Huntingdonshire District Council Air Quality Annual Status Report (ASR) for 2015

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

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Executive Summary: Air Quality in Our Area

Air Quality in Huntingdonshire

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].

Nitrogen Dioxide is the only pollutant that currently exceeds the objective level within the district. This is predominately caused by the A14 and to a lesser extent the A1 that runs straight through the district. However, local traffic within the market towns is also causing some elevated levels.

Huntingdonshire currently has four AQMA's. (1) Huntingdon, (2) St Neots, (3) and Brampton (4) A14 Hemingford to Fenstanton. As a whole the, level of nitrogen dioxide has fallen in the last five years and is mostly below the annual limit. However, Huntingdonshire is still experiencing a small hotspot which is showing readings above the annual limit.

Actions to Improve Air Quality

The re-routing of the A14 moves the A14 away from residential areas and predicts that all areas currently in an AQMA will see their NO^2 and PM^{10} levels significantly reduce once the scheme has been built. While some areas will increase slightly predictions have shown that these are all still below EU limit values. Huntingdonshire District Council was at the forefront of securing a satisfactory result for our residents.

[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

Local Priorities and Challenges

Huntingdonshire is currently a growth area and our main priority and challenge is ensuring that this growth does not cause any exceedances of AQ objectives.

How to Get Involved

You can improve air quality in your own area by using public transport or walking for small journeys, purchase energy efficient goods, make your home more energy efficient and purchase a low emission car, in some cases HDC can provide grants http://www.huntingdonshire.gov.uk/ but the energy savings trust can provide further advice http://www.energysavingtrust.org.uk/.

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1 Local Air Quality Management

This report provides an overview of air quality in Huntingdonshire 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 Huntingdonshire 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 Huntingdonshire 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 http://www.huntingdonshire.gov.uk/environmental-issues/noise-nuisance-pollution/air-quality/

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
AQMA Area 1: Huntingdon	NO_2 annual mean	Huntingdon	An area encompassing approximately 2831 domestic properties affected by the A14, A141, B1044, B1514 and Huntingdon Inner Ring Road.	Cambridgeshire Joint Air Quality Action Plan: http://www.huntingdonshire.gov.uk/media/1645/joint-air-quality-action-plan-2010.pdf
AQMA Area 2: St Neots	NO_2 annual mean	St Neots	An area encompassing approximately 115 domestic properties affected by local traffic in the town centre.	Cambridgeshire Joint Air Quality Action Plan: http://www.huntingdonshire.gov.uk/media/1645/joint-air-quality-action-plan-2010.pdf
AQMA Area 3: Brampton	NO_2 annual mean	Brampton	An area encompassing approximately 82 domestic properties affected by the A14.	Cambridgeshire Joint Air Quality Action Plan: http://www.huntingdonshire.gov.uk/media/1645/joint-air-quality-action-

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
				plan-2010.pdf
AQMA Area 4: Hemingford to Fenstanton	NO_2 annual mean	Fenstanton	An area encompassing approximately 62 domestic properties affected by the A14.	Cambridgeshire Joint Air Quality Action Plan: http://www.huntingdonshire.gov.uk/media/1645/joint-air-quality-action-plan-2010.pdf

2.2 Progress and Impact of Measures to address Air Quality in Huntingdonshire District Council

Measurement 1: The A14 upgrade has been agreed and, at the time of writing, currently being built with an estimated completion time of 2020.

Measurement 2: Implementation of air quality policies in local plan is currently on going.

Measurement 3 Development of an effective freight partnership. Now that the A14 will be moved away from the residential areas it is not expected that freight will cause a significant issue within Huntingdonshire.

Measurement 4 Inclusion of Huntingdonshire in the Quality Bus Partnership. Cambridgeshire County Council has so far not extended the QBP to outside Cambridge itself.

Measurement 5: The guided bus route is complete.

Measurement 6: Traffic lights at St Neots have been completed.

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
	Title	Select from the categories in blue box	Select from the subcategories in blue box		Date	Date				Date	
1	Re-routing of A14 away from settlements	Traffic Management	Strategic highway improvements	Highways England	Current	End of 2016		1, 3 & 4	Scheme has been approved	2020	Expected to improve all A14 AQMA's.
2	Implementation of air quality policies in the local plan.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Huntingdonshire District Council	Ongoing	Ongoing		All			Ongoing
3	Development of an effective freight partnership	Freight and Delivery Management	Other	Unknown	Unknown	Unknown	Unknown	All	Unknown	Unknown	Now the A14 improvement has been agreed and Highways England have opened communication on improving the A428 it is unknown if an effective fright partnership would have any significant effect.
4	Inclusion of Huntingdonshire in the Quality Bus Partnership	Alternatives to private vehicle use	Other	Cambridgeshire County Council	Ongoing	Unknown		All	None	None	At present CCC do not consider that it is feasible to run the QBP outside of the city of Cambridge

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	Completion and opening of Cambridgeshire Guided Busway	Transport Planning and Infrastructure	Bus route improvements	Cambridgeshire County Council	Completed	Completed		All	Completed	Completed	The guided busway was opened in August 2011 from Cambridge Huntingdon and extended to Peterborough in July 2012.
6	Change to traffic-light system in St Neots High street as specified in the St Neots Markets Town Strategy	Traffic Management	Strategic highway improvements	Cambridgeshire County Council	Completed	Completed		2	Completed 2013	Completed 2013	

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.

Huntingdonshire District Council is taking the following measures to address $PM_{2.5}$: We expect that the upgrade to the A14 which moves the A14 away from the major residential areas will reduce $PM_{2.5}$ significantly. In 2014 Huntingdonshire District Council joined with Public Health England and the other Cambridgeshire authorities to develop the transport and health joint strategic needs survey which focused on $PM_{2.5}$ from transport, see http://www.cambridgeshireinsight.org.uk/file/2552/download

Huntingdonshire District Council is intending to review and update the Council's Air Quality Action Plan.

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.

Huntingdonshire District Council undertook automatic (continuous) monitoring at one site during 2015. Table A.1 in Appendix A shows the site details.

NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available at https://uk-air.defra.gov.uk/interactive-map.

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

Huntingdonshire District Council undertook non- automatic (passive) monitoring of NO_2 at 44 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. HDC is aware of some issues with 2015 results which are being investigated.

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 only exceedances noted were from the diffusion tubes located in a small area in one of the AQMA's. However, the automatic monitoring station that is co-located at Pathfinder House did not identify any exceedences during the same period.

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.

3.2.3 Particulate Matter ($PM_{2.5}$)

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

$PM_{2.5}$ monitoring has only occurred in the last couple of years. The results show that the levels are slightly lower in 2015 than in 2014, although the figures are only slighty higher than the 2013 background concentrations as supplied by Defra.

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)
PFH	Huntingdon	Roadside	524060	271532	NO_2	Y	Chemiluminescent	3	7	2.5
					PM_{10}		Beta Attenuation			
					$PM_{2.5}$		Beta Attenuation			

(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)
	St Neots 5	Kerbside	517869	260132	NO_2	No	22m	1	No	3
	St Neots 3	Kerbside	518323	260263	NO_2	Yes	0m	1	No	3

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)
	St Neots 1	Urban Background	518925	260503	NO_2	No	4m	1	No	3
	St Neots 2	Urban Background	518489	260871	NO_2	No	3m	1	No	3
	St Neots 4	Kerbside	518433	260321	NO_2	Yes	0m	1	No	3
	Eynesbury	Suburban	518424	258556	NO_2	No	0m	17	No	1.75
	Eaton Socon	Suburban	516370	259514	NO_2	No	3m	5 (24m to trunk road)	No	3
	Southoe	Roadside	518714	264308	NO_2	No	24m	2 (14 to trunk road)	No	1.75
	Buckden	Roadside	519197	267955	NO_2	No	3m	1	No	3
	Buckden 2	Roadside	519082	267433	NO_2	No	0m	1 (35m to trunk road)	No	1.75
	Brampton 1	Roadside	520155	271561	NO_2	Yes	32m	2	No	3
	Brampton 2	Suburban	519839	271061	NO_2	No	18m	0.5	No	3
	Brampton 3	Suburban	519756	269900	NO_2	No	23m	0.5 (40m to trunk road)	No	1.5

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)
	Brampton 4	Suburban	520734	269623	NO_2	No	10m	0.5	No	3
	Catworth	Rural	508409	274876	NO_2	No	42m	42 (42 to trunk road)	No	3
	Alconbury	Roadside	518954	276010	NO_2	No	6m	2	No	3
	Sawtry	Suburban	517440	283443	NO_2	No	4m	2	No	3
	Stibbington	Roadside	508326	298684	NO_2	No	22m	2 (8m to trunk road)	No	3
	Huntingdon 1	Kerbside	524198	271949	NO_2	Yes	0m	1	No	1.75
	Huntingdon 2	Kerbside	523661	271802	NO_2	Yes	0m	1	No	3
	Huntingdon 3	Kerbside	523435	272464	NO_2	Yes	3m	1	No	3
	Huntingdon 4	Roadside	522293	272909	NO_2	Yes	3m	2	No	3
	Huntingdon 5	Roadside	524274	271939	NO_2	Yes	4m	2	No	3
	Huntingdon 6	Suburban	523177	271627	NO_2	No	3m	2	No	3

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)
	Godmanchester	Roadside	525319	270571	NO_2	No	3m	12 (34 to trunk road)	No	3
	PFH1	Roadside	524102	271540	NO_2	Yes	8m	6	Yes	3.6
	PFH2	Roadside	524102	271540	NO_2	Yes	8m	6	Yes	3.6
	PFH3	Roadside	524102	271540	NO_2	Yes	8m	6	Yes	3.6
	Fenstanton 1	Roadside	531427	268397	NO_2	Yes	20m	2 (20 to trunk road)	No	3
	Fenstanton 2	Roadside	531770	268215	NO_2	Yes	14m	2 (23m to trunk road)	No	3
	St Ives	Urban Background	531206	272334	NO_2	No	5m	1	No	3
	Ramsey	Urban Background	528433	284936	NO_2	No	4m	2	No	3
	Buckden 3	Roadside	519161	267624	NO_2	No	0m	1	No	2
	Buckden 4	Roadside	518981	267370	NO_2	No	0m	12 (10m to trunk road)	No	1.75
	Hilton *	Suburban	528961	266718	NO_2	No	2.5m	3	No	3

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)
	Fenstanton 3 *	Rural	531063	268063	NO_2	No	6m	1.5	No	3
	St Ives 2 *	Suburban	530850	270286	NO_2	No	6m	1.5	No	3
	Wood Green Animal Shelter *	Rural	526250	268264	NO_2	No	0m	235m	No	3
	Huntingdon 7 *	Kerbside	523401	271755	NO_2	Yes	10m	2	No	3
	Alconbury 2 *	Suburban	518955	275520	NO_2	No	10m	1	No	3
	Brampton 5 *	Suburban	519956	271461	NO_2	No	6m	1.5	No	3
	Brampton 6 *	Suburban	519874	270948	NO_2	No	7m	1.5	No	3
	Brampton 7 *	Suburban	520500	269646	NO_2	No	10m	1.5	No	3
	Offord Cluny *	Suburban	522086	267508	NO_2	No	1.5m	1.5	No	3

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site 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
PFH	Roadside	Automatic			37.6	**55.5**	**45.0**	38.9[1]	32.2
St Neots 5	Kerbside	Diffusion Tube	100	100	23.5	22.8	20.6	19.6	20.5
St Neots 3	Kerbside	Diffusion Tube	100	100	39.3	35.9	36.8	36.0	31.7
St Neots 1	Urban Background	Diffusion Tube	100	100	18.2	18.5	18.7	19.0	16.6
St Neots 2	Urban Background	Diffusion Tube	100	100	16.7	15.8	15.4	15.3	13.0
St Neots 4	Kerbside	Diffusion Tube	100	100	37.4	35.5	31.0	31.6	28.7
Eynesbury	Suburban	Diffusion Tube	100	100	23.4	22.3	21.4	20.3	19.9
Eaton Socon	Suburban	Diffusion Tube	100	100	29.3	27.9	24.5	23.5	24.5
Southoe	Roadside	Diffusion Tube	100	100	19.5	18.5	20.3	19.2	17.4
Buckden	Roadside	Diffusion Tube	100	100	21.4	20.0	19.5	19.5	19.4
Buckden 2	Roadside	Diffusion Tube	100	100	33.0	23.3	23.8	25.3	25.6
Brampton 1	Roadside	Diffusion Tube	100	100	27.4	26.9	29.4	25.6	22.7
Brampton 2	Suburban	Diffusion Tube	92	92	16.8	16.3	18.4	16.9	15.9
Brampton 3	Suburban	Diffusion Tube	100	100	17.9	17.0	19.2	18.0	15.7
Brampton 4	Suburban	Diffusion Tube	100	100	16.2	14.3	17.1	14.1	14.4
Catworth	Rural	Diffusion Tube	92	92	26.6	22.6	21.4	21.7	21.6
Alconbury	Roadside	Diffusion Tube	100	100	22.0	21.0	24.3	21.4	19.9
Sawtry	Suburban	Diffusion Tube	100	100	19.6	19.7	20.3	22.2	20.9
Stibbington	Roadside	Diffusion Tube	83	83	32.3	27.8	26.2	21.7	29.6
Huntingdon 1	Kerbside	Diffusion Tube	100	100	26.1	24.4	23.0	22.7	21.0
Huntingdon 2	Kerbside	Diffusion Tube	100	100	**48.8**	**44.5**	**42.9**	**41.1**	**40.7**
Huntingdon 3	Kerbside	Diffusion Tube	92	92	28.1	27.9	27.9	28.9	29.9
Huntingdon 4	Roadside	Diffusion Tube	100	100	32.8	29.1	29.9	27.0	27.6

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
Huntingdon 5	Roadside	Diffusion Tube	100	100	32.0	26.4	24.6	25.2	23.7
Huntingdon 6	Suburban	Diffusion Tube	100	100	19.9	20.2	21.3	18.5	17.1
Godmanchester	Roadside	Diffusion Tube	100	100	23.9	24.3	27.9	23.8	22.7
PFH1	Roadside	Diffusion Tube	100	100	**51.6**	**49.3**	**47.5**	**49.5**	**44.2**
PFH2	Roadside	Diffusion Tube	100	100	**49.0**	**49.0**	**48.8**	**52.0**	**44.7**
PFH3	Roadside	Diffusion Tube	100	100	**52.4**	**48.5**	**50.2**	**52.8**	**46.6**
Fenstanton 1	Roadside	Diffusion Tube	75	75	37.0	35.5	29.5	32.8	31.5
Fenstanton 2	Roadside	Diffusion Tube	100	100	28.6	24.5	22.0	22.5	19.9
St Ives	Urban Background	Diffusion Tube	100	100	20.0	18.9	17.8	18.7	17.6
Ramsey	Urban Background	Diffusion Tube	92	92	17.3	17.2	17.2	18.0	17.8
Buckden 3	Roadside	Diffusion Tube	100	100	40.8	31.3	32.2	32.2	28.9
Buckden 4	Roadside	Diffusion Tube	92	92	26.6	23.7	27.6	26.8	21.2
Hilton *	Suburban	Diffusion Tube	42	42					14.6[3]
Fenstanton 3 *	Rural	Diffusion Tube	42	42					14.4[3]
St Ives 2 *	Suburban	Diffusion Tube	42	42					22.4[3]
Wood Green Animal Shelter *	Rural	Diffusion Tube	42	42					13.1[3]
Huntingdon 7 *	Kerbside	Diffusion Tube	42	42					38.3[3]
Alconbury 2 *	Suburban	Diffusion Tube	42	42					18.6[3]
Brampton 5 *	Suburban	Diffusion Tube	42	42					19.8[3]
Brampton 6 *	Suburban	Diffusion Tube	42	42					17.9[3]
Brampton 7 *	Suburban	Diffusion Tube	42	42					17.7[3]
Offord Cluny *	Suburban	Diffusion Tube	42	42					21.3[3]

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
PFH	Roadside	Automatic	92	92	0	3	0	0	0

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

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

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

(3) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
PFH	Roadside	98	98	26.3	31.2	30.0	20.49	19.34

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

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

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

(3) All means have been "annualised" as per Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix 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
PFH	Roadside	98	98	0	**41**	26	6	3

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.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
PFH	Roadside	96.3	96.3				13.9	12.3

(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.

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)
St Neots 5	37.8	27.9	22.3	23.4	20.3	18.7	17.0	20.8	29.4	30.2	32.7	23.7	25.4	20.5
St Neots 3	44.9	49.9	37.2	42.2	34.2	30.2	34.0	37.4	36.7	41.4	40.3	41.1	39.1	31.7
St Neots 1	31.3	30.4	25.2	20.2	8.8	11.3	13.4	14.9	19.5	25.4	24.1	22.0	20.5	16.6
St Neots 2	27.5	26.2	19.9	17.6	10.7	10.1	8.2	14.3	14.7	19.3	22.2	21.4	16.1	14.3
St Neots 4	58.8	45.1	36.9	35.0	29.4	24.3	28.1	26.4	35.1	40.5	36.1	30.0	35.5	28.7
Eynesbury	30.4	35.7	28.8	27.5	20.4	14.9	16.4	17.0	18.1	24.4	29.6	31.7	24.6	19.9
Eaton Socon	42.6	34.2	32.1	32.9	27.9	22.5	24.3	20.2	26.9	32.5	36.7	30.6	30.3	24.5
Southoe	22.5	28.6	25.4	22.2	16.2	12.6	13.0	20.6	23.7	32.1	17.8	22.5	21.4	17.4
Buckden	26.2	35.5	25.0	25.6	18.0	15.3	18.5	19.5	23.1	25.8	30.2	25.2	24.0	19.4
Buckden 2	40.9	40.9	33.0	31.5	29.4	29.2	28.8	27.7	29.4	31.9	31.5	25.2	31.6	25.6
Brampton 1	37.1	32.7	29.4	28.5	20.4	19.9	17.2	23.5	34.4	42.4	30.9	19.3	28.0	22.7
Brampton 2	29.8	27.3	22.3	16.8	16.0		12.6	13.9	18.3	20.8	22.0	16.1	19.6	15.9
Brampton 3	12.8	24.8	23.9	28.1	14.1	12.6	11.5	15.7	20.4	30.4	17.4	20.4	19.3	15.7
Brampton 4	31.3	20.4	18.0	19.3	12.4	9.2	11.7	15.3	14.9	18.9	21.4	20.4	17.8	14.4
Catworth	35.3	37.2	26.4	26.4	23.9	20.1	25.2	24.1	22.3	20.4		32.1	26.7	21.6
Alconbury	30.2	31.3	27.1	30.9	13.8	14.7	16.2	20.2	27.1	35.7	24.4	23.3	24.6	19.9
Sawtry	30.2	27.7	28.1	30.2	16.4	12.4	19.3	24.6	28.3	40.3	28.1	24.4	25.8	20.9
Stibbington	41.8	47.0	31.5			22.3	40.9	25.4	33.2	31.3	44.7	47.8	36.6	29.6
Huntingdon 1	30.4	34.8	26.5	21.6	25.2	19.5	19.9	20.8	23.9	28.8	30.0	30.2	26.0	21.0
Huntingdon 2	54.6	55.6	48.2	50.0	44.9	42.4	48.1	48.7	46.4	47.9	61.1	54.4	50.2	40.7
Huntingdon 3	43.9	47.4	35.7	29.8	28.8		31.3	34.0	33.4	38.4	44.3	38.8	36.9	29.9

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)
Huntingdon 4	41.1	41.6	34.8	32.5	32.1	29.4	26.9	31.0	30.2	32.1	45.8	31.9	34.1	27.6
Huntingdon 5	40.7	40.0	18.3	23.9	23.1	18.1	26.2	28.3	27.5	32.3	35.5	37.8	29.3	23.7
Huntingdon 6	27.3	26.4	25.4	28.1	16.4	13.6	11.5	18.0	17.6	32.3	19.5	16.8	21.1	17.1
Godmanchester	36.9	33.8	32.7	34.6	19.9	17.2	19.7	26.4	33.4	41.4	21.0	19.5	28.0	22.7
PFH1	56.9	56.3	50.8	65.1	49.5	49.3	55.2	55.0	53.5	61.1	54.4	48.1	54.6	44.2
PFH2	58.6	57.1	50.0	64.0	44.5	55.2	53.1	58.8	60.2	64.7	49.9	46.8	55.2	44.7
PFH3	61.1	66.9	54.4	62.8	49.9	53.5	47.0	60.5	63.2	64.7	58.1	48.7	57.6	46.6
Fenstanton 1			42.8	36.9	42.8	29.6	40.1	39.9	35.7	36.9		45.6	38.9	31.5
Fenstanton 2	28.7	32.3	26.0	28.7	18.3	19.5	21.8	23.9	20.4	22.5	30.2	23.1	24.6	19.9
St Ives	30.0	32.3	23.3	19.9	16.4	12.2	13.9	17.4	16.2	23.1	28.8	27.1	21.7	17.6
Ramsey	27.7	42.6		23.1	14.3	10.9	14.5	19.3	20.1	26.0	24.4	19.3	22.0	17.8
Buckden 3	42.8	29.8	37.8	43.2	28.1	26.2	32.9	34.4	37.1	39.5	39.5	37.4	35.7	28.9
Buckden 4	18.3		30.2	33.4	19.3		27.1	30.2	30.4	40.9	25.4	30.6	26.2	21.2
Hilton *								13.2	19.7	18.9	18.0	16.0	18.1	14.6
Fenstanton 3 *								12.6	17.8	19.1	19.7	15.3	17.8	14.4
St Ives 2 *								21.2	23.1	30.2	33.8	23.5	27.7	22.4
Wood Green Animal Shelter *								11.1	13.8	17.6	14.5	19.7	16.1	13.1
Huntingdon 7 *								39.7	39.9	46.0	52.1	47.2	47.3	38.3
Alconbury 2 *								21.4	18.1	24.8	22.0	23.1	23.0	18.6
Brampton 5 *								22.3	24.4	26.0	23.7	19.9	24.5	19.8
Brampton 6 *								15.9	20.6	25.4	21.0	22.2	22.1	17.9
Brampton 7 *								14.3	17.4	19.5	26.7	25.8	21.8	17.7
Offord Cluny *								21.6	23.9	28.5	24.8	26.4	26.3	21.3

(1) See Appendix C for details on bias adjustment (2) Locations marked with a ***** are only temporary locations due to increased County Council funding.

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

Figure C.1 – Diffusion Tube Bias Adjustment

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/16

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2016
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4: **Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.**

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method	Year[2]	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
ESG Didcot	50% TEA in acetone	2015	R	Dumfries and Galloway Council	12	35	30	14.6%	G	**0.87**
ESG Didcot	50% TEA in acetone	2015	B	Gravesham Borough Council	12	40	30	34.1%	G	**0.75**
ESG Didcot	50% TEA in acetone	2015	B	Gravesham Borough Council	12	30	23	29.8%	P	**0.77**
ESG Didcot	50% TEA in acetone	2015	UI	North Lincolnshire	11	24	18	36.5%	P	**0.73**
ESG Didcot	50% TEA in acetone	2015	R	Swale BC	11	38	32	19.3%	P	**0.84**
ESG Didcot	50% TEA in acetone	2015	R	Swale BC	10	48	39	21.0%	G	**0.83**
ESG Didcot	50% TEA in acetone	2015	R	Swale Borough Council	11	40	34	19.7%	P	**0.84**
ESG Didcot	50% TEA in acetone	2015	R	Wrexham County Borough Council	12	19	19	0.6%	G	**0.99**
ESG Didcot	50% TEA in acetone	2015	UC	Cardiff Council	10	26	26	1.6%	G	**0.98**
ESG Didcot	50% TEA in acetone	2015	KS	Marylebone Road Intercomparison	12	104	81	27.9%	G	**0.78**
ESG Didcot	50% TEA in acetone	2015	R	Vale of White Horse District Council	11	34	29	15.7%	G	**0.86**
ESG Didcot	50% TEA in acetone	2015	UI	Stockton on Tees	12	24	18	29.4%	G	**0.77**
ESG Didcot	50% TEA in acetone	2015	R	Stockton on Tees	12	17	14	21.5%	G	**0.82**
ESG Didcot	50% TEA in acetone	2015	KS	Suffolk Coastal DC	12	44	35	26.0%	P	**0.79**
ESG Didcot	50% TEA in acetone	2015	SU	Thanet District Council	9	17	15	10.6%	G	**0.90**
ESG Didcot	50% TEA in acetone	2015	R	Thanet District Council	12	27	23	17.8%	G	**0.85**
ESG Didcot	50% TEA in acetone	2015	B	Medway Council	12	21	12	77.3%	G	**0.56**
ESG Didcot	50% TEA in acetone	2015	R	Medway Council	11	32	23	42.6%	G	**0.70**
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	10	34	28	21.2%	P	**0.83**
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	11	39	28	38.6%	G	**0.72**
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	11	55	47	16.2%	G	**0.86**
ESG Didcot	50% TEA in acetone	2015		**Overall Factor[3] (21 studies)**				**Use**		**0.81**

Figure C.2 – Third Party QA/QC reports

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CERTIFICATE OF CALIBRATION

Ricardo-AEA, Gemini Building, Fermi Avenue, Harwell, Oxon, OX11 0QR
Telephone 01235 753692

0401

Approved Signatories: D. Hector, S. Eaton, A. Madle, B. Stacey, N. Rand, S. Stratton

Signed:

Date of Issue: 03-07-15

Certificate Number: 03153

Customer Name and Address: Huntingdonshire District Council
Pathfinder House
St Mary's Street
Huntingdon
Cambridgeshire
PE29 3TN

Description: Calibration factors for Huntingdonshire Pathfinder House air monitoring station.

Ricardo-AEA Identification Number: 20645084/June 2015

Site / Date Test Carried Out	Species	Analyser Serial No.	Zero Response[1]	Uncertainty (ppb)	Calibration Factor[2]	Uncertainty (%)	Converter eff. (%)[3]
Pathfinder House 02 June 2015	NO_x	606815007	-1.6	2.5	1.070	3.5	7.1*
	NO		-1.0	2.6	1.071	3.5	

*Poor NO_2 converter result demonstrates a critical fault identified within the NO_x instrument. Result out of specification and invalid.

Site / Date Test Carried Out	Species	Analyser Serial No.	Parameter	Specified Value	Measured Value	Deviation %	Uncertainty (%)
Pathfinder House 02 June 2015	PM_{10}	CM9510077	Total Flow[4]	16.67	16.85	+1.1	2.2
	$PM_{2.5}$	CM9510083	Total Flow[4]	16.67	17.34	+4.0	2.2

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95% The uncertainty evaluation has been carried out in accordance with UKAS requirements.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

www.ricardo-aea.com

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Ricardo-AEA Registered Office: Shoreham • Technical Centre • Shoreham-by-Sea • West Sussex, BN43 5FG, UK
Registered in England No: 08229264 • VAT Registration No. GB 144024745

RICARDO-AEA

Certificate Number: 03153
Ricardo-AEA Identification Number: 20645084/June 2015

The gaseous ambient analysers listed above have been tested for zero response, calibration factor, linearity and converter efficiency (NO_x analysers only) by documented methods. The factors have been calculated using certified gas standards. The particulate analysers listed above have been tested for sample flow rates and k_0 (where appropriate) by documented methods. Note that the test results are valid on the day of test only, as analyser drift over time cannot be quantified. All results for gaseous species are given in ppb (parts per billion) mole fractions or ppm (parts per million) mole fractions.

[1]The zero response is the zero reading on the data logging system of the analyser when audit zero gas was introduced to the analysers under test.

[2]The calibration factor is the multiplying factor required to scale the reading on the data logging system of the analyser into reported concentration units (ppb for NO, NO_x, SO_2, O_3 and ppm for CO. Where 1 ppm = 1000 ppb). It should be used in conjunction with the zero response. A corrected concentration is calculated using the following equation:

Concentration = F (Output - Zero Response)

Where F = Calibration Factor provided on this certificate
Output = Reading on the data logging system of the analyser
Zero Response = Zero Response provided on this certificate

[3]Converter eff. is the measured efficiency of the NO_2 to NO converter within the oxides of nitrogen analyser under test.

[4]The measured total flow rate is the total flow rate through the particulate analyser under test. Units of flow are $l.min^{-1}$. Where flow rates are highlighted in bold, it indicates that measurements were not made at the analyser sample inlet. These measurements therefore may not accurately reflect analyser performance in normal operation.

The calibration results shaded are those that fall within our scope of accreditation, all other results on this certificate are not UKAS accredited, but have been included for completeness.

RICARDO-AEA

Dave Bass
Huntingdonshire District Council
Pathfinder House
St Mary's Street
Huntingdon
Cambridgeshire
PE29 3TN

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03 July 2015
Reference: 20645084/R18

AIR MONITORING CALIBRATION CLUB

Ambient air monitoring station: Pathfinder House
Date of Audit: 02nd June 2015

Dear Dave,

This report documents the results of quality control audits to Huntingdonshire District Council's Pathfinder House ambient air monitoring station. The work programme is supplied under Ricardo-AEA ED20645084 contract for the supply of audit services.

The Pathfinder House monitoring station was audited on the 02nd June 2015.The equipment audits utilise procedures that are applied within the Department for Environment, Food and Rural Affairs (Defra) national automatic air monitoring network quality control programme.

AUDIT RESULTS

The following sections provide details of the audit results on a pollutant basis with recommendations for data management action where appropriate.

Oxides of Nitrogen Analysers
A major factor governing the analyser's performance is the NO_x analyser's converter and its ability to reduce the nitrogen dioxide to nitric oxide. The recommended range for instrumentation in the national automatic air monitoring network is in the range of 98% 102% efficient. Our tests show the converter in this analyser to be 7.1% efficient at an NO_2 concentration of 264 ppb. This is an unusual result, a poor failure and this highlights a critical fault within the instrument system. Following the audit it was advised you contact your equipment support unit to request they rectify this issue immediately.

To ensure that the analysers are sampling only ambient air the instrument was leak checked. The results were satisfactory, indicating that the analyser sampling systems were free of significant leaks. The analysers exhibited good steady state responses to both zero and span (calibration) gases with acceptable levels of variation (noise).

The NOx analyser flow rate was measured using a calibrated flow meter, the measured flow rate was compared against the analyser displayed value to evaluate its accuracy. The devised audit pass criteria is that the measured flow and analyser displayed value agree within ±10%, the instrument passed this test.

Based on the NO_x analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinder has been reassessed. This provides an indication of the site standards stability. For the purpose of these stability checks, the criteria adopted within the national network, and used here, is that the recalculated concentration should lie within 10% of the stated concentrations. The results of the recalculations are presented below:

Pathfinder House - NO cylinder 115131D				
	NO_x (ppb)	% change from stated	NO (ppb)	% change from stated
Manufacturers Stated Concentration	469	---	469	---
Recalc. Concentration (03/06/2014)	440	-6.2	432	-7.8
Recalc. Concentration (03/12/2014)	427	-9.0	424	-9.6
Recalc. Concentration (02/06/2015)	414	-11.8	413	-12.0

These results indicate that the NO cylinder concentrations for the Pathfinder House monitoring station were outside the audit pass criteria of ±10% at -11.8% NO_x and -12% NO. Results outside the ±10% criteria either flag a data management action and/or replacement required of the site cylinder. When viewing the previous audit results in the table above it is evident the concentrations although outside the pass criteria have only drifted between the December 2014 and June 2015 audits by 3% for NO_x and 2.4% for NO.

We advise the outlying site cylinder concentrations can be accounted for within the data ratification process and the cylinder remains on site for another QC audit. The site cylinder audit recalculation results should be used in a linear manner to recalculate a corrected site cylinder concentration at each of the previous site calibration dates, calibration correction factors should be recalculated from the adjusted cylinder concentrations and data scaled accordingly. Consider the NO_x converter was identified as outlying at a critical level thus demonstrating a general poor performing instrument, this may have had an effect on the site cylinder recalculation results and another reason why we would recommend the cylinder stays on site for a future QC audit.

Other Recommendations

The onsite calibration system was checked against our audit system (a direct connection to the instrument sample inlet with an excess flow meter inline). It was noted the site calibration system deviated the audit calibration system by >10%, this may have been due to a general poor performing instrument. It is recommended this is evaluated at a future audit to ensure there are no issues with the onsite system. .

Thermo 5014i PM_{10} & $PM_{2.5}$ analysers

To ensure that a true PM_{10} measurement is made, the total flow through the sample inlet must be 16.7 litres per minute. Volumetric flow tests were carried out on the instrument. The measured flows showed good agreement with the system flow set points. To ensure that the analyser was sampling only ambient air, the instrument flow rates were also checked again with a flow restricting test adaptor. The aim here is to identify a leak in the system by comparing these restricted flow readings against the previously recorded unrestricted flow readings. No large discrepancy was found and the instrument was deemed as being free of major leaks.

The instruments temperature and pressure sensor displayed readings were checked against calibrated audit meters. The criteria for instrumentation in national automatic air monitoring network for temperature is that the measured temperature must within 3C of the instruments indicated temperature, for pressure the measured pressure must lie within 3mbar of the instruments indicated pressure. It was identified that the PM_{10} and PM2.5 temperature sensor were deviating the audit thermometer reading by >3C. It is recommended you inform your equipment support unit to calibrate these sensors at the next service.

Certificate of Calibration

Calibration factors and zeros have been produced on the basis of the audit calibrations conducted. All of these calibrations were conducted with transfer standards traceable to national metrology standards. The attached Certificate of Calibration provides the calibration and zero response factors for the oxides of nitrogen analysers under test on the day of the audits as well as the measured flows for the particulate analysers.

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DATA MANAGEMENT

The following recommendations and comments can be made as a result of these audits:

- Compare the Huntingdonshire District Council database scaling factors for the day of the audits with the factors and zeros on the Certificate of Calibration. If a deviation greater than the uncertainty of each factor on the Certificate of Calibration exists, the underlying reason should be investigated and suitable data management actions implemented.
- Consider the impact of the outlying NO_x converter efficiency on the data. The data sets should be reviewed for a signs of discontinuity and data rejected where appropriate. It was advised you contacted you equipment support unit to arrange an immediate repair of the instrument, ensure this has been undertaken.
- Consider the impact of the outlying site NO cylinder recalculated concentrations on the site calibrations. Consider these results may have been questionable due to the general poor performance of the instrument.
- Review the equipment support unit records and ensure a NO_x converter test has been undertaken following the instrument being repaired, check this lies within the recommended range of 98-102%. If this hasn't been undertaken or the result lies outside this range it is recommended the station has an additional QC audit to evaluate the converter efficiency and ensure the instrument is recording reliable data. Consider the risk of data rejection if the fault hasn't been rectified.

If you have any questions relating to our audit results or wish to discuss any aspect of air pollution monitoring, please don't hesitate to contact me on 01235 753692 or at andrew.madle@ricardo.com

Yours sincerely

Andrew Madle

Air Quality and Environment
www.ricardo-aea.com
www.airqualityengland.co.uk/

0401

CERTIFICATE OF CALIBRATION

Ricardo Energy & Environment, Gemini Building, Fermi Avenue, Harwell, Didcot, Oxfordshire OX11 0QR. Telephone 01235 753692

Approved Signatories: D. Hector, S. Eaton, A. Madle, B. Stacey, S. Stratton, N. Rand ✓

Signed:

Date of Issue: 14th December 2015

Certificate Number: 03228

Customer Name and Address:
Huntingdonshire District Council
Pathfinder House
St Mary's Street
Huntingdon
Cambridgeshire
PE29 3TN

Description: Calibration factors for Huntingdonshire Pathfinder House air monitoring station.

Ricardo Energy & Environment ID: 20645084/December 2015

Gaseous Analysers

Site / Date Test Carried Out	Species	Analyser Serial No.	Zero Response[1]	Uncertainty ppb	Calibration Factor[2]	Uncertainty %	Converter eff. (%)[3]
Pathfinder House 07th December 2015	NO_x	426608503	-0.8	2.7	1.330	3.5	98.5
	NO		-0.7	2.7	1.332	3.5	

Particulate Analysers

Site / Date Test Carried Out	Species	Analyser Serial No.	Parameter	Specified Value	Measured Value	Deviation %	Uncertainty %
Pathfinder House 07th December 2015	PM_{10}	CM9510077	Total Flow[4]	16.67	16.30	-2.2	2.2
	$PM_{2.5}$	CM9510083	Total Flow[4]	16.67	15.94	-4.4	2.2

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95% The uncertainty evaluation has been carried out in accordance with UKAS requirements. This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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Certificate Number: 03228

Ricardo Energy & Environment ID: 20645084/December 2015

The gaseous ambient analysers listed have been tested for zero response, calibration factor, linearity and converter efficiency (NOx analysers) by documented methods. The factors have been calculated using certified gas standards. The particulate analysers listed above have been tested for sample flow rates and k0 (where appropriate) by documented methods. Note that the test results are valid on the day of test only, as analyser drift over time cannot be quantified. All results for gaseous species are given in ppb (parts per billion) mole fractions or ppm (parts per million) mole fractions.

[1] The zero response is the zero reading on the data logging system of the analyser when audit zero gas was introduced to the analysers under test.

[2] The calibration factor is the multiplying factor required to scale the reading on the data logging system of the analyser into reported concentration units (ppb for NO, NOx, SO2, O3 and ppm for CO. Where 1 ppm = 1000 ppb). It should be used in conjunction with the zero response. A corrected concentration is calculated using the following equation:

Concentration = F (Output - Zero Response)

Where F = Calibration Factor provided on this certificate
Output = Reading on the data logging system of the analyser
Zero Response = Zero Response provided on this certificate

[3] Converter eff. is the measured efficiency of the NO_2 to NO converter within the oxides of nitrogen analyser under test.

[4] The measured total flow rate is the total flow rate through the particulate analyser under test. Units of flow are $l.min^{-1}$. Where flow rates are highlighted in bold, it indicates that measurements were not made at the analyser sample inlet. These measurements therefore may not accurately reflect analyser performance in normal operation

The calibration results shaded are those that fall within our scope of accreditation, all other results on this certificate are not UKAS accredited, but have been included for completeness.

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14th December 2015
Reference 20645084/R19

AIR MONITORING QA/QC AUDIT RESULTS

Ambient air monitoring stations: Huntingdon Pathfinder House

Date of Audits: 07th December 2015

Dear Richard,

This report documents the results of quality control audit to Huntingdonshire District Council's Pathfinder House ambient air monitoring station. The work programme is supplied under contract Ricardo Energy & Environment/20645084 for the supply of audit services.

The Huntingdon Pathfinder House monitoring station was audited on 07th December 2015. The equipment audits utilise procedures that are applied within the Department for Environment, Food and Rural Affairs (Defra) national automatic air monitoring network quality control programme.

AUDIT RESULTS

The following sections provide details of the audit results on a pollutant basis with recommendations for data management action where appropriate.

Oxides of Nitrogen Analysers

A major factor governing the analyser's performance is the NO_x analyser's converter and its ability to reduce the nitrogen dioxide to nitric oxide. The recommended range for instrumentation in the national automatic air monitoring network is in the range of 98% - 102% efficient. Our tests show the converter in this analyser to be 98.5% efficient with NO2 concentrations of 262 ppb. This is a good result.

To ensure that the analysers are sampling only ambient air the instruments were leak checked. The results were satisfactory, indicating that the analyser sampling systems were free of significant leaks. The analysers exhibited good steady state responses to both zero and span (calibration) gases with acceptable levels of variation (noise).

The NO_x analyser sample flow rate was measured using a calibrated flow meter and compared against the analyser's flow rate sensor displayed value to evaluate its accuracy. The analyser's flow rate sensor reading was within 10% of the calibrated flow meter reading and therefore passed this test.

Based on the NO_x analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinders have been reassessed. This provides an indication of the on-site standards stability (the gas concentration stabilities). For the purpose of these stability checks, the criteria adopted within the national network, and used here, is that the recalculated concentration should lie within 10% of the suppliers stated concentrations. The results of the recalculations are presented below:

Pathfinder House - NO cylinder 115131D				
	NO_x (ppb)	% change from stated	NO (ppb)	% change from stated
Manufacturers Stated Concentration	469	---	469	--
Recalculated Concentration (03/06/14)	440	-6.2	432	-7.8
Recalculated Concentration (03/12/14)	427	-9.0	424	-9.6
Recalculated Concentration (02/06/15)	414	-11.8	413	-12.0
Recalculated Concentration (07/12/15)	413	-11.8	412	-12.1

These results indicate that the NO cylinder concentrations for the Pathfinder House monitoring station were outside the audit pass criteria of ±10% at -11.8% NO_x and -12.1% NO. Results outside the ±10% criteria either flag a data management action and/or replacement required of the site cylinder. When viewing the previous audit results in the table above it is evident the concentrations although outside the pass criteria have not drifted between the June 2015 and December 2015 audits for NO_x and NO.

We advise the outlying site cylinder concentrations can be accounted for within the data ratification process and the cylinder remains on site for another QC audit.

Thermo 5015i PM_{10} & $PM_{2.5}$ analysers

To ensure that a true PM_{10} measurement is made, the total flow through the sample inlet must be 16.7 litres per minute. Volumetric flow tests were carried out on the instrument. The measured flows showed good agreement with the system flow set points. To ensure that the analyser was sampling only ambient air, the instrument flow rates were also checked again with a flow restricting test adaptor. The aim here is to identify a leak in the system by comparing these restricted flow readings against the previously recorded unrestricted flow readings. No large discrepancy was found and the instrument was deemed as being free of major leaks.

Certificate of Calibration

Calibration factors and zeros have been produced on the basis of the audit calibrations conducted. All of these calibrations were conducted with transfer standards traceable to national metrology standards. The attached Certificate of Calibration provides the calibration and zero response factors for the oxides of nitrogen analysers under test on the day of the audits as well as the measured flows and calculated calibration constant for the particulate analysers.

DATA MANAGEMENT

The following recommendations and comments can be made as a result of these audits:

- Compare the Huntingdonshire District Council database scaling factors for the day of the audits with the factors and zeros on the Certificate of Calibration. If a deviation greater than the uncertainty of the respective factors on the Certificate exists, investigate the underlying reason and implement suitable data management actions.
- Consider the impact of the outlying site NO cylinder recalculated concentrations on the site calibrations. Calibration correction factors should be recalculated using the audit recalculated cylinder concentrations and data then scaled accordingly

If you have any questions relating to our audit results or wish to discuss any aspect of air pollution monitoring, please don't hesitate to contact me on 01235 753601 or 07425 623526 darren.lane@ricardo.com

Yours sincerely

Darren Lane

Air Quality - Ricardo Energy and Environment
www.airqualityengland.co.uk/
ee.ricardo.com

Figure C.3 – NO_2 monitoring station service reports

Thermo NOX

AIR MONITORS

Job Report No:	CA240315
Serial No:	426608503
Fault Message:	None

	Pre Statistics		Post Statistics	
Alarm 1				
Alarm 2				
Amb Reading NO	37	ppb	16	ppb
AmbReading NOx	38	ppb	17	ppb
Sample flow inst	0.678		0.678	
Sample flow Act	0.7		0.7	
Cal Fact NO BKG	5.3		7.7	
Cal fact NO COEF	0.713		0.952	
Cal fact NO2 COEF	1		1	
Cal Fact NOX BKG	8.5		8.3	
Cal fact NOX COEF	1.006		1.004	
Pressure	200	mmHg	190	mmHg

	(tick approp box)		(tick approp box)	
	yes	no	yes	no
MODEM lights ON:	☐	☐	☐	☐
DATA Logger Operational:	☐	☐	☐	☐
Completed site inventory:	☐	☐	☐	☐
AIR Sample Manifold intact:	☐	☐	☐	☐

NOx Analyser Calibration/Linearity Report

AIR MONITORS

Model: 42C Serial No: 426608503 Report No. CA240315

Pre-Service/ Repair Calibration

Gas \ Result	NO		NO2		NOX	
	PPB	mV	PPB	mV	PPB	mV
External Zero	-0.2		-2.3		-2.5	
Injection of NO	271		1		272	
Injection of NO2						

Span Source Details

	NO	NO2
Cyl. No:	115131D	
Cyl. PSI:	1800	
Cyl. Conc:	469	

Post Service/Repair Calibration

Gas \ Result	NO		NO2		NOX	
	PPB	mV	PPB	mV	PPB	mV
External Zero	0		0		0	
Injection of NO	469		1		470	
Injection of NO2						

External Zero Source Details

On Site ZAG: ☐
Cylinder: ☐
Scrubber: ☑

GPT Check

	Display (PPB)	Injected (NO)	Injected (O3)
NO			0ppb
NO2			
NO			
NO2			

NO: 0
NO2: 0

Mnly Effeciency: #DIV/0!

Post Service Linearity Check

Requested Span Point	Gas Type	V out (mV)	Display (ppb)	Photo-meter (ppb)
200	NO			
160	NO			
120	NO			
80	NO			
40	NO			
0	ZERO AIR			

Blender Details

Blender Model / SN:
High Conc. Cyl No:
High Conc. Cyl PSI
High Conc. Cyl Conc

Engineer:-
Date:-

Thermo NOX

Job Report No:	fe05102015
Serial No:	426608503
Fault Message:	0

	Pre Statistics		Post Statistics	
Alarm 1	none			
Alarm 2	none			
Amb Reading NO	64.1	ppb	105	ppb
AmbReading NOx	83.3	ppb	139	ppb
Sample flow inst	0.668		0.67	
Sample flow Act	0.7		0.7	
Cal Fact NO BKG	7.7		6.6	
Cal fact NO COEF	0.952		0.821	
Cal fact NO2 COEF	1		1	
Cal Fact NOX BKG	8.3		7.2	
Cal fact NOX COEF	1.004		1.008	
Pressure	190.7	mmHg	192	mmHg

	(tick approp box)		(tick approp box)	
	yes	no	yes	no
MODEM lights ON:	☐	☐	☐	☐
DATA Logger Operational:	☐	☐	☐	☐
Completed site inventory:	☐	☐	☐	☐
AIR Sample Manifold intact:	☐	☐	☐	☐

NOx Analyser Calibration/Linearity Report

AIR MONITORS

Model: 42C Serial No: 426608503 Report No. fe0510201

Pre-Service/ Repair Calibration

Result / Gas	NO		NO2		NOX	
	PPB	mV	PPB	mV	PPB	mV
External Zero	-0.8		0.7		-0.1	
Injection of NO	365		2		367	
Injection of NO2						

Span Source Details

	NO	NO2
Cyl. No:	115131D	
Cyl. PSI:	1200	
Cyl. Conc:	412	

Post Service/Repair Calibration

Result / Gas	NO		NO2		NOX	
	PPB	mV	PPB	mV	PPB	mV
External Zero	0.6		1.1		1.7	
Injection of NO	412		2		414	
Injection of NO2						

External Zero Source Details

On Site ZAG:	☑
Cylinder:	☐
Scrubber:	☐

GPT Check

	Display (PPB)	Injected (NO)	Injected (O3)
NO			0ppb
NO2			
NO			
NO2			

NO	0
NO2	0
Moly Efficiency	#DIV/0!

Post Service Linearity Check

Requested Span Point	Gas Type	V out (mV)	Display (ppb)	Photo-meter (ppb)
200	NO			
160	NO			
120	NO			
80	NO			
40	NO			
0	ZERO AIR			

Blender Details

Blender Model / SN:	
High Conc. Cyl No:	
High Conc. Cyl PSI	
High Conc. Cyl Conc	

Engineer:-	Freddy Elmer
Date:-	05/10/2015

Appendix D: Map(s) of Monitoring Locations

Figure D.1 – Non automatic NO_2 monitoring locations

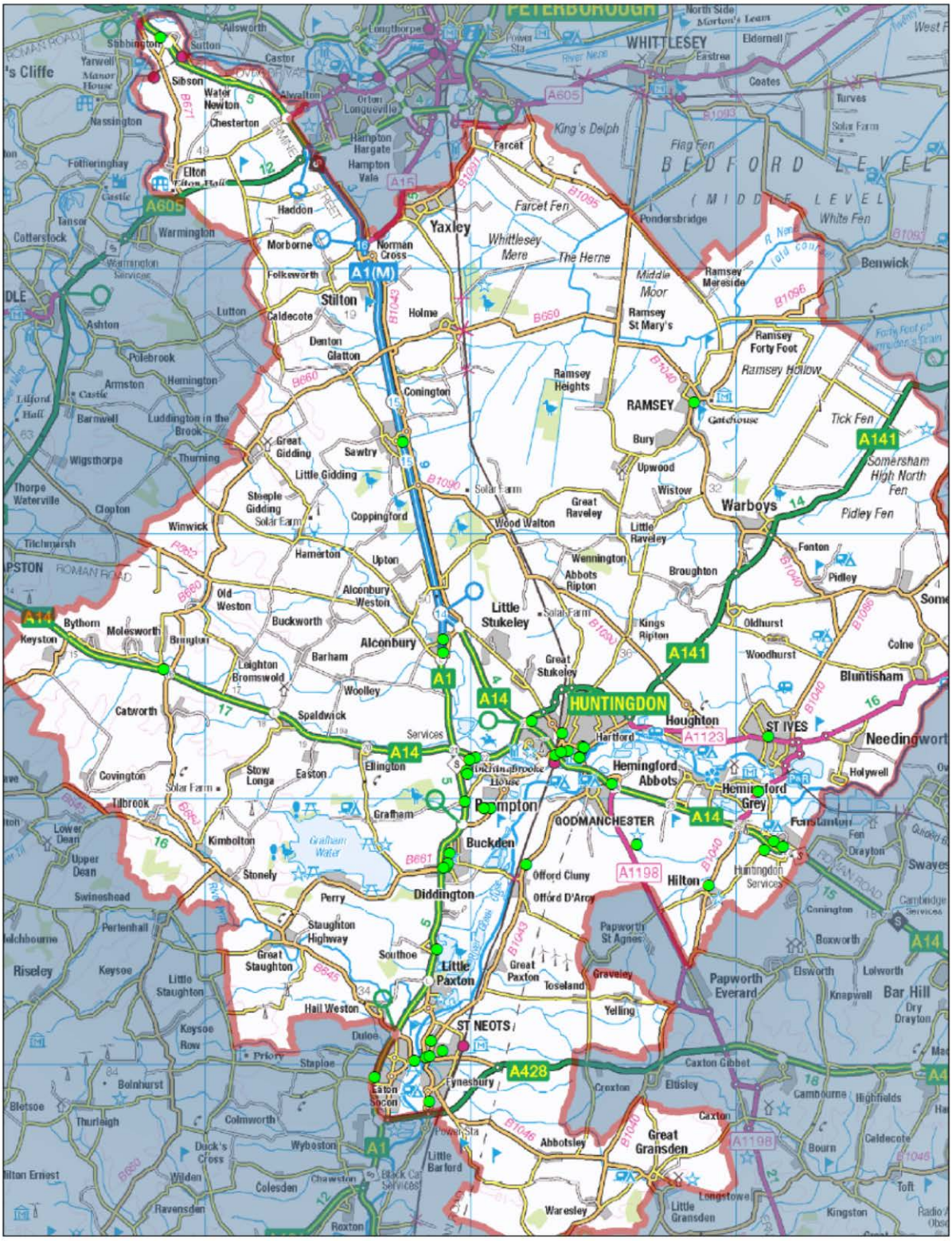
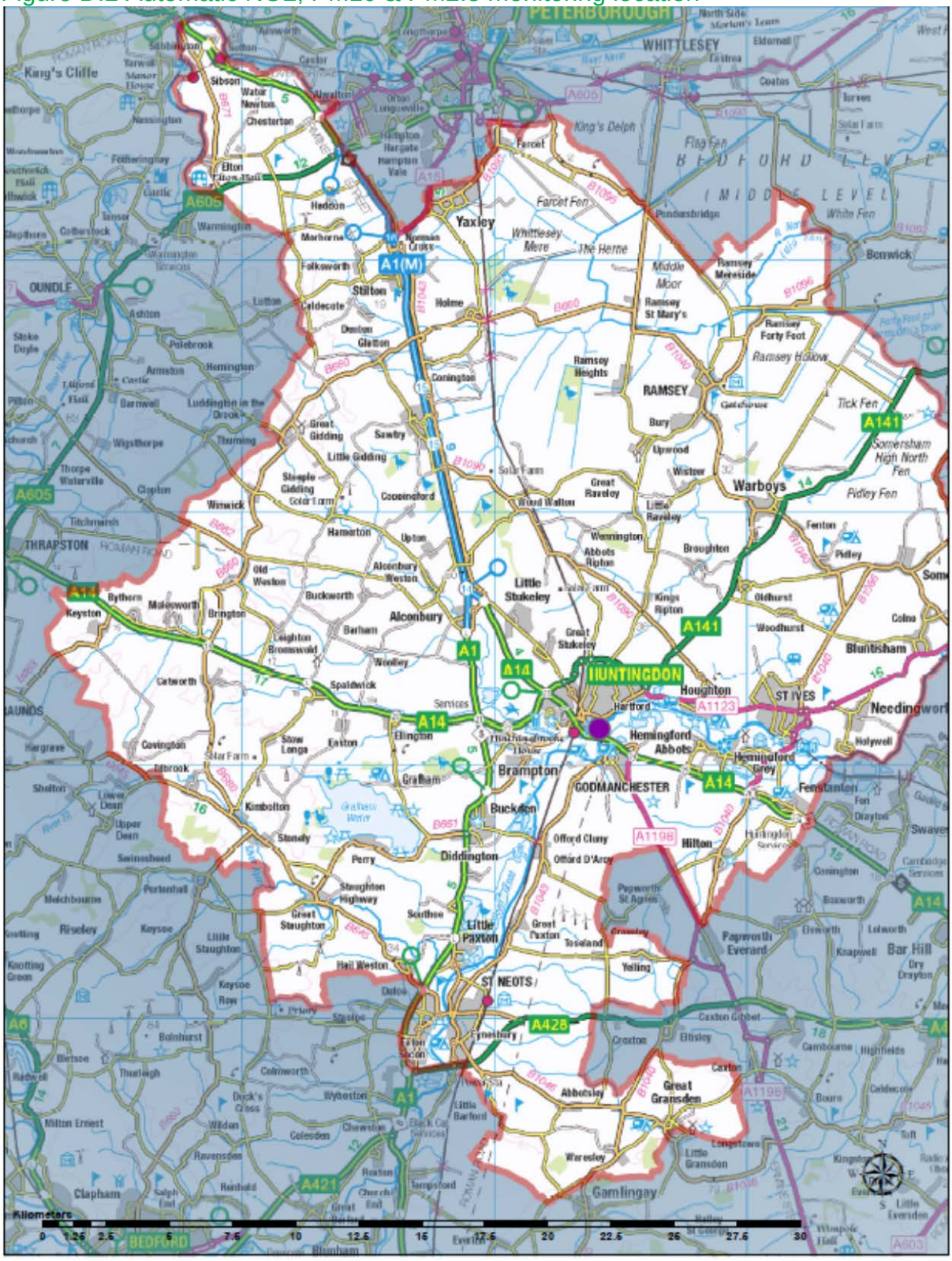


Figure D.2 Automatic NO2, PM10 & PM2.5 monitoring location



NO2, PM10 & PM2.5 automatic monitoring station

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