2013 Air Quality Progress Report for The Highland Council

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

April 2013

Local Authority Officer	Nick Thornton
Department	Transport Environment and Community Services
Address	Ross House, High Street, Dingwall, IV15 9QN
Telephone	01349868436
e-mail	nick.thornton@highland.gov.uk
Report Reference number	THCLAQMPR2013
Date	30th April 2013

Executive Summary

This document is a progress report undertaken by the Highland Council as part of the Local Air Quality Management Review and Assessment process.

Generally the air quality in the Highland Council area is good.

This report reviews air quality monitoring results since the last round of assessment and identifies new development which may be significant for air quality.

New monitoring data indicates that there may be exceedences of the Objectives for Nitrogen dioxide at roadside locations in the old town area of Inverness on Queensgate and Union Street. The Highland Council is undertaking a Detailed Assessment for Nitrogen dioxide in this area due to be completed at the end of 2013. The Detailed Assessment will determine whether the objectives are being achieved and the necessity to declare an Air Quality Management Area.

New development identified will be assessed at the next round of Updating and Screening Assessment due to be undertaken in 2015.

The Highland Council's next steps in the Local Air Quality Management Process will be: to report the outcome of a Detailed Assessment for Nitrogen dioxide in Inverness early in 2014; and complete another Progress Report at the end of April 2014.

Table of Contents

List of Tables

List of Figures

Appendices

1 Introduction

1.1 Description of Local Authority Area

The area of the Highland Council covers approximately 25,659 square kilometres, excluding inland water, around one third of the Scottish mainland. The area includes Skye and other Inner Hebridean islands. The central and western regions of the area are a combination of high mountain and moorland and deep glens bordered by a coastline of sea lochs. In the north east lies the "flow" country of Caithness. Further south on the east coast lie three estuarine systems, the Dornoch, the Cromarty and the Moray firths, which are flanked by extensive arable land. The Great Glen Fault runs approximately east – west from coast to coast between Inverness and Fort William. To the south of the Great Glen Fault, lie the massive upland areas of the Monadhliath and Cairngorm mountains, including the recently formed Cairngorm National Park. To the south west the area extends to the Ardnamurchan peninsula. 15% of the land area is afforested. Over 20% of the Highlands is designated as National Scenic Area.

Inverness is the capital city of the Highlands and had an estimated population of 67,960 in 2010. The next largest settlements in the Highlands at that time were Fort William(population 9,823) and Nairn (population 9,203)

In 2011 the total population of the Highlands was around 232,000. The majority of the population live in the eastern coastal areas of the Highlands, in the rapidly growing city of Inverness and in the numerous smaller towns along the A9 and A96 transport corridors. Population density in the Highlands was 8.7 per square kilometre in 2011 in comparison to the Scottish population density of 67.4 per square kilometre.

Industrial development is also concentrated in south and east, although there are some other significant industrial developments elsewhere such as the “Alcan” facility at Fort William.

Over most of the Highlands the transport network is sparse and for a large proportion of the network the usage is very light. 85% of the road network is classified as rural.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are

considered likely, the local authority must then 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in Scotland** are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	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 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	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}) (gravimetric)	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
Sulphur dioxide	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

1.4 Summary of Previous Review and Assessments

The first Review and Assessment of Air Quality in Highland was completed in 1998. The table below outlines the previous reports which have been published by the Highland Council as part of the Review and Assessment process.

The Local Air Quality Updating and Screening Assessment Report, 2003, identified that a Detailed Assessment would have to be carried out.

Detailed assessment was carried out for the following pollutants:

- Benzene. The screening assessment indicated that the running annual mean air quality objective for Benzene may be exceeded:
    a) in the vicinity of petrol terminals at Inverness harbour, and
    b) near the Talisman Energy UK Ltd, Nigg Oil Terminal petroleum refining process at Nigg.

- Sulphur Dioxide. The screening assessment indicated that:
    a) there was a risk that the 15 minute mean air quality objective for SO2 could be exceeded in Castletown in Caithness as a result of the density of dwellings which burn solid fuel; and
    b) a Detailed Assessment would need to be carried out in respect of the ALCAN Aluminium Smelter in Fort William as the number of stacks which emit SO2 at that site, did not lend themselves to simple screening techniques.

- Nitrogen dioxide. Both the Scottish Executive and the Scottish Environment Protection Agency voiced concern over levels of NO2 in Inverness City Centre as measured by passive diffusion tube and so a Detailed Assessment was also undertaken for Nitrogen dioxide.

The Detailed Assessment Report, published in 2005, concluded that there was little likelihood of a failure to meet the objectives for these pollutants.

The 2008 Progress Report identified that the monitoring data generated by the Automatic Monitoring station at Telford Street, Inverness suggested a likely exceedence of the PM10 annual mean objective at this location. It was concluded that a detailed assessment for PM10 would be required although later amendments to the monitoring dataset suggest that this is no longer necessary.

The Updating and Screening Assessment of 2009 identified a requirement to progress to a detailed assessment for particles (PM10) and Nitrogen dioxide with respect to a biomass installation in Halkirk, Caithness.

The 2010 Progress Report identified that the biomass installation in Halkirk had been modified in the process of gaining authorisation from SEPA and was not in fact requiring further assessment under LAQM.

The 2011 Progress report did not identify any requirement for further assessment.

The Updating and Screening Assessment completed in 2012 reported diffusion tube monitoring results at a site in Queensgate, Inverness that were in excess of the annual mean objective. The Highland Council was required to proceed to a detailed assessment of Nitrogen dioxide at Queensgate. The detailed assessment, which includes additional monitoring and modelling will be carried out through 2013 and reported in early 2014.

Table 1.2 Review and Assessment Reports and Outcomes

Date	Report	Outcome
1998	Air Quality in the Highlands - First Stage Review and Assessment	No requirement to proceed to second stage review and assessment
2001	Addendum to Air Quality in the Highlands	
2003	Updating and Screening Assessment	Proceed to detailed assessment for: Benzene in the vicinity of fuel storage facilities at Nigg and Inverness; Sulphur dioxide in respect of areas with a high density of domestic solid fuel burning; Sulphur dioxide in the vicinity of the Alcan Site, Fort William; and Nitrogen dioxide in Inverness city centre.
2005	Progress Report	Detailed assessment not required
2005	Detailed Assessment	Concluded: That there was no likelihood of the objective for benzene not to be met in the Highland Council Area; That the air quality objective for Sulpur dioxide is being met in the Highland Council Area; That the air quality objectives for Nitrogen dioxide are being met in the Highland Council Area; and that there is no requirement to declare an Air Quality Management Area in the Highland Council Area.
2006	Updating and Screening Assessment	Detailed Assessment not required
2007	Progress Report	Detailed Assessment not required

Date	Report	Outcome
2008	Progress Report	Likely exceedence identified at Telford Street, Inverness for PM_{10}. Detailed Assessment required. (subsequently this requirement was removed following a correction to the monitoring data)
2009	Updating and Screening Assessment	Detailed Assessment required for NO_2 and PM_{10} in Halkirk, Caithness. (subsequently this requirement was removed following a change to the emissions from a biomass process)
2010	Progress Report	Detailed Assessment not required
2011	Progress Report	Detailed assessment not required
2012	Updating and Screening Assessment	Detailed assessment required for Nitrogen dioxide at Queensgate, Inverness

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

There are no changes to the automatic monitoring locations with the Highland Council Area for the calendar year 2012.

Nitrogen dioxide is monitored at two sites being Telford Street, Inverness, a roadside site 4 metres from the A862 and Fort William, a suburban site in a mixed residential and recreational area.

Small particles as PM10 and PM2.5 are monitored at Telford Street, Inverness.

Ozone is monitored at two sites being the aforementioned Fort William site, and Strath Viach a rural site in a remote glen five miles from the nearest road.

All three stations are part of the UK Automatic Urban and Rural Network and are managed by Bureau Veritas of behalf of DEFRA. Data from the sites is available, fully ratified, for download on the internet.

Figure 2.1 Map(s) of Automatic Monitoring Sites (if applicable)

Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Reference		Pollutants Monitored	Monitoring Technique	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
IV4	Inverness	Roadside	265709	845670	PM_{10} $PM_{2.5}$	Gravimetric	N	Y(2.5m)	4m	N
					NO2	Chemiluminescent				
FW1	Fort William	Suburban	210857	774431	NO2	Chemiluminescent	N	N/A	N/A	N
					Ozone					
SV1	Strath Viach	Rural	234831	875029	Ozone		N	N/A	N/A	N

2.1.2 Non-Automatic Monitoring Sites

The Highland Council monitored Nitrogen dioxide by passive diffusion tube at ten sites in Inverness and Dingwall in 2012.

At the start of 2012 the location of diffusion tube sites in Inverness was reviewed. As a result the number of sites increased from five to six and some of the sites were relocated as follows:

- Site IV1 was relocated from intersect of Union Street and Lombard Street to Union Street as the former location was compromised by the addition of a new extraction outlet adjacent to the site.
- Site IV3A relocated on Queensgate to a more secure site.
- Site IV3B at the Bus stops on Queensgate relocated to a kerbside site adjacent to the stop to give better indication of exposure at that location. The tube is mounted on to street furniture at 2.5m above ground level
- IV3C was added to Queensgate. This is a roadside site 2.5m above ground level attached to the façade of a building via a 50mm spacer block
- IV2, which for clarification will be identified as IV2b, and IV4 remain unchanged.

Details of these sites are in Table 2.2 below.

At the end of 2012 as part of the detailed assessment work for Nitrogen dioxide on Queensgate a further eleven diffusion tube sites were added to Queensgate and other streets in the centre of Inverness as follows:

- Sites IV2e, IV2f and IV2g. Additional sites on Academy Street. All three sites at the façade approximately 2m from the kerb.
- Sites IV3d, IV3e, IV3f and IV3g are on Queensgate at first and second floor level on the façade.
- Sites IV6a and IV6b are on Church Street.
- IV7 is on Strothers Lane.
- IV8 is on Margaret Street.

It is expected that a complete dataset for these additional sites will be available for monitoring year 2013.

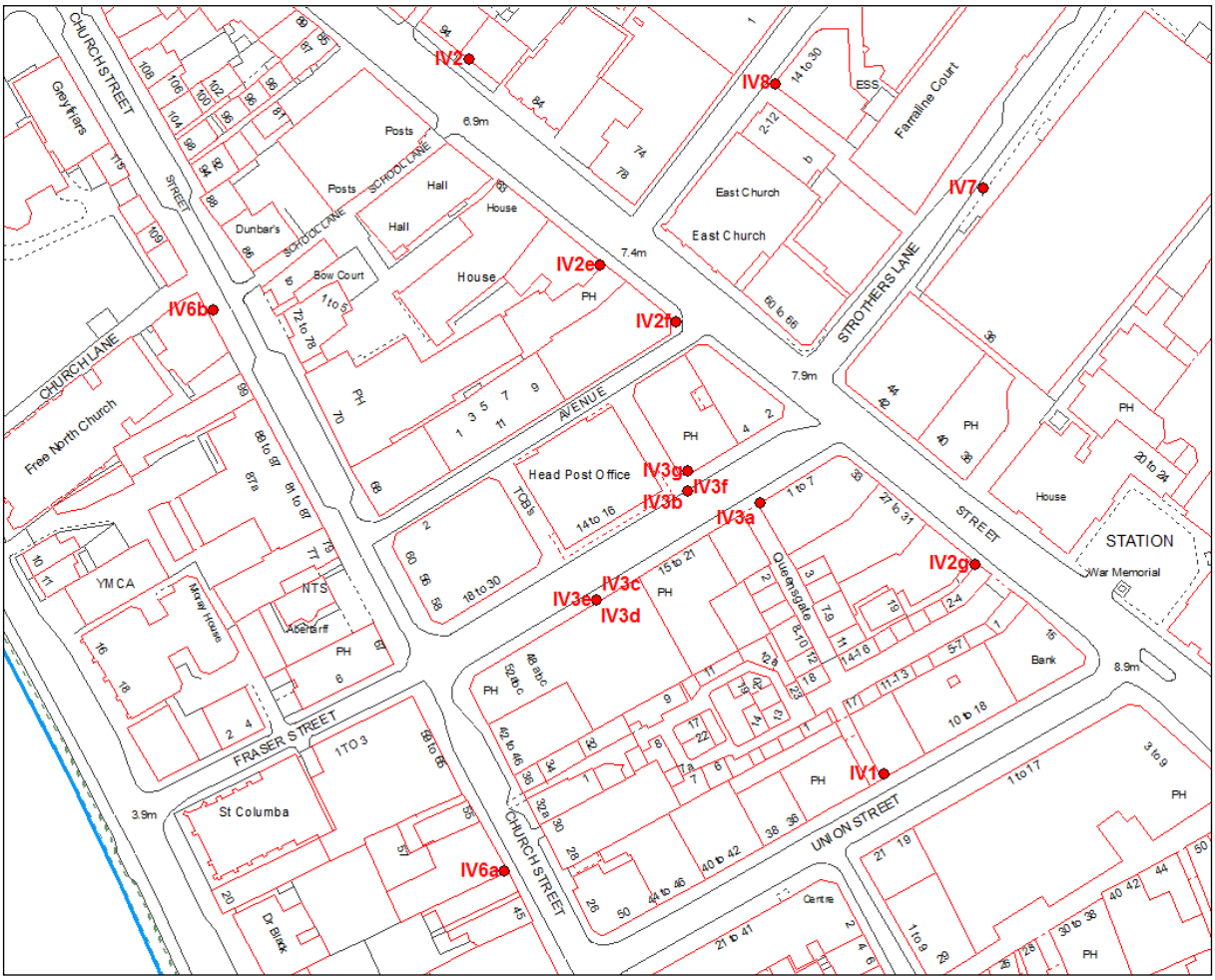
Figure 2.2 shows the location of all current diffusion tube sites (January 2013). A detailed site description for all new sites is included in the appendix.

QA/QC for these sites are described in the appendix.

Figure 2.2 Map(s) of Non-Automatic Monitoring Sites

Inverness

Inverness Old Town (All sites as at January 2013)



Dingwall

Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
IV1	Union Street	Roadside	266681	845361	3	NO_2	N	N	Y (0m)	3	Y
IV2b	Academy Street	Roadside	266577	845538	2	NO_2	N	N	Y (0m)	5	Y
IV2e	Academy Street E	Roadside	266610	845487	2.5	NO2	N	N	Y(0m)	2	Y
IV2f	Academy Street F	Roadside	266629	845473	2	NO2	N	N	Y(0m)	2	Y
IV2g	Academy Street G	Roadside	266704	845413	3	NO2	N	N	Y(0m)	2	Y
IV3a	Queensgate A	Roadside	266650	845428	3	NO_2	N	N	Y(0m)	3	Y
IV3b	Queensgate B	Kerbside	266632	845431	2.5	NO_2	N	N	Y(2.5m)	0.5	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
IV3c	Queensgate C	Roadside	266609	845404	3	NO_2	N	N	Y (0m)	3	Y
IV3d	Queensgate D	Roadside	266609	845404		NO2	N	N	Y(0m)	3	Y
IV3e	Queensgate E	Roadside	266609	845404		NO2	N	N	Y(0m)	3	Y
IV3f	Queensgate F	Roadside	266635	845437		NO2	N	N	Y(0m)	3	Y
IV3g	Queensgate G	Roadside	266632	845436		NO2	N	N	Y(0m)	3	Y
IV4	Telford Street	Roadside	265710	845672	3	NO_2	N	Y	Y (1.5m)	4	N
IV6a	Church Street A	Roadside	266586	845337	2.5	NO2	N	N	Y(0m)	3	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
IV6b	Church Street B	Roadside	266513	845476	2.5	NO2	N	N	Y(2m)	1	Y
IV7	Strothers Lane	Roadside	266706	845506	2.5	NO2	N	N	Y(0m)	3	Y
IV8	Margaret Street	Roadside	266654	845532	2.5	NO2	N	N	Y(0m)	3	Y
RC1	Wyvis Terrace	Roadside	254430	858968	4	NO_2	N	N	Y (0m)	1	Y
RC2	Station Road	Roadside	255200	858185	4	NO_2	N	N	Y (0m)	1	Y
RC3	Kintail Place	Urban Background	255112	859866	4	NO_2	N	N	Y (2.5m)	1	N/A
RC4	Burns Crescent	Urban Background	254420	859288	4	NO_2	N	N	Y (2.5m)	1	N/A

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

The measured annual mean Nitrogen dioxide concentration exceeded 40 µg/m^{-3} at four sites in 2012. None of the sites recorded more than 18 1-hour means above 200 µg/m^{-3}.

Automatic Monitoring Data

Inverness

Automatic monitoring of Nitrogen dioxide was undertaken at Telford Street, Inverness and Fort William throughout 2012. The results of monitoring are summarised in the tables 2.3 and 2.4 below.

An Annual mean Nitrogen dioxide concentration of 29.2µg/m^{-3} was recorded at Inverness in 2012. There were no hourly mean concentrations in excess of 200 µg/m^{-3} recorded in 2012. Data capture for the site was 94.9%.

Correction of Annual mean for Distance from Carraigeway

The Inverness AUN site is 4 metres away from the carriageway of the A862(Telford Street). Relevant exposure on the street consists of domestic houses the closest of which to the carriageway sit 2.5 metres from the kerb. The AUN site is therefore not representative of the closest relevant receptors on the street.

The procedure described in TG(09) has been followed to determine an estimate of the Nitrogen dioxide concentration at the closest receptors, which is 31.9µg/m^{-3}.

Fort William

The Fort William site is described as suburban. It lies on recreational ground within the town but is removed from the town centre and any busy roads.

An annual mean Nitrogen dioxide concentration of 12.1 µg/m^{-3} for the site was recorded in 2012. There were no recorded hourly mean concentrations in excess of 200 µg/m^{-3} in 2012. Data capture for the site was 95%.

Trends at Automatic Sites

Both the automatic monitoring sites continue to show an increasing trend in Nitrogen dioxide annual mean concentration.

The trend is more marked at the Inverness site over the last 3 years. Prior to 2007 concentrations on Telford Street were roughly static. There was a dip in concentrations around 2008 and 2009 which corresponds to a recorded step down in the AADT (annual average daily traffic) flow recorded on Telford Street - several large retail businesses in the Carse Retail Park situated at the west end of Telford Street closed around this time.

Since 2009 the annual mean concentration has increased, at Telford Street, from less than 21 µg/m^{-3} in 2009 to over 30 µg/m^{-3} in 2012. The AADT has remained roughly static during the same period.

Figure 2.3 displays the trend in annual mean NO_2 concentration at automatic sites.

Table 2.3 Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2012 %	Annual Mean Concentration (µg/m^3)				
					2008	2009	2010	2011	2012
Inverness	Roadside	N	N/A	94.9	20.6	20.7	24.5[3]	27	29.17
Fort William	Suburban	N	N/A	95	10.5[1]	9.35[2]	13.4	11.8[4]	12.08

1 only 88% of data was captured from the Fort William site in 2008

2 only 87.9% of data was captured from the Fort William site in 2009

3 only 88.8% of data was captured from the Inverness site in 2010

4 only 64% of data was captured from the Fort William site in 2011

Figure 2.3 Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites (and traffic flow at Inverness (Telford Street)

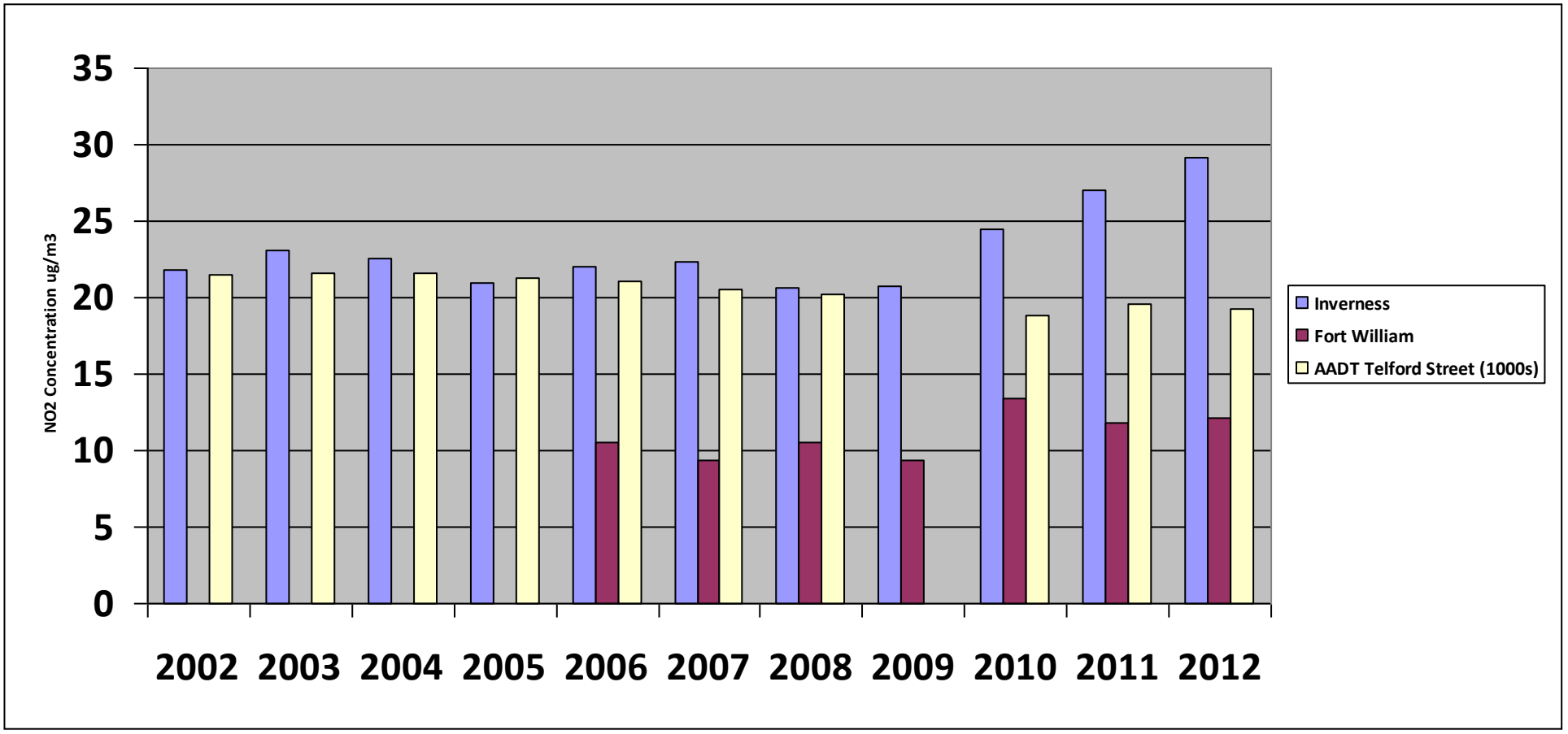


Table 2.4 Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2012 %	Number of Hourly Means > 200µg/m^3				
					2008	2009	2010	2011	2012
Inverness	Roadside	N	N/A	98.6	0	0	0(118)	0	0
Fort William	Suburban background	N	N/A	95	0(59)	0(73)	0	0(102)	0

Where the data capture for full calendar year is less than 90%, the 99.8th percentile of hourly means is displayed in brackets

Diffusion Tube Monitoring Data

Results of Nitrogen dioxide diffusion tube monitoring at sites within The Highland Council area are contained in table 2.5

Four of the diffusion tube sites recorded bias-adjusted annual mean concentrations in excess of the objective concentration of 40 ug/m^3. All four of these sites are in the "Oldtown" area of Inverness, an area characterised by narrow street canyons. There is relevant exposure at these sites although at some the exposure occurs at 1st floor level or above. The area is currently the subject of a detailed assessment for Nitrogen dioxide, focussed around Queensgate.

Site RC2 on station Road in Dingwall returned an annual mean concentration of 37.28 ug/m^3. The site is located on the A862. The road supports an AADT of around 13,000 vehicles. It is the only road in to the town of Dingwall from the south (Inverness) and often there is stationary queuing traffic on the road at morning and evening peak times. There is relevant exposure 1 metre from the kerb and the monitoring location is representative of relevant exposure. The measured concentration at this site is within 10% of the objective concentration.

Choice of Bias Adjustment Factor for Diffusion Tubes

The Technical Guidance LAQM.TG(09) recommends that a bias adjustment factor should be applied to passive diffusion tube measured annual mean concentrations. The bias adjustment factor compensates for variation in the accuracy of diffusion tube samples in comparison to the reference automatic monitoring method. Bias adjustment factors are derived by exposing diffusion tubes at an automatic monitoring site and comparing the results with that achieved by the automatic monitor (co-location). Three diffusion tubes are exposed at the Telford Street AUN site and have been used to determine a locally obtained bias adjustment factor for 2012 of 1.26.

Each year a national database of co-location studies is produced and is available via the Review and Assessment Helpdesk. From this database it is possible to obtain the combined bias adjustment factor for a particular laboratory and diffusion tube preparation method. For 2012 the combined bias adjustment factor returned by the database is 0.97. The combined factor has been derived from 27 co-location studies.

LAQM,TG(09) offers guidance as to the circumstances in which either of the aforementioned factors might be more appropriate. Taking that advice in to account it is considered that the local bias adjustment factor is more appropriate for use with the Highland Council's diffusion tube survey results. A bias adjustment factor of 1.26 has therefore been used, with the following exception.

Box 3.3 of LAQM.TG(09) recommends that "where the duration of the whole diffusion tube study is less than one year, especially if it is less than 9 months, the (bias) adjustment is best made for a matched time period rather than using an annual factor". The four sites in Dingwall (RC1-4) were surveyed for 6 months of the year. A local bias adjustment factor for the matched time period is calculated to be 1.09. Sites RC1-4 have been corrected using this bias adjustment factor.

Annualisation of Results

Where data capture occurs for less than 9 months in a diffusion tube study the annual mean has been annualised to take account of seasonal variations in NO_2 concentration. The method in Box 3.2 of LAQM.TG(09) has been followed to achieve this. Details of the method and the data used in this process are included in the Appendices. Five sites required this adjustment being: IV3a Queensgate, Inverness; RC1 Wyvis Terrace, Dingwall; RC2 Station Road, Dingwall; RC3 Kintail Place, Dingwall; and RC4 Burns Crescent, Dingwall.

Trends in the annual mean concentration

Figure 2.4, Figure 2.5 and Figure 2.6 illustrate the trend in Nitrogen dioxide concentration that has been evident at diffusion tube sites in the years to 2012. Figure 2.4 relates to site IV2, Academy Street in Inverness. This is the only site in

Inverness Old Town for which a trend can be determined as the site has remained unchanged for years. Figure 2.5 illustrates the trend at the two roadside sites in Dingwall; IV1 Wyvis Terrace and IV2 Station Road. Figure 2.6 illustrates the trend at the two urban background sites in Dingwall; IV3 Kintail Place and IV4 Burns Crescent.

All the aforementioned sites have shown an increasing trend in Nitrogen dioxide concentration over the last five years

Table 2.5 Results of NO_2 Diffusion Tubes 2012

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months or %) [a]	2012 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 1.26 [b]
IV4	Telford Street Inverness	Roadside	N	Triplicate and Co-located	9	30.3
IV1	Union street Inverness	Roadside	N	N	9	**41.71**
IV2b	Academy Street Inverness	Roadside	N	N	10	35.53
IV3a	Queensgate Inverness	Roadside	N	N	8	**46.98**
IV3b	Queensgate Inverness	Kerbside	N	N	11	**56.74**
IV3c	Queensgate Inverness	Roadside	N	N	10	**46.54**
RC1	Wyvis Terrace Dingwall	Roadside	N	N	6	24.58
RC2	Station Road Dingwall	Roadside	N	N	6	37.28
RC3	Kintail Place Dingwall	Urban Background	N	N	6	9.78
RC4	Burns Crescent Dingwall	Urban Background	N	N	6	11.92

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

In bold and underlined, annual mean > 60µg/m^3, indicating a potential exceedence of the NO_2 hourly mean AQS objective

[a] Means of sites with less than 75% full calendar year data capture have been "annualised" as described in Box 3.2 of LAQM.TG(09)

[b] If an exceedence is measured at a monitoring site not representative of public exposure, NO_2 concentration at the nearest relevant exposure has been estimated based on the "NO_2 fall off with distance calculation" as explained in Box 2.3 of LAQM.TG(09)

Table 2.6 Results of NO_2 Diffusion Tubes (2008 to 2012)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2008 (Bias Adjustment Factor = 0.9)	2009 (Bias Adjustment Factor = 0.9)	2010 (Bias Adjustment Factor = 0.92)	2011 (Bias Adjustment Factor = 1.09)	2012 (Bias Adjustment Factor = 1.26)
IV4	Roadside	N	19.91	20.82	24.38	27.24	30.56
IV1	Roadside	N		22.35	26.76	28.33	**41.71**
IV2b	Roadside	N		25.78	29.28	31.15	35.53
IV3a	Roadside	N		35.49	**41.93**	**48.05**	**46.98**
IV3b	Kerbside	N		30.65	36.31	34.01	**56.74**[b]
IV3c	Roadside	N					**46.54**
RC1	Roadside	N	18.9	22.91	26.04		24.58
RC2	Roadside	N	26.99	32.33	36.98		37.28
RC3	Urban Background	N		8.79	10.03		9.78
RC4	Urban Background	N		11.73	12.16		11.92

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

Underlined, annual mean > 60µg/m^3, indicating a potential exceedence of the NO_2 hourly mean AQS objective.

[a] Means have been "annualised" as in box 3.2 of LAQM.TG(09), if full calendar year data capture is less than 75%.

[b] 2012 IV3b site relocated from roadside to kerbside.

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at IV2b Academy Street, Inverness Diffusion Tube Monitoring Site

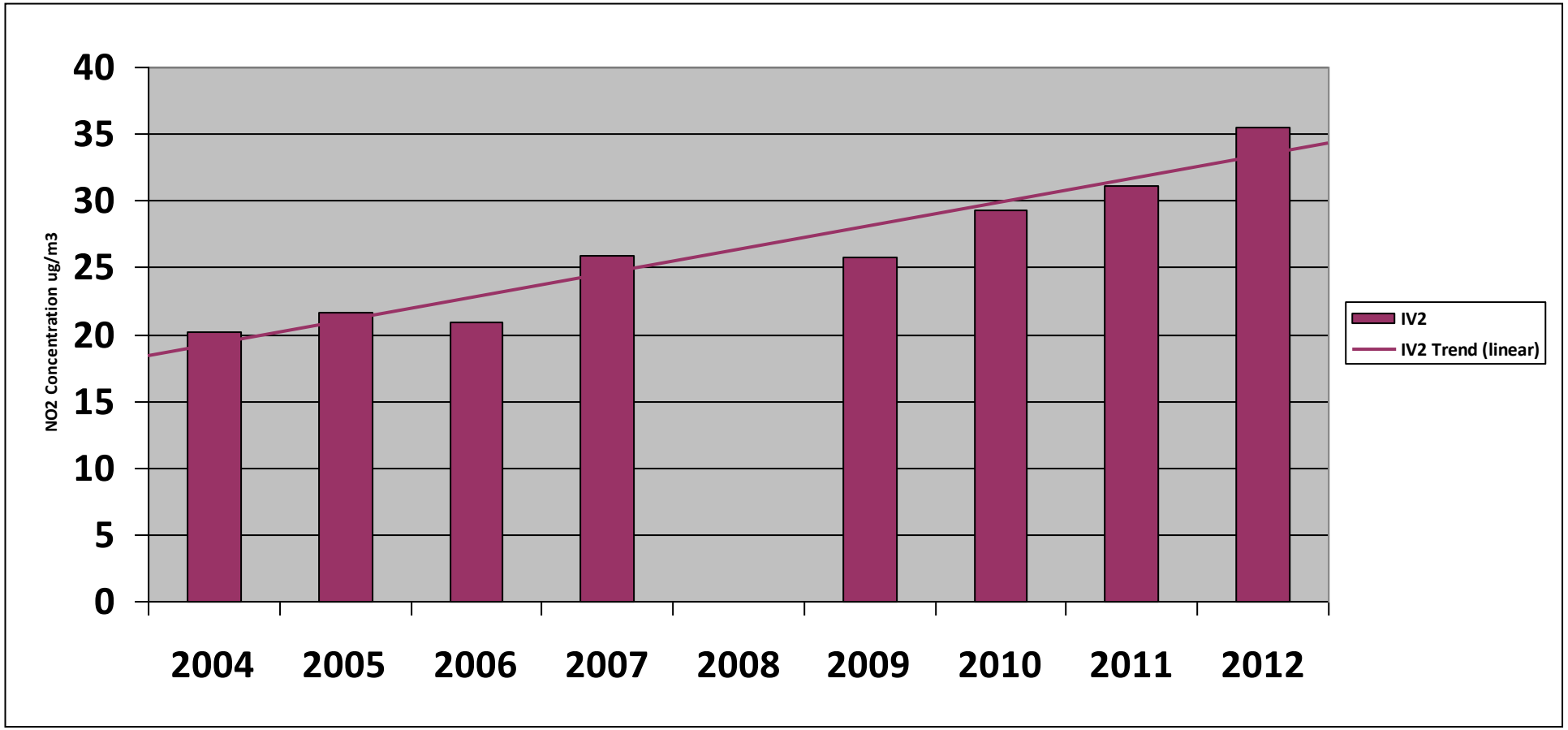


Figure 2.5 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Roadside Diffusion Tube Monitoring Sites in Dingwall – RC1 Wyvis Terrace and RC2 Station Road.

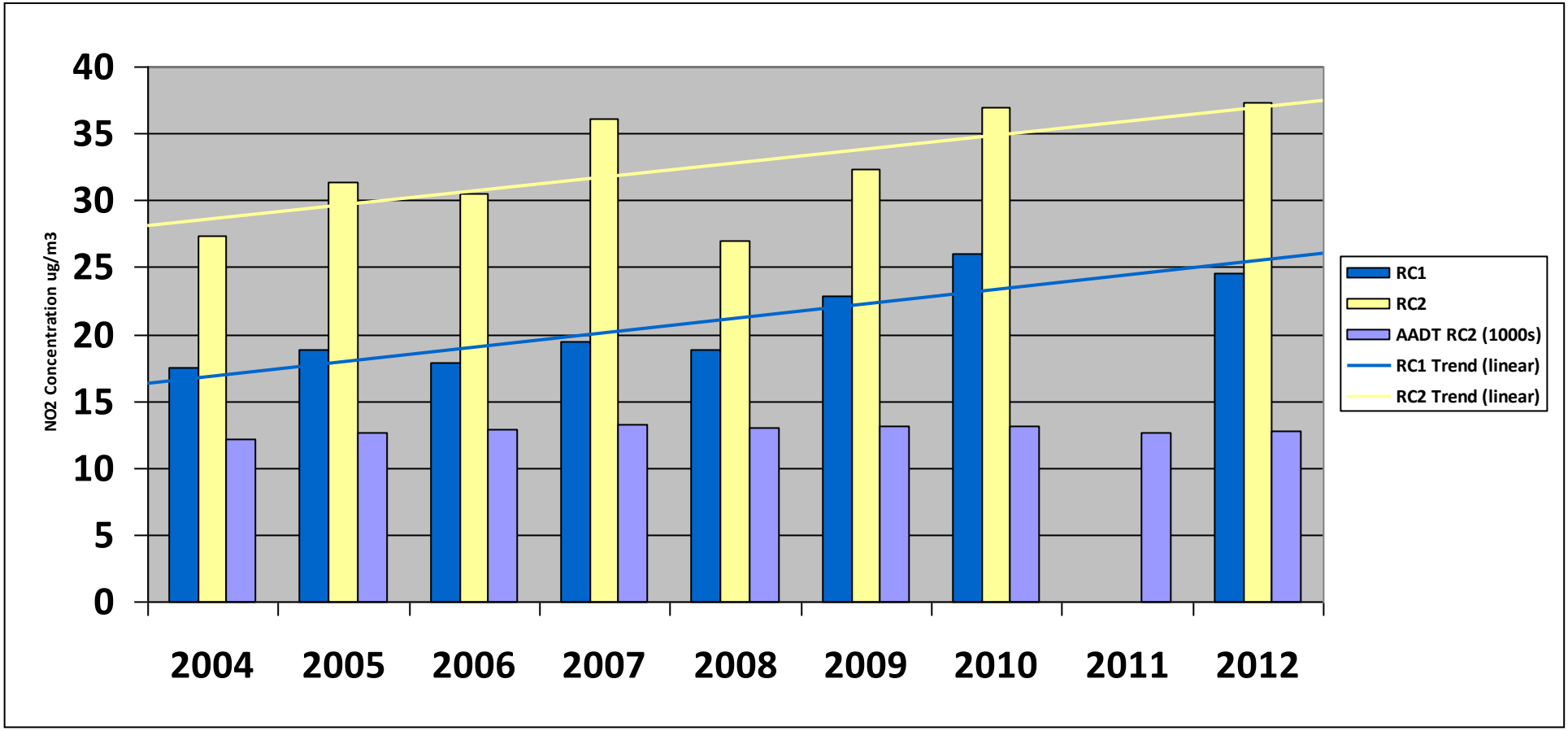
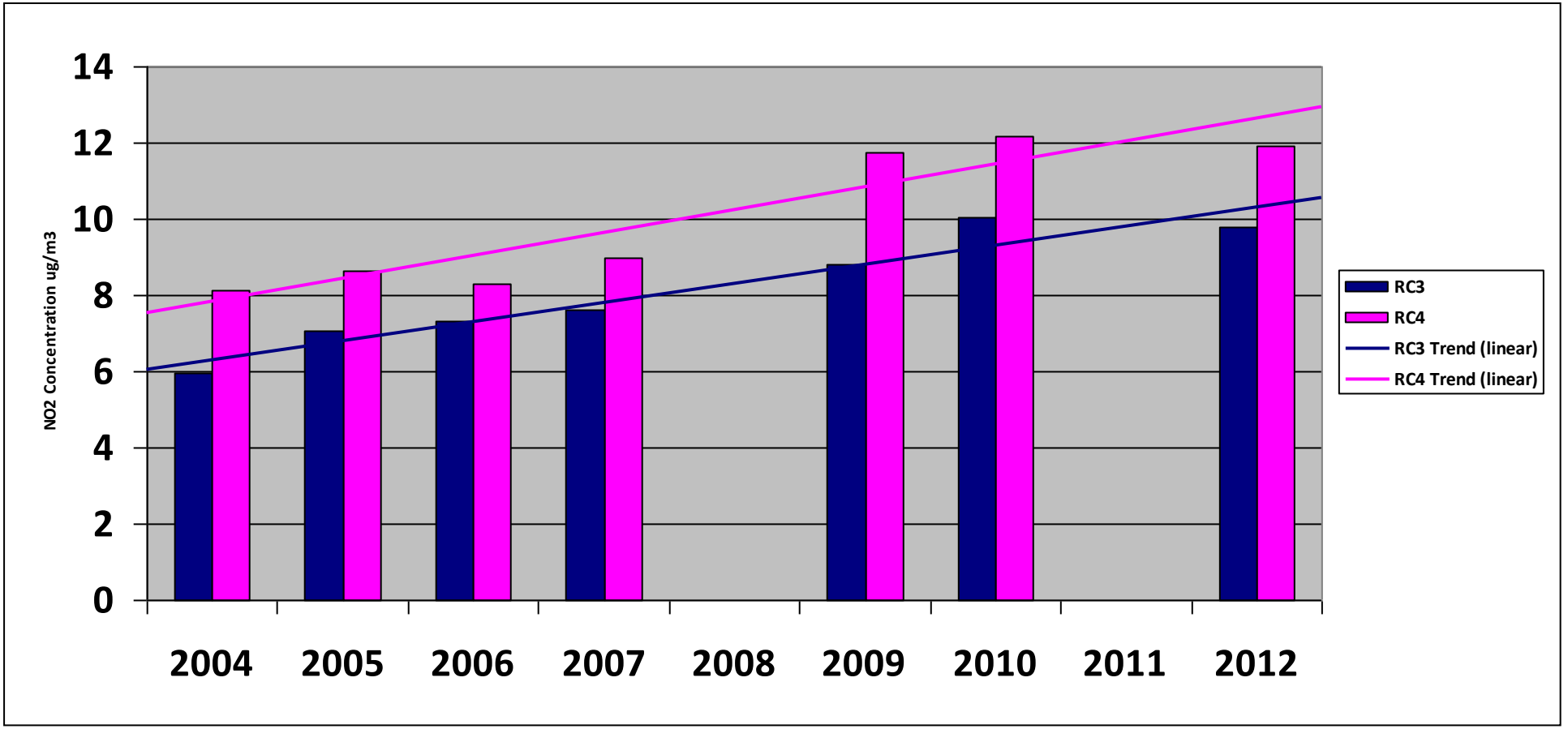


Figure 2.6 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Urban Background Diffusion Tube Monitoring Sites in Dingwall – RC3 Kintail Place and RC4 Burns Crescent.



2.2.2 Particulate Matter (PM_{10})

PM10 annual mean concentrations at Telford Street are significantly below the 2010 annual mean objective. Concentrations have shown a generally reducing trend over the last 6 years. Concentrations in 2010 showed a significant upward deviation from the general trend.

There was one exceedence of the 24 hour mean objective in 2012.

The monitoring location at Telford street is 4 metres from the kerb. While the majority of dwellings on the street are this distance or greater from the kerb, there are a small number of dwellings which are 2.5 metres from the kerb. However PM10 concentrations at the monitoring position are such that it is unlikely that concentrations, even at closest receptors are in excess of the objectives.

Table 2.7 Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2012 %	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m^3)				
						2008	2009	2010	2011	2012
Inverness	Roadside	N	94.5	94.5	Y	12.3	11.6	14	11.8	11.02

Figure 2.7 Trends in Annual Mean PM_{10} Concentrations

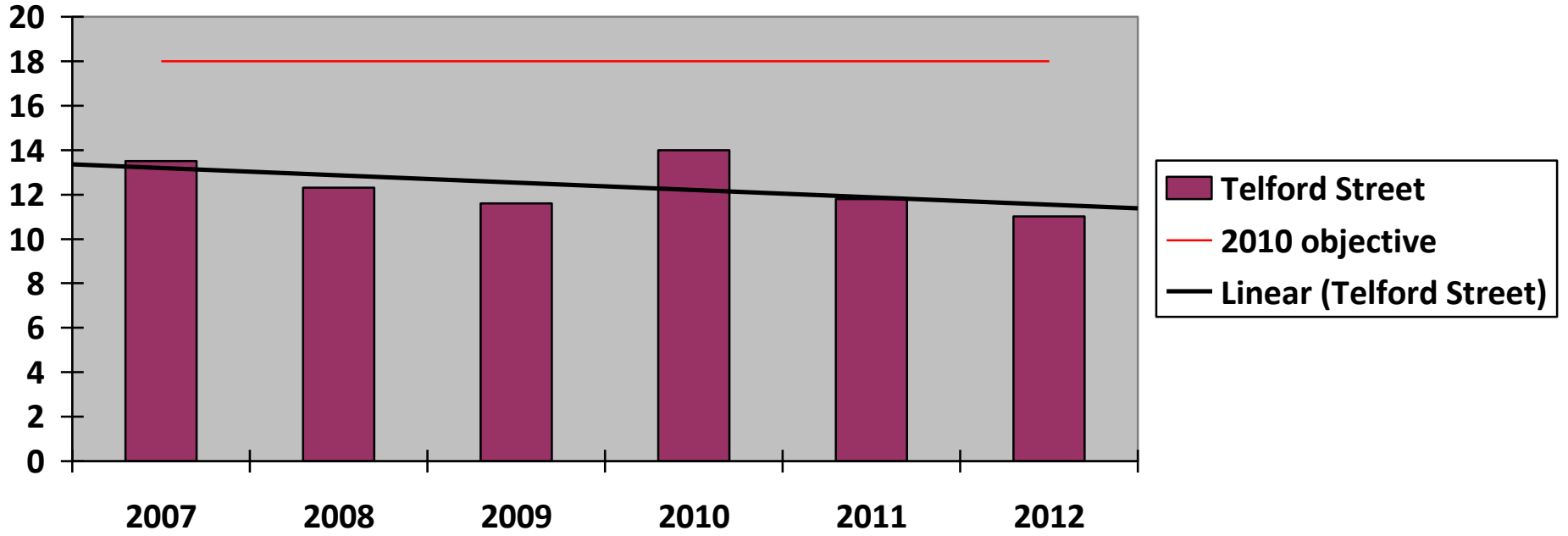


Table 2.8 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2012 %	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m^3				
						2008	2009	2010 [a]	2011 [a]	2012
Telford Street	Roadside	N	94.5	94.5	Y	0	0	2(24.9)	0(20)	1

[a] data capture for full calendar year is less than 90%. The 98.1th percentile of 24-hour means is displayed in brackets.

2.2.3 Other Pollutants Monitored

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007 identified UK Air Quality Objectives for the protection of human health. Some of these objectives, including those for PM2.5 and Ozone, are not included in the regulations at present. The objectives for these two pollutants are described in table 2.9 below. The results of the automatic monitoring within Highland for these pollutants are included here for information.

Table 2.9 UK Air Quality Strategy Objectives for the protection of human health, July 2007

Pollutant	Air Quality Objective		To be achieved by
	Concentration	Measured as	
Particles (PM2.5) (Gravimetric)	12 ugm-3 (limit)	Annual Mean	2020
Ozone	100 ugm-3 not to be exceeded more than 10 times a year	8 hourly running mean or hourly mean	31st December 2005

The annual mean PM2.5 concentration (daily gravimetic) measured at Telford Street, Inverness was 6 ugm-3 in 2012. This is less than the objective to be achieved by 2020 for the pollutant in Scotland.

In 2012 the maximum daily 8-hour running mean ozone concentration was greater than 100 ugm-3 on less than 10 occasions at Fort William and on 12 occasions at Strath Viach. The objective was therefore achieved at Fort William but was not achieved at Strath Viach. It should be noted that there is no relevant exposure at Strath Viach.

2.2.4 Summary of Compliance with AQS Objectives

The Highland Council has measured concentrations of Nitrogen dioxide above the annual mean objective at relevant locations outside of an AQMA, and **will need to proceed to a Detailed Assessment**, for the Old Town area of Inverness around Queensgate. A detailed assessment is being undertaken throughout 2013 and will be reported early in 2014.

3 New Local Developments

3.1 Road Traffic Sources

There are no new or newly identified road traffic sources identified in The Highland Council area.

3.2 Other Transport Sources

There are no new or newly identified non-road traffic sources identified in The Highland Council area.

3.3 Industrial Sources

There are no new, proposed or significantly changed industrial installations identified since the last round of review and assessment. There are no Major fuel storage depots storing petrol, petrol stations or poultry farms identified that have not been previously assessed.

3.4 Commercial and Domestic Sources

There are 53 new biomass combustion plant identified since the last round of review and assessment. These are listed at the end of this chapter. These developments will be considered at the next updating and screening assessment.

No areas where the combined impact of several biomass combustion sources may be relevant have been identified.

There are no new areas where domestic solid fuel burning may be significant.

3.5 New Developments with Fugitive or Uncontrolled Sources

No new developments with fugitive or uncontrolled sources have been identified since the last round of review and assessment.

The Highland Council confirms that there are no new or newly identified local developments in the categories listed below which may have an impact on air quality within the Local Authority area.

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **New developments with fugitive or uncontrolled sources.**

The Highland Council has identified the following new or previously unidentified biomass developments which may impact on air quality in the Local Authority area.

Bridgend Primary School, Alness, Biomass 150KW
Seaforth House, Golspie, Biomass 150KW
Milton of Kildary Primary School, Milton of Kildary, Biomass 150KW
Lybster Primary School, Lybster, Biomass 150KW
Upper Geiselittle, Wick, Biomass 1000KW
Invergordon Academy, Invergordon, Biomass 199KW
1 Balnagore, Tain, Biomass 111KW
Inverness High School, Inverness, Biomass 150KW
Golspie High School, Golspie, Biomass 150KW
Golspie Primary School, Golspie, Biomass 150KW
Grantown Primary School, Grantown-on-Spey, Biomass 150KW
Kilchiumen Primary School, Fort Augustus, Biomass 150KW
Fortrose Academy, Fortrose, Biomass 199KW
Black Isle Leisure Centre, Fortrose, Biomass 150KW

Invergordon Leisure Centre, Invergordon, Biomass 199KW
Isobel Rhind Centre, Invergordon, Biomass 150KW
Glenurquhart Primary School, Drumnadrochit, Biomass 150KW
Invernevis House, Fort William, Biomass 150KW
Bayview House, Thurso, Biomass 150KW
Beauly Primary School, Beauly, Biomass 150KW
Hilton Primary School, Inverness, Biomass 150KW
Bught Nursery, Inverness, Biomass 150KW
Adelphi Distillery Ltd, Acharacle, Biomass 2222KW
Croy Primary School, Croy, Biomass 150KW
Hanover Housing, Kingussie, Biomass 210KW
Craighill Health Centre, Tain, Biomass 150KW
Kingussie High School, Kingussie, Biomass 521KW
Tomatin Distillery, Tomatin, Biomass 4347KW
Broomhill House, Dulnain Bridge, Biomass 98KW
Taeblair Farm, Munlochy, Biomass 1260KW
Glenmore Lodge, Aviemore, Biomass 195KW
Grant House, Grantown-on-Spey, Biomass 100KW
The Torridon, Torridon, Biomass 360KW
Coul House Hotel, Contin, Biomass 152KW
Carrbridge Hotel, Carrbridge, Biomass 199KW
COOP Caol, Fort William, Biomass 140KW
Oykell Bridge Hotel, Sutherland, Biomass 165KW
Dell of Abernethy, Nethy Bridge, Biomass 90KW
Craig Dhu, Laggan, Biomass 100KW
Seaforth Home, Maryburgh, Biomass 218KW
Ullapool High School, Ullapool, Biomass 150KW
Kingussie Primary School, Kingussie, Biomass 150KW
Kinloch Lodge, Sleat, Isle of Skye, Biomass 96KW
Allt Shellach Hotel, Ballachuilish, Biomass 199KW
Glenmoriston Arms Hotel, Invermoriston, Biomass 150KW
Fairburn House, Marybank, Biomass 199KW
Fairburn Activity Centre, Marybank, Biomass 99KW
Ferry Cottage, Isle of Rhum, Biomass 100KW
Puffin Pool, Dingwall, Biomass 99KW
Raigmore Hospital, Inverness, Biomass 3400KW
Greenhouses, Skibo, Biomass 800KW
Great Glen House, Inverness, Biomass 150KW
Lovat Arms Hotel, Fort Augustus, Biomass 150KW

These will be taken into consideration in the next Updating and Screening Assessment

4 Planning Applications

In 2008 the Highland Council received a planning application for a Waste to Energy Incineration process at Invergordon. The application was refused. In 2012 the refusal was overturned at appeal. The process will be authorised by SEPA under the Waste Incineration Directive. The application was subject of an EIA which included an air quality assessment that indicated that the development would not result in a failure to achieve the UK Air Quality Objectives.

The following developments will be considered at the next updating and screening assessment

- Wood Pellet manufacturing plant and CHP Biomass, Upper Geiselittle, Caithness,
- Erection of Boiler House, Victoria Park, Dingwall,
- New Build Distillery, Glenbeg, Acharacle,
- BSW Timber Sawmill Phase 3, Corpach, Fort William
- Mineral Extraction, Balblair Quarry

5 Air Quality Planning Policies

The following planning policies determine the Highland Council's approach to the relationship between planning and air quality.

The Highland Wide Local Development Plan, April 2012
Policy 72 "Pollution" set out the general principles of the authorities approach to pollution issues in the development planning process.
Policy 73 "Air Quality" specifically identifies air quality as an issue for consideration.

6 Local Transport Plans and Strategies

The Highland Council Local Transport Strategy 2010/11 – 2013/14 is available to view on The Highland Council website at http://www.highland.gov.uk .

One of the main objectives of the strategy is to “Manage/reduce the impacts of transport on the natural and built environment”, a sub-objective of which is to “protect and enhance the current air quality of the Highland Area”.

7 Conclusions and Proposed Actions

7.1 Conclusions from New Monitoring Data

New monitoring data has identified diffusion tube monitoring sites in the Oldtown area of Inverness. Based upon the outcome of the 2012 Updating and Screening Assessment The Highland Council is already committed to completing a detailed assessment for Nitrogen dioxide in this area. The area is outside and AQMA. There are currently no AQMAs declared in Highland.

The 8-hour running mean objective for Ozone was also exceeded at the Strath Viach automatic rural monitoring site. Ozone is, however not included in the Local Air Quality Management process and there is no relevant exposure at this site.

No other exceedences of the objectives were identified.

7.2 Conclusions relating to New Local Developments

57 new local developments have been identified which will require more detailed consideration in the next Updating and Screening Assessment.

None of these developments give rise to the need to proceed to a detailed assessment

7.3 Proposed Actions

The Highland Council is progressing with a detailed assessment of air quality in the Queensgate area of Inverness with respect to the following objectives:

- 40 ugm-3 Annual Mean Objective for Nitrogen dioxide; and

- 200 ugm-3 1-hour Mean Objective for Nitrogen dioxide.

Monitoring data is being collected throughout 2013. A dispersion modelling exercise will be completed and the outcome of the detailed assessment will be reported early in 2014.

In addition to the above The Highland Council's next action will be to submit a progress report in April 2014.

8 References

1. DEFRA in partnership with the devolved administrations, **The Air Quality Strategy for England, Scotland, Wales and Northern Ireland**, July 2007.
2. **The Air Quality (Scotland) Regulations 2000**
3. **The Air Quality (Scotland) (Amendment) Regulations 2002**
4. DEFRA in partnership with the devolved administrations, **Local Air Quality Management Technical Guidance LAQMTG(09)**, 2009
5. The Highland Council, **Air Quality in The Highlands – First Stage Review and Assessment** 1998.
6. The Highland Council, **Addendum to Air Quality in the Highlands**, 2001.
7. The Highland Council, **Updating and Screening Assessment**, 2003
8. The Highland Council, **Progress Report**, 2005
9. The Highland Council, **Detailed Assessment Report**, 2005
10. The Highland Council, **Updating and Screening Assessment**, 2006.
11. The Highland Council, **Progress Report** 2007.
12. The Highland Council, **Progress Report** 2008.
13. The Highland Council, **Updating and screening Assessment**, 2009
14. The Highland Council, **Progress Report** 2010.
15. The Highland Council, **Progress Report** 2011
16. NETCEN, **Air Quality Monitoring: Highland**, 2005
17. **Environment Act 1995**
18. **Clean Air Act 1993**
19. http://www.airquality.co.uk/data_and_statistics_home.php
20. http://www.airquality.co.uk/laqm/laqm.php
21. AEA Energy and Environment on behalf of the Scottish Government, **Measurement and Modelling of Fine Particulate Emissions (PM10 and PM2.5) from Wood Burning Biomass Boilers**, 2008
22. AEA Technology, **QA/QC Data Ratification report for the Automatic Urban and Rural Network, October – December 2008 and Annual Review for 2008**, June 2009.
23. Gradko (International) Ltd, **Passive Diffusion Tube Monitors – Instruction manual for Exposure and Location**.
24. AEA Energy and Environment, **Technical Guidance – Screening Assessment for Biomass Boilers**, 2008
25. Air Quality Consultants, **Nitrogen dioxide Concentrations and Distance from Roads**, 2008
26. http://www.uwe.ac.uk/aqm/review/
27. AEA Energy and Environment for DEFRA and the devolved administrations, **Diffusion Tubes for Ambient NO2 Monitoring – Practical Guidance for Laboratories and Users**, 2008
28. Health and Safety Laboratory on behalf of DEFRA and the devolved administrations, **WASP - Annual Performance Criteria for NO2 Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of Laboratory Performance in Rounds 113-120.**

Appendices

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Factor from Local Co-location Studies (if available)

A diffusion tube co-location study has taken place at site IV4, a roadside site on Telford Street, Inverness. The tubes are co-located with the Telford Street AUN Station. AEA's DifTPAB spreadsheet tool has been used to determine the precision and accuracy of the diffusion tube co-location study. Overall data capture of the automatic monitor data was good. Precision of both the automatic data and the diffusion tube data were identified as good. The bias factor was determined to be 1.26. There were no periods of poor precision in the survey. There was one period of poor data capture on the automatic monitor. This period was not included in the calculation of the bias adjustment factor.

The four diffusion tube sites in Dingwall monitored a shorter period than a year. As advised by LAQM.TG(09) the bias adjustment factor for these tubes is based upon periods appropriate to the period of the survey. The bias adjustment factor derived for use with the Dingwall diffusion tube sites is 1.09.

Discussion of Choice of Factor to Use

The Highland Council was advised by the reviewer of the Authority's previous round review and assessment report to consider using the local bias adjustment factor for the adjustment of diffusion tubes in future reporting.

The Bias adjustment factor obtained from the local colocation study has been used in the adjustment of all diffusion data contained in this report.

PM Monitoring Adjustment

The method used for the measurement of PM10 at Telford Street, Inverness is considered to be equivalent to the reference method. No adjustment of the dataset has been necessary.

Short-term to Long-term Data adjustment

Diffusion tubes with data capture of less than 9 months in the year have had the annual mean adjusted according to the method described in Box 3.2 of LAQM.TG(09). Four long term sites were chosen for this calculation being:

1. Aberdeen Errol Place
2. Edinburgh St Leonards
3. Fort William
4. Peebles

Tables A.1 and A.2 below contain the data obtained from these site which was used to determine a period mean adjustment factor for site IV3a in Inverness and Sites RC1-4 in Dingwall

Table A.1 Short-Term to Long-Term Monitoring Data Adjustment for site IV3a

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
1	Urban Background	21.72	23.35	0.93
2	Urban Background	24.26	25.04	0.97
3	Suburban background	12.09	12.29	0.98
4	Urban Background	8.03	8.03	1
Average				0.97

Table A.2 Short-Term to Long-Term Monitoring Data Adjustment for sites RC1-4

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
1	Urban Background	21.72	24.51	0.89
2	Urban Background	24.26	27.48	0.88
3	Suburban background	12.09	12	1.01
4	Urban Background	8.03	10.22	0.78
Average				0.89

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 have supplied the following QA/QC statement:

Supply and Analysis of Nitrogen Dioxide (NO_2) Diffusion Tubes

Analysis of the NO_2 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 NO_2 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 WASP Inter- Comparison Project and NETCEN which are administered by the UK Health & Safety Laboratory.

100% of submissions by Gradko to the WASP Inter-comparison Project Rounds 116-119 were satisfactory.

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 B: Data

Nitrogen dioxide diffusion tube raw data for all sites

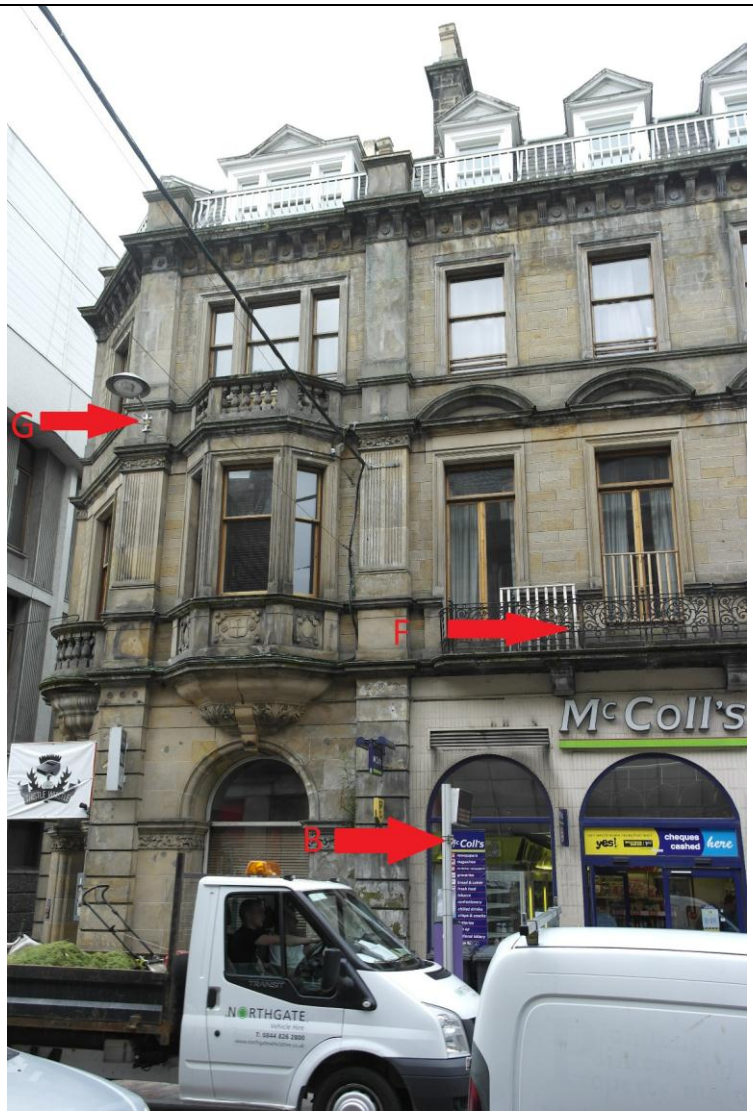
Month		Site										
	IV1	IV2b	IV3a	IV3b	IV3c	IV4a	IV4b	IV4c	RC1	RC2	RC3	RC4
JAN	28.91		44.57	49.92	30.68	35.42	38.94	33.99	32.64	44.23	15.80	20.11
FEB	19.70	23.99	41.32	47.39	34.06							
MAR		17.71	33.69	37.31								
APR	44.48	37.23		39.62	45.48	26.06	23.88	23.10				
MAY	39.27	32.97	39.50	48.49	30.20	11.78	10.40	10.59				
JUN	46.06	32.24	42.17	51.89	39.08	10.70	11.22	12.02				
JUL												
AUG		34.31	30.81	64.78	44.16	21.05	18.99	16.90	14.81	32.61	4.75	6.90
SEP	20.22	18.93		38.81	26.52	17.79	20.08	17.77	18.58	31.68	5.60	7.36
OCT	28.65	58.22	36.99	27.05	39.76	26.57	30.22	25.22	25.25	40.31	9.06	12.08
NOV	25.44	25.82	42.77	51.37	36.18	27.07	35.74	31.45	29.31	41.31	11.32	14.19
DEC	34.05	30.29		58.35	43.28	39.27	38.82	39.78	31.44	40.44	13.93	13.10

Appendix C: Site Details for new Diffusion Tube Sites

The following sites were either: relocated at the start of 2012; or introduced at the start of 2013

IV1 Union Street, Inverness (relocated)	
Site Type	Roadside
Location (NGR)	266681,845361
Height(m)	3
Mount type	Clip and spacer to street furniture
Distance to kerb(m)	3
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Narrow street canyon. Retail at ground floor with some flats and HMOs at upper floors.

IV3a Queensgate, Inverness (relocated)	
Site Type	Roadside
Location (NGR)	266650,845428
Height(m)	3
Mount type	Clip and spacer to street furniture
Distance to kerb(m)	3
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Narrow street canyon. Retail at ground floor with some flats and HMOs at upper floors.

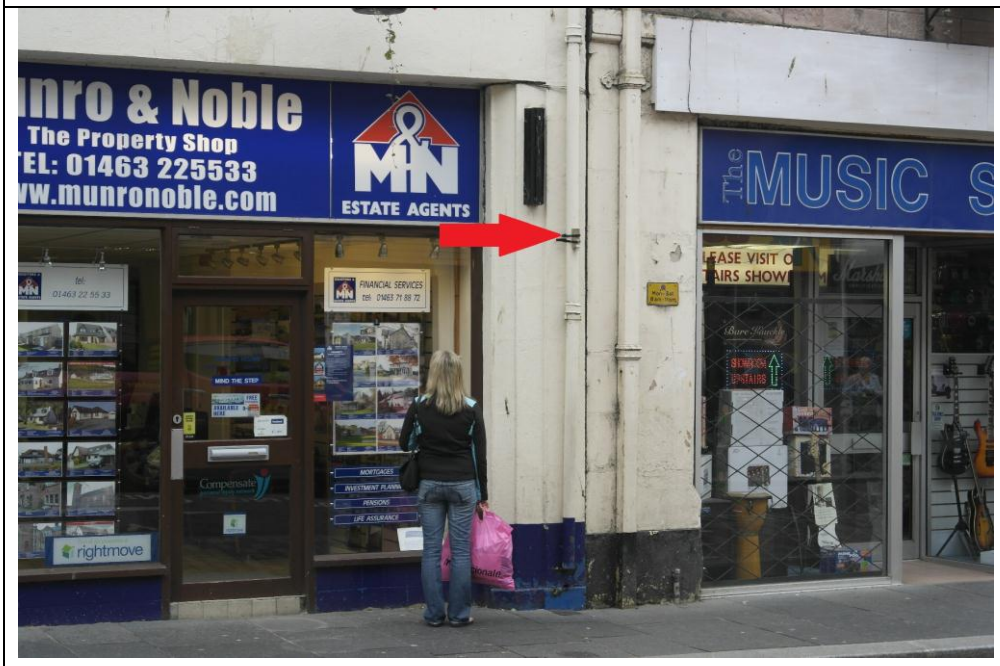
IV3b Queensgate, Inverness (relocated), IV3f Queensgate (new site), IV3g Queensgate (new site)	
Site Type	Kerbside and roadside
Location (NGR)	266632,845431
Height(m)	IV3b 2.5m; IV3f 5m; IV3g 8m
Mount type	Clip and spacer to street furniture or building façade.
Distance to kerb(m)	IV3b 1m; IV3f 3m; IV3g 3m
Relevant exposure	IV3b Exposure relevant to the 1-hour mean objective. IV3f and IV3g Exposure relevant to the annual mean objective.
Description	Narrow street canyon. Retail at ground floor with some flats and HMOs at upper floors. Site adjacent to busy city centre bus stop

IV3c Queensgate, Inverness (new site), IV3d Queensgate (new site), IV3e Queensgate (new site)	
	
Site Type	Roadside
Location (NGR)	266609, 845404
Height(m)	2.5; 6m; 9m
Mount type	Clip and spacer to façade
Distance to kerb(m)	3
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Narrow street canyon. Retail at ground floor with some flats and HMOs at upper floors.

IV2e Academy Street, Inverness (new site)	
	
Site Type	Roadside
Location (NGR)	266610,845487
Height(m)	2.5
Mount type	Clip and spacer to street furniture
Distance to kerb(m)	2
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Generally more open street. Retail and commercial at ground floor with some flats and HMOs at upper floors.

IV2f Academy Street, Inverness (new site)	
	
Site Type	Roadside
Location (NGR)	266629,845473
Height(m)	2.5
Mount type	Clip and spacer to street furniture
Distance to kerb(m)	2
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Generally more open street. Retail and commercial at ground floor with some flats and HMOs at upper floors.

IV2g Academy Street, Inverness (new site)	
	
Site Type	Roadside
Location (NGR)	266704,845413
Height(m)	2.5
Mount type	Clip and spacer to street furniture
Distance to kerb(m)	3
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Generally more open street. Retail at ground floor with some flats and HMOs at upper floors.

IV6a Church Street, Inverness	
	
Site Type	Roadside
Location (NGR)	266586,845337
Height(m)	2.5
Mount type	Clip and spacer to façade
Distance to kerb(m)	3
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Narrow street canyon. Retail at ground floor with some flats and HMOs at upper floors.

IV6b Church Street, Inverness

Site Type	Roadside
Location (NGR)	266513,845476
Height(m)	2.5
Mount type	Clip and spacer to street furniture
Distance to kerb(m)	2
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	More open street location. Commercial/Retail at ground floor with some flats at upper floors.

IV7 Strothers Lane, Inverness	
	
Site Type	Roadside
Location (NGR)	266706,845506
Height(m)	2.5
Mount type	Clip and spacer to street furniture
Distance to kerb(m)	1.5
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Narrow street canyon. Retail/commercial at ground floor with some flats at upper floors.

IV8 Margaret Street, Inverness	
	
Site Type	Roadside
Location (NGR)	266654,845532
Height(m)	2.5
Mount type	Clip and spacer to façade
Distance to kerb(m)	2
Relevant exposure	Exposure relevant to the annual mean objective at 1st floor level and above.
Description	Narrow street canyon. Retail at ground floor with some flats at upper floors.