2015 Air Quality Annual Status Report (ASR)

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

JAN 2017

Local Authority Officer	Becky Wotton
Department	Environment Health and Wellbeing
Address	Forde House, Brunel Road, Newton Abbot, TQ12 4XX
Telephone	01626 215066
E-mail	envc@teignbridge.gov.uk
Report Reference number	ASR 2015
Date	Jan 2017

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. 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].

Air Quality in Teignbridge District Council (TDC)

Within the district of Teignbridge local air quality is generally very good, however there are locations where air pollution levels are high typically along busy congested roads, with the highest levels being experienced where the roads are either narrow and/or have a steep incline and/or have street canyons (i.e. roads with properties close to the side of the road on both sides.) The pollutant of specific concern in these locations is Nitrogen Dioxide. The review and assessment process commenced in 2005 resulting in four Air Quality Management Areas (AQMA's) being declared because it was predicated that the National Air Quality objective would not be met for Nitrogen Dioxide (NO_2). The original four AQMA's were:-

- Dawlish (Iddesleigh Terrace)
- Teignmouth (A379 Along Bitton Park Road)
- Kingskerswell (Old A380)
- Newton Abbot (Town Centre)

In 2008 a Detailed Assessment was carried out which resulted in the boundary of the Newton Abbot Town Centre AQMA being revised and expanded to include Wolborough Street, and in Kingsteignton, Newton Road and Gestridge Road. In 2015 the geography of the four AQMAs remains unaltered. The latest ratified data shows that there is a year on year trend (from 2014 to 2015) of pollution levels reducing

[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

across the board; however some hotspot locations within the Teignmouth AQMA and the Newton Abbot and Kingsteignton AQMA remain worryingly high.

Kingskerswell (old A380):

The completion of this road is due to take place on the 31st December 2015. There is every expectation that the Council will be able to revoke this AQMA in 2019, as long as pollution levels prove to remain consistently well below the national objective for NO_2. (Note: well below is considered to mean at least 10% below).

Dawlish (Iddesleigh Terrace):

Monitoring results show a general reduction year on year from 2014 to 2015, and 2015 saw the first year where the levels of pollution monitored were well below the National Objective target for NO_2 at all four locations. If this trend is maintained such that the monitoring results for these locations remain more than 10% below the National Objective for 3 consecutive years then this AQMA could also be revoked in 2019.

Teignmouth (Bitton Park Road):

The year on year trend for 2014 to 2015 in this AQMA showed for the first time that monitored pollution levels at all 10 locations along this busy main road have reduced, however they remain high, and four of the locations are still above the National Objective target for NO_2.

Newton Abbot and Kingsteignton:

Except for two locations the year on year trend for 2014 to 2015 shows that pollution levels at the other 30 locations in this AQMA have been reducing, however the levels remain close to exceedance of the National Objective for NO_2. Crucially 4 locations are still well over the National Objective target, three of which are in a key the hotspot area namely Wolborough Street Newton Abbot.

Actions to Improve Air Quality

In improving Air Quality, Teignbridge District Council has completed a number of measures. Key measures include:-

- Assessing all planning applications in the District, either within an AQMA or ones that would have a significant impact on an AQMA.

- Teignbridge District Council Local Plan 2013 - 2033
- Provision of real-time information at bus stops.
- Cycle paths constructed.
- Contract of Euro 5 refuse fleet trucks.
- Provision of bikes for Teignbridge Staff to use for local meetings and lunch visits.

Teignbridge District Council expects the following measures to be completed in 2016:-

- Updated Air Quality Action Plan
- Work with other Local Authorities on Shared Projects – especially to roll out the Personal Exposure Study to all secondary and primary schools.
- Commencement of the New Kingskerswell By pass and to increase monitoring to provide future data for assessment on the question of revocation of this Kingskerswell AQMA.
- To apply for the next round of Government Grant Funding

Local Priorities and Challenges

The main priority for the Council is to ensure that the Action Plan is completed and approved. This would then allow us to continue to complete actions within this Plan. Another priority is to ensure that in 2016 current data collection issues are resolved. This is due to a number of factors, equipment not functioning correctly but primarily the persistent and unresolved communication issues with the equipment.

How to Get Involved

Public participation in the Air Quality issues is vital to maintaining standards within the objectives. In particular road journeys, transport mode choices, commuting methods and alternative travel methods can have significant local effect.

The following sources of information are available on the Council's website (https://www.teignbridge.gov.uk/airquality) for improving air quality.

- List of Air Quality Management Areas.

- Current Air Quality Action Plan.

The Council also does a lot of interacting with the public by means of social media (facebook & twitter), advising them of Air Quality issues.

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1 Local Air Quality Management

This report provides an overview of air quality in Teignbridge District Council 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 Teignbridge District 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 Teignbridge District 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://www.teignbridge.gov.uk/airquality

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Iddesleigh Terrace, Dawlish	NO_2 annual mean	Dawlish	Small section of road. It is a winding road and forms a street canyon.	Teignbridge District Council:- https://www.teignbridge.gov.uk/airquality
Kingskerswell	NO_2 annual mean	Kingskerswell	Main route into Torbay and experiences very high traffic flows. A congested route with slow moving traffic.	Teignbridge District Council:- https://www.teignbridge.gov.uk/airquality
Newton Abbot & Kingsteignton	NO_2 annual mean	Newton Abbot	Congested stressed and narrow in places with residential properties within metres of the edge of the roads. The AQMA was further extended in 2008 following a Detailed Assessment.	Teignbridge District Council:- https://www.teignbridge.gov.uk/airquality
Teignmouth	NO_2 annual mean	Teignmouth	Primary route and main thoroughfare for HGV traffic.	Teignbridge District Council:- https://www.teignbridge.gov.uk/airquality

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

Teignbridge 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 Teignbridge District Council Air Quality Action Plan. Key completed measures are:

- Assessing all Planning applications in the District, either within an AQMA or ones that would have a significant impact on an AQMA.
- Teignbridge District Council Local Plan 2013 – 2033. This new plan for the Council was developed and Environmental Health Officers were involved with this and helped to ensure that additional guidance for dealing with air quality issues within the Plan was included. The Plan is a cornerstone strategy for the Council and contains several large scale residential building schemes that will impact on existing traffic flows and in some cases bring about brand new road infrastructure. The plan also acknowledges explicitly that such schemes must consider impact on local air quality and must minimise new and remove/reduce existing impacts where opportunities arise. Specifically the A382 is a main traffic corridor to the northern side of the Newton Abbot AQMA, and this year pre-application consultations on air quality for road improvements to the A382 were completed. It has been agreed that when submitted the scheme design shall include the addition of a dedicated cycle path, and a new Park and Change facility, and dispersal of some of its traffic volume away from the AQMA.
- Provision of real-time information at bus stops. This has been identified as a key element to help passengers make a smart choice when travelling. It's primary aim is to encourage smarter travel choices from private transport to public transport.
- Cycle Paths – Following completion of the Newton Abbot to Kingsteignton cycle path in 2013 to continue with developing the walking and cycling network along the Teign Estuary.

- Contract of Euro 5 refuse fleet trucks. Teignbridge District Council refuse fleet's vehicles have now all been replaced with Euro 5 Standards.
- Bike Rack for TDC staff to encourage cycling to work and cycling to nearby meetings.

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

- Current data collection issues are unresolved. This is due to a number of factors, equipment not functioning correctly but primarily the persistent and unresolved communication issues with the equipment.

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	Planning Applications	Policy Guidance and General Control	Air Quality Planning and policy guidance	TDC	Ongoing	Ongoing	Local Plan 2013 - 2033	Quantified at planning application stage.	Ongoing	Ongoing	
2	Teignbridge District Council Local Plan	Policy Guidance and General Control	Air Quality Planning and Policy Guidance	TDC	Completed	Completed	Local Plan 2013 – 2033	Quantified at planning application stage	Completed	Local Plan adopted 6th May 2014	
3	Provision of Real Time Information at Bus Stops	Promoting Travel Alternatives	Other	DCC	Ongoing	Autumn 2014	Devon County Council Travel Plan		Completed	Spring 2015	For people who do not have direct access to a computer or smartphone but they do have a standard mobile phone, they can text a bus stop code to Traveline South West and receive up to date real time bus information for that stop.
4	Cycle Paths constructed	Promoting Travel Alternatives	Promotion of Cycling	TDC	Ongoing	Ongoing			Newton Abbot to Kingsteignton cycle path constructed -	On going	To help build with the Teign Estuary Cycle Trail.
5	TDC Refuse fleet	Vehicle fleet efficiency	Fleet efficiency and recognition schemes	TDC			Lease the lowest emissions vehicle available.		All fleet changed	completed	
6	Bike Rack for TDC Staff	Promoting Travel Alternatives	Promotion of Cycling	TDC	Ongoing	Ongoing	Introduction of cycle facilities		Bike rack installed	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.

There is no direct monitoring of $PM_{2.5}$ in Teignbridge. It is possible however to estimate concentrations based upon local PM_{10} data using the correction figure in TG (16). This method suggests that $PM_{2.5}$ concentrations in Teignbridge are no more than 20 µg/m^3 and the annual objective is 25 µg/m^3 so there is no suggestion that this level is being exceed in Teignbridge.

During the year the Council will also be working on the updated Air Quality Action Plan that will include reference to $PM_{2.5}$.

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.

Teignbridge District Council undertook automatic (continuous) monitoring at 8 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/ .

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.

Teignbridge District Council only undertakes monitoring for NO_2 and PM_{10} in our administrative area. NO_2 monitoring has been undertaken utilising diffusion tubes and two continuous analysers. PM_{10} has been monitored at various locations using Osiris (indicative monitors) and BAM (A Beta Attenuation Monitor) monitors and it is noted that the Osiris' are purely used as a screening tool option.

3.1.2 Non-Automatic Monitoring Sites

Teignbridge District Council undertook non- automatic (passive) monitoring of NO_2 at 69 sites during 2015. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) 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.

The data from 2015 shows that there were 11 sites exceeding the annual objective in 2015. All of these sites were within current Air Quality Management Areas. The spilt was as follows:-

5 Tubes within Newton Abbot and Kingsteignton AQMA.

4 Tubes within Teignmouth AQMA

2 Tubes within Kingskerswell AQMA

There were no tubes that exceeded the annual objective within our Dawlish AQMA. The extent of the exceedence of the objectives ranges from nearly 1µgm/^{3} at 173 Bitton Park Road, Teignmouth to 10 µgm/^{3} at 85 Wolborough Street, Newton Abbot. One of the normal highest tubes in the District is at 1 Reed Vale, Teignmouth. However you will notice from the 2015 data that this is significnatly lower than in

prevoius years. This is not due to a reduction in levels but due to a number of missing tubes in 2015. (8 in total). There was no annual average level over 60 µgm/^{3}, which would indicate that an exceedance of the 1-hour mean obective is also likely.

Each year Teignbridge review the sites of the diffusion tubes and take into consideration extending or reducing an AQMA. At present we do not have any current plans to amend any AQMA's.

Figure A.4.1 shows the NO_2 trend from 6 of our highest exceeding sites between 2011 – 2015. Although there are some signficiant peaks and troughs, this is due to missing tubes. There is a slight downward trend from the results but it is still evident that these tubes are exceeding the National Objective. It is not possible to link this trend directly to any specific national or local intervention.

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.

As can been seen by Table A.5 in Appendix A unfortunately the percentage of data capture has not been successful. This has been as a result of in house changes to our Information Technology Department and equipment not functionally correctly. It is therefore this Council's priorty to get adequate data available for 2016 Annual Status Report.

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	Halcyon Rd, Newton Abbot	Roadside	X285681	Y 71393	NO_2	Y	Chemiluminescent analyser	5	2	1.7
CM2	Bitton Park Rd, Teignmouth	Roadside	X293363	Y73094	NO_2	Y	Chemiluminescent analyser	8.5	1.73	1.7
CM3	BAM - Magnolia	Roadside	X283220	Y75972	PM_{10}	N	Absorption of Beta Radiation.	14	N/A	1.7
CM4	Queen St, Newton Abbot	Roadside	X286617	Y71332	PM_{10}	Y	Light scattering technique	2.18	2.63	1.7
CM5	11 Brow Hill, Heathfield TQ12 6SW	Special	X283149	Y75937	PM_{10}	N	Light scattering technique	80	N/A	1.7
CM6	Magnolia, Heathfield	Special	X283220	Y75972	PM_{10}	N	Light scattering technique	14	N/A	1.7

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)
	TQ12 6RE									
CM7	Battle Road, Heathfield	Special	X282813	Y75775	PM_{10}	N	Light scattering technique	N/A	0	1.7
CM8	A38, Heathfield, Bovey Tracey	Special	X283435	Y57826	Pm10	N	Light scattering technique	N/A	5	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)
1	Aller Brake Road N Abbot	Roadside	287396	69902	NO_2	N	1m	5m	N	1.7
2	DP 155(153) Bitton Park Road, Teignmouth	Kerbside	293277	293277	NO_2	Y	0	1m	N	1.7
3	9 Gestridge Rd, Kingsteignton	Kerbside	286967	73146	NO_2	Y	0	1m	N	1.7
4	DP 85 Wolborough St, Newton Abbot	Kerbside	285526	71010	NO_2	Y	0	1m	N	1.7
5	96 Bitton Park Rd, Teignmouth	Kerbside	293387	73101	NO_2	Y	0	1m	N	1.7
6	157 Queen St, Newton Abbot	Kerbside	286630	71329	NO_2	Y	0	1m	N	1.7
7	54 Newton Rd, Kingsteignton	Roadside	286718	72523	NO_2	Y	1m	5m	N	1.7
8	57 East St,	Kerbside	285991	71158	NO_2	Y	0	1m	N	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)
	Newton Abbot									
9	Forde House Offices, Newton Abbot	Other	287073	70915	NO_2	N	N/A	N/A	N	1.7
10	Control	Other				N	N/A	N/A	N	N/A
11	12 Torquay Rd, Newton Abbot	Kerbside	286345	71078	NO_2	Y	0	1m	N	1.7
12	Bus Stop/Datal office Torquay Rd, Newton Abbot	Kerbside	287939	68823	NO_2	Y	0	1m	N	1.7
13	22 Courtenay Road, Newton Abbot	Urban Background	286061	70812	NO_2	N	24m	1m	N	1.7
14	Bus StopWestcom be Caravan Park Torquay Rd, N Abbot	Kerbside	288024	68769	NO_2	Y	15m	1m	N	1.7
15	38 Ashburton Road	Roadside	275659	69917	NO_2	N	2m	2m	N	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)
16	46/48 Newton Rd, Kingsteignton	Roadside	286727	72538	NO_2	Y	2m	5m	N	1.7
17	Whitecourt, Iddesleigh Terrace, Dawlish	Kerbside	296299	76738	NO_2	Y	0	1m	N	1.7
18	DP Flat 2, Birchwood Court, Addison Rd, NA	Roadside	287211	70496	NO_2	Y	0	2m	N	1.7
19	DP 49 The Avenue, Newton Abbot	Roadside	286479	71558	NO_2	Y	0	5m	N	1.7
20	Specsavers 16 Queen Street Ground Floor Newton Abbot	Kerbside	286056	71334	NO_2	Y	0	1m	N	1.7
21	Specsavers 16 Queen Street First Floor Newton Abbot	Kerbside	286056	71334	NO_2	Y	0	1m	N	4
22	Opp Aster House,	Kerbside	297737	81748	NO_2	N	0	1m	N	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)
	Starcross									
23	108-110 Queen St First Floor level Newton Abbot	Kerbside	286519	71344	NO_2	Y	0	1m	N	4
24	87 East St, Newton Abbot	Kerbside	286061	71151	NO_2	Y	0	1m	N	1.7
25	DP 7 Station Rd, Newton Abbot	Roadside	286703	70922	NO_2	Y	0	4m	N	1.7
26	DP 34 Bradley Lane, Newton Abbot	Roadside	285510	71305	NO_2	Y	0	3m	N	1.7
27	DP 173 Bitton Park Rd, Teignmouth	Kerbside	293231	73085	NO_2	Y	0	1m	N	1.7
28	Western Cottages 1 Greenhill Road KKwell	Roadside	287671	67405	NO_2	N	5m	3m	N	1.7
29	Jct of Huxnor Rd and Eddginswell	Kerbside	287667	67263	NO_2	N	0	1m	N	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)
	Lane Kkwell									
30	1A Piermont Place, Dawlish	Kersbide	296281	296281	NO_2	Y	0	1m	N	1.7
31	DP 108-110 Queen St, Newton Abbot	Kerbside	286517	71336	NO_2	Y	0	1m	N	1.7
32	21 Oakford, Broadway Rd, Kingsteignton	Kerbside	286957	73112	NO_2	Y	0	1m	N	1.7
33	DP 30-34 Bradley Court, Highweek Street NA	Kerbside	285681	71393	NO_2	Y	0	1m	N	1.7
34	Nox Analyser, Halcyon Road, Newton Abbot	Other	286071	71478	NO_2	Y	0	N/A	Y	1.7
35	Lamp post St Mary Church Road Newton Abbot	Roadside	287299	70621	NO_2	N	5m	1m	N	1.7
36	DP Westhill House, Kingskerswell	Kerbside	288111	67872	NO_2	Y	0	1m	N	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)
37	Telegraph pole Ringslade, Highweek	Kerbside	284851	72101	NO_2	N	0	1m	N	1.7
38	DP 26 Newton Road, Kingsteignton	Roadside	286757	72583	NO_2	Y	2m	5m	N	1.7
39	Rock House 1 Maddacombe Rd KKwell	Kerbside	287477	67698	NO_2	N	0	1m	N	1.7
40	DP 8 Furze Cap, Kingsteignton	Roadside	286987	73148	NO_2	N	1m	5m	N	1.7
41	DP Aller Farmhouse, Kingskerswell	Kerbside	288077	68761	NO_2	Y	0	1m	N	1.7
42	Lay By Exeter Rd (opp Vauxhall Garage) Whitehill N Abbot	Kerbside	285477	72510	NO_2	N	N/A – pre planning application.	1m	N	1.7
43	Nox Analyser, Halcyon Road,	other	285681	71393	NO_2	Y	0	N/A	Y	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)
	Newton Abbot									
44	Nox Analyser, Halcyon Road, Newton Abbot	Other	285681	71393	NO_2	Y	0	N/A	Y	1.7
45	DP 4 Commercial Rd, Dawlish	Kerbside	296302	76756	NO_2	Y	0	1m	N	1.7
46	DP 3 Iddesleigh Terrace, Dawlish	Kerbside	296318	76763	NO_2	Y	0	1m	N	1.7
47	DP 114 Bitton Park Rd, Teignmouth	Kerbside	293256	73109	NO_2	Y	0	1m	N	1.7
48	DP 1 Reed Vale Lodge, Teignmouth	Kerbside	293446	73091	NO_2	Y	0	1m	N	2
49	DP 68 Bitton Park Rd, Teignmouth	Kerbside	293541	73083	NO_2	Y	0	1m	N	2
50	L/Post Newton Road (Northbound	kerbside	288027	68381	NO_2	Y	0	1m	N	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)
	opp Priory Ave) Kkwell									
51	DP St Mary's Court, Highweek St,NA	Roadside	285674	71401	NO_2	Y	0m	4m	N	1.7
52	DP 29 Vicarage Hill, Kingsteignton (Blindwell)	Roadside	287544	73067	NO_2	N	2m	5m	N	1.7
53	90 Wolborough Street Newton Abbot	Kerbside	285537	71035	NO_2	Y	0	1m	N	1.7
54	DP 3 Gestridge Road, Kingsteignton	Kerbside	286969	73130	NO_2	Y	0	1m	N	1.7
55	DP 79 Wolborough St, Newton Abbot	Kerbside	285554	71043	NO_2	Y	0	1m	N	1.7
56	DP Wywurree Bungalow,	Roadside	287198	70542	NO_2	Y	0	10m	N	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)
	Addison Road NA									
57	DP Aster House, The Strand, Starcross	Kerbside	297724	81743	NO_2	N	0	1m	N	1.7
58	L/Post Level with 28 Water laneTorquay Road (Northbound) Kkwell	Kerbside	288168	67516	NO_2	Y	0	1m	N	1.7
59	LP Newton Road, South of Pottery Road, Kingsteignton	Roadside	286730	72518	NO_2	Y	15m	2m	N	1.7
60	Nox Analyser - Bitton Park Road, Teignmouth	Other	293363	73094	NO_2	Y	0	N/A	Y	1.7
61	Nox Analyser - Bitton Park Road, Teignmouth	other	293363	73094	NO_2	Y	0	N/A	Y	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)
62	Nox Analyser - Bitton Park Road, Teignmouth	Other	293363	73094	NO_2	Y	0	N/A	Y	1.7
63	DP 3 Gestridge Rd, Kingsteignton (Broadway Rd)	Kerbside	286965	73120	NO_2	Y	0	1m	N	1.7
64	Telegraph Pole, 22 Gestridge Road, Kingsteignton	Kerbside	286985	73111	NO_2	N	0	1m	N	1.7
65	96 Wolborough St, Newton Abbot	Kerbside	285518	71018	NO_2	Y	0	1m	N	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)
66	Halfway House Torquay Road (next to Hare +Hound) Kkwell	Kerbside	288339	66936	NO_2	Y	0	1m	N	1.7
67	Coventry Cottage Torquay Road (Southbound)	Kerbside	288487	66690	NO_2	Y	0	1m	N	1.7
68	Cliffpark, Bishopsteignton Road, Teignmouth	Kerbside	292886	72930	NO_2	N	0	1m	N	1.7
69	Highweek Inn crossroad	Kerbside	284813	72062	NO_2	N	0	1m	N	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

Please note (A) represents an historical tube data from an alternative location.

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
BP	Roadside	Automatic	92.5	21.11	21.36	19.17	21.45	19.29	19.82
HR	Roadside	Automatic	93.75	21.11	28.03	27.33	29.77	**44.63**	29.01
1	Roadside	DT		0.67					27.66
1 (A)	Roadside	DT			24.62	32.08	23.37	20.80	
2	Kerbside	DT		0.92	**41.14**	**40.71**	38.82	38.88	36.97
3	Kerbside	DT		1.00	**42.10**	**41.34**	37.87	38.41	37.37
4	Kerbside	DT		1.00	**55.19**	**55.14**	**58.17**	**51.40**	**50.12**
5	Kerbside	DT		0.83	**52.49**	32.67	**50.03**	**46.05**	**42.08**

6	Kerbside	DT		1.00	37.95	37.20	**44.50**	36.79	34.97
7	Roadside	DT		0.83	32.19	31.78	33.49	30.72	30.76
8	Kerbside	DT		0.92	33.46	35.88	35.55	31.62	30.75
9	Roadside	DT		1.00	16.78	16.66	17.34	16.51	13.84
10	Control	DT		1.00		0.27	0.23	0.11	0.13
11	Kerbside	DT		0.83	31.73	23.70	34.83	37.41	31.46
12	Kerbside	DT		1.00					37.65
12 (A)	Roadside	DT				24.53	17.72	17.72	

13	Urban Background	DT		1.00	10.06	9.91	10.72	8.93	8.33
14	Kerbside	DT		0.92					31.38
14 (a)	Kerbside	DT			14.95	18.32	14.13	14.13	
15	Roadside	DT		1.00				8.93	27.08
15 (a)	Kerbside	DT			25.49	25.21	25.21		
16	Roadside	DT		1.00	35.58	35.69	35.64	13.51	36.40
17	Kerbside	DT		1.00	37.64	37.38	38.37	30.77	36.03
18	Roadside	DT		1.00	24.28	23.45	22.00	36.57	22.68

19	Roadside	DT		!00%	27.84	28.86	27.43	**40.07**	24.19
20	Kerbside	DT		0.83			22.07	25.25	19.45
20 (a)	Roadside	DT			14.47	14.30			
21	Kerbside	DT		1.00			23.32	28.05	19.39
21 (a)	Roadside	DT			21.89	22.06			
22	Kerbside	DT		1.00	28.84	30.02	31.04	21.21	25.49
23	Kerbside	DT		1.00			**40.82**	21.07	36.34

23 (a)	Roadside	DT			27.11	26.56			
24	Kerbside	DT		1.00	**43.04**	37.17	**42.64**	28.45	39.91
25	Roadside	DT		1.00	37.10	35.68	36.46	38.62	36.03
26	Roadside	DT		1.00	23.39	24.27	24.82	**42.46**	21.56
27	Kerbside	DT		0.92	**44.86**	**44.69**	**41.71**	36.67	**40.27**
28	Roadside	DT		1.00	0.00	0.00	0.00	0.00	9.72
28 (a)	Roadside	DT			**41.66**	**44.56**	**43.78**		
29	Kerbside	DT		1.00					11.01

29 (a)	Roadside	DT			27.74	23.99	25.50		
30	Kerbside	DT		1.00	38.69	34.66	35.59	29.64	34.30
31	Kerbside	DT		0.92	**43.36**	**43.11**	**43.46**	**42.71**	38.09
32	Kerbside	DT		1.00	27.10	27.93	26.78	26.43	25.12
33	Kerbside	DT		1.00	**48.14**	**43.00**	**44.39**	**43.58**	**41.28**
34	Nox Analyser, Halcyon Road, Newton Abbot	DT		1.00	29.98	28.89	31.96	29.06	28.11
35	Roadside	DT		1.00				30.33	27.49

35 (a)	Kerbside	DT		1.00	22.90	22.83	23.53		
36	Kerbside	DT		1.00	**40.33**	0.00	38.98	37.78	34.18
37	Kerbside	DT		1.00					17.81
37 (a)	Kerbside	DT			36.35	37.81	33.77	33.77	
38	Roadside	DT		1.00	36.89	35.39	35.37	34.76	32.90
39	Kerbside	DT		0.83					14.99
39 (a)	Roadside	DT			21.60	22.76			
39 (b)	Roadside	DT					35.37		

40	Roadside	DT		1.00					13.48
40 (a)	Kerbside	DT			19.85	20.44			21.37
41	Kerbside	DT		0.83	**41.37**	**40.54**	**40.62**	**45.90**	24.57
42	Kerbside	DT		1.00					20.39
42 (a)	Roadside	DT			14.52	13.80			
42 (b)	Roadside	DT					22.22		
43	Nox Analyser, Halcyon Road, Newton Abbot	DT		1.00	29.46	30.20	31.05	29.31	27.45

44	Nox Analyser, Halcyon Road, Newton Abbot	DT		1.00	29.66	30.70	33.76	28.64	27.64
45	Kerbside	DT		1.00	29.59	28.08	28.58	27.65	26.35
46	Kerbside	DT		1.00	29.47	29.27	32.98	**41.81**	32.30
47	Kerbside	DT		1.00	26.98	27.29	28.04	28.34	26.13
48	Kerbside	DT			**65.58**	**46.56**	**62.32**	**70.43**	**41.35**
49	Kerbside	DT		1.00	**48.30**	**58.16**	**50.16**	**48.70**	**47.25**
50	Kerbside	DT		1.00					**44.73**

50 (a)	Kerbside	DT			22.76	25.43	26.56	26.56	
51	Roadside	DT		1.00	27.03	26.10	26.74	26.58	26.09
52	Roadside	DT		1.00	36.90	38.91	39.99	24.54	19.92
53	Kerbside	DT		1.00	**49.53**	**42.01**	**46.90**	**44.15**	**45.89**
54	Kerbside	DT		0.92	36.27	36.47	37.52	36.73	35.00
55	Kerbside	DT		1.00	**47.38**	**52.03**	**56.34**	**50.69**	**48.76**
56	Roadside	DT		1.00	27.24	26.89	26.75	26.35	25.45

57	Kerbside	DT		0.92	33.64	26.86	31.36	33.53	32.27
58	Kerbside	DT							**42.35**
58 (a)	Kerbside	DT			23.43	23.49	24.12	24.12	
59	Roadside	DT		1.00	31.32	31.38	29.20	30.50	29.36
60	Nox Analyser - Bitton Park Road, Teignmouth	DT		1.00	23.58	23.28	25.11	23.45	20.92
61	Nox Analyser - Bitton Park Road, Teignmouth	DT		1.00	23.58	23.02	23.53	23.01	21.31

62	Nox Analyser - Bitton Park Road, Teignmouth	DT		1.00	23.78	23.25	25.21	22.73	21.26
63	Kerbside	DT		0.92	29.01	29.59	26.22	12.13	22.28
64	Kerbside	DT		58£					23.36
64 (a)	Kerbside	DT			25.84	27.77	27.94	27.94	
65	Kerbside	DT		1.00	32.28	30.90	33.03	30.88	30.76

66	Kerbside	DT		1.00					39.03
66 (a)	Kerbside,	DT			30.27	28.58	25.35	25.35	
67	Kerbside	DT		1.00					**41.43**
67 (a)	Kerbside	DT			28.69	25.02	28.08	28.08	
68	Kerbside	DT		0.83	25.61	30.40	34.02	30.53	25.92
68 (a)	Roadside	DT			14.63				
69	Kerbside	DT		1.00					12.86
69 (a)	Roadside	DT			15.68				

70		DT			13.77				
71	Roadside	DT			20.46	19.69			
72	Kerbside	DT			37.48				
73	Kerbside	DT			33.01				
74	Kerbside	DT			31.39				

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

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
CM1	Roadside (Halcyon Road)	Automatic	80	80	0	0	4	**18**	**No data**
CM2	Roadside (Bitton Park Road)	Automatic	95	95	**0**	2	0	0	**No data**

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	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
Mag	Roadside (BAM)	Automatic	89.5	9.80	Not at this location	Not at this location	Not at this location	**55.06**	25.79
Brow Hill	OSIRIS	Light Scattering		0.00	14.83	12.93	7.33	16.15	No Data
Magnolia	OSIRIS	Light Scattering	42.08	7.53	32.83	21.65	11.94	25.90	**49.38 (Data provided by Turnkey)**
A38	OSIRIS	Light Scattering	16.03	0.00	**N/A**	**N/A**	**N/A**	**128.59**	No Data
Queen Street	OSIRIS	Light Scattering	54.62	0.00	27.82	17.50	22.71	**61.56**	No Data
Battle Road	OSIRIS	Light Scattering	4.65	0.00	**N/A**	**N/A**	**N/A**	9.52	No Data

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 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/m^3 (3)				
				2011	2012	2013	2014	2015
Brow Hill	Osiris	58.9	-	5	4	0	No Data	No Data
Magnolia	Osiris	41.9	65	65	20	1	0	0
A38	Osiris	16	-	N/A	N/A	N/A	No Data	No Data
Queen Street	Osiris	47.3	-	27	8	308	0	No Data
Battle Road	Osiris	-	-	N/A	N/A	N/A	No data	No data

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 2015

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

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
1	40.13	35.95	35.8	M	M	20.06	22.31	26.57	23.96	M	M	30.67	29.43	27.66
2	35.53	35.51	34.99	44.31	37.87	41.11	49.53	42.46	35.87	43.07	M	38.83	39.92	36.97
3	45.1	41.48	42.57	37.36	34.61	29.57	38.95	43.19	36.22	49.76	44.73	43.9	40.62	37.37
4	46.3	60.87	56.69	53.31	48.89	42.52	50.67	54.36	54.21	81.87	56.21	47.82	54.48	**50.12**
5	42.06	49.32	49.77	M	M	47.57	45.24	49.23	46.73	70.42	31.76	36.86	46.90	**42.08**
6	36.25	37.03	39.54	43.68	31.79	31.42	32.42	41.68	37.3	56.23	39.45	29.34	38.01	34.97
7	32.78	35.42	38.38	34.46	29.09	27.66	28.67	35.16	30.11	M	M	28.55	32.03	30.76
8	38.89	34.64	32.83	37.74	31.07	25.99	28.23	36.16	31.29	48.46	24.99	M	33.66	30.75
9	17.55	17.91	20.23	15.57	12.19	10.13	10.45	13.37	13.97	21.92	13.08	14.09	15.04	13.84
10	0.03	0.1	0.27	0.14	0.09	0.16	0.03	0.17	0.03	0.11	0.16	0.37	0.14	0.13
11	30.98	35.05	35.96	34.87	30.04	29.95	M	31.93	M	45.66	35.2	37.65	34.73	31.46
12	47.06	46.22	48.66	42.25	39.25	41.9	33.8	40.81	40.3	56.83	29.85	24.12	40.92	37.65
13	12.09	12.02	14.23	9.33	5.57	6.1	6.07	7.87	9.46	14.24	5.21	6.46	9.05	8.33
14	40.43	37.62	36.99	30.45	35.43	M	40.49	41.2	29.04	38.15	29.73	25.45	35.00	31.38
15	33.91	29.86	35.67	34.32	23.23	22.73	26.96	27.92	28.89	43.44	29.68	16.63	29.44	27.08
16	41.97	40.89	37.4	33.61	31.29	33.22	32.24	42.77	33.8	43.29	65.9	38.45	39.57	36.40
17	33.57	36.12	39.71	42.31	37.81	36.02	40.3	44.71	38.99	47.54	35.6	37.23	39.16	36.03
18	30.66	29.3	27.87	25.39	21.46	19.3	19.86	23.9	22.65	29.98	22.96	22.47	24.65	22.68

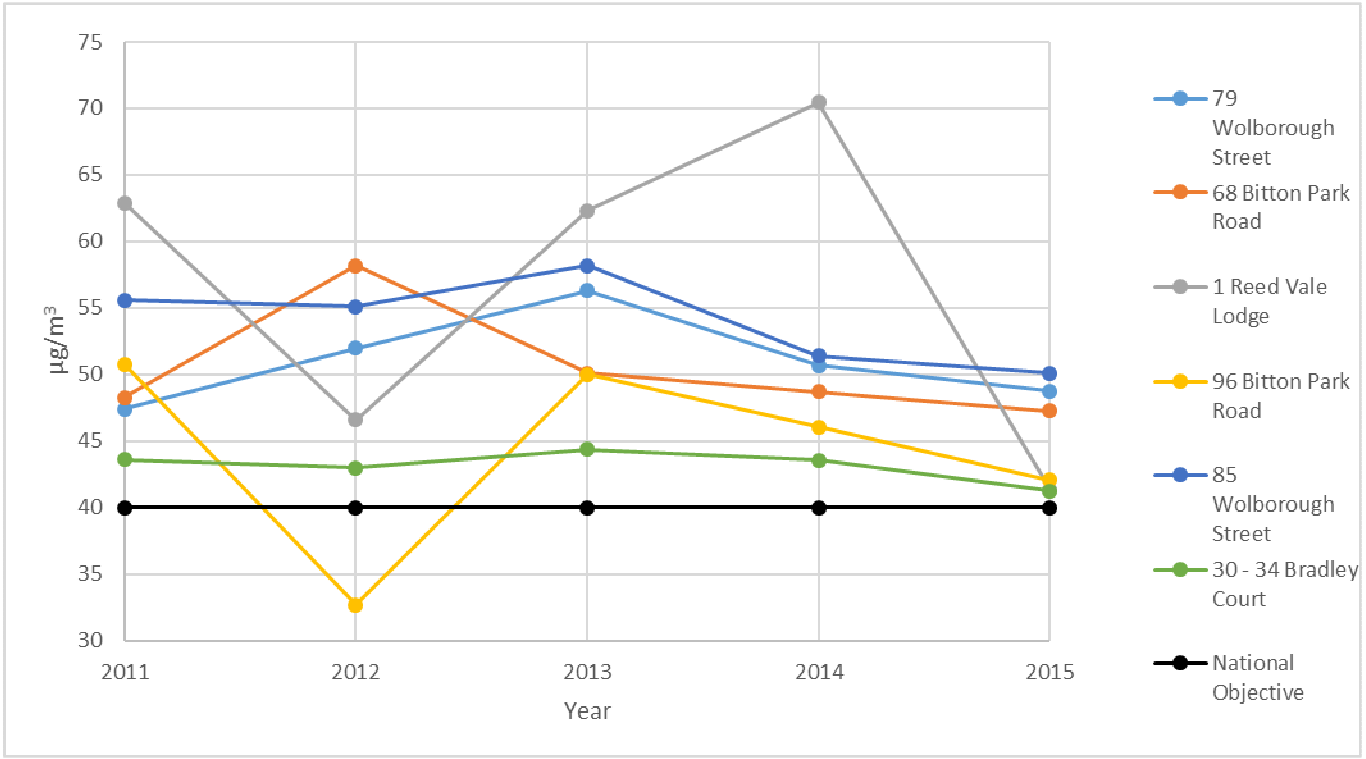
19	32.9	29.38	8.15	26.08	24.66	23.85	20.99	29.42	27.9	36.48	27.1	28.57	26.29	24.19
20	25.73	24.85	24.69	22.98	17.05	15.18	15.65	M	22.19	30.31	21.64	M	22.03	19.45
21	25.17	24.62	23.63	22.86	17.74	14.52	16.24	19.12	21.24	24.5	21.31	21.92	21.07	19.39
22	29.15	29.92	27.29	32.58	26.25	20.17	25.2	29.95	27.94	40.75	22.28	21.01	27.71	25.49
23	39.4	39.74	39.57	36.67	33.69	33.43	38.69	42.51	37.33	50.97	36.62	45.33	39.50	36.34
24	44.43	41.5	40.58	47.02	38.9	43.44	41.71	44.31	41.03	56.44	43.2	38.02	43.38	39.91
25	42.13	42.07	42.64	39.15	36.65	34.54	36.17	40.6	35.67	49.55	34.55	36.2	39.16	36.03
26	24.74	26.72	26.91	26.43	18.59	19.86	16.36	24.1	22.78	36.85	19.56	18.33	23.44	21.56
27	43.16	39.45	40.37	49.96	41.96	45.89	45.19	48.84	37.05	40.72	M	45.73	43.48	**40.27**
28	12.87	12.98	12.83	10.5	8.68	8.6	7.66	10.49	9.26	15	7.84	10.06	10.56	9.72
29	13.38	14.73	14.61	12.56	10	11.26	8.76	11.54	11.32	16.88	9.47	9.06	11.96	11.01
30	33.77	32.37	33.26	28.76	29.53	37.02	44.78	47.28	40.52	48.54	36.38	35.13	37.28	34.30
31	43.02	43.99	44.66	45.76	36.68	39.69	38.55	M	41.5	49.25	39.3	47.19	42.69	38.09
32	30.25	30.69	28.15	28.23	23.06	18.65	23.88	26.17	26.04	32.57	28.37	31.54	27.30	25.12
33	51.52	45.16	45.75	41.13	43.55	39.58	46.37	48.72	43.47	49.3	37.85	46.06	44.87	**41.28**
34	33.98	34.26	36.61	33.28	27.72	27.58	25.05	29.15	29.62	39.58	27.21	22.59	30.55	28.11
35	31.57	35.49	35.53	35.63	26.54	22.59	24.55	30	29.02	38.27	28.56	20.87	29.89	27.49
36	45.04	43	41.5	36.75	35.79	29.67	36.62	39.05	32.12	39.93	38.84	27.49	37.15	34.18
37		21.66	24.8	22.14	16.85	14.44	16.33	19.27	21.39	27.19	15.94	12.99	19.36	17.81
38	43.38	39.18	33.52	31.36	35	31.22	29.92	37.91	34.24	41.81	38.77	32.88	35.77	32.90
39	15.38	17.92	16.56	M	M	16.68	16.05	18.8	18.21	24.95	11.16	16.5	17.22	14.99
40	19.1	17.28	16.56	17.21	12.55	10.27	10.24	12.65	13.53	17.83	15.3	13.32	14.65	13.48
41	M	M	35.29	26.8	24.62	23.56	23	25.97	10.95	37.25	23.68	19.56	25.07	24.57
42	25.53	25.83	22.14	19.2	17.18	12.95	17.59	21.78	22.25	34.11	21.94	25.43	22.16	20.39
43	35.04	27.57	33.06	34.74	27.97	23.22	24.06	31.85	31.9	38.3	27.19	23.14	29.84	27.45

44	32.65	33.87	34.32	34.1	29.75	28.26	22.75	31.17	28.02	36.07	26.44	23.16	30.05	27.64
45	26.96	32.55	33.92	33.99	28.6	21.85	27.87	34.54	30.65	28.87	19.28	24.65	28.64	26.35
46	39.46	38.89	42.64	52.49	39.26	31.28	30.3	33.85	30.53	32.34	26.31	24.01	35.11	32.30
47	29.34	31.34	30.9	32.78	26.37	23.28	27.21	29.49	29.84	30.76	25.82	23.64	28.40	26.13
48	55.6	56.46	71.06	M	M	M	M	M	M	M	M	38.32	55.36	**41.35**
49	55.91	53.09	54.56	57.9	47.6	39.96	43.78	57.06	48.53	49.41	68.27	40.21	51.36	**47.25**
50	53.88	53.35	57.98	57.92	45.26	51.09	46.16	57.34	44.35	49.65	34.74	31.66	48.62	**44.73**
51	27.34	29.82	33.98	37.95	26.08	24.42	22.74	25.91	31.97	36.69	23.51	19.84	28.35	26.09
52	23.85	26.99	28.05	28.95	15.43	15.64	13.61	20.31	18.49	28.42	20.24	19.85	21.65	19.92
53	57.4	52.76	52.11	54.07	49.76	36.16	47.45	51.74	51.58	50.22	53.48	41.83	49.88	**45.89**
54	32.76	43.29	40.63	39.32	39.13	34.87	33.76	39.52	36.8	41.37	M	34.25	37.79	35.00
55	52.55	52.76	65.74	63.01	44.85	39.46	44.79	60.88	59.33	60.84	47.27	44.58	53.01	**48.76**
56	36.08	33.6	31.14	28.45	23.51	24.42	22.38	28.4	25.97	32.77	24.13	21.13	27.67	25.45
57	37.47	33.12	37.83	38.23	33.57	27.37	35.08	43.04	34.19	38.35	30.38	M	35.33	32.27
58	M	45.87	42.19	50.54	47.43	34.27	45.37	51.09	48.38	50.66	M	29.53	44.53	**42.35**
59	38.06	35.95	31.02	31.97	27.71	24.89	28.03	30.61	30.41	37.55	31.71	35.01	31.91	29.36
60	23.46	23.07	22.98	30.43	22.28	19.59	19.91	23.01	22.41	28.64	19.78	17.29	22.74	20.92
61	22.95	23.97	25.78	30.39	23.05	20.43	20.44	20.68	23.18	29.62	19.72	17.69	23.16	21.31
62	23.56	24.96	23.91	27.59	21.24	20.14	21.11	21.58	23.81	30.28	21.99	17.19	23.11	21.26
63	26.07	27.15	31.27	27.87	19.35	17.61	18.21	M	25.7	35.87	22.29	23.33	24.97	22.28
64	M	M	25.8	24.31	16.77	16.41	14.96	22.12	M	38.83	M	M	22.74	23.36
65	38.5	35.58	33.95	34.25	28.31	31.76	31.99	34.76	31.59	40.7	31.17	28.71	33.44	30.76
66	51.16	41.34	46.28	44.29	35.18	33.97	41.13	49.5	43.95	56.7	37.63	27.98	42.43	39.03
67	57.49	44.53	52.35	46.75	42.4	38.51	41.89	53.02	43.95	53.17	34.84	31.55	45.04	**41.43**
68	26.43	27.36	30.56	34.27	M	M	28.84	34.36	29.45	37.9	23.34	25.2	29.77	25.92

69		19.25	17.21	15.39	12.49	11.46	12.11	11.86	8.75	21.3	13.01	10.89	13.97	12.86

(1) See Appendix C for details on bias adjustment

Figure A 4.1- Trends in Annual Mean No2 Monitoring Results from 2011 - 2015



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

In December 2015 a major new bypass in Devon will be opened. The "South Devon Link Road" will connect Torbay and Newton Abbot bypassing Kingskerswell (a current AQMA). The scheme started in 2012 and will result in a 2.4 mile dual carriageway being built. The expectation is that the South Devon Link Road will be completed in Dec 2015, with the effect that traffic pollution levels on the existing Torquay Road will drop sufficiently that the Council can revoke the Kingskerswell Air Quality Management Area (AQMA).

In view of this fact in 2014 we reviewed the Nox tube locations and established some additional locations along the Torquay Road through Kingskerswell. This monitoring from 2014 – 2015 will give us a broad and comprehensive baseline to start from.

From Jan 2016 (based on a scheduled completion date of Dec 2015 for the bypass) we will need to carry out a year of "post build" monitoring using the same NOx tubes.

If the results from the NOx tubes for 2016 are well below the Air Quality Objective (A.Q.O.) then we will need to repeat the same monitoring for a second year (Jan to Dec 2017).

If results for both 2016 and 2017 are well below the A.Q.O. (more than 10% below) we will compose a Detailed Assessment for submission to DEFRA.

This means the earliest date that we could revoke the A.Q.M.A. will be early 2018.

QA/QC of Automatic Monitoring

NO_x Analysers

The guidance contained in Technical Guidance LAQM.TG (09) advises that a well-documented quality assurance and quality control programme must be followed in order to ensure reliable and credible measurements. An ongoing resource commitment to QA/QC is required in any monitoring survey, to ensure that measurements fully comply with the requirements of the air quality review and assessment and are therefore fit for the purpose.

The fundamental aims of the QA/QC programme are as follows:

- Data should be representative of ambient concentrations existing in the area under investigation.
- Measurements need to be sufficiently accurate and precise to meet the defined monitoring requirements.
- Data must be intercomparable and reproducible. Results from multi-site networks need to be internally consistent and comparable with national, international or other acceptable standards.
- Measurements should be consistent over time, particularly if long-term trend analysis is to be undertaken.

QA/QC procedures were applied to both sets of automatic monitoring data throughout the monitoring periods. The Chemiluminescent analysers are continuous automatic real time monitors and are housed in 'M' type purpose built air-conditioned enclosures. In order to minimise measurement uncertainty it is important to apply stringent QA/QC procedures to monitoring programmes. The following procedures were carried out in Teignbridge in order to meet the criteria.

Calibration Checks

The following calibration checks were carried out: -
• Daily 'automatic' calibration
• Fortnightly manual calibrations
• 6 monthly reference calibrations

During the daily automatic calibration, a two point calibration is used to quantify the analyser 'zero' and 'span' response. The 'zero' response is the response of the analyser when the pollutant species being measured is not present in the sample air stream. The 'span' response is the response, of the analyser to a gas mixture of accurately known concentration. In order to ensure reproducible data quality, automatic monitoring instruments must be properly calibrated using reliable and traceable calibration standards.

The gas mixture was of mixture type U, nitric oxide 2.5 and nitrogen 5.0, and was provided by E.T. under the service and maintenance contract. Teignbridge trained staff carried out the fortnightly calibration checks and the visits included checking the equipment, sampling systems and security of the enclosure and analyser. E.T. carries out the six monthly reference calibrations and the last one was completed on the 3rd/4th June 2009.

Equipment Service and Maintenance

Teignbridge has an ongoing service and maintenance contract with E.T. for the NOx Analysers. The contract provides the following cover:-

- Routine six monthly service visits in accordance with the manufacturers instruction and warranty conditions;
- Guaranteed breakdown call out service;
- Written reports showing work carried out and status of instrumentation;
- All work and documentation is carried out in accordance with BS ISO 9002;
- Dedicated telephone support in normal working hours.

Data Capture

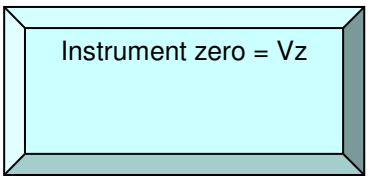
The LAQM.TG(16) recommends a data capture rate of 90% for ratified (usable) data. Teignbridge employs the following methods to ensure maximum data capture: -

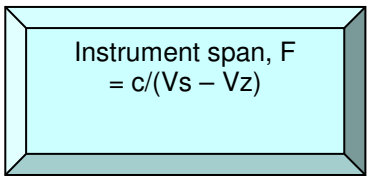
- The deployment of a proven NOx analyser;
- Automatic daily data collection using dedicated software (Opis EnviMan using the ComVisioner and Reporter modules). This enabled frequent checks of the data so that on-site problems could be identified quickly;
- M200A in built data storage capability;
- Rapid servicing, maintenance and repair;

- Comprehensive and documented site operational protocols;
- Regular and frequent site visits;
- Trained Teignbridge staff operators.

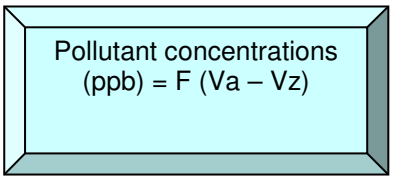
Data Processing

The M200A records the concentration of pollutants as continuous analogue voltage signals.
The signal is averaged over an hour period. An in-built data logger carries out this averaging process and the data is then downloaded via a modem to a computer in the Environment & Safety Services team. The modem is automatically dialled up three times a day at set times. The raw data collected has to be converted to more useful pollutant concentrations and this conversion is achieved using the 'zero' and 'span' calibration factors that are recorded during the manual fortnightly visits. The two-point calibration quantify's the analyser 'zero' and 'span' response. The 'zero' response, Vz, is the response in measurement units of the analyser when the pollutant species being measured is not present in the sample air stream. The 'span' response, Vs, is the response of the analyser to an accurately known concentration, c, in ppb (parts per billion) of the pollutant species. The instrument 'zero' and 'span' factors are then calculated using these data as follows:





Ambient pollution data are then calculated by applying these factors to logged output signals as follows:



Where Va is the recorded signal from the analyser sampling ambient air. The fortnightly
calibration factors applied to the raw data are then filed.

Data Ratification

Once the calibration factors have been applied to the raw data, the data is screened, by visual examination to see if they contain any spurious and/or unusual measurements. Any suspicious data, such as large spikes or spurious high concentrations can be 'flagged' and investigated more fully. This process is known as validation. Data validation is followed by data ratification, which is carried out at 3 – 6 month intervals. Steps in the ratification process included: -

- Examination of calibration records to ensure correct application of calibration factors;
- Examination of data for other pollutants and monitoring sites to highlight any anomalies;
- Deletion of data shown i.e. spikes generated by the analyser;
- Correction of any baseline drift as indicated by examination of daily calibration records;
- Examination of any local scale changes to the site environment;
- Application of correction factors from QA/QC audits.

When data verification has been completed then the data is ready for further statistical and critical examination for reporting purposes.

QA/QC of the BAM

The BAM-1020 is a continuous automatic real time analyser with a Graseby Anderson 10 sampling lead. It is housed in an M type purpose built air-conditioned enclosure.

The following procedures were carried out in Teignbridge in order to meet the criteria.

Calibration Checks

The BAM-1020 has a built in Mass Membrane Calibrator. The membrane is automatically moved into the Beta Pathway to determine the mass of the membrane each hour or when the filter tape advances. Each membrane has a factory verified mass and the value is stored in the BAM-1020. When the hourly membrane calibration is made, the computed value is compared to the stored factory value to determine proper operation. Should the instrument fail to perform to specification an error is logged in memory and data is flagged.

Zero testing of blank filter paper is performed at the beginning and end of each sample period to ensure the stability of the measurement system.

E.T. also carries out 6 monthly calibrations under the service and maintenance contract.

Equipment Service and Maintenance

Teignbridge has an ongoing service and maintenance contract with E.T. The contract provides the following cover:-

- Routine six monthly service visits in accordance with the manufacturers instruction and warranty conditions
- Guaranteed breakdown call-out service
- Written reports showing work carried out and status of instrumentation
- All work and documentation is carried out in accordance with BS ISO 9002
- Dedicated telephone support in normal working hours

The monitoring equipment has routine (fortnightly) on site checks and maintenance visits by Teignbridge staff. These routine visits include regular filter changes, sampling head cleaning, filtering tape changes and airflow/analyser test function checks at set intervals.

Non-routine visits, as a result of equipment failure or spurious data, are also carried out. All visits are fully documented and details kept of all works carried out i.e. adjustments, modifications and repairs completed.

BAM Monitoring Adjustment

The un-heated BAM inlet meets the equivalence criteria for PM_{10} monitoring, provided the results are corrected for slope. The measured concentrations have been divided by a factor of 1.21.

QA/QC of Osiris Monitors

The Osiris monitors are real-time, portable particulate matter monitors that use light-scattering technology to measure the concentration of different sized particles (PM_1, $PM_{2.5}$ and PM_{10}). Although Osiris' are not an approved method for measuring PM_{10} levels, as it is not possible to compare directly with the air quality objectives, it does provide indicative levels. The monitors are much easier and cheaper and less labour intensive than gravimetric analysers.

Teignbridge has an ongoing service and maintenance service contract with Turnkey Instruments Ltd for each of the monitors. The monitors are routinely checked every 3 months by trained Teignbridge DC officers. This involves a filter change and air flow test of the pump. The following parameters are also logged in a maintenance book filter minutes, filter weight and pump hours. The monitors are sent back to Turnkey Instruments annually for a complete service and calibration.

The monitors are dialled up weekly by trained Teignbridge DC officers and the data is downloaded onto Air Q for windows software. The data is screened by visual examination.

QA/QC of Diffusion Tube Monitoring

The NO_2 tubes diffusion tubes are analysed by Gradko International Limited in Winchester utilising 20% TEA in water for a 1-month exposure duration. Periodically samples of tubes prepared for exposure are spiked with known concentrations of nitrate solution and measured. Blank tube values are also monitored from each new batch of tubes prepared. Once a month, a stock solution containing a known amount of nitrate is received from AEA Technology and measured. The results are used as part of the UK NO_2 Survey QA/QC scheme. This stock solution is used by Gradko to check the ultra-violet spectrophotometer calibration graph. Gradko also participate in the inter-laboratory round robin exercise via the WASP scheme. Gradko demonstrated a 'good' performance in the WASP scheme for analysis of NO_2 diffusion tubes for the period January 2008 to January 2009.

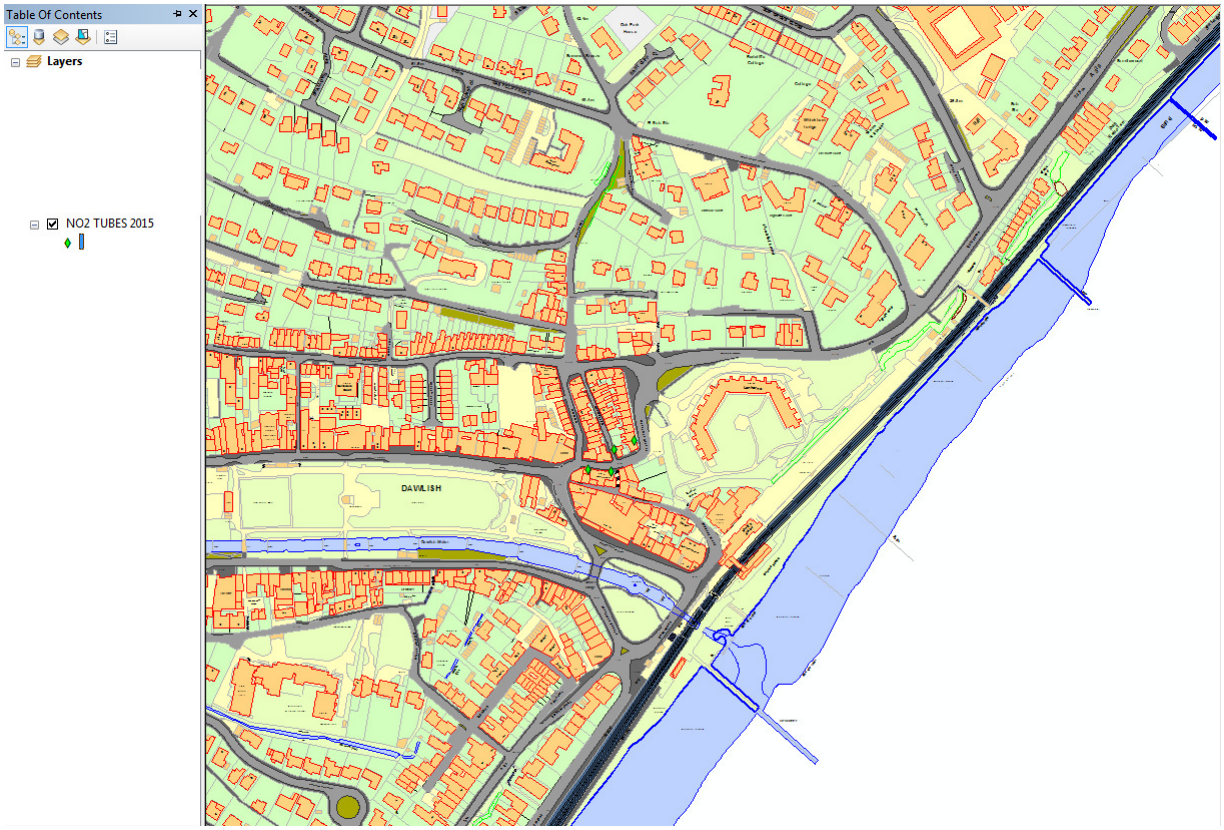
Gerry Stuchbury of Gradko International also sits on the Working Group on the Harmonisation of Diffusion Tubes. The Working Group's aim was to harmonise the methodology used in preparing, utilising and analysing diffusion tubes.

NO_2 Diffusion Tube Handling Procedures

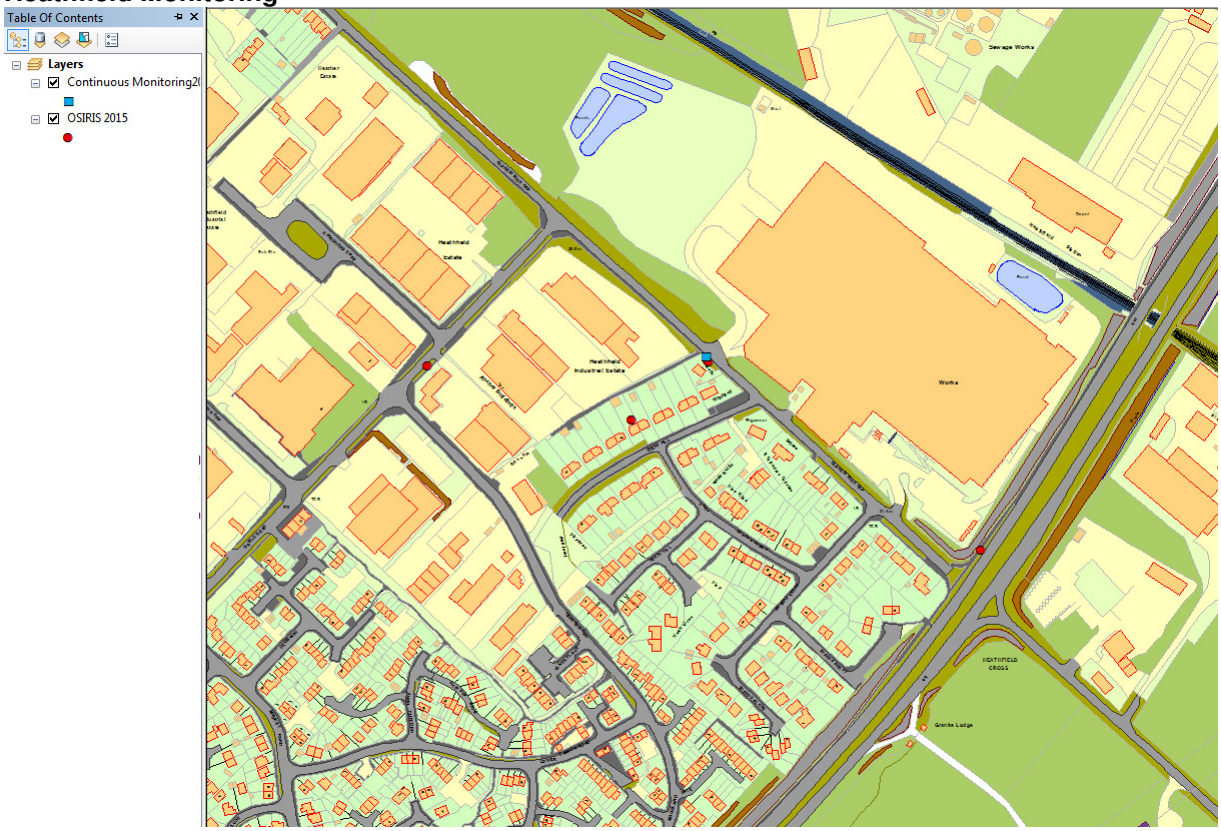
Teignbridge District Council's NO_2 diffusion tube monitoring is carried out in full accordance with the site quality assurance procedures contained in the UK Automatic Network Site Operator's Manual. Teignbridge also participates in the NO_2 UK Network. When the diffusion tubes are received in the post from Gradko they are stored in a refrigerator within the supplied packaging. The tubes ends are not removed until the tube has been placed at the monitoring location at the start of the monitoring period. Once the sampling period is completed, the tubes are recapped with the storage caps and returned for storage in the refrigerator until they are returned to Gradko for analysis. The tubes are returned within 24 hours from the end of the sampling period.

Appendix D: Map(s) of Monitoring Locations

Dawlish Monitoring Locations.

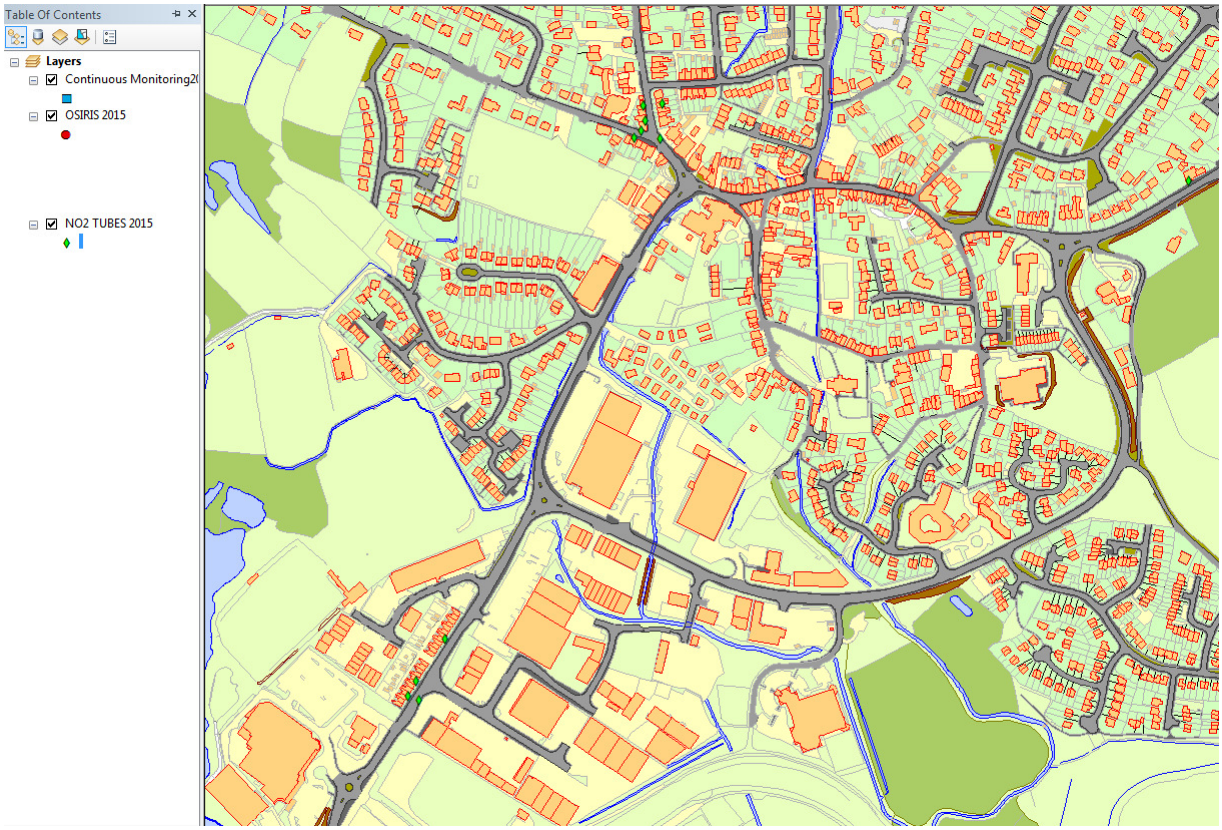


Heathfield Monitoring



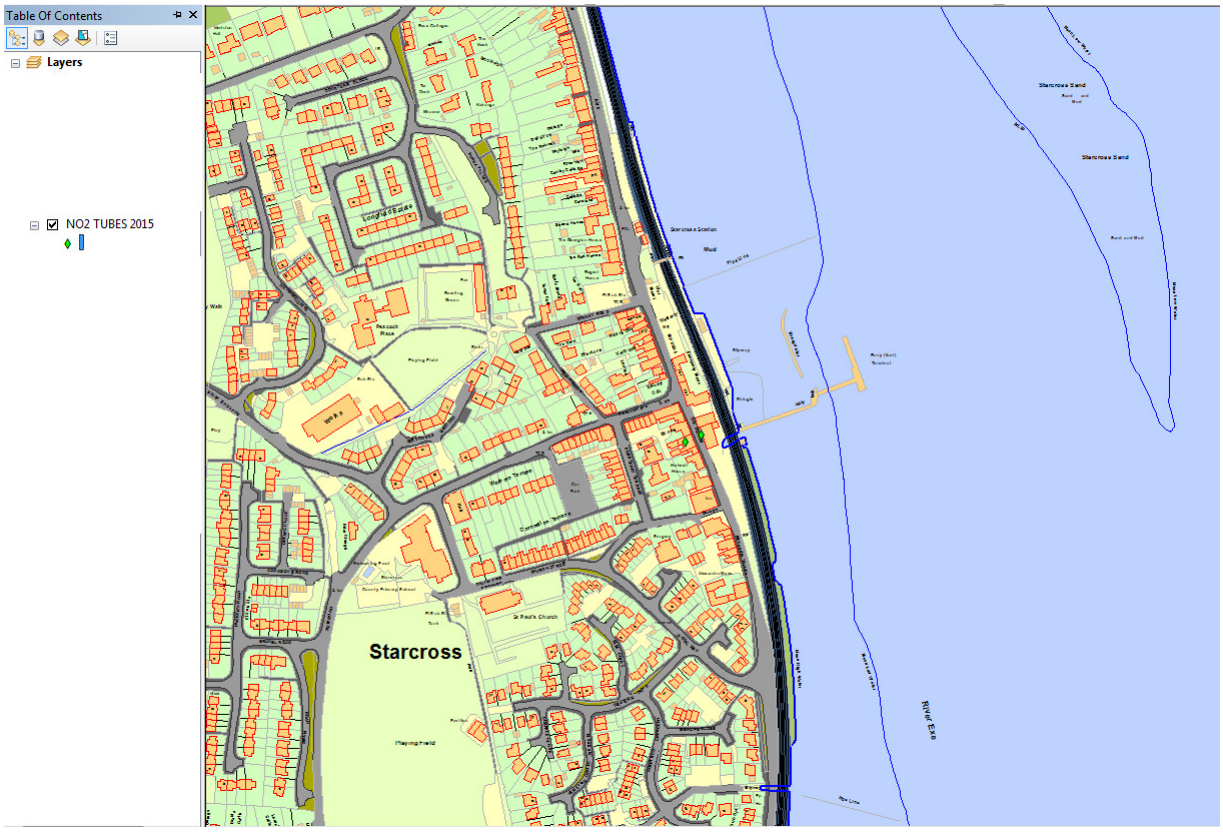
Kingskerswell Monitoring Locations.

Kingsteignton Monitoring Locations.

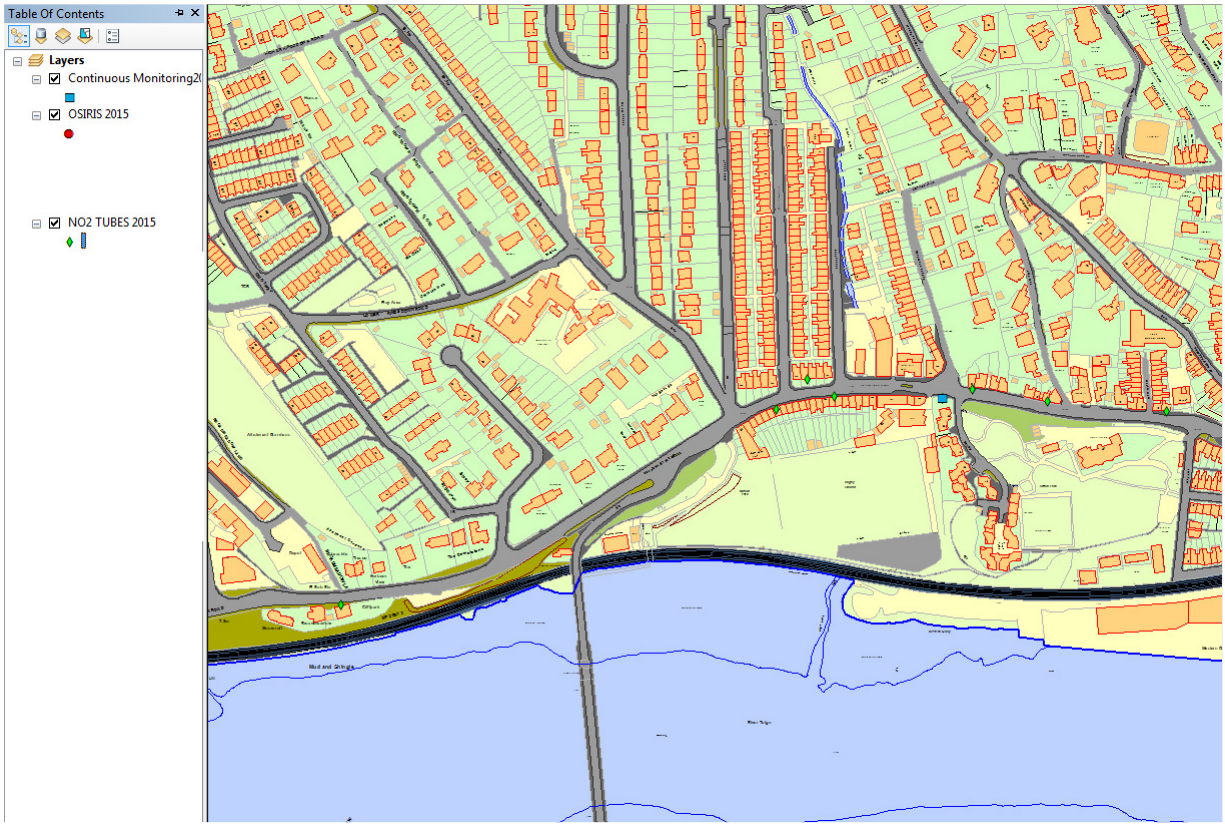


Newton Abbot Monitoring Locations

Starcross Monitoring Locations



Teignmouth Monitoring 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
TDC	Teignbridge District Council

References

Teignbridge District Council Action Plan 2010. www.teignbridge.gov.uk/airquality

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

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