2011 Air Quality Progress Report for *The Highland Council*

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

October 2011

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Report Reference number	THCLAQMPR2011
Date	October 2011

Executive Summary

This document is a Progress Report undertaken by the Highland Council in fulfilment of the requirements of the 2011 round of review and assessment for Local Air Quality Management.

The report considers new monitoring data and identifies new development that should be considered in more detail in the next Updating and Screening Assessment (USA), which is due to be submitted in 2012.

Air Quality in the Highlands continues to be generally good. The monitoring carried out through 2010 demonstrated that the Air Quality Objectives are being met. There continues to be significant investment in biomass combustion. New developments identified in this, and last year's, Progress Report will be assessed in detail in the next USA.

There is no requirement for the Highland Council to proceed to a detailed assessment for any pollutant at present time.

The Highland Council will submit an Updating and Screening Assessment Report in 2012.

Table of contents

Appendices

List of Tables

List of Figures

1 Introduction

1.1 Description of Local Authority Area

The area of the Highland Council covers approximately 26,500 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.

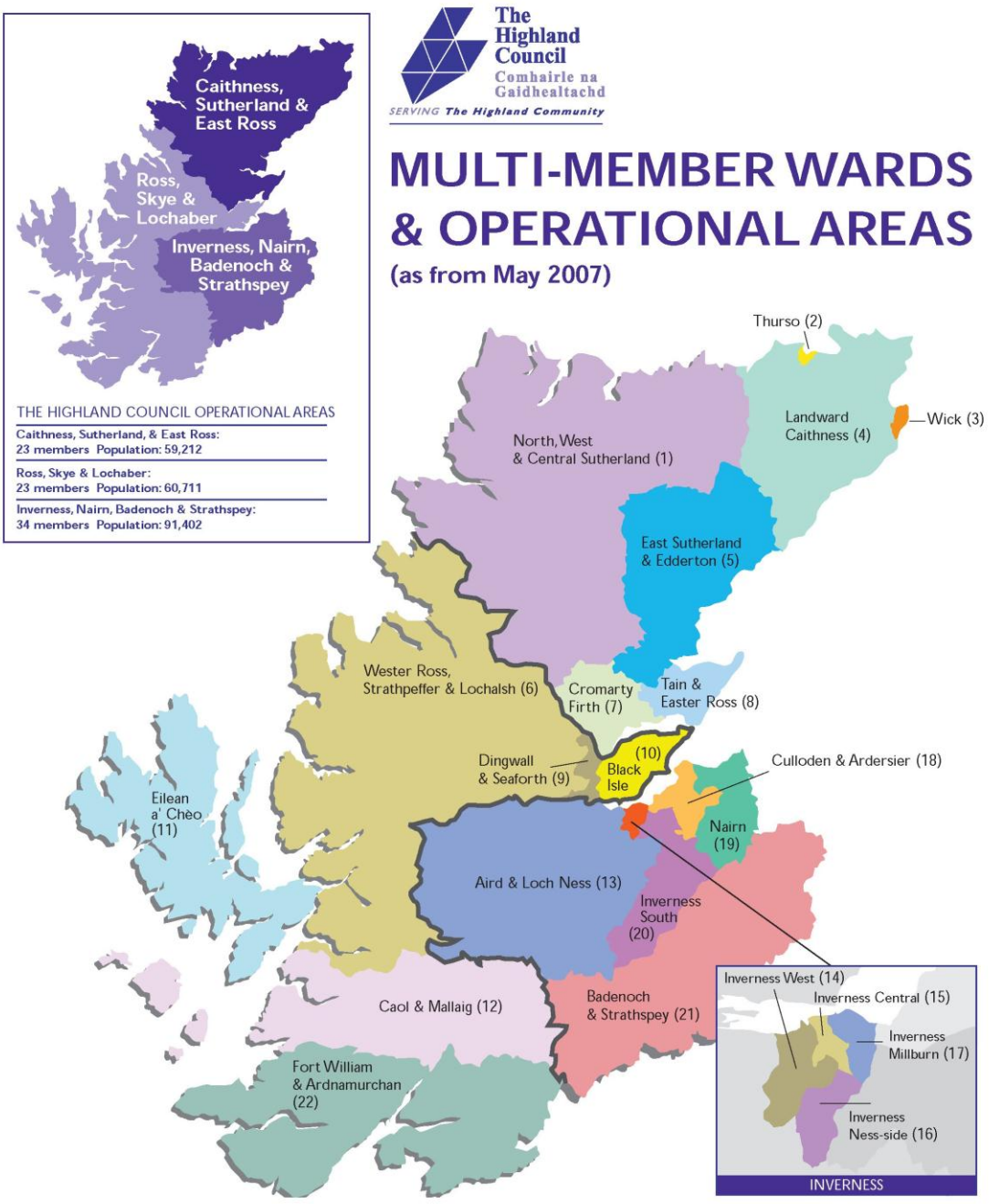
Inverness is the capital city of the Highlands and had an estimated population of 60,890 in 2009. The next largest settlements in the Highlands at that time were Nairn (population 10,948) and Fort William (9,857).

In 2007 the total population of the Highlands was over 220,000. 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.

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.

Figure 1.1 Map of Highland Council Area



CAITHNESS, SUTHERLAND & EASTER ROSS OPERATIONAL AREA

Ward No./ Ward Name		No. of Members	2004 Population
1	North, West & Central Sutherland	3	6,055
2	Thurso	3	7,849
3	Wick	3	7,506
4	Landward Caithness	4	9,809
5	East Sutherland & Edderton	3	7,620
7	Cromarty Firth	4	11,652
8	Tain & Easter Ross	3	8,721
	TOTAL	**23**	**59,212**

ROSS, SKYE & LOCHALSH OPERATIONAL AREA

Ward No./ Ward Name		No. of Members	2004 Population
6	Wester Ross, Strathpeffer & Lochalsh	4	11,758
9	Dingwall & Seaforth	4	11,073
10	Black Isle	4	9,468
11	Eilean a' Cheo	4	9,694
12	Caol & Mallaig	3	8,080
22	Ft William & Ardnamurchan	4	10,638
	TOTAL	**23**	**60,711**

INVERNESS, NAIRN, BADENOCH & STRATHSPEY OPERATIONAL AREA

Ward No./ Ward Name		No. of Members	2004 Population
13	Aird & Loch Ness	4	10,020
14	Inverness West	3	8,106
15	Inverness Central	4	12,672
16	Inverness Ness-Side	4	10,477
17	Inverness Millburn	3	8,657
18	Culloden & Ardersier	4	11,523
19	Nairn	4	10,809
20	Inverness South	4	7,156
21	Badenoch & Strathspey	4	11,983
	TOTAL	**34**	**91,402**

1.2 Purpose of Progress Report

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, $\mu g/m^3$ (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 Local Air Quality Management in Scotland.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	3.25 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	50 $\mu g/m^3$, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	40 $\mu g/m^3$	Annual mean	31.12.2004
	18 $\mu g/m^3$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, 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 NO_2 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.

Table 1.2 Summary of Previous Rounds of Review and Assessment

Report	Date	Outcome
Air Quality in The Highlands – First stage Review and Assessment	1998	No requirement to proceed to second stage review and assessment
Addendum to Air Quality in The Highlands	2001	
Updating and Screening Assessment	June 2003	Proceed to detailed assessment with respect to: Benzene in the vicinity of the 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. Nitrogen dioxide in Inverness City centre.
Progress Report	2005	Detailed Assessment not required.
Detailed Assessment	2005	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 Sulphur 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 a Local Air Quality Management Area in the Highland Council Area.
Updating and Screening Assessment	2006	Detailed Assessment not required.
Progress Report	2007	Detailed Assessment not required.
Progress Report	2008	Likely exceedence identified at Telford Street, Inverness for PM10. Detailed assessment required.
Updating and Screening Assessment	2009	Detailed Assessment required for NO_2 and PM10 in Halkirk, Caithness
Progress Report	2010	Detailed Assessment no longer required for NO2 and PM10 in Halkirk, Caithness

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

There are three automatic monitoring sites in the Highland Council Area. Details of the sites are summarised in table 2.1 below. The sites are operated and maintained by contractors on behalf of DEFRA and a fully ratified dataset for each site is available for download from the internet.

The Telford Street site is on one of the busiest streets in Inverness. Fort William is in a suburban recreation area of the town. Strath Viach is located in a remote highland glen 5km from the nearest road, monitoring Ozone.

There has been no change in the pollutants monitored at any of the three sites since the last round of review and assessment.

Figure 2.1 shows the location of these sites within the highlands.

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

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		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?
Telford Street	Roadside	265709	845670	NO_2	Chemi-luminescent	N	Y (2.5m)	4m	N
Fort William	Suburban	210857	774431	NO_2	Chemi-luminescent	N	Y 1-hour objective only	N/A	N
Telford Street	Roadside	265709	845670	$PM_{2.5}$ PM_{10}	Gravimetric	N	Y (2.5m)	4m	N
Fort William	Suburban	210857	774431	Ozone		N	N/A	N/A	N
Strath Viach	Rural	234831	875029	Ozone		N	N/A	N/A	N

2.1.2 Non-Automatic Monitoring Sites

The Highland Council continues to monitor Nitrogen dioxide at nine sites in Inverness and Dingwall using passive diffusion tubes. There are no changes to the detail of these sites since the last round of review and assessment. Diffusion tubes are supplied and analysed by Gradko International ltd. A full description of the method employed and QA/QC procedures is included in the appendices.

Figure 2.2 Contains maps showing the location of non-automatic monitoring sites.

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


Telford Street
Academy Street
Queensgate B
Queensgate A
Union Street
Quay
Viaduct
Waterloo Bridge
Friars' Bridge
Friars' Shot
Suspension Bridge (Foot)
Ness Bridge
Glebe Burial Gd
Superstore
Car Park
Liby
School
Inverness High School
The Highland Council HQ
Eden Court Theatre
Castle Hill
Govt Offs
Workshop
Football Ground
MHWS
MLWS

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Telford Street, Inverness	Roadside	265710	845672	NO_2	N	Y (2.5m)	4m	N
Union Street, Inverness	Roadside	266675	845339	NO_2	N	1-hour only (0.5m)	3m	N
Academy Street	Roadside	266577	845538	NO_2	N	Y (5m) 1-hour (0.5m)	5m	N
Queensgate A, Inverness	Roadside	266599	845416	NO_2	N	1-hour only (0.5m)	3m	N
Queensgate B, Inverness	Roadside	266642	845424	NO_2	N	1-hour only (0.5m)	3m	N
Wyvis Terrace, Dingwall	Roadside	254430	858968	NO_2	N	Y (2.5m)	1m	Y
Station Road, Dingwall	Roadside	255200	858185	NO_2	N	Y (1m)	1m	Y
Kintail Place, Dingwall	Urban Background	255112	859866	NO_2	N	Y (2.5m)	1m	N/A
Burns Crescent, Dingwall	Urban Background	254420	859288	NO_2	N	Y (2.5m)	1m	N/A

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

The annual mean Nitrogen dioxide concentration exceeded 40ug/m^3 at the diffusion tube monitoring site IV3a, Queensgate A in 2010. This site however has no exposure relevant to the annual mean objective. All other sites recorded an annual mean concentration less than 40ug/m3. None of the sites recorded more than 18 1-hour means above 200ug/m^3, or where appropriate the 99.8%ile of hourly means did not exceed 200ug/m^3. At none of the diffusion tube sites did the annual mean exceed 60 ug/m^3.

Automatic Monitoring Data

Results of the automatic Nitrogen dioxide monitoring are contained in Tables 2.3a and 2.3b below.

Nitrogen dioxide annual mean concentrations recorded at automatic monitoring sites were higher in 2010 than had been recorded in the previous two years.

The Telford Street AUN site is 4 metres from the carriageway of the A82 (Telford Street). The majority of houses along the street are around 6 metres from the carriageway. There are, however, several houses which are only 2.5 metres from the kerb. The AUN site is therefore not representative of the closest receptors on the street.

The procedure described in LAQM.TG(09) has been followed to calculate an estimate of the Nitrogen dioxide annual mean concentration at the closest receptors to Telford Street. Distance corrected results are displayed in brackets alongside the actual measured results in Table 2.3a.

The annual mean concentration recorded at Fort William is very low, which is to be expected given the nature of the site. There is, however, no relevant exposure at the Fort William site in terms of the annual mean objective.

There is relevant exposure at both locations in terms of the 1-hour objective. There were, however, no exceedences of the 200 ug/m3 1-hour mean objective at either location. The highest 1-hour mean concentration recorded at the Telford Street site was 151 ug/m^3. The highest 1-hour mean concentration recorded at Fort William during the monitoring period was 82 ug/m^3.

Figure 2.3 demonstrates the trends in the Annual mean Nitrogen dioxide concentration at automatic monitoring locations. In the Highland Council 2010 Progress Report a reducing trend was reported for Fort William and Inverness. However it can be seen that the increase in NO_2 concentration at both sites in 2010 has caused a reverse in

this trend. This may simply be a short term variation from the underlying trend. The results in future years will help to clarify this.

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture for full calendar year 2009 [b] %	Annual mean concentrations (μg/m^3)		
					2008	2009	2010
	Telford Street	N	88.8	88.8	20.6(24.1)	20.7(22.5)	24.5(26.8)
	Fort William	N	91.8	91.8	10.5[1]	9.35[2]	13.4

[1] only 88% data was captured from the Fort William site in 2008.
[2] only 87.9% data was captured from the Fort William site in 2009.

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Automatic Monitoring Sites.

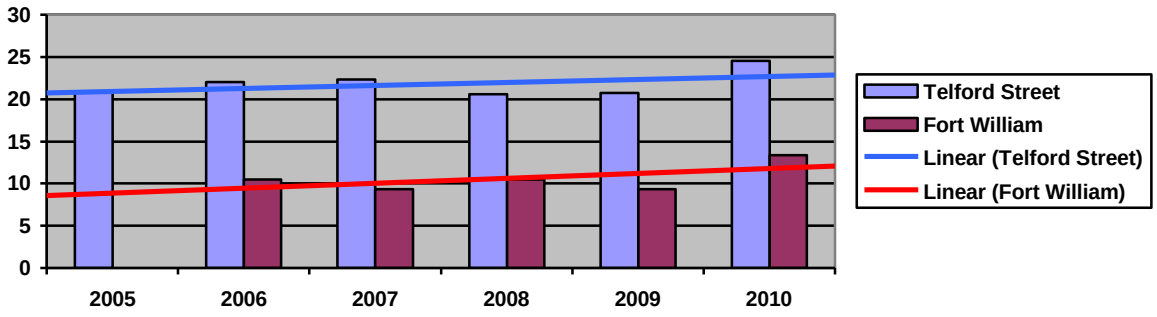


Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Number of Exceedences of hourly mean (200 μg/m^3)		
						2008	2009	2010
	Telford Street	N	Y	88.8	88.8	0	0	0 (118)
	Fort William	N	Y	91.8	91.8	0 (59)	0 (73)	0

Data Capture for Fort William in 2008 and 2009 were 88% and 87.9% respectively.
Figure in brackets is the 99.8th percentile or hourly means.

Diffusion Tube Monitoring Data

Results of the Nitrogen dioxide diffusion tube monitoring at sites within Highland are contained in Table 2.4 and 2.5 below.

Some of the sites reported here are on busy shopping streets where kerbside locations might be considered to be relevant exposure in terms of the 1-hour objective. The current guidance to local authorities is that exceedences of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60 ug/m3 or above. At appropriate sites the annual mean has been corrected to estimate annual mean concentration at 0.5 metres from the kerb. For none of the sites does this result in an annual mean concentration of 60 ug/m^3 or more.

Site IV4, is a collocation study at the site of the AUN (automatic urban network). The annual mean for this site noted in Table 2.4 is an average of the results for the triplicate tubes exposed at the location. All results were bias adjusted using an appropriate bias adjustment factor. Detailed discussion on the choice of bias adjustment factors is included in the appendices.

A full year of data for the remaining sites was not available for the 2009 calendar year. The annual mean concentration for the these sites was therefore determined from a short term measurement using the method described in Box 3.2 of LAQM.TG(09). The results are bias adjusted using a combined bias adjustment factor. A full description of the method undertaken is described in the Appendices.

Relevant Exposure at Diffusion Tube Monitoring Sites

The procedure described in LAQM.TG(09) has been followed to calculate an estimate of the Nitrogen dioxide concentrations at the closest relevant exposure where this is not represented by the monitoring location.

Site IV4, Telford Street; site IV1 Academy street; and the four sites in Dingwall have exposure relevant to the annual mean objective and the hourly mean objective. Results of monitoring from these six sites for comparison with the annual mean objective are displayed in Table 2.4a

Site IV4, Telford Street, is 4 metres from the kerb. The nearest relevant exposure to this street, for both long and short term objectives, is 2.5 metres from the kerb. It has therefore been necessary to correct the recorded annual mean concentrations at this site to reflect the distance from the kerb of the nearest relevant exposure.

The four sites in Dingwall are representative of relevant exposure in terms of both objectives therefore no adjustment is necessary

Site IV1 is considered to be representative of relevant exposure in terms of the annual mean objective.

There is no relevant exposure at sites IV2, IV3a and IV3b in terms of the annual mean objective.

Sites IV1, IV2, IV3a and IV3b are in the Old Town of Inverness. These are busy shopping streets where kerbside sites might be considered relevant exposure in terms of the 1-hour mean objective. However relevant exposure in terms of the 1-hour objective could be considered to be much closer to the kerb than the measurement location at any of these four sites. The annual mean concentration for these four sites has been corrected to a distance of 0.5 metres from the kerb.

These predicted concentrations at 0.5m from the kerb for the four sites in the old town are displayed in table 2.4b below.

Diffusion Tube Monitoring Trends

Figure 2.4 represents the trends that are evident in the diffusion tube monitoring results. The trends are demonstrated for the average results over three distinct site groups.

Firstly the four sites in the Inverness Old Town Area. The trend in the graph indicates an increase in concentration over the years. It was suggested in the 2010 Progress Report that this was skewed by the higher concentrations experienced in 2007 during the old town improvement project when there were major works in the area. Average concentrations in 2010 were higher and the increasing trend looks more firmly established.

An increasing trend is also evident at the Dingwall Roadside sites.

The two background sites in Dingwall have also shown a steady increase over the period.

An marked increase in concentrations this year is evident at all the sites in Highland possibly indicating that the increase is not due to local influences.

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes at sites with exposure relevant to long-term objective

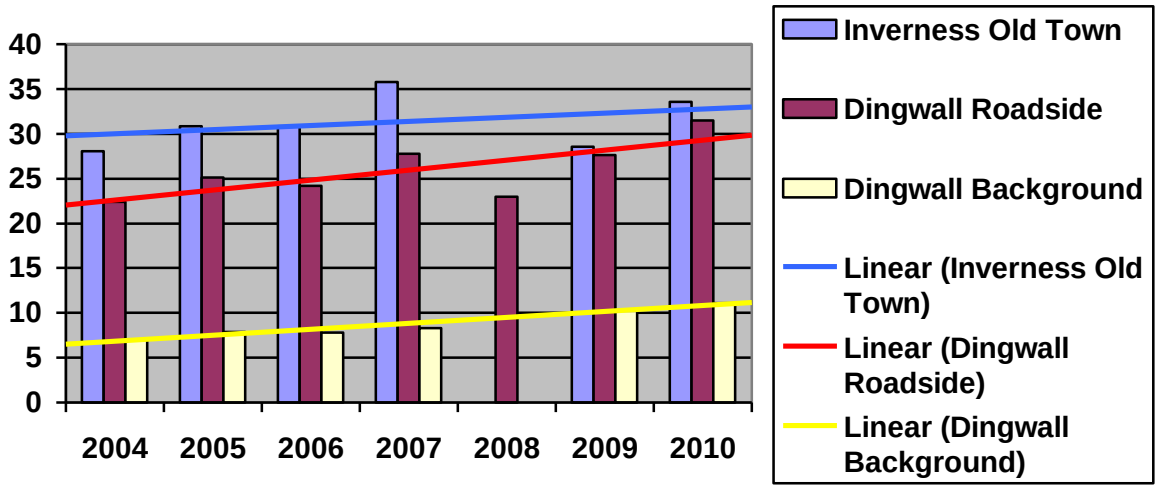
Site ID	Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations (corrected annual mean concentrations) (μg/m^3)		
						2008	2009	2010
IV4	Telford Street, Inverness	N	Y	100	100	20(22)	20.8(22.6)	24.4(26.7)
IV2	Academy Street, Inverness	N	Y	100	100		25.8	29.3
RC1	Wyvis Terrace, Dingwall	N	Y	91.7	91.7		22.9	26
RC2	Station Road, Dingwall	N	Y	91.7	91.7		32.3	37
RC3	Kintail Place, Dingwall	N	Y	75	75		8.8	10
RC4	Burns Crescent, Dingwall	N	Y	91.7	91.7		11.7	12.2

Table 2.4b Results of Diffusion Tube Monitoring at sites with exposure relevant to short term objective.

Site ID	Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Corrected[a] annual mean concentrations (μg/m^3)		
						2008	2009	2010
IV1	Union Street, Inverness	N	Y	75	75		29	35.9
IV2	Academy Street, Inverness	N	Y	100	100		37.3	43.8
IV3a	Queensgate, Inverness	N	Y	91.7	91.7		48.2	58.1
IV3b	Queensgate, Inverness	N	Y	66.7	66.7		41.1	49.9

[a]Note: Corrected annual mean concentrations relate to kerbside exposure and are only relevant for comparison with the 60 ug/m^3 indicator of likely compliance with the 1-hour mean objective

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.



2.2.2 PM_{10}

PM10 annual mean concentrations at Telford Street are significantly below the 2010 annual mean objective and, regardless of an increase in 2010 concentration over the most recent previous years, continue to be the subject of a reducing trend.

There were 2 exceedences of the 24 hour mean objective in 2010. Data capture at the site was less than 90%. The 98th percentile of 24 hour means was 38 ug/m^3.

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 PM_{10} concentrantions at the monitoring position are such that it is most unlikely that concentrations, even at closest receptors, are in excess of the objectives.

Table 2.5a Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

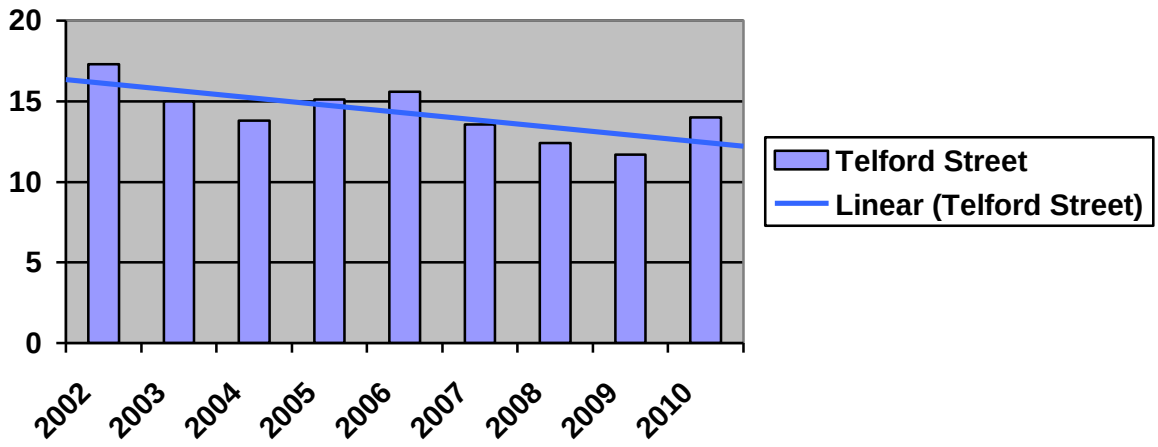
Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations (μg/m^3)		
					2008	2009	2010
IV4	Telford Street	N	88.2	88.2	12.3	11.6	14

Table 2.5b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture 2010 %	Number of Exceedences of daily mean objective (50 μg/m^3)		
					2008	2009	2010
IV4	Telford Street	N	88.2	88.2	0	0	2 (38)

where data capture is less than 90% the 98th percentile of daily means is included in brackets

Figure 2.5 Trends in Annual Mean PM_{10}.



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 2.6 below

Table 2.6 UK Air Quality Strategy Objectives for protection of human health, July 2007

Pollutant	Air Quality Objective		To be achieved by
	Concentration	Measured as	
Particles ($PM_{2.5}$) (gravimetric)	12ug m^{-3} (limit)	Annual mean	2010
Ozone	100ug m^{-3} not to be exceeded more than 10 times a year	8 hourly running mean or hourly mean	31st December 2005

In 2010 the 8 hourly running mean Ozone concentration was greater than 100ug/m^3 on 4 occasions at Fort William and 4 occasions at Strath Viach. The objective was therefore achieved for this pollutant at these locations.

The annual mean $PM_{2.5}$ concentration at Telford Street, Inverness was 7 ug/m^3 in 2010. This is less than the limit set by the objective to be achieved by 2010 for the pollutant in Scotland.

2.2.4 Summary of Compliance with AQS Objectives

The Highland Council has examined the results from monitoring in the local authority area. There are no exceedences of any objectives at sites with relevant exposure, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

3.1 Road Traffic Sources

There are no new road traffic sources identified in the Highland Council area since the last round of Review and Assessment.

3.2 Other Transport Sources

There are no new Airports; locations where diesel or steam trains are regularly stationary for periods of 15 minutes of more, with potential for relevant exposure within 15 metres; Locations with a large number of movements of diesel locomotive, and potential for long term relevant exposure within 30 metres; or ports for shipping identified in the Highland Council area since the last round of Review and Assessment.

3.3 Industrial Sources

There are no new industrial sources identified since the last round of Review and Assessment.

3.4 Commercial and Domestic Sources

Table 3.1 lists the individual biomass combustion plant that have been identified since the last round of Review and Assessment. These installations shall be investigated further at the next round of updating and screening assessments.

There are no new areas identified where the combined impact of several biomass combustion sources, or domestic solid fuel burning may be relevant.

Table 3.1 New Biomass Combustion Plant

Installation	Location
Dingwall Leisure Centre	Dingwall
Findon Hall	Culbokie
Conon Bridge Primary School	Conon Bridge
Keppoch House	Strathpeffer
North Kessock Public Hall	North Kessock
Munlochy Hall	Munlochy
Tarradale Primary School	Muir of Ord
Lochaber Leisure	Fort William
Abernethy Primary School	Boat of Garten
Forestry Commission	Inverness
Lovat Hotel	Beauly
Culloden Academy	Inverness
Wood Bees	Thurso
Tain Royal Academy	Tain
Drummuie	Golspie
Mallaig and District Swimming Pool	Mallaig
Pulteneytown Peoples Project	Wick
Plockton High School	Plockton
Dornoch Primary	Dornoch
Park Primary School	Invergordon
Ferry Inn	Uig
Kinmylies Building	Inverness
Milton of Leys Primary School	Inverness
Dunbar Hospital	Thurso
Town and County Hospital	Wick
Alvie Manse	Aviemore
Tarbet House	Acharacle
Ian Charles Community Hospital	Grantown on Spey
Biomass CHP	Georgemas Junction
Caberfeidh guesthouse/Seaview Hotel	John O Groats
Thurso High School	Thurso
Thurso Swimming Pool	Thurso
BSW Corpach	Fort William
Holly Cottage	Clunas, Nairn
Duke of Gordon Hotel	Newtonmore
Wardens House 25 Walter Cameron Way	Corpach, Fort William
Highland Housing Fair Site	Inverness
Former Arjo Wiggins Paper Mill Site	Corpach, Fort William
An Acarsaid Community Care Centre	Broadford
Balloan Fields	West Heather Road, Inverness
Arainn Chaluim Chille Campus	Teangue, Isle of Skye
Timespan	Helmsdale

3.5 New Developments with Fugitive or Uncontrolled Sources

There are no new developments with fugitive or uncontrolled sources identified since the last round of review and assessment.

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

Dingwall Leisure Centre
Findon Hall
Conon Bridge Primary School
Keppoch House
North Kessock Public Hall
Munlochy Hall
Tarradale Primary School
Lochaber Leisure
Abernethy Primary School
Forestry Commission, Inverness
Lovat Hotel
Culloden Academy
Wood Bees
Tain Royal Academy
Drummuie
Mallaig and District Swimming Pool
Pulteneytown Peoples Project
Plockton High School
Dornoch Primary
Park Primary School
Ferry Inn, Uig
Kinmylies Building
Milton of Leys Primary School
Dunbar Hospital
Town and County Hospital
Alvie Manse
Tarbet House
Ian Charles Community Hospital
Biomass CHP at Georgemas Junction
Caberfiedh Guesthouse/Seaview Hotel
Thurso High School
Thurso Swimming Pool
BSW Corpach
Holly Cottage
Duke of Gordon Hotel
Warden's House
Highland Housing Fair Site
Former Arjo Wiggins Paper Mill Site
An Acarsaid Community Care Centre
Balloan Fields
Arainn Chaluim Chille Campus
Timespan

These will be taken into consideration in the next Updating and Screening Assessment, scheduled for 2012.

4 Planning Applications

The planning applications identified in table 4.1 were received since the last round of review and assessment. Air quality issues are likely to be part of the planning process. The Broadford Primary School development will be discussed in detail at the next round of updating and air quality will be considered should the Brackla Farm development progress to full planning permission.

The 2010 Progress Report identified an application for a Residual Waste to Energy development in Invergordon and a Biomass CHP development at Invergarry. Both of these developments were refused permission.

Table 4.1 Planning Applications

Development	Planning Status
Broadford Primary School – Biomass Boiler	Pending
Brackla Farm – Proposed Wood Chip Boiler	Planning in Principle Granted

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

New monitoring data has not identified any potential or actual exceedences at relevant locations.

5.2 Conclusions relating to New Local Developments

The progress Report has identified 42 new biomass developments which will require more detailed consideration in the next round of updating and screening assessment.

No new local development was identified which gave rise to the need for a Detailed Assessment.

5.3 Other Conclusions

The progress report has identified some development which will require consideration in further rounds of review and assessment should permission be granted.

Some development in the planning process identified in previous rounds of assessment no longer require further consideration following a decision by the planning authority to refuse permission.

5.4 Proposed Actions

There is no requirement for the Highland Council to proceed to a Detailed Assessment for any pollutant at this stage.

The next course of action will be for the Highland Council to submit an Updating and Screening Assessment in 2012.

6 References

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8. The Highland Council, **Progress Report**, 2005
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16. **Environment Act 1995**
17. **Clean Air Act 1993**
18. http://www.airquality.co.uk/data_and_statistics_home.php
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20. 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
21. AEA Technology, **QA/QC Data Ratification report for the Automatic Urban and Rural Network, October – December 2008 and Annual Review for 2008**, June 2009.
22. Gradko (International) Ltd, **Passive Diffusion Tube Monitors – Instruction manual for Exposure and Location**.
23. AEA Energy and Environment, **Technical Guidance – Screening Assessment for Biomass Boilers**, 2008
24. Air Quality Consultants, **Nitrogen dioxide Concentrations and Distance from Roads**, 2008
25. http://www.uwe.ac.uk/aqm/review/
26. AEA Energy and Environment for DEFRA and the devolved administrations, **Diffusion Tubes for Ambient NO2 Monitoring – Practical Guidance for Laboratories and Users**, 2008
27. AEA Energy and Environment 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 105-109.**

Appendices

Appendix A: QA/QC Data

Appendix B: Measured Data

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes used by The Highland Council are supplied and analysed by Gradko International Ltd. The preparation method is "20% TEA in Water". The bias adjustment factor recommended by the R&A Helpdesk Database is 0.92. This factor is derived from 41 co-location studies.

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 although the data capture for month 1 was poor. Accuracy was therefore determined using 11 data periods only. The bias factor was determined to be 0.95. Overall precision of the diffusion tubes survey was good. There were no periods of poor precision in the survey.

Discussion of Choice of Factor to Use

A local bias adjustment factor has been used to adjust the results of the diffusion tube survey at site IV4, Telford Street, Inverness. The survey location is co-located with the automatic diffusion tube monitor. All other sites are adjusted with the combined bias adjustment factor. The table below shows raw annual mean data for all sites and data for each site adjusted with each of the bias factors discussed in the previous paragraph. The bias adjusted concentration that has been used in this progress report is highlighted in bold text.

Site ID	Annual Mean (uncorrected)	Corrected Annual Mean Local Factor	Corrected Annual Mean Combined Factor
IV1	29.09	27.63	**26.76**
IV2	31.83	30.23	**29.28**
IV3a	45.58	43.30	**41.93**
IV3b	39.46[a]	37.48	**36.30**
IV4	26	**24.7**	23.92
RC1	28.31	26.89	**26.04**
RC2	40.20	38.19	**36.98**
RC3	10.90	10.35	**10.03**
RC4	13.22	12.55	**12.16**

[a] Date from site IV3B has been annualised as described later in this appendix

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

The data set for the diffusion tube site IV3b was carried out over a short term monitoring period. The method described in Box 3.2 of LAQM.TG(09) has been used to annualise the mean concentration for this site. Two sites were determined to be appropriate to determine the period mean adjustment factor. These were Edinburgh St, Leonards and Grangemouth Murray. These are Urban Background sites and had good data capture for the year 2010.

The table below demonstrates the determination of the period adjustment factor applied to the data from this site to estimate the annual mean NO2 concentration. The period adjustment factor for this site was determined to be 1.028.

Site	Site Type	Annual Mean	Period Mean	Ratio
Edinburgh St Leonards	Urban Background	31.25	30.75	1.016
Grangemouth Murray	Urban Background	23.67	22.75	1.040
			Average	1.028

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.

Gradko performance on the WASP Inter-comparison Project Rounds 105-109 was described as "good".

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 monthly data for all sites

Month	Site										
	IV1	IV2	IV3a	IV3b	IV4a	IV4b	IV4c	RC1	RC2	RC3	RC4
JAN	32.36	33.88	49.36	41.92	34.70	39.02	34.21	37.47	49.75	15.86	21.45
FEB		43.51	59.38	48.44	35.37	36.35	32.40	31.49	44.90	13.48	16.77
MAR	28.26	30.15	48.61	35.76	29.49	29.93	25.33	26.04	39.14	10.47	13.11
APR	33.05	32.66	46.32		24.96	24.50	23.03	20.49	32.41		8.49
MAY	27.86	30.39	41.02	37.59	23.83	21.52	19.27	20.32	33.95		8.21
JUN		28.58		35.34	16.68	16.49	14.52	14.44	30.38	2.50	5.56
JUL	17.05	18.87	39.07		17.69	16.31	15.00				
AUG	27.05	31.75	37.28	33.67	21.48	20.24	15.06	14.09	25.54	4.48	6.32
SEP		38.74	50.52		25.87	25.42	25.53	22.56	41.23	7.67	10.09
OCT	27.26	29.12	45.81	34.00	28.50	27.77	26.82	21.86	28.69	6.94	8.59
NOV	37.51	32.39	44.96	40.38	30.02	35.42	33.33	37.00	50.84	16.54	19.23
DEC	31.41	31.90	39.02		40.00	36.69	31.31	65.62	65.38	20.17	27.57