Annual Progress Report (APR)

2016 Air Quality Annual Progress Report (APR) for
The Highland Council

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 The Highland Council

The air quality throughout most of the Highland Council is generally very good. Previous rounds of review and assessment identified a small area in the centre of Inverness City where the annual mean objective for Nitrogen dioxide was not being achieved. In September 2014 Then Highland Council declared an AQMA for the area around the junction between Academy Street and Queensgate. An action plan is being prepared for the AQMA and is expected to be published in 2016. The Council has been working with SEPA, NHS Highland, Inverness Business Improvement District, HITRANS and local community representatives in the preparation of the plan.

Latest monitoring confirms that over most of the local authority air quality is good and the air quality strategy objectives are being achieved. Monitoring within the AQMA in 2015 returned annual mean Nitrogen dioxide concentrations less than the objective for all but one kerbside site. At present all monitoring data for the AQMA has been obtained through passive methods. In 2016 the Highland Council has begun monitoring Nitrogen dioxide with an automatic monitor. It is expected that this monitoring in combination with the existing passive diffusion tubes will offer a better picture of actual pollution concentrations within the AQMA.

There has been significant uptake of biomass combustion heating technologies within Highland over recent years and this continues to be a large element of the review and assessment process. However in the right location and with appropriate stack provision and use of abatement technologies these developments are able to proceed without risk to the air quality objectives.

Actions to Improve Air Quality

The Highland Council is preparing an action plan relative to the Inverness City Centre AQMA.

Local Priorities and Challenges

In 2016 the Highland Council will be completing the action planning process relative to the Inverness City Centre AQMA. Priority will be to work within the Highland Council and with external partners to undertake actions to improve air quality within the AQMA. The Highland Council will continue to review and assess air quality in the wider Highland Council area and will monitor air quality to inform the review and assessment process.

How to Get Involved

Information on air quality within the Highlands can be obtained at www.highland.gov.uk/pollution

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1. Local Air Quality Management

This report provides an overview of air quality in The Highland 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 Progress Report (APR) is summarises the work being undertaken by the Highland Council to improve air quality and any progress that has been made.

Table 1.1 – Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m^3	Annual mean	31.12.2010
Particulate Matter ($PM_{2.5}$)	10 µg/m^3	Annual mean	31.12.2020
Sulphur dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m^3	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m^3	Running 8-Hour mean	31.12.2003
Lead	0.25 µg/m^3	Annual Mean	31.12.2008

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 months, setting out measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by The Highland Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=374.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Inverness City Centre AQMA	• NO_2 annual mean	Inverness	An area encompassing a number of properties at the junction of Academy Street, Queensgate and Strothers Lane.	Action Plan in progress not yet published

3. Air Quality Monitoring Data and Comparison with Air Quality Objectives

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives.

The Highland Council did not undertake any automatic continuous monitoring during 2015. However there are 3 sites within Highland which are part of the UK monitoring network. **Error! Reference source not found.** in Appendix A shows the details of the sites. National monitoring results are available at www.scottishairquality.co.uk.

Maps showing the location of the monitoring sites are provided in Appendix E. 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

The Highland Council undertook non- automatic (passive) monitoring of NO_2 at 23 sites during 2015. **Error! Reference source not found.** in Appendix A shows the details of the sites. The following changes were made to the diffusion tube monitoring in Highland for or during 2015:

A new diffusion tube site was set up on Glenurquhart Road (ID IV10), for 6 months during 2015, following concerns expressed by a resident in that area about air quality and traffic congestion on the A82(T) Glenurquhart Road.

The diffusion tube site IV9c was lost when the building beside it was destroyed by fire in April 2015. Site IV7 Strothers Lane also became inaccessible in December 2015 as a result of construction works ongoing in the aftermath of the aforementioned fire. The monitoring site has since been moved to the other side of Strothers Lane. It should be noted that from April 2015 onwards Strothers Lane was closed to through traffic. There has been a discernable reduction in the annual mean recorded at the site relative to previous years.

Maps showing the location of the monitoring sites are provided in Appendix E. 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.1 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.

There was one recorded exceedance of the NO_2 Annual Mean Objective recorded at the site IV9a, on Queensgate in Inverness. This site is within the Inverness City Centre AQMA. Site IV9a is a kerbside site and there is no relevant exposure immediately adjacent to the monitoring location on the same side of the street. All other monitoring locations within the AQMA were below the objective.

Sites IV9b and IV3b on the other side of the street are adjacent to relevant exposure. The annual mean returned for these two sites was 36.2µg/m^3 and 35.2µg/m^3 respectively. Both these sites are also kerbside.

Sites IV2f and IV2g on Academy Street, Inverness returned annual means below but close to the objective. Neither of these locations is adjacent to exposure relevant to the annual mean objective.

The annual mean NO_2 concentration at Site IV10 Glenurquhart Road, which was estimated from less than one year of monitoring data, was 16.7µg/m^3.

Table A.2 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. There were no exceedances of this objective at any of the monitoring locations.

3.2.2 Particulate Matter (PM_{10})

Table A.3 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 18µg/m^3.

Table A.4 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 7 times per year.

There were no exceedances of either of the PM10 objectives at any site within Highland in 2015.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.5 in Appendix A compares the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years with the air quality objective of 10µg/m^3.

There were no exceedances of the PM2.5 objective at any site within Highland in 2015.

3.2.4 Sulphur Dioxide (SO_2)

The Highland Council does not currently monitor for Sulphur dioxide.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

The Highland Council does not undertake any monitoring for these pollutants.

4. New Local Developments

4.1 Road Traffic Sources

There are no new local developments of this type.

4.2 Other Transport Sources

There are no new local developments of this type.

4.3 Industrial Sources

There are no new local developments of this type.

4.4 Commercial and Domestic Sources

The Highland Council has identified 18 new biomass combustion installations since the last round of review and assessment. Three of these developments were the subject of air quality assessment. The remainder were the subject of screening utilising the methods contained within LAQM.TG(16) and the tools available at www.scottishairquality.co.uk/laqm/tools . None of the developments were identified as likely to result in pollutant concentrations in excess of the objectives. Details of the installations are included in Appendix D.

4.5 New Developments with Fugitive or Uncontrolled Sources

There are no new local developments of this type.

5. Planning Applications

An application was received for a 15MWe biomass fired combined heat and power development at Georgemas Junction, Caithness. The planning application was refused but the refusal was appealed by the applicant and the appeal subsequently upheld and permission granted by the Scottish Government Reporter. A condition requiring a detailed air quality impact assessment has been attached to the permission.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Monitoring undertaken within Highland in 2015 has demonstrated the air quality to be generally good. Annual mean concentrations at all but one of the 24 sites monitored were below the objectives. The only measured exceedance of an objective was for the annual mean Nitrogen dioxide objective at one of the kerbside sites with the existing Inverness City Centre AQMA.

Monitoring has not identified any potential or actual exceedances out with existing AQMAs.

6.2 Conclusions relating to New Local Developments

18 new biomass developments were identified within the highland council area. All developments were either the subject of a detailed air quality assessment or a screening assessment. None of these assessments indicated an likelihood of failure to achieve air quality objectives as a result of the development.

6.3 Proposed Actions

No new exceedances of AQS objectives have been identified by monitoring within Highland. There is no evidence at present for additional AQMA or for the existing AQMA boundary to be amended or revoked.

Public Consultation on the draft action plan will be undertaken in August 2016. The A report presenting a completed Action Plan will be put before the Inverness City Committee on the 1st December 2016.

The next APR will be due in June 2016.

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)
IV4	Inverness	Roadside	265709	845670	NO_2; $PM_{10;}$ $PM_{2.5}$	N	Chemiluminescent; Daily Gravimetric	2.5	4	3
FW1	Fort William	Suburban	210857	774431	$NO_{2;}$ Ozone	N	Chemiluminescent	77	47	2.5
SV1	Strath Vaich	Rural	234831	875029	Ozone	N	Chemiluminescent	717	n/a	3

(1) 0 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?
IV1	Union Street	Roadside	266681	845361	NO_2	N	0	4	N
IV2e	Academy Street B	Kerbside	266610	845487	NO2	N	1.5	0.5	N
IV2f	Academy Street F	Roadside	266629	845473	NO2	N	0	2	N
IV2g	Academy Street G	Roadside	266704	845413	NO2	N	0	2	N
IV3a	Queensgate A	Roadside	266650	845428	NO2	Y	0	4	N
IV3b	Queensgate B	Kerbside	266632	845431	NO2	Y	2.5	1.5	N
IV3c	Queensgate C	Roadside	266609	845404	NO2	N	0	4	N

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?
IV4	Telford Street	Roadside	265710	845672	NO2	N	2.5	4	Y
IV6a	Church Street A	Roadside	266586	845337	NO2	N	0	2	N
IV6b	Church Street B	Roadside	266513	845476	NO2	N	2.5	2.5	N
IV7	Strother's Lane	Roadside	266706	845506	NO2	N	0	3	N
IV8	Margaret Street	Roadside	266654	845532	NO2	N	0	3	N
IV9a	Queensgate LHS	Kerbside	266666	845441	NO2	Y	n/a	0.5	N
IV9b	Queensgate RHS	Kerbside	266657	845447	NO2	Y	3.5	0.5	N

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?
IV9c	Strother's Lane LHS	Roadside	266659	845467	NO2	Y	n/a	2	N
IV9d	Strother's Lane RHS	Kerbside	266677	845451	NO2	Y	2.5	0.5	N
IV10	Glenurquhart Road	Roadside	266086	844749	NO2	N	8	3	N
RC1	Wyvis Terrace, Dingwall	Roadside	254430	858968	NO2	N	0	1	N
RC2	Station Road, Dingwall	Roadside	255200	858185	NO2	N	0	1	N
RC3	Kintail Place, Dingwall	Urban Background	255112	859866	NO2	N	0	1	N

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?
RC4	Burns Crescent, Dingwall	Urban Background	254420	859288	NO2	N	4	1	N

(1) 0 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.1 – 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 (µg/m^3) [3]				
					2011	2012	2013	2014	2015
IV1	Roadside	Diffusion Tube		100	28.3	**41.7**	27.4	26.4	20.4
IV2e	Kerbside	Automatic		100			**42.1**	39.2	36.6
IV2f	Roadside	Diffusion Tube		100			39.9	38.2	38.1
IV2g	Roadside	Diffusion Tube		91.7			**40.8**	38.7	39.3
IV3a	Roadside	Diffusion Tube		100	**48**	**47**	38.4	37.1	32.1
IV3b	Kerbside	Diffusion Tube		100		**41.5**	34.4	31.3	35.2
IV3c	Roadside	Diffusion Tube		100		**46.5**	34.3	33	29.4
IV4	Roadside	Automatic		74	27	29.2	21	21.03	25.35
IV4	Roadside	Diffusion Tube		100	27.2	30.6	22.7	20.6	21.1
IV6a	Roadside	Diffusion Tube		91.7			29.4	31.2	24.99
IV6b	Roadside	Diffusion Tube		100			19.2	19	17.11
IV7	Roadside	Diffusion Tube		83.3			33.9	30.3	24.3

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
IV8	Roadside	Diffusion Tube		100			25.5	22.5	21.95
IV9a	Kerbside	Diffusion Tube		100				37.8	**44.8**
IV9b	Kerbside	Diffusion Tube		100				29.1	36.2
IV9c	Roadside	Diffusion Tube	100	25				33.1	32.6
IV9d	Kerbside	Diffusion Tube		91.7				28.9	31.7
IV10	Roadside	Diffusion Tube	100	50					16.7
FW1	Suburban Background	Automatic		80	11.8	12.1	8.98	10.98	12.75
RC1	Roadside	Diffusion Tube	100	66.7		24.6	17.6	16.2	17.6
RC2	Roadside	Diffusion Tube	100	66.7		37.3	30.8	28.7	27.6
RC3	Urban Background	Diffusion Tube	100	66.7		9.8	7.1	6.9	6.7
RC4	Urban background	Diffusion Tube	100	66.7		11.9	8.9	8.1	7.9

Notes: Exceedences of the NO_2 annual mean objective of 40µg/m3 are shown in **bold**.

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.2 – 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
IV4	Roadside	Automatic	74	74	0	0	0	0	0(106)
FW1	Suburban Background	Automatic	80	80	0(102)	0	0	0	0(70)

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.3 – 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
IV4	Roadside	95	95	11.8	11	11.7	10.9	9

Notes: Exceedances of the PM_{10} annual mean objective of 18µg/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 LAQM.TG(16), if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 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
IV4	Roadside	95	95	0(20)	1	0	0	0

Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 7 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.5 – Annual Mean $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
				2011	2012	2013	2014	2015
IV4	Roadside	94	94	6	6	6	6	5

Notes: Exceedances of the PM_{10} annual mean objective of $10\mu g/m^3$ 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 LAQM.TG(16), if 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 for 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)
IV1	18.7	17.9	25.4	22.6	25.9	26	24.7	22.9	23.9	22.1	16.5	22.2	22.4	20.4
IV2e	44.7	39.8	44.4	37.3	40.0	38.3	23.5	41	40	47.4	40.6	44.6	40.2	36.6
IV2f	51.4	45.5	47.7	34.9	41.1	35.4	36.7	38.2	46	47.7	35.6	41.7	41.8	38.1
IV2g	44.6	35.2	45	34.9	40.2		41.5	42.1	54.1	48.8	44.1	44.9	43.2	39.3
IV3a	15.8	39.8	43.2	33	32.9	31	37.7	36.5	37.6	37	38.9	40.1	35.3	32.1
IV3b	35.7	43.3	41.4	33.9	41.2	36.9	37.8	39.2	44.1	40	34.6	36.7	38.7	35.2
IV3c	32.1	36.3	37.2	26.6	31.6	27.1	25.9	31.4	34	36.7	33.2	35.8	32.3	29.4
IV4a	26.9	27.2	25	23.2	17.4	16.9	16.5	22.8	21.5	26.7	26.9	32.1	23.6	21.5
IV4b	25.5	31	24.5	21.2	16.6	15.6	16.6	20.1	23.4	27.3	22.8	26.2	22.9	20.8
IV4c	25.4	24.2	21.4	21	18.5	17.3	15.8	21.8	27.2	27.8	29.8	30.6	23.1	21
IV6a	18.7	27.8	31.3	24	27.6	23.8	33.4	25.7	27.7	32.2		29.7	27.5	25
IV6b	19.4	20.6	18.1	16.7	17.1	15.6	17.4	17	18.2	22.9	20.8	21.9	18.8	17.1
IV7	41.2	36.6		31.1	18.4	19.4	21.7	24.2	24.4	23.1	27.1		26.7	24.3

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
IV8	36.6	24.2	24.9	20.3	19.8	20.5	22.2	24.3	25.2	29.9	23.8	28.6	23.9	21.7
IV9a	48	59.5	68.6	39.6	43	39.5	49.7	50.8	44.9	45.7	54.9	46.3	49.2	44.8
IV9b	38.4	44.2	45.1	39	38.7	35.9	38.4	38.4	44.4	42.6	37.3	35	39.8	36.2
IV9c	42.7	42.5	43.1										42.7	32.6
IV9d		32.6	30.2	55.7	30	30.4	32.8	31	36.8	36.9	32.6	33.9	34.8	31.7
IV10							19.5	21.4	21.4	5.6	22.7	23.2	19	16.7
RC1		20.9		15			16.4	19.3	20.1	23	26.8	24.5	20.7	17.6
RC2		36.7		30			27.8	30.7	30.3	36.5	33.2	35.6	32.6	27.6
RC3		9.1		5.5			4.6	5.8	6.8	11	8.4	11.6	7.9	6.7
RC4		11.6		6.6			4.9	5.9	8.1	12.5	10.1	15.1	9.3	7.9

(1) See Appendix C for details on bias adjustment

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

Choice of Bias Adjustment Factor for diffusion tube monitoring

A diffusion tube co-location study has taken place at site IV4, the Telford Street AUN site, Inverness. In 2015 the Automatic monitoring dataset could not be used for the calculation of a local bias factor due to poor data capture.

The combined bias adjustment factor for 2015 for Gradko 20% TEA in water based upon 16 studies is 0.91. this factor has been used to bias adjust all Nitrogen dioxide diffusion tube annual mean concentrations reported in this document.

Short-term to Long-term Data Adjustment

For some of the diffusion tube sites a lack of data has necessitated an adjustment from short term to long term data. The period mean (covering the period of the short term monitoring) is compared with the annual mean at two or more background sites with good data capture. The comparison generates a ratio which when applied to the short term monitoring mean allows for variations in concentration at different times of the year to be accounted for. The sites in the table below were used for this adjustment:

Table C.1 IV9C Inverness (Jan-Feb)

Site	Site Type	Annual Mean	Period Mean	Ratio
Aberdeen – Errol Place	Urban Background	22.85	29.18	0.783269
Dundee – Mains Loan	Urban Background	10.6	11.9	0.89078
			Average	0.837025

Table C.2 Site IV10 (Jul-Dec)

Site	Site Type	Annual Mean	Period Mean	Ratio
Aberdeen – Errol Place	Urban Background	22.85	22.12	1.032968
Dundee – Mains Loan	Urban Background	10.6	11.73	0.902931

	Average	0.96795

Table C.3 Sites RC1-4 (Feb, April, July-Dec)

Site	Site Type	Annual Mean	Period Mean	Ratio
Aberdeen – Errol Place	Urban Background	22.85	23.80	0.960168
Dundee – Mains Loan	Urban Background	10.6	11.79	0.898719
			Average	0.929444

QA/QC of Automatic Monitoring

The AURN sites in Highland are operated for DEFRA by Bureau Veritas with QA/QC provided by AEA.

QA/QC of diffusion tube monitoring

Gradko who supply and analyse the tubes reported here have supplied the following QA/QC statement:

Supply and Analysis of Nitrogen Dioxide (NO2) Diffusion Tubes

Analysis of the NO2 diffusion tubes is carried out using ion chromatography techniques in accordance with Gradko International Ltd U.K.A.S. accredited (ISO/IEC 17025) internal laboratory procedure GLM 7, which is a recommended UV spectrophotometric method.
Reporting of the NO2 analysis results is sent to electronically to each authority in PDF format or if requested EXEL format. The report is issued within 10 working days from receipt of the exposed diffusion tubes to the Gradko Laboratory.

Quality Assurance: The laboratory has a fully documented Quality Management System, which has been assessed and accredited by U.K.A. S. (Accreditation No. 2187). A copy of the Quality Manual Contents Index is available on request.

Quality Control Procedures: All tube components are maintained in a high state of cleanliness. New absorbent is prepared by the Laboratory and checked for levels of nitrogen dioxide.
The diffusion tubes are prepared in a dedicated clean laboratory and stored under refrigerated conditions to maintain stability. A sample of each batch of tubes

prepared is checked by the analyst for blank levels. If the tubes are stored for more than one week, a further sample is taken and checked for any increases in blank levels. If the levels reach a pre-determined value, the batch of tubes is discarded Analytical Quality Control Procedures are implemented by the use of internal standards checks using certified standards from two different sources, and the use of external proficiency schemes such as AIR/WASP Inter- Comparison Project which is administered by the UK Health & Safety Laboratory.

100% of submissions by Gradko to the AIR/PT NO2 proficiency scheme were satisfactory over the monitoring period.

Tube Exposure Procedure

The Highland Council exposes diffusion tubes according to the method described in "Passive Diffusion Air Monitors – Instruction Manual for Exposure and Location" by Gradko International Ltd. Guidance is also found in "Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance" by AEA for DEFRA.

Appendix D: List of Developments considered in this Report

Table D.1 Biomass Installations screened

Name	Location	NGR X	NGR Y	Capacity (kW)	Screening Outcome
Druim House	Nairn	291381	857612	45 + 36	Detailed assessment not required
Kilcoy Castle	Tore	257941	851329	130	As above
NDA Archive	Wick	336721	951935	442	As above
Ben Nevis Hotel (1)	Fort William	211765	774901	60	No relevant exposure
Alexandra Hotel	Fort William	210491	774013	350	Detailed assessment not required
Ben Nevis Hotel (2)	Fort William	211765	774901	60	As above
Ben Nevis Hotel (3)	Fort William	211765	774901	60	As above
Hilton Coylumbridge	Aviemore	291033	810853	2 * 540	As above
Fort William Former Secondary School	Fort William	209826	773504	165	As above
Fortrose Care Home	Fortrose	273137	856768	201	As above

Name	Location	NGR X	NGR Y	Capacity (kW)	Screening Outcome
The Doune	Rothiemurchus, Aviemore	288586	809772	90	As above
Blairbeg Public Hall	Drumnadrochit	250825	829408	60	As above
Grantown Care Home	Grantown on Spey	303101	827941	201	As above
West Highland Hotel	Mallaig	167586	796885		As above
Ashley Ann	Wick	335690	951200	600	As above

Table D.2 Biomass Boiler Installations with an Air Quality Assessment

Name	Location	NGR X	NGR Y	Capacity (kW)	Assessment Outcome
Aviemore Primary School	Aviemore	289694	813290	2 * 412	Objectives unlikely to be exceeded
Golspie High School	Golspie	283425	900214	2 * 400	Objectives unlikely to be exceeded
Ullapool High School	Ullapool	213190	894234	400	Objectives unlikely to be exceeded

Appendix E – Maps

Figure E.1 Inverness City Centre AQMA

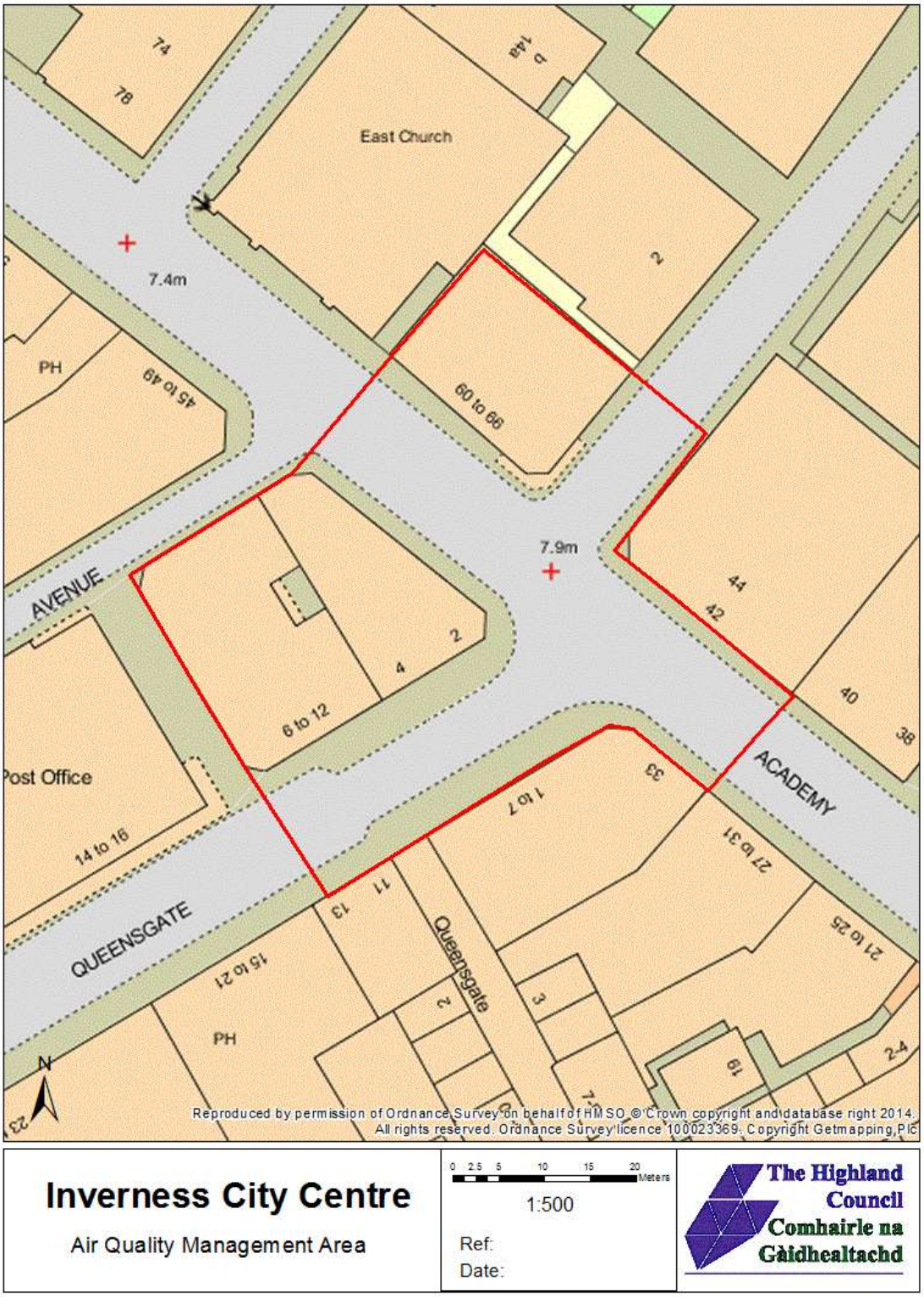


Figure E.2 Automatic Monitoring Sites

Figure E.3 Inverness City Centre Diffusion Tube Monitoring Sites

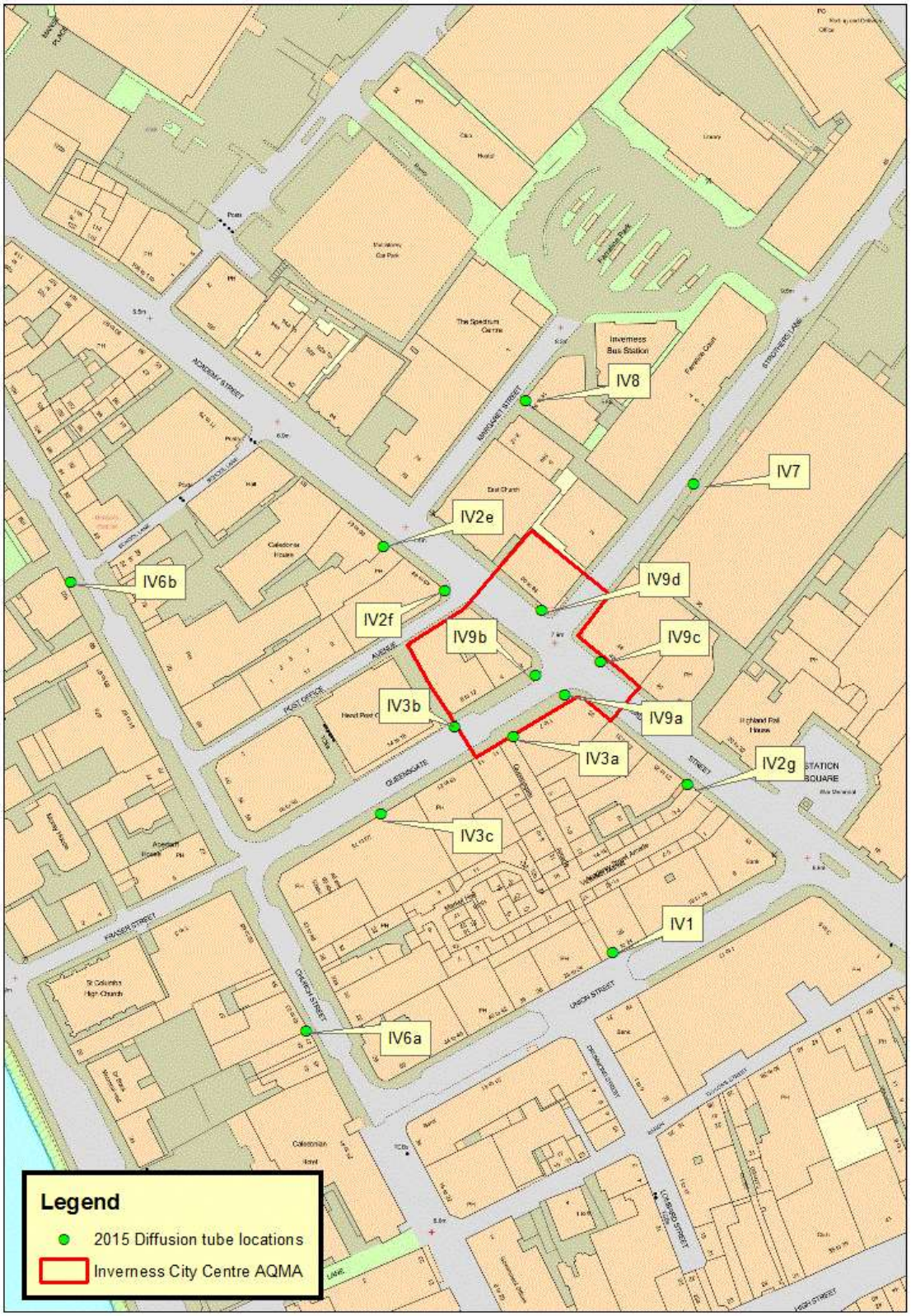
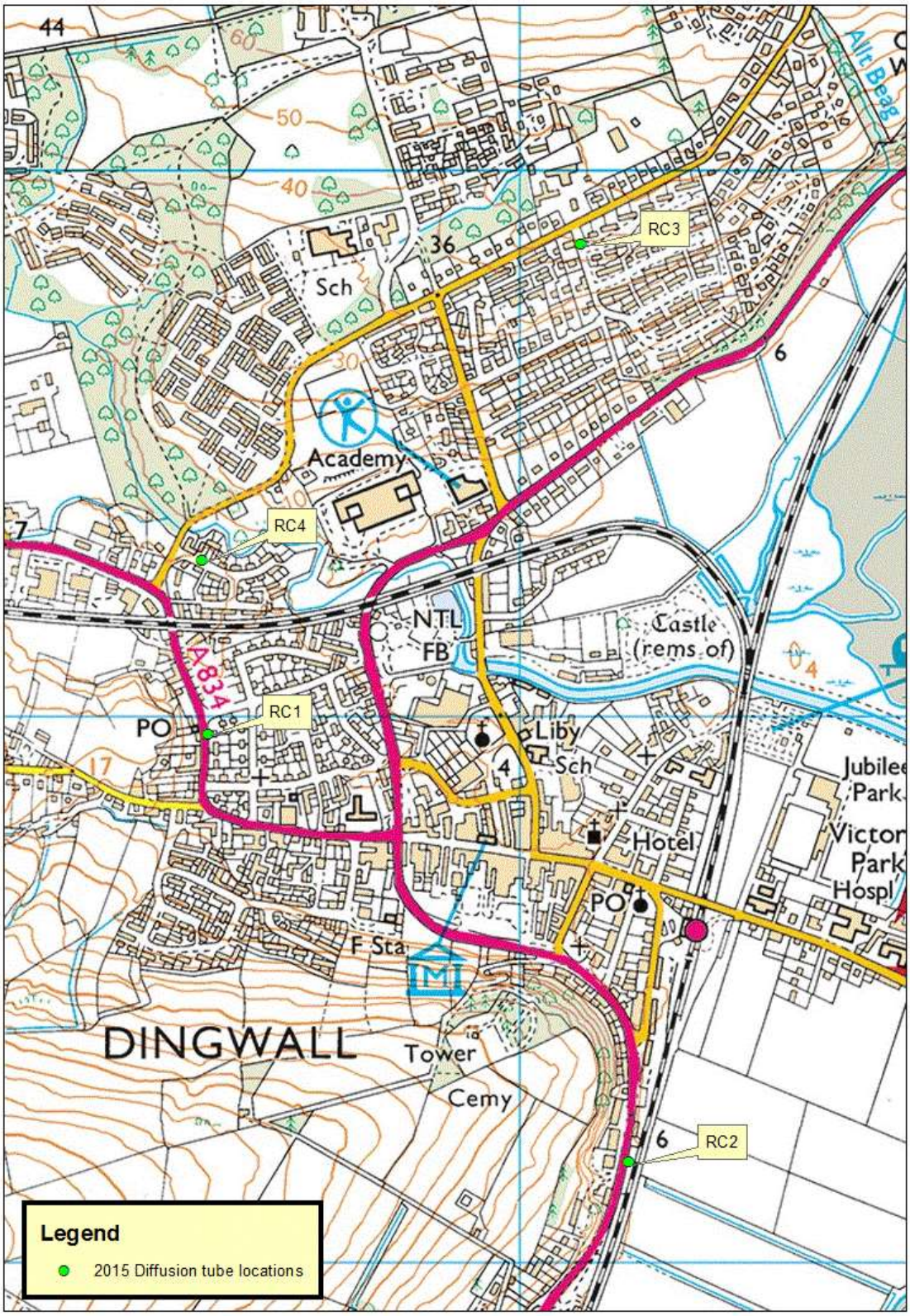


Figure E.4 Dingwall Diffusion Tube Monitoring Sites



Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA 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
APR	Air quality Annual Progress Report
AQS	Air Quality Strategy of the UK and Devolved administrations
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
HITRANS	The Highland Regional Transport Partnership
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
SEPA	Scottish Environment Protection Agency
SO_2	Sulphur Dioxide
ug/m^3	Microgrammes per cubic meter – a measure of the concentration of pollutants in air.

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