and internet	MK Council	2011	ongoing		n/a	ongoing	ongoing	
12	Sustainability – promotion of alternative energy generation / energy efficient technology			MK Council				n/a			Low carbon living initiative
13	Free ULEV green car parking permit	Transport planning and infrastructure	Car parking	MK Council	2016	2016	Number of permits issued	n/a	Introduced July 2016	completed	

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.

The national air quality objective for $PM_{2.5}$ is an annual mean concentration of 25 µg/m^3, to be achieved by 31-Dec-2010. There is a target to reduce concentrations at urban background locations by 15%, to be achieved between 2010 and 2020.

The Public Health Outcomes Framework (PHOF) includes an indicator relating to anthropogenic particulate air pollution, measured as fine particulate matter, $PM_{2.5}$.

The health effects of $PM_{2.5}$ are recognised in Milton Keynes and the Joint Strategic Needs Assessment (JSNA) contains a section on this pollutant and its effect on the local population; https://www.milton-keynes.gov.uk/social-care-and-health/health-and-wellbeing-board/health-and-wellbeing-strategies-and-the-jsna

It is estimated that UK emissions contribute about 50% of total annual average $PM_{2.5}$, the rest is mainly from European countries, the proportion varying from year to year depending on meteorology; many episodes of high concentration occur on easterly winds. Emissions from diesel engines are a major source of fine particles.

Milton Keynes Council is taking the following measures to address $PM_{2.5}$ primarily by reducing emissions from transport and by promoting a more active lifestyle:

- Partnership working to address pollution and health concerns takes place between Environmental Health, Transport Policy, Public Health and Sustainability Departments within the council.
- By promoting active travel plans - the “Get Smarter Travel in MK” campaign encourages more sustainable forms of travel such as walking and cycling, moving away from single occupancy vehicles.
- Raising awareness of the effect of air pollution on public health and of the health benefits of more active travel.

- Promoting the use of electric and other low emission vehicles and providing charge points throughout the Borough.
- Improving bus services and providing real time bus passenger information to encourage the use of public transport; Get on Board is a promotional initiative funded by the Department of Transport's Better Bus Area (BBA) fund.
- Procuring electric buses for major routes through the city.
- By adopting a low carbon, more sustainable approach to living in Milton Keynes. Solar photo-voltaic panels were installed on the roof of the Civic Offices in 2015, financed by using the Carbon Offset Fund. A business case is being prepared for a 750 kW installation at the Coachway interchange near junction 14 of the M1 that may be coupled to vehicle charge points.

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

3.1 Summary of Monitoring Undertaken

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

3.1.1 Automatic Monitoring Sites

Milton Keynes Council undertook automatic (continuous) monitoring at 3 sites during 2016. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://uk-air.defra.gov.uk/data/

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

Milton Keynes Council undertook non- automatic (passive) monitoring of nitrogen dioxide (NO_2) at 37 sites during 2016. All tubes are deployed in duplicate or triplicate. Table A.2 in Appendix A shows the details of the sites. Diffusion tubes are prepared 'in-house' using 20% triethanolamine (TEA) in water and are analysed following the procedures set out in the AEA Practical Guidance document. MKC participates in the proficiency testing scheme, AIR PT, provided by LGC Standards for quality assurance of diffusion tube analysis. MKC also participates in the monthly NO_2 Network Field Inter-comparison Exercise managed by the National Physical Laboratory.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (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 40 µg/m^3.

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

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 200 µg/m^3, not to be exceeded more than 18 times per year.

There are no exceedences of either the annual or hourly objectives at any monitored location throughout the Borough. For the second year running all diffusion tube locations within the Olney AQMA recorded annual means below the objective. The highest value was 36.9 µg/m^3 recorded at the façade of 10 High Street South, Olney. The automatic analyser in Olney recorded an annual mean of 22.8 µg/m^3.

Figure A.1 shows a graph of the annual mean data from the automatic air quality stations. There is a downward trend at all three monitoring stations, however there was an increase at the Wolverton Road station when compared with 2015 results.

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 40 µg/m^3.

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

Automatic monitoring results have been adjusted using the Volatile Correction Method (VCM) as developed by ERG at King's College, London for TEOM analysers.

There were no exceedences of either the annual mean or daily mean objectives. The Civic Offices station recorded an annual mean concentration of 14.2 µg/m^3, and the Olney station annual mean was 17.4 µg/m^3 both well within the objective. Figure A.2 shows there is a slight downward trend at both stations over the last 10 years that is less pronounced in 2015/2016.

3.2.3 Particulate Matter ($PM_{2.5}$)

No specific $PM_{2.5}$ monitoring is undertaken within the Borough of Milton Keynes. Estimates of local $PM_{2.5}$ concentrations can be made by referring to background maps, surrogate data from AURN sites and by using local PM_{10} data adjusted using the methodology in the technical guidance.

Based on the 2013 maps available on the Defra UK-Air website, the projected 2016 average background $PM_{2.5}$ concentration in Milton Keynes is 10.9 µg/m^3. An estimation of $PM_{2.5}$ concentration can be made from PM_{10} monitoring data by applying the nationally derived correction factor of 0.7, as described in Chapter 7 Section 1 paras 7.107 to 7.111 of the Technical Guidance. The estimated $PM_{2.5}$ annual mean concentration at the Civic Offices is 9.9 µg/m^3 and at the Olney station the estimated concentration is 12.2 µg/m^3.

3.2.4 Sulphur Dioxide (SO_2)

Automatic monitoring was undertaken between 1999 and 2012. Sulphur dioxide is no longer monitored in Milton Keynes because levels are very low and there are no risks of exceeding air quality objectives. An analyser has been retained at the Civic Offices air quality station and can be brought back on line if needed in the future.

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)
Fixed	Civic Offices, CMK	Urban Centre	485070	239131	NO_2; PM_{10}; O_3	NO	Chemiluminescence; Teom 1400AB; UV absorption	113 (to residential)	4.8	3.2
Roadbox 1	Wolverton Road, Newport Pagnell	Roadside	486290	243344	NO_2	NO	Chemiluminescence	25 (to residential)	3.4	1.5
Roadbox 2	High Street South, Olney	Roadside	488922	251157	NO_2; PM_{10}	YES	Chemiluminescence; Teom 1400AB	11 (to residential)	2	1.5

Notes:

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

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube colocated with a Continuous Analyser?	Height (m)
C1 C2 C3	10 High St South, Olney (Cowper School House)	Roadside	488914	251173	NO2	YES	0	2	NO	2.26
D1 D2 D3	9 High St South, Olney (Olney Wine Bar)	Roadside	488904	251177	NO2	YES	0	1.7	NO	2.24
E1 E2 E3	20 High St, Olney	Roadside	488926	251455	NO2	NO	3.3	7.6	NO	2.15
F1 F2 F3	17 High St, Olney (Opp. No.20 High St)	Roadside	488905	251456	NO2	NO	0	7.2	NO	2.12
H1 H2	76 High St, Newport Pagnell	Roadside	487514	243901	NO2	NO	2.3	2.2	NO	2.38
I1 I2	63 High St, Newport Pagnell	Kerbside	487588	243912	NO2	NO	2	0.4	NO	2.36
J1 J2	57 High St, Newport Pagnell (The Plough PH)	Kerbside	487620	243922	NO2	NO	2	0.4	NO	2.4
G1 G2 G3	Corner of Coneygere and Palmers Rd, Olney	Suburban	489108	251213	NO2	NO	10.4	1.7	NO	2.19

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 colocated with a Continuous Analyser?	Height (m)
V1 V2	63 Windsor St, Wolverton	Urban Background	481412	240860	NO2	NO	2.3	1.1	NO	2.3
N1 N2	222 Wolverton Rd, Blakelands	Suburban	486069	243148	NO2	NO	25	1.6	NO	2.22
DD1 DD2	Aylesbury St, Fenny Stratford (Bracknell House)	Roadside	488118	233814	NO2	NO	11.1	4.5	NO	2.4
T1 T2	Silbury Boulevard, CMK (corner of North Tenth St)	Kerbside	485298	239126	NO2	NO	28.2	0.9	NO	2.5
U1 U2	52-100 North Tenth Street, Central Milton Keynes	Roadside	485229	239223	NO2	NO	4.5	6.1	NO	2.3
QQ1 QQ2	Silver Street, Stony Stratford	Suburban	478740	240217	NO2	NO	3	0.9	NO	2.02
RR1 RR2	Horsefair Green, Stony Stratford	Suburban	478882	240265	NO2	NO	3.5	2.6	NO	2.01
W1 W2	130 Newport Rd, New Bradwell	Roadside	482965	241515	NO2	NO	6.1	1.6	NO	2.35
O1 O2	64 Nicholas Mead, Great	Urban Background	486039	241484	NO2	NO	2.4	4	NO	1.9

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 colocated with a Continuous Analyser?	Height (m)
	Linford									
FF1 FF2 FF3	Cross Keys Office, High St South, Olney	Roadside	488898	251186	NO2	YES	0.2	1.6	NO	2.03
HH1 HH2 HH3	33 High Street South, Olney (Art Mart)	Roadside	488891	251248	NO2	YES	0.6	2	NO	2.05
KK1 KK2 KK3	18/20 Bridge St, Olney	Roadside	488917	251068	NO2	YES	0.4	2.2	NO	2.22
LL1 LL2 LL3	Courtney House, Bridge St, Olney	Roadside	488909	251077	NO2	YES	0.4	1.7	NO	2.05
OO1 OO2	Watling Street, Fullers Slade	Roadside	480015	239400	NO2	NO	43	7.6	NO	2.49
SS1 SS2	Stratford Road, Wolverton (Tesco End)	Roadside	481966	241314	NO2	NO	n/a	1.4	NO	2.52
SS3 SS4	Stratford Road, Wolverton (Station End)	Roadside	481993	241328	NO2	NO	n/a	1.4	NO	2.52
TT1 TT2	62 High Street, Newport Pagnell (Co-Op North)	Roadside	487589	243923	NO2	NO	0	4.2	NO	2.01

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 colocated with a Continuous Analyser?	Height (m)
TT3 TT4	77 High Street, Newport Pagnell (Co-Op South)	Roadside	487585	243895	NO2	NO	0	3.7	NO	2.31
B1 B2	Northampton Rd, Lavendon (Horseshoe PH)	Roadside	491769	253542	NO2	NO	0.6	3	NO	2.08
BB1 BB2	14-16 Newport Rd, Wavendon	Roadside	491498	237284	NO2	NO	9.7	7.2	NO	1.9
AA1 AA2	Brook Farm, Broughton Rd, Middleton	Suburban	489237	239016	NO2	NO	23	1	NO	2.1
K1 K2	16-17 Greenlands, Newport Pagnell	Suburban	486296	243208	NO2	NO	10.1	1.6	NO	2.08
L1 L2	5-7 Greenlands, Newport Pagnell	Suburban	486345	243230	NO2	NO	5.4	1.4	NO	2.52
M1 M2	42-44 Walnut Close, Newport Pagnell	Suburban	486495	243345	NO2	NO	7.6	1.5	NO	2
EE1 EE2	6 Atherstone Court, Two Mile Ash	Suburban	481331	238825	NO2	NO	9.5	0.4	NO	1.88

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 colocated with a Continuous Analyser?	Height (m)
PP1 PP2	1 Tudor Gardens, Stony Stratford	Suburban	479459	239536	NO2	NO	17	2.3	NO	2.18
MM1 MM2	18 Wheatcroft Close, Beanhill	Urban Background	486332	236228	NO2	NO	10.1	0.3	NO	2.2
R1 R2 R3	Static Air Quality Station (Civic Offices)	Urban Centre	485070	239131	NO2	NO	113	4.8	YES	3.5
S1 S2 S3	Roadbox 1 (Newport Pagnell)	Roadside	486290	243344	NO2	NO	25.8	1.8	YES	2.4
JJ1 JJ2 JJ3	Roadbox 2 (Olney)	Roadside	488922	251157	NO2	YES	10.1	2	YES	2.14

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

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
Fixed	Urban Background	Automatic	83.6	83.6	21.9	20.9	19.0	18.8	18.1
Roadbox 1	Roadside	Automatic	74.3	74.3	36.1	33.2	29.6	27.0	32.8
Roadbox 2	Roadside	Automatic	95.9	95.9	27.0	26.7	27.0	22.3	22.8
C1 C2 C3	Roadside	Diffusion Tube	100	100	**42.8**	**44.0**	**40.5**	32.9	36.9
D1 D2 D3	Roadside	Diffusion Tube	100	100	39.6	36.6	34.1	29.5	32.3
E1 E2 E3	Roadside	Diffusion Tube	100	100	25.8	24.3	21.9	21.6	23.5
F1 F2 F3	Roadside	Diffusion Tube	100	100	27.8	25.4	26.7	23.6	24.9
H1 H2	Roadside	Diffusion Tube	100	100	27.6	28.3	26.4	22.8	25.5
I1 I2	Kerbside	Diffusion Tube	100	100	33.3	34.2	31.1	27.7	30.6
J1 J2	Kerbside	Diffusion Tube	100	100	35.0	35.5	34.2	30.1	31.4
G1 G2 G3	Suburban	Diffusion Tube	100	100	14.5	13.2	12.8	10.5	11.5
V1 V2	Urban Background	Diffusion Tube	100	100	19.0	18.0	15.2	14.7	15.8
N1 N2	Suburban	Diffusion Tube	100	100	26.9	29.3	24.7	20.1	23.2
DD1 DD2	Roadside	Diffusion Tube	100	100	23.4	25.9	24.2	20.1	22.5
T1 T2	Kerbside	Diffusion Tube	91.7	91.7	23.9	25.3	23.7	21.1	23.5
QQ1 QQ2	Suburban	Diffusion	100	100	21.1	22.4	19.8	18.6	18.0

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2012	2013	2014	2015	2016
		Tube							
RR1 RR2	Suburban	Diffusion Tube	100	100	21.8	25.4	22.3	20.2	22.1
W1 W2	Roadside	Diffusion Tube	100	100	24.5	23.0	20.1	17.8	19.9
O1 O2	Urban Background	Diffusion Tube	100	100	19.2	18.4	17.7	15.1	17.4
FF1 FF2 FF3	Roadside	Diffusion Tube	100	100	**41**	36.2	37.3	32.9	34.0
HH1 HH2 HH3	Roadside	Diffusion Tube	100	100	37.9	32.6	32.0	28.5	30.5
KK1 KK2 KK3	Roadside	Diffusion Tube	100	100	**42.4**	**40.2**	**41.3**	34.2	36.3
LL1 LL2 LL3	Roadside	Diffusion Tube	100	100	**40.1**	33.6	34.3	31.6	33.5
OO1 OO2	Roadside	Diffusion Tube	100	100	20.8	21.7	18.1	17.6	20.8
SS1 SS2	Roadside	Diffusion Tube	91.7	91.7	_	27.1	27.3	23.0	25.3
SS3 SS4	Roadside	Diffusion Tube	91.7	91.7	_	34.6	31.9	27.6	33.3
TT1 TT2	Roadside	Diffusion Tube	100	100	_	_	34.2	27.6	27.1
TT3 TT4	Roadside	Diffusion Tube	100	100	_	_	27.4	23.1	24.6
B1 B2	Roadside	Diffusion Tube	91.7	91.7	19.7	20.3	19.3	17.0	17.6
BB1 BB2	Roadside	Diffusion Tube	100	100	24.9	24.7	23.7	19.4	21.1
AA1 AA2	Suburban	Diffusion Tube	100	100	18.5	17.9	15.8	13.3	15.9
K1 K2	Suburban	Diffusion	100	100	29.2	26.0	28.4	25.6	23.4

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
		Tube							
L1 L2	Suburban	Diffusion Tube	100	100	27.2	25.7	25.0	22.3	21.8
M1 M2	Suburban	Diffusion Tube	100	100	22.8	20.2	19.9	18.0	18.1
EE1 EE2	Suburban	Diffusion Tube	100	100	13.8	13.6	12.6	10.8	11.9
PP1 PP2	Suburban	Diffusion Tube	100	100	13.4	12.8	10.6	9.2	11.1
MM1 MM2	Urban Background	Diffusion Tube	100	100	23.1	23.7	24	22.0	24.1
R1 R2 R3	Urban Centre	Diffusion Tube	100	100	22.8	20.4	19.4	17.1	18.9
S1 S2 S3	Roadside	Diffusion Tube	100	100	35.7	32.2	31.4	29.6	29.0
JJ1 JJ2 JJ3	Roadside	Diffusion Tube	100	100	27.1	26.4	26.2	22.7	24.5

☒ **Diffusion tube data has been bias corrected**

☒ **Annualisation has been conducted where data capture is <75%**

☐ **If applicable, all data has been distance corrected for relevant exposure (confirm by selecting in box)**

Notes:

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

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

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

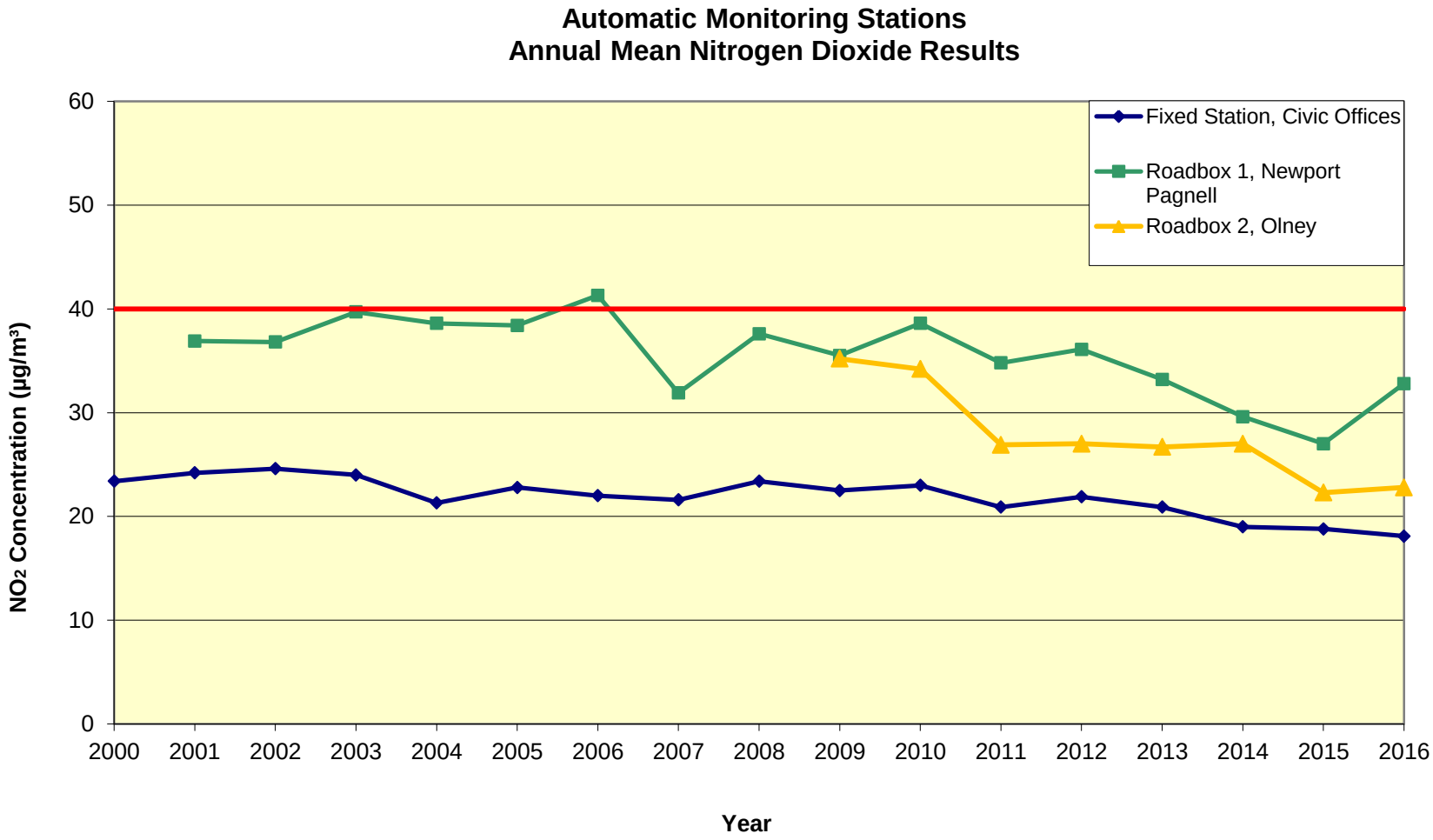


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2012	2013	2014	2015	2016
Fixed	Urban Centre	Automatic	83.6	83.6	0	0	0 (88.1)	0	0 (99.1)
Roadbox 1	Roadside	Automatic	74.3	74.3	0	0	0	0	0 (110.3)
Roadbox 2	Roadside	Automatic	95.9	95.9	0	0	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 85%, 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 2016 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2012	2013	2014	2015	2016
Fixed	Urban Centre	95.2	95.2	17.5	15.7	14.7	14.8	14.2
Roadbox 1	Roadside	n/a	n/a	18.4	19.2	18	n/a	n/a
Roadbox 2	Roadside	75.7	75.7	18.8	20.8	19.1	16.7	17.4

☒ **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.

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

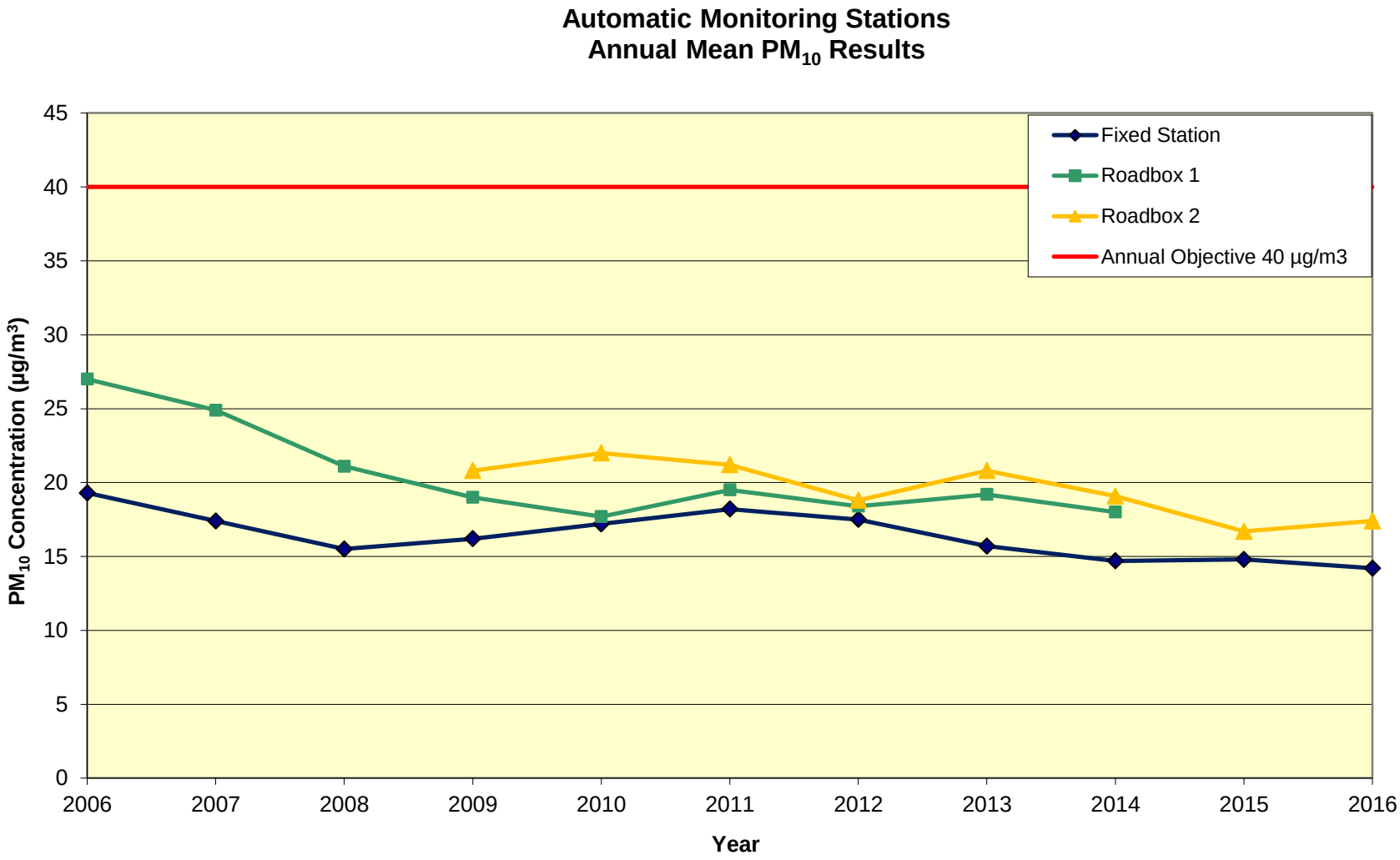


Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2012	2013	2014	2015	2016
Fixed	Urban Centre	95.2	95.2	1	1	4	1	1
Roadbox 1	Roadside	n/a	n/a	9	4	4	-	-
Roadbox 2	Roadside	75.7	75.7	13	1	3	0	1

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 85%, the 90.4th percentile of 24-hour means is provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2016

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.68) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
C1 C2 C3	54.4	53.9	60.8	56.4	54.3	53.7	40.5	33.0	53.6	61.0	62.0	67.8	54.3	36.9	36.9
D1 D2 D3	51.0	51.2	53.4	52.7	45.3	42.4	40.2	37.0	43.5	49.3	46.4	57.8	47.5	32.3	32.3
E1 E2 E3	36.3	36.9	37.6	33.7	36.9	30.7	20.3	22.4	35.9	38	40.4	46.1	34.6	23.5	22.0
F1 F2 F3	45.1	39	38.8	35.1	32.8	26	33.2	30	38.5	32.5	41.9	47.3	36.7	24.9	24.9
H1 H2	41.9	41.9	40.4	38.4	31.8	31	26.5	25.7	36.1	35.9	47.8	52.4	37.5	25.5	23.9
I1 I2	54.4	52.7	43.6	43.8	40	33.5	36	37.9	40.3	43.2	53.7	61.6	45.1	30.6	26.2
J1 J2	57.7	54.1	45.3	46.1	41	35.1	35.4	35.5	40.2	44.7	55.1	64.4	46.2	31.4	26.8
G1 G2 G3	24.4	21.9	19.7	14.6	10.8	8.8	10.4	5.8	16.3	15.7	23.7	31.6	17.0	11.5	11.4
V1 V2	27.9	25.9	27.7	26.8	17.9	15.3	12.7	10.4	19.7	25.6	29.6	39.5	23.3	15.8	15.3
N1 N2	36.9	36.5	41.2	37.3	37	31.7	19.4	20.2	29.2	38.4	38	43.4	34.1	23.2	17.3
DD1 DD2	37.6	37.7	40	30.8	26.6	25.1	20.8	16.5	34.9	38.5	39.6	49.8	33.2	22.5	19.8
T1 T2	42.3	40.1	35.7	29.7	29.4	24.9	23.1	21.3	missing	37.5	38.3	57.1	34.5	23.5	20.2
QQ1 QQ2	30.9	31.2	32.7	28.8	24.7	22.7	18.1	19	20.2	27.9	27.8	32.8	26.4	18.0	16.0

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.68) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
RR1 RR2	36.1	35.5	38.7	32.5	30.4	26.8	22	21.4	30.9	34.6	39.6	42.1	32.6	22.1	19.8
W1 W2	40	35	32.1	29.3	27.4	16.6	22.5	16.2	26.3	27.3	34.4	44.1	29.3	19.9	17.6
O1 O2	35.9	30.7	26.1	22.6	21.6	16.1	18.1	15.7	24	24.5	30.4	41	25.6	17.4	17.3
FF1 FF2 FF3	59.5	56.7	51	48	42.6	40.4	50.1	43.8	55.2	42.2	49.5	60.8	50.0	34.0	33.4
HH1 HH2 HH3	49.7	50.6	51.1	45.3	39.2	40.4	40.1	33.8	45.2	42.2	46	53.8	44.8	30.5	29.3
KK1 KK2 KK3	62.7	62.3	57	53.4	51.9	53.7	46.5	39.3	46.4	50.3	50.4	66.4	53.4	36.3	35.3
LL1 LL2 LL3	56.4	56.5	51.8	46.1	40.8	41	49.3	40.1	53.3	41.8	51	63	49.3	33.5	32.4
OO1 OO2	29.1	35.3	35.4	29.7	28.8	33	16.5	19.4	21.3	42	34.3	42	30.6	20.8	n/a
SS1 SS2	41.7	39.4	missing	38.3	34.4	30.7	29.8	26.7	35.9	39.3	43	50.2	37.2	25.3	n/a
SS3 SS4	52.1	52.4	missing	52.9	45.1	45.6	41	35.7	42.4	52.1	58.9	60.1	48.9	33.3	n/a
TT1 TT2	45.5	46.2	24.9	42	37	37.5	29.7	26.3	39.4	43.9	52.4	53.7	39.9	27.1	27.1
TT3 TT4	44.7	43.4	35.7	36.1	33.5	25.6	29.5	25.4	35	33.4	44.8	47.4	36.2	24.6	24.6
B1 B2	38	34.8	27.1	24	23.2	19.7	17.6	13.9	27.6	23.3	35.1	missing	25.8	17.6	17.3
BB1 BB2	35	35.3	38.1	30.7	28.6	23.1	22.2	20.4	26.3	36.1	36.4	40.5	31.1	21.1	19.3
AA1 AA2	29.2	28.4	28	21.8	20.3	15.1	12.9	12	20.7	25.2	28.9	38.2	23.4	15.9	14.9
K1 K2	51.6	45.6	37.6	24.9	28.7	21.6	29.9	19.3	32.3	27.3	40.6	53.5	34.4	23.4	19.1
L1 L2	50.2	43	32.7	31.6	26.3	20.2	27.3	19.9	26.1	25.7	32.6	48.6	32.0	21.8	19.0
M1 M2	39.9	30.4	30.4	26.1	16.8	16.4	22.4	13.5	25.6	21.6	34.4	42.4	26.7	18.1	16.4

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.68) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
EE1 EE2	23.8	20.8	21.6	18.1	12.3	12	9.9	7.7	12.2	18.5	23.2	29.4	17.5	11.9	11.5
PP1 PP2	18.9	19.4	19.7	16	14	10.1	7.5	7.1	15.6	18.8	20.1	29.1	16.4	11.1	11.1
MM1 MM2	43.1	42.6	40.8	36.1	34	26.5	30.2	24.2	30.2	33.2	34.4	50.1	35.5	24.1	19.3
R1 R2 R3	35.5	34.3	30.5	20	20.7	17.4	16.1	15.3	26.7	31.6	38.5	47.3	27.8	18.9	n/a
S1 S2 S3	53.7	51	47.2	40.2	40	31.9	37.4	30.6	32.5	40.9	49.7	56	42.6	29.0	n/a
JJ1 JJ2 JJ3	44.4	43.7	46	34.8	29.1	28.4	27.2	20.4	34.7	36	39.4	48.1	36.0	24.5	n/a

☒ **Local bias adjustment factor used**

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

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

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

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

Diffusion Tube Bias Adjustment Factors

Nitrogen dioxide diffusion tubes are prepared 'in-house' by Milton Keynes Council using 20% triethanolamine (TEA) in water and are analysed following the procedures set out in the AEA Practical Guidance document produced by the Defra Working Group on Harmonisation of NO_2 Diffusion Tubes that was released early in 2008. The Council participates in the proficiency testing scheme, AIR PT, provided by LGC Standards for quality assurance of diffusion tube analysis and the monthly NO_2 Network Field Intercomparison Exercise managed by the National Physical Laboratory (NPL).

Factors from Local Co-location Studies

Local co-location studies are carried out at all the automatic monitoring stations. Tubes are sited in triplicate near the air intake. Data can only be included in the bias adjustment factor calculation if there are more than 9 months data at each of the locations.

The co-location bias adjustment results for 2016 were 0.63, 0.72, and 0.62 giving a combined adjustment factor of 0.66. In addition we received a bias adjustment factor of 0.74 for the Marylebone Road, London, intercomparison tube study. The average for the four results was 0.68.

Table C.1 – Co-location Study at Fixed Station, Civic Offices

Month	Start Date	End Date	Diffusion Tube µg/m^3				Auto Average µg/m^3	
			1	2	3	Average		
Jan	06-Jan-16	03-Feb-16	32.06	37.13	37.28	35.49	22.91	
Feb	03-Feb-16	02-Mar-16	34.39	33.85	34.67	34.30	21.83	
Mar	02-Mar-16	30-Mar-16	32.03	27.46	31.94	30.48	22.58	
Apr	30-Mar-16	27-Apr-16	20.53	21.51	18.08	20.04	14.88	
May	27-Apr-16	25-May-16	21.16	22.12	18.71	20.66	13.04	
Jun	25-May-16	29-Jun-16	15.63	18.35	18.18	17.39	11.43	
Jul	29-Jun-16	27-Jul-16	16.73	16.63	14.93	16.10	8.60	
Aug	27-Jul-16	24-Aug-16	14.83	15.84	15.29	15.32	11.05	
Sep	24-Aug-16	28-Sep-16	27.70	26.93	25.51	26.71	16.24	
Oct	28-Sep-16	26-Oct-16	32.51	31.38	30.93	31.61		
Nov	26-Oct-16	30-Nov-16	36.05	41.44	37.88	38.45	22.40	
Dec	30-Nov-16	04-Jan-17	49.16	47.13	45.73	47.34	27.44	**Adjustment Factor**
					Annual average:	**27.82**	**17.49**	**0.6286**

Table C.2 – Co-location Study at Roadbox Station, Wolverton Road

Month	Start Date	End Date	Diffusion Tube µg/m^3				Auto Average µg/m^3	
			1	2	3	Average		
Jan	06-Jan-16	03-Feb-16	52.11	55.08	53.77	53.65	37.40	
Feb	03-Feb-16	02-Mar-16	47.48	51.27	54.14	50.96	34.93	
Mar	02-Mar-16	30-Mar-16	46.01	47.44	48.18	47.21		
Apr	30-Mar-16	27-Apr-16	42.50	36.41	41.61	40.17		
May	27-Apr-16	25-May-16	37.82	44.19	38.10	40.04	19.04	
Jun	25-May-16	29-Jun-16	32.58	27.83	35.24	31.88	24.49	
Jul	29-Jun-16	27-Jul-16	34.33	38.56	39.26	37.38	27.10	
Aug	27-Jul-16	24-Aug-16	38.15	25.59	27.92	30.55	24.59	
Sep	24-Aug-16	28-Sep-16	32.50			32.50	31.90	
Oct	28-Sep-16	26-Oct-16	42.95	40.55	39.31	40.94	28.12	
Nov	26-Oct-16	30-Nov-16	44.68	50.68	53.87	49.75	38.86	
Dec	30-Nov-16	04-Jan-17	52.15	56.20	59.75	56.03	41.22	**Adjustment Factor**
					Annual average:	**42.59**	**30.77**	**0.7224**

Table C.3 – Co-location Study at Roadbox Station 2, Olney

Month	Start Date	End Date	Diffusion Tube µg/m^3				Auto Average µg/m^3	
			1	2	3	Average		
Jan	06-Jan-16	03-Feb-16	45.65	42.85	44.67	44.39	18.99	
Feb	03-Feb-16	02-Mar-16	43.66	45.29	42.11	43.69	30.70	
Mar	02-Mar-16	30-Mar-16		45.30	46.75	46.03	26.59	
Apr	30-Mar-16	27-Apr-16	35.01	33.03	36.33	34.79	25.18	
May	27-Apr-16	25-May-16	32.59	29.39	25.26	29.08	18.76	
Jun	25-May-16	29-Jun-16	33.65	29.04	22.40	28.37	17.52	
Jul	29-Jun-16	27-Jul-16	32.00	24.11	25.39	27.17	16.00	
Aug	27-Jul-16	24-Aug-16	18.44	21.18	21.54	20.38	15.18	
Sep	24-Aug-16	28-Sep-16	36.80	38.30	28.91	34.67	19.81	
Oct	28-Sep-16	26-Oct-16	36.34	34.70	37.07	36.04	20.64	
Nov	26-Oct-16	30-Nov-16	41.42	37.30		39.36	29.18	
Dec	30-Nov-16	04-Jan-17	49.78	48.55	46.00	48.11	30.44	**Adjustment Factor**
					Annual average:	**36.01**	**22.41**	**0.6225**

Table C.4 – Co-location study at Marylebone Road London

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	06/01/2016	03/02/2016	117.0	118.7	120.5	119	1.8	1	4.3	86.78383	97.02491633	Good	Good
2	03/02/2016	02/03/2016	109.0	113.6	107.9	110	3.0	3	7.5	75.7171	93.08293046	Good	Good
3	02/03/2016	30/03/2016	95.6	97.5	95.2	96	1.2	1	3.1	80.58766	97.35961324	Good	Good
4	30/03/2016	27/04/2016	111.5	110.5	116.4	113	3.2	3	7.8	88.81171	94.60766084	Good	Good
5	27/04/2016	25/05/2016	112.0	114.6	119.6	115	3.9	3	9.6	80	95.90925995	Good	Good
6	25/05/2016	29/06/2016	97.4	92.5	88.0	93	4.7	5	11.7	69	95.72331722	Good	Good
7	29/06/2016	27/07/2016	120.3	94.7	114.2	110	13.4	12	33.2	70	96.87616214	Good	Good
8	27/07/2016	24/08/2016	95.0	99.1	104.9	100	5.0	5	12.4	76	97.13648196	Good	Good
9	24/08/2016	28/09/2016	111.2	103.5	105.7	107	4.0	4	9.9	74	91.55820007	Good	Good
10	28/09/2016	26/10/2016	90.0	89.9	88.7	90	0.7	1	1.8	67	95.20267758	Good	Good
11	26/10/2016	30/11/2016	109.3	105.2	113.4	109	4.1	4	10.2	90.80837	98.2149498	Good	Good
12	30/11/2016	01/01/2017	127.9	127.4	128.4	128	0.5	0	1.2	92.7043	96.87616214	Good	Good
13													
												Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey -->

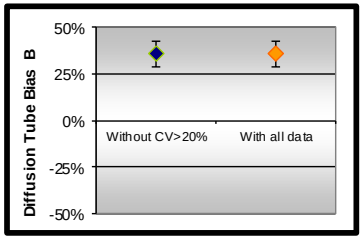
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Marylebone Road

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.74 (0.7 - 0.78)
Bias B	35% (29% - 42%)
Diffusion Tubes Mean:	107 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	79 μgm^{-3}
Data Capture for periods used:	96%
Adjusted Tubes Mean:	79 (75 - 84) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.74 (0.7 - 0.78)
Bias B	35% (29% - 42%)
Diffusion Tubes Mean:	107 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	79 μgm^{-3}
Data Capture for periods used:	96%
Adjusted Tubes Mean:	79 (75 - 84) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

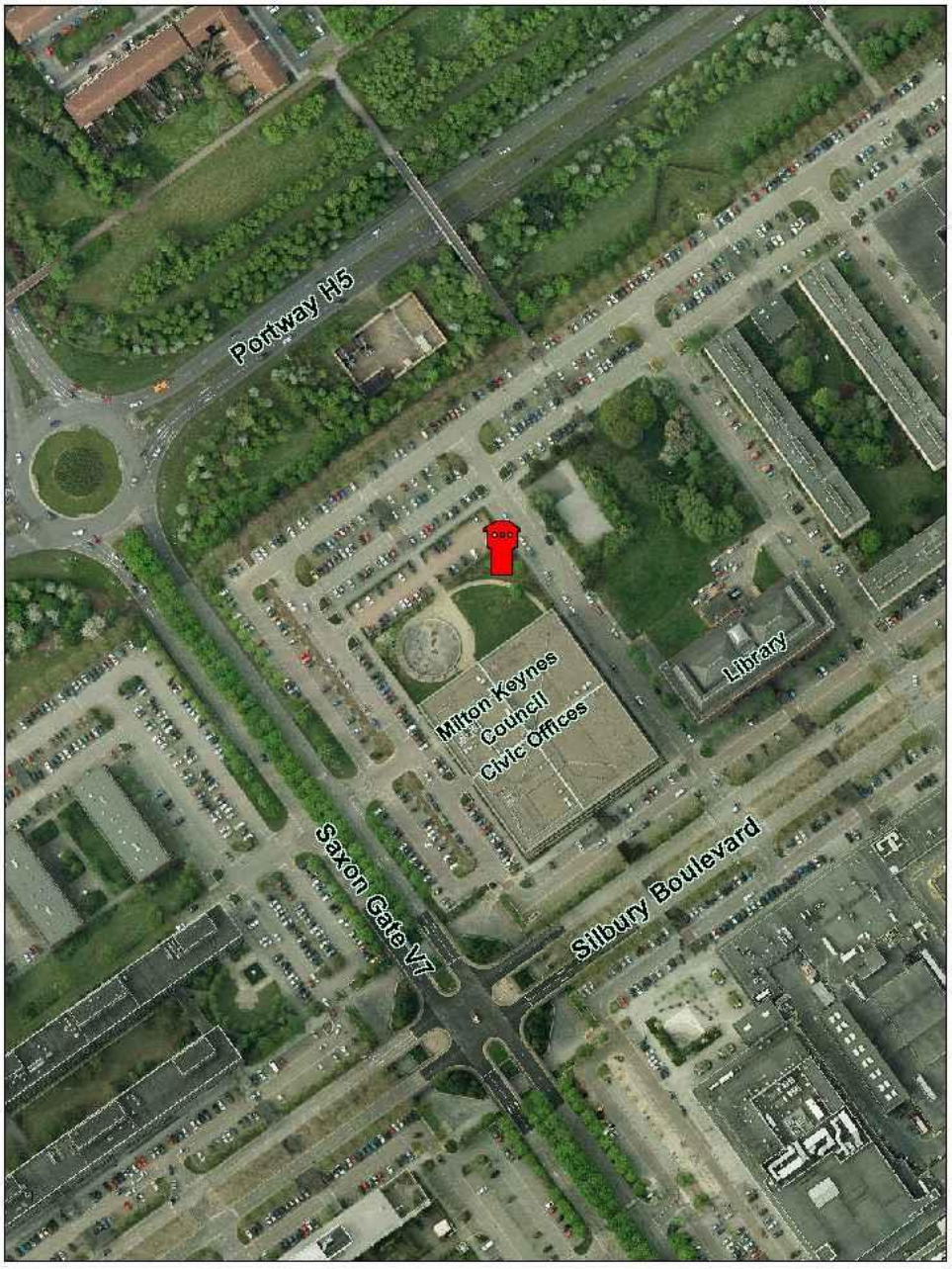
If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Figure 4 Marylebone Road London Air Quality Monitoring Site

Appendix D: Map(s) of Monitoring Locations and AQMAs

Automatic Monitoring Sites

Figure 5 Fixed Air Quality Station, Civic Offices, Central Milton Keynes



Air Quality Monitoring Station - Civic Offices, Central Milton Keynes

Figure 6 Roadbox Air Quality Station, Wolverton Road, Newport Pagnell

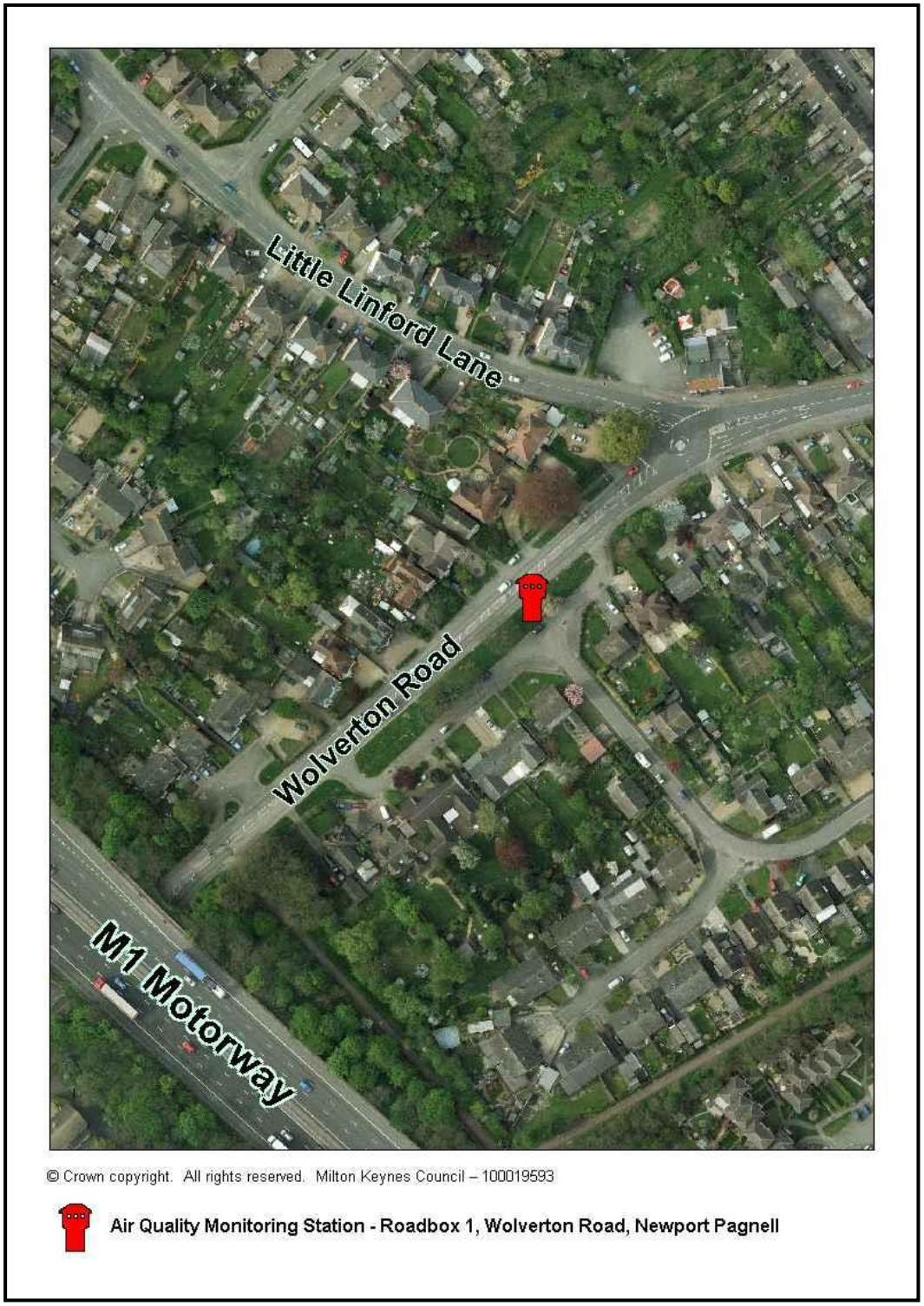
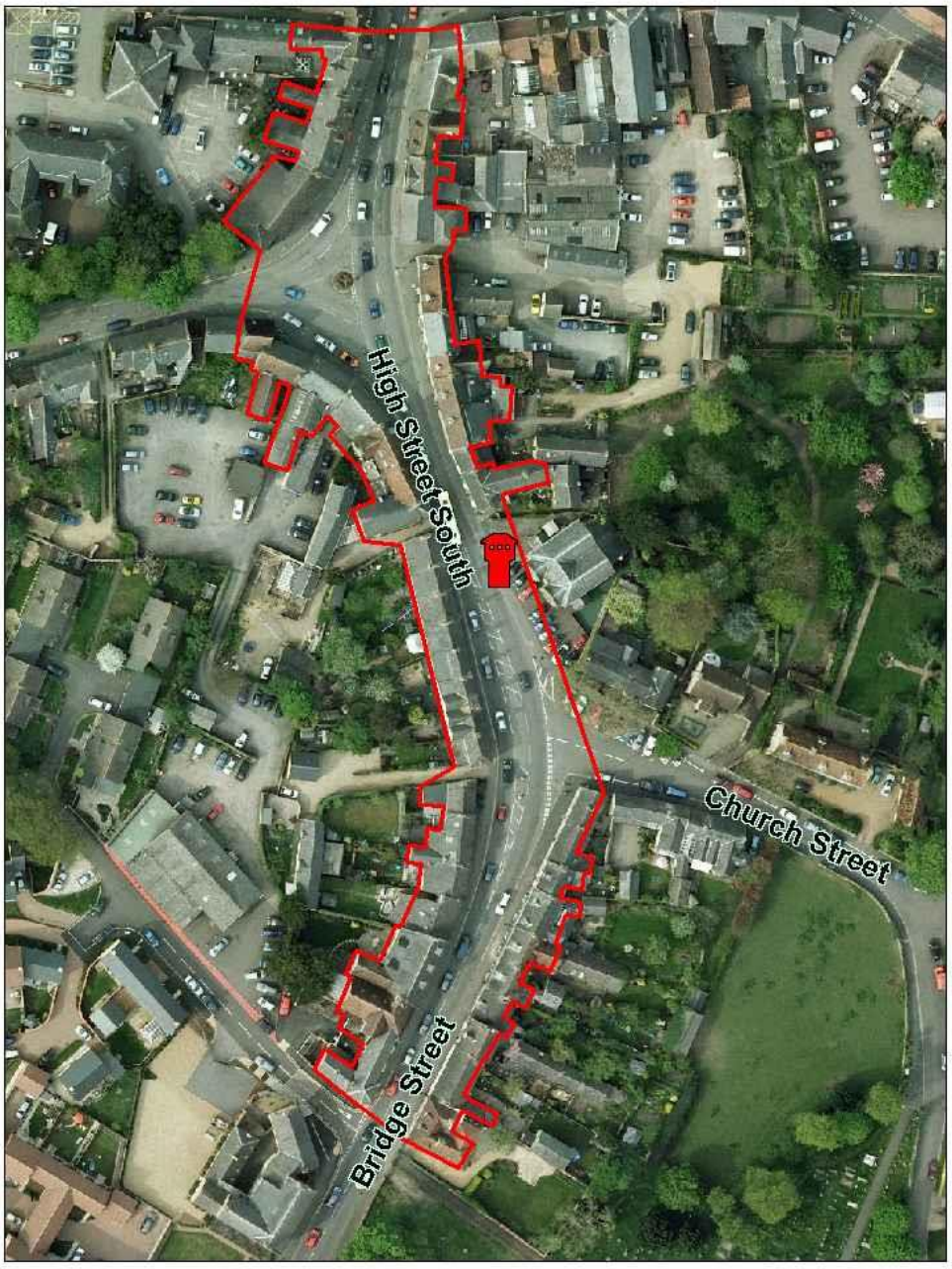


Figure 7 Roadbox Air Quality Station, High Street South, Olney (Within Designated Air Quality Management Area)



Air Quality Monitoring Station - Roadbox 2, High Street South, Olney
(Air Quality Management Area boundary in red)

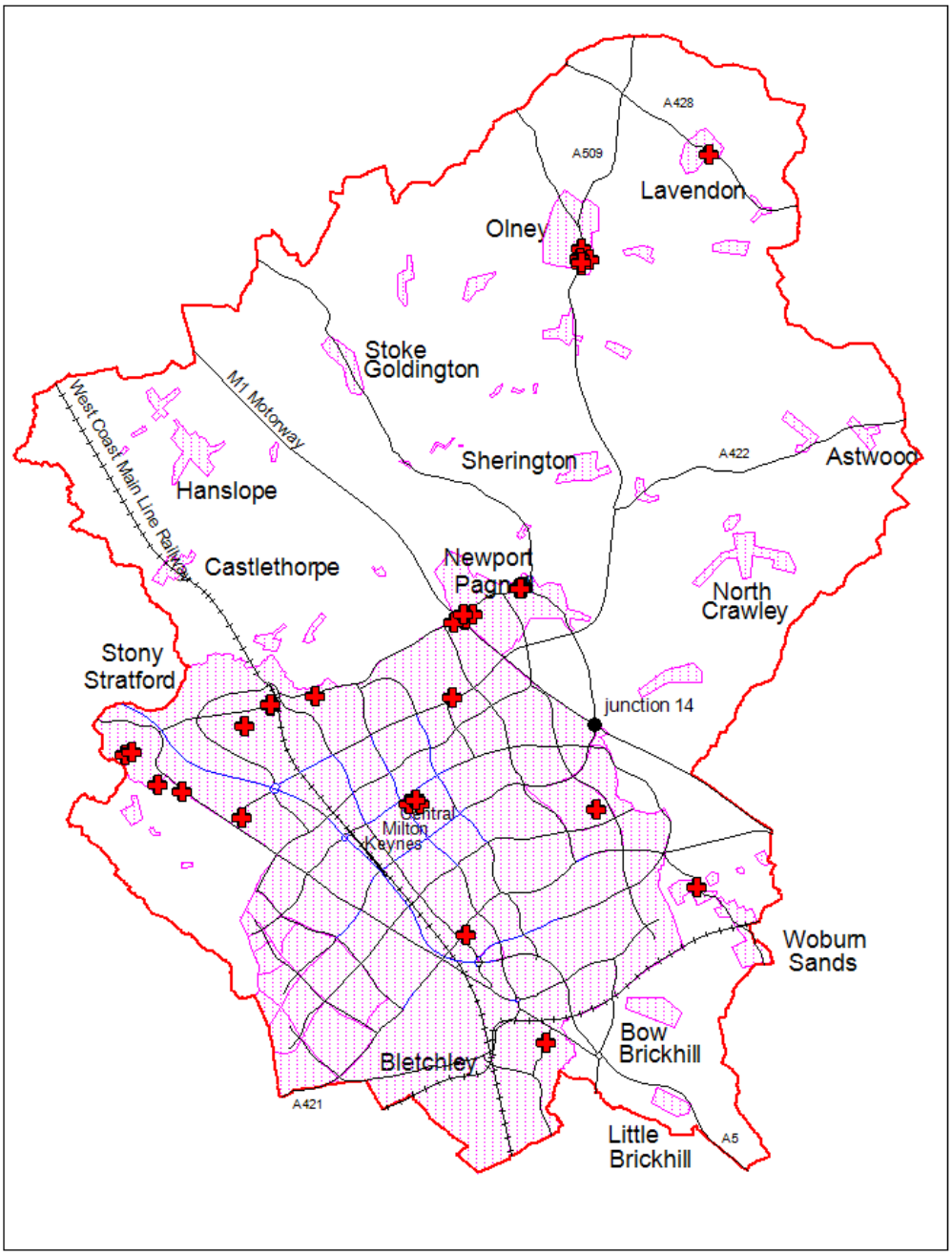
Figure 8 Automatic Air Quality Monitoring Station Photographs

Static Monitoring Station Civic Offices, CMK. (View from North Eighth Street towards Silbury Boulevard)

Roadbox 1 Monitoring Station Wolverton Road, Newport Pagnell (M1 bridge in background)

Roadbox 2 Monitoring Station High Street South, Olney (Within Air Quality Management Area)

Figure 9 Map of Non-Automatic Monitoring Sites



Nitrogen Dioxide diffusion tube locations

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/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
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (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
…	…

References

1. Department of the Environment, Food and Rural Affairs, The Air Quality (England) Regulations 2000, The Stationery Office.

2. Department for Environment, Food and Rural Affairs, Local Air Quality Management, Technical Guidance TG16, DEFRA Publications.

3. Department for Environment, Food and Rural Affairs, Local Air Quality Management, Policy Guidance PG16, DEFRA Publications.

4. Milton Keynes Council, Annual Status Report 2016

5. Milton Keynes Council, Updating and Screening Assessment 2015.

6. Milton Keynes Council, Progress Reports 2013 and 2014.

7. Milton Keynes Council, Air Quality Action Plan, Jan 2012.

8. Local Air Quality Management Tools, NETCEN, on behalf of Department of the Environment, Food and Rural Affairs, available from web site: http://uk-air.defra.gov.uk/