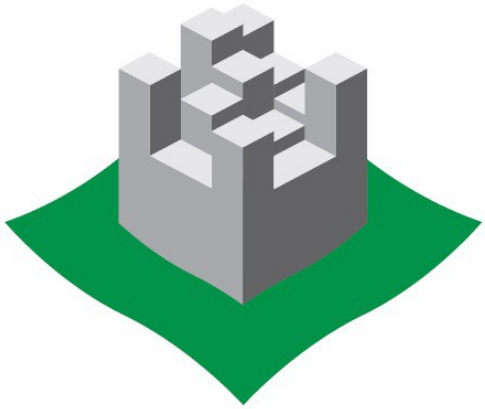

Exeter
City Council

2015 Air Quality Annual Status Report (ASR)

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

May 2016

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Executive Summary: Air Quality in Our Area

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. Nationally it has been shown that there is often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

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

Air Quality in Exeter

Air quality in Exeter is mainly good, with just a small number of hot spots where levels of nitrogen dioxide are above government objectives. These are at Livery Dole junction, East Wonford Hill, Honiton Road and the Blackboy Road/Pinhoe Road junction. All these are included within Exeter's Air Quality Management Area, an area where the Council will bring forward and facilitate actions to improve air quality. Further details of the Air Quality Management Area, and the Council's Action Plan are available online at https://exeter.gov.uk/airpollution/. During 2016 the Council will be working on an updated Air Quality Action Plan, together with partners like Devon County Council, and Public Health England.

The monitoring that the Council has done shows that concentrations of nitrogen dioxide have been falling throughout the city since around 2009, despite significant housing and commercial development over the same period. No new sources of pollution have been identified that are likely to cause new areas to exceed the objective levels for any form of air pollution.

Actions to Improve Air Quality

Exeter City Council took forward a number of measures during 2015 in pursuit of improving local air quality. Key completed measures are:

[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

- Newcourt station.
- Cranbrook station.
- Tithebarn link for new bus route to Cranbrook.
- Car clubs on new areas of development.
- Personal exposure projects to highlight the beneficial effects of alternative travel modes, or travel routes on personal exposure to $PM_{2.5}$.
- Taxi emissions licensing standards.
- Reductions in Exeter City Council fleet fuel use.
- Bridge road widening.

Exeter City Council expects the following measures to be completed in 2016:

- Work to update the Air Quality Action Plan, to include ambitious targets for reduction of NO_2 concentrations and $PM_{2.5}$ exposure.
- Ide P&R.
- Car club bike hire scheme.
- Marsh Barton Station.
- Bus Real-Time Information.
- Ecostars scheme to reduce emissions from commercial vehicle fleets.

Local Priorities and Challenges

The City Council's challenge for 2016 is to implement existing actions to reduce air pollution in a climate where funding is harder to find, and at the same time to prepare a new updated air quality action plan for the city.

How to Get Involved

Everyone in Exeter can take action on a personal level to improve our air quality. Some examples are shown below.

Walk or cycle

Replacing a car journey by walking or cycling helps reduce traffic and traffic emissions. It has proven health and mental health benefits too.

Take public transport or carshare

For longer journeys, why not use public transport or car share?

And if you have to use your car…

Make sure your tyre pressure is correct (low tyre pressure increases fuel use, fuel costs and emissions).

Think about whether you need to use the air conditioning. Using it increases fuel consumption by 30%; driving with windows open only increases it by 5%.

Using a roof rack on your car can increase fuel consumption by 20 to 30%. Bicycles are better attached to the back of the car.

If you need to buy a car, check its fuel economy. With an ultra-low emission vehicle (ULEV) you will use less fuel and produce less exhaust fumes.

Go for local produce!

Transporting goods a long way creates more air pollution than transporting them short distances. Try to buy locally produced goods and eat local foods that are in season: transporting and producing them doesn't generate as much air pollution.

Tell us what you think

Consultation on the new AQAP will also take place during the year, which will give individuals the opportunity to comment on and direct future actions to improve air quality. Information will be made available online at https://exeter.gov.uk/airpollution/, in local media and via the Exeter Community Forum.

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1 Local Air Quality Management

This report provides an overview of air quality in Exeter 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 Exeter 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 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 Exeter 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://exeter.gov.uk/airpollution/

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Exeter AQMA	• NO_2 annual mean • NO_2 hourly mean	Exeter	An area encompassing the radial routes into the city and other major routes	Exeter Air Quality Action Plan https://exeter.gov.uk/airpollution/

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

Exeter 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 Exeter Air Quality Action Plans. Key completed measures are:

- Newcourt station. A new station has opened on the Exmouth line at the Newcourt development.
- Cranbrook station. The station allows residents of the new settlement at Cranbrook to travel into Exeter by train.

- Tithebarn link for new bus route to Cranbrook. This will facilitate a new, high speed and high quality bus route to Cranbrook, via the new developments at Monkerton. It will also allow residents of central Exeter to reach the new Science Park by bus.
- Car clubs. Car clubs have been expanded onto new areas of development.
- Personal exposure projects. The Council has been involved in projects to highlight the beneficial effects of alternative travel modes, or travel routes on personal exposure to $PM_{2.5}$.
- Taxi emissions. New licensing standards will significantly reduce emissions from hackney carriages.
- Exeter City Council fleet. Fuel use in the Council's waste fleet has been reduced by 7% as a result of new technology to improve driving style.
- Bridge road widening. This will reduce congestion along Bridge Road, and improve facilities for walking and cycling along this route.

Progress on the following measures has been slower than expected due to:

- Local Transport Plan. Funding available for new highway schemes identified to improve air quality is now very limited. In real terms the level of Local Transport Plan funding is around a 1/3 of that in previous years. And the limited funding remaining is under pressure to develop bids and help match fund major schemes. The viability of new developments and contributions to highways infrastructure has also been an issue. But schemes are being delivered, such as new rail stations and key highway infrastructure around Exeter which is either under construction or opened. Future funding bids though the LEP are looking to support new cycling infrastructure. But in order for local sustainable travel projects to gain future funding it will be important to keep stressing their air quality and public health benefits and take advantage of bids and funding opportunities through external sources and local plans\CIL.
- ECC fleet. Bids for external funding to replace vehicles with ultra-low emissions vehicles have not been successful, which has slowed the pace of fleet upgrades.

Exeter City Council expects the following measures to be completed over the course of the next reporting year:

- Ide P&R. This will give a new public transport alternative to those entering the city from the A30.
- Car club bikes. A new bike hire scheme is to be introduced by the car club company ExeCoCars. This will provide bikes for hire at key points in the city.
- Marsh Barton Station. This will create a new stop on the Exeter to Newton Abbot and Plymouth line, which can be used by those working on Marsh Barton and will also serve the adjacent new housing proposed within Teignbridge District Council's area.
- Bus Real-Time Information. This will improve the information available to passengers and increase the desirability of bus travel.
- Ecostars. This is a project to reduce emissions from commercial vehicle fleets in Devon.

Exeter City Council's priority for the coming year is to review, consult upon and publish a new Air Quality Action Plan, led by an AQAP Steering Group. Subject to agreement, the plan may cover a wider area than just the Exeter City Council boundary, for example reflecting the travel to work area. It will set ambitious targets for reduction of NO_2 concentrations and $PM_{2.5}$ exposure. Further information on the AQAP steering group is available in Appendix C.3.

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	Public health and community awareness	Public Information	Other	ECC	Complete	2016	Undertake personal exposure study and use results to raise public awareness	N/A	Pilot studies completed	December 2016	The aim is to encourage and support behavioural change on an individual level
2	ECC vehicle fleet	Promoting Low Emissions Transport	Public vehicle procurement – Prioritising uptake of low emission vehicles	ECC	Complete	2016-2018	Purchase the lowest emissions vehicle available that meets the needs of the vehicle user	Unquantified because of difficulty in estimating contribution of emissions from ECC vehicles	One electric car purchased in 2015 7% reduction in waste fleet fuel use due to new technology	Rolling program to be reviewed in 2018	
3	ECC parking strategy	Traffic Management	Other	ECC	2015	2016 - 2026	Implement Action Plan. Impact on congestion (traffic volumes and speeds at peak hours) will be monitored	No target set	New strategy adopted March 2016	2026	http://committees.exeter.gov.uk/documents/s50631/ECC%20Parking%20Strategy%20Draft%20Feb%2016%20Final.pdf
4	Highways works, reduce congestion, new junctions etc	Transport Planning and infrastructure	Other	DCC	Ongoing	2011-2026 (LTP3 period)	• Improvements to Alphington Corridor • Exhibition Way link • Use of real-time technology and signage • Bridge Road widening	1% reduction in emissions in AQMA based upon measures contained in 'LES lite'	Tithebarn link completed and Bridge Road works commenced	2026	https://exeter.gov.uk/airpollution/

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
5	Travel planning support, car clubs (inc bikes) and Park & Change	Alternatives to Private Vehicle Use	Car and lift sharing schemes & Car Clubs	DCC	Ongoing	2011-2026 (LTP3 period)	• Developers to contribute towards establishment of car clubs • Introduction of bike hire scheme • Provide travel planning support service where funding available	1% reduction in emissions in AQMA based upon measures contained in 'LES lite'	• Car Clubs established at Newcourt and Rougemont Park • Contributions received from developers for travel plans at 8 housing sites in the city	2026	https://exeter.gov.uk/airpollution/
6	Electric vehicle charging	Promoting Low Emissions Transport	Procuring alternative refuelling infrastructure	ECC	Complete	2014-2019	Implement Electric Vehicle Strategy	1% reduction in emissions in AQMA based upon measures contained in 'LES lite'	Charging points installed in 6 car parks	2019	https://exeter.gov.uk/media/1616/ehod-electric-vehicle-strategy-final.pdf
7	Park and Ride	Alternatives to Private Vehicle Use	Bus based Park & Ride	DCC	Ongoing	2011-2026 (LTP3 period)	• Introduce new Park and Ride at Ide • Maintain and expand existing P&R schemes where possible	Quantified at planning stage (Ide P&R) as not significant	Planning application made (Ide)	2026	https://exeter.gov.uk/airpollution/
8	Bus, smart ticketing, RTI, new services	Alternatives to Private Vehicle Use	Other	DCC	Ongoing	2011-2026 (LTP3 period)	• Introduce real-time information • Investigate options for smart ticketing • New and extended services to major areas of development	1% reduction in emissions in AQMA based upon measures contained in 'LES lite'	• Real-time information infrastructure being installed at bus stops • Newcourt services operating	2026	https://exeter.gov.uk/airpollution/

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
9	Bus links and bus priority	Transport planning and Infrastructure	Bus route improvements	DCC	Ongoing	2011-2026 (LTP3 period)	• Topsham Road bus priority works • Continue to identify options for bus priority improvements	1% reduction in emissions in AQMA based upon measures contained in 'LES lite'	London Inn Square bus priority works complete	2026	https://exeter.gov.uk/airpollution/
10	Walking and cycling infrastructure	Promoting Travel Alternatives	Promotion of cycling & Promotion of walking	DCC	Complete	2010-2020	• 20% of journeys to work by bike • 20% of journeys to primary school by bike • 30% of journeys to secondary school by bike	Not quantified	Exeter Cycle Strategy and Exeter Walking Strategy published and developer contributions towards key infrastructure improvements	2020	http://www.devon.gov.uk/eldf-exeter-cycle-strategy.pdf and http://www.devon.gov.uk/exeter-walking-strategy-august-2012.pdf
11	Devon Metro	Alternatives to Private Vehicle Use	Rail based Park & Ride	DCC	Ongoing	2011-2026 (LTP3 period initially)	Marsh Barton station open	1% reduction in emissions in AQMA based upon measures contained in 'LES lite'	Cranbrook and Newcourt Stations complete	ongoing	https://exeter.gov.uk/airpollution/ and http://www.devon.gov.uk/devon_metro_briefing.pdf
12	Taxi licensing	Promoting Low Emission Transport	Taxi licensing conditions	ECC	complete	2015-2020	At least 50% of hackney carriage fleet to be ULEV or ZEV	1% reduction in emissions in AQMA based upon measures contained in 'LES lite'	Emissions standard set in policy	2020	https://exeter.gov.uk/media/1428/taxi-policy-2015.pdf
13	Future developments, and travel planning	Promoting Travel Alternatives	Encourage/Facilitate home working & Personalised travel planning & Other	ECC / DCC	?? see email to RH	ongoing	Developers to be offered travel planning support by DCC	1% reduction in emissions in AQMA based upon measures contained in 'LES lite'	??? see email to RH	ongoing	

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
14	Wider Exeter travel to work area	Policy Guidance and Development	Regional groups co-ordinating programmes to develop area-wide strategies	ECC	2016	2017-2022	To be determined after planning phase completed	To be determined after planning phase completed	Initial discussions with neighbouring authorities	2022	Working more closely with neighbouring authorities to integrate actions,
15	Freight Quality partnership (FQP), Ecostars	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	ECC / DCC	2015	2016	Five businesses within Exeter to sign up to EcoStars	Unknown	One fleet committed to sign up to scheme	2016	FQP is a DCC responsibility to take forward, if funding available
16	Wider projects, including Exeter City Futures (ECF) and Low Carbon Task Force (LCTF)	Policy Guidance and Development Control	Other policy	ECC	ongoing	ongoing	To lobby for local air quality to be considered in wider projects to improve the sustainability of the city and the greater Exeter region	Unknown	• Officers meeting regularly with Exeter City Futures and the LCTF, plus seeking other opportunities • 100 volunteers to trial 'Lightfoot' technology in private cars (ECF project)	ongoing	http://www.exeterandeastdevon.gov.uk/Low-Carbon-Task-Force%20 and http://exetercityfutures.com/

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.

There is no direct monitoring of $PM_{2.5}$ in Exeter. However it is possible to estimate concentrations based upon local PM_{10} data using the correction factor in TG(16). This method suggests that $PM_{2.5}$ concentrations at Exeter RAMM and Alphington Street are 13.5 $\mu g/m^3$. The annual average EU limit value for $PM_{2.5}$ is 25 $\mu g/m^3$ so there is no suggestion that this level is being exceeded in Exeter. However the council still has a duty to reduce emissions of and exposure to this pollutant.

During 2016, Exeter City Council will be taking the measures described in Table 2.2 that will address $PM_{2.5}$ as well as NO_2. The measures expected to have the most significant effect on $PM_{2.5}$ are those which encourage modal shift, or uptake of ULEVs such as measures 1, 5, 6, 10, 11, 12, 13, 15 and 16. During the year the Council will also be working on an updated AQAP that will include explicit reference to $PM_{2.5}$, and set out the actions that will be taken to reduce $PM_{2.5}$ during the next five years. This will involve close partnership working with public health professionals, which is reflected in the make-up of the steering group (Appendix C.3).

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Exeter City Council undertook automatic (continuous) monitoring at 2 sites during 2015. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at https://uk-air.defra.gov.uk/. At the start of 2015, Exeter City Council ceased monitoring CO and SO_2 on the grounds that the concentrations of these pollutants were substantially below the objective levels, and had been so since monitoring began. There was no evidence of a trend of increasing concentrations of either pollutant (Exeter City Council 2015).

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

Exeter City Council undertook non- automatic (passive) monitoring of NO_2 at 62 sites during 2015. Table A.2 in Appendix A shows the details of the sites. There were no changes to the monitoring network in 2015.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

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 C.

3.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2015 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 200µg/m^3, not to be exceeded more than 18 times per year. Figure A.4.1 shows the longer-term trend in annual mean concentrations at 6 sites with the longest continuous data record.

The data shows that just four locations measured an exceedence of the annual objective in 2015. Three of these are at relevant locations (DT40 Pinhoe Road (Polsloe Road), DT53 East Wonford Hill and DT48 Livery Dole). The fourth (DT64 Honiton Road) is not at a relevant receptor, but there is also a tube located at the nearest property (DT55 Honiton Road façade). This tube does not show an exceedence. All four locations that exceeded the objective are within the AQMA. The extent of the exceedence of the objectives ranges from 2 µg/m^3 at Pinhoe Road (Polsloe Road) to 19 µg/m^3 at East Wonford Hill. No annual average level was over a level of 60µg/m^3, which would indicate that an exceedance of the 1-hour mean objective is also likely.

The general trend in the diffusion tube data for the last 5 years shown in Table A.4 is downward. There has been a corresponding reduction in the number of sites which exceed the objective. Exeter City Council has no current plans to amend the AQMA and reduce the area included. The AQMA boundary was originally drawn to include a larger area than just the strict areas of exceedence (Exeter City Council 2011). The rationale for this boundary remains sound.

Figue A.4.1 shows that this downward trend seems to have existed since around 2009, and is evident at background sites as well as roadside ones. This is a welcome trend, especially in the context of significant local housing and commercial development. However it has not been possible to link this trend directly to any specific national or local intervention and some element of inter-annual variability caused by weather conidtions will be included.

3.2.2 Particulate Matter (PM_{10})

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

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

There were no measured exceedences of the PM_{10} air quality objectives in Exeter in 2015. Annual average concentrations have reduced slightly since 2014, and the number of exceedences of an hourly mean of 50µg/m^3 remains low. The long-term trend in annual concentrations is a decline since 2005 or 2006.

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	Exeter Roadside	Kerbside	291939	092830	NO_2, O_3 PM_{10}	Y (for NO_2)	Chemiluminescent, UVA and TEOM	0	1	1.7
CM2	Alphington Street	Roadside	291670	091773	PM_{10}	N	TEOM	12	3	1.7

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

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT1	High Street Castle Street	Kerbside	292199	92814	NO_2	Yes	50	0.5	N	2
DT2	Longbrook Street	Kerbside	292315	93016	NO_2	No	0	1	N	1.7
DT3	New North Road	Kerbside	292185	93049	NO_2	Yes	0	1	N	2
DT4	Queen Street	Kerbside	291779	93011	NO_2	Yes	0	1.5	N	2
DT5	RAMM 1	Kerbside	291944	92826	NO_2	Yes	0	1	Y	1.7
DT6	RAMM 2	Kerbside	291944	92826	NO_2	Yes	0	1	Y	1.7
DT7	High Street Guildhall	Roadside	291984	92626	NO_2	Yes	0	2	N	2
DT8	North Street	Kerbside	291895	92569	NO_2	Yes	0	1	N	1.7
DT9	South Street	Roadside	291943	92511	NO_2	Yes	3	1.5	N	2
DT10	Market Street	Kerbside	291833	92433	NO_2	Yes	0	1	N	1.7
DT11	Magdalen Street	Kerbside	292291	92292	NO_2	Yes	8	1	N	1.7
DT12	Magdalen Street Façade	Kerbside	292422	92320	NO_2	Yes	0	1	No	1.7
DT13	Archibald Road	Roadside	292590	92743	NO_2	No	0	1.5	No	1.7
DT14	Heavitree Road Inbound	Roadside	292832	92731	NO_2	Yes	0	10	No	2

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT15	Heavitree Road Outbound	Kerbside	292703	92807	NO_2	Yes	0	1	No	1.7
DT16	Holloway Street	Kerbside	292378	92039	NO_2	Yes	0	1	No	1.7
DT17	Carders Court, Shilhay	Roadside	291699	92091	NO_2	No	0	15	No	1.7
DT18	Rear of Gervase Avenue	Roadside	291657	91973	NO_2	Yes	5	5	No	2
DT19	Alphington Street	Kerbside	291669	91812	NO_2	Yes	0	1	No	2
DT20	Alphington Road Inbound	Roadside	291532	91349	NO_2	Yes	0	2	No	1.7
DT21	Queens Road	Urban B'ckground	291460	91390	NO_2	No	8	2	No	1.7
DT22	Alphington Road Outbound	Roadside	291509	91151	NO_2	Yes	0	8	No	1.7
DT23	Alphington Road outer	Roadside	291518	90813	NO_2	Yes	15	2	No	1.7
DT24	Church Road Alphington	Roadside	291691	90425	NO_2	Yes	0	1.5	No	1.7
DT25	Church Road	Kerbside	291767	90160	NO_2	Yes	0	1	No	1.7

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
	II									
DT26	Cowick Street (Cowick Lane)	Kerbside	290864	91725	NO_2	Yes	0	1	No	1.7
DT27	Cowick Street Inbound	Roadside	291249	91874	NO_2	Yes	0	4	No	1.7
DT28	Cowick Street Outbound	Roadside	291376	91944	NO_2	Yes	0	1.5	No	1.7
DT29	Cowick Street (Exe Bridges)	Roadside	291500	92055	NO_2	Yes	0	2	No	1.7
DT30	Okehampton Street	Roadside	291351	92169	NO_2	Yes	0	4	No	1.7
DT31	Bonhay Road (St Clements Lane)	Roadside	291253	93299	NO_2	Yes	0	2	No	2
DT32	Red Cow Village	Kerbside	291242	93483	NO_2	Yes	0	1	No	1.7
DT33	Red Cow II	Kerbside	291272	93468	NO_2	Yes	0	1	No	1.7
DT34	Cowley Bridge Road	Roadside	291054	94399	NO_2	Yes	0	4	No	1.7
DT35	Pennsylvania Road	Roadside	292391	93291	NO_2	No	0	1	No	1.7
DT36	York Road School	Roadside	292469	93245	NO_2	No	3.5	2.5	No	1.7
DT37	York Road	Kerbside	292579	93146	NO_2	No	1.5	0	No	1.7
DT38	Union Road	Roadside	293047	93877	NO_2	No	10	1	No	1.7

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT39	Pinhoe Road Inbound	Roadside	293405	93395	NO_2	Yes	0	3	No	1.7
DT40	Pinhoe Road (Polsloe Road)	Kerbside	293251	93375	NO_2	Yes	Yes (0m)	1	No	1.7
DT41	Blackboy Road (Polsloe Road)	Roadside	293227	93356	NO_2	Yes	Yes (0m)	2	No	1.7
DT42	Beacon Heath	Kerbside	295068	94487	NO_2	No	No (10m)	0	No	1.7
DT43	Pinhoe	Kerbside	296418	94470	NO_2	No	No (1m)	0	No	1.7
DT44	Langaton Lane	Urban Background	296984	94327	NO_2	No	No (20m)	0	No	1.7
DT45	Pinhoe Road (Fairfield Avenue)	Roadside	295413	93689	NO_2	Yes	Yes (0m)	5	No	1.7
DT46	East John Walk	Urban Background	293091	92825	NO_2	No	No (1.5m)	N/A	No	1.7
DT47	Magdalen Road (Barrack Road)	Kerbside	293448	92419	NO_2	Yes	Yes (0m)	1	No	1.7
DT48	Livery Dole	Roadside	293418	92497	NO_2	Yes	Yes (0m)	1.5	No	1.7
DT49	Rowancroft	Kerbside	293533	92473	NO_2	Yes	Yes (0m)	0.2	No	2
DT50	Salutary	Roadside	293738	92396	NO_2	Yes	Yes (0m)	4	No	1.7

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
	Mount									
DT51	Fore St. Heavitree Outbound	Roadside	293781	92409	NO_2	Yes	No (8m)	4	No	1.7
DT52	Fore Street Heavitree Inbound	Roadside	294043	92359	NO_2	Yes	Yes (0m)	2	No	1.7
DT53	East Wonford Hill	Roadside	294410	92310	NO_2	Yes	Yes (0m)	2	No	1.7
DT54	Honiton Road	Roadside	295203	92378	NO_2	Yes	No (13m)	1.5	No	1.7
DT55	Honiton Road façade	Roadside	295191	92395	NO_2	No	Yes (0m)	15	No	1.7
DT56	Sidmouth Road lamp post	Roadside	295466	92365	NO_2	Yes	No (6m)	1.5	No	2
DT57	Sidmouth Road (Middlemoor)	Roadside	295636	92232	NO_2	Yes	Yes (0m)	10	No	1.7
DT58	Topsham Road (Countess Wear)	Roadside	294694	90001	NO_2	Yes	Yes (0m)	5	No	2
DT59	Bridge Road (Countess Wear)	Roadside	294652	89974	NO_2	No	Yes (0m)	15	No	1.7
DT60	High Street	Kerbside	296415	88477	NO_2	No	Yes (0m)	1	No	1.7

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
	Topsham									
DT61	Topsham Road (Tollards Road)	Roadside	294227	90435	NO_2	Yes	Yes (0m)	1.5	No	1.7
DT62	Topsham Road (Barrack Road)	Roadside	293213	91245	NO_2	Yes	Yes (0m)	10	No	1.7

(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 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
CM1	Kerbside	Continuous Analyser		99%	32	33	32	31	28
DT1	Kerbside	Diffusion Tube		100.0%	33.7	31.5	28.7	29.9	25.0
DT2	Kerbside	Diffusion Tube		100.0%					24.8
DT3	Kerbside	Diffusion Tube		91.7%	33.8	32.8	30.0	28.1	26.5
DT4	Kerbside	Diffusion Tube		83.3%	27.2	29.5	27.2	26.0	21.6
DT5	Kerbside	Diffusion Tube		83.3%	33.0	33.5	32.5	30.6	29.6
DT6	Kerbside	Diffusion Tube		83.3%	32.2	32.5	32.7	31.1	28.9
DT7	Roadside	Diffusion Tube		100.0%	28.4	28.9	27.3	29.2	25.0
DT8	Kerbside	Diffusion Tube		100.0%	**40.2**	**45.1**	**40.0**	39.8	34.8
DT9	Roadside	Diffusion Tube		100.0%	35.5	38.1	34.8	33.6	30.6
DT10	Kerbside	Diffusion Tube		100.0%	34.1	35.7	32.4	34.1	28.3
DT11	Kerbside	Diffusion Tube		100.0%	31.7	33.2	31.7	31.5	27.6
DT12	Kerbside	Diffusion Tube		100.0%	30.3	33.3	33.9	31.9	28.0
DT13	Roadside	Diffusion Tube		100.0%	22.5	25.1	24.8	22.1	20.5
DT14	Roadside	Diffusion Tube		100.0%	20.5	23.7	23.2	21.7	19.6
DT15	Kerbside	Diffusion Tube		100.0%	37.6	37.4	39.6	38.8	33.5
DT16	Kerbside	Diffusion Tube		100.0%	33.4	36.4	39.2	35.9	28.8
DT17	Roadside	Diffusion Tube		100.0%	22.8	25.9	24.1	23.5	20.5
DT18	Roadside	Diffusion Tube		91.7%	28.0	29.4	24.7	26.6	23.7
DT19	Kerbside	Diffusion Tube		100.0%	**41.1**	**42.4**	**45.8**	**44.4**	35.2
DT20	Roadside	Diffusion Tube		91.7%	36.2	35.9	35.7	36.3	32.5
DT21	Urban B'ckground	Diffusion Tube		100.0%	15.5	15.4	15.3	15.2	12.8
DT22	Roadside	Diffusion Tube		100.0%	33.4	29.5	29.6	30.7	25.3

Site ID	Site Type	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
DT23	Roadside	Diffusion Tube		100.0%	26.0	28.1	31.2	28.6	22.3
DT24	Roadside	Diffusion Tube		100.0%	28.1	28.2	26.0	26.4	24.1
DT25	Kerbside	Diffusion Tube		100.0%	24.7	30.3	29.6	29.1	26.9
DT26	Kerbside	Diffusion Tube		100.0%	**57.7**	**50.4**	**47.7**	**45.4**	36.4
DT27	Roadside	Diffusion Tube		100.0%	25.6	24.5	24.7	24.6	20.5
DT28	Roadside	Diffusion Tube		100.0%	**41.9**	**41.9**	38.6	**40.8**	34.0
DT29	Roadside	Diffusion Tube		91.7%	36.9	37.8	35.6	35.7	32.4
DT30	Roadside	Diffusion Tube		100.0%	27.0	28.5	27.8	26.5	23.7
DT31	Roadside	Diffusion Tube		100.0%	30.1	33.1	32.6	31.5	27.2
DT32	Kerbside	Diffusion Tube		100.0%	38.1	**43.7**	**40.8**	**42.7**	36.1
DT33	Kerbside	Diffusion Tube		100.0%	**40.2**	37.1	34.0	36.8	32.0
DT34	Roadside	Diffusion Tube		83.3%	33.5	37.5	36.4	38.3	33.2
DT35	Roadside	Diffusion Tube		100.0%	26.5	30.5	31.2	31.3	25.6
DT36	Roadside	Diffusion Tube		91.7%					27.9
DT37	Kerbside	Diffusion Tube		100.0%	25.3	37.8	37.3	38.8	32.0
DT38	Roadside	Diffusion Tube		100.0%		32.5	31.2	32.1	22.3
DT39	Roadside	Diffusion Tube		100.0%	38.4	38.0	34.1	37.7	30.6
DT40	Kerbside	Diffusion Tube		100.0%	**49.6**	**55.4**	**48.4**	**48.3**	**42.1**
DT41	Roadside	Diffusion Tube		100.0%	34.6	34.3	32.9	33.4	29.2
DT42	Kerbside	Diffusion Tube		75.0%	33.0	19.8	17.3	19.0	17.5
DT43	Kerbside	Diffusion Tube		100.0%	26.6	28.8	35.9	38.4	24.9
DT44	Urban Background	Diffusion Tube		100.0%	18.1	18.4	17.7	18.7	16.7
DT45	Roadside	Diffusion Tube		100.0%	20.1	21.7	20.7	20.2	18.5
DT46	Urban Background	Diffusion Tube		100.0%	16.3	17.1	15.0	15.7	13.9

Site ID	Site Type	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
DT47	Kerbside	Diffusion Tube		100.0%	**42.0**	**43.8**	**43.1**	**40.4**	37.2
DT48	Roadside	Diffusion Tube		91.7%	**52.8**	**51.8**	**49.3**	**52.0**	**48.8**
DT49	Kerbside	Diffusion Tube		100.0%	**40.7**	**46.7**	**41.6**	**42.5**	38.2
DT50	Roadside	Diffusion Tube		100.0%	**43.8**	**44.7**	39.3	39.5	35.5
DT51	Roadside	Diffusion Tube		100.0%	36.7	32.9	29.2	30.3	29.5
DT52	Roadside	Diffusion Tube		100.0%	**48.7**	**50.9**	**46.2**	**48.5**	38.6
DT53	Roadside	Diffusion Tube		100.0%	**62.6**	**70.6**	**60.8**	**64.2**	**59.2**
DT54	Roadside	Diffusion Tube		91.7%	**51.9**	**56.2**	**53.9**	**58.4**	**42.7**
DT55	Roadside	Diffusion Tube		100.0%	20.3	21.8	20.9	21.9	18.4
DT56	Roadside	Diffusion Tube		100.0%	36.1	36.9	34.6	35.3	31.4
DT57	Roadside	Diffusion Tube		100.0%	22.4	24.4	23.8	24.0	21.2
DT58	Roadside	Diffusion Tube		100.0%	27.7	27.9	27.3	29.0	26.3
DT59	Roadside	Diffusion Tube		100.0%	22.8	22.2	22.5	21.6	19.3
DT60	Kerbside	Diffusion Tube		83.3%	26.9	28.5	26.6	26.1	21.6
DT61	Roadside	Diffusion Tube		100.0%	**40.2**	**42.6**	38.1	**40.2**	36.6
DT62	Roadside	Diffusion Tube		100.0%	26.9	27.5	26.9	27.6	24.1

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 C for details.

Figure A.3.1 – Trends in Annual Mean NO_2 Monitoring Results at 6 Long-Term Sites in Exeter

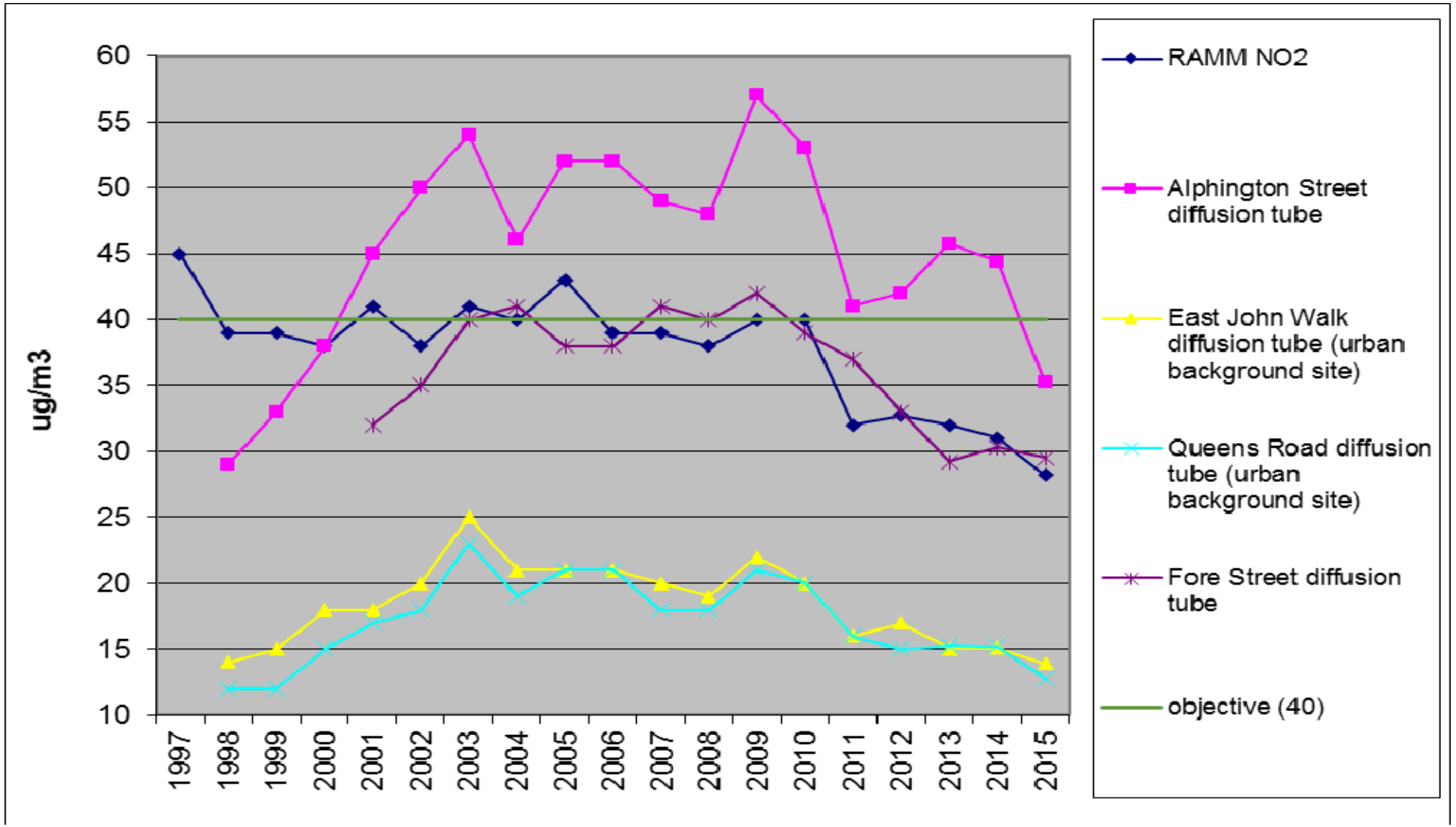


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

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	Kerbside	Continuous Analyser		99%	0	1	0	0(109)	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/m³) (3)				
				2011	2012	2013	2014	2015
CM1	Kerbside		91%	27	16	22	20	19
CM2	Roadside		87%	24	19	21	20	19

Notes: Exceedances of the PM_{10} annual mean objective of 40µg/m³ are shown in **bold.**

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

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

(3) All means have been "annualised" as per Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C 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/m³ (3)				
				2011	2012	2013	2014	2015
CM1	Kerbside		91%	21	3	8	2	6
CM2	Roadside		87%	15	3	3	2	6 (29.5)

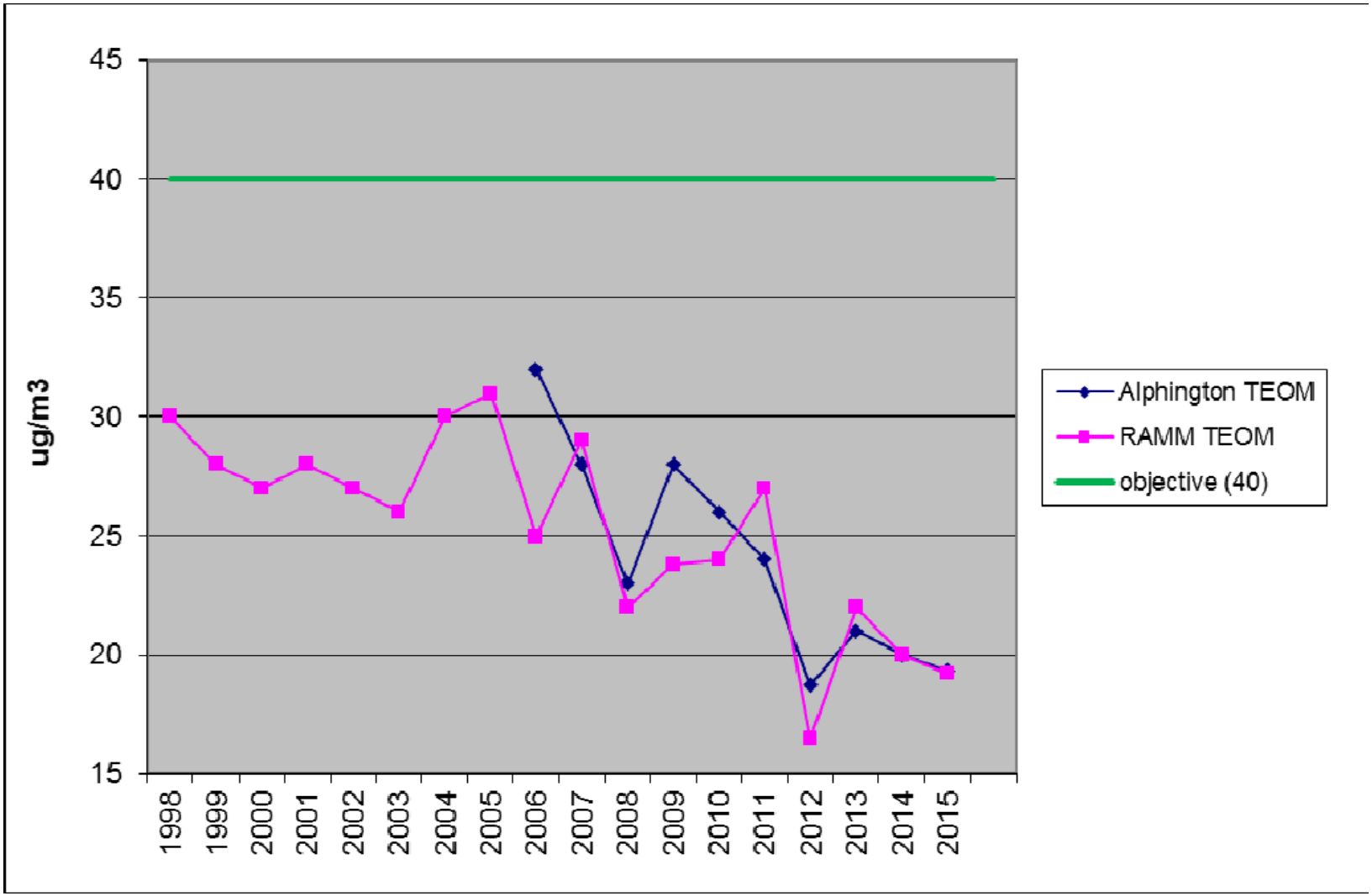
Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold.**

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

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

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

Figure A.5.1 – Trends in Annual Mean PM_{10} Monitoring Results



Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2015

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 (1)
DT1	33.84	33.89	33.89	35.18	29.36	21.23	27.60	26.50	26.53	32.32	25.07	31.16	29.7	25.0
DT2	35.13	30.11	30.11	31.34	23.56	30.21	23.41	28.28	27.59	32.61	29.58	32.33	29.5	24.8
DT3	31.92	32.26	32.26	31.73	28.97	28.96	30.80	31.60	27.49	34.64		36.50	31.6	26.5
DT4	30.12			29.42	23.02	27.60	18.29	26.13	22.86	32.65	24.40	22.94	25.7	21.6
DT5	37.83	40.06	40.06	37.75	26.09		28.30		37.02	44.60	28.77	31.49	35.2	29.6
DT6	35.62	37.70	37.70	39.64	28.03		28.80		33.12	44.26	29.21	30.01	34.4	28.9
DT7	30.02	32.83	32.83	34.84	26.42	24.37	27.33	28.01	25.38	34.68	24.85	35.04	29.7	25.0
DT8	49.72	40.76	40.76	43.97	38.92	32.89	41.06	45.45	37.03	40.10	40.36	46.12	41.4	34.8
DT9	42.19	38.95	38.95	39.70	34.14	26.25	37.36	34.91	34.87	39.30	30.71	39.65	36.4	30.6
DT10	38.24	35.03	35.03	38.70	26.78	24.53	29.74	34.45	31.23	36.38	35.74	38.71	33.7	28.3
DT11	39.35	35.05	35.05	36.24	27.35	23.71	30.10	32.02	32.00	39.42	32.14	31.49	32.8	27.6
DT12	44.42	42.37	42.37	37.46	28.43	23.53	26.01	33.01	30.74	38.27	25.75	27.49	33.3	28.0
DT13	30.01	30.07	30.07	31.99	18.45	12.55	18.95	22.81	23.49	33.79	18.43	22.43	24.4	20.5
DT14	27.36	29.00	29.00	26.68	18.33	15.85	17.87	21.75	22.27	31.55	21.48	18.14	23.3	19.6

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 (1)
DT15	46.01	43.12	43.12	43.19	35.04	29.11	37.92	42.04	43.07	49.28	32.34	34.60	39.9	33.5
DT16	42.82	40.10	40.10	38.89	28.10	23.82	29.91	35.62	33.11	42.30	26.49	29.95	34.3	28.8
DT17	27.43	29.99	29.99	29.86	21.97	17.04	14.47	22.47	22.95	30.68	23.57	22.36	24.4	20.5
DT18	34.56	29.66	29.66	31.30	20.08	18.78		26.84	26.85	30.06	33.41	29.18	28.2	23.7
DT19	44.32	45.34	45.34	44.29	35.62	31.23	40.40	44.64	43.29	55.17	35.31	38.18	41.9	35.2
DT20	44.87	45.86	45.86	32.74	33.79	28.63		41.73	38.13	42.41	37.46	33.88	38.7	32.5
DT21	17.70	19.89	19.89	19.54	9.26	9.29	9.94	13.59	13.71	24.87	11.76	13.49	15.2	12.8
DT22	28.61	34.17	34.17	35.31	25.15	23.87	26.24	31.98	29.23	40.06	26.29	26.70	30.1	25.3
DT23	25.99	32.77	32.77	27.92	19.91	19.50	23.45	22.62	24.70	33.63	22.60	33.35	26.6	22.3
DT24	30.23	35.00	35.00	32.06	24.67	19.94	23.28	30.22	27.94	36.67	24.73	25.12	28.7	24.1
DT25	41.86	39.09	39.09	32.55	29.32	22.74	27.78	30.63	29.62	30.32	31.08	30.83	32.1	26.9
DT26	49.96	36.38	36.38	47.73	44.19	37.65	46.56	44.39	36.81	43.48	39.16	57.93	43.4	36.4
DT27	28.58	28.99	28.99	29.05	19.32	18.68	20.25	21.01	23.16	31.91	21.66	21.21	24.4	20.5
DT28	41.22	44.06	44.06	43.98	38.87	32.33	39.99	41.64	39.96	38.38	37.53	43.05	40.4	34.0
DT29	48.01	47.15	47.15	43.56	34.23		35.21	32.18	34.50	40.05	31.35	30.72	38.6	32.4
DT30	28.57	31.09	31.09	31.81	23.67	22.25	24.93	26.00	26.11	38.16	26.08	29.49	28.3	23.7
DT31	37.95	40.70	40.70	38.04	30.92	24.93	28.02	30.47	27.56	40.42	27.46	21.56	32.4	27.2

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 (1)
DT32	42.75	42.08	42.08	45.50	42.48	34.99	43.20	45.43	43.09	46.95	43.61	43.57	43.0	36.1
DT33	46.99	45.36	45.36	40.14	34.11	30.59	32.87	34.06	32.22	41.42	38.33	35.81	38.1	32.0
DT34		45.39	45.39	40.10	36.34	31.55		38.52	36.36	40.62	34.03	46.83	39.5	33.2
DT35	31.48	31.62	31.62	39.33	24.14	21.94	26.16	29.65	30.26	37.24	30.06	31.87	30.4	25.6
DT36	38.62	39.89	39.89	34.91	29.88	24.41	27.00	31.89		40.42	27.41	31.37	33.2	27.9
DT37	43.47	45.89	45.89	49.28	28.84	25.82	32.01	30.63	38.71	51.27	31.62	34.07	38.1	32.0
DT38	24.46	30.51	30.51	27.77	22.09	18.82	21.14	27.22	25.72	32.83	28.70	28.88	26.6	22.3
DT39	42.95	40.00	40.00	38.95	31.09	21.96	34.37	35.31	34.01	32.22	43.02	43.49	36.4	30.6
DT40	51.23	58.99	58.99	50.29	43.05	37.42	46.07	52.48	46.47	49.68	47.08	60.13	50.2	42.1
DT41	45.74	39.99	39.99	38.00	32.83	23.43	28.93	39.53	31.74	36.76	29.87	30.73	34.8	29.2
DT42	24.16			19.29	17.94		15.06	29.40	17.32	22.34	19.85	22.23	20.8	17.5
DT43	40.25	36.34	36.34	36.07	25.89	19.20	17.50	36.18	24.21	30.80	23.35	28.89	29.6	24.9
DT44	20.84	22.63	22.63	23.43	11.83	12.74	16.05	26.20	16.36	25.66	18.52	22.28	19.9	16.7
DT45	27.15	23.68	23.68	26.37	17.65	14.75	16.12	28.57	19.88	29.23	19.13	17.76	22.0	18.5
DT46	19.81	19.14	19.14	19.43	9.54	9.45	11.98	24.26	12.59	19.89	17.56	16.29	16.6	13.9
DT47	57.02	55.76	55.76	60.08	33.83	29.81	32.06	44.23	38.47	55.68	37.59	30.41	44.2	37.2
DT48		73.42	73.42	59.76	54.15	43.78	47.06	59.20	56.58	53.15	55.17	63.64	58.1	48.8

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 (1)
DT49	54.93	55.59	55.59	49.82	40.72	33.16	38.51	51.90	41.93	47.07	36.61	40.52	45.5	38.2
DT50	45.66	47.17	47.17	46.89	43.51	35.10	43.73	39.62	37.24	38.83	38.08	43.64	42.2	35.5
DT51	38.47	43.80	43.80	42.35	28.31	25.55	29.80	31.99	35.16	40.84	32.58	28.09	35.1	29.5
DT52	53.40	49.10	49.10	46.26	44.94	38.49	45.68	43.59	38.17	38.83	47.33	55.92	45.9	38.6
DT53	80.70	81.52	81.52	73.24	72.35	59.43	64.32	68.88	74.69	58.10	58.50	72.02	70.4	59.2
DT54	67.11	57.08	57.08		34.54	36.62	46.97	51.61	47.92	51.89	54.47	54.38	50.9	42.7
DT55	24.48	28.95	28.95	22.56	17.32	15.25	17.94	21.35	21.18	28.26	17.59	19.35	21.9	18.4
DT56	44.35	41.88	41.88	45.15	27.56	30.90	30.30	34.04	39.78	46.43	35.09	31.55	37.4	31.4
DT57	29.52	31.01	31.01	29.75	20.67	19.12	20.11	23.85	22.42	29.26	23.83	21.80	25.2	21.2
DT58	40.34	36.32	36.32	36.62	26.65	24.11	31.40	27.99	27.57	32.72	30.17	26.08	31.4	26.3
DT59	31.01	29.43	29.43	27.84	16.78	16.33	18.02	19.78	19.37	29.46	22.02	16.56	23.0	19.3
DT60	31.22			33.38	23.65	20.03	22.29	27.27	28.05	34.24	17.62	19.04	25.7	21.6
DT61	50.32	53.36	53.36	40.41	43.45	34.66	43.28	39.88	36.79	48.11	41.71	37.32	43.6	36.6
DT62	26.54	33.84	33.84	33.72	23.50	21.53	25.06	27.91	24.12	38.71	24.95	31.24	28.7	24.1

(1) See Appendix C for details on bias adjustment

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

C.1 – Supporting Technical Information

Two potentially significant changes to sources were assessed during 2015. Both were assessed through the planning process. First, the proposed new Park and Ride site at Ide, which will increase the number of buses along the Alphington corridor, and second the redevelopment of the city centre bus station and associated changes to the road layout in the city centre. Neither of these is predicted to have a significant adverse impact on air quality, or result in any new exceedence of the objective levels. Monitoring at existing diffusion tube locations on Alphington Road, Alphngton Street, Longbrook Street and York Road will measure the effect of these developments as they progress.

C.2 – Air Quality Strategy

Exeter City Council updated its Air Quality Strategy in 2015. The strategy is available online at https://exeter.gov.uk/airpollution/.

C.3 – Air Quality Action Plan Steering Group

A Steering Group has been set up to inform the production of the new AQAP. The group includes representatives from Devon County Council, Exeter University, Public Health Devon, Public Health England, Teignbridge District Council, Mid Devon District Council and East Devon District Council. Other individuals and organisations will be included if needed, and interest groups will be consulted on the plans at an early stage.

C.4 – Air Quality Monitoring Data QA/QC

Diffusion Tube Bias Adjustment Factors - National Factor

The national bias adjustment factor of 0.91 has been obtained from the spreadsheet version 03/16, for Gradko diffusion tubes (20% TEA in water).

Factor from Local Co-location Studies

The precision and local bias factor (0.84) for the co-located diffusion tubes at Exeter Roadside (RAMM Queen Street) has been calculated using the spreadsheet shown as Figure C.4.1 below.

Figure C.4.1 Diffusion Tube Precision and Accuracy

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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	Automatic Method: Period Mean	Automatic Method: Data Capture (% DC)	Data Quality Check: Tubes Precision Check	Data Quality Check: Automatic Monitor Data
1	07/01/2015	04/02/2015	37.83	35.62		37	1.6	4	14.0	31.10	98.90	Good	Good
2	04/02/2015	05/03/2015	40.06	37.70		39	1.7	4	15.0	33.30	99.40	Good	Good
3	05/03/2015	01/04/2015	40.06	37.70		39	1.7	4	15.0	34.80	99.40	Good	Good
4	01/04/2015	29/04/2015	37.75	39.64		39	1.3	3	12.0	31.60	99.40	Good	Good
5	29/04/2015	27/05/2015	26.09	28.03		27	1.4	5	12.3	21.70	99.30	Good	Good
6	27/05/2015	01/07/2015								23.20	99.80		Good
7	01/07/2015	29/07/2015	28.30	28.80		29	0.4	1	3.2	19.20	99.70	Good	Good
8	29/07/2015	26/08/2015								25.00	99.30		Good
9	26/08/2015	30/09/2015	37.02	33.12		35	2.8	8	24.8	36.60	96.80	Good	Good
10	30/09/2015	28/10/2015	44.60	44.26		44	0.2	1	2.2	38.90	99.60	Good	Good
11	28/10/2015	02/12/2015	28.77	29.21		29	0.3	1	2.8	22.10	99.50	Good	Good
12	02/12/2015	06/01/2015	31.49	30.01		31	1.0	3	9.4	22.90	99.70	Good	Good
13													
											Overall survey -->	Good precision	Good Overall

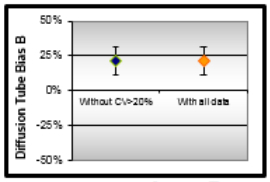
It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: RAMM (Exeter Roadside)

Precision: 10 out of 10 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%		Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 10 periods of data		Bias calculated using 10 periods of data	
Bias factor A	0.84 (0.77 - 0.92)	Bias factor A	0.84 (0.77 - 0.92)
Bias B	19% (9% - 29%)	Bias B	19% (9% - 29%)
Diffusion Tubes Mean:	35 µgm^{-3}	Diffusion Tubes Mean:	35 µgm^{-3}
Mean CV (Precision):	4	Mean CV (Precision):	4
Automatic Mean:	29 µgm^{-3}	Automatic Mean:	29 µgm^{-3}
Data Capture for periods used:	99%	Data Capture for periods used:	99%
Adjusted Tubes Mean:	29 (27 - 32) µgm^{-3}	Adjusted Tubes Mean:	29 (27 - 32) µgm^{-3}



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Version 03 - November 2006

Discussion of Choice of Factor to Use

Data from the tubes are ratified and suspect data is rejected by Exeter City Council, following the procedure in the DEFRA practical guidance. Analysis of the data from the two tubes that are co-located with the continuous analyser shows that these have good precision and a bias factor of 0.84 (Figure C.4.1). This means that the Exeter diffusion tubes over-estimate actual concentrations when compared to the reference method. The nationally collated bias adjustment factor is similar, at 0.91.

Results calculated using the Exeter factor are used in this report because the data capture at Exeter RAMM is over 90%, and it is thought to be more representative of local conditions.

QA/QC of Automatic Monitoring

Neither of the two TEOMs are part of the national network, however recommended QA/QC procedures from the AURN Local Site Operator's manual are followed, including the filter change frequency and methodology. Horiba also service each analyser every six months. Data capture at the RAMM site was over 90% in 2015, but at the Alphington Street site it was 87%. The low data capture was caused by a pump fault which took some time to repair.

The PM_{10} data is collected, validated and ratified by Exeter City Council. Validation involves checking the data daily for instrumentation errors etc and then visually screening the data on a weekly basis to mark any obviously spurious or unusual measurements. The Council also undertakes data ratification on an approximately three monthly basis as well as following site services. This involves:

- Comparison of data with other pollutants and other appropriate AURN network sites (roadside sites and other sites in the south west),
- Final checking and deletion of data marked as possibly erroneous,
- Removal of data from unrepresentative periods of operation (e.g. road works in immediate vicinity of site etc where data is shown or believed to have been affected),
- Adjustment for issues identified during services etc.

Both the PM_{10} analysers are TEOMs. The TEOM method of measuring particulates has failed the EC equivalence test, however advice from DEFRA is that Local Authorities need not replace TEOMs immediately unless PM_{10} concentrations are close to the objective level. In Exeter, previous reports have not found that the objective level for particulates is likely to be exceeded and therefore the two TEOMs are still being used. When they are due for replacement, care will be taken to ensure that any new equipment does meet the EC equivalence criteria. In the meantime, the

data has been adjusted for volatiles using the online Volatile Correction Model tool from Kings College, London.

The NO_2 data from Exeter Roadside is collected and ratified by the AURN. Network data from the site can be found at http://uk-air.defra.gov.uk/data/. It is ratified every 3 months by NETCEN, and is reported in the QA / QC Data Ratification Report for the Automatic Urban Network. Data capture from the NO_2 analyser was above 90% in 2015.

Plots of hourly average values for nitrogen dioxide and particulate matter are shown below in figures C.4.2 and C.4.3.

Figure C.4.2 Hourly NO_2 data from Exeter Roadside (RAMM) ($\mu g/m^3$)

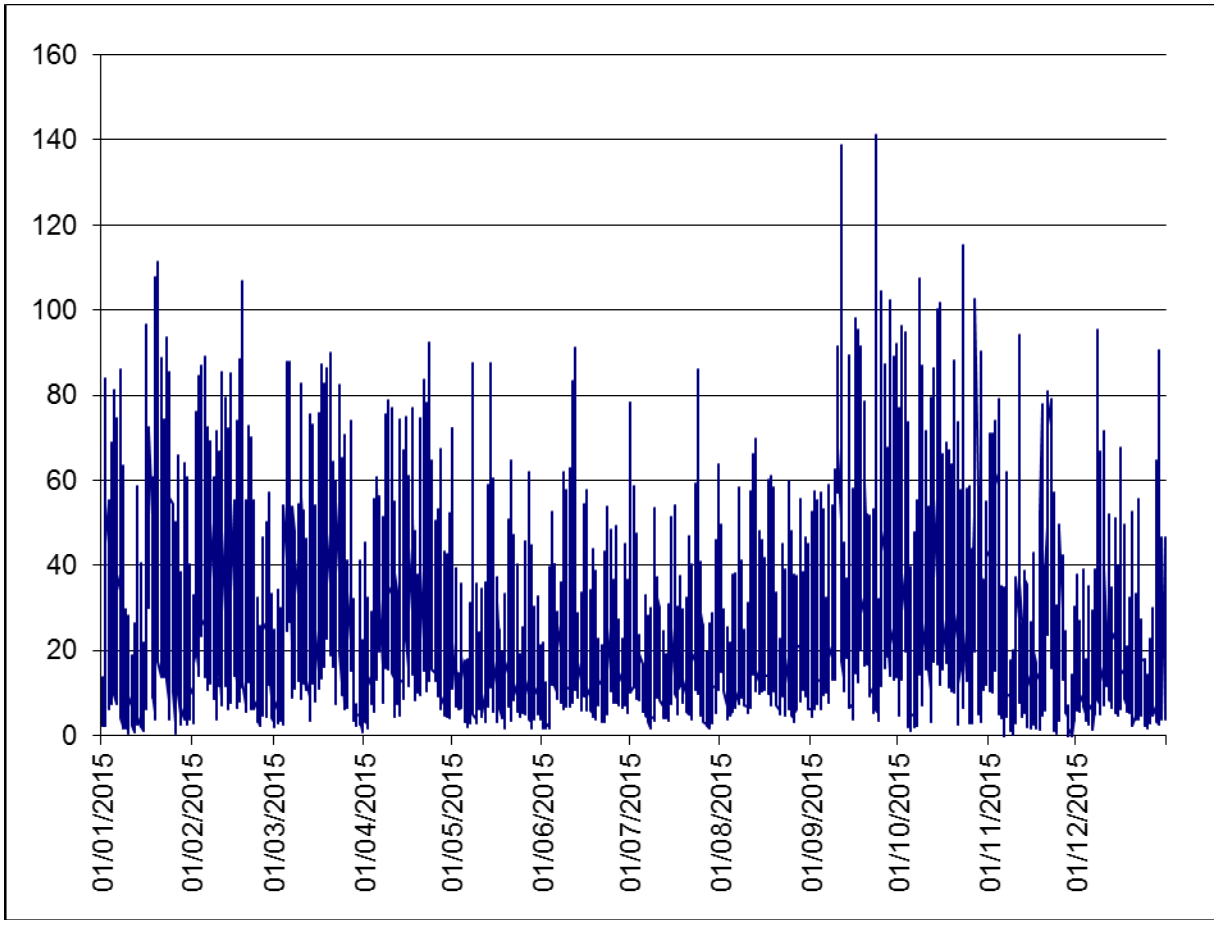
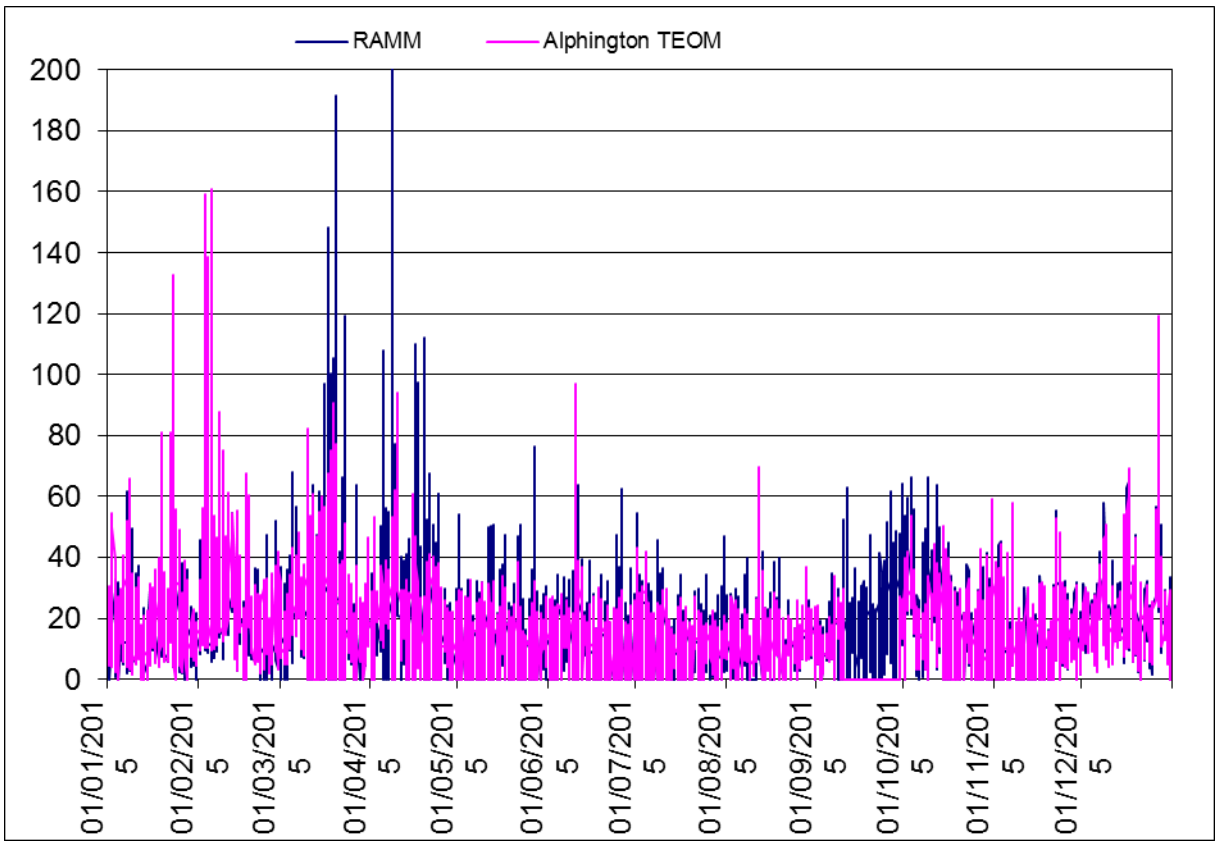


Figure C.4.2 Hourly PM_{10} data from Exeter Roadside (RAMM) and Alphington Street ($\mu g/m^3$)



QA/QC of Diffusion Tube Monitoring

The diffusion tubes are supplied by GRADKO[4] and are prepared using 20% TEA in water. The GRADKO lab follows the procedures set out in the Harmonisation Practical Guidance. The performance of laboratory is rated as satisfactory in the centralised AIR NO_2 PT scheme for quality assurance and quality control.

The tube exposure period used follows the timetable provided by the Air Quality Support Helpdesk, i.e. an exposure time of 4 or 5 weeks, with an allowed variation in exposure time of $\pm$ 2 days. The tubes are stored in a fridge before they are exposed. Location sites and fixings follow the recommendations in the DEFRA practical guidance on the use of diffusion tubes for NO_2 monitoring, published in 2008. Two tubes are collocated with the continuous analyser at the Royal Albert Memorial Museum (RAMM), Queen Street (Exeter Roadside).

[4] GRADKO International Ltd., St. Martins House, 77 Wales Street, Winchester, Hants. SO23 0RH

Data from the tubes are ratified and suspect data rejected by Exeter City Council, following the procedure in the DEFRA practical guidance. Analysis of the data from the two tubes that are co-located with the continuous analyser shows that these have good precision.

The full monthly dataset is shown in Table B1 above.

Appendix D: Maps of Monitoring Locations

Please see separate document.

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[5]	
	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

[5] 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
ECF	Exeter City Futures
EU	European Union
FDMS	Filter Dynamics Measurement System
FQP	Freight Quality Partnership
LAQM	Local Air Quality Management
LCTF	Low Carbon Task Force
LTP	Local Transport Plan
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

Exeter City Council 2011. Exeter Air Quality Action Plan 2011-2016. https://exeter.gov.uk/airpollution/

Exeter City Council 2015. Exeter Updating and Screening Assessment Report. https://exeter.gov.uk/airpollution/

Local Air Quality Management Technical Guidance 2016 - LAQM.TG(16)

Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users 2008

National bias adjustment factor spreadsheet: http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Tube precision spreadsheet: www.airquality.co.uk/archive/laqm/tools/AEA_DifTPAB_v03.xls

Volatile Correction Model website: http://www.volatile-correction-model.info/

Devon Local Transport Plans: http://www.devon.gov.uk/index/transportroads/devon_local_transport_plan.htm

DEFRA 2015. DEFRA National Statistics Release; Emissions of air pollutants in the UK, 1970 to 2014