



## 2014 Air Quality Progress Report for City of Edinburgh Council

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

July 2014

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<b>Report Reference number</b>	PR14
<b>Date</b>	July 2014

## Executive Summary

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act 1995 and the National Air Quality Strategy 2007. The report has been completed in accordance with Technical Guidance (LAQM, TG09) document, produced by DEFRA and the Devolved Administrations.

### Nitrogen Dioxide

Data for the year 2013 shows that monitoring locations within each of the Air Quality Management Areas (AQMA) continue to exceed the annual mean air quality objective; therefore they remain valid. A number of monitoring locations within the AQMA meet the objective; however a much wider area than the geographical extent of the exceedences is generally included in AQMA to ensure effective management.

In 2013 the hourly mean objective is met at St John's Road for the first time since monitoring commenced at this location. There are also no exceedences of this objective at any other monitoring location. Monitoring will continue and if a consistent pattern of lower concentrations develop, the Local Authority will consider revoking or amending AQMA in respect to this objective.

Exceedences of the annual mean objective occurred at monitoring locations out with the AQMA at Angle Park Terrace, Dundee Street, Nicolson Street, South Bridge, South Clerk Street, and Slateford Road. In conclusion to Detailed Assessment work the Central AQMA will be extended to include these areas.

In addition Detailed Assessment work at Fountainbridge and the Portobello Road / Sir Harry Lauder Road junction concludes that AQMA will not be required as there are no exceedences of the objective.

Monitoring will also continue at Queensferry Road regarding an anomalous roadside measurement not in keeping with facade (relevant exposure) concentrations. A recent Detailed Assessment concluded that an AQMA is not necessary for this area.

### Particulate Matter (PM<sub>10</sub>)

PM<sub>10</sub> data from all monitoring locations in 2013 meet the EU limit values and UK National objectives. The background sites at St Leonards and Currie meet the tighter

Scottish objective. Data from Queen Street and Glasgow Road is border-line compliant with regards this objective and at Salamander Street and Queensferry Road it is exceeded.

The Local Authority is currently undertaking a Detailed Assessment with regards to PM<sub>10</sub> city wide, which will be reported separately in 2014. Air quality consultants have been employed to assist in determining the AQMA boundary necessary to contend with fugitive sources in the vicinity of the Salamander Street monitoring location. Other work is ongoing to consider transport and industrial sources.

### **Trend**

Historically it has proved difficult to formulate reliable assumption on data trends for both NO<sub>2</sub> and PM<sub>10</sub> due to disruptions to normal traffic flows, arising from construction work associated with the Edinburgh Trams. With construction now complete, the Local Authority has agreed to undertake a period of monitoring to assess traffic movements. It is anticipated that this will occur over a period of twelve months to allow for conditions to normalise.

Notwithstanding this, in 2013 data shows a general downward trend of both pollutants at the majority of monitoring locations in the city. With the passive diffusion tube data this could be linked to a general downward trend of the bias adjustment factor but it is also likely that improvements to the bus fleet in a number of hot-spot areas has also contributed.

A revised **Air Quality Action Plan** (AQAP) will be produced to address the new areas of concern. Nevertheless, there has been steady progress with respect to the two main measures contained in the current AQAP relating to management of emissions from buses and freight, via voluntary partnerships.

All bus companies operating in Edinburgh continue to improve their fleet, although it is recognised that without substantial financial input it will not be possible to achieve the draft Voluntary Emissions Reduction Partnership target of Euro 5 or better, by 2015.

The Local Authority became a partner in an EU project, ECOSTARS Europe through which the ECOSTARS Edinburgh scheme was officially established in January 2012. The scheme provides a relatively low-cost, 'partnership' mechanism to assist the Council encourage and facilitate emissions improvements from the goods and

passenger transport sector operating in the city. To date 51 operators have joined and a total of 3,525 vehicles have been registered.

There are other initiatives in the AQAP relating to the council's fleet, electric vehicle charging infrastructure, the use of SCOOT (traffic management system) and a remote real-time pollutant trial with MOTES, which are also progressing. A trial of a vehicle telematic system observed positive changes in driver behaviour and operation of vehicles, details of which are now being evaluated by the Local Authority.

The newly revised Local Transport Strategy recognises air quality has been an issue and the adverse impact that the increasing use of diesel-powered cars is having on some parts of the City. It defines a number of policies which aim to reduce traffic levels overall and encourage modal shift e.g. Park and Ride, Controlled Parking Zones, Priority Parking Zones and the development and implementation of an Active Travel Action Plan. These will benefit local air quality on a city-wide basis. It is the Council's intention to wait for the development later in 2014 of the Scottish Government National Low Emission Strategy and associated guidance prior to assessing the potential for the introduction of a mandatory Low Emission Zone, which is stated as an action in the revised Local Transport Strategy 2014.

The Local Authority secured funding from the Scottish Government Air Quality Action Plan Grant Scheme to undertake a feasibility modelling study which considered three options for Newbridge Roundabout to reduce congestion on the A8 approach. The study showed significant emission reductions and reduced vehicle queue lengths for all three options, which is likely to have a positive impact on the Glasgow Road AQMA. The Council is currently evaluating the three proposals with respect to cost and benefit prior to a decision being made on which option to select.

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# 1 Introduction

## 1.1 Description of Local Authority Area

Edinburgh is the capital city of Scotland and the seat of the Scottish Parliament. It is the second largest city in Scotland and the seventh most populous in the United Kingdom. Located in the south east of Scotland's central belt it is bounded by the Firth of Forth to the North and the Pentland Hills to the South. The latter comprises 20 miles of farming and recreational land. The peripheral areas of the city to the West and South West are predominately semi-rural. The city is a financial, commercial and tourist centre and attracts over one million visitors annually.

Edinburgh's population grew by nearly 28,000 between the 2001 Census and the 2011 Census – an increase of 6.2%, to 476,600. In terms of absolute numbers this was the largest increase of any local authority area in Scotland. Although there has been a substantial growth in population, the Census has shown that this has not been as fast as previously thought. This means that future population estimates and projections will need to be recalibrated to reflect the detailed and comprehensive information now available. The revised population figure for the city could have a number of implications for future land use allocations.

In Edinburgh, a large number of people live within the core of the city centre. Approximately 55% of Edinburgh's population live in tenements or high-rise flats, compared to the Scottish average of 33%. The majority of tenement properties are located in the central and northern areas of the city. There has been a substantial growth of residential flats within these locations due to the development of many former industrial sites. The southern and western peripheral areas of the city have predominantly detached and semi-detached housing.

Many of Edinburgh's main streets and the major radial routes into the city are narrow, with tenement buildings four to five stories high on either side of the road carriageway, which form street canyons. In many instances, the distances from the edge of the road to the façade of residential properties can be as little as two metres.

As a major employment centre, Edinburgh attracts a substantial amount of road and rail commuter traffic. The main means of transport within Edinburgh is via the road

network. In 2011 30% of the population used the bus and train, 25% walked and 7% cycled. The main UK East Coast rail line is routed through the city centre and there are further rail links to Glasgow, Fife and the major centres of the north.

Smoke Control Orders cover the entire Edinburgh Council area and significant improvements in air quality have been achieved since their introduction due to use of natural gas in the domestic and commercial sectors.

A major cause of poor air quality in certain parts of Edinburgh, as in many urban environments, can be related to road traffic.

## **1.2 Purpose of Progress Report**

This report fulfils the requirements of the Local Air Quality Management (LAQM) 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 LAQM 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 microgrammes per cubic metre  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  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 <sup>3</sup>	Running annual mean	31.12.2003
	3.25 µg/m <sup>3</sup>	Running annual mean	31.12.2011
1,3-Butadiene	2.25 µg/m <sup>3</sup>	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m <sup>3</sup>	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m <sup>3</sup>	Annual mean	31.12.2004
	0.25 µg/m <sup>3</sup>	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m <sup>3</sup>	Annual mean	31.12.2005
Particulate Matter (PM <sub>10</sub> ) (gravimetric)	50 µg/m <sup>3</sup> , not to be exceeded more than 7 times a year	24-hour mean	31.12.2011
	18 µg/m <sup>3</sup>	Annual mean	31.12.2011
Sulphur dioxide	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m <sup>3</sup> , 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 UK Review and Assessment process of Local Air Quality Management (LAQM) commenced in 1997.

A summary of the City of Edinburgh's findings and description of the three AQMAs are detailed in Tables 1.2 and 1.3. Maps of the boundaries of the AQMAs are presented in Figures 1.1 to 1.5.

Table 1.2 Summary of previous Review and Assessments

Round / Report		Date	Outcome
1	<b>Review &amp; Assessment of Air Quality Stage 1/2</b>	1998	Potential exceedences of NO <sub>2</sub> and PM <sub>10</sub>
1	<b>City of Edinburgh Council Review Stage 3</b>	2000	Exceedences of NO <sub>2</sub> annual mean objective. Attributed to traffic emissions <a href="#">AQMA declared for City Centre 31.12.2000</a>
1	<b>Review &amp; Assessment of Air Quality Stage 4</b>	2002	Source apportionment identified that buses were the major contributors of NO <sub>2</sub>
2	<b>Air Quality Action Plan</b>	2003	Key actions; cleaner vehicles HGVs and buses, congestion charging, tram network.
2	<b>Updating &amp; Screening Assessment Phase 2</b>	2003	Detailed Assessment required city-wide for PM <sub>10</sub> due to high background concentrations and tightening of air quality objectives for Scotland. Detailed Assessment for NO <sub>2</sub> at St John's Road.
2	<b>Detailed Assessment Report</b>	2004	Partisol co-location study with TEOM gave local gravimetric conversion factor of 1.14 AQMA not required for PM <sub>10</sub> using 1.14. AQMA required for NO <sub>2</sub> at St John's Road.
2	<b>Progress Report</b>	2005	Potential exceedences of NO <sub>2</sub> at West Port and Great Junction Street Four locations in Central AQMA likely to fail EU limit value – West Maitland St, Torphichen PI, Princes St and Roseburn Terrace. Concerns were raised with respect to density of development in city centre and North Edinburgh Waterfront.
3	<b>Updating &amp; Screening</b>	2006	Exceedences of NO <sub>2</sub> within Central AQMA & St John's Road

Round / Report	Date	Outcome
<b>Assessment Report</b>		<a href="#">AQMA declared for St John's Rd 31.12.2006</a>
<b>3 Detailed Assessment for Nitrogen Dioxide at Great Junction St and West Port</b>	2007	AQMA required for NO <sub>2</sub> at Gt. Junction Street and West Port. West Port also likely to not meet hourly NO <sub>2</sub> objective. Council to explore various options to extend existing Central AQMA to cover both areas or West Port. Declare two separate AQMAs. Preferred option to extend Central AQMA.
<b>3 Air Quality Progress Report.</b>	2008	<p>NO<sub>2</sub> exceedences within AQMAs. Number of locations also did not meet hourly mean objective. Based on 2007 data predictions EU limit values are likely to be exceeded within AQMAs. Exceedences of NO<sub>2</sub> at Bernard St, Commercial St, Ferry Rd, Easter Rd, London Rd, Hope Park Terrace, Glasgow Rd. Detailed Assessment required.</p> <p>City-wide Detailed Assessment required for PM<sub>10</sub> due to exceedences of Scottish Air Quality Objectives using 1.14 local gravimetric factor.</p> <p><a href="#">AQMA declared for Gt. Junction Street 09.03.2009 to include area of exceedence on Ferry Road. Central AQMA amended to include West Port and exceedences of hourly mean NO<sub>2</sub> objective. St John's Rd AQMA amended to include exceedence of hourly mean NO<sub>2</sub></a></p>
<b>3 Air Quality Action Plan</b>	2008	Revised, Congestion charge removed as an action. Include St John's Road AQMA
<b>4 Updating and Screening Assessment</b>	2009	<p>NO<sub>2</sub> exceedences within AQMAs. Existing AQMAs remain valid. NO<sub>2</sub> annual exceedences noted at Glasgow Rd, Easter Rd, London Rd, Bernard St, Grassmarket, Cowgate, Queensferry Rd/ Barnton and Hillhouse Rd. Potential exceedences of NO<sub>2</sub> at Hope Park Terrace, Broughton Rd and Commercial Street.</p> <p>City-wide Detailed Assessment for PM<sub>10</sub> required, which will address the four biomass installations and poultry farm complex at Gogarburn. Most congested main roads in</p>

Round / Report	Date	Outcome
		city centre are likely to exceed Scottish annual objective for PM <sub>10</sub> based on monitoring at Queen Street, Haymarket and DMRB modelling.
<b>4 Progress Report</b>	2010	NO <sub>2</sub> exceedences within all 3 AQMAs. AQMAs remain valid. Exceedences of NO <sub>2</sub> at, Portobello High St, Inverleith Row, Bernard Street, Glasgow Road, Easter Road, London Road, Queensferry Road, Grassmarket. Potential exceedences at, Broughton Rd, Commercial St, Hope Park Terrace, Cowgate, Hillhouse Road.
<b>4 Further Assessment: St John's Road West Port (extension of Central AQMA) Great Junction Street</b>	2011	<p>NO<sub>2</sub> exceedence within 3 AQMAs, which remain valid.</p> <p>Source apportionment –Within local vehicle fleet, buses contribute the greatest percentage of the measured NO<sub>2</sub> at St John's Rd and Gt. Junction St, whilst at West Port the greatest contribution is attributed to cars.</p> <p>% Range of roadside NO<sub>x</sub> reduction required to meet NO<sub>2</sub> Annual Mean Objective (40µg/m<sup>3</sup>). Using both UK and Scottish (SG) background maps.</p> <p>Gt. Junction St UK 40.7% SG49.9%</p> <p>St John's Rd UK 70.6%SG76.8%</p> <p>West Port UK 74.9% SG86.4%</p>
<b>4 Progress Report</b>	2011	<p>NO<sub>2</sub> exceedences in all 3 AQMAs. Existing AQMAs remain valid.NO<sub>2</sub> exceedences outwith existing AQMAs – London Road, Easter Road, Grassmarket, Cowgate, Bernard Street, Hope Park Terrace, Queensferry Road, Glasgow Road, Inverleith Row, Hillhouse Road Angle Park Terrace, Slateford Road, Fountainbridge / Tollcross and Gorgie Road / Delhaig.NO<sub>2</sub> potential exceedences identified at Broughton Road, Ferry Road, Commercial Street, Salamander Street/Bath St and Portobello High St.</p> <p>NO<sub>2</sub> Detailed Assessment work being progressed at Queensferry Road, Portobello,</p>

Round / Report	Date	Outcome
		<p>Inverleith Row and required for Hope Park Terrace / Clerk Street junction, Hillhouse Road, Slateford Road, Fountainbridge / Tollcross and Angle Park Terrace</p> <p><a href="#">Extend Central AQMA and &amp; Great Junction St AQMA for exceedences of NO<sub>2</sub></a>  <a href="#">Declare Glasgow Road/Newbridge for exceedences of NO<sub>2</sub></a></p>
<p><b>5 Updating and Screening Assessment</b></p>	<p>2012</p>	<p>NO<sub>2</sub> exceedences in all 3 AQMAs. Existing AQMAs remain valid. Exceedences in proposed new Glasgow Road AQMA and extensions to existing Central and Great Junction Street AQMAs. Other exceedences at Inverleith Row, Queensferry Road, Portobello Road and Angle Park Terrace. Potential exceedences of NO<sub>2</sub> identified at Slateford Road, Fountainbridge/Tollcross, Hope Park Terrace, Hillhouse Road, Salamander Street/Baltic, Salamander Street/Bath Road and Ferry Road. Ongoing Detailed Assessment work at Hope Park Terrace/Clerk Street, Hillhouse Road, Slateford Road, Fountainbridge/Tollcross and Angle Park Terrace. Progress with declaration of Glasgow Road AQMA and extensions of Central and Great Junction Street AQMAs.</p> <p><a href="#">Declare AQMA at Inverleith Row for exceedences of annual mean objective for NO<sub>2</sub></a></p>
<p><b>5 Progress Report</b></p>	<p>2013</p>	<p><b>NO<sub>2</sub></b> exceedences in all 3 AQMAs. Existing AQMAs remain valid. Exceedences outwith AQMAs at Queensferry Road, Angle Park Terrace, Slateford Road, Nicolson Street and South Clerk Street. Potential exceedences of NO<sub>2</sub> identified at Broughton Road, Queensferry Road, Hope Park Terrace, Ferry Road, Salamander Street and Fountainbridge.</p> <p>Detailed Assessment work in relation to Clerk Street &amp; Angle Park Terrace not concluded due to complications originating from temporary traffic management arrangements. Ongoing Detailed Assessment at Portobello Road &amp; Fountainbridge.</p>

Round / Report	Date	Outcome
		<p>Further Assessment work being progressed with regards to the declared AQMAs at Inverleith Row/Ferry Road junction and Glasgow Road; and the extension to the Central and Great Junction Street AQMAs.</p> <p>Exceedences of the <b>PM</b><sub>10</sub> annual and 24hr mean objectives.</p>
<b>Further Assessment</b>	2013	<p>Further Assessment work completed with regards to the declared AQMAs at Inverleith Row/Ferry Road junction and Glasgow Road; and the extension to the Central and Great Junction Street AQMAs. Report is to be submitted to the Scottish Government and DEFRA for approval.</p>

Table 1.3 Descriptions of AQMAs

Description AQMA / Declaration (Date)	Pollutant / Source	Amendments
<p><b>Central AQMA</b> <span style="float: right;"><b>31/12/2000</b></span></p> <p>Includes area of City Centre and main arterial routes leading into the city centre. Exceedences mostly in locations where there are street canyons, high percentage of bus movements and congested traffic. Residential properties at basement, ground, first, second, third, and fourth level, 2 - 4 metres from road edge.</p> <p>Busy shopping areas include Princes Street, George Street, Dalry/Gorgie Rd, Leith Walk, North Bridge, West Port, Grassmarket, London Road and Easter Road.</p> <p>Upwards road gradient Leith Walk, North Bridge (south bound) &amp; West Port.</p>	<p><b>NO<sub>2</sub></b></p> <p><b>Traffic</b></p>	<p><b>09/03/2009</b></p> <p>Extended to include West Port - Amended to cover hourly breach as well as annual breach of NO<sub>2</sub> air quality objective</p> <p><b>26/04/2013</b></p> <p>Extended to include Gorgie Road / Chesser, Grassmarket/Cowgate and London Road/Easter Road.</p>
<p><b>St John's Road</b> <span style="float: right;"><b>31/12/2006</b></span></p> <p>Part of the A8 route at Corstorphine area. Residential properties at ground, first, second, third and fourth floor level within 2m of kerb edge. Street canyon effect in part. Busy shopping area. Congested flat road with high percentage of bus movements.</p>	<p><b>NO<sub>2</sub></b></p> <p><b>Traffic</b></p>	<p><b>09/03/2009</b></p> <p>Amended to cover hourly breach as well as annual breach of NO<sub>2</sub>.</p>
<p><b>Great Junction Street</b> <span style="float: right;"><b>09/03/2009</b></span></p> <p>The full length of road to the depth of the building facades, including the Ferry Road Junction area. Residential properties at first, second, third and fourth floor level. Street canyon, congested traffic and busy shopping area.</p>	<p><b>NO<sub>2</sub></b></p> <p><b>Traffic</b></p>	<p><b>26/04/2013</b></p> <p>Extended to include Bernard Street, Commercial Street and North Junction Street.</p>

Description AQMA / Declaration (Date)	Pollutant / Source	Amendments
Receptors close to road edge. High percentage of bus movements.		
<p><b>Glasgow Road</b> <span style="float: right;"><b>26/04/2013</b></span></p> <p>Part length of A8, between Newbridge Roundabout and Ratho Station, to the depth of the building facades.</p>	<p><b>NO<sub>2</sub></b></p> <p><b>Traffic</b></p>	
<p><b>Inverleith Row</b> <span style="float: right;"><b>26/04/2013</b></span></p> <p>The road comprising the junction of Inverleith Row and Ferry Road, to the depth of building facades.</p>	<p><b>NO<sub>2</sub></b></p> <p><b>Traffic</b></p>	



Figure 1.1 Map of Central AQMA Boundaries



Figure 1.2 Map of St. John's Road AQMA Boundaries

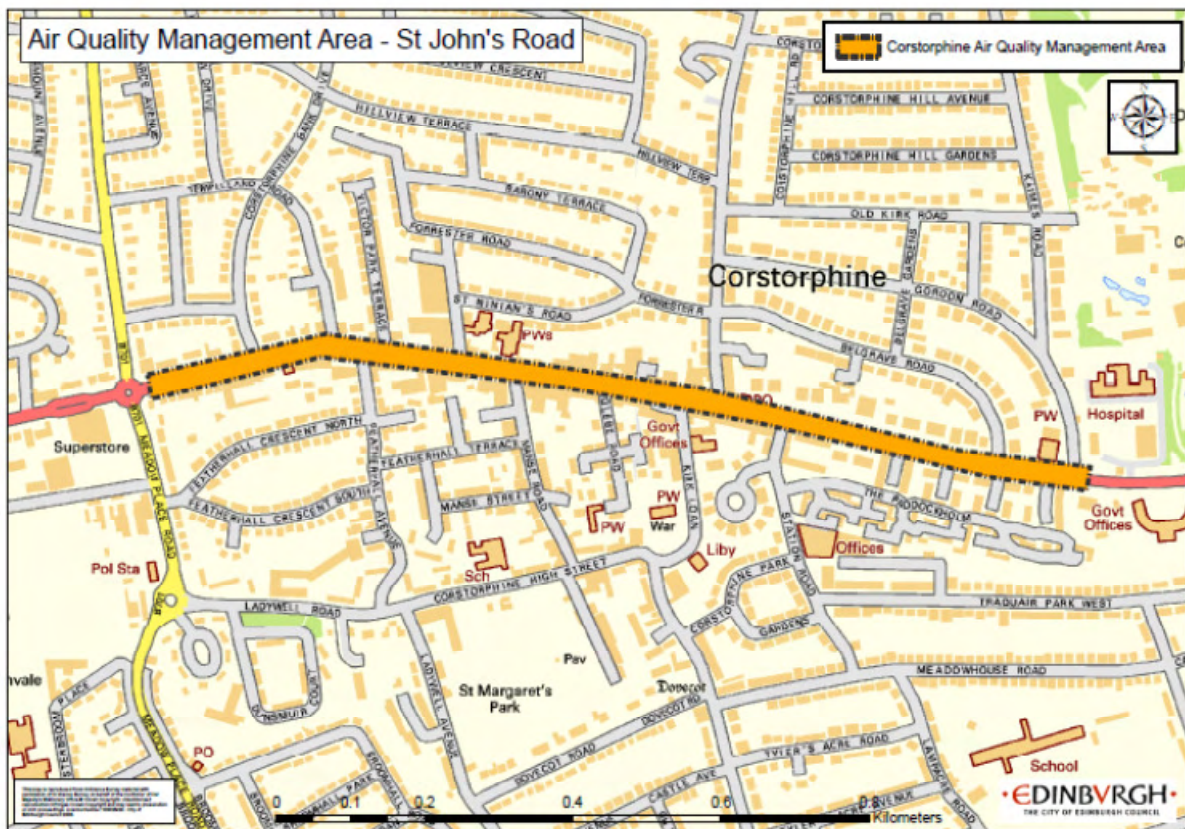


Figure 1.3 Map of Great Junction Street AQMA Boundaries

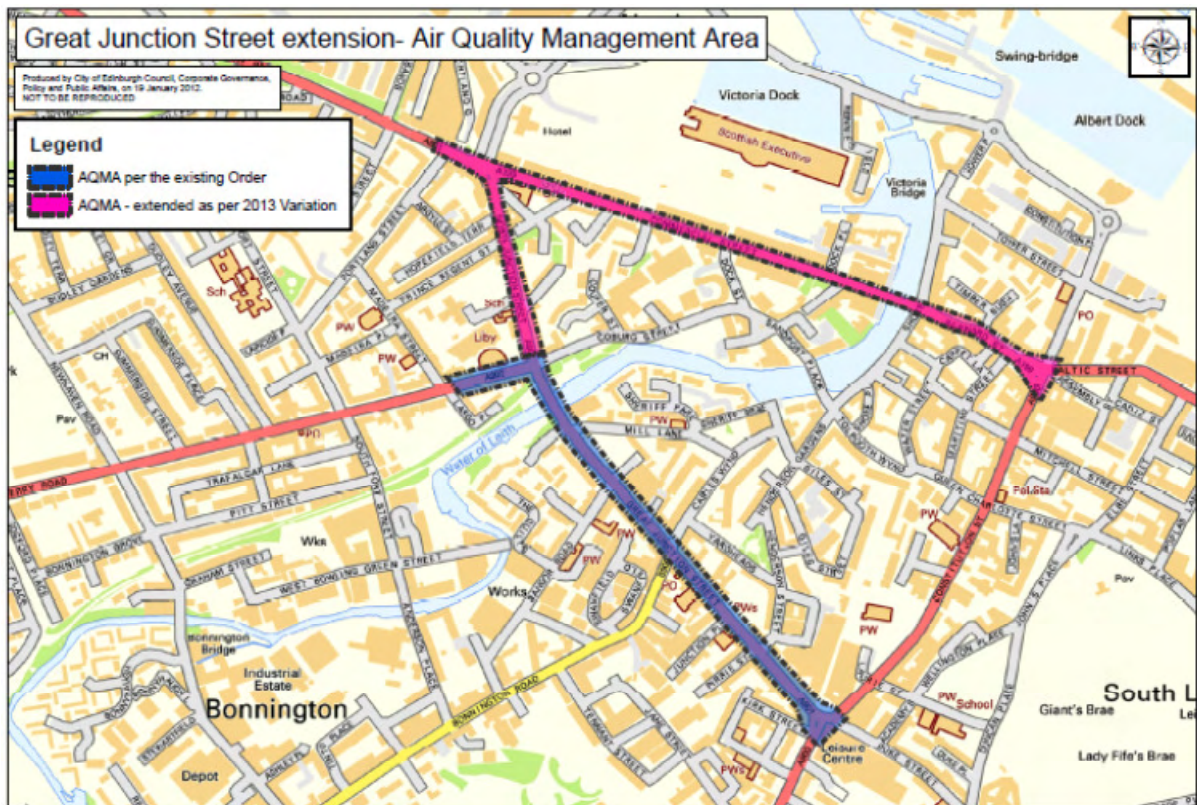


Figure 1.4 Map of Glasgow Road AQMA Boundaries

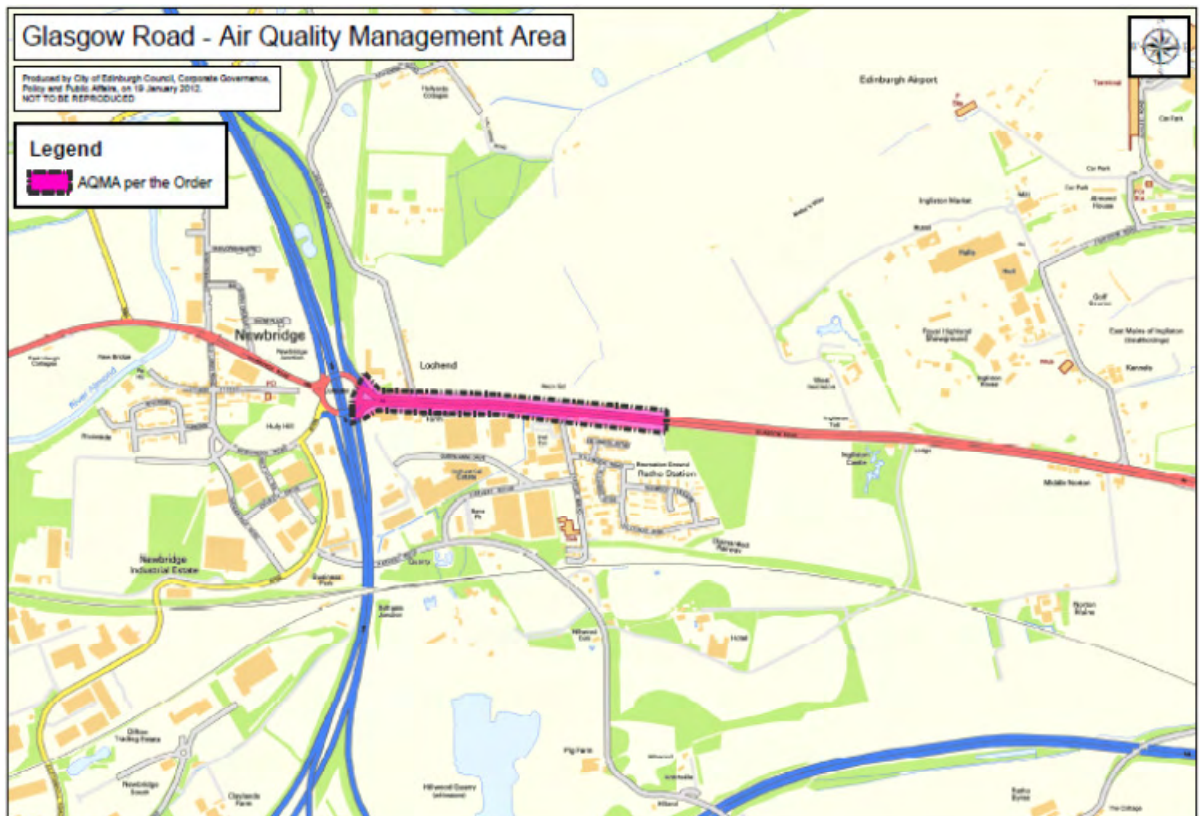
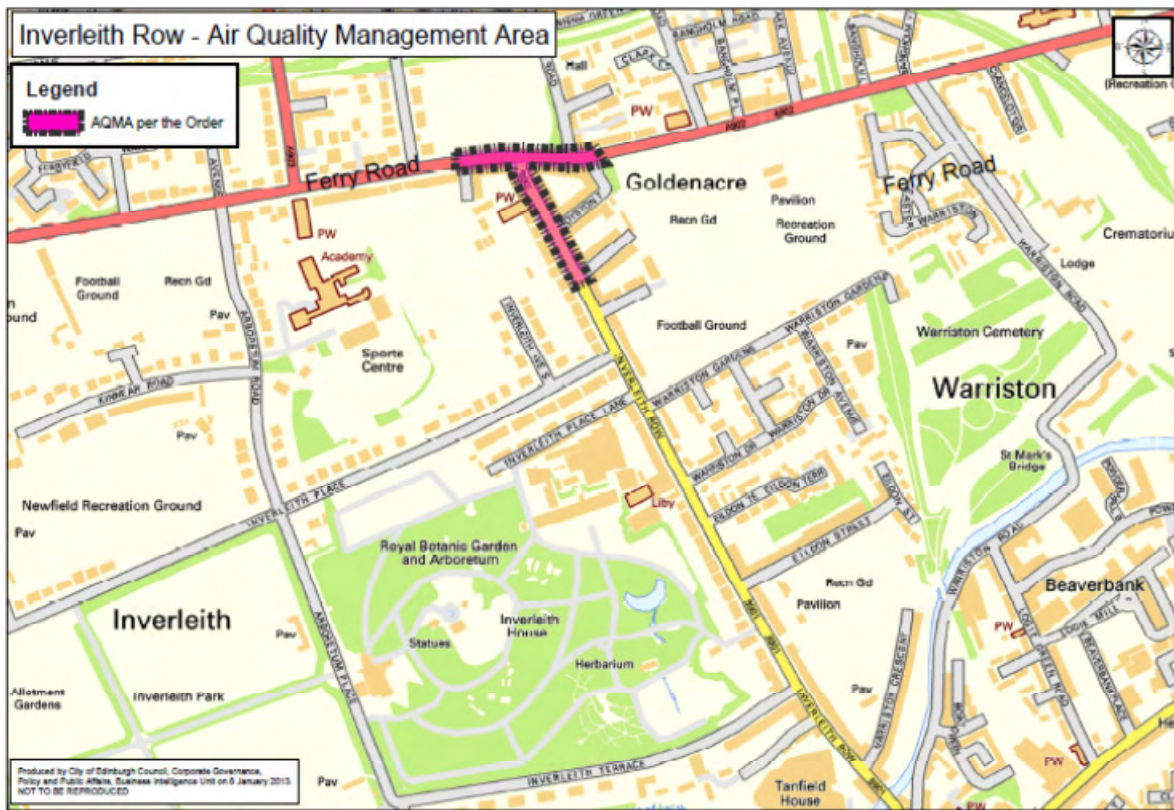


Figure 1.5 Map of Inverleith Row AQMA Boundaries



**Developments since Progress Report 2013**

**Nitrogen Dioxide**

Additional monitoring was established in 2014 at a number of sites in the city centre including St Leonards, Torphichen Place, Leith Street and Bruntsfield. Outside the city new monitoring commenced in the village of Kirkliston, Corstorphine High Street and Glasgow Road (Ratho Station).

Further Assessment work has been completed with regards to the declared AQMAs at Inverleith Row/Ferry Road junction and Glasgow Road; and the extension to the Central and Great Junction Street AQMAs. The Assessment, which has yet to be approved by the Scottish Government and DEFRA found that exceedences of the annual mean objective occurred since 2009 however they were not widespread within the AQMAs, tending to be in areas where relevant receptors are close to the road edge, in street canyons and close to busy junctions.

Source apportionment studies identified local background concentrations as contributing a large proportion to the overall concentration of nitrogen dioxide. The contribution from each of the vehicle classes was diverse, with buses having a marginal role in Cowgate and Grassmarket to having the largest impacts at London Road, Gorgie/Chesser and Inverleith Row. Cars were shown to have a significant impact in all areas and LGVs showed the least.

Table 1.4 Source apportionment of NO<sup>2</sup> emissions from different vehicle classes from locations in AQMA's across the city.

Receptor	Buses		Cars		HGVs		LGVs	
	Traffic Vol.	NO <sub>2</sub> Contrib.	Traffic Vol.	NO <sub>2</sub> Contrib.	Traffic Vol.	NO <sub>2</sub> Contrib.	Traffic Vol.	NO <sub>2</sub> Contrib.
<b>Cowgate</b>	<1%	5%	85%	49%	3%	30%	12%	16%
<b>Easter Road</b>	3%	31%	83%	37%	2%	20%	12%	12%
<b>Gorgie Road</b>	4%	34%	80%	31%	3%	23%	13%	11%
<b>Grassmarket</b>	1%	13%	84%	46%	3%	26%	12%	15%
<b>London Road</b>	8%	57%	80%	25%	2%	10%	10%	8%
<b>Bernard Street</b>	2%	16%	82%	35%	5%	38%	11%	11%
<b>Glasgow Road</b>	1%	17%	86%	41%	4%	32%	9%	10%
<b>Ferry Road</b>	3%	30%	85%	49%	2%	21%	12%	12%
<b>Inverleith Row</b>	5%	44%	83%	37%	2%	14%	11%	10%

A simple visual comparison of the degree of contribution from each vehicle class is provided in Table 1.4. The report concluded that it will be necessary for future action planning to keep most motor vehicle classes under consideration for actions to improve air quality in these areas. The required reduction in NO<sub>x</sub> emissions from local roads to attain the annual mean nitrogen dioxide Air Quality Objective were also defined and are reproduced below:

**Table 1.5 Required reduction of NO<sub>x</sub> to meet annual mean nitrogen dioxide Air Quality Objective**

Central AQMA:		Great Junction Street AQMA	
Cowgate	17%	Bernard Street	21%
Easter Road	26%	Glasgow Road AQMA	
Gorgie Road/ Chesser	12%	Newbridge junction	43%
Grassmarket	25%	Ratho Station	35%
London Road	30%	Inverleith Row/Ferry Road AQMA	
		Inverleith Row	28%

**Table 1.6 Visual comparison of each vehicle class contribution to Overall Local Road NO<sub>2</sub> Concentrations in AQMAs**

Degree of Contribution from Vehicle Classes operating in AQMAs					
Receptor		Cars	LGVs	HGVs	Buses
<b>Central AQMA extensions</b>					
48	Cowgate	■ ■ ■ ■	■ ■	■ ■ ■	■
37A	Grassmarket	■ ■ ■ ■	■ ■	■ ■ ■	■
25	Easter Road	■ ■ ■ ■	■	■ ■	■ ■ ■
80	Gorgie/Chesser	■ ■ ■	■	■ ■	■ ■ ■ ■
81	London Road	■ ■ ■	■	■ ■	■ ■ ■ ■
<b>Great Junction Street AQMA extension</b>					
29C	Bernard Street	■ ■ ■	■	■ ■ ■ ■	■ ■
<b>Glasgow Road AQMA</b>					
58	Glasgow Road	■ ■ ■ ■	■	■ ■ ■	■ ■
<b>Inverleith Row AQMA</b>					
53	Ferry Road	■ ■ ■ ■	■	■ ■	■ ■ ■
55	Inverleith Row	■ ■ ■	■	■ ■	■ ■ ■ ■
<p>■ ■ ■ ■ = Most significant contribution to local road NO<sub>2</sub></p> <p>■ ■ ■</p> <p>■ ■</p> <p>■ = Least significant contribution to local road NO<sub>2</sub></p>					

**Particulate Matter PM<sub>10</sub>**

The Scottish PM<sub>10</sub> objectives are close to, at or being exceeded at a number of monitoring locations. The Local Authority is progressing a city-wide Detailed Assessment for this pollutant and sources other than traffic are being investigated. Currently, modelling work has been commissioned to consider the extent of an AQMA boundary that will take account of fugitive sources near the Salamander Street monitoring station. Further work is necessary in conjunction with the Scottish Government and the Scottish Environmental Protection Agency (SEPA) to consider a number of poultry farms in the west of the city. Road traffic sources are also under examination, particularly on Queensferry Road and around the M8 and M9 junction.

The city-wide Detailed Assessment will be concluded and published separately in 2014.

## 2 New Monitoring Data

### 2.1 Summary of Monitoring Undertaken

#### 2.1.1 Automatic Monitoring Sites

Edinburgh has eight automatic monitoring stations. One of the stations at St Leonard's is part of the UK Automated Urban and Rural National Network (AURN). All stations were operational during 2013.

Details and descriptions of the automatic monitoring stations are shown in Figure 2.1 and Tables 2.1 and 2.1a.

QAQC procedures on the automated monitoring sites are shown in Appendix A.

**Figure 2.1 Map of Automatic Monitoring Sites**

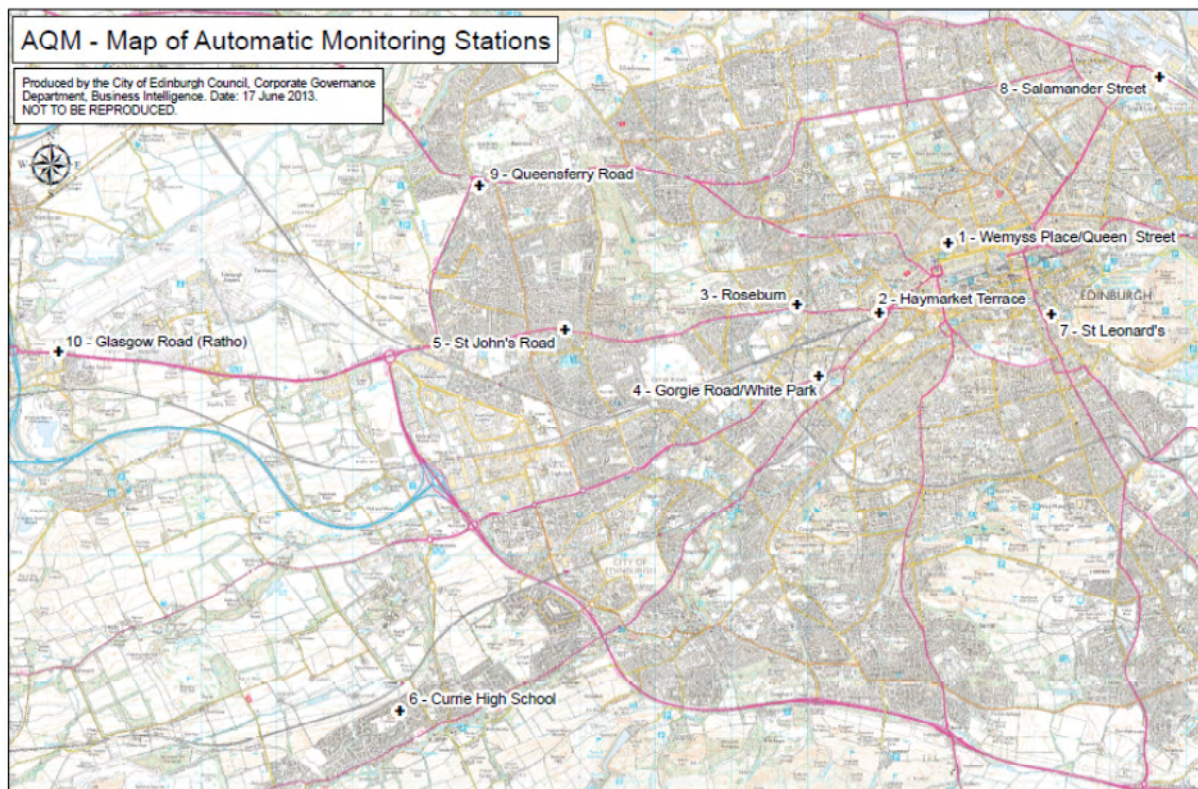


Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	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?
ID1	Queen Street	Roadside	324826	674078	2.87	NO <sub>2</sub> PM <sub>10</sub>	Yes	Chemilum TEOM	Y (façade)	5.2m	Y
ID2	Haymarket <sup>1</sup>	Roadside	323896	673197	N/A	NO <sub>2</sub> PM <sub>10</sub>	Yes	Chemilum TEOM	Y (7m)	9.2m	N
ID3	Roseburn <sup>1</sup>	Roadside	322939	673233	n/a	NO <sub>2</sub> PM <sub>10</sub>	Yes	Chemilum TEOM	Y (4.9m)	7.6m	N
ID4	Gorgie Road	Roadside	323121	672314	2.63	NO <sub>2</sub>	Yes	Chemilum	Y (façade)	2.5m	Y
ID5	St. John's Road	Kerbside	320101	672907	1.98	NO <sub>2</sub>	Yes	Chemilum	Y (1.35m)	0.5m	Y
ID6	Currie High School	Suburban	317595	667909	3.59 3.24	NO <sub>2</sub> PM <sub>10</sub>	No	Chemilum TEOM	Y (rear of school)	N/A	N/A

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Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	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?
ID7	St. Leonard's	Urban Back-ground (AURN)	326265	673129	3.4m - 3.2m - 3.1m - 3.4m - 3.4m - 3.4m - 3.4m -	NO <sub>2</sub> PM <sub>10</sub> PM <sub>2.5</sub> O <sub>3</sub> CO SO <sub>2</sub> PAH	No	Chemilum FDMS FDMS UV absorp IR absorp UV absorp Digitalsamp	Y (29.0m)	26m	N/A
ID8	Salamander Street	Roadside	327615	676333	2.86	NO <sub>2</sub> PM <sub>10</sub>	No	Chemilum TEOM	Y (façade) <sup>2</sup>	2.13m	Y
ID9	Queensferry Road	Roadside	318736	674930	2.96	NO <sub>2</sub> PM <sub>10</sub>	No	Chemilum TEOM/FDMS	Y (6.5m)	1.7m	Y
ID10	Glasgow Road	Roadside	313103	672663	2.84	NO <sub>2</sub> PM <sub>10</sub>	Yes	Chemilum TEOM	Y (facade) <sup>2</sup>	6m	Y

<sup>1</sup> Historic monitoring location now decommissioned

<sup>2</sup> Adjacent residential properties which are same distance from roadside as the monitoring station

Table 2.1a Description of Automatic Monitoring Locations

Site ID	Site Name	Description of automatic monitoring location
ID1	Queen Street	Pavement in line with residential property located 5.2m from road edge. No buildings at rear of monitoring unit. Relevant exposure.
ID2	Haymarket	Now decommissioned, this monitoring site was located in a car parking bay at Haymarket Station 9.2m from the main road, set back from the façade of residential property. Not in street canyon.
ID3	Roseburn	Now decommissioned, it was located on footbridge over the water of Leith 7.6m from kerb edge. Set back from line of residential property. Does not take account of canyon at Roseburn Terrace.
ID4	Gorgie Road	Located in line with façade of adjacent residential flats on edge of children's play park. Within 2.5m of kerb edge. Not located in canyon area of street. Relevant exposure.
ID5	St John's Road	Pavement (kerbside) of busy shopping street. Residential properties within 2.1m of kerb edge. Takes account of junction and street canyon. Relevant exposure and worst-case location.
ID6	Currie High School	Located adjacent to school building at rear of school. Representative of suburban / semi-rural exposure.
ID7	St. Leonard's	Located in small park area adjacent to Medical centre 45m from nearest main road. Representative of urban exposure.
ID8	Salamander Street	Located on pavement 2.13m from road edge, in line with adjacent residential property.
ID9	Queensferry Road	Located on pavement 1.7m from busy road edge and adjacent bus stop. 6.5m in front of residential property.
ID10	Glasgow Road	Located on recreational land 6m from A8 northbound carriageway, in line with nearby residential properties.

### 2.1.2 Non-Automatic Monitoring Sites

Edinburgh has an extensive network of passive diffusion tube samplers located throughout the city, which monitor **nitrogen dioxide**. These are within and outwith the AQMAs. The majority of the locations are in street canyons where tenement-style residential properties are within 2 to 3 metres of the road edge. Most of the passive diffusion tubes are sited at the building facades of residential properties. Details are provided in Table 2.2, catalogued into six different geographical areas of the city.

Additional monitoring was established in 2013 at Portobello Road/Sir Harry Lauder Road junction in order to progress Detailed Assessment work. As a precautionary measure, monitoring also commenced at Balgreen and Hamilton Place where increases in traffic were identified. Other new monitoring locations were identified at St Colme Street, North Junction Street, South Bridge, Brunton Place (London Road) and Torphichen Street. At Great Stuart Street new sites were identified at relevant receptors rather than kerbside (ID75C) where monitoring ceased.

Monitoring was reduced on Portobello High Street, following completion of the Detailed Assessment which did not identify concerns. Monitoring was also terminated at locations where data collection had been poor including, West Port (ID28), Cowgate (ID48D), Dundee Street (79C) and Nicolson Street (ID134). The George Street site (ID74C) was discontinued due to removal of a post. One PDT at duplicate site ID16 (Glasgow Road) was relocated to the facade of the adjacent property.

QC/QA work associated with passive diffusion tube method of monitoring is contained in the following Appendices:

- A1 Nitrogen Dioxide (NO<sub>2</sub>) Diffusion tube bias adjustment factors
- A2 NO<sub>2</sub> Bias Adjustment Factor from Local Co-location studies
- A3 Discussion of Choice of factor to use
- A5 Short-term to Long-term data adjustment for NO<sub>2</sub>
- A7 QA/QC of diffusion tube monitoring.

Maps illustrating the network of non-automatic monitoring locations for nitrogen dioxide across the city are shown in Appendix B.

All passive diffusion tubes are fixed at a height of approximately two metres.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (m) (N/A if not applicable)	Worst-case Location?
	<b>NORTH</b>							
29	<b>Bernard Street/CA</b>	Roadside	327148	676507	Yes	Y façade	2.2	Y
29a	<b>Bernard Street/Kings Chambers</b>	Roadside	327137	676529	Yes	Y façade	2.1	Y
29b	<b>Bernard Street No 32</b>	Roadside	327192	676513	Yes	Y façade	2.2	Y
29c	<b>Bernard Street/PS</b>	Roadside	327135	676515	Yes	Y façade	2.1	Y
7	<b>Commercial Street No 3/4<sup>a</sup></b>	Roadside	327009	676565	Yes	Y façade	2.47	Y
9	<b>Commercial Street No 88<sup>a</sup></b>	Roadside	326879	676626	Yes	Y façade	2.6	Y
9a	<b>Commercial St/Portland Place</b>	Roadside	326430	676754	Yes	Y (3.90)	1.47	Y
52	<b>Ferry Road No 268</b>	Roadside	324946	676070	No	Y (4.6)	1.65	Y
53	<b>Ferry Road/Bowhill Terrace No 6</b>	Roadside	324726	676004	Yes	Y (1.57)	1.75 +2.85 <sup>b</sup>	Y
45b	<b>Ferry Road/Maderia Street</b>	Roadside	326359	676420	No	Y façade	7.5	Y
45	<b>Ferry Road/North Fort Street</b>	Roadside	326136	676361	No	Y façade	3.7	Y
45d	<b>Ferry Road/North Junction Street</b>	Roadside	326503	674436	Yes	Y façade	3.1	Y
30b	<b>Great Junction Street No137</b>	Roadside	326740	676138	Yes	Y façade	2.9	Y
30c	<b>Great Junction Street No14</b>	Roadside	326925	675949	Yes	Y façade	2.8	Y
30d	<b>Great Junction Street/WC</b>	Roadside	326757	676144	Yes	Y façade	2.8	Y
30e	<b>Great Junction Street/CG</b>	Roadside	326845	676015	Yes	Y façade	2.7	Y
30	<b>Great Junction Street/FV</b>	Roadside	326884	675997	Yes	Y façade	2.8	Y
55	<b>Inverleith Row/Ferry Road</b>	Roadside	324638	675993	Yes	Y façade	4.65	Y
55c	<b>Inverleith Row/Montague</b>	Roadside	324686	675941	Yes	Y (1.06)	2.28 + 2.0 <sup>b</sup>	Y
9c	<b>North Junction Street<sup>d</sup></b>	Roadside	326458	676672	Yes	Y facade	2.65	Y
9b	<b>Ocean Drive/Leith</b>	Roadside	326455	676805	No	Y façade	4.2	Y
51c	<b>Salamander Street/Baltic Street</b>	Roadside	327476	676418	No	Y façade	2.25	Y

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Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (m) (N/A if not applicable)	Worst-case Location?
51b	<b>Salamander Street/Bath Road</b>	Roadside	327665	676331	No	Y façade	1.8	Y
14	<b>Trinity Crescent</b>	Roadside	324896	676991	No	Y (4.0)	2.0	Y
	<b>EAST</b>							
19	<b>Baileyfield Road <sup>a</sup></b>	Background	329997	674274	No	N	18	Y
31	<b>Dalkeith Road No187</b>	Roadside	327231	671782	No	Y (4.9)	1.8	Y
25	<b>Easter Road/CH Shop</b>	Roadside	326934	674503	Yes	Y façade	2.3	Y
25b	<b>Easter Road/Rossie Place</b>	Roadside	326950	674624	Yes	Y façade	3.3	Y
25c	<b>Easter Road No105/109</b>	Roadside	326958	674770	Yes	Y façade	3.25	Y
25d	<b>Easter Road/Bothwick</b>	Roadside	326974	674780	Yes	Y façade	2.8	Y
25e	<b>Easter Road No 198</b>	Roadside	326999	674940	Yes	Y façade	3.95	Y
25f	<b>Easter Road No 271</b>	Roadside	327010	675149	No	Y façade	2.8	Y
25g	<b>Easter Road No 327</b>	Roadside	327071	675467	No	Y façade	3.0	Y
46b	<b>London Road/Brunton Place <sup>d</sup></b>	Roadside	326779	674487	Yes	Y facade	6.9 + 2 <sup>b</sup>	Y
81	<b>London Rd/East Norton Place</b>	Roadside	326980	674446	Yes	Y façade	2.5	Y
67	<b>London Road/Earlston Place</b>	Roadside	327190	674433	Yes	Y façade	2.7	Y
68	<b>Parsons Green Terrace</b>	Roadside	328049	674174	Yes	Y façade	2.7	Y
69	<b>London Road/Wolseley Place</b>	Roadside	328272	674143	Yes	Y façade	2.62	Y
70	<b>London Road/Wolseley Terrace</b>	Roadside	328337	674129	Yes	Y façade	4.6	Y
66	<b>London Road/Cadzow Place</b>	Roadside	327468	674362	Yes	Y façade	2.04 + 2.0 <sup>b</sup>	Y
46	<b>London Road/Easter Road</b>	Roadside	326944	674472	Yes	Y façade	5.6	Y
32	<b>Niddrie Mains Road No 28</b>	Kerbside	328889	671649	No	Y (4.7)	0.2 + 2.4 <sup>b</sup>	Y
82	<b>Piersfield Terrace</b>	Roadside	328771	674190	No	Y façade	4.0 + 2.1 <sup>b</sup>	Y
73b	<b>Portobello High Street No 23</b>	Roadside	330242	674162	No	Y façade	3.8	Y
71	<b>Portobello High StreetNo185</b>	Roadside	330533	673850	No	Y façade	3.0	Y
73a	<b>Portobello Road/Ramsay 1</b>	Roadside	329923	674389	No	Y (1.98)	2.8	Y

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Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (m) (N/A if not applicable)	Worst-case Location?
73d	Portobello Road/Ramsay F <sup>d</sup>	Roadside	329917	674388	No	Y facade	3.7	Y
73e	Portobello Road/Ramsay 2 <sup>d</sup>	Roadside	329885	674384	No	Y (2)	2.5	Y
73f	Portobello Road /College Court <sup>d</sup>	Roadside	329848	674371	No	Y facade	10.3	Y
73g	Portobello Road/Inchview Terr <sup>d</sup>	Roadside	329839	674697	No	Y (8.4)	4.5	Y
72	Seafield Road East No10	Roadside	329993	674457	No	Y facade	4.5	Y
72a	Seafield Road East No. 7 <sup>d</sup>	Roadside	330001	674444	No	Y facade	8.5	Y
	<b>CITY CENTRE NORTH</b>							
43	Broughton Road	Roadside	325513	675134	No	Y facade	2.0	Y
44	Broughton Street	Roadside	325855	674527	No	Y facade	4.5	Y
13	Deanhaugh Street	Kerbside	324603	674555	No	Y (5.1)	0.6 + 2.1 <sup>b</sup>	Y
35	Dundas Street	Kerbside	325243	674400	No	Y (7.3)	0.3 + 2.1 <sup>b</sup>	Y
74f	George Street No 112	Roadside	324880	673891	Yes	Y facade	6.8	Y
74e	George Street/Charlotte Sq	Kerbside	324783	673868	Yes	Y (5.2)	0.3	Y
75b	Great Stuart Street No 7	Kerbside	324488	673978	No	Y (6.1)	0.4 + 2.1 <sup>b</sup>	Y
75e	Great Stuart Street No 9 <sup>d</sup>	Roadside	324476	673967	No	Y facade	7.25 + 2.1 <sup>b</sup>	Y
75f	Great Stuart Street No 14 <sup>d</sup>	Roadside	324487	673936	No	Y facade	7.2 + 2.4 <sup>b</sup>	Y
143	Hamilton Place No. 72 <sup>d</sup>	Roadside	324734	674683	No	Y facade	4.6m	Y
143a	Hamilton Place Library <sup>d</sup>	Roadside	324699	674651	No	Y play area	2.1m	Y
34	India Street	Background	324790	674341	No	N	0.4 + 2.1 <sup>b</sup>	N
55b	Inverleith Row/Summer Place	Roadside	325052	675217	No	Y facade	6.1	Y
21	Leith Walk/Brunswick Road	Roadside	326386	674872	Yes	Y (3.4)	1.16	Y
20	Leith Walk/McDonald Road	Kerbside	326361	674882	Yes	Y facade	5.6	Y
47	Princes Street (Eastbound)	Roadside	325049	673791	Yes	Y (2.5)	9.0	Y
24	Princes Street/Mound	Kerbside	325397	673869	Yes	Y (10.2)	1.0	Y
33	Queen Street/Hanover Street	Roadside	325362	674205	Yes	Y (4.25)	2.2 + 2.0 <sup>b</sup>	Y

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Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (m) (N/A if not applicable)	Worst-case Location?
75a	St Colme Street	Kerbside	324624	674012	No	Y (5.1)	0.6	Y
75d	St Colme Street No. 4 <sup>d</sup>	Roadside	324646	674025	No	Y facade	6.2	Y
36	York Place	Roadside	325828	674362	Yes	Y (2.7)	5.5	Y
	<b>CITY CENTRE SOUTH</b>							
138	Clerk Street No 15	Roadside	326229	672287	No	Y facade	2.35 +2 <sup>b</sup>	Y
48	Cowgate/Gurthrie Street	Roadside	325881	673471	Yes	Y facade	4.5	Y
48a	Cowgate/Blair Street	Roadside	325929	673490	Yes	Y facade	3.2	Y
48b	Cowgate No 301	Roadside	326132	673519	Yes	Y facade	3.8 +2 <sup>b</sup>	Y
48c	Cowgate Blackfriars	Roadside	326047	673519	Yes	Y facade	2.4	Y
48e	Cowgatehead No 2	Roadside	325537	673405	Yes	Y facade	1.9	Y
79d	Dundee Street/Yeaman Place <sup>a</sup>	Roadside	323926	672550	No	Y facade	2.3	Y
79a	FountainbridgeNo103	Roadside	324731	672984	No	Y facade	2.2	Y
79b	Fountainbridge/Grove Street	Roadside	324438	672859	No	Y facade	2.2	Y
79	Fountainbridge/Tollcross	Roadside	324682	672939	No	Y facade	3.3	Y
37c	Grassmarket/Thompsons Court	Background	325397	673377	Yes	Y facade	21 + 2.1 <sup>b</sup>	N
37	Grassmarket/PS	Roadside	325427	673371	Yes	Y (5.0)	2.0 + 2.1 <sup>b</sup>	Y
37a	Grassmarket No 41	Roadside	325401	673340	Yes	Y facade	3.4	Y
37b	Grassmarket No 75	Roadside	325471	673369	Yes	Y facade	5.0	Y
10	Home Street	Roadside	324905	672893	No	Y facade	2.8	Y
17a	Hope Park Terrace/VS	Roadside	326312	672614	No	Y facade	5	Y
139	Hope Park Terrace No 5	Roadside	326244	672581	No	Y facade	4.9	Y
140	Hope Park Terrace/Clerk Street	Roadside	326323	672596	No	Y (3.5)	1.3	Y
38	Melville Drive	Roadside	325141	672733	No	Y (10.0)	2.8	Y
42	Midmar Drive	Background	325105	670511	No	N	1.4	N
8	Morningside Road	Kerbside	324538	671166	No	Y (2.8)	0.7	Y

City of Edinburgh Council

Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (m) (N/A if not applicable)	Worst-case Location?
49	<b>Morrison Street</b>	Roadside	324167	673249	Yes	Y (2.4)	2.2	Y
137	<b>Nicolson Street No 124</b>	Roadside	326181	672971	No	Y façade	3.4 + 2 <sup>b</sup>	Y
135	<b>Nicolson Street No 69</b>	Roadside	326112	673115	No	Y façade	3 + 2	Y
136	<b>Nicolson Street No 92</b>	Roadside	326164	673054	No	Y façade	3.74 + 2 <sup>b</sup>	Y
27	<b>North Bridge – South</b>	Roadside	325944	673670	Yes	Y façade	3.5	Y
144	<b>South Bridge No 59<sup>d</sup></b>	Roadside	326020	673370	No	Y façade	2.3	Y
142	<b>South Clerk Street No 41a</b>	Roadside	326367	672554	No	Y façade	1.96 + 2 <sup>b</sup>	Y
141	<b>South Clerk Street No 84</b>	Roadside	326383	672472	No	Y façade	2.57 + 2 <sup>b</sup>	Y
3	<b>Torphichen Place</b>	Roadside	324260	673270	Yes	Y (1.55)	0.73	Y
3a	<b>Torphichen Street</b>	Roadside	326020	673370	Yes	Y façade	5.8	Y
2	<b>West Maitland Street<sup>c</sup></b>	Kerbside	324193	673346	Yes	Y (5.2)	0.5	Y
28b	<b>West Port No 62</b>	Roadside	325166	673242	Yes	Y façade	1.4	Y
28c	<b>West Port Opp. No 50</b>	Roadside	325184	673261	Yes	Y façade	3.0	Y
28d	<b>West Port No 42</b>	Roadside	325203	673250	Yes	Y façade	2.7	Y
	<b>WEST</b>							
56	<b>Glasgow Road /Drumrae</b>	Roadside	319212	672921	No	Y (4.6)	0.57 + 2.0 <sup>bc</sup>	Y
57	<b>Glasgow Road No158</b>	Roadside	318185	672756	No	Y (8.5)	3.6	Y
16	<b>Glasgow Road No 68</b>	Roadside	313028	672633	Yes	Y (4.4)	1.8	Y
16a	<b>Glasgow Road No 68 facade<sup>d</sup></b>	Roadside	313028	672629	Yes	Y façade	6.2	Y
58	<b>Glasgow Road Newbridge</b>	Roadside	312693	672670	Yes	Y (5.2) <sup>c</sup>	2.8	Y
15	<b>Glasgow Road Newbridge</b>	Roadside	312664	672672	Yes	Y (3.8) <sup>c</sup>	1.6 + 2.4 <sup>bc</sup>	Y
40f	<b>Hillhouse Road No 118</b>	Roadside	322478	674406	No	Y (2.57)	2.6	Y
40c	<b>Hillhouse Road No 240</b>	Roadside	322082	674543	No	Y façade	3.2	Y
40a	<b>Hillhouse Road/Telford Road</b>	Roadside	321526	674945	No	Y façade	4.5 + 7 <sup>b</sup>	Y
40b	<b>Hillhouse/Craigcrook Terrace</b>	Roadside	321990	674586	No	Y (4.9)	2.1	Y



City of Edinburgh Council

Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (m) (N/A if not applicable)	Worst-case Location?
40e	Hillhouse/Marischall Place No1	Roadside	322153	674470	No	Y façade	2.8	Y
40d	Hillhouse/Marischall Place No4	Roadside	322123	674492	No	Y façade	3.1	Y
41	Hillview Terrace	Background	320081	673232	No	N	1.0	N
61	Maybury Road/Barnton	Roadside	318612	674924	No	Y (12.5)	2.8	Y
40	Queensferry Rd/Hillhouse Rd	Roadside	322144	674497	No	Y façade	2.0 + 2 <sup>b</sup>	Y
63	Queensferry Road No 544	Roadside	318723	674963	No	Y façade	13.6	Y
64	Queensferry Road No 550	Roadside	318698	674955	No	Y (9.2)	1.49	Y
64a	Queensferry Road No 552	Roadside	318698	674964	No	Y façade	10.5	Y
62	Queensferry Road No 561	Roadside	318810	674903	No	Y façade	16.9	Y
23	Roseburn Terrace	Kerbside	323007	673198	Yes	Y (2.3)	0.23	Y
1	St John's Road SB	Kerbside	320122	672917	Yes	Y (1.8)	0.54	Y
1b	St John's Road IR	Roadside	320154	672911	Yes	Y façade	2.0	Y
1d	St John's Road No 131	Roadside	320096	672907	Yes	Y façade	2.1	Y
39	St John's Road/Victor Pk <sup>c</sup>	Roadside	319677	672991	Yes	Y (4.15)	1.6	Y
50a	Whitehouse Rd/Barnton Grove	Roadside	318571	675028	No	Y (1.57)	3.5	Y
	<b>SOUTH WEST</b>							
76	Angle Park/Harrison Road	Roadside	323498	672263	No	Y façade	2.20	Y
76c	Angle Park Terrace No 25	Roadside	323587	672360	No	Y façade	4.75	Y
76b	Angle Park Terrace No 74	Roadside	323526	672285	No	Y façade	2.1	Y
76a	Ardmillan Terrace No 22	Roadside	323487	672287	No	Y façade	2.2	Y
80d	Balgreen Road / School <sup>d</sup>	Roadside	322069	672317	No	Y play area	2.9	Y
80e	Balgreen Road / Library <sup>d</sup>	Roadside	322110	672268	No	Y play area	2	Y
4	Calder Road	Roadside	319062	670543	No	Y (25)	1.6	Y
18	Gorgie Road No 8	Roadside	323477	672476	Yes	Y façade	2.4	Y
80c	Gorgie Road No 87	Roadside	323265	672394	Yes	Y façade	2.5	Y

Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (m) (N/A if not applicable)	Worst-case Location?
80b	<b>Gorgie Road No 549</b>	Roadside	321724	671557	Yes	Y façade	2.5	Y
80	<b>Gorgie Road / Delhaig</b>	Roadside	321967	671666	Yes	Y façade	2.6	Y
80a	<b>Gorgie Road Glen Lea</b>	Roadside	322381	671950	Yes	Y façade	2.6	Y
5	<b>Gorgie Road/Murieston Road</b>	Kerbside	323484	672478	Yes	Y (4.9)	0.3	Y
76d	<b>Henderson Terrace</b>	Roadside	323632	672449	No	Y façade	1.8	Y
11	<b>Lanark Road No No610</b>	Roadside	319527	668420	No	Y (3.7)	1.5	Y
77a	<b>Slateford Road No 51<sup>a</sup></b>	Roadside	323167	672009	No	Y façade	2.3	Y
77b	<b>Slateford Road No 93/95</b>	Roadside	322999	671876	No	Y façade	2.6	Y
77	<b>Slateford Road No 97</b>	Roadside	322960	671846	No	Y façade	2.67	Y
78	<b>Slateford Road/The Maltings</b>	Roadside	322772	671606	No	Y façade	2.2	Y

**Notes for table excluding site ID column:**

a Amendments made to details following review

b Distance to nominal kerb, due to parking bay in front of monitoring location

c Site relocated in 2013 in close proximity to previous site

d New monitoring location in 2013

## **2.2 Comparison of Monitoring Results with Air Quality Objectives**

### **2.2.1 Nitrogen Dioxide (NO<sub>2</sub>)**

#### **Automatic Monitoring Data**

At Queensferry Road the monitoring station is set 6.5m to the front of residential facades; hence measured concentrations are likely to overestimate relevant exposure. Data was therefore corrected using DEFRA's Distance Correction Calculator Tool<sup>1</sup>. All other monitoring locations represent relevant exposure as they are at or aligned with a residential facade.

The automatic monitoring data for 2013, corrected where necessary, complies with the annual and hourly mean nitrogen dioxide objectives except at St John's Road, where data shows a breach of the annual mean objective. For the first time since monitoring commenced at this location the hourly mean objective has been met. There were eight exceedences in 2013 compared with 62 the previous year. (A maximum of 18 is allowable) Monitoring will continue and if a pattern of lower concentrations develop, the Local Authority will consider revocation or amendment of the AQMAs in respect to this objective.

Data capture was poor at Queensferry Road, predominantly due to analyser problems during August and September. The results have therefore been annualised following Technical Guidance LAQM TG09<sup>2</sup> to give an estimated annual concentration. The calculation is shown in Appendix A5.

For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year, therefore data from Gorgie Road, where data capture was low in July September and October to give an annual capture rate of 86% so the data should be considered with caution.

Automatic data is shown in Tables 2.3a and 2.3b.

Table 2.3a Results of Automatic Monitoring for NO<sub>2</sub>: Comparison with Annual Mean Objective

Site ID	Site Name	Within AQMA?	Valid Data Capture 2013 % <sup>a</sup>	Annual Mean Concentration (µg/m <sup>3</sup> )					
				2008	2009	2010	2011	2012	2013
1	Queen Street	Y	98	32	33	37	29	28	28
2	Haymarket	Y	N/A	<b>41 (49)</b>	N/A	N/A	N/A	N/A	N/A
3	Roseburn	Y	N/A	28 (31)	26 (28)	30 (33)	24 <sup>b</sup>	N/A	N/A
4	Gorgie Road	Y	86	<b>42</b>	38	<b>41</b>	37	39	38
5	St John's Road	Y	91	<b>75</b>	<b>70</b>	<b>71</b>	<b>65</b>	<b>58</b>	<b>57</b>
6	Currie	N	92	N/A	N/A	10	6	8	8
7	St Leonard's	N	99	31	24	31	25	24	22
8	Salamander Street	N	96	N/A	30	30	29	30	28
9	Queensferry Road	N	74	N/A	N/A	N/A	41 (29)	52 ( <b>40</b> )	43 (34) <sup>b</sup>
10	Glasgow Road	Y	98	N/A	N/A	N/A	N/A	29 <sup>b</sup>	27

**Notes for table;**

In bold and red, exceedence of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> and in bold black, result of 40µg/m<sup>3</sup> shown

a i.e. data capture for the full calendar year.

b Mean "annualised" as valid data capture is less than 75%.

Data in brackets represents the estimated annual concentration at relevant receptors using the NO<sub>2</sub> Fall Off with Distance calculator (DEFRA website, LAQM, Tools, 2013).

Table 2.3b Results of Automatic Monitoring for NO<sub>2</sub>: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 % <sup>a</sup>	Number of Hourly Means > 200µg/m <sup>3</sup>					
				2008	2009	2010	2011	2012	2013
1	Queen Street	Y	98	0	0	0	0	0	0
2	Haymarket	Y	N/A	1	N/A	N/A	N/A	N/A	N/A
3	Roseburn	Y	N/A	0	0	1	0 (101) <sup>b</sup>	N/A	N/A
4	Gorgie Road	Y	86	0	0 (130) <sup>b</sup>	0 (122) <sup>b</sup>	0	0	0 (115)
5	St John's Road	Y	91	<b>166</b>	<b>114</b>	<b>60</b>	<b>52</b>	<b>62</b>	8
6	Currie	N	92	N/A	N/A	0	0	0	0
7	St Leonard's	N	99	0	0	0	0	0	0
8	Salamander St	N	96	0	0 (144) <sup>b</sup>	0	0	0	0
9	Queensferry Rd	N	74	N/A	N/A	N/A	0	3	0 (145)
10	Glasgow Road	Y	98	N/A	N/A	N/A	0	0	0

**Notes for table;**

In bold and red, exceedence of the NO<sub>2</sub> hourly mean objective (200µg/m<sup>3</sup> – not to be exceeded more than 18 times per year).

a data capture for the full calendar year.

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

## Trends in Annual Mean NO<sub>2</sub> Concentrations Measured at Automatic Monitoring Sites

Trend analysis has been undertaken at monitoring locations with five or more years of valid data. Annual mean nitrogen dioxide concentrations have been plotted for successive years at St Leonard's, Queen Street, Gorgie Road, St John's Road and for the first time, Salamander Street. Trend lines have been drawn using an Excel simple regression statistical program. Analysis has also been carried out with the hourly mean data from St John's Road.

Data trends are shown in Figures 2.3 to 2.8 and summarised in Table 2.4.

**Table 2.4 Summary of Annual Mean Nitrogen Dioxide trends measured at Automatic Monitoring Sites**

Monitoring Location	Site Type	Trend in annual mean NO <sub>2</sub> (years included)	Concentrations of NO <sub>2</sub>
St Leonard's	Urban background	↓ (2004 to 2013)	Decreasing
Queen Street	Roadside	↓ (2006 to 2013)	Decreasing
Gorgie Road	Roadside	↓ (1999 to 2013)	Slight Decrease
St John's Road	Kerbside	↓ (2007 to 2013)	Decreasing
Salamander St	Roadside	↓ (2009 to 2013)	Decreasing

Trend analysis of annual mean nitrogen-dioxide concentrations at St Leonards and Gorgie Road show a slight decrease since monitoring began in 2004 and 1999 respectively. Similarly with the first analysis for Salamander Street (2009 to 2013) there is a downward trend in concentrations.

There is a more defined downward trend at Queen Street and St John's Road. Some of this may be attributable to the temporary changes in traffic management associated with the Edinburgh Tram construction works, however at St John's Road it is likely that improvements in the bus fleet operating along the traffic corridor have brought about improvement. This is also evident in the significant reduction of the number of exceedences of the hourly mean objective, which also shows a distinct downward trend.

Figure 2.3 Trend in Annual Mean Nitrogen Dioxide Concentrations ( $\mu\text{g}/\text{m}^3$ ) measured at St Leonard's AURN

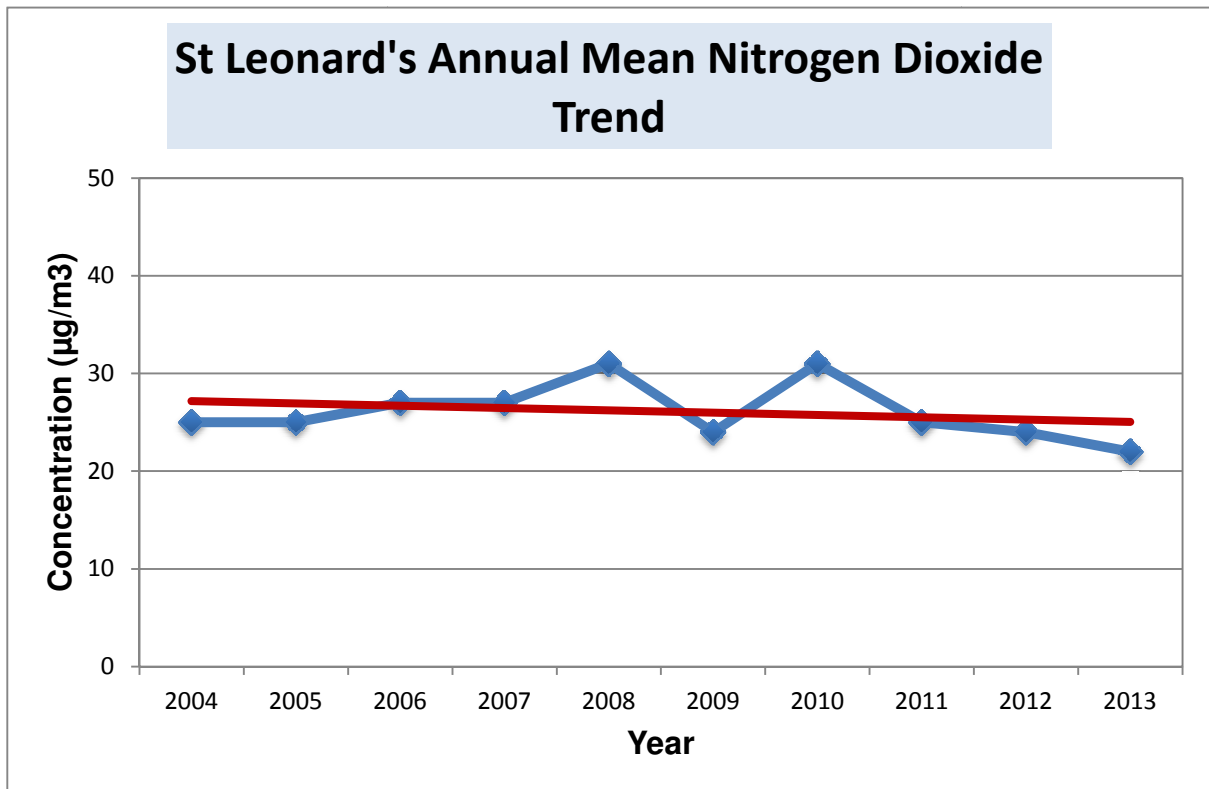


Figure 2.4 Trend in Annual Mean Nitrogen Dioxide Concentrations ( $\mu\text{g}/\text{m}^3$ ) measured at Queen Street

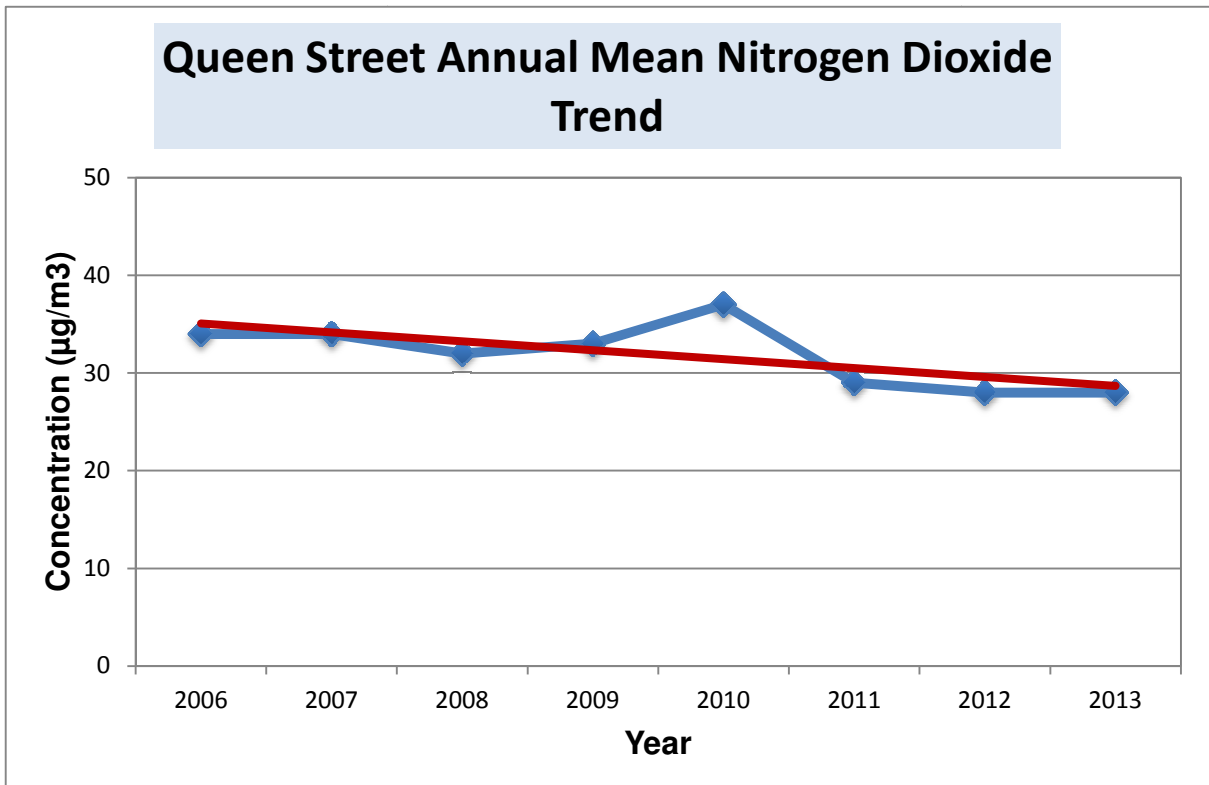


Figure 2.5 Trend in Annual Mean Nitrogen Dioxide Concentrations ( $\mu\text{g}/\text{m}^3$ ) measured at Gorgie Road

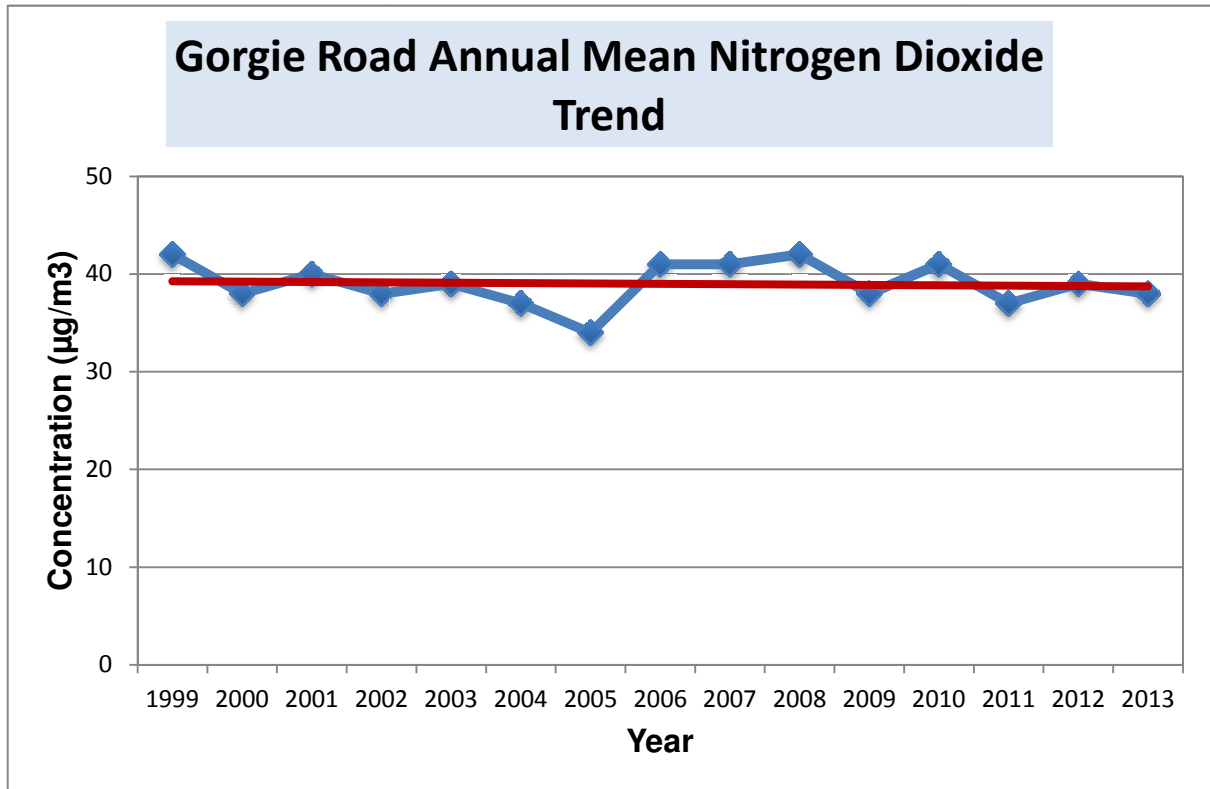


Figure 2.6 Trend in Annual Mean Nitrogen Dioxide Concentrations ( $\mu\text{g}/\text{m}^3$ ) measured at Salamander Street

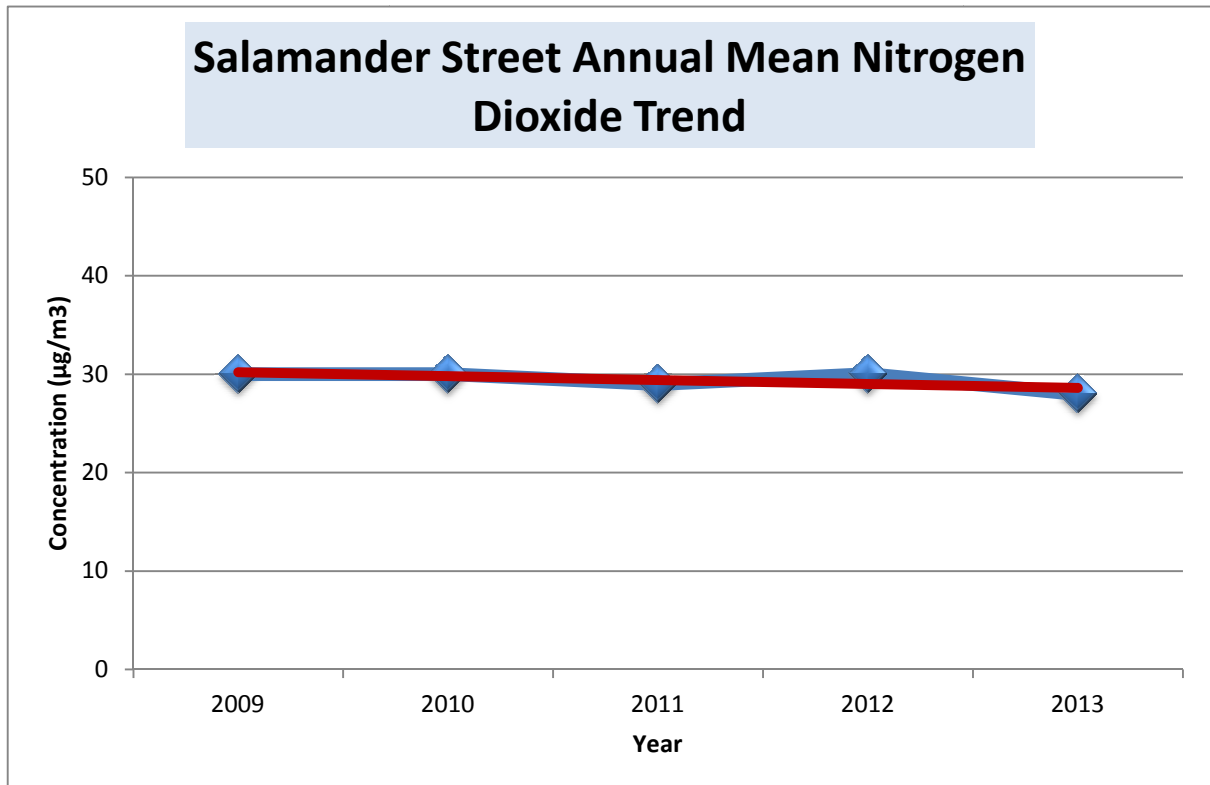




Figure 2.7a Trend in Annual Mean Nitrogen Dioxide Concentrations ( $\mu\text{g}/\text{m}^3$ ) measured at St John's Road

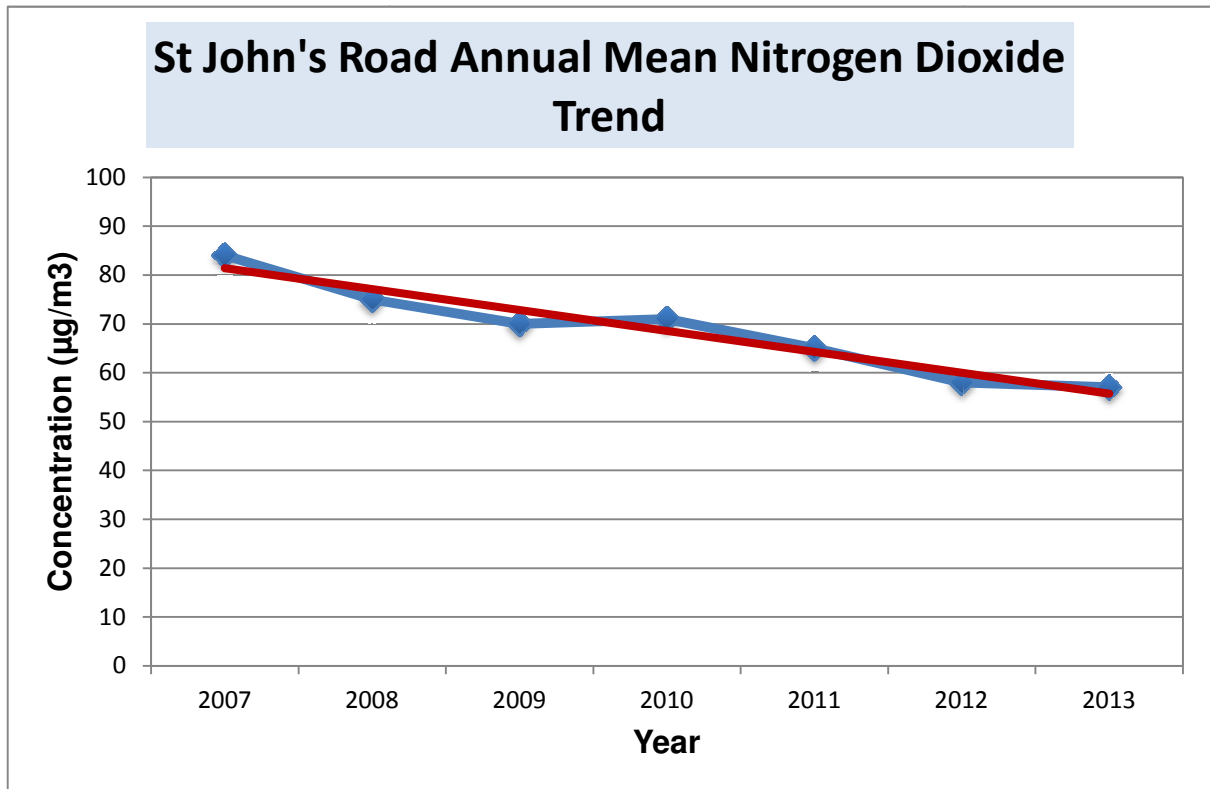
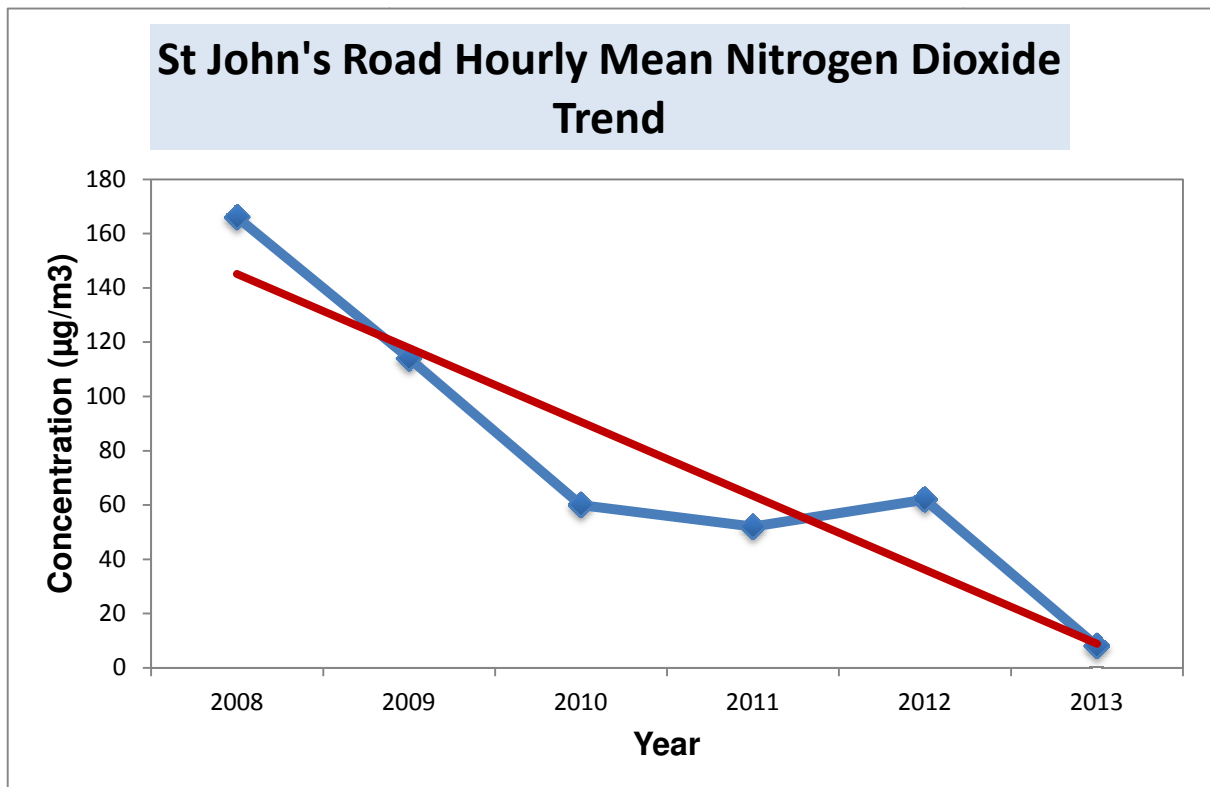


Figure 2.7b Trend in the Number of Exceedences of the Hourly Mean Objective for Nitrogen Dioxide at St John's Road



## **Diffusion Tube Monitoring Data**

All result data from passive diffusion tube monitoring is shown in Table 2.5.

### **Exceedences - Within the AQMAs**

The passive diffusion tube monitoring for 2013 shows exceedences of the annual mean nitrogen dioxide objective within each of the AQMAs. Results show all the AQMAs remain valid.

Data from a number of monitoring sites within the AQMAs is below the objective as per previous years. The setting of the boundary of an AQMA involves an element of judgement and can range from isolated buildings to the entire local authority area as per Scottish Government Policy guidance<sup>3</sup>. The City of Edinburgh Council has chosen to designate several AQMAs, each covering an area of concern, with boundaries based on natural features and road network which generally includes a much wider area than the geographical extent of the exceedences. This allows for a strategic approach, focusing on hot spot locations, which is important for informing planning processes as well as indicating where resources need to be allocated in terms of equipment and overall effort<sup>3</sup>. Scottish Government Air Quality Grant Funding is also available to address concerns within these areas.

In 2013 there are no data in breach (or estimated to be in breach) of the hourly mean objective although monitoring on West Port (ID28d) was borderline. Monitoring will continue within the relevant AQMAs.

### **Exceedences - Outwith the AQMAs**

Exceedences at monitoring locations outwith the AQMAs are identified at the following locations, Angle Park Terrace, Dundee Street/Yeaman Place, Nicolson Street, South Bridge, South Clerk Street, Queensferry Road, and Slateford Road; and are shown in Table 2.6.

These sites are considered in detail within the following Detailed Assessments which conclude that an extension to the existing Central AQMA is necessary to address areas of exceedence.

Data from the site at Queensferry Road ID64 breaches the annual mean objective, with concentrations at the nearest residential facade estimated to be  $47\mu\text{g}/\text{m}^3$  when distance corrected using the DEFRA approved Tool. Monitoring commenced at the facade coincident with this site mid-2012. Annualised data showed levels were actually much lower at the facade. In 2013 there was a full calendar year of data at the facade which resulted in a concentration of  $28\mu\text{g}/\text{m}^3$ , conflicting with the roadside measurement. Further monitoring at the facade along Queensferry Road (ID63) also indicates concentrations well below the objective;  $26\mu\text{g}/\text{m}^3$ . The automatic monitoring station located near the opposite carriageway has corresponding distances to the road and receptor as site ID64. Concentrations here are also relatively low – estimated  $34\mu\text{g}/\text{m}^3$  at the facade.

The Local Authority is satisfied that the facade measurements more appropriately represent relevant exposure than the roadside location and for this reason Detailed Assessment work (in 2012) concluded that an AQMA was not required in this area. It is anticipated there are localised circumstances for the high roadside results at ID64 such as a pedestrian crossing and boundary wall, however investigations to date with local residents and Transport officials have been unable to determine the exact reasons. Monitoring and investigations will continue.

Table 2.7 shows data of diffusion tube monitoring from 2008 to 2012.

### **Potential exceedences**

Locations which are considered borderline with respect to exceeding the annual mean objective are detailed in Table 2.8.

A number of these sites are also included in the Detailed Assessment work below, including; Clerk Street, South Clerk Street, Hope Park Terrace, Nicolson Street, Portobello Road, Slateford Road and Fountainbridge.

At Queensferry Road/Hillhouse Road (ID40) and Broughton Road (ID43) monitoring resulted in concentrations of  $37\mu\text{g}/\text{m}^3$  at the nearest relevant receptors. Monitoring will continue at these sites.

New monitoring at Balgreen has resulted in borderline concentrations of 36 and  $37\mu\text{g}/\text{m}^3$ , representative of the school/nursery play areas. Monitoring will continue at

these locations as a precautionary measure. At Hamilton Place, site ID143a is also representative of the adjacent school play area. Data shows concentrations well below the annual mean objective ( $34\mu\text{g}/\text{m}^3$ ).

Data at Baileyfield Road (ID19) is  $20\mu\text{g}/\text{m}^3$  which is comparable with the Scottish (background) maps of annual nitrogen dioxide concentrations available on the Scottish Air Quality Database website<sup>4</sup>. A review of the site determined very low use of adjacent residential road, serving only a few residential properties. The A199 Sir Harry Lauder Road is 18m away. The site has therefore been reclassified to a background monitoring location.

### **General notes**

Monitored concentrations are lower in 2013 compared to the previous year except at a number of sites in areas of concern; Great Junction Street (ID30 & ID30c), London Road (ID67 & ID70), Princes Street (ID 47 & ID24), Grassmarket (ID37a), St John's Road (ID39) and Gorgie Road (80, 80b & 80c); and at two other sites where monitoring concentrations are well below the objective; Portobello High Street (ID71) and Hillhouse Road (ID40b).

The lower concentrations could be related to a number of factors. The traffic management changes in the city in relation to the Edinburgh Tram construction could have had an impact as well as improvements to the bus fleet. For example, the latter is likely to be attributed to air quality improvements on Easter Road. This traffic corridor is a typical narrow street canyon and has residential tenement (flats) properties close to the roadside, along with a high concentration of shops. Local bus services operate regularly on Easter Road, at 10 minute intervals during peak times. Approximately half of these buses are a diesel-electric parallel hybrid vehicle, equivalent to Euro 5 engine standard. The buses have a specially designed body frame combined with alloy wheels, to save weight and therefore reduce fuel consumption. In addition they operate stop-start technology at bus stops and traffic lights where the vehicle pulls away from the bus stop in pure electric mode. Nitrogen dioxide concentrations have shown a steady decline on Easter Road since 2008. See Figure 2.8.

The bias adjustment factor for 2013 is 0.75 which is the lowest since monitoring commenced. Appendices A2 and A3 describe in detail the assessment involved in determining the choice of factor. The Local Authority has historically used a number of local co-location studies, until a step change in 2011. Since then a combined factor has been calculated using data from the national database in combination with local studies. At the time of calculating the factor for 2013, there was only one study available on the national database, which could not have been used in isolation. Hence, a manual approximate orthonogel regression calculation was undertaken to combine all the studies.

All passive diffusion tube data reported in the tables below are representative of relevant exposure, except background sites at India Street (ID34), Hillview Terrace (ID41), Midmar Drive (ID42) and Baileyfield Road (ID19).

All raw passive diffusion tube monitoring is described in Appendix C.

Appendix D details the calculations used to estimate annual concentration at relevant receptors using the NO<sub>2</sub> Fall Off with Distance calculator (DEFRA website, LAQM, Tools, 2013).

Appendix A5 (Short-term to Long-term Data adjustment for NO<sub>2</sub>) shows the calculations undertaken to estimate the annual mean concentration where data capture was poor, as per instruction in Technical Guidance 09 and with further advice from the LAQM Helpdesk.

Data from the following four sites was not 'annualised' due to poor data capture; Junction Street (ID9c), Grassmarket (ID37), Nicolson Street (ID137) and West Maitland Street (ID2).

Table 2.5 Results of NO<sub>2</sub> Diffusion Tubes 2013

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2013 %	2013 Annual Mean Concentration <sup>a b</sup> (µg/m <sup>3</sup> ) Bias Adjustment factor = 0.75
	<b>NORTH</b>					
29	<b>Bernard Street/CA</b>	Roadside	Yes	No	100	36
29a	<b>Bernard Street/King Chamber</b>	Roadside	Yes	Yes	96	38
29b	<b>Bernard Street No 32</b>	Roadside	Yes	No	100	31
29c	<b>Bernard Street/PS</b>	Roadside	Yes	Yes	100	<b>42</b>
7	<b>Commercial Street No 3/4</b>	Roadside	Yes	No	92	30
9	<b>Commercial Street No 88</b>	Roadside	Yes	No	92	32
9a	<b>Commercial St/Portland Place</b>	Roadside	Yes	No	92	36
52	<b>Ferry Road No 268</b>	Roadside	No	No	100	28
53	<b>Ferry Road/Bowhill Terrace No6</b>	Roadside	Yes	No	100	34
45b	<b>Ferry Road/Maderia Street</b>	Roadside	No	No	100	27
45	<b>Ferry Road/North Fort Street</b>	Roadside	No	No	92	32
45d	<b>Ferry Road/North Junction St</b>	Roadside	Yes	No	92	34
30b	<b>Great Junction Street No 137</b>	Roadside	Yes	No	100	36
30c	<b>Great Junction Street No 14</b>	Roadside	Yes	No	83	39
30d	<b>Great Junction Street/WC</b>	Roadside	Yes	No	100	34
30e	<b>Great Junction Street/CG</b>	Roadside	Yes	No	67	36
30	<b>Great Junction Street/FV</b>	Roadside	Yes	Yes	100	<b>41</b>
55	<b>Inverleith Row/Ferry Road</b>	Roadside	Yes	Yes	100	<b>43</b>
55c	<b>Inverleith Row/Montague</b>	Roadside	Yes	No	100	31
9c	<b>North Junction Street<sup>c</sup></b>	Roadside	Yes	No	25	N/A
9b	<b>Ocean Drive/Leith</b>	Roadside	No	No	92	29
51c	<b>Salamander Street/Baltic Street</b>	Roadside	No	No	92	33
51b	<b>Salamander Street/Bath Street</b>	Roadside	No	No	100	35

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2013 %	2013 Annual Mean Concentration <sup>a b</sup> ( $\mu\text{g}/\text{m}^3$ ) Bias Adjustment factor = 0.75
14	Trinity Crescent	Roadside	No	No	100	27
	EAST					
19	Baileyfield Road	Background	No	No	100	20
31	Dalkeith Road No 187	Roadside	No	No	100	28
25	Easter Road/CH Shop	Roadside	Yes	No	92	41
25b	Easter Road/Rossie Place	Roadside	Yes	No	75	34
25c	Easter Road No 105/109	Roadside	Yes	No	92	37
25d	Easter Road/Bothwick	Roadside	Yes	No	92	30
25e	Easter Road No 198	Roadside	Yes	No	100	27
25f	Easter Road No 271	Roadside	No	No	75	24
25g	Easter Road No 327	Roadside	No	No	92	26
46b	London Road/Brunton Place <sup>C</sup>	Roadside	Yes	No	100	30
81	London Rd/East Norton Place	Roadside	Yes	No	92	44
67	London Road/Earlston Place	Roadside	Yes	No	100	46
68	Parsons Green Terrace	Roadside	Yes	No	100	29
69	London Road/Wolseley Place	Roadside	Yes	No	100	40
70	London Road/Wolseley Terrace	Roadside	Yes	No	92	44
66	London Road/Cadzow Place	Roadside	Yes	No	83	34
46	London Road/Easter Road	Roadside	Yes	No	83	38
32	Niddrie Mains Road No 28	Kerbside	No	No	100	31
82	Piersfield Terrace	Roadside	No	No	100	26
73b	Portobello High Street No23	Roadside	No	No	100	28
71	Portobello High Street No 185	Roadside	No	No	100	33
73a	Portobello Road/Ramsay I	Roadside	No	No	100	37
73d	Portobello Road/Ramsay F <sup>C</sup>	Roadside	No	No	100	38

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2013 %	2013 Annual Mean Concentration <sup>a b</sup> ( $\mu\text{g}/\text{m}^3$ ) Bias Adjustment factor = 0.75
73e	Portobello Road/Ramsay 2 <sup>c</sup>	Roadside	No	No	92	35
73f	Portobello Road /College Ct. <sup>c</sup>	Roadside	No	No	100	19
73g	Portobello Road/Inchview Terr <sup>c</sup>	Roadside	No	No	92	28
72	Seafield Road East No10	Roadside	No	No	100	36
72a	Seafield Road East No. 7 <sup>c</sup>	Roadside	No	No	92	35
	<b>CITY CENTRE - NORTH</b>					
43	Broughton Road	Roadside	No	No	100	37
44	Broughton Street	Roadside	No	No	100	31
13	Deanhaugh Street	Kerbside	No	No	75	31
35	Dundas Street	Kerbside	No	No	83	30
74f	George Street No 112	Roadside	Yes	No	100	34
74e	George Street/Charlotte Sq	Kerbside	Yes	No	67	30
75b	Great Stuart Street No 7	Kerbside	Yes	No	100	30
75f	Great Stuart Street No 14 <sup>c</sup>	Roadside	No	No	100	26
75e	Great Stuart Street No 9 <sup>c</sup>	Roadside	No	No	100	24
143	Hamilton Place No. 72 <sup>c</sup>	Roadside	No	No	100	31
143a	Hamilton Place Library <sup>c</sup>	Roadside	No	No	100	34
34	India Street	Background	Yes	No	100	21
55b	Inverleith Row/Summer Place	Roadside	Yes	No	100	30
21	Leith Walk/Brunswick Road	Roadside	Yes	No	92	34
20	Leith Walk/McDonald Road	Kerbside	Yes	No	100	34
47	Princes Street (Eastbound)	Roadside	Yes	No	100	<b>50</b>
24	Princes Street/Mound	Kerbside	Yes	No	92	<b>41</b>
33	Queen Street/Hanover Street	Roadside	Yes	No	67	33
75a	St Colme Street	Kerbside	No	No	83	34



Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2013 %	2013 Annual Mean Concentration <sup>a b</sup> ( $\mu\text{g}/\text{m}^3$ ) Bias Adjustment factor = 0.75
75d	St Colme Street No. 4 <sup>c</sup>	Roadside	No	No	100	31
36	York Place	Roadside	Yes	No	100	28
	<b>CITY CENTRE - SOUTH</b>					
138	Clerk Street No 15	Roadside	No	No	58	38
48	Cowgate/Gurthrie Street	Roadside	Yes	No	100	38
48a	Cowgate/Blair Street	Roadside	Yes	No	75	35
48b	Cowgate No 301	Roadside	Yes	No	100	30
48c	Cowgate Blackfriars	Roadside	Yes	No	83	<b>42</b>
48e	Cowgatehead No 2	Roadside	Yes	No	58	39
79d	Dundee Street/Yeaman Place	Roadside	No	No	83	<b>46</b>
79a	FountainbridgeNo103	Roadside	No	No	83	37
79b	Fountainbridge/Grove Street	Roadside	No	No	92	28
79	Fountainbridge/Tollcross	Roadside	No	No	100	36
37	Grassmarket/PS	Roadside	Yes	No	33	N/A
37a	Grassmarket No 41	Roadside	Yes	No	100	<b>44</b>
37b	Grassmarket No 75	Roadside	Yes	No	100	37
37c	Grassmarket/Thompsons Court	Background	No	No	100	27
10	Home Street	Roadside	No	No	92	31
17a	Hope Park Terrace/VS	Roadside	No	Yes	100	36
139	Hope Park Terrace No 5	Roadside	No	No	100	30
140	Hope Park Terrace/Clerk Street	Roadside	No	No	100	35
38	Melville Drive	Roadside	No	No	83	26
42	Midmar Drive	Background	No	No	92	15
8	Morningside Road	Kerbside	No	No	75	25
49	Morrison Street	Roadside	Yes	No	100	<b>42</b>

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2013 %	2013 Annual Mean Concentration <sup>a b</sup> ( $\mu\text{g}/\text{m}^3$ ) Bias Adjustment factor = 0.75
137	Nicolson Street No 124	Roadside	No	No	25	N/A
135	Nicolson Street No 69	Roadside	No	No	100	45
136	Nicolson Street No 92	Roadside	No	No	100	39
27	North Bridge – South	Roadside	Yes	No	92	47
144	South Bridge No 59 <sup>c</sup>	Roadside	No	No	100	46
142	South Clerk Street No 41a	Roadside	No	No	92	40
141	South Clerk Street No 84	Roadside	No	No	92	41
3	Torphichen Place	Roadside	Yes	No	83	43
3a	Torphichen Street	Roadside	Yes	No	100	32
2	West Maitland Street	Kerbside	Yes	Yes	50	N/A
28b	West Port No 62	Roadside	Yes	No	58	52
28c	West Port Opp. No 50	Roadside	Yes	No	75	39
28d	West Port No 42	Roadside	Yes	No	75	58
	<b>WEST</b>					
56	Glasgow Road / Drumbrae	Roadside	No	No	92	30
57	Glasgow Road No158	Roadside	No	No	83	33
16	Glasgow Road No 68	Roadside	Yes	No	100	40
16a	Glasgow Road No 68 facade <sup>c</sup>	Roadside	Yes	No	83	38
58	Glasgow Road Newbridge	Roadside	Yes	Yes	100	46
15	Glasgow Road Newbridge	Roadside	Yes	No	100	39
40f	Hillhouse Road No 118	Roadside	No	No	100	31
40c	Hillhouse Road No 240	Roadside	No	No	92	28
40a	Hillhouse Road/Telford Road	Roadside	No	No	100	25
40b	Hillhouse/Craigcrook Terrace	Roadside	No	No	100	27
40e	Hillhouse/Marisshall Place No1	Roadside	No	No	100	27

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2013 %	2013 Annual Mean Concentration <sup>a b</sup> ( $\mu\text{g}/\text{m}^3$ ) Bias Adjustment factor = 0.75
40d	Hillhouse/Marisshall Place No 4	Roadside	No	No	100	33
41	Hillview Terrace	Background	No	No	100	18
61	Maybury Road/Barnton	Roadside	No	No	100	25
40	Queensferry Rd/Hillhouse Rd	Roadside	No	No	83	37
63	Queensferry Road No 544	Roadside	No	No	100	26
64	Queensferry Road No 550	Roadside	No	No	100	47
64a	Queensferry Road No 552	Roadside	No	No	100	28
62	Queensferry Road No 561	Roadside	No	No	100	21
23	Roseburn Terrace	Kerbside	Yes	No	67	35
1	St John's Road SB	Kerbside	Yes	No	100	36
1b	St John's Road IR	Roadside	Yes	No	100	41
1d	St John's Road No 131	Roadside	Yes	No	100	52
39	St John's Road/Victor Park	Roadside	Yes	No	92	35
50a	Whitehouse Rd/Barnton Grove	Roadside	No	No	100	28
	<b>SOUTH WEST</b>					
76	Angle Park/Harrison Road	Roadside	No	No	92	41
76c	Angle Park Terrace No 25	Roadside	No	No	100	32
76b	Angle Park Terrace No 74	Roadside	No	No	100	46
76a	Ardmillan Terrace No 22	Roadside	No	No	100	30
80d	Balgreen Road / School <sup>c</sup>	Roadside	No	No	100	36
80e	Balgreen Road / Library <sup>c</sup>	Roadside	No	No	92	37
4	Calder Road	Roadside	No	No	100	30
18	Gorgie Road No 8	Roadside	Yes	Yes	100	45
80c	Gorgie Road No 87	Roadside	Yes	No	92	40
80b	Gorgie Road No 549	Roadside	Yes	No	83	34

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2013 %	2013 Annual Mean Concentration <sup>a b</sup> ( $\mu\text{g}/\text{m}^3$ ) Bias Adjustment factor = 0.75
80	<b>Gorgie Road / Delhaig</b>	Roadside	Yes	No	100	<b>44</b>
80a	<b>Gorgie Road Glen Lea</b>	Roadside	Yes	No	100	33
5	<b>Gorgie Road/Murieston Road</b>	Kerbside	Yes	No	100	<b>41</b>
76d	<b>Henderson Terrace</b>	Roadside	No	No	92	35
11	<b>Lanark Road No No 610</b>	Roadside	No	No	100	22
77a	<b>Slateford Road No 51</b>	Roadside	No	No	100	37
77b	<b>Slateford Road No 93/95</b>	Roadside	No	No	100	<b>42</b>
77	<b>Slateford Road No 97</b>	Roadside	No	No	100	<b>40</b>
78	<b>Slateford Road/The Maltings</b>	Roadside	No	No	83	30

**Notes for table;** In bold and red, exceedence of the  $\text{NO}_2$  annual mean objective of  $40\mu\text{g}/\text{m}^3$  and in bold black, results of  $40\mu\text{g}/\text{m}^3$  shown.

- a All data is representative of relevant exposure, except at background sites [India Street (ID34), Hillview Terrace (ID41), Midmar Drive (ID42) and Baileyfield Road (ID19)] which are not distance corrected.
- b Means “annualised” as in Box 3.2 of TG(09), where full calendar year data capture is less than 75%
- c New monitoring location 2013

**Table 2.6 Locations outwith AQMAs where 2012 monitoring results showed exceedences of the Annual Mean Nitrogen Dioxide Objective**

Site ID	Location	Data Capture %	Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )
76	<b>Angle Park/Harrison Road</b>	92	<b>41</b>
76B	<b>Angle Park Terrace No 74</b>	100	<b>46</b>
79D	<b>Dundee Street/Yeaman Place</b>	83	<b>46</b>
135	<b>Nicolson Street No 69</b>	100	<b>45</b>
64	<b>Queensferry Road No 550</b>	100	<b>47</b>
77B	<b>Slateford Road No 93/95</b>	100	<b>42</b>
141	<b>South Clerk Street No 84</b>	92	<b>41</b>
144	<b>South Clerk St No 41a *</b>	100	<b>46</b>

\* New monitoring locations not previously reported

In bold and red, exceedence of the  $\text{NO}_2$  annual mean objective of  $40\mu\text{g}/\text{m}^3$

Table 2.7 Results of NO<sub>2</sub> Diffusion Tubes (2008 to 2013)

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/m <sup>3</sup>					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
	<b>NORTH</b>							
29	<b>Bernard Street/CA</b>	Yes	<b>45.3</b>	<b>45.1</b>	<b>43.7</b>	38.9	37	36
29a	<b>Bernard Street/King Chambers</b>	Yes	<b>48.0</b>	<b>42.0</b>	<b>44.6</b>	<b>41.9</b>	<b>40</b>	38
29b	<b>Bernard Street 32</b>	Yes	<b>41.3</b>	32.9	36.9	32.7	33	31
29c	<b>Bernard Street/PS</b>	Yes	<b>53.4</b>	<b>48.2</b>	<b>49.4</b>	<b>44.6</b>	<b>44</b>	<b>42</b>
7	<b>Commercial Street 3/4</b>	Yes	38.6	34.8	34.2	32.2	29	30
9	<b>Commercial Street 88</b>	Yes	<b>40.4</b>	31.6	36.7	31.2	35	32
9a	<b>Commercial St/Portland Place</b>	Yes	-	-	38.1	<b>41.0</b>	39	36
52	<b>Ferry Road 268</b>	No	-	32.1	32.4	32.5	34	28
53	<b>Ferry Road/Bowhill Terrace 6</b>	Yes	-	36.4	34.8	32.5	35	34
45b	<b>Ferry Road/Maderia Street</b>	No	35.3	30.9	33.5	32.7	31	27
45	<b>Ferry Road/North Fort Street</b>	No	39.6	35.4	<b>41.5</b>	32.6	36	32
45d	<b>Ferry Road/North Junction St</b>	Yes	<b>42.4</b>	<b>40.9</b>	38.3	39.6	37	34
30b	<b>Great Junction Street 137</b>	Yes	38.4	38.5	39.9	<b>40.0</b>	38	36
30c	<b>Great Junction Street 14</b>	Yes	<b>50.2</b>	<b>42.6</b>	<b>44.1</b>	38.4	38	39
30d	<b>Great Junction Street/WC</b>	Yes	39.0	37.1	39.9	33.8	38	34
30e	<b>Great Junction Street/CG</b>	Yes	<b>43.1</b>	<b>41.9</b>	38.7	<b>41.2</b>	37	36
30	<b>Great Junction Street/FV</b>	Yes	<b>44.6</b>	<b>44.1</b>	<b>41.8</b>	39.1	38	<b>41</b>
55	<b>Inverleith Row/Ferry Road</b>	Yes	-	<b>42.6</b>	<b>44.0</b>	<b>43.8</b>	<b>46</b>	<b>43</b>
55c	<b>Inverleith Row/Montague</b>	Yes	-	-	-	28.2	32	31
9b	<b>Ocean Drive/Leith</b>	No	-	-	33.0	26.2	31	29
51c	<b>Salamander St/Baltic St</b>	No	-	37.1	36.2	38.5	35	33

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
51b	Salamander St/Bath Rd	No	-	37.4	<b>40.3</b>	37.0	38	35
14	Trinity Crescent	No	28.3	28.6	27.5	28.9	28	27
	<b>EAST</b>							
19	Baileyfield Road	No	24.6	22.5	27.5	24.3	22	20
31	Dalkeith Road 187	No	31.8	28.1	27.8	28.0	29	28
25	Easter Road/CH shop	Yes	<b>58.2</b>	<b>50.8</b>	<b>49.7</b>	<b>43.6</b>	<b>45</b>	<b>41</b>
25b	Easter Road/Rossie Place	Yes	<b>44.9</b>	38.8	39.1	35.8	35	34
25c	Easter Road 105/109	Yes	<b>43.8</b>	38.0	37.7	<b>41.0</b>	<b>41</b>	37
25d	Easter Road/Bothwick	Yes	<b>40.8</b>	37.3	37.1	32.7	34	30
25e	Easter Road 198	Yes	37.3	34.1	34.2	32.0	33	27
25f	Easter Road 217	No	35.0	30.1	32.5	27.9	-	24
25g	Easter Road 327	No	33.4	27.9	30.3	26.8	28	26
46b	Brunton Place	Yes	-	-	-	-	-	30
81	London Road/East Norton Pl	Yes	-	-	-	<b>51.2</b>	<b>46</b>	<b>44</b>
67	London Rd/Earlston Place	Yes	-	<b>47.9</b>	<b>51.3</b>	<b>45.5</b>	<b>46</b>	<b>46</b>
68	London Road /Parsons Grn Ter	Yes	-	30.4	36.6	31.5	33	29
69	London Road/Wolseley Place	Yes	-	<b>56.2</b>	<b>50.6</b>	<b>50.4</b>	<b>42</b>	<b>40</b>
70	London Road/Wolseley Terr	Yes	-	<b>47.3</b>	<b>46.1</b>	<b>42.4</b>	<b>41</b>	<b>44</b>
66	London Rd/Cadzow Place	Yes	-	<b>43.0</b>	<b>40.5</b>	-	36	34
46	London Road/Easter Road	Yes	<b>52.3</b>	<b>43.4</b>	<b>46.2</b>	<b>40.4</b>	<b>46</b>	38
32	Niddrie Mains Road 28	No	26.9	30.7	32.5	30.9	33	31
82	Piersfield Terrace	No	-	-	-	27.8	28	26
73b	Portobello High St 23	No	-	-	-	31.2	28	28
71	Portobello High St West 185	No	-	<b>43.0</b>	39.2	36.0	32	33

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
73a	Portobello Road/Ramsay Inst	No	-	-	-	41.6	37	37
73d	Portobello Road/Ramsay F	No	-	-	-	-	-	38
73e	Portobello Road/Ramsay 2	No	-	-	-	-	-	35
73f	Portobello Road /College Court	No	-	-	-	-	-	19
73g	Portobello Road/Inchview Terr	No	-	-	-	-	-	28
72	Seafield Road East No10	No	-	35.0	38.4	33.1	37	36
72a	Seafield Road East No. 7	No	-	-	-	-	-	35
	<b>CITY CENTRE - NORTH</b>							
43	Broughton Road	No	40.4	38.1	39.8	34.6	37	37
44	Broughton Street	No	37.7	35.1	35.3	32.8	34	31
13	Deanhaugh Street	No	32.3	30.1	33.0	33.5	32	31
35	Dundas Street	No	28.9	27.2	31.6	30.6	31	30
74f	George Street No 112	Yes	-	-	43.4	44.7	47	34
74e	George Street/Charlotte Square	Yes	-	-	42.6	42.5	43	30
75b	Great Stuart Street 7	No	-	-	36.2	33.4	31	30
75f	Great Stuart Street 14	No	-	-	-	-	-	26
75e	Great Stuart Street 9	No	-	-	-	-	-	24
143	Hamilton Place No 72	No	-	-	-	-	-	31
143a	Hamilton Place Library	No	-	-	-	-	-	34
34	India Street	No	22.7	22.6	22.7	23.6	23	21
55b	Inverleith Row/Summer Place	No	-	-	-	33.7	32	30
21	Leith Walk/Brunswick Rd	Yes	37.3	35.3	35.4	34.2	36	34
20	Leith Walk/McDonald Rd	Yes	53.1	36.8	38.1	N/A	35	34
47	Princes Street East Bound	Yes	64	34	58	45.3	45	50



Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
24	Princes Street/Mound	Yes	51.5	36.2	49.3	N/A	34	41
33	Queen Street/Hanover Street	Yes	43.7	50.8	56.3	50.0	49	33
75a	St Colme Street	No	-	-	38.5	36.5	38	34
75d	St Colme Street No 4	No	-	-	-	-	-	31
36	York Place	Yes	40.5	37.5	39.0	35.4	41	28
	CITY CENTRE - SOUTH							
138	Clerk Street 15	No	-	-	-	-	40	38
48	Cowgate/Gurthrie Street	Yes	46.6	39.8	46.2	40.2	40	38
48a	Cowgate/Blair Street	Yes	-	-	37.7	31.4	40	35
48b	Cowgate No 301	Yes					33	30
48c	Cowgate Blackfriars	Yes	-	-	-	-	43	42
48e	Cowgatehead No 2	Yes	-	-	-	-	-	39
79d	Dundee Street/Yeaman Place	No	-	-	-	-	-	46
79a	FountainbridgeNo103	No	-	-	-	-	39	37
79b	Fountainbridge/Grove Street	No	-	-	-	-	32	28
79	Fountainbridge/Tollcross	No	-	-	42.0	36.3	37	36
37	Grassmarket /PS	Yes	35.1	35.4	38.4	32.5	35	N/A
37a	Grassmarket 41	Yes	42.3	40.5	60.0**	42.0	43	44
37b	Grassmarket 75	Yes	-	-	-	37.1	39	37
37c	Grassmarket/Thompsons Ct	No	-	-	-	-	-	27
10	Home Street/Tollcross	No	37.4	32.3	36.5	25.7	33	31
17a	Hope Park Terrace/VS	No	-	38.8	43.4	37.4	39	36
139	Hope Park Terrace 5	No	-	-	-	-	34	30
140	Hope Park Terrace/Clerk St	No	-	-	-	-	35	35

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
38	Melville Drive	No	26.2	25.3	27.6	27.3	29	26
42	Midmar Drive	No	17.4	15.2	18.4	16.1	18	15
8	Morningside Road	No	30.0	27.1	28.8	28.6	26	25
49	Morrison Street	Yes	<b>61.4**</b>	<b>44.6</b>	<b>49.3</b>	<b>48.5</b>	<b>46</b>	<b>42</b>
137	Nicolson Street 124	No	-	-	-	-	<b>41</b>	N/A
135	Nicolson Street 69	No	-	-	-	-	<b>50</b>	<b>45</b>
136	Nicolson Street 92	No	-	-	-	-	<b>42</b>	39
27	North Bridge - South	Yes	<b>52.3</b>	<b>48.4</b>	<b>49.4</b>	<b>48.7</b>	<b>52</b>	<b>47</b>
144	South Bridge 69	No	-	-	-	-	-	<b>46</b>
142	South Clerk Street 41a	No	-	-	-	-	<b>42</b>	<b>40</b>
141	South Clerk Street 84	No	-	-	-	-	<b>44</b>	<b>41</b>
3	Torphichen Place	Yes	<b>58.2</b>	26.3	<b>55.6</b>	<b>55.1</b>	<b>48</b>	<b>43</b>
3a	Torphichen Street	Yes	-	-	-	-	-	32
2	West Maitland St/Palmerston PI	Yes	<b>70.1**</b>	<b>45.6</b>	<b>52.4</b>	<b>55.3</b>	<b>40</b>	N/A
28b	West Port 62	Yes	<b>72.5**</b>	<b>66.7**</b>	<b>62.4**</b>	<b>57.0</b>	<b>61</b>	<b>52</b>
28c	West Port Opp 50	Yes	<b>51.5</b>	<b>43.5</b>	<b>41.5</b>	39.0	-	39
28d	West Port 42	Yes	<b>66.6**</b>	<b>60.2**</b>	<b>54.9</b>	<b>55.2</b>	<b>60</b>	<b>58</b>
	WEST							
56	Glasgow Road/Drumbrae	No	-	28.6	30.7	29.5	31	30
57	Glasgow Road No 158	No	-	34.9	36.3	36.5	36	33
16	Glasgow Road 68	Yes	<b>42.4</b>	<b>46.8</b>	<b>44.5</b>	<b>43.8</b>	<b>47</b>	<b>40</b>
16a	Glasgow Road 68 facade	Yes	-	-	-	-	-	38
58	Glasgow Rd Newbridge R about	Yes	-	<b>51.1</b>	<b>51.3</b>	<b>51.5</b>	<b>48</b>	<b>46</b>
15	Glasgow Rd Newbridge R about	Yes	35.7	<b>42.0</b>	37.6	<b>40.9</b>	<b>40</b>	39

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
40f	Hillhouse Road 118	No	-	-	-	-	35	31
40c	Hillhouse Road 240	No	-	-	-	-	30	28
40a	Hillhouse Rd/Telford Rd	No	-	-	-	-	28	25
40b	Hillhouse/Craigcrook Terr	No	-	-	-	-	26	27
40e	Hillhouse/ Marischall PI 1	No	-	-	-	-	28	27
40d	Hillhouse/ Marischall PI 4	No	-	-	-	-	32	33
41	Hillview Terrace	No	19.6	21.2	22.4	18.4	21	18
61	Maybury Rd/Barnton	No	-	24.2	27.0	25.8	16	25
40	Queensferry Rd/Hillhouse Rd	No	<b>44.4</b>	37.4	<b>42.4</b>	34.2	<b>40</b>	37
63	Queensferry Road 544	No	-	27.6	29.4	25.2	26	26
64	Queensferry Road 550	No	-	<b>46.8</b>	<b>47.5</b>	<b>43.9</b>	<b>50</b>	<b>47</b>
64a	Queensferry Road 552	No	-	-	-	-	30	28
62	Queensferry Road 561	No	-	22.0	25.6	19.2	25	21
23	Roseburn Terrace	Yes	<b>49.5</b>	37.2	<b>43.2</b>	34.5	38	35
1	St John's Road SB	Yes	<b>41.2</b>	<b>36.7</b>	<b>38.6</b>	35.1	38	36
1b	St John's Road IR	Yes	<b>48.8</b>	<b>44.2</b>	<b>43.5</b>	38.4	<b>44</b>	<b>41</b>
1d	St John's Road 131	Yes	<b>84.9**</b>	<b>57.8</b>	<b>58.8</b>	<b>56.3</b>	<b>52</b>	<b>52</b>
39	St John's Road	Yes	31.7	28.2	31.1	30.0	32	35
50a	Whitehouse Rd/Barnton Grove	No	31.4	29.8	32.1	27.8	32	28
	<b>SOUTH WEST</b>							
76	Angle Park/Harrison Rd	No	-	-	<b>52.9</b>	<b>44.4</b>	<b>48</b>	<b>41</b>
76c	Angle Park Terrace 25	No	-	-	-	-	36	32
76b	Angle Park Terrace 74	No	-	-	-	-	<b>51</b>	<b>46</b>
76a	Ardmillan Terrace 22	No	-	-	-	-	32	30

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
80d	Balgreen Road / School	No	-	-	-	-	-	36
80e	Balgreen Road / Library	No	-	-	-	-	-	37
4	Calder Road	No	<b>29.5</b>	<b>26.3</b>	<b>25.9</b>	31.7	32	30
18	Gorgie Road 8	Yes	<b>51.5</b>	<b>45.0</b>	<b>54.5</b>	<b>48.2</b>	<b>49</b>	<b>45</b>
80c	Gorgie Road 87	Yes	-	-	-	-	39	<b>40</b>
80b	Gorgie Road 549	Yes	-	-	-	-	33	34
80	Gorgie Road /Delhaig	Yes	-	-	<b>47.4</b>	<b>42.2</b>	<b>42</b>	<b>44</b>
80a	Gorgie Road Glen Lea	Yes	-	-	-	-	-	33
5	Gorgie Road/Murieston Road	Yes	<b>44.3</b>	<b>42.6</b>	<b>42.9</b>	<b>44.4</b>	<b>43</b>	<b>41</b>
76d	Henderson Terrace	No	-	-	-	-	38	35
11	Lanark Road 610	No	<b>24.8</b>	<b>22.3</b>	<b>23.5</b>	22.5	24	22
77a	Slateford Road 51	No	-	-	-	-	<b>41</b>	37
77b	Slateford Road 93/95	No	-	-	-	-	<b>46</b>	<b>42</b>
77	Slateford Road 97	No	-	-	<b>47.6</b>	38.1	<b>43</b>	<b>40</b>
78	Slateford Rd/The Maltings	No	-	-	<b>35.9</b>	30.2	31	30

**Notes;** In bold and red, exceedence of the NO<sub>2</sub> annual mean objective of 40 $\mu\text{g}/\text{m}^3$  and in bold black, results of 40 $\mu\text{g}/\text{m}^3$  shown.

Underlined, annual mean greater than 60 $\mu\text{g}/\text{m}^3$ , indicating a potential exceedence of the NO<sub>2</sub> hourly mean AQS objective.

All data is representative of relevant exposure.

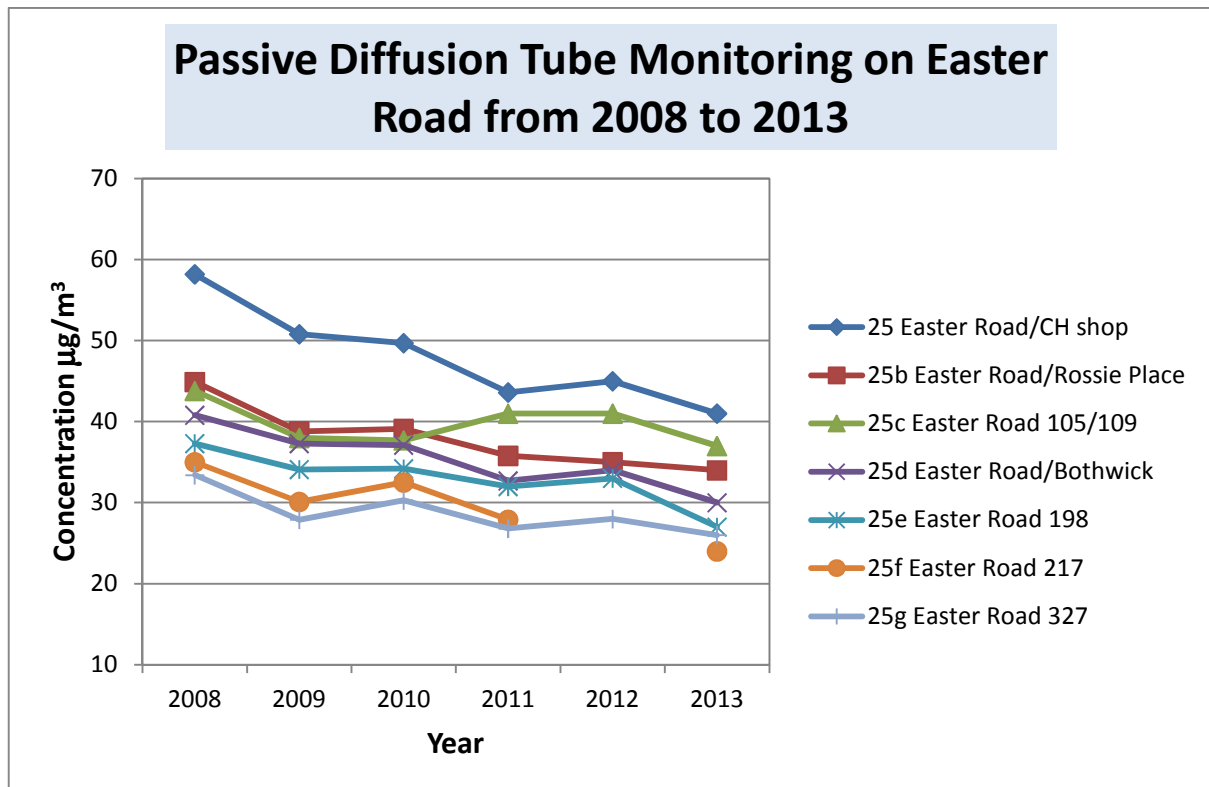
Data expressed in integer from 2012 onwards.

**Table 2.8 Locations outwith AQMAs where monitoring results indicate potential exceedences of the Annual Mean Nitrogen Dioxide Objective**

site id	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
80d	Balgreen Road / School	No	-	-	-	-	-	36
80e	Balgreen Road / Library	No	-	-	-	-	-	37
43	Broughton Road	No	<b>40.4</b>	38.1	<b>39.8</b>	34.6	37	37
138	Clerk Street 15	No	-	-	-	-	<b>40</b>	38
79a	FountainbridgeNo103	No	-	-	-	-	39	37
79	Fountainbridge/Tollcross	No	-	-	<b>42.0</b>	36.3	37	36
17a	Hope Park Terrace/VS	No	-	38.8	<b>43.4</b>	37.4	39	36
136	Nicolson Street 92	No	-	-	-	-	<b>42</b>	39
73a	Portobello Road/Ramsay Inst	No	-	-	-	<b>41.6</b>	37	37
73d	Portobello Road/Ramsay F	No	-	-	-	-	-	38
40	Queensferry Rd/Hillhouse Rd	No	<b>44.4</b>	37.4	<b>42.4</b>	34.2	<b>40</b>	37
77	Slateford Road 97	No	-	-	<b>47.6</b>	38.1	<b>43</b>	<b>40</b>
142	South Clerk Street 41a	No	-	-	-	-	<b>42</b>	<b>40</b>

Note; In bold and red, exceedence of the  $\text{NO}_2$  annual mean objective of  $40\mu\text{g}/\text{m}^3$  and in bold black, results of  $40\mu\text{g}/\text{m}^3$  shown.

Figure 2.8 Passive Diffusion Tube Monitoring on Easter Road from 2008 to 2013



**Trend Data from Nitrogen Dioxide Passive Diffusion Tubes within AQMAs**

Passive diffusion tube data used in the trend assessment has been corrected for bias and taken from the point of measurement. This is to ensure consistency due to the change in methodology in 2008 for calculating nitrogen dioxide fall off with increasing distance from source.

Many of Edinburgh’s historic monitoring sites within the Central AQMA were positioned at the kerbside/roadside and these locations have been retained for continuity. Trend lines have been drawn using an Excel simple regression statistical program.

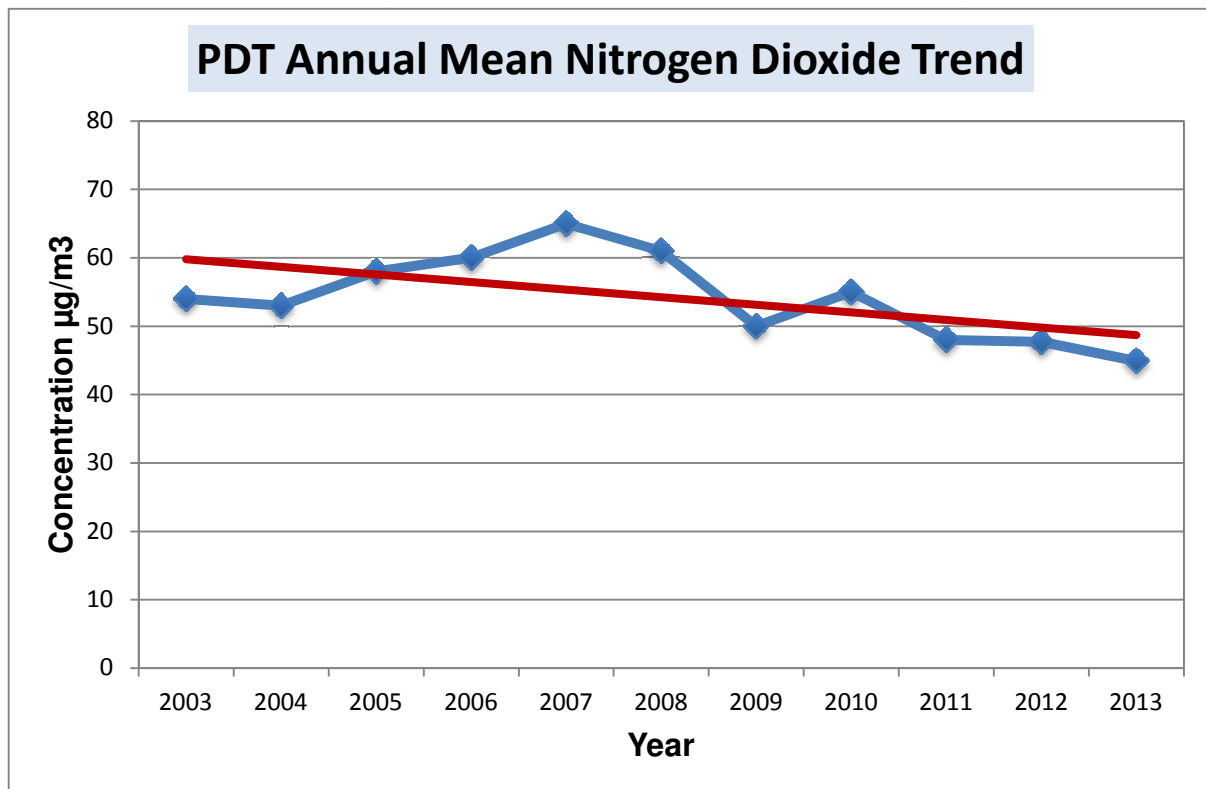
Figure 2.13 shows the trend analysis. The data used is shown in Appendix E.

The trend data is based on the average mean concentrations obtained from passive diffusion tube monitoring at the following locations each year;

- St John’s Road (ID 1)
- St John’s Road (ID 1b)
- Gorgie Road (ID 18)
- Princes Street (ID 24)

- St John's Road (ID 1d)
- Torphichen Place (ID 3)
- Roseburn Terrace (ID 23)
- West Maitland Street (ID 2)
- North Bridge (ID 27)
- York Place (ID 36)
- West Port (ID 28b)
- Great Junction Street (ID 30)

**Figure 2.13 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites within the AQMAs.**



There is a general downward trend of nitrogen dioxide concentrations at passive diffusion tube sites located within Air Quality Management Areas since records began in 2003. Some caution should be applied to this analysis considering the extensive traffic management changes, road works/closures etc particularly throughout the Central AQMA which are relate to the Edinburgh Tram project. Nevertheless improvements have been made in the bus fleet operating through many of the AQMA trafficked corridors. On the other hand, it is also noted that there is a general downward trend of bias adjustment factors, with the lowest of 0.75 in 2013 (See Appendix A1).

### Detailed Assessment at Hope Park Terrace, Clerk Street

Passive diffusion tube data from 2013 is considered in the context of the Detailed Assessment for Hope Park Terrace/Clerk Street in Table 2.9 below. A new monitoring location was identified in 2013 on South Bridge (ID144). Data Capture was considered insufficient at Nicolson Street (ID137) to warrant analysis. Data was annualised at Clerk Street (ID138) because it was below 75% capture for the calendar year in 2012 and 2013. All other sites had good data capture.

Details of the monitoring results and data capture since 2009 are also recorded in the table. Figure 2.9 shows the monitoring locations involved in the assessment.

**Table 2.9 Monitoring Results for Hope Park Terrace/Clerk Street Detailed Assessment**

Site ID	Site Name	Annual mean concentration at relevant receptors, adjusted for bias ( $\mu\text{g}/\text{m}^3$ ) Data capture in brackets (%)				
		2009 bias adjustment factor 0.86	2010 bias adjustment factor 0.85	2011 bias adjustment factor 0.81	2012 bias adjustment factor 0.76	2013 bias adjustment factor 0.75
144	South Bridge	-	-	-	-	<b>46</b> (100%)
135	Nicolson Street 69	-	-	-	<b>50</b> (100%)	<b>45</b> (100%)
136	Nicolson Street 92	-	-	-	<b>42</b> (92%)	39 (100%)
137	Nicolson Street 124	-	-	-	<b>41</b> (92%)	N/A (25%)
138	Clerk Street 15	-	-	-	<b>40</b> (67%)	38 (58%)
139	Hope Park Terrace	-	-	-	34 (100%)	30 (100%)
17a	Hope Park Terrace	39(100%)	<b>43</b> (100%)	37(100%)	39 (83%)	36 (100%)
140	Hope Pk/Clerk St	-	-	-	35 (100%)	35 (100%)
142	South Clerk St 41a	-	-	-	<b>42</b> (92%)	<b>40</b> (92%)
141	South Clerk St 84	-	-	-	<b>44</b> (92%)	<b>41</b> (92%)

\*Duplicate passive diffusion tube

The monitoring continues to show exceedences of the annual mean objective at sites along the arterial road in the Detailed Assessment area ranging from 41 to  $46\mu\text{g}/\text{m}^3$ . The new monitoring site ID144 on South Bridge shows the highest annual mean concentration of nitrogen dioxide of  $46\mu\text{g}/\text{m}^3$ . Street canyon topography represents most of the assessment area along the main A7 road.

Monitoring at other sites is below the annual mean objective but borderline, except at two sites on Hope Park Terrace (ID139 & ID140), where there is less idling traffic and receptors are located further from the road.



In conclusion, it will be necessary to extend the Central AQMA to include this main traffic corridor and a localised area around the Hope Park Terrace junction.

Figure 2.9A Monitoring Locations for Hope Park Terrace/Clerk St Detailed Assessment

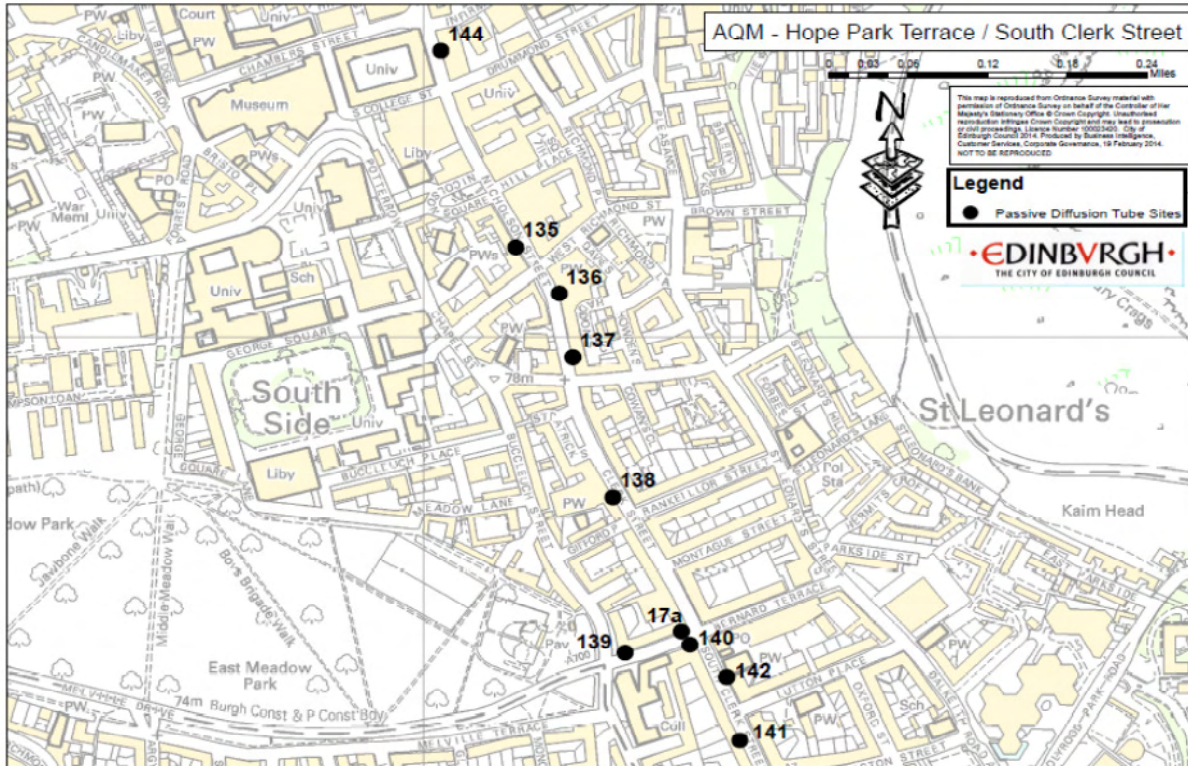
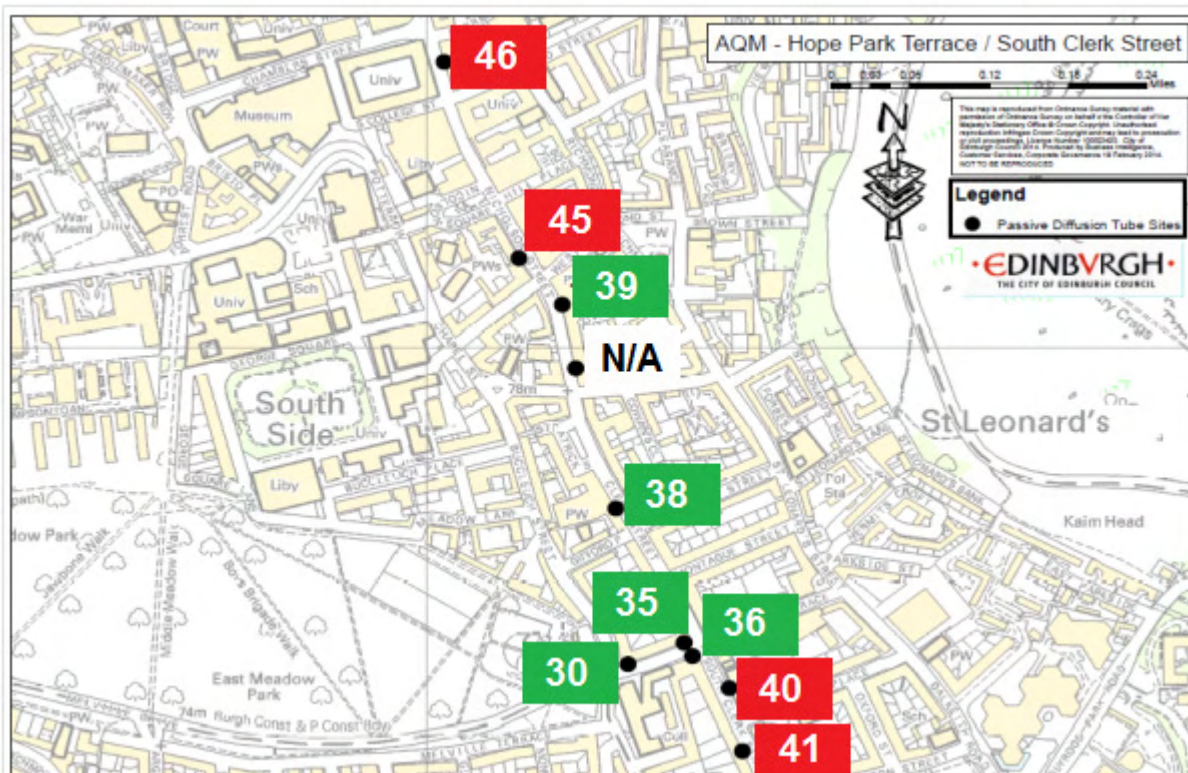


Figure 2.9B Data for Locations in Hope Park Terrace/Clerk St Detailed Assessment



**Detailed Assessment at Angle Park Terrace / Slateford Road**

Table 2.10 describes the monitoring results for nine monitoring locations considered in the Detailed Assessment for Angle Park Terrace / Slateford Road. There was good data capture at all sites in 2013. The monitoring locations which are all representative of worse-case scenario are shown in Figure 2.10.

A number of monitoring sites have continued to show exceedence of the annual mean objective in 2013. Exceedences are high at the monitoring locations close to the Angle Park Terrace and Harrison Road junction where results ranged from 41µg/m<sup>3</sup> at ID76 to 46µg/m<sup>3</sup> at ID76b. Data from Angle Park Terrace/Harrison Road (ID76) has breached the objective since 2010.

There also continues to be exceedences of the objective on Slateford Road (42µg/m<sup>3</sup> at ID77b) while at the long term site (ID77) the concentration was just below the objective in 2013 at 40µg/m<sup>3</sup>. The supplementary Slateford Road site (ID77a) shows a borderline result of 37µg/m<sup>3</sup>.

In conclusion it will be necessary to extend the Central AQMA to include these areas in breach of the annual mean objective.

**Table 2.10 Monitoring Results for Angle Park Terrace / Slateford Road Detailed Assessment**

Site ID	Site Name	Annual mean concentration at relevant receptors, adjusted for bias (µg/m <sup>3</sup> ) Data capture in brackets (%)			
		2010 bias adjustment factor 0.85	2011 bias adjustment factor 0.81	2012 bias adjustment factor 0.76	2013 bias adjustment factor 0.75
78	Slateford Road	36 (75%)	30 (83%)	31 (100%)	30 (83%)
77	Slateford Road 97	48 (92%)	38 (100%)	<b>43</b> (100%)	<b>40</b> (100%)
77b	Slateford Road 93/95	-	-	<b>46</b> (100%)	<b>42</b> (100%)
77a	Slateford Road 51	-	-	<b>41</b> (83%)	37 (100%)
76	Angle Pk/Harrison Rd	<b>53</b> (100%)	<b>44</b> (100%)	<b>48</b> (100%)	<b>41</b> (93%)
76a	Ardmillan Terrace 22	-	-	32 (83%)	30 (100%)
76b	Angle Park Terrace 74	-	-	<b>51</b> (100%)	<b>46</b> (100%)
76c	Angle Park Terrace 25	-	-	36 (100%)	32 (100%)
76d	Henderson Terrace	-	-	38 (83%)	35 (92%)

Figure 2.10A Monitoring Locations for Angle Park Terrace / Slateford Road Detailed Assessment

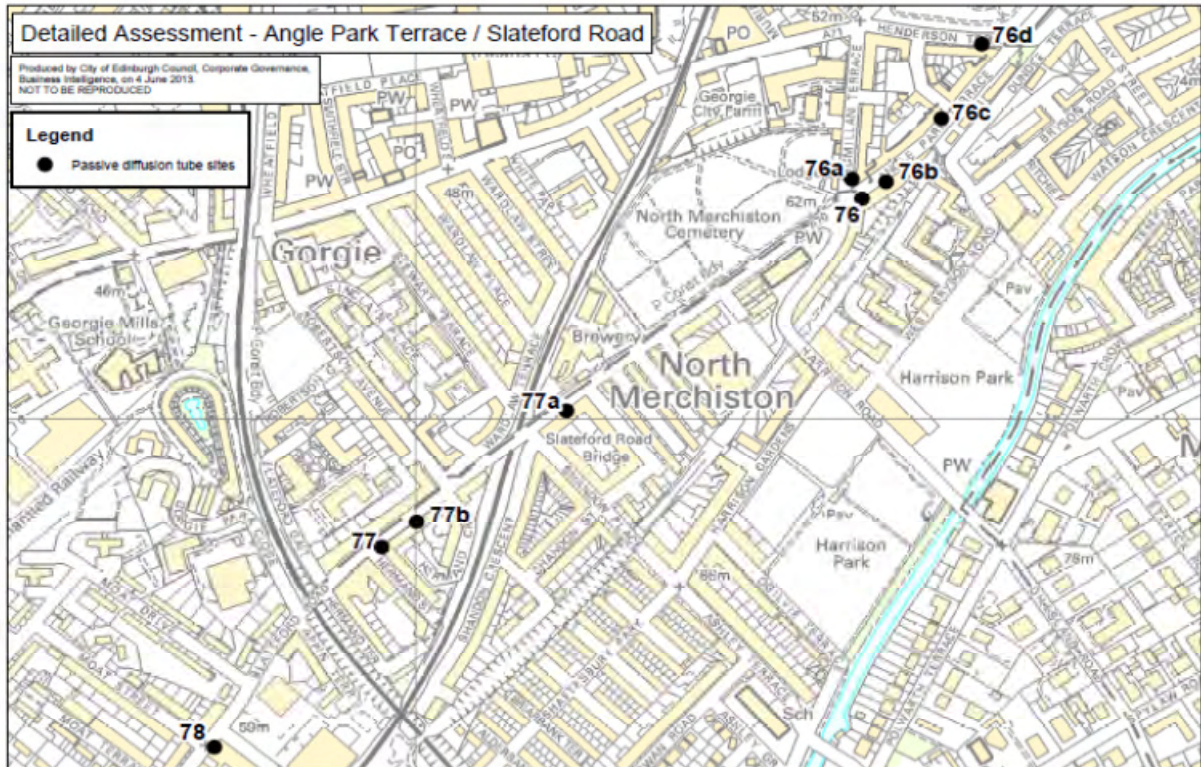
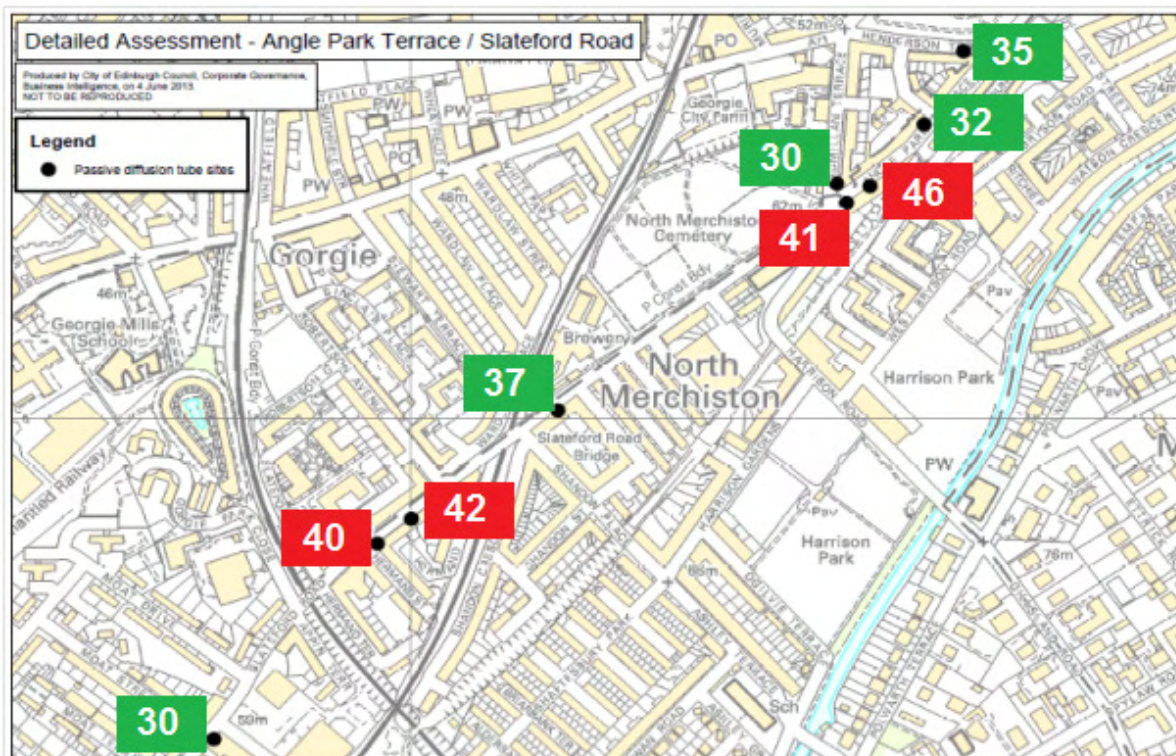


Figure 2.10B Data for Monitoring Locations in Angle Park Terrace / Slateford Road Detailed Assessment



### Detailed Assessment Fountainbridge/Dundee Street

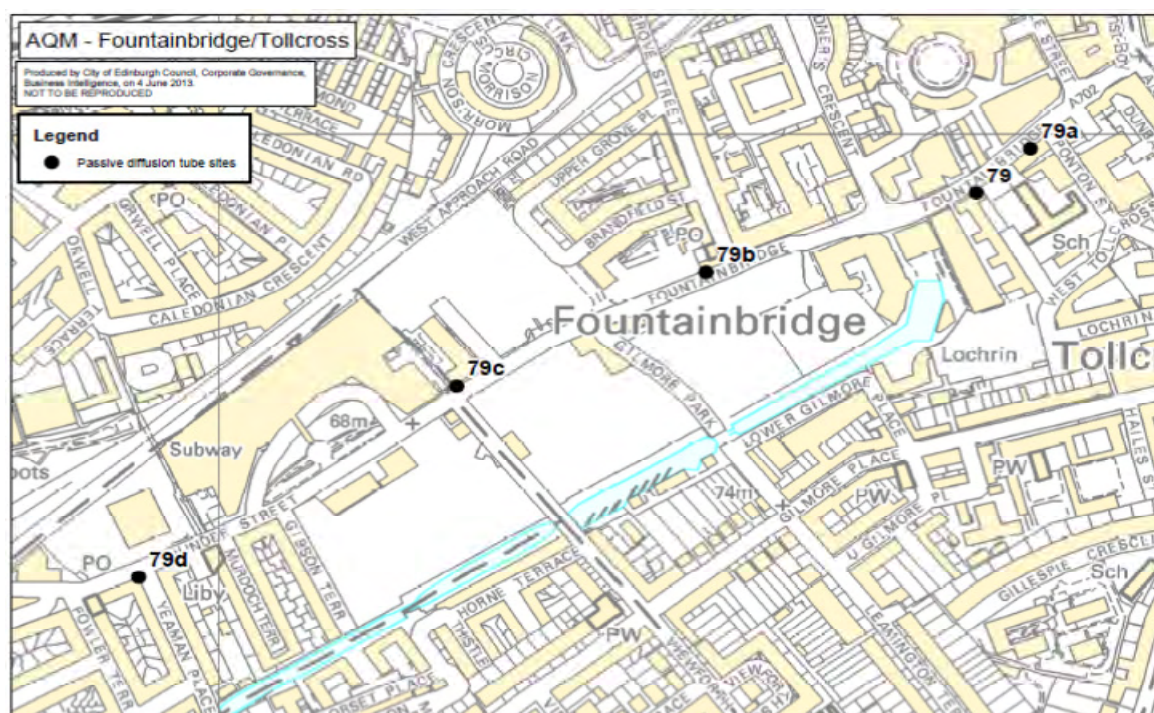
In 2013 monitoring ceased at the Dundee Street (ID76C) site as data collection was poor the previous year. Data collection was also poor at Dundee Street/Yeaman Place (ID79D) in 2012 so results have been annualised for the purpose of the Detailed Assessment to give an estimated annual average concentration. This was not undertaken in 2010 for the Fountainbridge/Tollcross (ID79) so results should be considered with caution. In 2013 all other sites had good data capture.

Details of the monitoring results and data capture since 2010 are recorded in Table 2.11. Figure 2.11 shows the monitoring locations involved in the assessment.

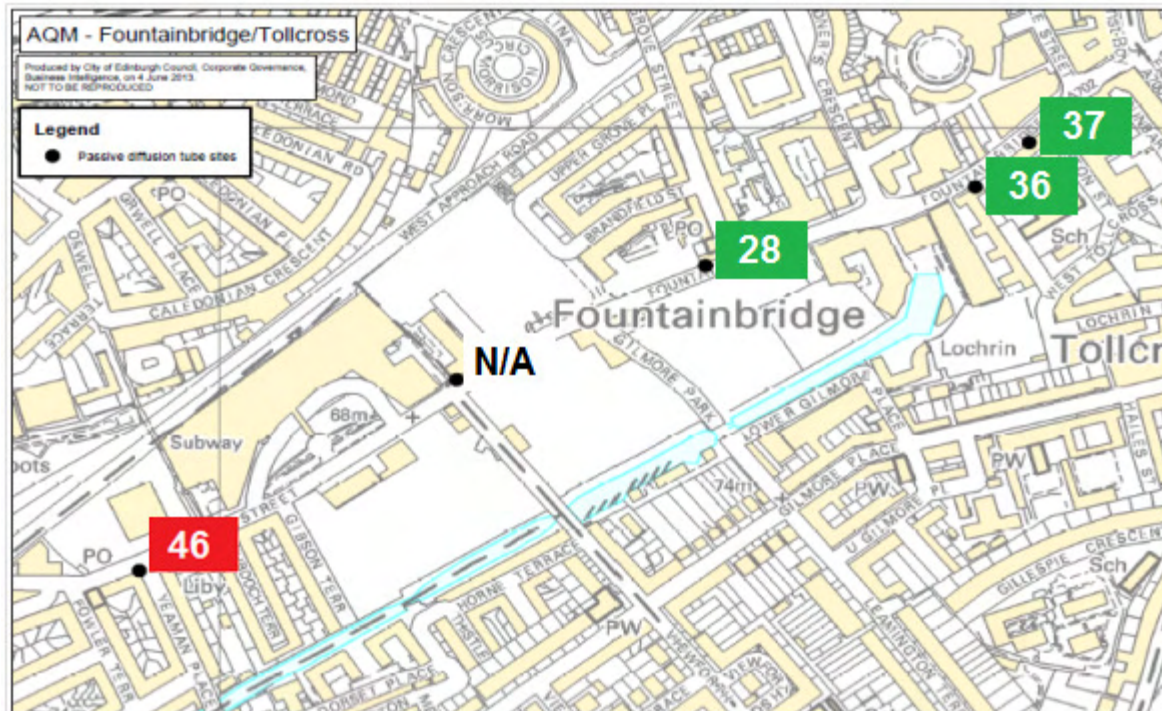
**Table 2.11 Monitoring Results for Fountainbridge/Dundee Street Detailed Assessment**

Site ID	Site Name	Annual mean concentration at relevant receptors, adjusted for bias ( $\mu\text{g}/\text{m}^3$ ) Data capture in brackets (%)			
		2010 (bias adj. factor = 0.85)	2011 (bias adj. factor = 0.81)	2012 (bias adj. factor = 0.76)	2013 (bias adj. factor = 0.75)
79d	Dundee St/Yeaman Place	-	-	46 (50%)	46 (83%)
79c	Dundee Street 114	-	-	- (33%)	N/A
79b	Fountainbridge/Grove St	-	-	32 (75%)	28 (92%)
79	Fountainbridge/Tollcross	42 (50%)*	36 (92%)	37 (100%)	36 (100%)
79a	Fountainbridge 103	-	-	39 (83%)	37 (83%)

**Figure 2.11A Monitoring Locations in Fountainbridge / Dundee Street Detailed Assessment**



**Figure 2.11B Data for Monitoring Locations in Fountainbridge/Dunee Street Detailed Assessment**



Breaches of the annual mean objective are identified at Dundee Street/Yeaman Place (ID79d) in 2013, where data shows a concentration of  $46\mu\text{g}/\text{m}^3$ , equivalent to the 2012 (annualised) result. At Fountainbridge/Grove Street (ID79b) concentrations have consistently been well below the annual mean objective. At the remaining two sites data is borderline with concentrations of  $36\mu\text{g}/\text{m}^3$  at Fountainbridge/Tollcross (ID79) and  $37\mu\text{g}/\text{m}^3$  at Fountainbridge (ID79a).

In conclusion, it will be necessary to extend the Central AQMA to include a localised area around Dundee Street and continue monitoring in Fountainbridge in relation to the borderline results.

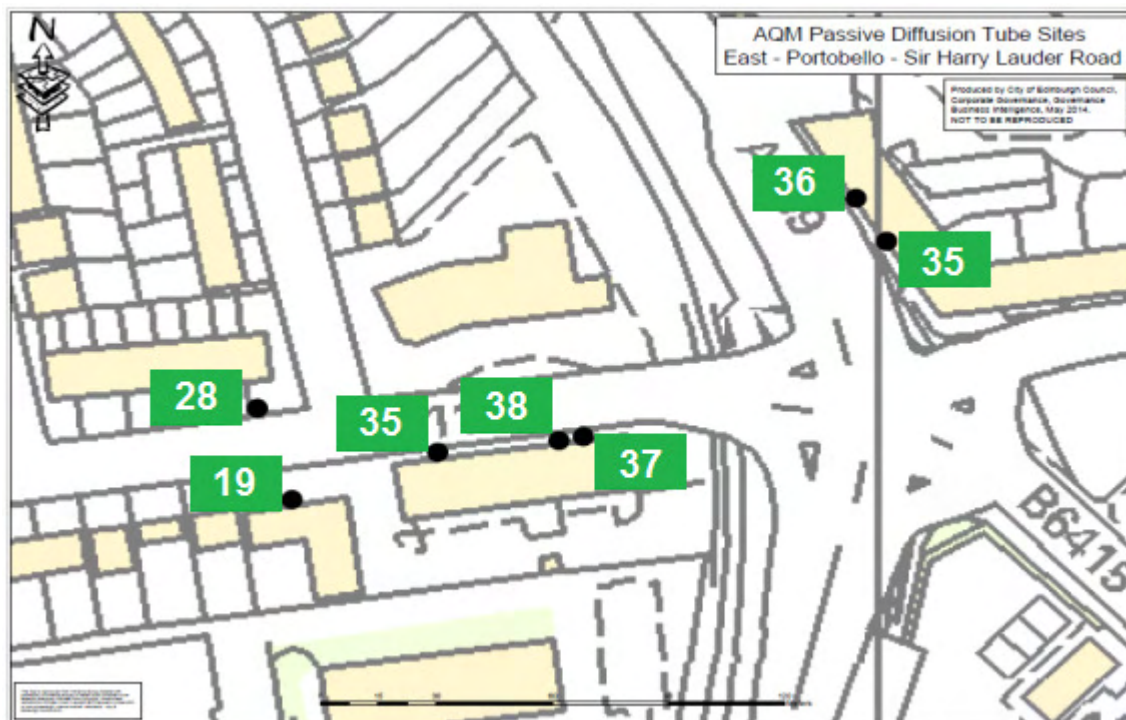
### **Detailed Assessment Portobello Road/Sir Harry Lauder Road**

Five additional monitoring sites were established in 2013 at Portobello Road/Sir Harry Lauder Road junction in order to progress Detailed Assessment work. Figure 2.12 below shows locations of these sites. There was good data capture at all sites in 2013. A summary of the monitoring associated with the Detailed Assessment are shown in Table 2.12.

Figure 2.12A Monitoring Locations - Portobello Road/Sir Harry Lauder Road Detailed Assessment



Figure 2.12B Data for Monitoring Locations in Portobello Road / Sir Harry Lauder Road Detailed Assessment



**Table 2.12 Monitoring Results for Portobello Road/Sir Harry Lauder Road Detailed Assessment**

Site ID	Site Name	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$ Data capture % (in brackets)			
		2010 (Bias Adj. Factor = 0.85)	2011 (Bias Adj. Factor = 0.81)	2012 (Bias Adj. Factor = 0.76)	2013 (Bias Adj. Factor = 0.75)
73g	Portobello Rd/Inchview Terr	-	-	-	28 (92%)
73f	Portobello Road/College Ct	-	-	-	19 (100%)
73e	Portobello Rd/R.Institute 2	-	-	-	35 (92%)
73d	Portobello Rd/R.Institute(f)	-	-	-	38 (100%)
73a	Portobello Rd/R.Institute	-	41.6 (100%)	37 (100%)	37 (100%)
72	Seafield Road East 10	38 (92%)	33.1(100%)	37 (100%)	36 (100%)
72a	Seafield Road East 7	-	-	-	35 (92%)

Concentrations at all monitoring sites in 2013 are below the annual mean objective. Therefore it will not be necessary to declare an Air Quality Management Area for the junction. Data at Ramsay Institute building on Portobello Road (ID73a and ID73d) and Seafield Road East (ID72) – is borderline with results of 37, 38 and  $36\mu\text{g}/\text{m}^3$  respectively. Monitoring will continue at these sites.

### 2.2.2 Particulate Matter ( $\text{PM}_{10}$ )

St Leonard's (AURN) and Queensferry Road operate a Filter Dynamics Measurement System (FDMS) unit to monitor  $\text{PM}_{10}$ . All other monitoring stations use Tapered Element Oscillating Microbalance (TEOM) instruments.

The data at Queen Street, Salamander Street, Currie and Glasgow Road has been corrected to provide a gravimetric equivalent, using the Kings College Volatile Correction Model (VCM). This is discussed in Appendix A4.

The data has also been gravimetrically corrected using Edinburgh's local derived gravimetric factor of 1.14 for comparison and continuity with historical data. The data shows to show that the two correction methodologies are comparable. Data is shown in Tables 2.13 and 2.14.

All monitoring locations are representative of relevant public exposure.

Table 2.13 Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with Annual Mean Objective

Site ID	Site Name Equipment Type	Within AQMA?	Valid Data Capture 2013 % <sup>a</sup>	Annual Mean Concentration (µg/m <sup>3</sup> )					
				2008	2009	2010	2011	2012	2013
1	Queen Street TEOM	Y (NO <sub>2</sub> )	96	<b>19</b> (vcm) <b>19</b> (1.14)	<b>18</b> (vcm) <b>18</b> (1.14)	<b>18</b> (vcm) <b>19</b> (1.14)	16 (vcm) 16 (1.14)	16 (vcm) 16 (1.14)	17 (vcm) 17 (1.14)
6	Currie TEOM	N	64	N/A	N/A	11 (vcm) 11 (1.14)	13 (vcm) 11 (1.14)	11 (vcm) 11 (1.14)	<i>12 (vcm)</i> <i>11 (1.14)</i>
7	St Leonard's FDMS	N	94	15	17	14	15	16	14
8	Salamander St TEOM	N	94	N/A	<b>22</b> (vcm) <b>23</b> (1.14)	<b>26</b> (vcm) <b>27</b> (1.14)	<b>26</b> (vcm) <b>27</b> (1.14)	<b>23</b> (vcm) <b>24</b> (1.14)	<b>22</b> (vcm) <b>22</b> (1.14)
9	Queensferry Rd FDMS	N	77	N/A	N/A	N/A	<b>21</b>	<b>18</b>	<b>19</b>
10	Glasgow Road TEOM	Y (NO <sub>2</sub> )	97	N/A	N/A	N/A	N/A	<i>15 (vcm)</i> <i>15 (1.14)</i>	16 (vcm) 16 (1.14)

**Notes for table:**

In bold and red, exceedance of the PM<sub>10</sub> annual mean objective of 18µg/m<sup>3</sup> and in bold black, result of 18µg/m<sup>3</sup> shown.

In *italic*, poor data capture

a Data capture for the full calendar year



Table 2.14 Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Data Capture 2013 %	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m <sup>3</sup>					
					2008	2009	2010	2011	2012	2013
1	Queen Street TEOM	Y (NO <sub>2</sub> )	96	Y	0	1	1	0	2	2
6	Currie TEOM	N	64	Y	N/A	N/A	0	0	0	0 (29) <sup>a</sup>
7	St Leonard's FDMS	N	94	Y	0	2	1	0	2 (40) <sup>a</sup>	3
8	Salamander St TEOM	N	94	Y	N/A	2 (44) <sup>a</sup>	<b>19</b>	<b>22</b>	<b>13</b>	5
9	Queensferry Rd FDMS	N	77	Y	N/A	N/A	N/A	2	3	2 (41) <sup>a</sup>
10	Glasgow Road TEOM	Y (NO <sub>2</sub> )	97	Y	N/A	N/A	N/A	N/A	0 (35) <sup>a</sup>	1

**Notes for table;**

In bold and red, exceedence of the PM<sub>10</sub> daily mean objective 50µg/m<sup>3</sup> – not to be exceeded more than 7 times per year

a if data capture for full calendar year is less than 90%, include the 98.08h percentile of 24-hour means in brackets (expressed in µg/m<sup>3</sup>)

PM<sub>10</sub> data from all monitoring locations in 2013 meet the EU limit values and UK National Objectives. The St Leonard's background site meets the tighter Scottish air quality annual mean objective of 18µg/m<sup>3</sup>. Data from Currie, a suburban background site is well below the objective. Although data capture was only 67% there are no concerns with regards compliance. Monitoring at Queensferry Road and Salamander Street shows breaches of the Scottish annual mean PM<sub>10</sub> objective where results are 19µg/m<sup>3</sup> and 22 µg/m<sup>3</sup> respectively.

The Local Authority is currently undertaking a Detailed Assessment with regards to PM<sub>10</sub> concentrations across the city. Generally there are high background levels through the Local Authority area in relation to the tight Scottish objective. The transboundary effects of the pollutant concentrations will be outwith the control of the Authority. Nevertheless, Air Quality Management Areas will be declared to address exceedences, which are a combination of fugitive and transport related – direct PM<sub>10</sub> emissions as well as re-suspended dust from the road. Industrial sources such as poultry farms will also be taken in account in the Detailed Assessment.

Regarding the fugitive sources at Salamander Street the Local Authority is currently working with an air quality specialist consultant to determine the extent of the AQMA boundary.

The Detailed Assessment will consider a number of other locations across the city where breaches of the objective are likely, in conjunction with modelling work being carried out for the UK Pollution Climate Mapping (PCM) programme, which has recently become available to Local Authorities. In addition consideration will be given to monitoring at Queen Street (17µg/m<sup>3</sup>) and Glasgow Road (16µg/m<sup>3</sup>) which is border-line in comparison with the Scottish Objective.

The city-wide Detailed Assessment for PM<sub>10</sub> will be completed by the end of 2014.

### **Trend in Annual Mean PM<sub>10</sub> concentrations**

Uncorrected TEOM data (non-volatile fraction) has been used to assess PM<sub>10</sub> trends due to changes in gravimetric correction methodology.

The non-volatile fraction of the FDMS data for years 2008 to 2013 at St Leonard's has also been used to ensure a consistent approach. Nevertheless this should be

viewed with caution as the TEOM instrument was replaced with a FDMS unit in 2008. Trend lines have been drawn using an Excel simple regression statistical program.

Data trends are shown in Figures 2.15 and 2.16 and summarised below.

**Table 2.15 Summary of PM<sub>10</sub> Annual Mean Trend Data**

Monitoring Location / Type	Trend in annual mean PM <sub>10</sub> (years)	Concentrations of PM <sub>10</sub>
Queen Street (Roadside)	↓ (1999 to 2013)	Decreasing
St Leonard's (Urban background)	↓ (2004 to 2013)	Decreasing

Downward trends in PM<sub>10</sub> concentrations are noted at St Leonard's and Queen Street.

The city-wide detailed assessment due for completion in 2014 will undertake a full assessment of trend analysis.

**Figure 2.14 Trend in Uncorrected Annual Mean Non Volatile Fraction PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>) measured at St Leonards**

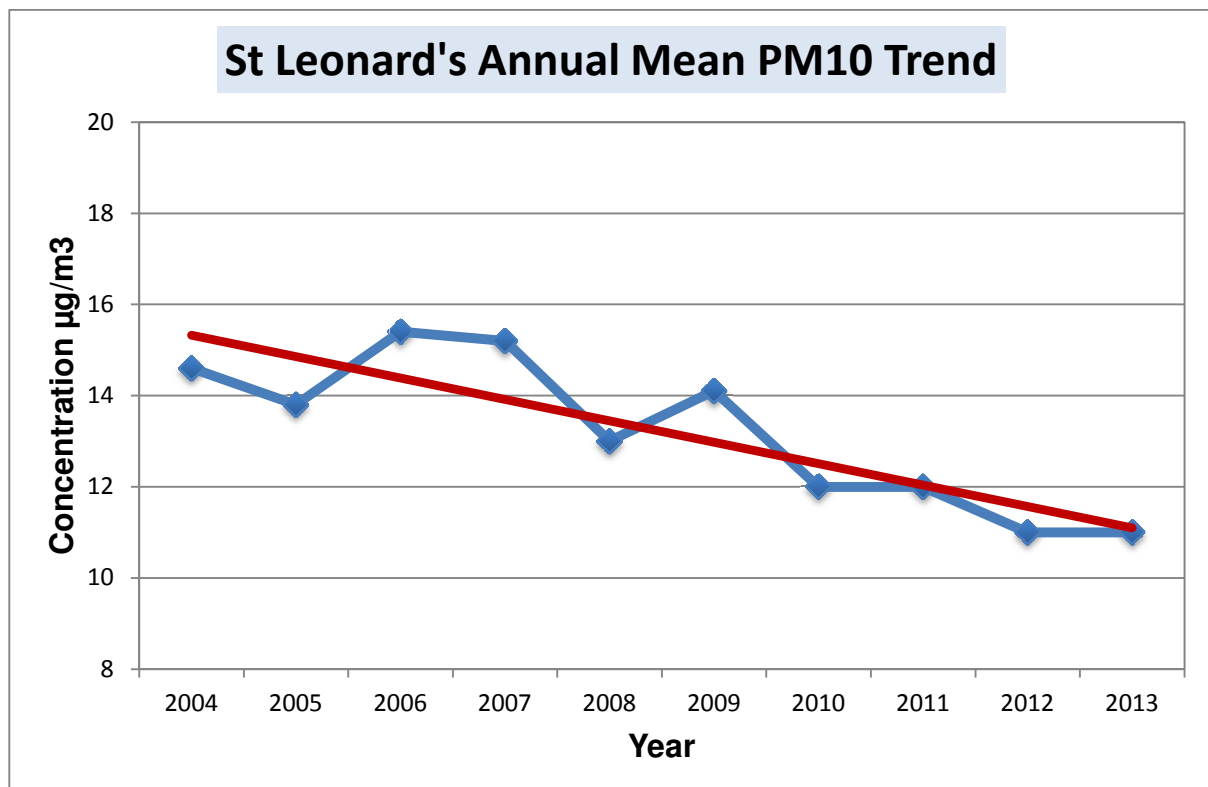
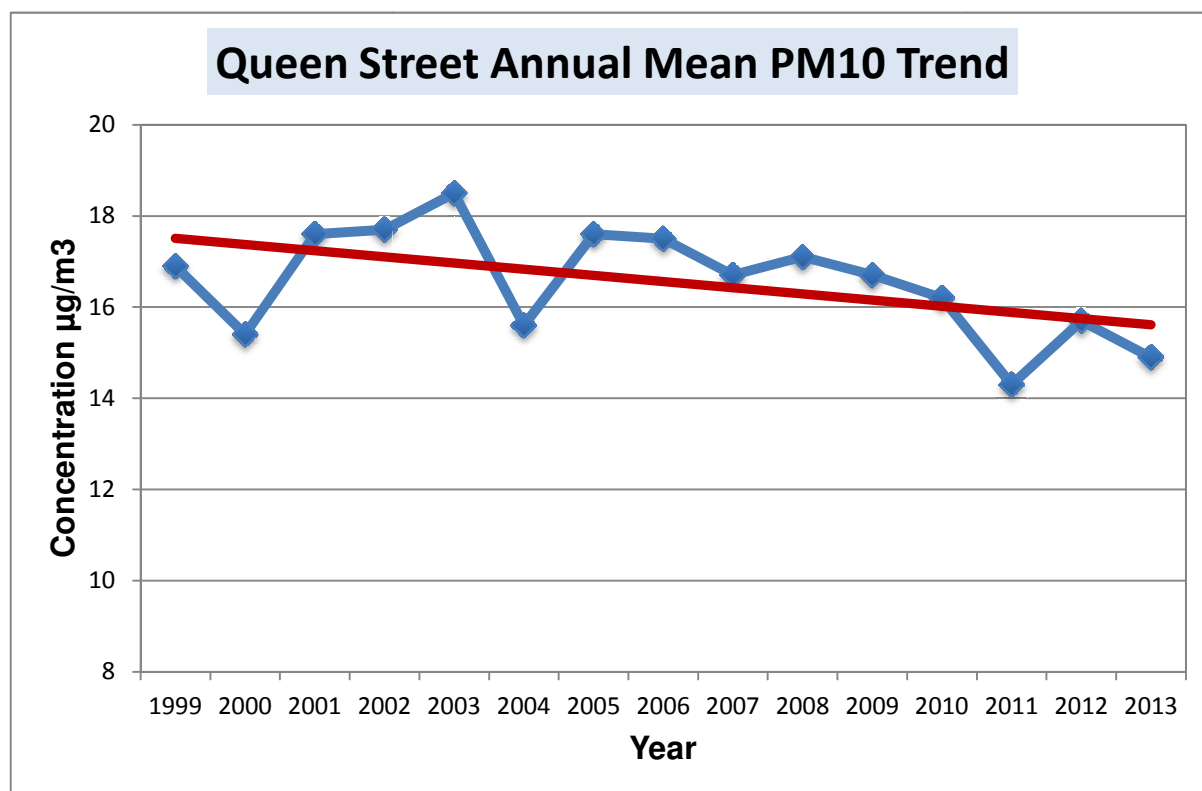


Figure 2.15 Trend in Uncorrected Annual Mean Non Volatile Fraction PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>) measured at Queen Street



### 2.2.3 Sulphur Dioxide (SO<sub>2</sub>)

Historical and current data from the urban background site at St Leonard’s shows that the 15-minute, 1-hour and 24-hour monitoring periods all met their appropriate Objectives and have been doing so since 2009; Table 2.16.

Table 2.16 Results of Automatic Monitoring of SO<sub>2</sub>

Site ID & Type	Within AQMA?	Monitoring Year (% Data Capture )	Number of Exceedences (percentile in bracket µg/m <sup>3</sup> )		
			15-minute Objective (266 µg/m <sup>3</sup> )	1-hour Objective (350 µg/m <sup>3</sup> )	24-hour Objective (125 µg/m <sup>3</sup> )
St Leonard’s Urban Background	N	2009 (95%)	0	0	0
		2010 (92%)	0	0	0
		2011 (98%)	0	0	0
		2012 (98%)	0	0	0
		2013 (97%)	0	0	0

## 2.2.4 Benzene

Benzene is no longer monitored within the Local Authority area

## 2.2.5 Other Pollutants Monitored

The UK Government and Devolved Administrations are responsible for the review and assessment of the following pollutants: Ozone, Polycyclic Aromatic Hydrocarbons (PAHs) and PM<sub>2.5</sub>. These pollutants were monitored at the AURN site at St Leonard's and data is presented below.

### 2.2.5.1 Ozone

Ozone concentrations did not meet UK objective between the years 2007, 2009 and 2012, but did meet in 2010 and 2011. In 2013 the results was borderline with 9 exceedences of the 8-hr running mean >100µg<sup>m</sup><sup>-3</sup>. The objective states that there should not be more than 10 exceedences in a calendar year. See Table 2.17 below.

**Table 2.17 Number of Ozone exceedences at St Leonard's**

St Leonard's Urban Background site	2007	2008	2009	2010	2011	2012	2013
No. of exceedences	11	14	12	0	0	43	9
<b>Ozone Objective</b> 100µg <sup>m</sup> <sup>-3</sup> not to be exceeded more than 10 times per year as an 8-hour running mean by 31 <sup>st</sup> December 2005							

### 2.2.5.2 PM<sub>2.5</sub>

PM<sub>2.5</sub> monitoring commenced at St Leonard's in November 2008. In 2013 the annual mean value is 8µg/m<sup>3</sup> a reduction on the previous two years. Table 2.18 details monitoring since 2009.

**Table 2.18 PM<sub>2.5</sub> Average annual concentrations at St Leonards**

St Leonard's Urban Background site					
Year (Data Capture %)	2009 (95%)	2010 (94%)	2011 (98%)	2012 (72%)	2013 (98%)
Annual Concentration (µg/m <sup>3</sup> )	8	9	12	11	8
<b>PM<sub>2.5</sub> Scottish Objective</b> 12µg/m <sup>3</sup> annual average (limit) 2010. This target is not in Air Quality Regulations					

### 2.2.5.3 Polycyclic Aromatic Hydrocarbons (PAHs)

The area range of PAHs with benzo (a) pyrene (BaP) used as a marker. Monitoring is undertaken at St Leonard’s using a digital sampler. Results since 2009 are shown in Table 2.19. In 2013 the objective was met.

**Table 2.19 PAH (B(a)P) Monitoring: Comparison with Objective**

St Leonard’s Urban Background site	2009	2010	2011	2012	2013
Annual Concentration (ngm <sup>-3</sup> )	0.131	0.129	0.099	0.109	0.084
<b>BaP Objective</b>					
0.25ngm <sup>-3</sup> as an annual average by 31 December 2010					

### 2.2.6 Summary of Compliance with AQS Objectives

The City of Edinburgh Council has examined the results from monitoring within the Local Authority area.

Concentrations within each of the AQMAs still exceed the annual mean objective for nitrogen dioxide at relevant receptors and therefore they remain valid. There were no breaches of the hourly mean objective for nitrogen dioxide in 2013, however some data was borderline so monitoring will continue.

The Local Authority has measured concentrations of **nitrogen dioxide** above the annual mean objective at relevant locations outwith the AQMAs. In conclusion to the Detailed Assessments at the following locations, the Local Authority will proceed with **extending the Central AQMA** to include these areas;

- Clerk Street / South bridge
- Angle Park Terrace / Slateford Road
- Dundee Street (Yeaman Place)

Measured concentrations of **PM<sub>10</sub>** are above the Scottish annual mean objective. A Detailed assessment is currently being undertaken with reference to city wide PM<sub>10</sub> levels. 2013 data show this is still relevant and that AQMA(s) will needs to be declared. The Local Authority will report the findings of the PM<sub>10</sub> Detailed Assessment at the end of 2014.

## 3 New Local Developments

### 3.1 Road Traffic Sources

A number of Air Quality Impact Assessments were included with planning applications for major development sites or sites located within or near an AQMA in 2013. Generally the assessments found that the development would have a negligible or insignificant impact on local air quality. For example, City Park, near Ferry Road (Planning reference no. 13/00604/FUL), West Bowling Street (12/01840/FUL), Seafield Place (13/02584/FUL) and Blackchapel Close (13/01378/FUL). Other applications did not include an air quality impact assessment but typical air quality related mitigation measures were proposed and recommended with the schemes. These mitigation measures included electric vehicle charging points and construction phase dust control. The issue of potential impacts from cumulative development remains an issue for the Local Authority.

A development in North Fort Street (12/04268/FUL) for 94 residential units was approved in May 2013, with reduced density to a previous scheme. The site is located in close proximity to the Great Junction Street AQMA, so further reductions in car parking provision were negotiated to lessen any impact on air quality. Electric charging points for vehicles were encouraged with the development and an informative to the planning permission was recommended to that effect.

Construction work associated with the Edinburgh Tram system was largely completed within the City during the latter part of 2013. Extensive sections of the city centre were re-opened including Haymarket junction, Shandwick Place and York Place which previously had been unavailable during the construction works. This has led to some of the road network being re-configured. For example West Maitland Street, Morrison Street and Torphichen Place now accommodate two-way traffic.

Commencement of the trams passenger operations has seen an increasing number of trams in operation. This has resulted in some traffic congestion on roads approaching the tram network in the city centre. The Local Authority has agreed to undertake monitoring to assess traffic movements as well as the behavioral impacts of pedestrians, cyclists and other road users in and around the city centre for a period of twelve months. This period of time is to allow conditions to normalise and

settle, and to be representative of all seasonal weather conditions. Air quality monitoring will continue within the city centre for this period and thereafter source apportionment work will be reassessed for the Central AQMA. A review of the monitoring will be undertaken through typical processes within the LAQM Review and Assessment process.

Monitoring of traffic will be coordinated with other project work associated with the City Centre Vision, approved by Council in October 2013<sup>7</sup>. This includes an Experimental Traffic Regulation Order (ETRO) for George Street, ensuring widened foot-ways and a one-way traffic system.

In 2013 there were a number of changes to the routing of bus services in the city centre as parts re-opened following Edinburgh Tram's construction work. Coinciding with the commencement of the Tram's passenger service Lothian Buses will make further changes from 1st June 2014. This will include two new routes, one a 30 minute frequency, daily service to replace part of an existing service and the other is a summertime only service operating Saturday and Sundays. Both run through the Central AQMA. The Airlink 100 route which operates through the St John's Road AQMA will operate 24 hours per day, seven day a week. Airlink currently runs between 0426 and 0019, so it is anticipated there will not be a major impact. A number of other services have increased buses.

The Leith Walk major infrastructure project is currently considering future operation of the Foot of the Walk junction, located within the Great Junction Street AQMA. Traffic modelling work carried out for a number of junction designs showed that increase queuing is likely to occur on Great Junction Street. The preferred design has been agreed subject to monthly monitoring of the junction's functionality on completion, with the purpose of being able to ascertain the extent of any changes in driver behaviour and real-time operation of the junction. It is anticipated that this in turn will identify the best options for modifying the junction's signal phasing and develop the basis for a review of the Traffic Regulation Order for Great Junction Street.

## **3.2 Other Transport Sources**

In October 2013 work began on a significant extension to Edinburgh Airport's terminal building, as part of investment plans for the airport over the next five years. The extension will bring the terminal building closer to the Edinburgh Airport tram



stop. It is anticipated that access to the tram will contribute to the airport's ambitious targets of increasing the mode share of departing passengers from 29% to 35%. A new Staff Travel Plan has now also been implemented. In addition the energy needs of the airport are under review and although an Energy from Waste plant was considered, this has now been ruled out.

### **3.3 Industrial Sources**

The Proposed Local Development Plan designates the north and eastern docks at Leith Docks as a Business and Industry Area, defined as a Special Economic Area and nationally, as an Enterprise Area. It is also defined in the National Renewable Infrastructure Plan as an opportunity for manufacturing industry to support off shore renewable energy industry. Following completion of a marine engineering feasibility exercise the intention is to prepare a new Leith Docks Masterplan. Proposals for the Docks will then be taken forward through a combination of a Harbour Revision Order and planning application(s).

The Local Authority is currently reviewing a planning application for development of a petrol filling station and electric vehicle charging station on Burdiehouse Road, approximately 30 meters from the nearest existing residential properties. Land immediately adjacent to the site has been given planning consent for residential development.

### **3.4 Commercial and Domestic Sources**

Since the Updating and Screening Assessment 2012 there have been no new biomass combustion installations. The Council issued Interim Planning Policy (2010) that discourages the installation of commercial biomass combustion installations in the city. Nevertheless a number of individual organisations have sought pre-planning advice in relation to installing such plant. The sites in question are located off the gas grid at Dundas Castel, near South Queensferry and Prestonfield in the city.

As part of its long term strategy to provide its own sustainable energy provision the University of Edinburgh has designed a new Combined Heat and Power (CHP) system at the Pleasance, to supply the eastern part of its estate. The scheme will provide heat and energy to new developments in Holyrood, High School Yards and

the Pleasance, as well as established buildings in the area, where a number of smaller boilers will be replaced. Work is continuing with the University to fully assess the impact of the development on local air quality.

A number of smaller, medium sized CHP plants have been included in developments elsewhere. These include; Royal Edinburgh Hospital (Phase1) and a social housing development in Moredun Park Street outside the city centre and the Sheraton Hotel and Spa in Festival Square. Chimney height calculations have been submitted to the Local Authority for these developments. The Local Authority is continuing to collate data on these types of installations for further consideration in the next round of Review and Assessment.

Smoke Control Orders cover the entire local authority area. There are currently no areas where significant coal burning takes place.

### **3.5 New Developments with Fugitive or Uncontrolled Sources**

PM<sub>10</sub> Detailed Assessment work is currently investigating the extent of fugitive sources near the Salamander Street air quality monitoring station. Initial results from qualitative analysis of dust samples taken from within the monitoring station identified fragments of fine silt and sand, amongst a variety of particles of typical background dust. Open storage of these types of materials at Leith Docks and the surrounding area will be considered further within the Detailed Assessment. Re-suspended dust is also likely to be a source. The Local Authority is currently working with an air quality specialist consultant to determine the extent of an AQMA boundary in the vicinity.

City of Edinburgh Council has identified the following new or previously unidentified local developments which may impact on air quality in the Local Authority area;

#### **Road traffic sources**

- Re-organisation of the way general traffic and public transport services move through the core City Centre, following implementation of the tram, including the Temporary Traffic Regulation Order for George Street; and
- Reconfiguration of Foot of the Walk junction.

**Commercial and Domestic Sources**

- CHP developments within the city centre, particularly the University Pleasance energy centre

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

**Fugitive emissions** from a number of sources in the surrounding area of Leith Docks contributing to exceedences of PM<sub>10</sub> at Salamander Street will be investigated in detail as part of city-wide Detailed Assessment.

## 4 Planning Applications

In March 2013 the Planning Committee of City of Edinburgh Council approved the Proposed Local Development Plan (LDP) and its supporting documents, which was then subject to a period of consultation and examination by the Scottish Ministers.

A Second Proposed Plan was drafted thereafter and presented to Planning Committee on 19<sup>th</sup> June 2014 where it was approved. The plan predominately addresses changes to housing land requirements at Strategic Development Plan level. It is accompanied by a Second Proposed Action Programme, which sets out actions intended to mitigate and manage impacts, including those on traffic and hence air quality. The actions relate to public transport access and active travel, with some intended to manage traffic flow.

Any representation to the Second Plan will be considered by the Council then dealt with by further examination by Scottish Ministers in 2015. It is anticipated the new LDP will then be adopted in early 2016.

## 5 Air Quality Planning Policies

The Local Authority agreed a Second Local Development Plan at the Planning Committee on 19<sup>th</sup> June 2014. The first (Proposed) Local Development Plan (LDP) 2013 described policies that aimed to mitigate against adverse air quality impacts identified in the strategic environmental assessment. These policies include environmental, employment, housing and transport guidance and are shown in Table 5.1 below. Predominately the policies remain unchanged in the second LDP.

**Table 5.1 Key Policies in Edinburgh’s Proposed Local Development Plan ( to deal with the cumulative impact of development on air quality**

Policy	Statement
<b>Env 22</b>	Planning permission will only be granted for development where; <ul style="list-style-type: none"> <li>a) There will be no significant adverse effects for health, the environment and amenity and either;</li> <li>b) There will be no significant effects on air, water or soil quality or</li> <li>c) Appropriate mitigation to minimise any adverse effects can be provided.</li> </ul>
<b>Emp1</b>	High quality, office developments, including major developments, will be supported; <ul style="list-style-type: none"> <li>a) In the City Centre as identified on the Proposal Maps.</li> <li>b) In the other strategic business centres identified on the Proposals Map at Edinburgh Park/South Gyle, International Business Gateway and Leith, preferable as part of business led mixed use proposals.</li> <li>c) At other accessible, mixed use locations in the urban area near to public transport nodes, where the scale of development must be compatible with the accessibility of the location by public transport and the character of the local environment.</li> </ul>
<b>Emp 10</b>	Hotel development will be permitted: <ul style="list-style-type: none"> <li>a) In the City Centre where developments may be required to form part of mixed use schemes, if necessary to maintain city centre diversity and vitality, especially retail vitality on important shopping frontages.</li> <li>b) Within the boundaries of Edinburgh Airport, the Royal Highland Centre and the International Business Gateway.</li> <li>c) In locations within the urban area with good public transport access to the city centre.</li> </ul>
<b>Hou 4</b>	The Council will seek an appropriate density of development on each

Policy	Statement
	<p>site having regard to:</p> <ul style="list-style-type: none"> <li>a) Its characteristics and those of the surrounding area.</li> <li>b) The need to create an attractive residential environment and safeguard living conditions within the development.</li> <li>c) The accessibility of the site to public transport and other relevant services.</li> <li>d) The need to encourage and support the provision of local facilities necessary to high quality urban living.</li> </ul> <p>Higher densities will be appropriate within the City Centre and other areas where a good level of public transport accessibility exists or is to be provided. In established residential areas, proposals will not be permitted which would result in unacceptable damage to local character, environmental quality or residential amenity.</p>
<b>Tra 1</b>	<p>Planning permission for major development which would generate significant travel demand will be permitted on suitable sites in the City Centre. Where a non City Centre site is proposed, the suitability of a proposal will be assessed having regard to:</p> <ul style="list-style-type: none"> <li>a) The accessibility of the sites by modes other than the car.</li> <li>b) The contribution the proposal makes to Local Transport Strategy objectives and the effect on targets in respect of overall travel pa and car use.</li> <li>c) Impact of any travel demand generated by the new development on the existing road and public transport networks.</li> </ul> <p>In general, applicants should demonstrate that the location proposed is suitable with regard to access by public transport, cycling and walking that measures will be taken to mitigate any adverse effects on networks and bring accessibility by and use of non-car modes up to acceptable levels if necessary.</p>
<b>Tra 8</b>	<p>Planning permission will not be granted for development which would:</p> <ul style="list-style-type: none"> <li>a) Prevent the implementation of proposed cycle paths/footpaths shown on the Proposals Map.</li> <li>b) Be detrimental to a path which forms part of the core paths network or prejudice the continuity of the off-road network generally.</li> <li>c) Obstruct or adversely affect a public right of way unless satisfactory provision is made for its replacement.</li> <li>d) Prejudice the possible incorporation of an abandoned railway alignment into the off-road path network.</li> </ul>
<b>Tra 9</b>	<p>Planning permission will not be granted for development which would prejudice the proposed new roads and road network improvements listed in Table 9 and shown indicatively on the Proposals Map.</p>

The purpose of the policies is to support public transport access and active travel, with some intended to manage traffic flow. Policy Env22 specifically considers the impact of new development on air, as a natural resource as well as its effect in respect to human health.

The LDP refers to the support of biomass in relation to sustainable energy. Currently the Local Authority has interim Planning Policy to manage and control the introduction of biomass combustion installations in development proposals in the current absence of proven, cost-effective abatement technologies<sup>8</sup>.

The policy states that proposals for biomass installations of 50MW (e) or less will only be considered acceptable where it is demonstrated that the following conditions can be met;

- An appropriate and effective abatement system to control emissions of concern can be applied to the plant, and maintained.
- Contributions to levels of pollutants of concern in Edinburgh do not conflict with the requirements of the UK National Air Quality Strategy and/or the Council's statutory obligations in Local Air Quality Management per the Environment Act 1995 (Part 4).

In view of the challenges in meeting air quality standards in many parts of the city and in the ongoing absence of effective abatement technologies, continuation of this position is viewed as an important tool for managing emissions of fine particles as well as nitrogen dioxide.

## 6 Local Transport Plans and Strategies

Local authorities are advised in Technical Guidance document LAQM TG (09) to align AQAPs with those local transport policies which contribute towards improving air quality. Edinburgh's Local Transport Strategy (LTS) 2014 to 2019 was formally adopted by the Council in January 2014<sup>9</sup>.

The strategy recognises air quality has been an issue and the adverse impact that the increasing use of the car is having on the city.

*'The Council recognises that cars are the most effective way to undertake many journeys. It seeks to implement a transport strategy that enables cars to be used efficiently for those tasks for which they are well suited and at uncongested times and locations. However, there is simply not enough space in the city to accommodate all possible demands for movement by car at all times. It is therefore necessary to manage this demand'*

Edinburgh's Local Transport Strategy (LTS) 2014

Several other significant policy issues are covered by separate processes which inform the revised LTS. These include development of specific Action Plans covering Public Transport and Active Travel (walking and cycling).

In addition, the Local Authority will be taking forward actions to manage traffic flows, where possible, through its computerized traffic light control system (Intelligent Transport Systems) and work with Transport Scotland to deliver a package of public transport enhancements that will complement the new Forth Crossing.

As well as the LTS, the City of Edinburgh Council's Transport 2030 Vision provides an overarching strategy for the future development of transport in Edinburgh over a 20 year period from 2010<sup>10</sup>. This document provides the framework for the development of the LTS. A number of its outcomes and indicators include reductions in nitrogen dioxide and carbon dioxide emissions and overall traffic volumes. The measures in the Transport 2030 Vision that assist delivering improvements in local air quality are listed below:

1. 'Low Emission Zones' if other measures do not make the necessary progress towards improved air quality.



2. Working with operators towards an emissions-free public transport fleet and supporting initiatives for electric and hybrid vehicles.
3. Air quality improvements in partnerships with the public transport and freight industries.
4. Active Traffic Management to mitigate pollution hot-spots.
5. Working through Planning and Economic Development initiatives to foster low impact development that reduces the need to travel by car.
6. Engaging with the Scottish Government and other partners to encourage a shift to low carbon transport including supporting use of electric vehicles.
7. Parking permit charges based on vehicle emissions.
8. Green procurement when purchasing new vehicles for the Council's fleet.
9. Promotion of ecological driving and slower speeds.
10. Creating walkable and cyclable neighbourhoods through 20mph speed limits.
11. Promote smarter travel through support for behaviour-change programmes including travel plans.
12. Targeting the school run, school travel plans and safe routes to school.
13. Improved cross-River Forth services to Fife.
14. Expansion of Park and Ride facilities.
15. Supporting growth of the 'City Car Club'.

*Transport 2030 Vision, City of Edinburgh Council, 2010*

Key synergistic policies identified in City of Edinburgh Council's Local Transport Strategy (LTS) 2014 to 2019 recently approved by the Council's Transport and Environment Committee are listed in Table 6.1

The Scottish Environment Protection Agency (SEPA) and Transport Scotland (TS) jointly established a new national forum in October 2012: the Scottish Transport Emissions Partnership (STEP) to promote and share 'best practice' between key organisations and individuals with an interest and capability to influence the delivery of improvements in local air quality in Scotland. The forum consists of a range of partners, including Scottish Government, Local Authorities and representatives from the transport, planning and road user sectors.

On 25<sup>th</sup> July 2013 a ‘Low Emission Zones’ summit was hosted by STEP at the Local Authority’s City Chambers. The aim of the event was to share experience and best practice across the different sectors.

**Table 6.1 Key Air Quality Improvement Policies Contained in the City Of Edinburgh Council’s Local Transport Strategy 2014 – 2019**

Policy	Statement
<b>Sustaining a thriving city</b>	
Thrive1	The Council will seek to ensure integration of land use planning and transport policies.
Thrive3	The Council will seek the implementation of travel planning measures proportionate to the scale and nature of developments. The Council will also seek to improve its monitoring of the implementation and impact of travel planning measures.
<b>Protecting our environment</b>	
Env1	The Council will ensure that its Air Quality Action Plan and Local Transport Strategy are adequate to address issues around air quality. It supports the use of emission reduction measures as a means of working towards the air quality standards set down in legislation.
Env2	The Council seeks to support increased use of low emission vehicles through: <ul style="list-style-type: none"> <li>• Working with partners to provide a network of electric charging points;</li> <li>• encouraging the purchase of low emission vehicles through its charges for resident parking permits; and</li> <li>• taking account vehicle emissions in its fleet purchasing policies.</li> </ul>
<b>Road Safety</b>	
Safe1	The council will maintain its commitment to education for young people with regard to road safety, user behaviour, active travel and travel planning by continuing its engagement with primary and secondary schools across Edinburgh. Where appropriate, it will work with partners such as Sustrans, Road Safety Scotland and Cycling Scotland and consider opportunities to involve the local community.
<b>Managing and maintaining our infrastructure</b>	
Streets2	The Council will use its Urban Traffic Control system and other ITS systems to prioritise public transport and facilities for pedestrians and cyclists, whilst ensuring efficient flow of traffic through the city.
Streets3	Before approving any road capacity increase, the Council will seek to ensure that all viable measures for shifting vehicle trips to walking, cycling, public transport and car sharing, or for managing demand have;

Policy	Statement
	<ul style="list-style-type: none"> <li>• been fully adopted; and</li> <li>• been found not to meet model share or demand reduction needs.</li> </ul>
<b>Travel Planning, travel choices and marketing</b>	
TravPlan1	The Council supports the development of flexible working lifestyles including homeworking and teleworking.
TravPlan2	The Council will seek to lead by example in the area of travel planning. In refreshing its Travel Plans, it will set mode targets for travel to work by Council employees in line with the outcomes and targets of this LTS.
TravPlan3	The council will seek the implementation of travel planning measures aimed at reducing the demand for car travel to and from new office, retail and wholly or predominantly residential developments.
<b>Active Travel</b>	
Walk1	The Council will seek opportunities to improve pedestrian facilities and will consider pedestrian priority, or partial or complete pedestrianisation in appropriate streets where there are high levels of pedestrian activity.
Walk2	There will be a presumption in favour of road maintenance, new traffic management schemes, new or revised controlled parking zones and new developments always incorporating measures for pedestrians and cyclists..
PCycle2	<p>There will be a presumption in favour of new traffic management schemes always incorporating measures for cyclists, particularly:</p> <ul style="list-style-type: none"> <li>• exemptions from road closures</li> <li>• advanced stop lines (ASLs) with approach cycle lanes or cycle lanes where ASLs are not required at traffic signal controlled junctions</li> <li>• all new pedestrian crossings to be considered as potential toucans: and</li> <li>• cycle lanes or, where appropriate , cycle paths, in all schemes involving main roads with speed limits of over 20mph and with no bus lanes.</li> </ul>
PCycle9	In the event of a private investor bringing forward proposals in line with the Council's central objectives, the Council would support a pedal/electric bike share scheme in the city.
<b>Public Transport</b>	
PubTrans1	The Council will presume in favour of giving buses and Trams priority over other motorised traffic.
PubTrans2	<p>The Council will seek:</p> <ul style="list-style-type: none"> <li>• a fully accessible and environmentally – friendly bus fleet ahead of legislative requirements and</li> <li>• marketing of services targeted at persuading regular car</li> </ul>

Policy	Statement
	commuters to use public transport (and where relevant active travel)
PubTrans3	The Council will investigate a budget proposal for increasing funding for supported bus services: to maintain or enhance bus services where commercial provision is not available or low frequency, allied to a package of changes e.g. pump priming new services.
PubTrans4	The Council supports the provision of orbital bus services on the city bypass corridor and will favour such improvements and associated bus priority over any general increase in capacity on the bypass (See also Cars3, Connect1 and 2.
PubTrans11	The Council supports further enhancement of Waverley and Haymarket Stations and the rail route between them to facilitate further expansion of rail services into Edinburgh.
<b>Car and motorcycle travel</b>	
Cars1	The Council will encourage efficient use of cars, through measures such as parking management, management of the road network and promotion of car clubs.
Cars3	The Council will promote the expansion of car clubs, in particular by affording car club parking high priority and ensuring that lack of on-street parking does not cap the supply of car club vehicles.
Cars4	The Council will work with promoters/developers to facilitate car-free housing in appropriate locations.
<b>Car Parking</b>	
Park4	The Council will resist proposals for new car parking that are likely to encourage commuting by car.
Park9	The Council will consider less on-street parking as part of projects to enhance the City Centre environment and improve conditions for pedestrians, cyclists and public transport.
Park 23	The Council will keep under review the need for new CPZs/Priority Parking Areas and/or further extensions to the existing CPZ.
Park 26	Through the development control process, the Council will encourage the development of car-free housing with an emphasis on low car ownership and high membership of city car clubs
Park 30	The Council will continue to support and promote bus and rail-based Park and Ride, with a focus on sites that currently have lower utilisation. The Council will work with operators, seeking to ensure that the most attractive ticket packages are available to users.
Park 31	The Council will support the development and/or extension of station car parks at locations both within and outwith Edinburgh.
Park 32	Subject to consideration of the impact on longer distance bus and rail services, the Council will support new and enlarged P+R sites serving Edinburgh.

Policy	Statement
Park 33	The Council will promote access to P+R sites by bus, cycle and on foot and will support the provision of high quality public transport services to link P+R sites to major destinations outside the city Centre.
<b>Freight</b>	
Freight3	The Council will work with road freight operators in the development of any proposals for emission control measures.
Freight5	<p>The Council will support the use of rail and sea freight, in particular through the planning process. It will:</p> <ul style="list-style-type: none"> <li>• safeguard rail access to key industrial sites;</li> <li>• safeguard key distribution locations including the former Portobello freightliner terminal;</li> <li>• seek to ensure that any major new freight generating developments, including developments within Leith Docks, are accessible to the rail network; and</li> <li>• seek to ensure that any continuing bulk movement of waste and recycling products from Edinburgh continues to use rail.</li> </ul>
Freight6	The Council will seek to ensure that its procurement procedures for freight transport ensure that services purchased have the least environmental and safety impacts.
<b>Edinburgh's Connectivity</b>	
Connect2	The Council will only support major road upgrades to or around Edinburgh, including on the city bypass, where the principle outcome is to prioritise public transport ( and, where appropriate, high occupancy vehicles). Improvements should protect vulnerable road users.
Connect 3	The Council supports use of the existing Forth Road Bridge (after completion of the Queensferry Crossing) as a dedicated sustainable transport route carrying public transport, pedestrians and cyclists and possible future adaptation to carry Trams. It would not support further widening of the permitted categories of vehicle.
Connect 4	The Council will continue to support enhanced rail connections to other Scottish Cities, particularly increased capacity of the Edinburgh- Glasgow route as set out in the Edinburgh Glasgow Improvement Project. It supports action to reduce journey times and increase electrification
Connect7	The Council will work with the owners and operators of Edinburgh Airport and other partners to continue to increase significantly the use of sustainable travel modes for access to Edinburgh airport. Its guiding principle will be to seek a balanced package of interventions that minimises the number of motor vehicle movements per air passenger and per trip to work

## 7 Climate Change Strategies

In January 2007 the Council signed Scotland's Climate Change Declaration which commits the Council to reducing its greenhouse gas emissions and to adapting to the predicted impacts of climate change. The Declaration also contains a strong commitment to sustainable development. Scottish local authorities are required to publish an annual progress report detailing their climate change actions. To support councils to complete their 'Year 6' reports for the period 2013-14, the Sustainable Scotland Network has published a revised Reporting Template. The template will include information requested within the Scottish Government's Sustainability Reporting Guidance and Adaptation Scotland's Five Steps to Managing your Climate Risk. The Council's 'Year 6' report will be considered by Committee in Autumn 2014.

A new Framework to identify priority climate change adaptation actions for the city has been prepared by the Council in conjunction with Adaptation Scotland. Consultation and engagement with key partners will take place during 2014, with the resulting document expected to be considered by Committee in Autumn 2014.

The City of Edinburgh Council's first Carbon Management Plan (CMP), developed with the Carbon Trust, was published in 2008 and ran until 2013. The Council is drafting a second CMP for the period 2014-2020 using updated guidance from Resource Efficient Scotland. This plan collates Service Areas' actions to reduce the Council's carbon footprint and includes those that the Council is currently implementing as well as actions in development. The CMP will also be considered by Committee in autumn 2014.

A Sustainable Energy Action Plan (led by the Council) is being developed for the city in partnership with stakeholders. Input from a range of service areas within the council and external partners have produced a consultation document, the basis for an engagement exercise during 2014 to secure ownership across the city for the plan. The plan will outline the key areas where carbon reductions can be made to meet national carbon reduction targets and actions required to make the city energy resilient. A detailed action plan will support the strategic document for implementation in 2014-2020.

## 8 Implementation of Action Plans

### 8.1 Action Plan Summary

City of Edinburgh Council's initial Air Quality Action Plan (AQAP) was approved in 2003 following declaration of the Central AQMA for exceedences of the pollutant nitrogen dioxide. This plan contained a number of radical transport measures including Congestion Charging which if fully implemented were estimated to reduce nitrogen oxides (NO<sub>x</sub>) by 40%<sup>11</sup>.

An additional 40% reduction was expected to occur without intervention due to improvements in vehicle technology and subsequent fleet replacement. The overall reduction in NO<sub>x</sub> emissions which could be achieved was estimated at 80% from a baseline year of 2001.

The required level of reduction in roadside NO<sub>x</sub> concentrations to meet the 2005 annual mean air quality objective within the Central AQMA were calculated to be between 33% and 68%<sup>12</sup>. Therefore, the proposed actions within the AQAP 2003 were expected to deliver the required improvement.

Source apportionment work undertaken in 2002 within the Central AQMA identified that the majority of NO<sub>x</sub> emissions were derived from buses; Leith Walk (56%), Gorgie Road (55%) and West Maitland Street (63%)<sup>12</sup>. Therefore, the main challenge for the Local Authority was to stimulate a vehicle clean-up programme, targeting bus operators in the city.

A key element of the AQAP 2003 was the introduction of a vehicle congestion charging scheme. In addition to reducing traffic and congestion levels in the city centre, the scheme was expected to generate sufficient revenue to enable provision of grants to assist a clean-up of older 'more' polluting vehicles. However, following a Council Referendum in 2005, congestion charging was not progressed. The AQAP was revised in 2008, to remove Congestion Charging as an Action and to include the new AQMA designation at St John's Road (2006)<sup>13</sup>.

The focus of the current AQAP is to have cleaner bus and road freight vehicles operating in the city. A Low Emission Strategy Feasibility study commissioned by the Council was undertaken in 2007 by the consultancy Transport and Travel Research

2007 (TTR)<sup>14</sup>. The study concluded that, the greatest reductions in NO<sub>x</sub> and PM<sub>10</sub> emissions for the Council's administrative area would be achieved by implementing a mandatory emission reduction scheme for bus and road freight operators. Voluntary Partnership Agreements were deemed the next best option, depending on the percentage of fleet improvement that could be achieved.

Further Assessment work at St John's Road and Great Junction Street also identified that buses were the main contributors of NO<sub>x</sub> emissions<sup>15</sup>.

As well as targeting bus and freight vehicles it was considered that the Council should lead by example and strive to operate cleaner low emission vehicles.

The current AQAP also highlighted the failure to address cumulative impacts associated with development. Therefore, to gain a more accurate understanding of cumulative impacts, a Policy Initiative to develop a Land Use and Traffic model capability was included in the AQAP. However, no progress has been achieved with this initiative, primarily due to the high capital and revenue costs involved. It is unlikely that such a model will be available in the foreseeable future. Consequently, the issue of un-quantified impacts from cumulative development is likely to continue.

## **8.2 Progress made with Actions**

It is well recognised that the expected NO<sub>x</sub> emission reductions from improvements in vehicle technology have not been delivered in 'real life' driving situations. This is one of the reasons why Edinburgh like the majority of other cities with air quality issues has not observed the anticipated decrease in concentrations of roadside nitrogen dioxide. In addition, there is now a greater proportion of diesel-engine vehicles in the national fleet which emit more direct NO<sub>2</sub> compared with petrol-engine vehicles.

A new 'Emissions Factor Toolkit' has been prepared by DEFRA and Devolved Administrations which incorporates updated NO<sub>x</sub> emission factors and vehicle fleet information. This provides more realistic road traffic emission data.

The measures and progress made during 2013/14 are summarised in Table 8.18 and supplementary information is described under the following headings:



### **8.2.1 Managing emissions from buses**

During 2009, all bus companies operating services in the city were invited to enter into a Voluntary Emissions Reduction Partnership (VERP) with the Council. The proposal was to eliminate vehicles below Euro 4 from the AQMAs by October 2012, with the aim of achieving 100% Euro 5 standard buses by October 2015. However, the two main bus companies operating in the city, Lothian Buses and First Scotland (East) considered the proposal too onerous in the absence of substantial financial support. Consequently no formal agreement was reached.

The Low Emissions Strategy Feasibility study 2007 undertaken by Transport and Travel Research (TTR) on behalf of City Edinburgh Council was based on the bus fleet profile in 2005/2006. Due to a significant improvement of the bus fleet operating in Edinburgh, introduction and expansion of Park and Ride services and an increase of bus frequency on some routes, it was deemed necessary to re-visit the original study outcomes.

Consequently, an update was commissioned in 2011 to take account of these changes. The new study focussed on the total number of bus movements and their NO<sub>x</sub> and PM<sub>10</sub> emissions in each of the three AQMAs. It concluded that the optimistic scenario (Euro 5) as set out in the VERP would provide the greatest reductions in NO<sub>x</sub> and PM<sub>10</sub> emissions by 2015<sup>16</sup>.

### **8.2.2 Bus Improvements 2013/2014**

All bus companies operating in Edinburgh continue to improve their fleet, although it is recognised that without substantial financial input it will not be possible to achieve the draft Voluntary Emissions Reduction Partnership target of Euro 5 or better, by 2015.

#### **Lothian Buses**

Lothian Buses are the main service operator in the urban areas of Edinburgh. A large percentage (46%) of the fleet is Euro 5 or EEV (in between Euro 5 and Euro 6) standard. In 2014 there is an increase in Euro 3 buses from reserve, due to expanding services generally across the network. These numbers are likely to fall back once new buses are purchased this year (see below).

Significant improvements have been achieved since 2006 with the assistance of Scottish Government funding (Table 8.2). The company has been successful in obtaining £1.05 million from the Scottish Government Green Bus Fund (Round 4) which will enable the purchase of 20 single deck hybrid vehicles this year.

The company will also self fund the purchase of 25 Double Deck Euro 6 vehicles which should be in service by the end of the year. In addition, 25 Euro 4 single deck and 1 Euro 4 double-deck Volvo vehicles will be converted to a Euro 5 emissions standard by a process of 'engine management alteration'. The new configured engines will be certified by the Vehicle and Operators Services Agency (VOSA).

Lothian Buses, use Euro 5 standard buses on high frequency services (Airlink 100 and the Number 26) which transits both the Central and St John's Road AQMAs. Service 22 is a high frequency service and buses are also of a Euro 5 standard. This service route is within the Central and Great Junction Street AQMAs. The 15 diesel-electric hybrid vehicles which entered service late 2011 are used on the Number 10 route, which is another high-frequency service which transits both the Central and Great Junction Street AQMAs. The single deck hybrids purchased in 2013 are used on the Number 1 route which operates within the Central AQMA, including the recently extended areas of Easter Road and part of London Road.

The new single deck hybrid buses will be used on the service 30 and a section of this route is within the Central AQMA.

Lothian Buses are committed to working towards reducing emissions from their fleet and the purchase of cleaner vehicles. The degree of improvement in the fleet is illustrated in Tables 8.3 and 8.4.

**Table 8.2 Number of older vehicles retrofitted and number of new buses purchased**

<b>Technology</b>	<b>2011 (Funding)</b>	<b>2012 (Funding)</b>	<b>2013 (Funding)</b>	<b>2014 (Funding)</b>
<b>Retro fit using SCRT (EMINOX) Euro 3 to Euro 5/6 (EEV standard)</b>	43 <sup>(A)</sup> In service			
<b>New hybrid Double Deck vehicles Euro 5 Standard</b>	15 <sup>(B)</sup> In service			
<b>New hybrid Single Deck vehicles</b>		10 <sup>(C)</sup> In service	20 <sup>(E)</sup> In service	20 <sup>(F)</sup>
<b>Double Deck EEV Standard</b>	60 <sup>(D)</sup> In service			
<b>Single Deck EEV Standard</b>		5 <sup>(D)</sup> In Service		
<b>Euro 4 to 5 upgrades via engine Management alteration</b>				26 <sup>(D)</sup>
<b>Euro 6 Double Deck</b>				25 <sup>(D)</sup>

A Lothian Buses contributed to total cost of £500,000 (Lothian buses £243,000, CEC £50,000 and Scottish Government £207,000)

B Total cost £5M (Scottish Government £1M Green bus fund round 1)

C Total cost £2.65M (Scottish Government £750,000 Green bus fund round 2)

D Lothian Buses self-funding

E Scottish Government £1.5M Green bus fund round 3

F Scottish Government £1.05M Green bus fund round 4

Table 8.2 shows that five additional Euro 2 buses entered the network in 2012.

These vehicles were utilised by Lothian Buses on a temporary basis to provide new services into East Lothian which were previously operated by First Scotland (East). The latter bus company withdrew a number of their services in spring 2012 due to a major business review.

The deployment of new Euro 5 and diesel- electric hybrid vehicles in March 2013 has enabled the removal of all Euro 2 vehicles from Lothian Buses service fleet.

In 2011, Lothian Buses installed a 4 minute idling engine cut out system across the entire fleet. It has been anticipated that there will be significant fuel savings with this initiative which ultimately will result in reduced emissions.

**Table 8.3 Euro Standard of Service Bus Fleet (Lothian Buses 2006 to 2014)**

Euro Standard	Base year 2006	Sept 2010	Oct 2011	Aug 2012	May 2013	May 2014
Pre Euro	63 (10%)	0	0	0	0	0
Euro 1	33 (5%)	0	0	0	0	0
Euro 2	202 (32%)	64 (10%)	7 (1%)	12 (2%)	0	0
Euro 3	317 (52%)	307 (52%)	257 (43%)	254 (42%)	251 (41%)	273 (43%)
Euro 4	0	79 (13%)	79 (13%)	81 (13%)	81 (13%)	75 (12%)
Euro 5	0	136 (23%)	141 (23%)	141 (23%)	141 (23%)	147 (23%)
EEV (5/6)	0	1 (0.1%)	117 (20%)	117 (19%)	142 (23%)	146 (23%)
Euro 6						1 (<1%)
<b>Total</b>	<b>615</b>	<b>587</b>	<b>601</b>	<b>605</b>	<b>615</b>	<b>642</b>

Data provided by Lothian Buses, May 2014

**Table 8.4 Euro Standard of City Tour Bus Fleet (Lothian Bus 2010 to 2014)**

Euro Standard (Lothian Bus)	Sept 2010	Oct 2011	Aug 2012	May 2013	May 2014
Pre Euro	9	0	0	0	0
Euro 1	0	0	0	0	0
Euro 2	37	45	38	38	44
Euro 3	0	0	1	1	1
Euro 4	0	0	0	0	0
Euro 5	0	1	1	1	2
<b>Total</b>	<b>47</b>	<b>46</b>	<b>40</b>	<b>40</b>	<b>47</b>

Data provided by Lothian Buses, May 2014

It is recognised that the majority of the City Tour bus fleet consists of Euro 2 standard vehicles. In a trial during 2011, one vehicle was retrofitted to a Euro 5 emissions standard. Currently a further trial is underway to explore the EMINOX SCRT system on one of the Denis Trident open top buses, which is the model type of most of the open top fleet. The tour fleet has a high operational presence in the City Centre AQMA and adjoining areas. This trial has been extended to fully assess the impact of using SCRT exhausts on slow speed operations. City of Edinburgh Council and Lothian Buses are committed to exploring possibilities for reducing emissions from the Tour fleet and presently further options for improvement are being considered.

### First Scotland (East)

First Scotland (East) is the second major operator in Edinburgh. However, as previously mentioned a number of their services were withdrawn in Spring 2012 as a result of a company business review. There are now fewer First Scotland (East) buses operating in Edinburgh; the majority of which are now Euro 3 standard vehicles and all Euro 1 and 2 standard vehicles have been removed from routes within the city. The current fleet which operates in Edinburgh is shown in Table 8.5

**Table 8.5 First Scotland (East) Fleet operating in Edinburgh 2011 and 2014**

Euro Standard	2011	2013	2014
<b>Euro 1</b>	23 (7%)	0	0
<b>Euro 2</b>	149 (45%)	0	0
<b>Euro 3</b>	116 (35%)	75 (69%)	53 (52%)
<b>Euro 4</b>	33 (10%)	24 (22%)	31 (30%)
<b>Euro 5</b>	9 (3%)	10 (9%)	18 (18%)
<b>Total vehicles</b>	<b>330</b>	<b>109</b>	<b>102</b>

Data provided by First Scotland (East), May 2014

There has been a significant improvement in the emission standards of the First Scotland (East) fleet operating in Edinburgh, compared to 2011 where 7% of the fleet was Euro 1 and 45% was Euro 2. Currently, 18% of the fleet are of Euro 5 standard. First Scotland (East) will continue to review their fleet operations in Edinburgh and work towards the deployment of cleaner vehicles during 2014.

### Stagecoach

The majority of the Stagecoach fleet (86%) which regularly operates on services into Edinburgh city centre along the Queensferry Road and Corstorphine Road corridors, as well as the 747 service to the Airport, is Euro 4 engine standard or better. The total number of vehicles increased since 2013 due to the introduction of new services and the increased frequency of an existing service.

**Table 8.6 Current standard of Stagecoach operating in Edinburgh**

Euro Standard	2012	2013	2014
<b>Euro 1</b>	0 (0%)	0 (0%)	0 (0%)
<b>Euro 2</b>	2 (5%)	0 (0%)	0 (0%)
<b>Euro 3</b>	4 (10%)	4 (10%)	8 (14%)
<b>Euro 4</b>	27 (69%)	27 (64%)	33 (59%)
<b>Euro 5</b>	6 (15%)	11 (26%)	15 (27%)
<b>Total vehicles</b>	<b>39</b>	<b>42</b>	<b>56</b>

Data supplied by Stagecoach July 2014

## Citylink

The Citylink bus fleet is comprised of 72 buses which operate throughout Scotland. The anticipated fleet standard at October 2012 is shown in Table 8.7. At the time of reporting City of Edinburgh Council were not in receipt of an update from Citylink.

**Table 8.7 Standard of Citylink Bus fleet**

<b>Euro Standard</b>	<b>Oct 2012 (%)</b>
<b>Euro 1</b>	0
<b>Euro 2</b>	0
<b>Euro 3</b>	4 (6%)
<b>Euro 4</b>	1 (1%)
<b>Euro 5</b>	67 (93%)
<b>Total</b>	<b>72</b>

Data provided by Citylink, May 2014

## 8.3 Managing emissions from freight

The road freight sector is extremely diverse, with a large number of individual and corporate operators, a variety of fleet types and sizes and a substantial range of operating models. As a result, it has been a more demanding grouping for the Local Authority to access and co-ordinate. In previous reports, it was believed that the most feasible way of delivering voluntary reductions in emissions, from road freight vehicles in Edinburgh, was through engagement with the South East Scotland Regional Transport Authority (SESTRAN) Regional Freight Quality Partnership. However, SESTRAN's regional remit means that it is more challenging for Edinburgh-centred actions to be pursued and alternative options have been considered.

### 8.3.1 ECOSTARS Edinburgh

In an attempt to encourage road freight operators to voluntarily reduce their emissions, the Local Authority became a partner in an EU project, ECOSTARS Europe through which the ECOSTARS Edinburgh scheme was established. This is a voluntary, free to join fleet recognition scheme which provides guidance on environmental best practice to operators of goods vehicles, buses and coaches whose fleets regularly serve the Edinburgh area. The project is an extension of a

similar scheme, which has been trialled successfully by a consortium of South Yorkshire local authorities in partnership with Transport Travel Research (TTR).

The scheme was officially launched in January 2012 and to date 51 operators have joined and a total of 3,525 vehicles have been registered. The majority of member operators are from the freight haulage sector (38) followed by passenger transport sector (11) and public sector (2).

The scheme was part funded by Intelligent Energy Europe until May 2014 and will continue in its current form until at least April 2015. Beyond that date, a number of options for the furtherance of the scheme are under consideration, such as collaborating with other existing schemes to form a regional or national scheme.

ECOSTARS provides a relatively low-cost, 'partnership' mechanism to assist the Council encourage and facilitate emissions improvements from the goods and passenger transport sector operating in the city. Progress is detailed in Table 8.8.

**Table 8.8 ECOSTARS Progress Achieved from Inception to 2014**

<b>Year</b>	<b>Number of vehicles in the scheme</b>	<b>Number of operators in the scheme</b>
<b>2012 (May)</b>	1,684	14
<b>2013 (May)</b>	2,900	35
<b>2014 (May)</b>	3,525	51

Three other ECOSTARS schemes have been established by Scottish Local Authorities and a number of others have expressed interest in setting up similar schemes which will bring wider benefits.

## **8.4 Improvement in Council Fleet Vehicles**

The Council is committed to lead by example and ensure the acquisition of low emission vehicles for its own fleet as detailed in Policy ENV 2 of the LTS (2014 to 2019).

All Pre-Euro 1, Euro 1 and Euro 2 vehicles have now been eliminated from the Council's fleet and Euro 3 forms a very small proportion (5%). The Council has been successful in obtaining Scottish Government Funding via the Low Carbon Vehicle Procurement Support Scheme and 1% of the vehicle fleet are now electric. Table 8.9

**Table 8.9 City of Edinburgh Council Fleet (Including hire vehicles) Improvement**

<b>Euro Standard</b>	<b>2003</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
<b>Pre Euro</b>	12 (1.0%)	0	0	0	0
<b>Euro 1</b>	96 (12%)	0	0	0	0
<b>Euro 2</b>	374 (45%)	0	0	0	0
<b>Euro 3</b>	338 (41%)	78 (8.3%)	45 (4.6%)	38 (4.0%)	44 (5%)
<b>Euro 4</b>	12 (1%)	627 (67.1%)	561 (58.2%)	476 (50.0%)	476 (49%)
<b>Euro 5</b>	0	227 (24.2%)	348 (36.1%)	430 (45.0%)	440 (45%)
<b>Electric</b>	0	3 (0.3%)	10 (1.0%)	10 (1.0%)	11 (1%)
<b>Total</b>	<b>832</b>	<b>935</b>	<b>964</b>	<b>954</b>	<b>971</b>

There are plans in 2014/15 to deliver further fleet efficiencies and savings by reducing fleet numbers and replacing approximately 200 fleet vehicles. It is intended that this process will eliminate most Euro 3 standard engine vehicles and a substantial number of Euro 4's, replacing them with Euro 6 engine vehicles. Stop Start technology will be mandatory for replacement like-for-like cars and small vans. Vans and HGVs will use vehicle technologies that limit their speed or reduce excessive throttle use.

Consideration will be also given to downsizing vehicles where possible, or the use of petrol powered vehicles instead of diesel. The local authority purchased a number of hybrid and electric vehicles, through a Scottish Government Scheme. However, the funding is now directed towards providing electric charging infra structure;

## **8.5 Managing traffic emissions via a Mandatory Low Emission Zone**

In late 2009, the Council's Transport, Infrastructure and Environment Committee instructed that a stakeholder consultation take place on the feasibility of introducing a Low Emission Zone (LEZ) for the city. The Council's current administration restated its commitment to investigate LEZ's following the local elections in 2012. However, a number of technical considerations delayed the process. This was primarily due to the revision of Vehicle Emissions Factors by Department for Transport (DfT). Road traffic emission factors are a crucial element in the development of an LEZ.



The Scottish Government has indicated that a national LEZ framework from DEFRA will be delayed to allow further consideration with the Department of Energy and Climate Change (DECC), and DfT (UK). It was anticipated that the Framework would provide guidance to Local Authorities considering introducing a LEZ.

However, the Scottish Government are in the process of developing a National Low Emission Strategy (NLES) which will include Low Emission Zones. A series of consultation workshops were run in June with various stakeholders. The information collated will help inform the strategy.

It is the Council's intention to wait for the development of the Scottish Government NLES and associated guidance prior to assessing the potential for the introduction of a mandatory LEZ, which is stated as an action in the revised LTS 2014 to 2019:

*'The Council will develop options for emission control measures for Edinburgh during 2014:*

*Air Quality Actions; the Council will assess the potential for the introduction of emission control measures, based on emerging guidance from UK and Scottish Governments, in partnerships with bus and heavy goods vehicles operator. Options will be developed during 2014 in consultation with relevant partners and businesses. Any proposals will be subject to public consultation'*

The Scottish Government draft NLES document is expected to be available in November 2014.

## **8.6 Electric vehicles / Plugged in places**

Embodied within the LTS is a commitment from the Council that it, *'will prepare an action plan for low emission vehicles that will:*

- *cover the acquisition of low emission vehicles for its own fleet,*
- *set priorities for the location of electric vehicle charging points and alternative fuelling stations*
- *develop pathways for enhancing the attractiveness of low emission vehicles including partnership working with external bodies and;*
- *establish a regular monitoring process to ascertain the effectiveness of measures and the direction of technological trends.'*

## **City of Edinburgh Council**

The United Kingdom Office for Low Emission Vehicles (OLEV) has provided funding for the third wave of its 'Plugged in Places' (PIP) programme, which part funds electric vehicle infrastructure in all 32 of Scotland's Community Planning Partnership areas. Edinburgh has been successful in securing funding for the purchase and installation of 4 fast 22kW charging units to be located at public accessible Government Offices in the city.

The PIP funding scheme for 2013/14 has enabled Edinburgh Community Planning Partnership to procure and install Combi- Rapid Chargers for three Park and Ride sites that serve the City of Edinburgh, Ingliston, Hermiston and Straiton.

Currently, there are electric vehicle charging points at 20 Council premises, offering 40 charging heads for use by its own and NHS vehicles. See Table 8.10 overleaf.

Table 8.10 Locations and number of charging units installed in Edinburgh

Location	No. Charging Units
<b>Council Premises</b>	
Waverley Court (City Centre) <sup>(A)</sup>	5
Quadrangle City Chambers (City Centre) <sup>(A)</sup>	2
Central Library (Cowgate)	1
Drumrae Hub (West)	2
Russell Road Depot (West)	5
West Neighbourhood Office Drumrae (West)	2
Bankhead Depot (West)	2
Murrayburn Depot (South West)	1
South Neighbourhood Office (South)	2
Cowan's Close (South)	1
Inch Park (South)	1
Scientific Services Seafield Laboratory (East)	4
Restalrig House Craigentiny (East)	1
East Neighbourhood Office Niddrie (East)	2
Peffer Place (East)	2
Portobello Town Hall	1
Kirk Loan (St Johns Road)	1
Powderhall Broughton Road (North)	2
North Edinburgh Office (North)	2
Kirkliston Local Library (North West)	1
<b>Universities</b>	
Appleton Tower Edinburgh University (City Centre)	2
Edinburgh Napier Merchiston Campus (South)	2
Queen Margaret University (East Lothian)	2
Kings Buildings West Mains Road (South)	2
Western General (North West)	2
<b>Other</b>	
Ingliston Park and Ride (West)	3
Fettes Lothian and Borders Police HQ (North)	4
High School Yards Infirmiry Street (City Centre)	2

<sup>(A)</sup> Funding obtained from Scottish Government Air Quality Action Plan Grant

All public charging sites are listed on the following website <http://chargeyourcar.org.uk>

Progress regarding installation of electric charging infrastructure through the PIP funding scheme is charted in Table 8.11

**Table 8.1 Electric charging infrastructure progress from 2012 to 2014**

Infrastructure	2012	2013	2014 (May)
Number of charging heads	8	14	58
Number of site locations	5	9	26

City of Edinburgh Council has recently reviewed its policy on Parking Standards. The Policy now states that developers should consider provisions to encourage electric vehicle charging infrastructure throughout all types of development. This is currently being progressed via the inclusion of an informative on planning consents, rather than use of Section 75 Legal Agreements or use of planning conditions. It is recognised that the Council may need to provide more encouragement if increased electric charging provision is to be realised.

## 8.7 Traffic Management

### 8.7.1 SCOOT

Spilt Cycle Offset Optimisation Technique (SCOOT) systems are automatically responsive to traffic flow and demand, and therefore help to ease congestion by effective control over traffic signals. The City of Edinburgh Council upgraded their UTC server in March 2013. This includes an upgrade of SCOOT to the latest version, SCOOT MMX SP1. This has an enhanced emission models derived from the latest research by TRL, and along with numerous other tools and improvements, which should help to keep traffic moving and reduce emissions related problems around the city.

SCOOT infrastructure is in place on a number of road networks in the city. However, due to ongoing utility works and road improvements, many loops which lay under the road surface have been damaged and require to be repaired. Lack of staff resources has led to an extensive backlog of loop repairs and validation of the system which

has prevented the full operational benefits of SCOOT in locations of concern. This matter has been raised with Transport.

Currently, SCOOT is only fully operational within the Central AQMA at Gorgie Road/Chesser/ Balgreen and Westfield Avenue, Roberston Avenue.

### **Ongoing programme of SCOOT work**

#### **St John's Road AQMA**

It was anticipated that SCOOT at St Johns Road AQMA would be complete and commissioned by 2013 in association with the MOTES trial (see section 8.7.2). However, cabling works are still incomplete at Manse Road and due to recent footway improvements at Clermiston Road there is a potential for further loop damage. This will need to be reviewed once the work has been completed. SCOOT is expected to be fully operational by end of 2014. Initially this will run without connecting to the Emotes units.

#### **Central AQMA**

##### **Ardmillan Triangle**

This area encompasses Angle Park Terrace, Henderson Road, Ardmillan Terrace and Gorgie Road. Scottish Government funding has enabled SCOOT to be installed at this junction. Gorgie Road/Dalry junction is part of the Central AQMA. Detailed Assessment at Angle Park Terrace concluded that the Central AQMA requires to be extended to encompass this area. Loops have now been cut at the junctions and connected. The Controller Unit at Ardmillan Terrace required to be reconfigured which has led to delays. The new configurations are being tested and will be installed by Seimens. Once in place the area will require validating. SCOOT is expected to be fully operational by the end of 2014.

##### **Inverleith Row/ Ferry Road junction**

Loops repairs are required on Ferry Road to address the following junctions, Inverleith Row, Granton Road, East Fettes Avenue and Pilton Drive. A phone line also needs to be connected at Ferry Road Granton Road junction and validation is required. SCOOT is expected to be fully operational by the end of 2014.

**Proposed SCOOT work in AQMAs for 2014/2015**

**Central AQMA (Easter Road and London Road)**

Loops and cabling work will be repaired at Easter Road and London Road during 2014. Implementation of SCOOT and repair work is subject to funding availability. The current status of SCOOT within AQMAs is detailed in Table 8.12

**Table 8.12 Status of SCOOT in Edinburgh 2014**

<b>SCOOT Status</b>	<b>Locations</b>
<b>Central AQMA</b>	
Fully operational	Gorgie Road, Chesser Avenue, Balgreen Road
Fully operational	Gorgie Road, Westfield Avenue and Robertson Avenue
Infrastructure installed, but loop repairs and revalidation required	Bridges, London Road, Easter Road Nicholson Street*, Clerk Street / South Clerk Street*
Loops and validation required	Roseburn
Validation required	Ardmillan Triangle including Gorgie Road / Dalry Angle Park Terrace*, Slateford*
Unlikely to be reinstalled due to Tram priority	Queen Street, Princes Street, Haymarket, Leith Walk, St Andrews Square
Not installed	Grassmarket, Cowgate and West Port
<b>St John's Road AQMA</b>	
Infrastructure installed Cabling work, configuration and revalidation required	St Johns Road Corstorphine Manse Road / St Johns Road <sup>(A)</sup>
<b>Great Junction Street AQMA</b>	
Infrastructure not installed	Bernard Street/ Shore Ocean Terminal/ Commercial Street
<b>Inverleith Row/ Ferry Road junction</b>	
Infrastructure installed Loop repairs and validation required	Inverleith Row (Goldenacre) Ferry Road Granton Road junction require phone line connection.

\* Potential Air Quality Management Area Extensions

A Clermiston Road / St John's Road (potential loop repair and revalidation following recent footway improvements)

### 8.7.2 Newbridge Roundabout/ Glasgow Road

The traffic signalling which controls Newbridge Roundabout is a 'non cable linked fixed time' (CLF) system. It operates a fixed green time for each of the links of the junction. This system is very inflexible and is unable to respond to fluctuations in the volume of traffic on each approach, which results in losing time under low flow conditions and causing congestion under heavy flow conditions.

Local authority secured funding from the Scottish Government Air Quality Action Plan Grant Scheme to undertake a feasibility modelling study which considered three options for Newbridge Roundabout to reduce congestion on the A8 approach.

The options were as follows:

- Option 1 - Optimisation of Signal Timings
- Option 2 - Implementation of Microprocessor Optimised Vehicle Actuation (MOVA)
- Option 3 - Road Widening on A8 approach to 3 lanes.

All three options were evaluated with respect to reduction in emissions of NO<sub>x</sub>, PM<sub>10</sub>, total carbon and traffic queue lengths for the PM period on the A8 approach<sup>17</sup>.

The modelling study showed significant emission reductions and reduced vehicle queue lengths for all three options. See Table 8.13 and Table 8.14. The Council will evaluate the three proposals with respect to cost and benefit, prior to a decision being made on which option to select.

**Table 8.13 Percentage reduction of emissions for afternoon peak period.**

Options	NO <sub>x</sub>	PM <sub>10</sub>	CO <sub>2</sub>
Option 1	43%	26%	38%
Option 2	44%	26%	40%
Option 3	47%	29%	43%

**Table 8.14 Reduction in vehicle queue lengths during afternoon peak period**

Options	Afternoon west bound vehicle queue length in metres
Option 1	173m
Option 2	134m
Option 3	72m
Average current afternoon vehicle queue length = 790 m	

### **8.7.3 EMote (Real-time Remote Sensor system)**

E Mote sensors provide instant qualitative real-time NO<sub>x</sub> data, which can be linked to SCOOT systems and govern traffic signalling with respect to ambient concentrations of NO<sub>x</sub>. It is anticipated that improvements in traffic flow coupled with the knowledge of real time NO<sub>x</sub> data will lead to a reduction in hourly exceedences and the annual mean.

A trial involving MOTES sensors was commissioned early 2013 and a number of units were installed in March 2013 along St John's Road (within the AQMA). The initial phase of the trial involved the assessment of NO<sub>x</sub> data gathered from a co-located MOTES sensor at the real time air quality monitoring station at St John's Road prior to linking with traffic signalling. The data obtained from the Motes unit has not correlated well with the real time data from the reference analyser. It has transpired that the electrochemical sensor deployed in the unit for measuring NO<sub>2</sub>/NO was faulty and this is currently under investigation.

The Council will require assurance that the NO<sub>x</sub> data gathered by the sensor units is reliable prior to progressing this trial.

## **8.8 Telematics Trial**

Scottish Government support funding was provided during 2010/2011 for the Council to carry out a trial of a vehicle Telematics system, to assess its ability to deliver fuel efficiencies through improved vehicle and driver management. The trial was carried out on a collaborative basis with the system provider Masternaut (Cybit) UK Ltd.

The aim was to reduce fuel consumption through more efficient driving, better route planning and improved utilisation of vehicles.

Fifteen vehicles that operate primarily within the AQMAs were selected for the trial and fitted with the necessary components and software. Following commissioning, the system was operated for a period of three months without intervention to obtain baseline information. Eco Driving training was then provided to the vehicle drivers and post-training data was gathered.



Relevant real-time data from the vehicle as it operates was fed back to a web-based collation system. The Council obtained weekly reports on driver/vehicle performance e.g. speeds, braking, idling and fuel consumption.

A report has been prepared by Masternaut (Cybit) on behalf of the Council and the overall outcomes are positive<sup>18</sup>. These outcomes will require to be evaluated internally within the Council. A summary of the findings is shown in Table 8.15.

**Table 8.15 Changes observed following eco driving instruction.**

Parameter measured between Benchmark and Go Live	Percentage Change
Decrease in average mileage	30.5%
Reduction in average idling time	26.5%
Reduction in harsh events	18.5%
Improvement in MPG	4.3%
Reduction in average weekly fuel litres	4.1%
Reduction in CO <sub>2</sub> output	4.2%

## 8.9 Local Transport Strategy Initiatives

Progress on Local Transport Strategy (LTS) policy measures which are included in AQAP and aim to reduce car traffic are detailed below:

### 8.9.1 Park and Ride

Edinburgh is served by a number of Park and Ride locations around the periphery of the city. The current number of spaces available has the potential to reduce the daily work commuter traffic journeys by 9174 if operated at maximum capacity. Table 8.16

**Table 8.16 Park & Ride Sites Serving Edinburgh & Number of Parking Spaces**

Park and Ride Site	Number of Parking Spaces
Wallyford, East Lothian	321
Hermiston	470
Sheriffhall, Midlothian	561
Newcraighall	565
Straiton	600
Ingliston	1030
Ferrytoll, Fife	1040
<b>Total</b>	<b>4587</b>

Data on usage rates for bus based Park and Ride sites in Edinburgh is collected by automated counting equipment and verified by twice daily manual counts.

Hermiston has the highest utilisation, which at times reaches 100% of existing spaces. Ingliston currently has utilisation of around 56%. However, this is post expansion and there is evidence of recent growth to fill the additional capacity. Straiton and Newcraighall (operated by Network Rail) have lower utilisation levels, but offer opportunity of spare capacity to meet future demand. Ferrytoll (operated by Fife Council) has shown steady increase in patronage since it was established in 2007 (expanded 2010). Data on usage shows that the site is approaching capacity during periods of peak demand.

In September 2009, the Local Authority's Transport, Infrastructure and Environment Committee approved a report recommending further capacity for Park and Ride site at Hermiston (400 spaces) and Sheriffhall Midlothian (600 spaces). Plans to double the capacity at Hermiston are at an advanced stage with the final design complete and finance secured to acquire the necessary land.

Informatives and conditions attached to the planning consent placed a requirement to investigate the installation of electric vehicle charging points and stipulated that the site be serviced by Euro 5 (or better) buses. Current average peak occupancy rates at Sherrifhall vary between 60 and 75%, whilst near-capacity occupancy is observed during the Edinburgh Festival and Christmas period. Recent advice from Midlothian Council is that the proposed expansion at Sheriffhall has still to progress.

In addition to the existing Park and Ride sites the Scottish Government has identified a priority need for a new Park & Ride facility at Hillend, on Edinburgh's boundary with Midlothian. This project, which falls under the remit of Midlothian Council, will reduce car journeys into the city of Edinburgh from the south-west.

### **8.9.2 Promotion of Walking, Cycling and Safe Routes to School**

Edinburgh's LTS contains a number of cycling and walking policies intended to encourage modal shift. In further support of these ambitions the Council also introduced an Active Travel Action Plan (ATAP) in 2010. The Plan aims to deliver significant increases in the numbers of pedestrian and cycling journeys travelled

within Edinburgh, and sets targets of 35% for walking and 10% for cycling of all trips in the city by 2020. A core element of the plan is the development of a 'Family Network' of cycle routes that enable people to travel around the city on safe routes, away from the busier roads.

Several major and smaller cycling/ pedestrian schemes have been delivered and additional schemes are in progress. Table 8.17 below.

**Table 8.17 Active Travel Plan Cycling and Pedestrian Schemes.**

Delivered	In Progress
Leith to Portobello (Phase 1 & 2)	Leith Walk segregated cycleway
Quality Bike Corridor	George Street segregated cycleway
Roseburn to Forth Bridge (NCN1) Sections 1,4 and 5	Roseburn (NCN1) Section 2 and 3
Restalrig railway path	Roseburn to Leith Walk
Corstorphine railway plan	Roseburn to Union Canal
Craigleith to Royal Botanical Gardens	Meadows to Innocent cycle route (NCN1)
Improvements South Meadow walk and North Meadow Walk widening and resurfacing	Meadows to canal cycle Route (NCN75)
Union Canal provision of solar LED lights	Cultins Road shared footway

This work has been accelerated through the Council's commitment to spend at least 7% in 2014/15 of its transport budget on cycling. Sustrans will also assist by match funding through the provision of grants.

Since implementation of the ATAP levels of cycling have increased in Edinburgh. Between 2010 and 2012 there has been a rise of 16% on off road paths and a 25% increase has been recorded around the city centre cordon between 2009 to 2012. This data is collected by automatic cycle counters on off road paths and at various points on the city centre cordon as part of the annual Central Edinburgh Passenger and Transport Study (CEPATS).

The Council has also secured European funding for a cycling project, 'Cycling Heroes Advancing sustainable Mobility Practice' (CHAMP, previously 'Managing Energy Reduction through Cycling eXcellence' (MERCX)). This project has funded cycling promotion through marketing and promotional activities, including the

development and distribution of publicity materials, as well as helping to support the piloting of on-street residential bike parking and the planning and delivery of workplace initiatives. This project commenced in October 2011 and is due to run for three years.

### **8.9.3 Differential Residential Car Parking Permits**

In October 2010, the Council implemented a 'Park Green' scheme; a tiered pricing system for residential parking permits with charges based on vehicle CO<sub>2</sub> emissions (or engine size for vehicles registered prior to March 2001). The scheme aims to encourage those living in residential parking zones to buy and run lower emission vehicles. The scheme effectiveness will be assessed through Permit Charges data.

### **8.9.4 Controlled Parking Zones**

The boundary of the city centre Controlled Parking Zone (CPZ) was substantially extended in 2006-2007. By allocating a proportion of on-road parking to residents, CPZ's effectively discourage car commuting into the city centre.

An alternative form of CPZ, a Priority Parking Zone (PPZ) - trialled recently in the south-central area of the city - has delivered positive outcomes and will be made permanent. The operational times of the PPZ have been set to coincide with peak travel periods and, as with the standard PCZs, serve to influence commuter travel. Introduction of new CPZs or PPZs and extensions will be kept under review.

### **8.9.5 Borders Rail link**

Construction work has commenced to reinstate a thirty-mile rail link between Galashiels in Scottish Borders to Edinburgh Waverley Station. When completed, this major infrastructure project is likely to deliver air quality benefits in the city as a result of commuter modal shift from road to rail.

### **8.9.6 Trams**

Edinburgh Trams became operational on 30 May 2014. The line operates between the city centre (York Place) and Edinburgh Airport. It is too early to determine passenger numbers and if there has been any modal shift from car to tram.

Congestion caused by trams having priority at traffic signals will be kept under review.

## **8.10 Other policies & initiatives to improve air quality, not related to traffic sources.**

### **8.10.1 Planning Guidance on Biomass Installations in Edinburgh**

The Council's Planning Committee introduced Interim Planning Guidance (IPG) in November 2009 to manage the introduction of unabated biomass combustion in new development proposals. The IPG '*Use of Biomass in Edinburgh of 50MW (e) or less in Edinburgh*' has discouraged the growth of commercial-scale biomass units within the city. Due to the challenges in meeting air quality standards in many parts of the city and on-going absence of effective abatement technologies continuation of this position is an important tool for managing emissions of fine particles and nitrogen dioxide.

In November 2012, the Council's Transport & Environment Committee agreed to continue the Biomass IPG until the outcomes of the delayed city-wide Detailed Assessment of PM<sub>10</sub> are reported.

### **8.10.2 Clean Air Act & Smoke Control Areas**

Although Smoke Control Orders are in place across the whole of the Council's administrative area, it is apparent from a range of information sources, that increasing numbers of residents (the majority being anonymous) are burning coal and wood in open fires. To address the issue, the Council has adopted a pro-active approach and towards the end of each summer, runs a publicity campaign to draw attention to the air quality impacts and legal requirements of the Clean Air Act.

Table 8.18 Action Plan Progress

No	Measure	Focus	Lead authority	Planning phase	Implement phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1	Manage bus emissions	Reduce Emissions through establishment of Voluntary Emissions Reduction Partnership, between City of Edinburgh Council and Bus Companies	CEC/ SFC	2009 - 2011	2011 to 2014	Euro 4 by 2012 Euro 5 by 2015  Formal agreement not reached. Bus operators consider too onerous in the absence of financial support	<b>Central</b> 59% NOx  <b>St John's</b> 48% NOx  <b>GtJunct</b> 61% NOx  Target year <b>2015</b>  (per TTR study)	TTR study completed	Lothian Bus Main Fleet  Euro 3 (43%) Euro 4 (12%) Euro 5 (23%) Euro 5/6(23%)  First Scotland (East)  Euro 3 (52%) Euro 4 (30%) Euro 5 (18%)	Ongoing	Further improvement will require substantial additional funding  Lothian bus proposals 2014/15; Self fund purchase of 25 E6 Double Decks and upgrade 26 E4 to E5 vehicles Purchase 20 Hybrid single deck from Scottish Green Bus fund Round 4
1a	Manage bus emissions and potentially emissions from other vehicle classes	Reduce emissions via implementation of a LEZ	CEC SFC/ transport	2010-2012	Feasibility study / consultations will have influence	Euro 5 by 2015	Not calculated  This work will be central to feasibility study  <b>Note</b> largest reduction in bus NOx emissions identified in LES study would be via <b>mandatory</b> scheme	CEC decision to consult with stakeholders on feasibility of LEZ  Scottish Govt. support funding secured for consultation	Delayed due to national re-evaluation of Vehicle Emission Factors and publication of DEFRA National LEZ Framework (anticipated Spring 2013)  Study delayed until Scottish LES outcomes are known.	Ongoing	Revised study in 2011 on buses within AQMAs show significant NOx reductions could be achieved with buses operating at Euro 5.  LEZ feasibility study will also consider other vehicle classes

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No	Measure	Focus	Lead authority	Planning phase	Implement phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	Manage Road freight emissions	Reduce emissions via establishment of Freight Quality Partnership	SESTRAN	On going	On going	Euro 5	Not calculated			On going	Regional Freight Quality Partnership established by South East of Scotland Regional Transport Partnership. Progress to date has been limited with little direct impact in Edinburgh.
2a (2)	Manage Road Freight Emissions	Edinburgh ECOSTARS Europe.  Freight Recognition Scheme. Rating system includes - Emissions Stds; Types of Fuel; Driver training; Fuel efficiency; Scheduling techniques;	CEC	2010-11	2011 - 2014	Target number of vehicles to join scheme in each of the 3 funded years:  Yr 1 3000 Yr 2 4000 Yr 3 1667	Not calculated	Number of vehicles joined scheme to May 2014  3,525 vehicles 51 operators	Recruitment of operators and vehicles ongoing. Membership levels consistent with scheme targets.  Increasing emphasis in 2013 on bus and coach operators	June 2014	Further funding being sought to continue with Scheme ( Part funding available from SG)
3	Council Fleet Cleaner Vehicles	Improve emissions by ensuring highest Euro std. for vehicle replacement. Increase uptake of electric vehicles		2003 onwards	Ongoing		Not calculated	Since 2003 all pre-Euro, Euro 1 and Euro 2 vehicles removed from fleet Euro 3 now small percentage	Current fleet profile  Euro 3 5% Euro 4 49% Euro 5 45% EEV 1%	Ongoing	

City of Edinburgh Council

No	Measure	Focus	Lead authority	Planning phase	Implement phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
3a	Council Fleet Develop driver eco training prog. / carry out trial of vehicle telematics system.	Reduction in fuel usage beneficial to air quality	CEC/ SFC Corporate			Reductions in fuel consumption		SG funding secured to trial vehicle telematics in CEC vehicles; Eco-driving instruction integral component	Completed  15 vehicles selected which operate through all AQMAs  Baseline for 3 months established (no Intervention) for 10 vehicles Eco driving instruction provided to vehicle operators.	2013	Report trial findings, overall positive Report submitted to Scottish Government, Spring 2014 Will require to discuss outcomes internally regarding the installation of systems on other CEC vehicles
4	LTS Park and Ride sites established	Reduce emissions by easing traffic congestion at peak travel times			Complete	Patronage rates	Not quantified NOTE Older buses were serving P&R; now minimum Euro 3 std.	Ferrytoll (1040) Ingliston (1030) Straiton (600) N'craighall (565)  Sheriffhall (561)  Hermiston (470)  Wallyford (321)	Hermiston and Ferrytoll sites approaching capacity  Council approved additional capacity at:  Hermiston (+400)  Sheriffhall (+600)	Proposals for further additional capacity at Hermiston & Sheriffhall  Total 1000 new spaces.	Now utilising minimum Euro 3 std. buses.  Further improvements still necessary



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No	Measure	Focus	Lead authority	Planning phase	Implement phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
5	LTS Differential Parking	Carbon and LAQM pollutants	CEC Transport	2008	Oct 2010	Number of low carbon vehicles registered	Not quantified			Ongoing	
6	LTS Tram	Reduced Emissions - Zero at Source	CEC Transport	2008-11 (revised to 2014)	Issues with funding	Patronage	Not quantified		Tram Line 1 between Edinburgh Airport and York Place Completed	2014 Completed May 2014 (revised)	Not quantified Potential issues with bus and general traffic displacement Possible congestion where tram and bus routes coincide
7	LTS New rail line/station	One of a package of measures to reduce road traffic entering Edinburgh from Airdrie / Bathgate and Newcraighall  Borders Rail	CEC Transport  Rail			Passenger numbers	Not quantified	Bathgate / Airdrie and Newcraighall		Lines completed  2016  Construction Started	Passenger growth recorded for all stations
8	LTS Cycle Initiatives	Modal shift Reduce emissions via Active Travel plan and MERCX cycling promotion project	CEC Transport			Modal shift All trips by 2020  35% walking 10% cycling	Not quantified	Development of cycle routes to enable travel around the city on safe routes CEC secured EU funding (MERCx project)	From 2010 to 2012 Increase 16% Cycling on off road paths 2009 to 2012 25% increase in cycling	2014	
9	Traffic Management					Reduce congestion	Not calculated	Ferry Road, majority of loops re-cut and will now		2014 Revised	SCOOT – damaged systems to be repaired

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No	Measure	Focus	Lead authority	Planning phase	Implement phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	systems <b>SCOOT</b>							programme repairs from 2013.  SG funding for loop repairs at St Johns Rd (on-going)		2014 Revised	Additional installation subject to funding availability
	<b>MOTEs (trial)</b>							Ardmillan 'Triangle' Junction Validation Summer 2013  Trial start date early 2013 in St John's Rd AQMA -	Issues with NOx sensors trial delayed	2014 (revised)  2014 but will be dependant on reliability of sensors	MOTEs – Series of 10 remote pollutant sensing devices to be connected to SCOOT. Trial will establish if real-time pollutant data can be successfully linked with reactive traffic management processes
10	Electric Charging Installation		CEC/SFC						Public E charging  58 charging heads 26 locations	Ongoing	
11	Development of city-wide Land Use and Traffic (LUTi) model	Measure would enable more accurate prediction of air quality impacts from cumulative development	CEC / SFC			Manage density of development/ locate new development such that traffic emissions impacts can be minimised		Limited due to high capital & revenue costs involved.	None		Land use and traffic modelling will continue to be considered.  Existing traffic modelling capability within CEC to be considered by Air Quality Working Group in 2013

## 9 Conclusions and Proposed Actions

### 9.1 Conclusions from New Monitoring Data

#### 9.1.1 Nitrogen Dioxide

Nitrogen Dioxide data for the year 2013 shows that monitoring locations within each of the AQMAs continue to exceed the annual mean air quality objective, therefore they remain valid. Some data is border-line in comparison with the hourly mean objective, therefore monitoring will continue.

Exceedences occurred at monitoring locations outwith the AQMAs at Angle Park Terrace, Dundee Street, Nicolson Street, South Bridge, South Clerk Street, Queensferry Road and Slateford Road. A summary of all locations where monitoring results are at or above the objectives is shown in Table 9.1.

**Table 9.1 Summary of locations where monitoring results are at or exceed the Nitrogen Dioxide objective in 2013.**

Site ID	Area / Site Name	In AQMA?	Data Capture 2013 %	Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ ) 2013 Bias Adjustment factor = 0.75
	<b>NORTH</b>			
29c	<b>Bernard Street/PS</b>	Y Gt Junction St	100	<b>42</b>
30	<b>Great Junction Street/FV</b>	Y Gt Junction St	100	<b>41</b>
55	<b>Inverleith Row/Ferry Road</b>	Y Gt Junction St	100	<b>43</b>
	<b>EAST</b>			
25	<b>Easter Road/CH Shop</b>	Y Central	92	<b>41</b>
81	<b>London Rd/East Norton PI</b>	Y Central	92	<b>44</b>
67	<b>London Road/Earlston PI</b>	Y Central	100	<b>46</b>
69	<b>London Road/Wolseley PI</b>	Y Central	100	<b>40</b>
70	<b>London Rd/Wolseley Terr</b>	Y Central	92	<b>44</b>
	<b>CITY CENTRE - NORTH</b>			
47	<b>Princes Street Eastbound</b>	Y Central	100	<b>50</b>
24	<b>Princes Street/Mound</b>	Y Central	92	<b>41</b>
	<b>CITY CENTRE - SOUTH</b>			
48c	<b>Cowgate Blackfriars</b>	Y Central	83	<b>42</b>
79d	<b>Dundee Street/Yeaman PI</b>	No	83	<b>46</b>
37a	<b>Grassmarket No 41</b>	Y Central	100	<b>44</b>

Site ID	Area / Site Name	In AQMA?	Data Capture 2013 %	Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ ) 2013 Bias Adjustment factor = 0.75
49	Morrison Street	Y Central	100	42
135	Nicolson Street No 69	No	100	45
27	North Bridge – South	Y Central	92	47
144	South Bridge No 59	No	100	46
142	South Clerk Street No 41a	No	92	40
141	South Clerk Street No 84	No	92	41
3	Torphichen Place	Y Central	83	43
28b	West Port No 62	Y Central	58	52
28d	West Port No 42	Y Central	75	58
	<b>WEST</b>			
16	Glasgow Road No 68	Y Glasgow Rd	100	40
58	Glasgow Road Newbridge	Y Glasgow Rd	100	46
64	Queensferry Road No 550	No	100	47
1b	St John's Road IR	Y St John's Rd	100	41
1d	St John's Road No 131	Y St John's Rd	100	52
	<b>SOUTH WEST</b>			
76	Angle Park/Harrison Road	No	92	41
76b	Angle Park Terrace No 74	No	100	46
18	Gorgie Road No 8	Y Central	100	45
80c	Gorgie Road No 87	Y Central	92	40
80	Gorgie Road / Delhaig	Y Central	100	44
5	Gorgie Road/Murieston Rd	Y Central	100	41
77b	Slateford Road No 93/95	No	100	42
77	Slateford Road No 97	No	100	40

Of the exceedences outwith AQMAs all but one was included in Detailed Assessment work. At South Bridge, Clerk Street and Nicolson Street there were exceedences similar to 2012, where the Detailed Assessment study could not be concluded due to temporary traffic arrangements. With continued exceedences in 2013, it will be necessary to extend the Central AQMA to include this area - the main arterial road (A7) with a localised area around the Hope Park Terrace junction. This part of the road network consists primarily of a typical street canyon where pollution dispersal is restricted.

Similarly at Angle Park Terrace and Slateford Road there are a number of exceedences of the annual mean objective in typical street canyon type topography, in 2012 and 2013. Detailed Assessment work concludes that these areas should also be included in an extension to the Central AQMA.

Monitoring locations established at the Portobello Road and Sir Harry Lauder Road junction, fulfilling Detailed Assessment work, shows that there are no exceedences of the objective. An AQMA will not be required for this area, however monitoring will continue where results are borderline.

It was possible to conclude findings of the Fountainbridge Detailed Assessment as data capture was good in comparison to 2012. In conclusion the monitoring shows that the majority of the sites are below the annual mean objective. However there was one exceedence at Dundee Street/Yeamans Place, therefore it will be necessary to extend the Central AQMA to include this localised area. Monitoring will also continue in Fountainbridge where data shows borderline concentrations, however an AQMA will not be required in this area.

Monitoring will also continue at Queensferry Road. Although residential facade monitoring indicated the objectives are met, one roadside monitoring site, when distance corrected, shows exceedence. This may be due to a pedestrian crossing in close proximity and a wall funnelling idling emissions towards the PDT monitor on the prevailing wind.

### **9.1.2 Particulate Matter 10 (PM<sub>10</sub>)**

PM<sub>10</sub> data from all monitoring locations in 2013 meet the EU limit values and UK National objectives. The background sites at St Leonards and Currie meet the tighter Scottish objective. Data from Queen Street and Glasgow Road is borderline with regards this objective and at Salamander Street and Queensferry Road it is exceeded.

The Local Authority is currently undertaking a Detailed Assessment with regards to PM<sup>10</sup> city wide, which will be reported separately in 2014. Interim findings acknowledge a number of fugitive, transport and industrial sources that required investigation. Air quality specialist consultants have been employed to assist in determining the AQMA boundary necessary to contend with fugitive sources in the vicinity of the Salamander Street monitoring location.

### **9.1.3 Trend Data**

Historically it has proved difficult to formulate reliable assumption on data trends for both NO<sub>2</sub> and PM<sub>10</sub> due to disruptions to normal traffic flows, arising from

construction work associated with the Edinburgh Trams. With construction now complete, the Local Authority has agreed to undertake a period of monitoring to assess traffic movements. It is anticipated that this will occur over a period of twelve months to allow for conditions to normalise.

In the meantime data shows a general downward trend of both pollutants at the majority of monitoring locations in the city. With the passive diffusion tube data this could be linked to a general downward trend of the bias adjustment factor.

Nevertheless, it is also likely that improvements to the bus fleet in a number of hot-spot areas have also contributed to concentration reductions.

## **9.2 Conclusions relating to New Local Developments**

The re-organisation of the way traffic and public transport services move through the core City Centre will need to be considered in the next round of Review and Assessment. The Temporary Traffic Regulation Order for George Street and reconfiguration of the roads around the tram line will need to be taken into account.

The Foot of the Walk junction is being redesigned as part of the footway and environmental improvements to Leith Walk. Traffic modelling has intimated that there could be additional queuing on Great Junction Street. After construction of the junction, monitoring of the real time operation will be undertaken to determine whether signalling adjustment is required. This issue will need to be considered in the next round of Review and Assessment.

CHP developments within the city centre will also be reviewed in the next round of Review and Assessment.

Fugitive emissions from a number of sources in the surrounding area of Leith Docks contributing to exceedences of PM<sub>10</sub> at Salamander Street will be investigated in detail as part of city-wide Detailed Assessment.

## **9.3 Other Conclusions**

### **9.3.1 Implementation of Air Quality Action Plan**

All bus companies operating in Edinburgh continue to improve their fleet, although it is recognised that without substantial financial input it will not be possible to achieve

the draft Voluntary Emissions Reduction Partnership target of Euro 5 or better, by 2015.

The Local Authority became a partner in an EU project, ECOSTARS Europe through which the ECOSTARS Edinburgh scheme was officially established in January 2012. The scheme provides a relatively low-cost, 'partnership' mechanism to assist the Council encourage and facilitate emissions improvements from the goods and passenger transport sector operating in the city. To date 51 operators have joined and a total of 3,525 vehicles have been registered. The majority of member operators are from the freight haulage sector (38) followed by passenger transport sector (11) and public sector (2).

The Council is committed to lead by example and ensure the acquisition of low emission vehicles for its own fleet as detailed in Policy ENV 2 of the LTS (2014 to 2019). All Pre-Euro 1, Euro 1 and Euro 2 vehicles have now been eliminated from the Council's fleet and Euro 3 forms a very small proportion (5%). The Council has been successful in obtaining Scottish Government Funding via the Low Carbon Vehicle Procurement Support Scheme and 1% of the vehicle fleet are now electric.

It is the Council's intention to wait for the development of the Scottish Government National Low Emission Strategy and associated guidance prior to assessing the potential for the introduction of a mandatory Low Emission Zone, which is stated as an action in the revised Local Transport Strategy 2014.

The 'Plugged in Places' funding scheme for 2013/14 has enabled Edinburgh Community Planning Partnership to procure Combi- Rapid Chargers for three Park and Ride sites that serve the City of Edinburgh, Ingliston, Hermiston and Straiton. Currently, there are electric vehicle charging points at 20 Council premises, offering 40 charging heads for use by its own and NHS vehicles.

The City of Edinburgh Council upgraded their main traffic management system (SCOOT) which now includes enhanced emission models derived from the latest research by TRL, and numerous other tools and improvements, which should help to keep traffic moving effectively around the city.

The Council is currently evaluating the three proposals for improvements to Newbridge roundabout (including Glasgow Road AQMA) with respect to cost and benefit prior to a decision being made on which option to select.

There has also been progress on a number of Local Transport Strategy (LTS) policy measures which are included in AQAP which aim to reduce car traffic. These include extensions to the park and ride and promotion of walking cycling and 'Safe routes to school' programme.

### **9.3.2 Further Assessment 2013**

Further Assessment work was completed in 2013 with regards to the declared AQMAs at Inverleith Row/Ferry Road junction and Glasgow Road; and the extension to the Central AQMA and Great Junction Street AQMAs.

Source apportionment studies identified local background concentrations as contributing a large proportion to the overall concentration of nitrogen dioxide. The contribution from each of the vehicle classes was diverse, with buses having a marginal role in Cowgate and Grassmarket to having the largest impacts at London Road, Gorgie/Chesser and Inverleith Row. Cars were shown to have a significant impact in all areas and LGVs showed the least. The report which will be submitted for approval to the Scottish Government and DEFRA for approval concludes that it will be necessary for future action planning to keep most motor vehicle classes under consideration for actions to improve air quality in these areas.

### **9.3.3 Additional Monitoring not covered by LAQM**

Monitoring data for pollutants that are not directly the responsibility of the Council under the LAQM regime have also been included in this report for completeness. These pollutants are measured at the AURN background site at St Leonards.

The 2013 monitoring results show that PAH and PM<sub>2.5</sub> complies with their specified objectives and Ozone exceeded the national objective.

### **9.3.4 Planning Applications**

A Second Proposed Local Development Plan was approved by the Local Authority's Planning Committee 19<sup>th</sup> June 2014. It addressed changes to housing land



requirements at Strategic Development Plan level and is accompanied by a Second Proposed Action Programme, which sets out actions intended to mitigate and manage impacts, including those on traffic and hence air quality. Any representation to the Second Plan will be considered by the Council then dealt with by examination by Scottish Ministers in 2015. It is anticipated the new LDP will then be adopted in early 2016.

### **9.3.5 Local Transport Strategy**

Edinburgh's Local Transport Strategy (LTS) 2014 to 2019 was formally adopted by the Council in January 2014. The strategy recognises air quality as an issue and details a range of policies to contribute towards improving air quality.

## **9.4 Proposed Actions**

### **9.4.1 Nitrogen dioxide**

#### **Extension to the Central AQMA**

The Central AQMA will be extended to include the A7 South Bridge to South Clerk Street including a localised area around the Hope Park Terrace junction, as well as an area around the Ardmillan triangle leading to Slateford Road and Dundee Street. Source apportionment work will be undertaken to identify the predominant sources that contribute to the air quality exceedences.

#### **Potential Reduction of AQMA's**

The current Local Authority policy of diligently reviewing and assessing air quality across the city with the largest network of automatic and manual monitors in Scotland has resulted in declaration and extension of five AQMA's across the city. Some local authorities have declared only one city wide AQMA for NO<sub>2</sub> whereas Edinburgh tackle each hotspot area as they arise. Some commentators view five small areas as worse than one very large area. This approach allows resources, in conjunction with the city wide Air Quality Action Plan, to be targeted to the problems.

Due to recent improvements in nitrogen dioxide air quality in some areas there are now a number of streets in the Local Authority area that are in AQMA's which now comply with the annual mean for nitrogen dioxide. These areas include top of Leith Walk, Easter Road, Queen Street, large parts of Great Junction Street, Commercial Street and parts of St John's Road. The Local Authority intends to review the areas

of compliance in AQMA's to begin the process if appropriate of reducing the boundaries of the current AQMA's. For example based on current data only the Clermiston Road junction part of St John's Road is in exceedance so the AQMA could potentially on current data be reduced by around 70%.

### **Source Apportionment Work**

Further source apportionment work will be undertaken for areas previously considered, in order to take account of the latest emission factors and traffic changes in the Central AQMA.

In addition up-to-date traffic information from the MOTES trial will be used to update Source Apportionment work for the St John's Road AQMA.

#### **9.4.2 PM<sub>10</sub>**

The Local Authority is currently undertaking a Detailed Assessment with regards to PM10 city wide, which will be reported separately in 2014. Currently modelling work is being undertaken by air quality consultants in order to define an AQMA boundary to deal with fugitive sources near the Salamander Street monitoring location. Transport and industrial sources are also being considered in detail.

#### **9.4.3 Revision of the Air Quality Action Plan**

A revised Air Quality Action Plan will be produced to address the new areas of concern, and to account for any decision taken by the Council in respect of a Low Emissions Zone for the city. The revised Action Plan will be developed following the outcomes from the Further Assessment (Source Apportionment) work.

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# Appendices

## **Appendix A: Quality Assurance / Quality Control (QA/QC) Data**

- A1 Nitrogen Dioxide (NO<sub>2</sub>) Diffusion Tube Bias Adjustment Factors
- A2 NO<sub>2</sub> Bias Adjustment Factor from Co-location Studies
- A3 Discussion of Choice of Factor to Use
- A4 PM Monitoring Adjustment
- A5 Short-term to Long-term Data adjustment for NO<sub>2</sub>
- A6 QA/QC of automatic monitoring
- A7 QA/QC of Diffusion Tube Monitoring

## **Appendix B: Maps of Non Automatic Air Quality Monitoring (AQM) Passive Diffusion Tube Locations**

## **Appendix C: Raw Passive Diffusion Tube Data**

## **Appendix D: Passive diffusion tube Distance Correction Calculations**

## **Appendix E: Passive diffusion tube data used in Trend analysis**

## Appendix A: QA/QC Data

### A1 Nitrogen Dioxide (NO<sub>2</sub>) Diffusion Tube Bias Adjustment Factors

Edinburgh Scientific Services supply and analyse the passive diffusion tubes. The tubes are made of acrylic and the laboratory uses 50% v/v Triethanolamine (TEA) in acetone for the adsorbent; the grids are dipped into this solution and allowed to dry before insertion into the tube. The tubes are exposed for 4 or 5 week periods, typically in accordance with the recommended calendar supplied by DEFRA. The method has remained unchanged during the monitoring periods.

The annual mean data from the historical local co-location studies always show that passive diffusion samplers over read the real time analysers by average factors from 0.85 to 0.91. See Tables A1a and A1b.

In 2011 and 2012 the bias was calculated using a combination of local factors and the factors contained in the National Bias Database, with sites which are also analysed by Edinburgh Scientific Services. This followed a step change in the bias factor in 2011. A manual approximate orthogonal regression calculation was undertaken to combine the bias factors and represent worse-case scenario.

**Table A1a Historical bias data used in previous reports 2001 - 2006**

Site	Type	2001	2002	2003	2004	2005	2006
Queen St	Roadside	0.91	0.91	0.91	0.90	0.84	0.83
Haymarket	Roadside	0.93	N/A	N/A	0.88	0.93	0.91
Leith Walk	Roadside	0.89	N/A	N/A	N/A	N/A	N/A
Currie	Suburban	N/A	N/A	N/A	0.91	N/A	N/A
Gorgie	Roadside	N/A	N/A	N/A	N/A	0.86	N/A
Roseburn	Roadside	N/A	N/A	N/A	N/A	0.92	N/A
<b>Mean</b>		<b>0.91</b>	<b>0.91</b>	<b>0.91</b>	<b>0.89</b>	<b>0.89</b>	<b>0.87</b>

**Table A1b Historical bias data used in previous reports 2007 - 2011**

Site	Type	2007	2008	2009	2010	2011	2012
Queen Street	Roadside	0.85	0.81	0.83	0.84	0.69	0.65
Haymarket	Roadside	0.92	0.87	N/A	N/A	N/A	N/A
Gorgie	Roadside	0.91	0.94	N/A	N/A	0.87	0.86
Roseburn	Roadside	N/A	0.91	0.82	0.85	N/A	N/A
St. John's Road.	Kerbside	0.93	0.86	0.92	0.92	0.79	0.74
Salamander	Roadside	N/A	N/A	N/A	0.79	0.77	0.80
Queensferry Road	Roadside	N/A	N/A	N/A	N/A	0.66	0.71
<b>Mean</b>		<b>0.90</b>	<b>0.88</b>	<b>0.86</b>	<b>0.85</b>	0.76	0.75
<b>Combined Mean*</b>						<b>0.81*</b>	<b>0.76*</b>

\* An approximate orthogonal regression calculation undertaken with National Bias Database data

## A2 NO<sub>2</sub> Bias Adjustment Factor from Local Co-location Studies

Six automatic monitoring stations were considered for the co-location study during 2013. The factors for studies are shown in Table A2.

**Table A2 Bias factors used for 2012 data**

Site	Type	Analyser Mean	DC# % Analyser	PDT* Mean	PDT* Precision	Period	Bias Factor A	Bias B (%)
<b>Gorgie Road</b>	Roadside	38	95	44	6	9	0.87	14
<b>Queen Street</b>	Roadside	29	98	41	4	11	0.7	42
<b>Queensferry Rd</b>	Roadside	47	89	66	6	10	0.71	41
<b>Salamander St</b>	Roadside	29	98	37	6	11	0.78	28
<b>St John's Rd</b>	Kerbside	58	91	75	5	12	0.77	30
<b>Glasgow Rd</b>	Roadside	28	98	43	7	12	0.64	57

Notes for table; \* PDT - Passive Diffusion Tube

# DC - Data Capture for periods used

## A3 Discussion of Choice of Factor to Use

Edinburgh co-locates triplicate tubes on the sampler head cages of each roadside/kerbside monitoring station. The analysis has been undertaken for a number of years using Edinburgh Scientific Services Laboratory and the preparation of tubes has remained the same. Generally the passive diffusion tubes give higher concentrations than the real time analysers over an annual period.

Prior to 2011 historical data shows that the annual mean bias factors (Bias A) ranged from 0.85 to 0.91. The local co-location study for 2011 showed a step change in the mean bias factor (A) 0.76, therefore a combination of local factors and the factors contained in the National Bias Data Base were used which resulted in a factor 0.81. The study in 2012 was in keeping with the previous year and the same calculation was undertaken.

In 2013, an annual mean bias factors (Bias A) of 0.75 was calculated. Usual checks were carried out with respect to the automated and passive diffusion tube data to assess the reliability of the bias factor. With respect to analysis of passive diffusion tubes, Edinburgh Scientific Services stated that there had not been any change in laboratory procedures. Although a single round of the external proficiency scheme, WASP (Workplace Analysis Scheme for Proficiency) was 75% satisfactory, the rolling five round WASP window was 95% satisfactory, which is in keeping with the required standards.

The co-located studies showed that overall precision of triplicate tubes was good, although data capture was poor at two sites; Queensferry Road and Gorgie Road, however the minimum nine period of data was available.

Combining the local bias factors with one available on the National Bias Database (Version 03/14) also resulted in a factor of 0.75. This was the intercomparison study for Maryleborne Road also analysed by Edinburgh Scientific Services. The calculation is undertaken using the bias B values in accordance with Air Quality Consultant Guidance document paragraph 2.4 and shown in Table A3 below.

Although the passive diffusion change over dates for the national survey differed to the local studies (the Local Authority continued with the original Calendar of Suggested Exposure Periods and not the amended version) the Local Authority is satisfied that, overall, the approach taken will ensure that the most conservative factor is derived. It is considered inappropriate to utilise the national factor available, as this consists of only one study (Maryleborne Road).

Table A3 Manual approximate orthonogel regression calculation for 2013 bias

Site	Bias A 2013	Bias B 2013	Calculation as AQC Guidance Para 2.4	Bias 2013
<b>Local</b>				
Gorgie Road	0.87	14%		
Queen Street	0.7	42%		
Queensferry Road	0.71	41%		
Salamander Street	0.78	28%		
St John's Road	0.77	30%		
Glasgow Road	0.64	57%		
<b>National</b>				
Marylebone Road	0.79	27%		
<b>Mean Local</b>	<b>0.745</b>	35%	$0.35+1 = 1.35$	
			$1/1.35 =$	<b>0.74</b>
<b>Mean Combined</b>		34%	$0.34 +1 = 1.34$	
			$1/1.34 =$	<b>0.75</b>

#### A4 PM Monitoring Adjustment

Ricardo-AEA provided Volatile Correction Model (VCM) corrected Tapered Element Oscillating Microbalance (TEOM) data to the Local Authority under the Scottish Air Quality Database and Website project for the following automatic monitoring stations, Queen Street, Salamander Street and Glasgow Road. In 2013 this included the Currie station for the first time.

TEOM data was also corrected to provide a gravimetric equivalent using Edinburgh's local gravimetric factor 1.14, which was derived from undertaking a co-location study with a partisol unit and TEOM instrument in Detailed Assessment Report 2004.

#### A5 Short-term to Long-term Data adjustment for NO<sub>2</sub>

Data from St Leonards and Bush Estate (Midlothian) monitoring sites were used to estimate annual nitrogen dioxide concentrations from short term measurements.

Both sites are part of the national Automatic Urban and Rural Network (AURN) and are located within the required distance to Edinburgh. Data capture (DC) was also considered to be within acceptable limits.



Automatic Monitoring

Data was not collected at the Queensferry Road monitoring station during August and September due to problems with the analyser, therefore an estimation of annual mean concentration is calculated below;

<b>Queensferry Road Automatic Monitoring Station</b>				
<b>Measured Mean Value (M) – 45.8 µg/m<sup>3</sup></b>				
<b>Site</b>	<b>Site Type</b>	<b>Annual Mean (AM) µg/m<sup>3</sup></b>	<b>Period Mean (PM) µg/m<sup>3</sup></b>	<b>Ratio(R) AM/PM</b>
St Leonard's	Urban background	22	22.5	0.978
Bush	Rural background	6	6.7	0.896
			<b>Average R (R<sub>a</sub>)</b>	<b>0.937</b>
<b>Adjusted Mean (M x R<sub>a</sub>) = 43 µg/m<sup>3</sup></b>				

Non-Automatic Monitoring (Passive Diffusion Tubes)

Where passive diffusion tubes have less than 75% data capture for the annual period, a calculation is undertaken to estimate the annual concentrations. Details are shown in the subsequent tables.

<b>Site ID/Location 30e Great Junction Street</b>			
<b>Measured Mean Value (M) = 51.3 µg/m<sup>3</sup></b>			
<b>Background Site</b>	<b>Annual Mean (AM) µg/m<sup>3</sup></b>	<b>Period Mean (PM) µg/m<sup>3</sup></b>	<b>Ratio AM/PM (R)</b>
St Leonard's	22	24.2	0.909
Bush Estate	6	6.4	0.938
		<b>Average Ratio (R<sub>a</sub>)</b>	<b>0.923</b>
<b>Adjusted Mean (M x R<sub>a</sub>) = 47.4 µg/m<sup>3</sup></b>			

<b>Site ID/Location 74e George Street/Charlotte Square</b>			
<b>Measured Mean Value (M) = 52.9 µg/m<sup>3</sup></b>			
<b>Background Site</b>	<b>Annual Mean µg/m<sup>3</sup></b>	<b>Period Mean µg/m<sup>3</sup></b>	<b>Ratio AM/PM (R)</b>
St Leonard's	22	21.6	1.019
Bush Estate	6	6.9	0.870
		<b>Average Ratio (R<sub>a</sub>)</b>	<b>0.944</b>
<b>Adjusted Mean (M x R<sub>a</sub>) = 49.9 µg/m<sup>3</sup></b>			

<b>Site ID/Location 33 Queen Street</b>			
<b>Measured Mean Value (M) = 51.6 <math>\mu\text{g}/\text{m}^3</math></b>			
<b>Background Site</b>	<b>Annual Mean <math>\mu\text{g}/\text{m}^3</math></b>	<b>Period Mean <math>\mu\text{g}/\text{m}^3</math></b>	<b>Ratio AM/PM (R)</b>
St Leonard's	22	23.7	0.928
Bush Estate	6	6.9	0.870
		<b>Average Ratio (R<sub>a</sub>)</b>	<b>0.899</b>
<b>Adjusted Mean (M x R<sub>a</sub>) = 46.4 <math>\mu\text{g}/\text{m}^3</math></b>			

<b>Site ID/Location 138 Clerk Street</b>			
<b>Measured Mean Value (M) = 51.0 <math>\mu\text{g}/\text{m}^3</math></b>			
<b>Background Site</b>	<b>Annual Mean <math>\mu\text{g}/\text{m}^3</math></b>	<b>Period Mean <math>\mu\text{g}/\text{m}^3</math></b>	<b>Ratio AM/PM (R)</b>
St Leonard's	22	20.3	1.084
Bush Estate	6	6.5	0.923
		<b>Average Ratio (R<sub>a</sub>)</b>	<b>1.003</b>
<b>Adjusted Mean (M x R<sub>a</sub>) = 51.2 <math>\mu\text{g}/\text{m}^3</math></b>			

<b>Site ID/Location 48e Cowgatehead</b>			
<b>Measured Mean Value (M) = 50.8 <math>\mu\text{g}/\text{m}^3</math></b>			
<b>Background Site</b>	<b>Annual Mean <math>\mu\text{g}/\text{m}^3</math></b>	<b>Period Mean <math>\mu\text{g}/\text{m}^3</math></b>	<b>Ratio AM/PM (R)</b>
St Leonard's	22	21.5	1.023
Bush Estate	6	5.8	1.034
		<b>Average Ratio (R<sub>a</sub>)</b>	<b>1.029</b>
<b>Adjusted Mean (M x R<sub>a</sub>) = 52.3 <math>\mu\text{g}/\text{m}^3</math></b>			

<b>Site ID/Location 2 West Maitland Street</b>			
<b>Measured Mean Value (M) = 66.7 <math>\mu\text{g}/\text{m}^3</math> &amp; 68.6 <math>\mu\text{g}/\text{m}^3</math></b>			
<b>Background Site</b>	<b>Annual Mean <math>\mu\text{g}/\text{m}^3</math></b>	<b>Period Mean <math>\mu\text{g}/\text{m}^3</math></b>	<b>Ratio AM/PM (R)</b>
St Leonard's	22	22.4	0.982
Bush Estate	6	6.1	0.984
		<b>Average Ratio (R<sub>a</sub>)</b>	<b>0.983</b>
<b>Adjusted Mean (M x R<sub>a</sub>) = 65.5 <math>\mu\text{g}/\text{m}^3</math> &amp; 67.4 <math>\mu\text{g}/\text{m}^3</math></b>			

Site ID/Location 28b West Port			
Measured Mean Value (M) = 82.2 µg/m <sup>3</sup>			
Background Site	Annual Mean µg/m <sup>3</sup>	Period Mean µg/m <sup>3</sup>	Ratio AM/PM (R)
St Leonard's	22	25.4	0.866
Bush Estate	6	7.3	0.822
		<b>Average Ratio (R<sub>a</sub>)</b>	<b>0.844</b>
Adjusted Mean (M x R <sub>a</sub> ) = 69.4 µg/m <sup>3</sup>			

Site ID/Location 23 Roseburn Terrace			
Measured Mean Value (M) = 58.2 µg/m <sup>3</sup>			
Background Site	Annual Mean µg/m <sup>3</sup>	Period Mean µg/m <sup>3</sup>	Ratio AM/PM (R)
St Leonard's	22	23.6	0.932
Bush Estate	6	6.3	0.952
		<b>Average Ratio (R<sub>a</sub>)</b>	<b>0.942</b>
Adjusted Mean (M x R <sub>a</sub> ) = 54.9 µg/m <sup>3</sup>			

## A6 QA/QC of Automatic Monitoring

All monitoring stations are subject to an independent audit and stringent QA/QC procedures which are undertaken by Ricardo-AEA on behalf of DEFRA and the Scottish Government. This agreement commenced in 2007. Nevertheless, all data, including calibration data, is scrutinised on a daily basis by Local Authority officers (Monday to Friday) by visual examination, to see if they contained unusual measurements. Any data which was considered to be suspicious e.g. large spikes, is flagged to undergo further checks.

### Staff competence

Officers are trained as local site operators in relation to the management of the stations and undertake the necessary calibrations and basic maintenance. Training was carried out by Ricardo-AEA in February 2013.

### Calibration procedures

The three ML 9841 B NO<sub>x</sub> analysers (located at Queen Street, Glasgow Road and Salamander Street) perform an auto-calibration each day with zero air and NO gas. Warning limits are set at +/- 5 % on the software program.

All other sites including those listed above are visited fortnightly, apart from the National Network site AURN which is visited monthly, and manual calibration checks are carried out using certified NO gas at approximately 500ppb plus a zero check. All cylinders are replaced at 12 - 18 month intervals. Nitric Oxide cylinders were supplied by Air Liquide UK prior to September 2012 and thereafter, by BOC.

Details of manual calibration checks and precision and accuracy of instruments can be made available on request.

### **Servicing**

All instruments are serviced and recalibrated every six months by the appropriate supplier. The service contracts include a support package for software and replacement parts, plus any necessary call outs to the sites.

The TEOM heads on the automatic PM<sub>10</sub> units are cleaned monthly and filters are changed regularly - approximately every 2 weeks.

During all visits to the monitoring stations, actions which are taken and activities adjacent to the site, are recorded in the site log book.

### **A7 QA/QC of Diffusion Tube Monitoring**

Sampling staff at Scientific Services Laboratory, City of Edinburgh Council are trained to fulfil the requirements associated with passive diffusion tube samplers. The tubes are also supplied and analysed by the laboratory. It is UKAS accredited for this task and participates in the Workshop Analysis Scheme for Proficiency (WASP) inter laboratory QC/QA. The laboratories performance was rated as being satisfactory over the rolling five rounds prior to the end of 2013, with 95% of results  $\leq \pm 2$ .

NO<sub>2</sub> diffusion tube monitoring is conducted in accordance with the quality requirements contained in the UK NO<sub>2</sub> Survey Instruction Manual for local/unitary authorities and Government Guidance Document LAQM.TG (09). The kerbside diffusion tubes are located within 1 metre of the edge of the kerb, roadside locations are greater than 1 metre from the road edge or at the façade of residential property. The tubes are attached to sign posts/lampposts using plastic spacer holders at a height of approximately 2.0m above ground level.

Three diffusion tubes from each monthly batch are used as blanks. These tubes are not exposed and are stored in the refrigerator during the exposure period. They are analysed along with the appropriate batch of exposed tubes. The purpose of blanks is to determine whether or not NO<sub>2</sub> contamination occurred during tube preparation.

All passive diffusion tube monitoring data shown in this report has been corrected for diffusion tube bias in accordance with LAQM TG (09). The monthly exposed passive diffusion tubes in Edinburgh over read real-time analysers. Pre-2011 this was by a factor range of 0.85 to 0.91, which were derived from local co-location studies. There was then a step change in the studies, so to achieve worse-case scenario the bias adjustment factor was calculated from a combination of national and local studies. In 2011, 2012 and 2013 the factors were 0.81, 0.76 and 0.75 respectively.

## Appendix B: Raw Passive Diffusion Tube Data 2013

Data highlighted in bold red was excluded from the annual set due to very low or extremely high values that were not in keeping with the monitoring location nor related to pollution episodes.

See notes at the end of this section for an explanation of the abbreviated letters.

	Site ID	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean	Corrected
<b>NORTH</b>															
Bernard Street	29	55.6	50.4	44.4	41.5	38.3	40.7	48.3	47.3	44.7	46.9	60.3	49.6	<b>47.3</b>	
Bernard Street/KC	29a	63.5	59.2	48.7	43.7	44.3	52.5	47.5	<b>M</b>	42.3	55.2	54.3	42.8	<b>50.4</b>	
Bernard Street/KC	29a	62.7	59.0	63.8	58.4	40.2	46.3	43.9	38.9	41.1	59.4	51.9	41.1	<b>50.6</b>	
Bernard Street 32	29b	49.6	51.3	41.8	39.8	33.7	35.2	37.6	36.4	36.4	45.5	48.3	34.2	<b>40.8</b>	
Bernard Street/PS	29c	68.4	56.0	50.9	51.1	46.9	50.8	52.3	55.6	51.4	65.1	62.8	52.3	<b>55.3</b>	
Bernard Street/PS	29c	62.4	66.4	51.9	55.6	48.3	51.3	50.2	49.5	54.1	60.2	69.7	49.7	<b>55.8</b>	
Commercial St	7	51.2	<b>M</b>	38.1	34.4	34.7	31.0	37.4	35.8	35.0	40.8	50.9	45.4	<b>39.5</b>	
Commercial St	9	49.4	44.7	55.1	48.0	<b>M</b>	46.1	36.8	33.5	35.2	45.2	45.7	35.4	<b>43.2</b>	
Commercial St	9a	61.5	47.5	53.6	46.3	53.3	53.6	<b>M</b>	54.4	46.5	59.6	58.7	59.5	<b>54.0</b>	
Ferry Road 268	52	57.8	37.0	41.0	41.9	33.7	45.3	47.2	39.1	37.3	37.6	52.5	39.9	<b>42.5</b>	
Ferry Rd/Bowhill	53	58.3	37.2	38.4	35.8	43.7	38.9	50.6	50.1	50.7	39.4	68.4	56.0	<b>47.3</b>	
Ferry Rd/Maderia	45b	40.3	42.8	40.4	35.1	28.3	35.1	35.3	30.6	34.1	33.8	43.0	32.2	<b>35.9</b>	
Ferry Rd 128	45	<b>M</b>	45.6	51.6	51.0	32.5	44.8	47.0	34.4	35.2	42.8	44.8	32.6	<b>42.0</b>	
Ferry Rd	45d	<b>M</b>	49.6	35.8	41.6	44.3	37.3	43.4	47.3	47.8	48.6	58.5	49.3	<b>45.8</b>	
Great Junction St	30b	54.8	54.4	47.6	44.5	43.0	41.7	47.8	51.4	51.0	47.8	54.8	41.5	<b>48.4</b>	
Great Junction St	30c	57.0	63.2	<b>M</b>	55.9	41.4	59.7	53.7	<b>M</b>	42.0	60.0	51.6	34.6	<b>51.9</b>	
Great Junction St	30d	55.6	60.9	58.7	47.0	36.9	46.1	43.0	41.7	39.7	50.7	41.5	29.3	<b>45.9</b>	
Great Junction St	30e	58.7	58.2	56.4	<b>M</b>	40.6	<b>M</b>	51.9	<b>M</b>	47.9	<b>M</b>	53.5	43.2	<b>N/A</b>	<b>47.4<sup>a</sup></b>
Great Junction St	30	66.4	59.9	60.4	49.3	39.1	59.6	57.1	51.9	45.7	67.8	48.7	40.1	<b>53.8</b>	
Great Junction St	30	58.7	65.9	71.4	64.6	44.6	61.4	58.7	46.5	46.7	69.7	46.5	32.6	<b>55.6</b>	
Inverleith Row	55	54.7	61.9	51.7	52.9	49.5	56.3	63.2	60.3	56.6	58.3	65.2	57.3	<b>57.3</b>	

	Site ID	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean	Corrected
Inverleith Row	55	63.9	61.7	47.1	54.0	49.9	56.1	62.1	54.4	57.5	52.7	66.1	60.5	57.2	
Inverleith Row	55c	55.2	43.3	52.2	53.6	34.1	48.6	39.2	32.8	30.9	47.0	38.6	24.9	41.7	
North Junction St	9c	M	M	M	M	M	M	M	32.5	34.6	M	44.9	M	N/A	
Ocean Drive/Leith	9b	45.4	42.4	39.5	35.5	32.4	32.2	40.5	36.6	32.0	38.5	47.6	M	38.4	
Salamander St	51c	55.8	50.7	38.4	36.7	36.1	32.5	M	41.3	45.9	38.3	64.3	49.7	44.5	
Salamander St	51b	54.4	59.7	44.3	54.5	33.9	52.3	50.7	44.1	36.1	48.4	49.9	30.6	46.6	
Trinity Crescent	14	43.9	35.6	43.6	36.2	32.4	33.1	33.6	37.2	38.8	35.5	47.6	46.1	38.6	
<b>EAST</b>															
Baileyfield Road	19	35.2	33.7	28.9	15.7	22.1	25.2	22.5	27.0	21.5	27.0	31.5	28.9	26.6	
Dalkeith Road 187	31	50.7	50.5	52.2	47.6	34.6	40.9	37.4	34.4	34.3	43.2	32.6	23.1	40.1	
Easter Road	25	72.4	58.8	70.9	M	42.0	52.3	56.2	47.3	43.8	64.6	51.6	47.1	55.2	
Easter Road	25b	57.9	52.1	50.3	46.2	34.6	40.8	45.3	M	33.3	49.3	M	M	45.5	
Easter Road 105/109	25c	60.2	52.8	43.2	35.7	41.1	35.4	43.2	46.0	42.3	74.6	74.6	M	49.9	
Easter Road	25d	52.2	50.3	INV	35.7	31.5	41.6	39.7	37.0	36.9	43.3	39.4	31.1	N/A	39.9 <sup>b</sup>
Easter Road 198	25e	49.0	40.0	43.7	36.0	28.5	39.3	32.5	33.4	29.4	41.4	34.4	30.2	36.5	
Easter Road 217	25f	45.0	42.7	M	22.3	26.5	29.5	28.5	M	32.8	31.7	M	33.2	32.5	
Easter Road 327	25g	42.7	41.6	35.5	28.4	25.6	28.7	30.6	33.4	M	36.2	42.6	31.2	34.2	
London Rd	46b	50.0	51.3	46.5	41.9	29.7	36.5	37.6	33.5	32.0	45.8	43.1	37.1	40.4	
London Rd	81	68.0	67.0	45.0	55.1	45.4	M	54.3	61.5	57.4	73.9	64.6	58.1	59.1	
London Rd	67	63.5	72.2	55.7	70.4	50.6	63.0	72.1	56.3	60.8	61.4	64.6	41.1	61.0	
London Rd	68	36.6	51.0	45.2	40.1	25.4	42.6	38.2	42.5	39.2	36.1	42.6	28.9	39.0	
London Rd	69	60.2	60.5	52.6	49.9	43.0	52.7	53.9	56.1	48.7	55.0	62.2	47.7	53.5	
London Rd	70	55.0	61.3	51.4	245	71.8	102	46.9	49.7	44.4	44.3	53.7	61.1	N/A	58.3 <sup>b</sup>
London Rd	66	46.5	M	54.8	45.3	35.7	47.9	47.3	40.7	36.6	51.5	41.7	INV	N/A	44.8 <sup>b</sup>
London Rd	46	52.3	61.5	57.5	48.3	37.7	46.9	<1.0	119	50.3	54.5	53.4	38.2	N/A	50.1 <sup>b</sup>
Niddrie Mains Rd	32	60.7	58.2	47.9	40.6	36.1	42.9	44.2	49.2	44.5	43.6	58.4	43.4	47.5	
Piersfield Terrace	82	42.6	45.8	48.0	34.2	23.8	34.3	27.7	32.2	25.0	34.1	37.8	24.7	34.2	

	Site ID	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean	Corrected
Portobello High St	73b	51.5	40.2	33.5	30.5	24.8	29.9	34.4	39.2	36.4	35.3	50.0	37.4	36.9	
Portobello High St	71	58.7	49.6	40.0	38.2	38.9	37.5	38.6	43.4	44.0	43.0	52.6	43.1	44.0	
Portobello Road	73a	62.5	64	56.0	39.9	44.6	45.9	49.7	57.7	45.2	55.5	55.1	55.8	52.7	
Portobello Rd	73d	64.5	57	54.3	53.8	41.0	45.3	42.8	47.2	40.9	59.1	54.9	47.9	50.7	
Portobello Rd	73e	68.1	62.7	57.0	52.2	37.3	42.9	M	46.4	37.0	55.2	46.1	37.2	49.3	
Portobello Rd	73f	36.6	28.6	30.1	21.5	23.4	25.6	23.6	26.0	20.4	27.3	26.2	20.8	25.8	
Portobello Rd	73g	45.4	48.6	55.1	37.6	33.0	40.3	41.4	38.9	34.0	55.7	M	25.0	41.4	
Seafield Road East	72	53.2	55.1	70.5	62.4	34.4	48.4	45.6	37.5	37.0	56.9	41.2	31.0	47.8	
Seafield Road East	72a	M	53.1	71.5	57.4	38.2	48.3	47.1	42.0	39.9	54.2	35.2	29.4	46.9	
<b>CITY CENTRE - NORTH</b>															
Broughton Road	43	69.3	52.9	54.8	48.7	31.8	45.5	40.8	45.1	41.2	50.2	57.1	51.8	49.1	
Broughton Street	44	49.6	49.8	47.2	48.5	31.5	42.9	39.2	35.5	33.4	42.7	43.4	38.6	41.9	
Deanhaugh Street	13	54.8	64.4	42.1	43.2	39.8	INV	38.9	39.7	M	43.5	M	39.5	N/A	45.1 <sup>b</sup>
Dundas Street	35	56.3	53.7	51.9	37.5	35.8	34.5	36.6	M	35.9	45.0	52.7	M	44.0	
George Street 112	74f	57.7	47.3	52.8	51.3	39.8	45.6	47.0	38.3	41.9	47.2	41.5	39.2	45.8	
George Street	74e	39.9	68.4	64.4	42.5	49.5	53.7	56.8	47.8	M	M	M	M	N/A	49.9 <sup>a</sup>
Gt Stuart Street 7	75b	55.5	50.8	46.6	27.8	34.1	35.9	40.1	46.2	40.6	42.8	61.6	43.2	43.8	
Gt Stuart Street 14	75f	43.3	40.5	43.5	36.8	22.8	30.2	28.3	29.5	28.4	41.0	35.5	30.4	34.2	
Gt Stuart Street 9	75e	39.8	36.7	37.5	30.9	26.5	29.5	26.7	30.4	29.5	33.4	38.1	29.5	32.4	
Hamilton Place 72	143	53.4	59.7	57.9	49.0	27.0	31.9	27.0	29.2	31.3	39.6	51.9	41.4	41.6	
Hamilton Place	143a	62.1	53.4	52.7	38.5	28.1	40.8	39.0	37.4	40.9	56.4	51.8	42.1	45.3	
India Street	34	43.2	29.1	35.0	28.3	20.9	21.3	18.2	19.3	22.2	30.1	34.6	29.7	27.7	
Inverleith Row	55b	52.6	47.2	32.9	32.4	35.0	32.6	37.0	40.1	39.2	37.6	52.6	45.8	40.4	
Leith Walk	21	54.1	56.8	49.0	38.9	37.0	42.1	M	44.1	45.5	52.1	53.9	57.1	48.2	
Leith Walk	20	48.2	55.7	47.1	33.4	31.5	43.2	45.1	35.9	42.5	50.8	52.1	49.7	44.6	
Princes Street	47	50.5	64.7	68.0	57.5	44.1	58.2	50.0	51.7	51.9	66.0	53.1	40.6	54.7	
Princes Street	24	85.3	69.6	80.1	64.0	73.1	81.6	82.0	96.3	82.4	M	84.9	79.8	79.9	



	Site ID	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean	Corrected
Queen Street	33	65.2	56.5	52.0	43.6	39.7	40.7	M	M	M	M	59.5	55.9	N/A	46.4 <sup>a</sup>
St Colme Street	75a	78.9	58.9	61.2	53.0	48.6	M	M	54.2	56.7	68.1	50.8	35.7	56.6	
St Colme Street	75d	62.2	50.0	44.5	42.5	33.3	44.3	42.0	37.8	32.2	47.9	38.9	25.4	41.8	
York Place	36	46.4	40.5	39.1	28.5	29.4	30.4	34.8	35.3	38.8	48.4	52.6	41.4	38.8	
<b>CITY CENTRE - SOUTH</b>															
Clerk Street 15	138	59.1	M	43.9	41.3	53.8	53.8	M	59.2	M	M	M	46.1	N/A	51.2 <sup>a</sup>
Cowgate/Guthrie St	48	53.5	54.1	49.3	53.9	46.2	49.8	50.3	49.0	42.4	50.4	62.0	41.5	50.2	
Cowgate/Blair Street	48a	48.9	M	M	50.4	44.0	52.6	M	46.0	38.3	53.0	47.6	36.6	46.4	
Cowgate 301	48b	51.3	45.6	45.9	38.1	35.2	37.6	35.8	43.3	38.0	39.7	36.0	38.2	40.4	
Cowgate/Blackfriars	48c	46.0	64.4	49.4	53.8	53.0	56.5	57.7	M	54.5	50.7	67.6	M	55.4	
Cowgatehead 2	48e	50.1	M	M	54.7	48.9	M	54.6	M	51.0	M	55.2	41.2	N/A	52.3 <sup>a</sup>
Dundee Street	79d	65.0	M	55.9	59.0	55.5	60.8	M	65.9	62.7	62.5	66.3	54.2	60.8	
Fountainbridge 103	79a	56.9	54.4	59.4	53.0	44.1	51.2	48.5	M	44.5	INV	43.7	32.5	N/A	48.8 <sup>b</sup>
Fountainbridge	79b	41.6	44.4	48.6	34.3	32.8	40.4	39.0	32.9	M	35.4	41.2	25.3	37.8	
Fountainbridge	79	54.7	59.7	49.5	54.2	43.2	48.2	46.5	48.6	39.9	52.5	44.2	40.7	48.5	
Grassmarket/PS	37	M	M	40.2	40.7	M	M	M	M	M	50.2	56.6	M	N/A	
Grassmarket 41	37a	54.0	60.0	67.9	54.8	43.3	48.0	47.6	52.2	54.9	96.6	70.0	60.5	59.2	
Grassmarket 41	37a	58.5	64.6	70.2	56.6	47.5	53.1	56.7	51.1	41.5	89.9	54.5	44.5	57.4	
Grassmarket 75	37b	47.2	53.7	58.4	56.3	41.6	45.7	48.1	49.5	37.4	52.8	52.9	40.2	48.7	
Grassmarket	37c	33.2	39.9	40.7	37.6	33.3	36.6	36.7	31.6	31.9	37.5	37.5	30.4	35.6	
Home Street	10	42.7	M	45.6	45.3	35.4	43.3	42.3	40.3	38.5	42.3	40.4	33.5	40.9	
Hope Park Terr	17a	47.7	59.4	48.7	52.6	45.3	51.2	54.1	51.8	45.4	47.6	55.0	36.0	49.6	
Hope Park Terr	17a	48.9	60.7	46.4	46.1	42.7	50.1	53.8	46.3	44.3	48.2	46.4	37.3	47.6	
Hope Park Terr	139	39.3	47.5	39.4	42.5	33.3	44.8	41.7	43.0	38.6	42.0	39.6	27.0	39.9	
Hope Park Terr	140	68.5	61.2	54.6	46.2	43.0	46.7	42.2	53.8	39.2	50.1	56.4	41.9	50.3	
Melville Drive	38	34.0	43.8	33.3	21.7	32.7	33.4	35.7	40.8	M	30.3	46.6	M	35.2	
Midmar Drive	42	23.4	25.7	24.4	17.6	17.0	21.3	17.6	18.8	17.4	17.7	M	15.1	19.6	

	Site ID	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean	Corrected
Morningside Road	8	M	M	38.9	37.7	28.9	36.6	32.1	35.3	31.6	33.4	M	30.7	33.9	
Morrison Street	49	68.6	63.1	82.1	66.7	51.5	67.5	66.2	49.5	55.3	63.9	75.2	39.5	62.4	
Nicholson Street 124	137	M	M	66.4	60.0	M	M	M	M	M	M	M	27.5	N/A	
Nicholson Street 69	135	58.3	65.1	54.1	50.2	53.5	58.3	65.5	73.1	59.4	62.1	69.0	52.6	60.1	
Nicholson Street 92	136	62.7	61.3	65.3	63.1	43.7	32.6	52.7	51.7	45.6	59.0	49.8	34.8	51.9	
North Bridge South	27	64.3	58.2	81.2	73.9	52.0	69.7	71.8	M	47.0	73.2	53.0	48.5	63.0	
South Bridge 59	144	61.9	62.6	59.1	62.8	56.3	68.3	62.0	65.0	59.0	69.4	58.1	48.0	61.0	
South Clerk Street	142	62.7	M	57.2	58.3	50.4	50.4	50.5	49.3	46.9	60.3	52.9	41.7	52.8	
South Clerk Street	141	19.8	65.6	54.9	47.1	48.1	54.0	49.1	59.3	54.3	63.7	57.3	47.9	N/A	54.7 <sup>b</sup>
Torphichen Place	3	78.3	80.9	62.7	41.8	58.9	64.3	72.5	65.9	M	66.5	M	52.3	64.4	
Torphichen Street	3a	49.7	50.6	32.5	45.2	37.6	43.6	40.2	45.1	40.1	44.7	41.3	37.5	42.3	
West Maitland St	2	53.7	M	M	46.1	M	M	50.3	49.6	M	M	112	88.0	N/A	
West Maitland St	2	55.2	M	M	47.9	M	M	50.5	48.6	M	M	127	82.7	N/A	
West Port 62	28b	81.7	89.7	88.0	M	M	81.8	M	M	M	76.1	85.6	72.5	N/A	69.4 <sup>a</sup>
West Port	28c	47.0	M	58.8	56.1	M	52.8	55.3	M	49.4	51.9	52.1	41.2	51.6	
West Port 42	28d	M	96.9	70.5	73.4	M	72.9	74.6	82.2	71.7	INV	88.1	63.3	N/A	77.1 <sup>b</sup>
<b>WEST</b>															
Glasgow Road	56	54.7	55.4	50.1	44.1	37.5	40.6	39.9	35.3	39.4	M	49.9	33.7	43.7	
Glasgow Road 158	57	58.5	65.3	56.8	53.5	50.1	45.0	40.0	52.3	M	47.4	6.3	51.7	N/A	52.1 <sup>b</sup>
Glasgow Road 68	16	69.9	61.9	80.8	58.0	42.9	64.1	62.5	64.3	41.9	65.2	65.7	41.2	59.9	
Glasgow Road 68	16a	62.7	M	63.7	48.8	44.9	56.7	M	54.1	39.9	57.1	41.8	32.4	50.2	
Glasgow Road	58	76.0	73.4	65.7	70.8	66.7	74.7	64.4	82.7	72.9	64.3	85.3	80.4	73.1	
Glasgow Road	58	82.4	65.2	65.4	62.8	66.1	69.8	66.5	81.1	65.8	63.7	81.2	61.7	69.3	
Glasgow Road	15	59.5	54.5	47.7	56.7	52.7	47.6	55.8	57.0	47.8	47.1	71.6	64.5	55.2	
Hillhouse Road 118	40f	52.3	59.4	49.5	47.7	39.2	52.7	31.2	40.9	38.9	49.3	40.2	25.6	43.9	
Hillhouse Road 240	40c	51.3	43.5	47.7	40.4	29.1	42.2	34.4	34.6	29.8	M	33.9	23.0	37.3	
Hillhouse Road	40a	42.7	33.6	27.7	31.3	28.9	28.0	29.2	32.0	30.9	31.9	44.2	35.9	33.0	

	Site ID	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean	Corrected
Hillhouse Road	40b	55.8	47.3	42.9	46.6	31.0	40.7	36.7	40.3	36.4	43.0	36.2	33.4	40.9	
Hillhouse Road	40e	44.6	35	34.2	35.7	34.4	36.8	32.4	34.5	37.1	36.1	37.5	37.3	36.3	
Hillhouse Road	40d	53.3	58.5	41.5	40.8	39.9	37.7	40.0	42.0	42.0	39.5	48.4	43.2	43.9	
Hillview Terrace	41	30.3	26.4	27.3	25.5	16.6	21.9	20.1	20.6	20.2	25.7	27.2	17.8	23.3	
Maybury Road	61	50.3	47.1	45.3	42.7	32.4	45.8	40.5	40.1	40.5	38.9	39.8	31.8	41.3	
Queensferry Rd	40	63.7	60.7	56.3	51.0	1.7	M	40.0	38.0	41.9	47.6	50.9	39.8	N/A	49.0 <sup>b</sup>
Queensferry Rd 544	63	38.7	42.2	36.1	30.2	29.2	29.5	30.4	34.2	32.1	28.0	48.0	35.2	34.5	
Queensferry Rd 550	64	96.8	90.1	70.4	74.6	M	114	102	101	99.0	82.8	100	78.8	91.8	
Queensferry Rd 552	64a	47.2	50.4	40.6	34.2	33.2	32.8	35.0	37.8	32.8	36.0	34.7	30.5	37.1	
Queensferry Rd 561	62	37.7	33.6	35.3	31.8	20.1	29.0	28.4	24.7	23.7	29.7	23.9	18.8	28.1	
Roseburn Terrace	23	70.4	69.4	M	M	M	64.5	54.5	INV	46.1	71.7	52.7	36.5	N/A	54.9 <sup>a</sup>
St John's Road SB	1	64.6	76.8	66.6	58.6	43.2	61.1	58.1	49.1	36.4	66.5	49.3	35.0	55.4	
St John's Road IR	1b	66.8	65.7	61.9	60.2	41.7	50.5	48.3	49.9	42.4	63.6	55.3	41.5	54.0	
St John's Road 131	1d	66.7	81.9	61.2	61.5	65.5	65.4	66.1	73.2	62.2	65.4	84.6	71.3	68.8	
St John's Rd	39	55.8	59.0	46.3	50.8	49.1	52.8	52.7	55.0	M	49.7	54.3	49.5	52.3	
WhitehouseRd	50a	52.0	59.8	45.3	26.8	33.4	36.2	36.2	35.8	35.5	35.3	41.3	33.5	39.3	
<b>SOUTH WEST</b>															
Angle Park Terr	76	67.4	72.8	47.5	65.6	49.0	55.6	52.3	53.5	44.5	40.5	49.5	14.5	N/A	54.4 <sup>b</sup>
Angle Park Terr	76c	45.2	50.8	44.0	38.7	38.3	40.1	41.2	40.7	41.6	40.5	48.3	39.3	42.4	
Angle Park Terr	76b	65.7	73.2	63.2	62.4	54.7	55.7	54.9	58.7	53.3	67.7	63.2	62.1	61.2	
Ardmillan Terrace 22	76a	51.3	45.5	48.7	39.4	30.4	37.9	36.8	35.1	34.1	42.3	44.5	31.0	39.8	
Balgreen Rd/School	80d	55.5	57.3	49.5	35.3	38.3	40.4	40.6	49.0	50.5	44.5	66.6	47.5	47.9	
Balgreen Rd/Library	80e	57.2	59.1	51.3	38.2	43.8	44.8	45.0	44.1	M	47.4	62.6	43.0	48.8	
Calder Road	4	47.9	49.7	56.6	48.6	43.1	49.7	49.2	48.7	43.6	54.0	39.6	31.3	46.8	
Gorgie Road 87	80c	61.4	63.6	49.1	52.9	45.6	49.2	M	46.9	50.2	52.5	60.9	52.4	53.2	
Gorgie Road 549	80b	50.5	45.8	55.0	48.8	34.9	45.8	47.6	40.0	M	M	45.1	37.0	45.1	
Gorgie Road	80a	54.0	47.8	51.4	56.1	37.5	39.2	40.1	38.0	37.9	48.4	52.6	31.2	44.5	

	Site ID	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean	Corrected
<b>Gorgie Road 8</b>	<b>18</b>	62.0	77.1	68.2	63.8	45.1	62.5	61.6	52.2	52.6	64.5	62.0	43.1	<b>59.6</b>	
<b>Gorgie Road 8</b>	<b>18</b>	65.1	73.9	67.0	56.5	39.3	63.7	68.1	55.7	60.3	63.1	65.0	34.9	<b>59.4</b>	
<b>Gorgie Road</b>	<b>80</b>	72.5	71.9	67.1	67.6	46.9	56.1	55.7	51.5	52.6	64.5	62.8	41.1	<b>59.2</b>	
<b>Gorgie Road</b>	<b>5</b>	75.1	73.7	63.3	62.3	55.6	60.7	69.2	57.0	70.8	69.4	75.5	43.0	<b>64.6</b>	
<b>Henderson Terrace</b>	<b>76d</b>	39.4	57.2	50.1	<b>M</b>	42.1	45.9	46.1	49.2	43.8	47.5	55.1	32.9	<b>46.3</b>	
<b>Lanark Road 610</b>	<b>11</b>	39.2	35.0	32.2	30.9	29.5	33.8	30.1	28.8	27.0	32.1	32.1	20.6	<b>30.9</b>	
<b>Slateford Road 51</b>	<b>77a</b>	62.0	46.9	59.1	59.6	44.8	43.3	42.5	43.6	44.4	54.0	47.1	44.8	<b>49.3</b>	
<b>Slateford Road 93/95</b>	<b>77b</b>	61.5	64.2	65.6	62.3	45.1	52.6	50.5	53.4	46.9	55.6	55.9	50.3	<b>55.3</b>	
<b>Slateford Road 97</b>	<b>77</b>	65.0	67.6	64.9	61.2	44.4	52.0	49.7	47.4	43.5	62.0	46.9	36.8	<b>53.5</b>	
<b>Slateford Road</b>	<b>78</b>	54.1	48.8	49.7	42.0	30.6	<b>M</b>	34.1	34.6	30.3	41.5	37.6	<b>M</b>	<b>40.3</b>	

### Notes for raw data

a Data corrected - estimation of annual mean concentrations from short term monitoring

b Data corrected having regard to outliers or problematic data

M – Tube missing on collection

N/A – Data not used

Figures in bold red – Problematic data not used

INV – Tube inverted on collection; any data not used

## Appendix C: Passive Diffusion Tube Distance Correction Calculations

SITE NO.	1	3	4	5	8	9a	11	13	14
Step 1 How far from kerb was measurement made (m)	0.54	0.73	1.6	0.3	0.7	1.47	1.5	2.7	2
Step 2 How far from kerb is receptor in metres (m)	2.34	2.28	26.6	5.2	3.5	5.37	5.2	7.8	6
Step 3 Local background concentration of NO <sub>2</sub>	22.0	22*	27.4	31.7	24.3	24.2	19.0	22*	20.3
Step 4 Annual mean bias corrected value	41.6	48.3	35.1	48.5	25.4	40.5	23.2	33.8	29
<b>Result; Predicted annual mean at receptor</b>	36.4	42.6	30.3	40.7	25.1	35.9	22.1	30.6	26.8
SITE NO.	15	16	19	21	23	24	31	32	33
Step 1 How far from kerb was measurement made (m)	4	1.8	4.1	1.16	0.23	1	1.8	2.6	4.2
Step 2 How far from kerb is receptor in metres (m)	7.8	5.2	7.6	4.56	2.53	11.2	6.7	7.3	6.45
Step 3 Local background concentration of NO <sub>2</sub>	26.7	24.6	21.8	28.6	22*	22*	21.9	19.4	22*
Step 4 Annual mean bias corrected value	41.4	44.9	20	36.2	41.2	59.9	30.1	35.6	34.8
<b>Result; Predicted annual mean at receptor</b>	38.7	40.0	n/a	34.0	34.8	41.4	27.6	31.4	33.2
SITE NO.	35	36	38	39	40b	40f	47	49	50a
Step 1 How far from kerb was measurement made (m)	2.4	5.5	2.8	1.6	2.1	2.6	9	2.2	3.5
Step 2 How far from kerb is receptor in metres (m)	7.7	8.2	12.8	5.65	7	5.17	2.5	4.6	5.07
Step 3 Local background concentration of NO <sub>2</sub>	22*	22*	25.6	22.5	19.3	21.6	22*	22*	15.2
Step 4 Annual mean bias corrected value	33	29.1	26.4	39.2	30.6	32.9	41	46.8	29.4
<b>Result; Predicted annual mean at receptor</b>	29.9	28.2	26.1	34.5	27.4	31	49.8	42.4	28

\* Measured background data used (from St Leonard's AURN monitoring station).

SITE NO.	52	53	55c	56	57	58	58	61	64
Step 1 How far from kerb was measurement made (m)	1.65	4.6	4.28	2.57	3.6	2.8	2.8	2.8	1.49
Step 2 How far from kerb is receptor in metres (m)	6.25	6.17	5.34	7.17	12.1	8	8	15.3	10.69
Step 3 Local background concentration of NO <sub>2</sub>	20.3	20.3	21.4	22.5	21.5	26.7	26.7	17.6	17.6
Step 4 Annual mean bias corrected value	31.9	35.5	31.3	32.8	39	54.8	52	31	68.8
<b>Result; Predicted annual mean at receptor</b>	28.4	34.2	30.7	30.2	33.2	47.3	45.2	25.2	46.7

SITE NO.	73a	73e	73g	74e	75a	75b	80e	140
Step 1 How far from kerb was measurement made (m)								
Step 2 How far from kerb is receptor in metres (m)	2.8	2.5	4.5	0.3	0.6	2.5	2	1.3
Step 3 Local background concentration of NO <sub>2</sub>	4.78	4.5	12.9	5.5	5.7	8.6	3.3	4.8
Step 4 Annual mean bias corrected value	21.5	21.5	21.5	22*	22*	22*	31.1	26.2
<b>Result; Predicted annual mean at receptor</b>	39.5	37	31	37.4	42.5	32.8	36.6	37.7
	37.1	34.7	28.1	30.1	34.1	29.5	36	34.5

\* Measured background data used (from St Leonard's AURN monitoring station).

## Appendix D: Passive Diffusion Tube data used in trend analysis

Data which was used to establish the trend of concentration of nitrogen dioxide at passive diffusion tube sites within the AQMAs.

		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Bias	0.91	0.89	0.89	0.87	0.9	0.88	0.86	0.85	0.81	0.76	0.75
Site ID	Site Name											
1	St John's Rd	46	45	52	57	54	50	43	47	39	43	42
1b	St John's Rd	-	41	59	51	51	49	44	44	38	44	41
1d	St John's Rd	-	66	79	80	82	76	58	59	56	52	52
2	West Maitland St	78	77	85	96	104	97	57	73	75	50	-
3	Torphichen Place	63	72	87	77	87	67	65	64	63	54	48
18	Gorgie Road	46	43	43	48	47	52	45	55	48	49	45
21	Leith Walk/Brunswick Rd	41	39	38	42	47	44	40	41	36	39	36
23	Roseburn Terrace	47	40	49	52	70	67	48	58	41	45	41
24	Princes Street	84	85	84	87	93	79	46	73	-	50	60
27	North Bridge	58	54	49	52	56	52	48	49	49	52	47
36	York Place	44	42	46	44	52	54	38	41	37	43	29
30	Great Junction Street	40	43	39	43	49	45	44	42	39	38	41
28b	West Port	-	-	-	68	65	73	67	62	57	61	<i>52</i>
	<b>Average</b>	<b>54</b>	<b>53</b>	<b>58</b>	<b>60</b>	<b>65</b>	<b>61</b>	<b>50</b>	<b>55</b>	<b>48</b>	<b>48</b>	<b>45</b>

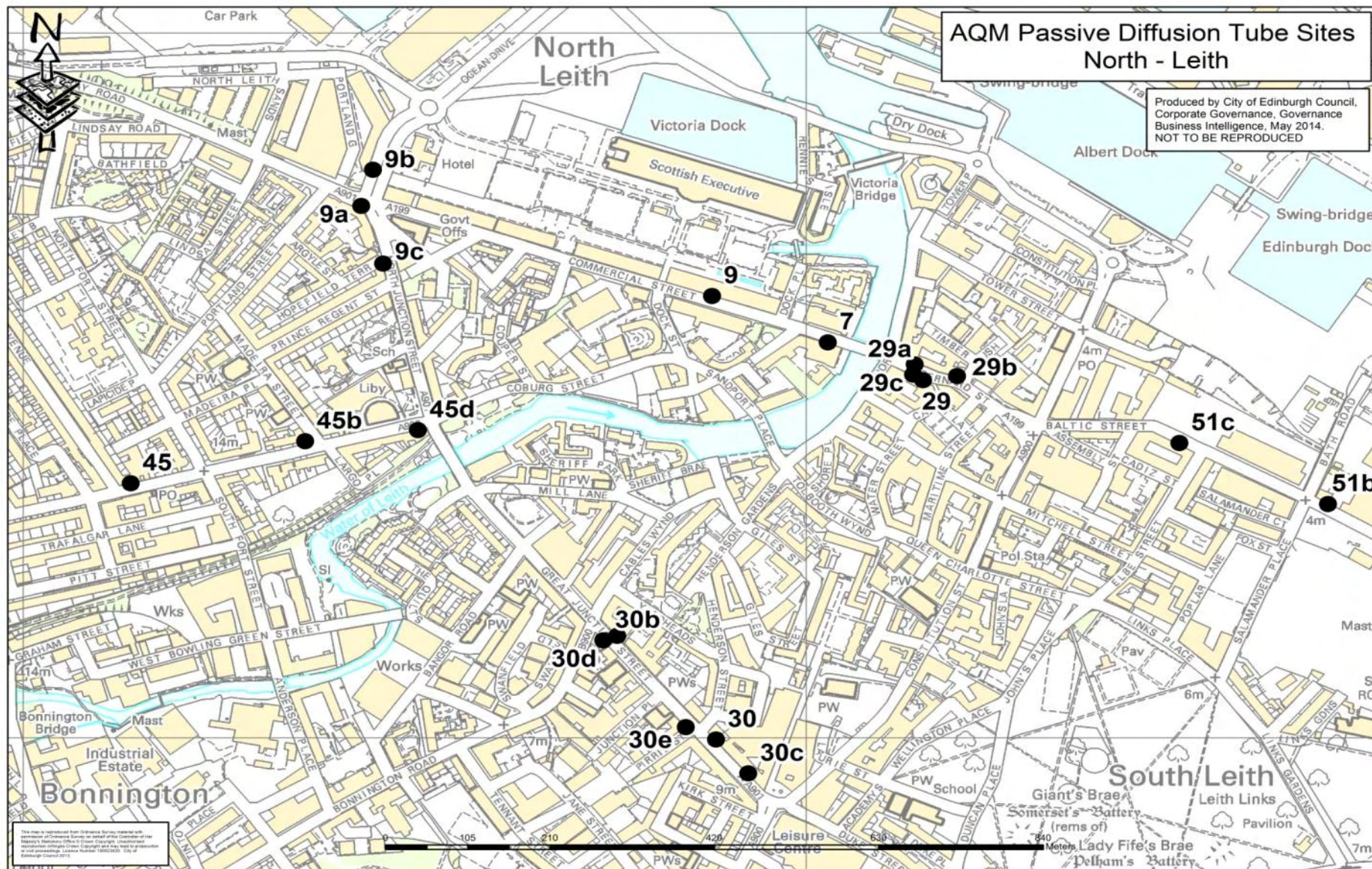
Note, from 2013 *italics* show data that had poor data capture and therefore results were annualised following Technical Guidance 09.

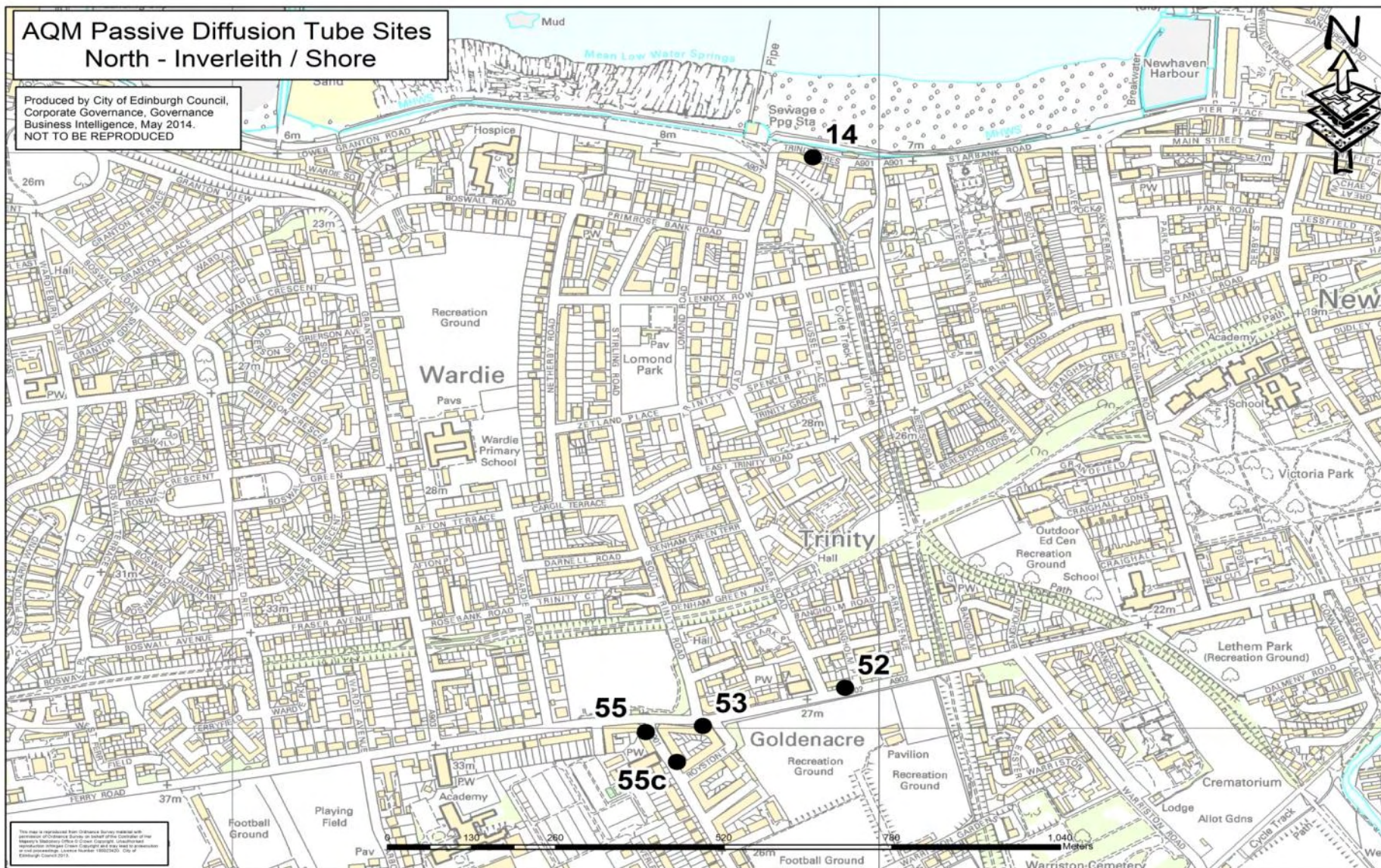
## **Appendix E: Maps of Air Quality Monitoring (AQM) Passive Diffusion Tube Sites**

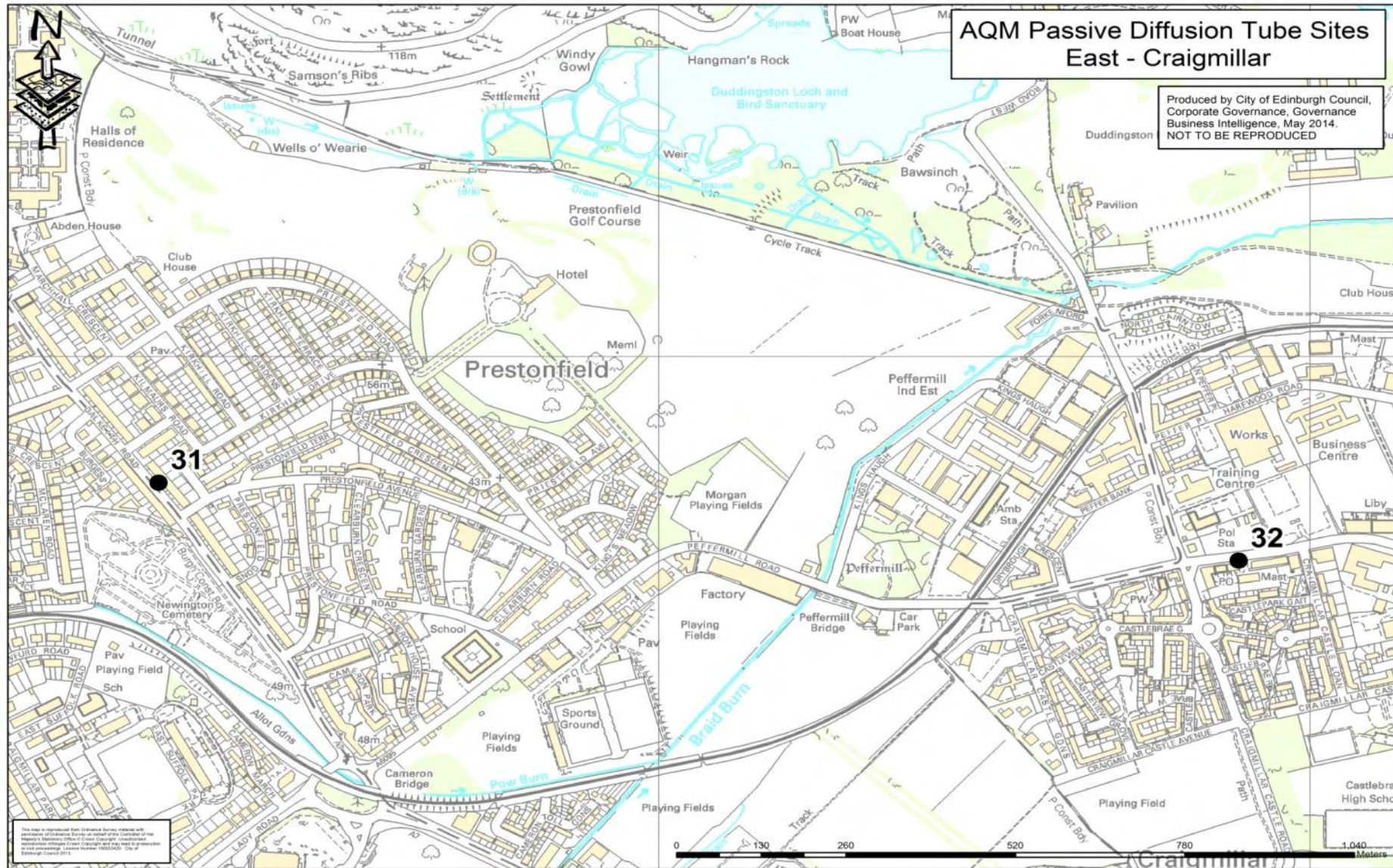
Maps of passive diffusion tubes are presented in the following six geographical areas of the city. Further details are stipulated in Table 2.2 within main report.

- North
  - Leith
  - Inverleith / Shore
  
- East
  - Craigmillar
  - Easter Road / London Road
  - Portobello
  
- City Centre North
  
- City Centre South
  - Centre
  - Morningside
  
- West
  - Barnton junction / Queensferry Road
  - Queensferry Road / Hillhouse Road
  - St John's Road and Newbridge (insert)
  
- South West
  - Slateford / Gorgie
  - Lanark & Calder Road



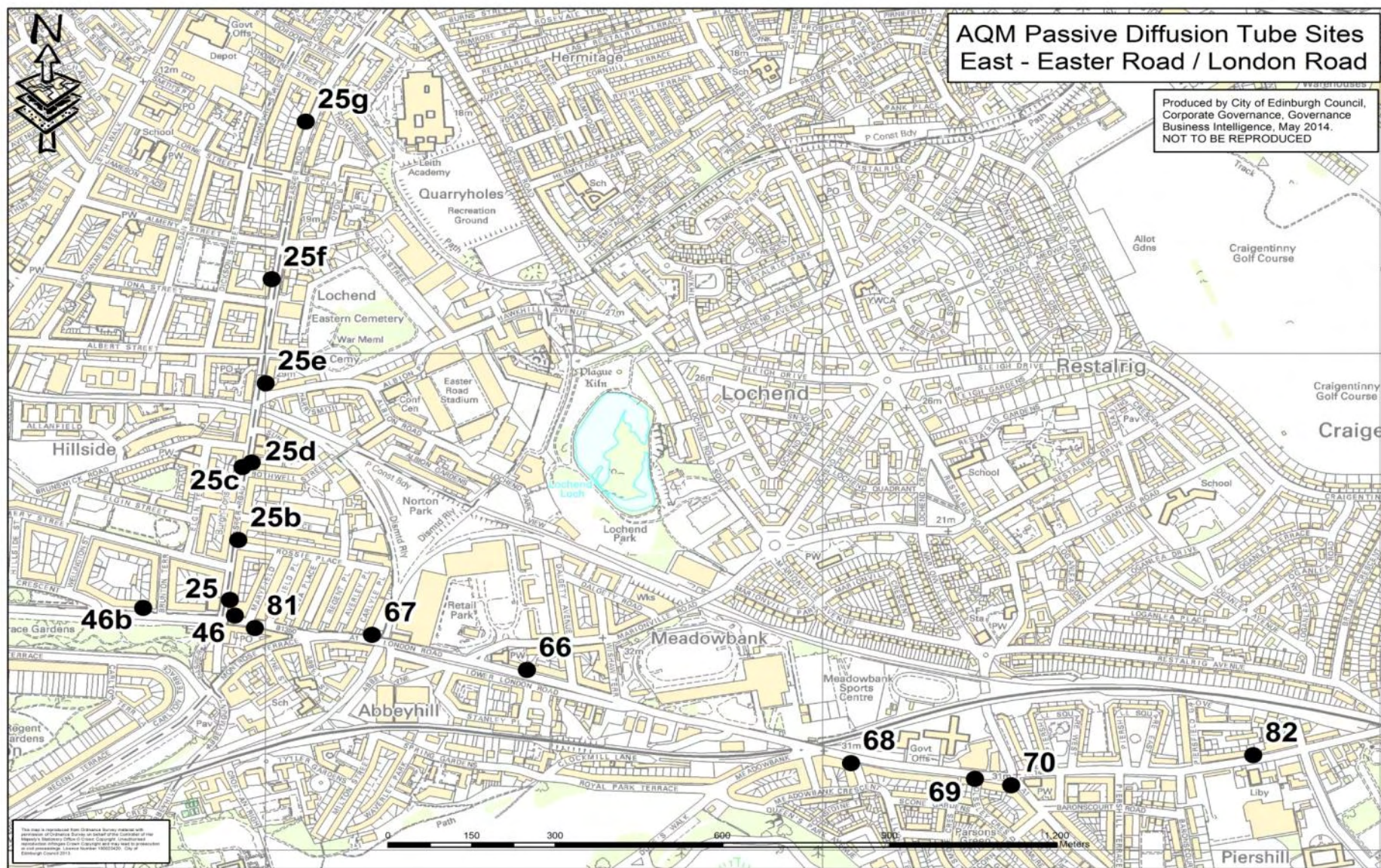






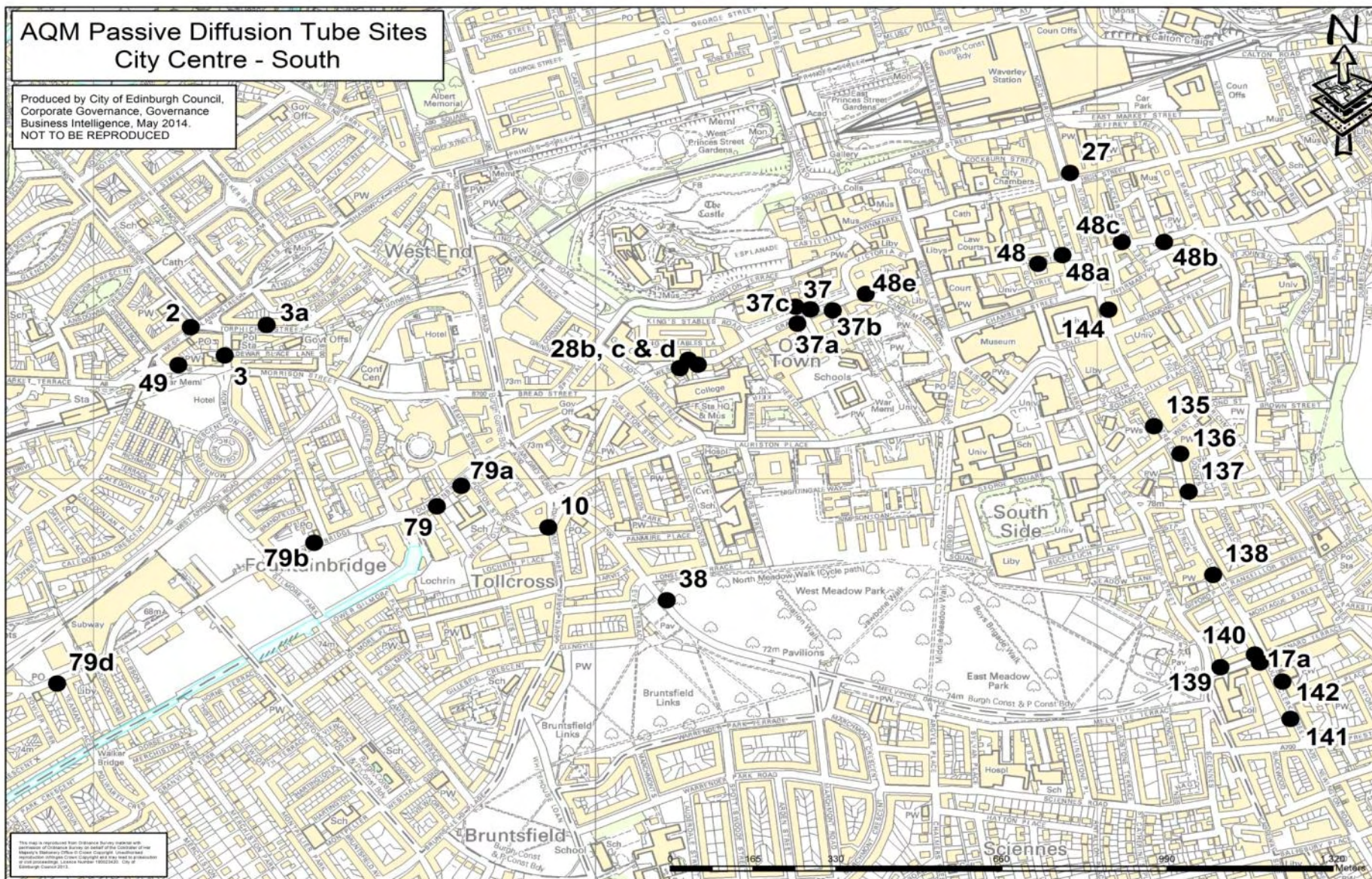
AQM Passive Diffusion Tube Sites  
East - Easter Road / London Road

Produced by City of Edinburgh Council,  
Corporate Governance, Governance  
Business Intelligence, May 2014.  
NOT TO BE REPRODUCED





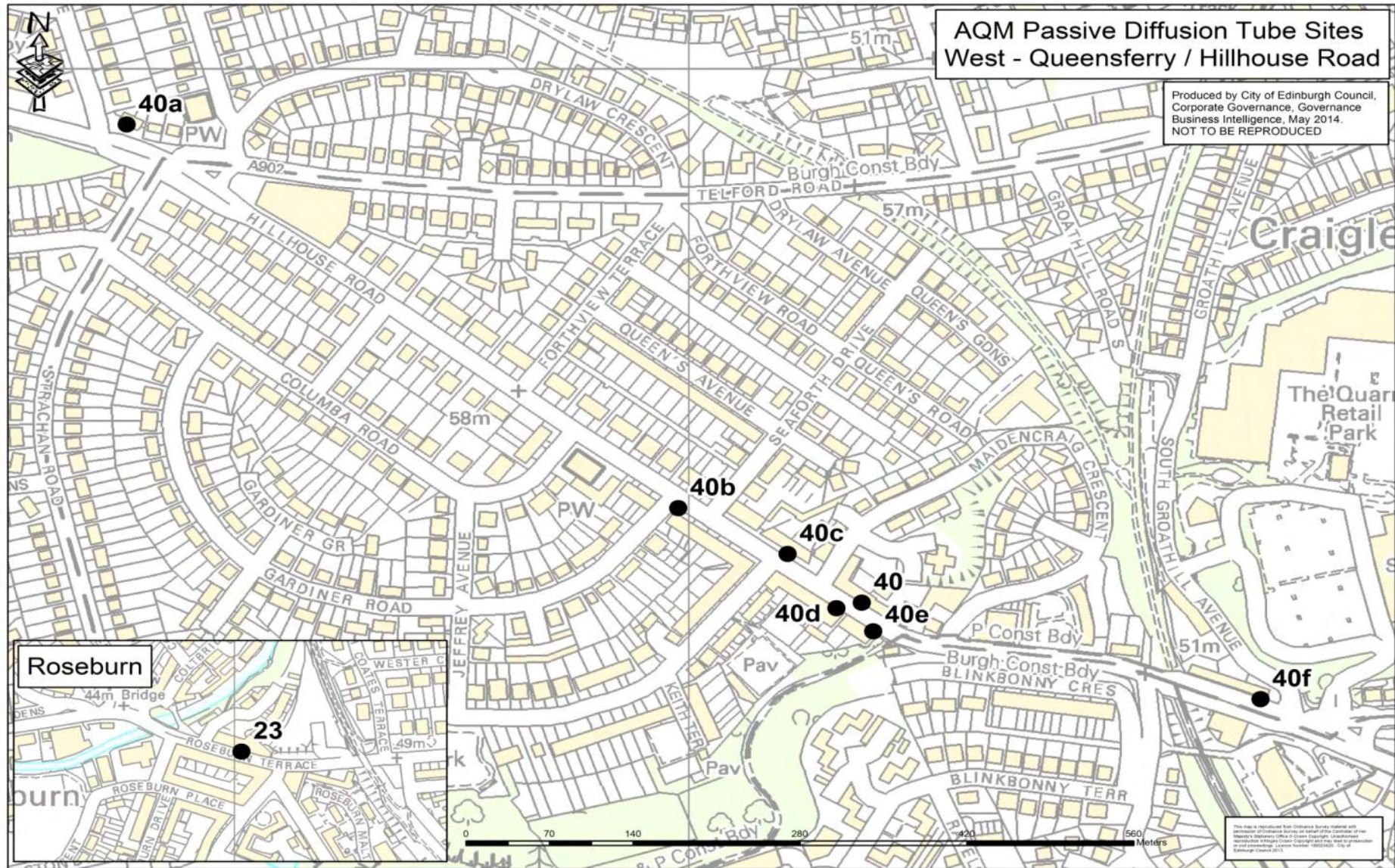


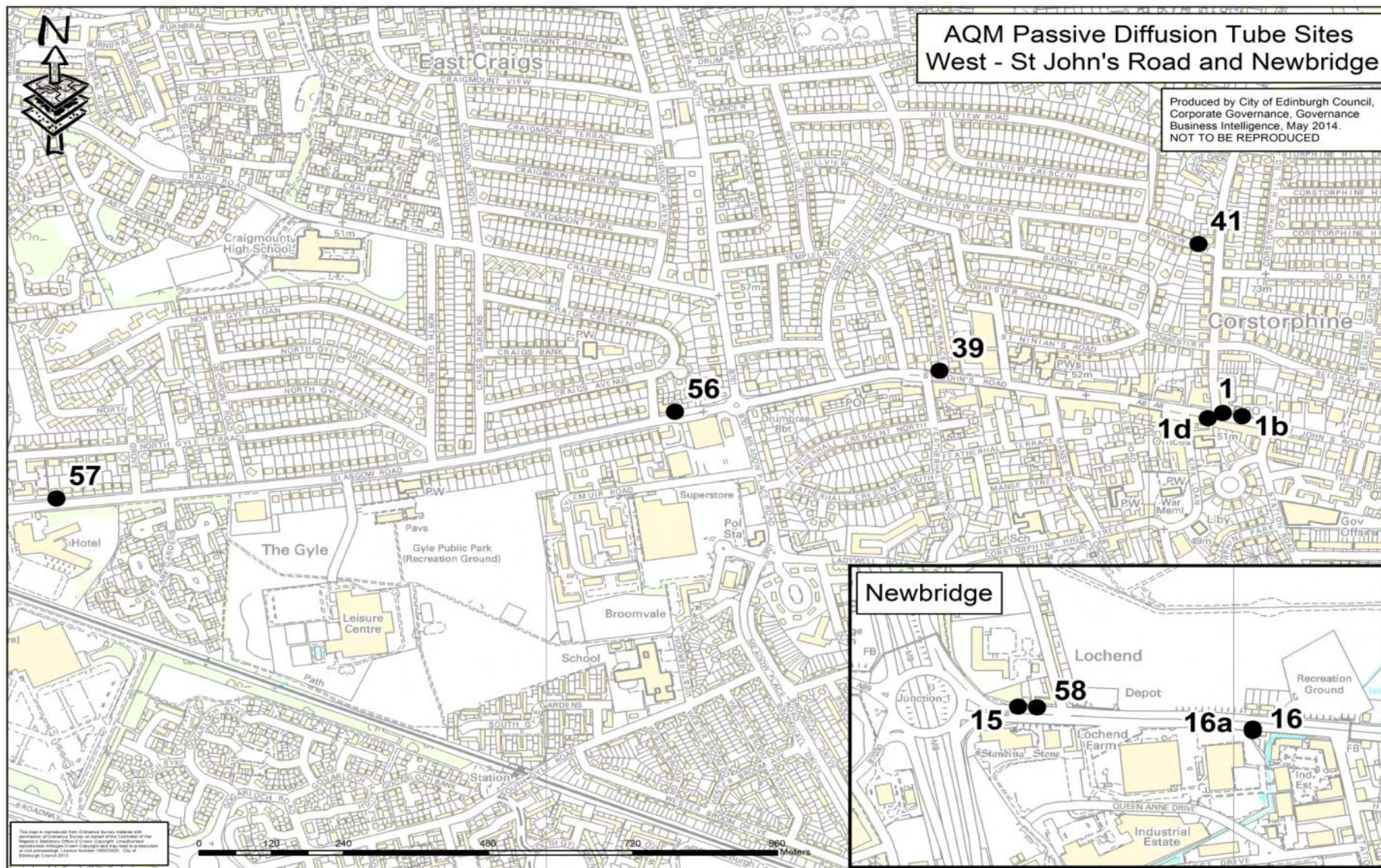
















## **Appendix F: Maps of Air Quality Monitoring (AQM) Passive Diffusion Tube Results**

Maps of passive diffusion tubes are presented in the following six geographical areas of the city. Further details are stipulated in Table 2.2 within main report.

- North
  - Leith
  - Inverleith / Shore
  
- East
  - Craigmillar
  - Easter Road / London Road
  - Portobello
  
- City Centre North
  
- City Centre South
  - Centre
  - Morningside
  
- West
  - Barnton junction / Queensferry Road
  - Queensferry Road / Hillhouse Road
  - St John's Road and Newbridge (insert)
  
- South West
  - Slateford / Gorgie
  - Lanark & Calder Road