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THE CITY OF EDINBURGH COUNCIL

2013 Air Quality Progress Report for City of Edinburgh Council

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

Date July, 2013

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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

Concentrations of the pollutant within the Air Quality Management Areas (AQMAs) continue to exceed the national objectives and therefore the AQMAs remain valid. It is noted that some data points in the AQMAs have fallen below the annual mean objective. Outwith the AQMAs, exceedences of the annual mean objective are identified at the following locations; Queensferry Road, Angle Park Terrace, Slateford Road, Nicolson Street and South Clerk Street.

In respect to Detailed Assessment work at Nicolson Street, Clerk Street and South Clerk Street assessment was complicated due to closure of Princess Street for tram works and rerouting of traffic up North Bridge towards Nicolson Street. In the area around Angle Park Terrace and Slateford Road assessment was complicated due to extended road works on Gorgie Road, diversions for tram works and loss of the SCOOT system at traffic junctions. Monitoring will continue as these extenuating factors unwind. If exceedances continue it will be necessary to extend the Central AQMA to include these two areas.

Further monitoring is required for detailed assessment work at Fountainbridge due to lack of data collected during 2012. In addition, monitoring will continue at Hillhouse Road and Queensferry Road to investigate local circumstances.

Ongoing detailed assessment work at Portobello Road/Sir Harry Lauder Road junction is expected to be completed in April 2014, while further assessment work pertinent to the recently declared AQMAs at Inverleith Row/Ferry Road junction and Glasgow Road as well as the extension to the Central and Great Junction Street AQMAs, is due for completion Summer 2013.

Fine Particles PM_{10}

The report concludes that the EU limit values and UK national objectives are met. The tighter Scottish objective of 18ug/m^3 was not met at Salamander Street and the annual mean objective is borderline at Queensferry Road. It is anticipated that the city wide assessment for PM_{10} can be progressed and completed in 2013.

It is difficult to formulate reliable assumptions on data trends for both NO_2 and PM_{10} due to disruptions to normal traffic flows, arising from construction works associated with the Edinburgh Tram project and other major infrastructure projects.

New local developments in respect to a traffic management system in the core city centre and road/environmental improvements in the Leith Walk area are currently

being considered by the Local Authority and require further consideration in respect to the impact they may have on air quality.

A revised **Air Quality Action Plan** (AQAP) will be produced during 2013/14 to address the new areas of concern, and to account for any decision taken by the Council in respect of a Low Emissions Strategy/Zone for the city, anticipated autumn 2013. 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. However, Lothian Bus have indicated a willingness to retrofit the 40 per cent of their fleet that is Euro 3 up to Euro 5/6 standard. This is made possible by technological improvements allowing fitment of their tested system to double decker buses.

Edinburgh ECOSTARS freight recognition scheme is enabling the Council to engage much more effectively with the road freight sector on local air quality issues and is encouraging an increasing number of fleet operators to improve operational performance and to reduce fuel consumption and tailpipe emissions.

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 trial of remote real-time pollutant trial with MOTES, which are also progressing. A trial of a vehicle telematic system in part of the Council's fleet has recently been completed and findings will be reported to the Scottish Government.

A number of policies within the Council's **Local Transport Strategy** (to be updated during 2013) aim to reduce traffic levels overall and encourage model 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.

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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 [1]. 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 as well as other matters.

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. Approximately two per cent of the city is covered by an AQMA and due to the property type in the AQMAs around three per cent of the population are in an AQMA.

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 process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

These reports 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 µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	3.25 µg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide	200 µg/m^{3}not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter(PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m^3	Annual mean	31.12.2010
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

The 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	**Review & Assessment of Air Quality Stage 1/2**	1998	Potential exceedences of NO_2 and PM_{10}
1	**City of Edinburgh Council Review Stage 3**	2000	Exceedences of NO_2 annual mean objective. Attributed to traffic emissions AQMA declared for City Centre 31.12.2000
1	**Review & Assessment of Air Quality Stage 4**	2002	Source apportionment identified that buses were the major contributors of NO_2
2	**Air Quality Action Plan**	2003	Key actions; cleaner vehicles HGVs and buses, congestion charging, tram network.
2	**Updating & Screening Assessment Phase 2**	2003	Detailed Assessment required city-wide for PM_{10} due to high background concentrations and tightening of air quality objectives for Scotland. Detailed Assessment for NO_2 St John's Road.
2	**Detailed Assessment Report**	2004	Partisol co-location study with TEOM gave local gravimetric conversion factor of 1.14 AQMA not required for PM_{10} using 1.14. AQMA required for NO_2 at St John's Road.
2	**Progress Report**	2005	Potential exceedences of NO_2 at West Port and Great Junction Street Four locations in Central AQMA likely to fail EU limit value – West Maitland St, Torphichen Pl, Princes St and Roseburn Terrace. Concerns were raised with respect to density of development in city centre and North Edinburgh Waterfront.
3	**Updating & Screening Assessment Report**	2006	Exceedences of NO_2 within Central AQMA & St John's Road AQMA declared for St John's Rd 31.12.2006

Round / Report		Date	Outcome
3	**Detailed Assessment for Nitrogen Dioxide at Great Junction St and West Port**	2007	AQMA required for NO_2 at Gt Junction Street and West Port. West Port also likely to not meet hourly NO_2 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.
3	**Air Quality Progress Report.**	2008	NO_2 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_2 at Bernard St, Commercial St, Ferry Rd, Easter Rd, London Rd, Hope Park Terrace, Glasgow Rd. Detailed Assessment required. City-wide Detailed Assessment required for PM_{10} due to exceedences of Scottish Air Quality Objectives using 1.14 local gravimetric factor. 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_2objective.St John's Rd AQMA amended to include exceedence of hourly mean NO_2
3	**Air Quality Action Plan**	2008	Revised, Congestion charge removed as an action. Include St John's Road AQMA
4	**Updating and Screening Assessment**	2009	NO_2 exceedences within AQMAs. Existing AQMAs remain valid. NO_2 annual exceedences noted at Glasgow Rd, Easter Rd, London Rd, Bernard St, Grassmarket, Cowgate, Queensferry Rd/ Barnton and Hillhouse Rd. Potential exceedences of NO_2 at Hope Park Terrace, Broughton Rd and Commercial Street. City-wide Detailed Assessment for PM_{10} required, which will address the four biomass installations and poultry farm complex at Gogarburn. Most congested main roads in city centre are likely to exceed Scottish annual objective for PM_{10} based on monitoring at Queen Street, Haymarket and DMRB modelling.
4	**Progress Report**	2010	NO_2 exceedences within all 3 AQMAs. AQMAs remain valid. Exceedences of NO_2 at, Portobello High St, Inverleith Row, Bernard Street, Glasgow Road, Easter Road,

Round / Report		Date	Outcome
			London Road, Queensferry Road, Grassmarket. Potential exceedences at, Broughton Rd, Commercial St, Hope Park Terrace, Cowgate, Hillhouse Road.
4	**Further Assessment:** **St John's Road** **West Port (extension of Central AQMA)** **Great Junction Street**	2011	NO_2 exceedence within 3 AQMAs, which remain valid. Source apportionment -Within local vehicle fleet, buses contribute the greatest percentage of the measured NO_2 at St John's Rd and Gt Junction St, whilst at West Port the greatest contribution is attributed to cars. % Range of roadside NO_X reduction required to meet NO_2 Annual Mean Objective (40µg/m^3). Using both UK and Scottish (SG) background maps. Gt Junction St UK 40.7% SG49.9% St John's Rd UK 70.6%SG76.8% West Port UK 74.9% SG86.4%
4	**Progress Report**	2011	NO_2 exceedences in all 3 AQMAs. Existing AQMAs remain valid.NO_2 exceedencesoutwith 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_2 potential exceedences identified at Broughton Road, Ferry Road, Commercial Street, Salamander Street/Bath St and Portobello High St. NO_2 Detailed Assessment work being progressed at Queensferry Road, Portobello, Inverleith Row and required for Hope Park Terrace / Clerk Street junction, Hillhouse Road, Slateford Road, Fountainbridge / Tollcross and Angle Park Terrace Extend Central AQMA and & Great Junction St AQMA for exceedences of NO_2Declare Glasgow Road/Newbridge for exceedences of NO_2 PM_{10} citywide Detailed Assessment progressing

Round / Report		Date	Outcome
5	**Updating and Screening Assessment**	2012	NO_2 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_2 identified at Slateford Road, Fountianbridge/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. Declare AQMA at Inverleith Row for exceedences of annual mean objective for NO_2 PM_{10} Detailed Assessment progressing city-wide

Table 1.3 Descriptions of AQMAs

Description AQMA / Declaration (Date)	Pollutant/ Source	Amendments
Central AQMA 31/12/2000 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. Busy shopping areas include Princes Street, George Street, Dalry/Gorgie Rd,Roseburn Terrace, Leith Walk and North Bridge. Upwards road gradient Leith Walk/North Bridge (south bound).	**NO_2** **Traffic**	**09/03/2009** Extended to include West Port - Amended to cover hourly breach as well as annual breach of NO_2 air quality objective **26/04/2013** Extended to include Gorgie Road, Grassmarket/Cowgate and London Road/Easter Road
St John's Road 31/12/2006 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.	**NO_2** **Traffic**	**09/03/2009** Amended to cover hourly breach as well as annual breach of NO_2.
Great Junction Street 09/03/2009 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. Receptors close to road edge. High percentage of bus movements.	**NO_2** **Traffic**	**26/04/2013** Extended to include Bernard Street, Commercial Street and North Junction Street.
Glasgow Road 26/04/2013 Part length of A8, between Newbridge Roundabout and Ratho Station, to the	**NO_2** **Traffic**	

Description AQMA / Declaration (Date)	Pollutant/ Source	Amendments
depth of the building facades.		
Inverleith Row **26/04/2013** The road comprising the junction of Inverleith Row and Ferry Road, to the depth of building facades.	**NO_2** **Traffic**	

Figure 1.1 Map of Central AQMA Boundaries

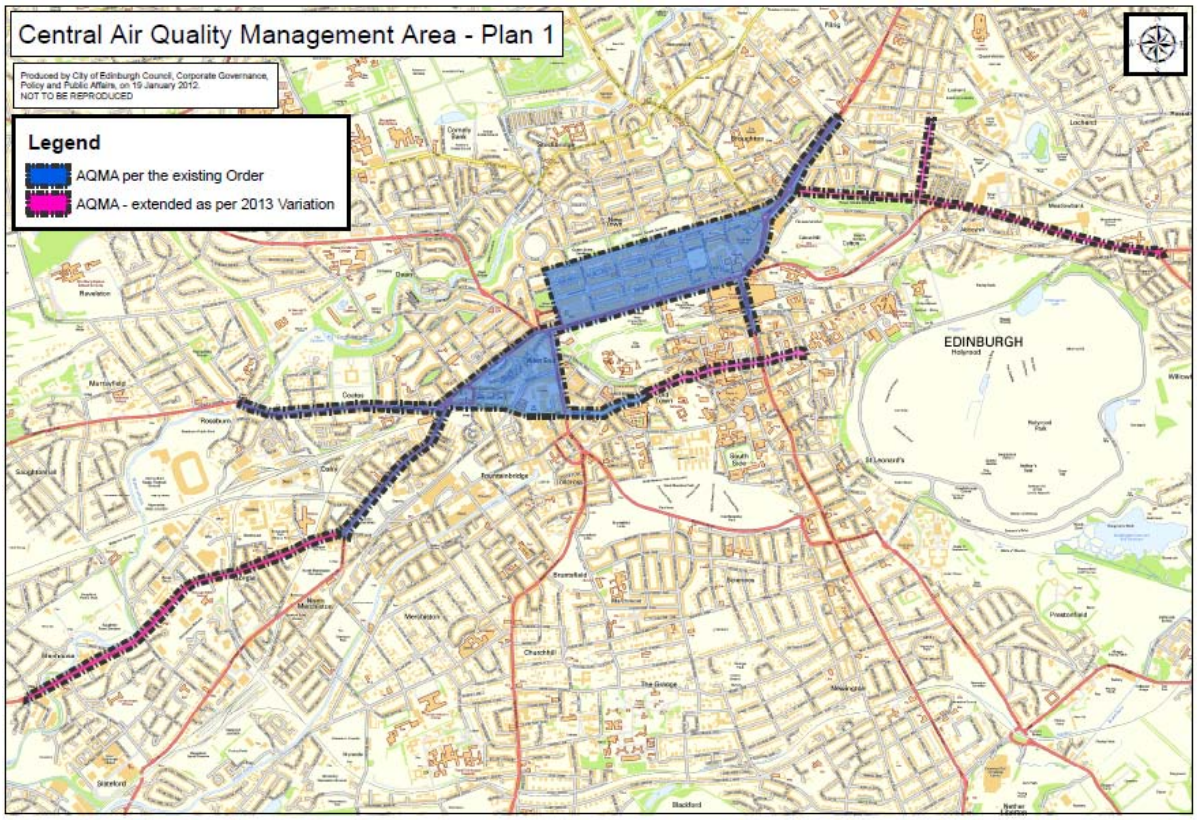

Figure 1.2 Map of St. John's Road AQMA Boundaries

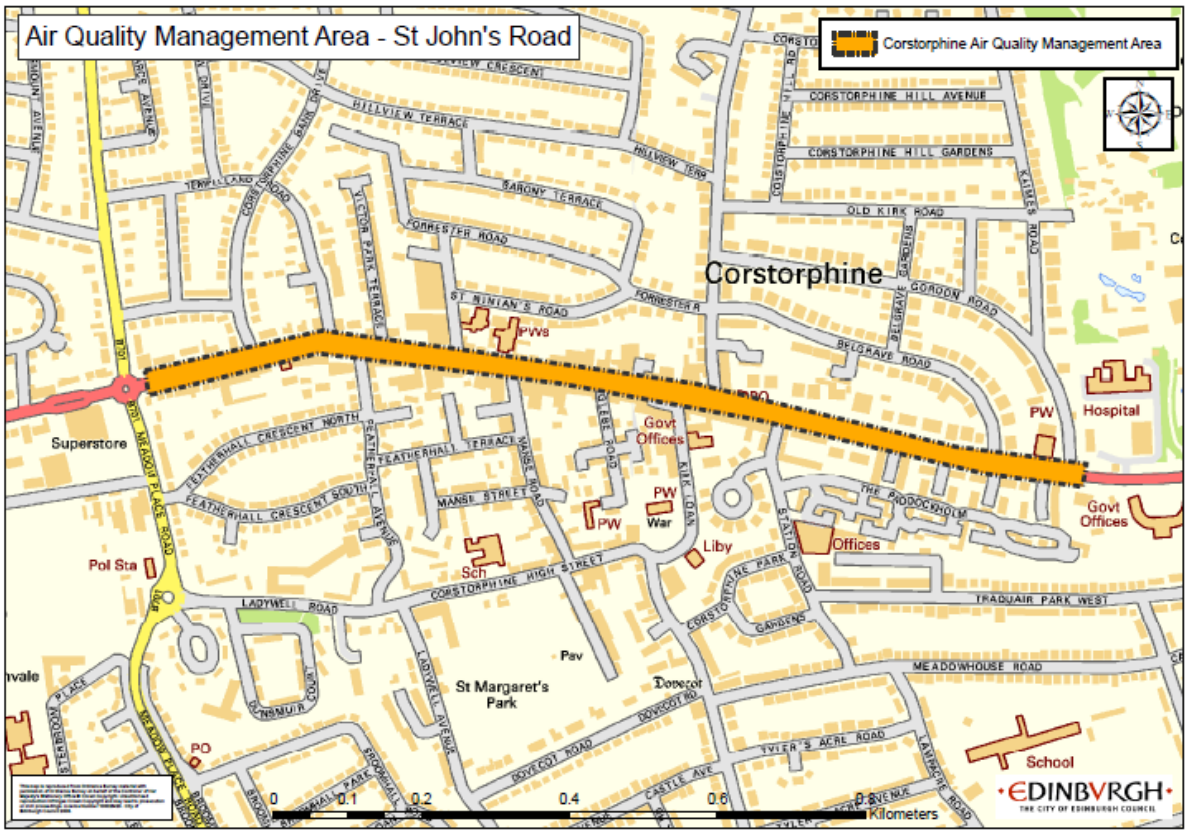

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Figure 1.3 Map of Great Junction Street AQMA Boundaries

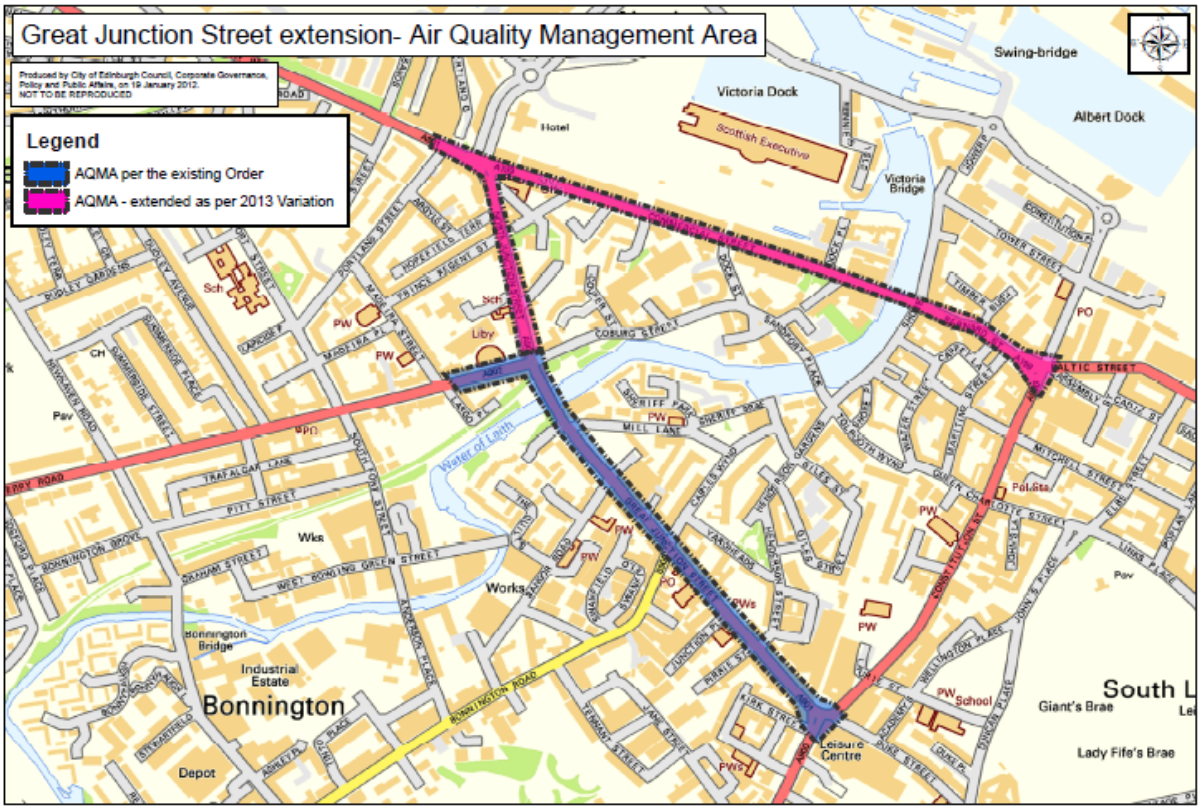

Figure 1.4 Map of Glasgow Road AQMA Boundaries

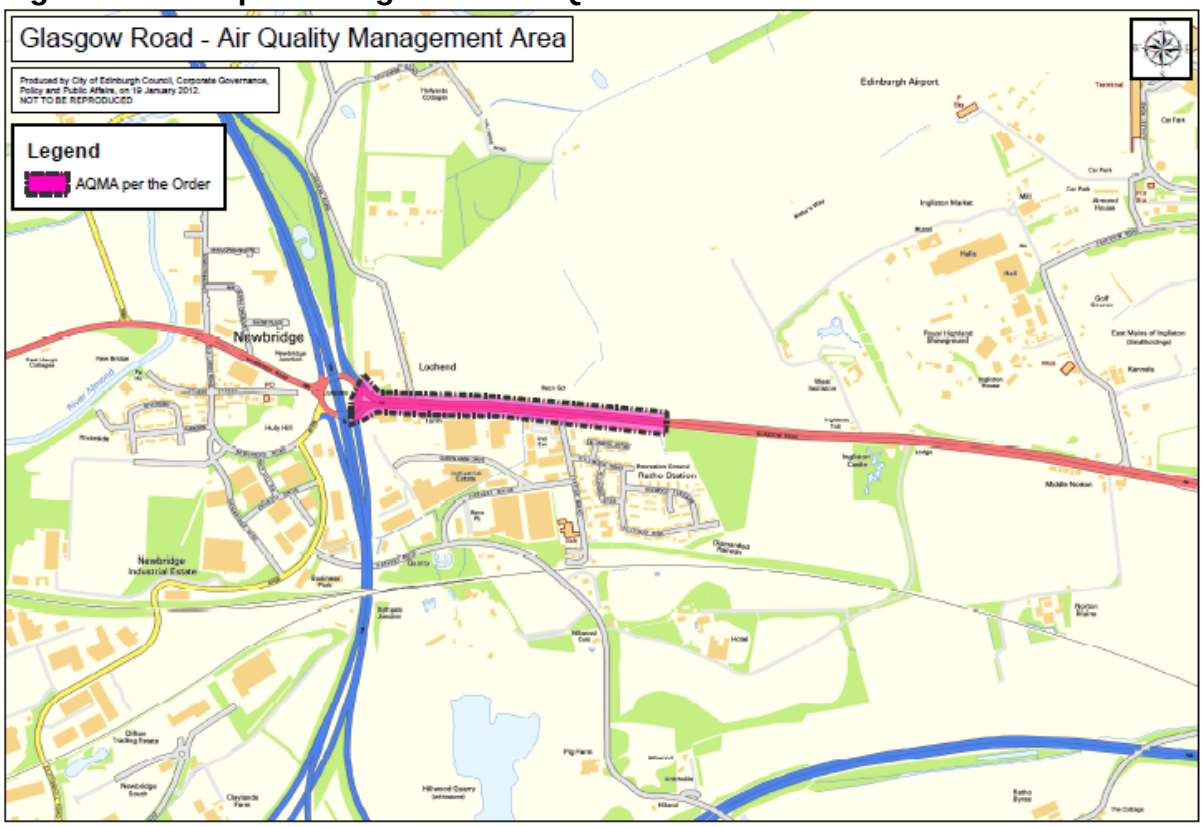

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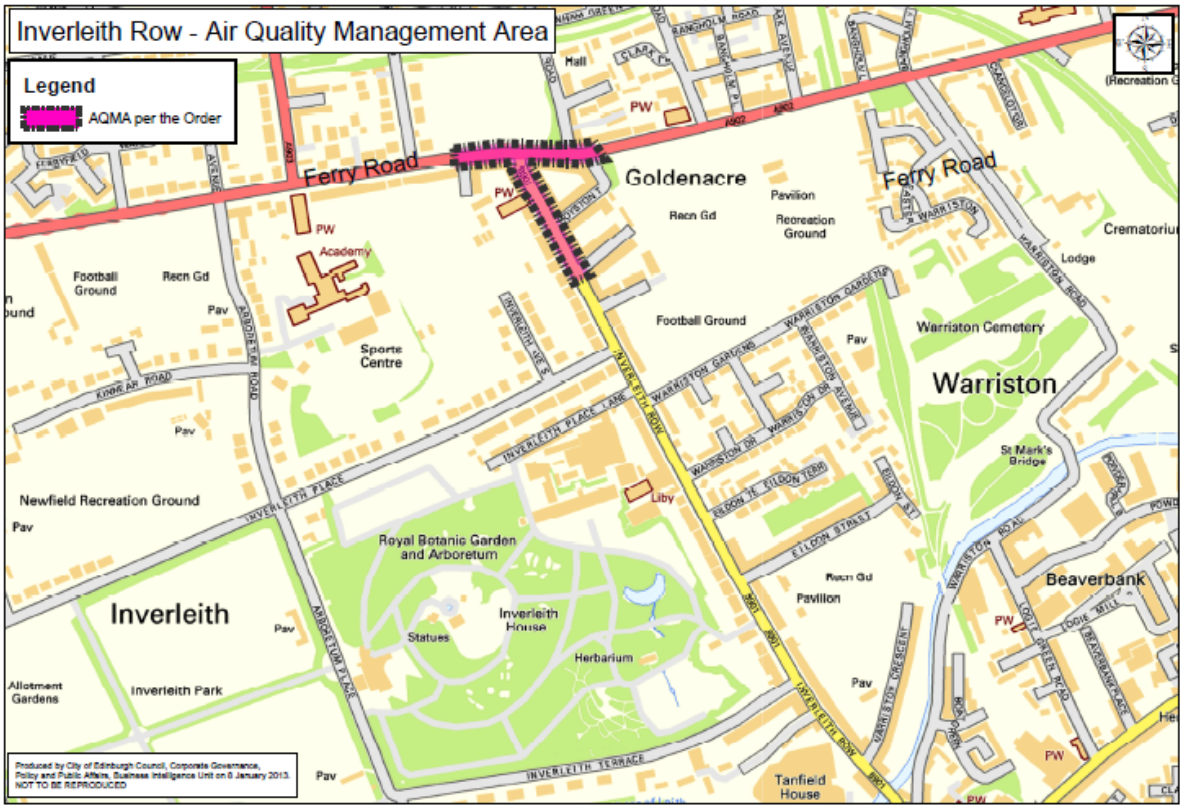
Figure 1.5 Map of Inverleith Row AQMA Boundaries



Developments since Updating and Screening Assessment 2012
Nitrogen Dioxide

New AQMAs have been declared at Glasgow Road, Newbridge and Inverleith Row/Ferry Road junction for exceedences of the annual mean nitrogen dioxide objective. Extensions have been made to the Central and Great Junction Street AQMAs, also for breach of the annual mean objective.

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 have been identified.

Particulate Matter PM_{10}

Although data capture at the St Leonard's AURN site was poor in 2012 due to technical difficulties with the instrument, it is anticipated that the city wide assessment for PM_{10} can be progressed and completed in 2013.

Further assessment work

Further assessment work is current being undertaken with regards to the recently declared AQMAs at Inverleith Row/Ferry Road junction and Glasgow Road as well as the extension to the Central and Great Junction Street AQMAs. This includes source apportionment work at Inverleith Row, Glasgow Road, Gorgie Road, Cowgate, Grassmarket, Easter Road, London Road and Bernard Street.

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). The Roseburn station was moved to Glasgow Road at Ratho Station and became operational in September 2012. All other stations were operational during 2012.

Details and descriptions of the automatic monitoring stations for 2012 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

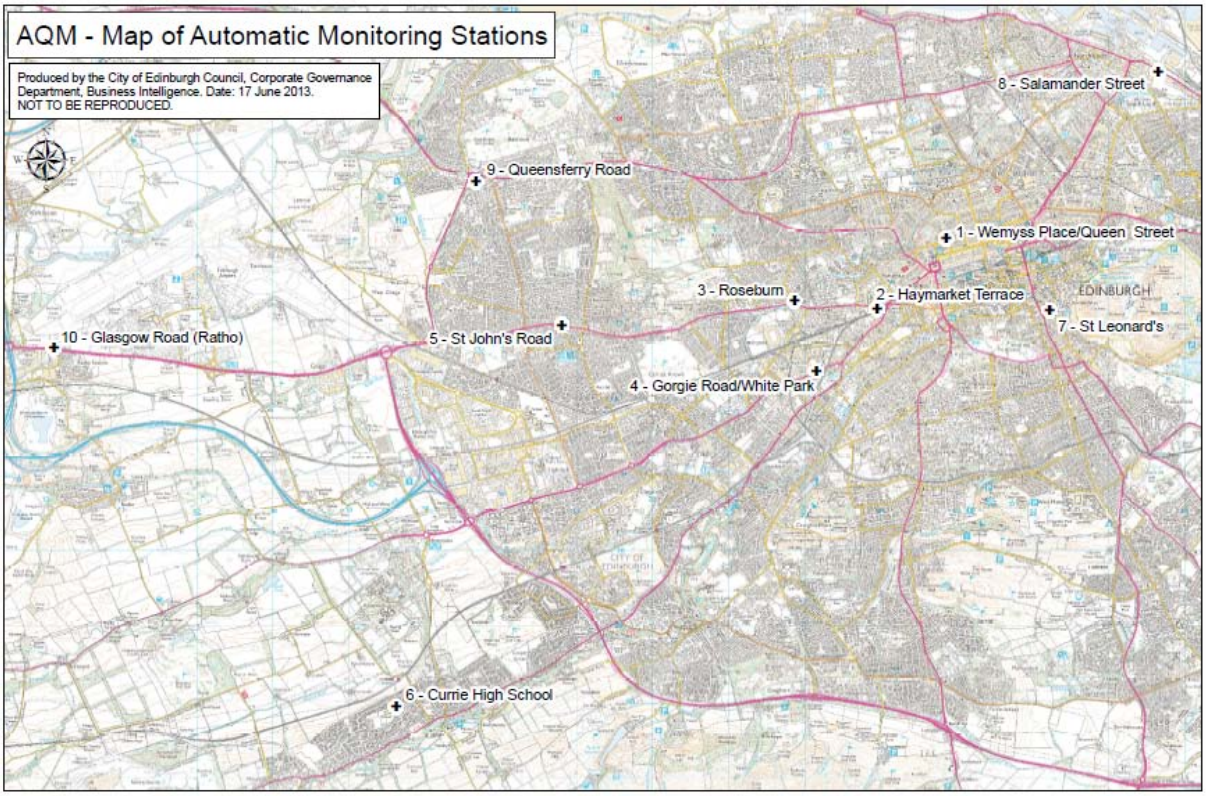


Table 2.1 Details of Automatic Monitoring Sites

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_2 PM_{10}	Yes	Chemilum TEOM	Y (façade)	5.2m	Y
ID2	**Haymarket**	Roadside	323896	673197	N/A	NO_2 PM_{10}	Yes	Chemilum TEOM	Y (7m)	9.2m	N
ID3	**Roseburn**	Roadside	322939	673233	n/a	NO_2 PM_{10}	Yes	Chemilum TEOM	Y (4.9m)	7.6m	N
ID4	**Gorgie Road**	Roadside	323121	672314	2.63	NO_2	Yes	Chemilum	Y (façade)	2.5m	Y
ID5	**St. John's Road**	Kerbside	320101	672907	1.98	NO_2	Yes	Chemilum	Y (1.35m)	0.5m	Y
ID6	**Currie High School**	Suburban	317595	667909	3.59 3.24	NO_2 PM_{10}	No	Chemilum TEOM	Y (rear of school)	N/A	N/A

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_2 PM_{10} $PM_{2.5}$ O_3 CO SO_2 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_2 PM_{10}	No	Chemilum TEOM	Y (façade)*	2.13m	Y
ID9	**Queensferry Road**	Roadside	318736	674930	2.96	NO_2 PM_{10}	No	Chemilum TEOM/FDMS	Y (6.5m)	1.7m	Y
ID10	**Glasgow Road**	Roadside	313103	672663	2.84	NO_2 PM_{10}	Yes	Chemilum TEOM	Y (facade)*	6m	Y

*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**	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 in six different geographical areas of the city, as shown in Figure 2.1a.

Additional monitoring was established in 2012 at the following locations in order to progress Detailed Assessment work: Hope Park Terrace/Clerk Street, Hillhouse Road, Slateford Road, Angle Park Terrace and Fountainbridge/Tollcross.

Monitoring at the Inverleith Tanfield site (ID55a) was discontinued due to removal of a post. The St John's Road (ID39) and Queen Street (ID33) monitoring sites were re-located in close proximity and with similar site conditions due to an overgrown hedge and risk of people smoking nearby, respectively.

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

- A1 Nitrogen Dioxide (NO_2) Diffusion tube bias adjustment factors
- A2 NO_2 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_2
- A7 QA/QC of diffusion tube monitoring.

Maps illustrating the network of non-automatic monitoring locations for NO_2 across the city are shown in Figures 2.2a – 2.2f.

All passive diffusion tubes are fixed at a height of approximately two meters. It is the intention to collect exact heights throughout 2013 and 2014 and report these in the next progress report.

Figure 2.2a Map of Non-Automatic Monitoring Sites – North

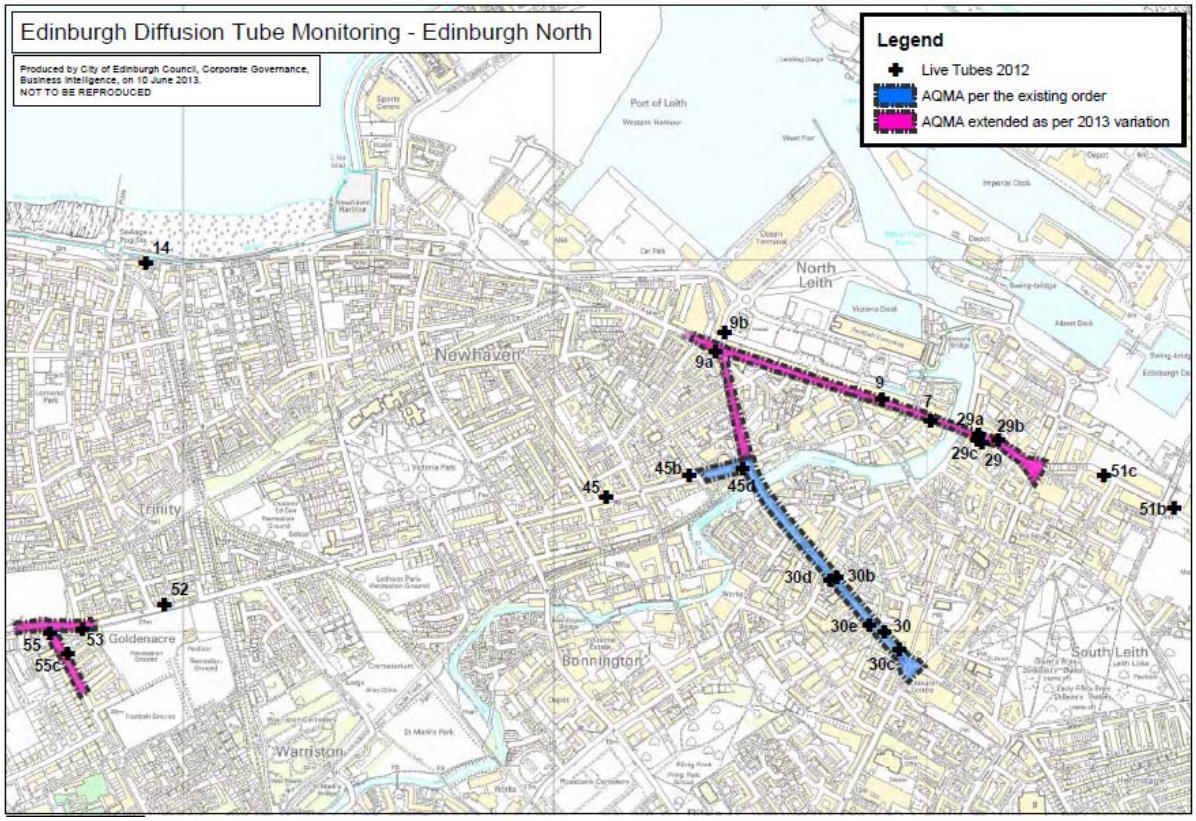


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Figure 2.2b Map of Non-Automatic Monitoring Sites – City Centre (North)

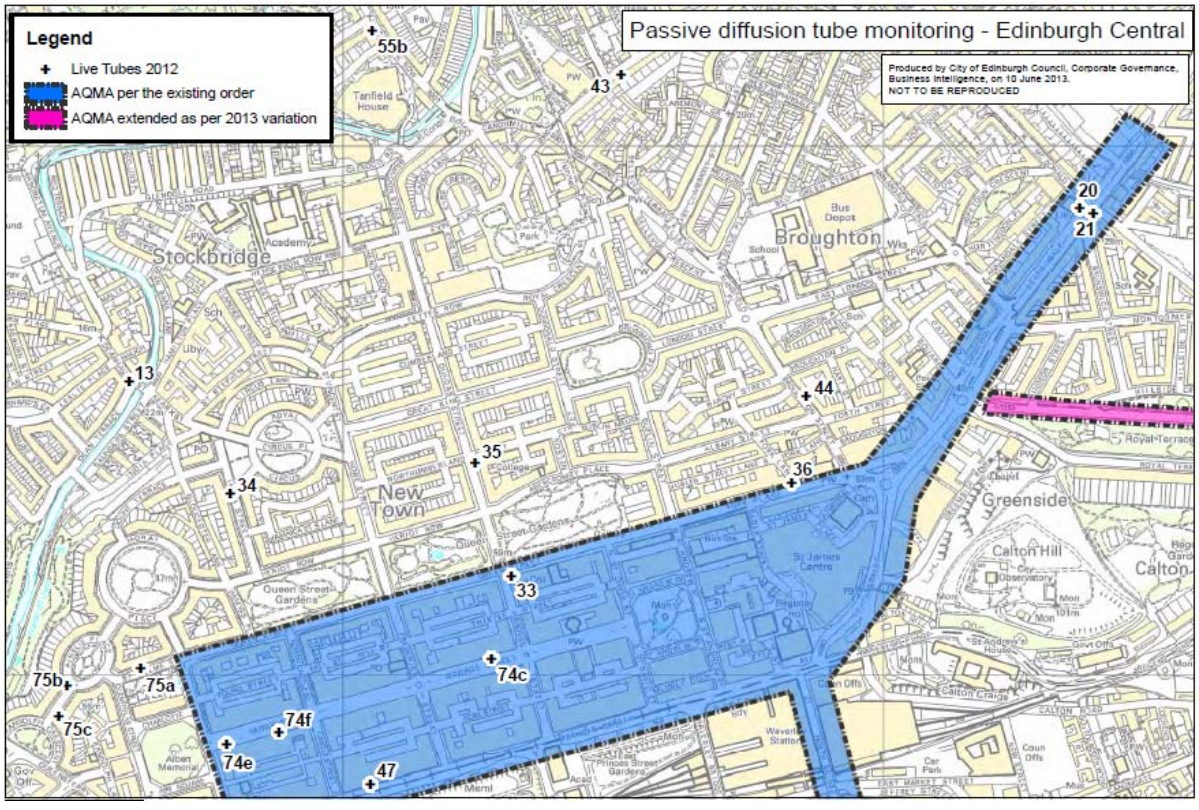

Figure 2.2c Map of Non-Automatic Monitoring Sites – City Centre (South)

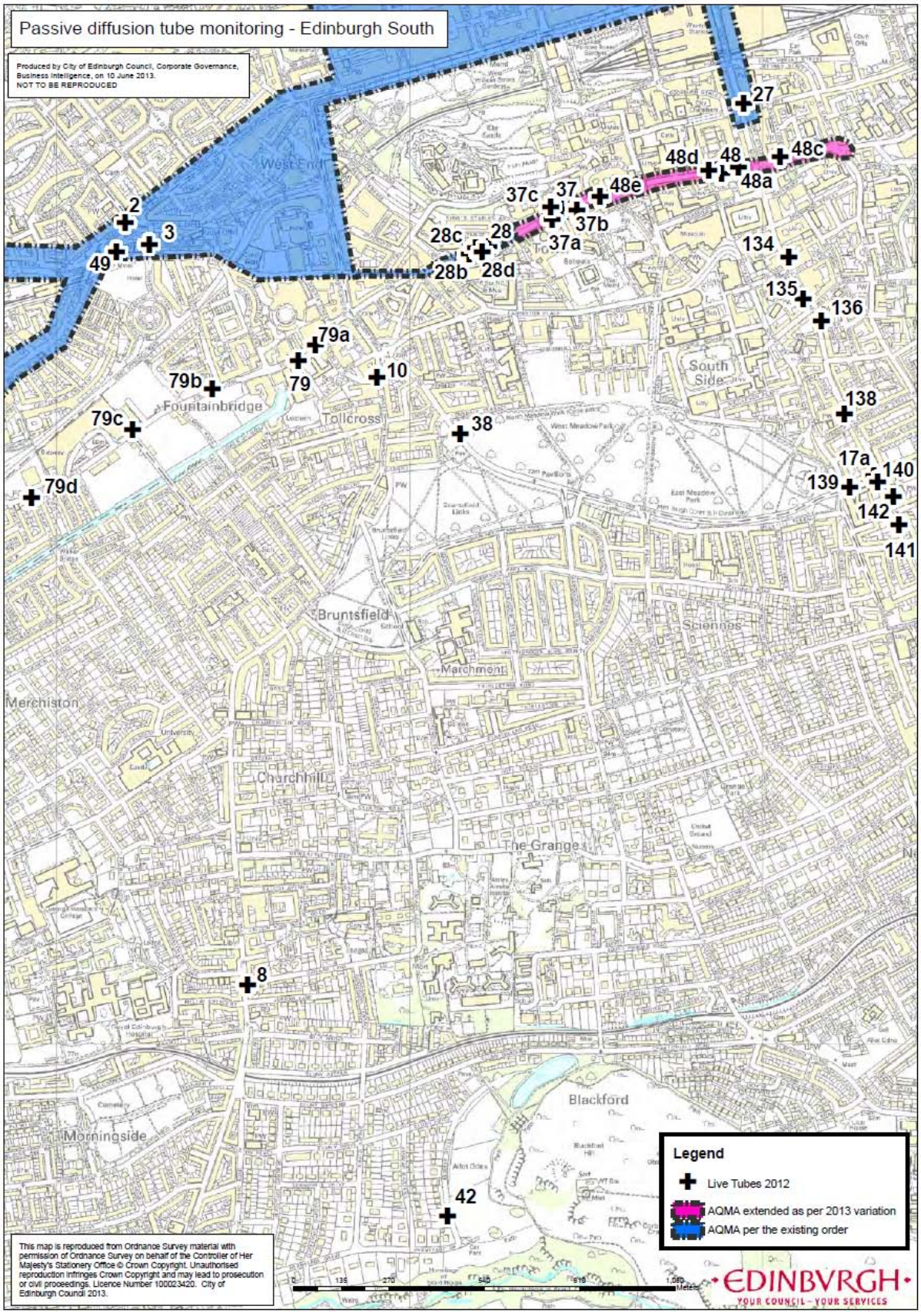

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Figure 2.2d Map of Non-Automatic Monitoring Sites – East

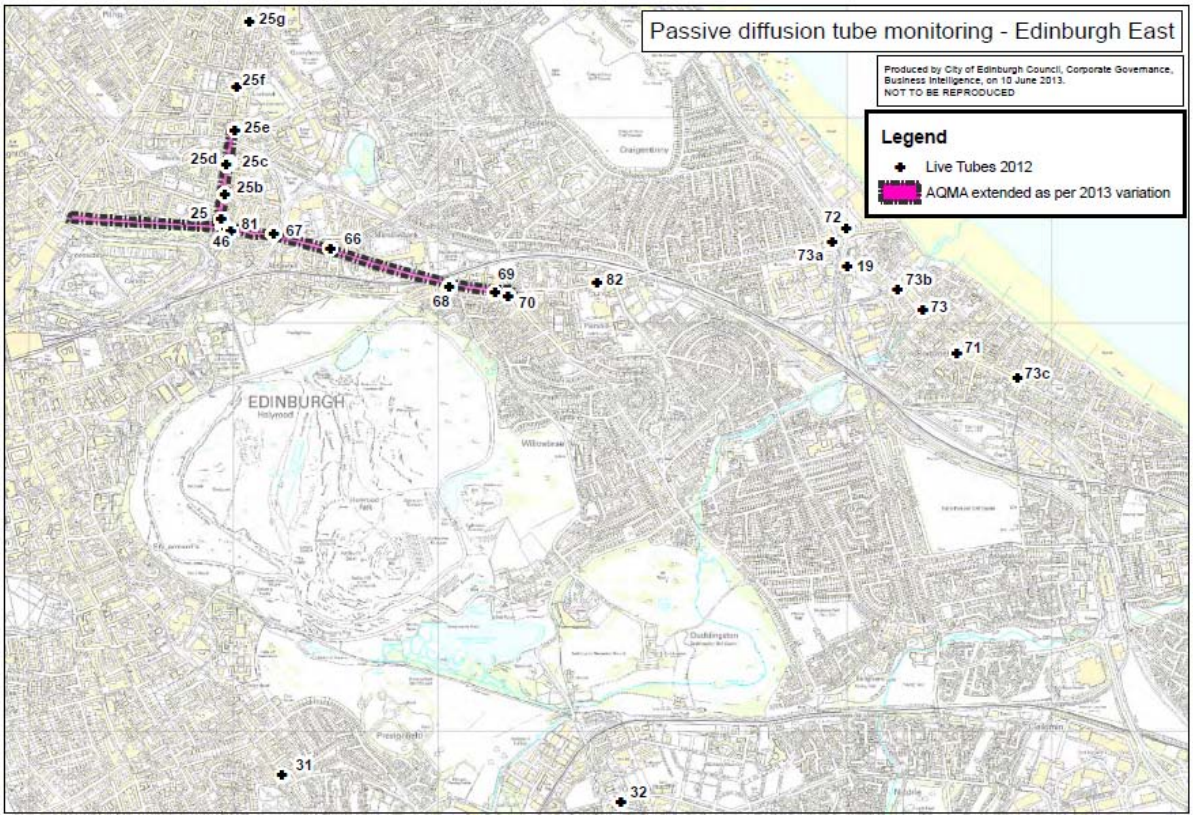


Figure 2.2e Map of Non-Automatic Monitoring Sites – South West Edinburgh

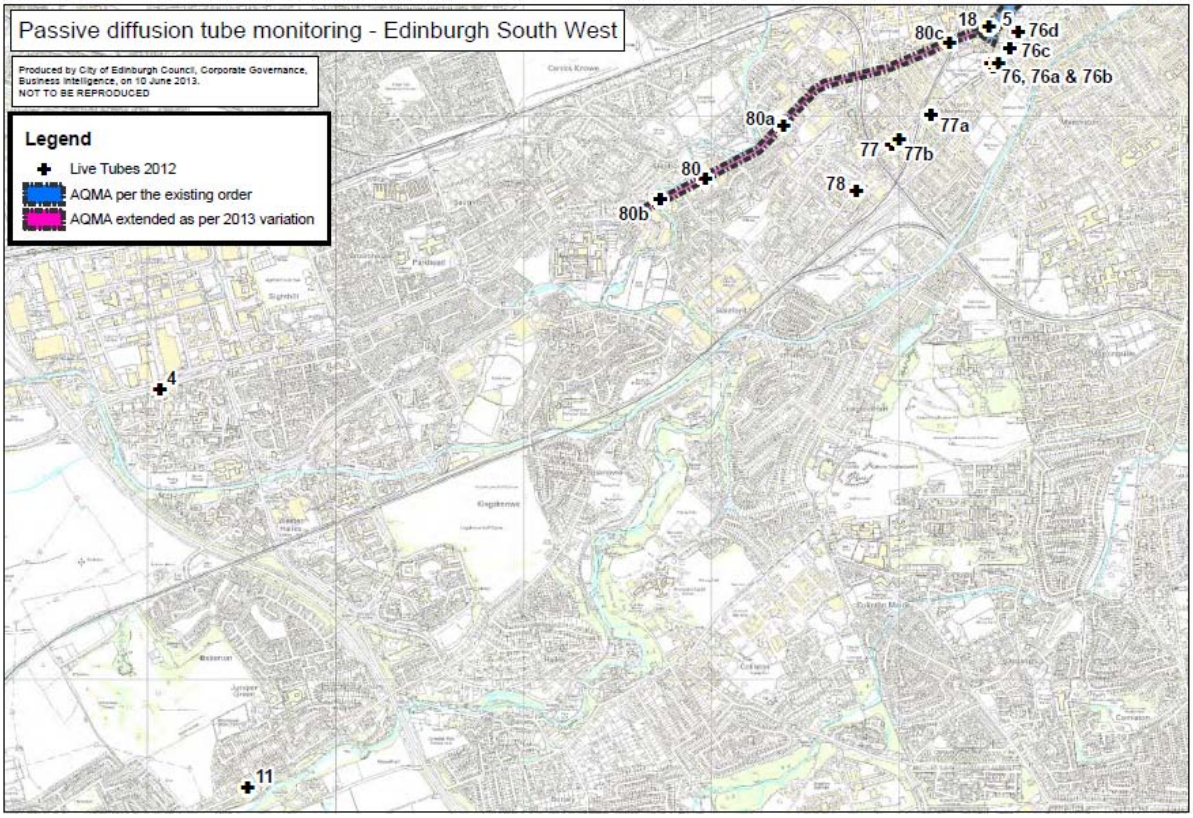


Figure 2.2f Map of Non-Automatic Monitoring Sites – West

Table 2.2 Details of Non- Automatic Monitoring Sites for Nitrogen Dioxide

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 ?
	NORTH							
29	**Bernard Street/CA**	Roadside	327148	676507	Yes	Y façade	2.2	Y
29a	**Bernard Street/King Chambers**	Roadside	327137	676529	Yes	Y façade	2.1	Y
29b	**Bernard StreetNo 32**	Roadside	327192	676513	Yes	Y façade	2.2	Y
29c	**Bernard Street/PS**	Roadside	327135	676515	Yes	Y façade	2.1	Y
7	**Commercial Street No 11**	Roadside	327009	676565	Yes	Y façade	2.47	Y
9	**Commercial Street No 78**	Roadside	326879	676626	Yes	Y façade	2.6	Y
9a	**Commercial St/Portland Place**	Roadside	326430	676754	Yes	Y (3.90)	1.47	Y
52	**Ferry Road No 268**	Roadside	324946	676070	No	Y (4.6)	1.65	Y
53	**Ferry Road/Bowhill Terrace No6**	Roadside	324726	676004	Yes	Y (1.57)	1.75 +2.85[b]	Y
45b	**Ferry Road/Maderia Street**	Roadside	326359	676420	No	Y façade	7.5	Y
45	**Ferry Road/North Fort Street**	Roadside	326136	676361	No	Y façade	3.7	Y
45d	**Ferry Road/North Junction St**	Roadside	326503	674436	Yes	Y façade	3.1	Y
30b	**Great Junction Street No137**	Roadside	326740	676138	Yes	Y façade	2.9	Y
30c	**Great Junction Street No14**	Roadside	326925	675949	Yes	Y façade	2.8	Y
30e	**Great Junction Street/CG**	Roadside	326845	676015	Yes	Y façade	2.7	Y
30	**Great Junction Street/FV**	Roadside	326884	675997	Yes	Y façade	2.8	Y
30d	**Great Junction Street/WC**	Roadside	326757	676144	Yes	Y façade	2.8	Y
55	**Inverleith Row/Ferry Road**	Roadside	324638	675993	Yes	Y façade	4.65	Y
55c	**Inverleith Row/Montague**	Roadside	324686	675941	Yes	Y (1.06)	2.28 + 2.0[b]	Y
9b	**Ocean Drive/Leith**	Roadside	326455	676805	No	Y façade	4.2	Y
51c	**Salamander Street/Baltic Street**	Roadside	327476	676418	No	Y façade	2.25	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 ?
51b	**Salamander Street/Bath Street**	Roadside	327665	676331	No	Y façade	1.8	Y
14	**Trinity Crescent**	Roadside	324896	676991	No	Y (4.0)	2.0	Y
	EAST							
19	**Baileyfield Road**	Roadside	329997	674274	No	Y (3.5)	2.0 + 2.1[b]	Y
31	**Dalkeith Road No187**	Roadside	327231	671782	No	Y (4.9)	1.8	Y
25	**Easter Road/CH Shop**	Roadside	326934	674503	Yes	Y façade	2.3	Y
25b	**Easter Road/Rossie Place**	Roadside	326950	674624	Yes	Y façade	3.3	Y
25c	**Easter Road No105/109**	Roadside	326958	674770	Yes	Y façade	3.25	Y
25d	**Easter Road/Bothwick**	Roadside	326974	674780	Yes	Y façade	2.8	Y
25e	**Easter Road No 198**	Roadside	326999	674940	Yes	Y façade	3.95	Y
25f	**Easter Road No 271**	Roadside	327010	675149	No	Y façade	2.8	Y
25g	**Easter Road No 327**	Roadside	327071	675467	No	Y façade	3.0	Y
81	**London Rd/East Norton Place**	Roadside	326980	674446	Yes	Y façade	2.5	Y
67	**London Road/Earlston Place**	Roadside	327190	674433	Yes	Y façade	2.7	Y
68	**Parsons Green Terrace**	Roadside	328049	674174	Yes	Y façade	2.7	Y
69	**London Road/Wolseley Place**	Roadside	328272	674143	Yes	Y façade	2.62	Y
70	**London Road/Wolseley Terrace**	Roadside	328337	674129	Yes	Y façade	4.6	Y
66	**London Road/Cadzow Place**	Roadside	327468	674362	Yes	Y façade	2.04 + 2.0[b]	Y
46	**London Road/Easter Road**	Roadside	326944	674472	Yes	Y façade	5.6	Y
32	**Niddrie Mains Road No 28**	Kerbside	328889	671649	No	Y (4.7)	0.2 + 2.4[b]	Y
82	**Piersfield Terrace**	Roadside	328771	674190	No	Y façade	4.0 + 2.1[b]	Y
73b	**Portobello High Street No 23**	Roadside	330242	674162	No	Y façade	3.8	Y
73c	**Portobello High Street No 292**	Roadside	330830	673726	No	Y façade	2.3	Y
73	**Portobello High Street No 74**	Roadside	330366	674057	No	Y façade	3.1	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 ?
71	**Portobello High StreetNo185**	Roadside	330533	673850	No	Y façade	3.0	Y
73a	**Portobello Road/Ramsay**	Roadside	329923	674389	No	Y (1.98)	2.8	Y
72	**Seafield Road East No10**	Roadside	329993	674457	No	Y façade	4.5	Y
	CITY CENTRE NORTH							
43	**Broughton Road**	Roadside	325513	675134	No	Y façade	2.0	Y
44	**Broughton Street**	Roadside	325855	674527	No	Y façade	4.5	Y
13	**Deanhaugh Street**	Kerbside	324603	674555	No	Y (5.1)	0.6 + 2.1[b]	Y
35	**Dundas Street**	Kerbside	325243	674400	No	Y (7.3)	0.3 + 2.1[b]	Y
74f	**George Street No 112**	Roadside	324880	673891	Yes	Y façade	6.8	Y
74c	**George Street No 41**	Roadside	325273	674030	Yes	Y (4.3)	0.54	Y
74e	**George Street/Charlotte Sq**	Kerbside	324783	673868	Yes	Y (5.2)	0.3	Y
75c	**Great Stuart Street No18**	Kerbside	324473	673920	No	Y (6.9)	0.36 + 2.4[b]	Y
75b	**Great Stuart Street No 7**	Kerbside	324488	673978	No	Y (6.14)	0.4 + 2.1[b]	Y
34	**India Street**	Background	324790	674341	No	N	0.4 + 2.1[b]	N
55b	**Inverleith Row/Summer Place**	Roadside	325052	675217	No	Y façade	6.1	Y
21	**Leith Walk/Brunswick Road**	Roadside	326386	674872	Yes	Y (3.4)	1.16	Y
20	**Leith Walk/McDonald Road**[a]	Kerbside	326361	674882	Yes	Y façade	5.6	Y
47	**Princes Street (Eastbound)**	Roadside	325049	673791	Yes	Y façade	9.0	Y
24	**Princes Street/Mound**	Kerbside	325397	673869	Yes	Y (10.2)	1.0	Y
33	**Queen Street/Hanover Street** [a]	Roadside	325362	674205	Yes	Y (4.25)	2.2 + 2.0 [b]	Y
75a	**St Colme Street**	Kerbside	324624	674012	No	Y (5.1)	0.6	Y
36	**York Place**	Roadside	325828	674362	Yes	Y (2.7)	5.5	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 ?
	CITY CENTRE SOUTH							
48	**Cowgate/Gurthrie Street**	Roadside	325881	673471	Yes	Y façade	4.5	Y
48a	**Cowgate/Blair St**	Roadside	325929	673490	Yes	Y façade	3.2	Y
79	**Fountainbridge/Tollcross**	Roadside	324682	672939	No	Y façade	3.3	Y
37	**Grassmarket/PS**	Roadside	325427	673371	Yes	Y (5.0)	2.0 + 2.1[b]	Y
37a	**GrassmarketNo 41**	Roadside	325401	673340	Yes	Y façade	3.4	Y
37b	**GrassmarketNo 75**	Roadside	325471	673369	Yes	Y façade	5.0	Y
10	**Home Street**	Roadside	324905	672893	No	Y façade	2.8	Y
17a	**Hope Park Terrace/VS**	Roadside	326312	672614	No	Y façade	5	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
49	**Morrison Street**	Roadside	324167	673249	Yes	Y (2.4)	2.2	Y
27	**North Bridge – South**	Roadside	325944	673670	Yes	Y façade	3.5	Y
3	**Torphichen Place**	Roadside	324260	673270	Yes	Y (1.55)	0.73	Y
2	**West Maitland Street**	Kerbside	324192	673332	Yes	Y (4.2)	0.65	Y
28	**West Port/Grassmarket**	Roadside	325221	673263	Yes	Y façade	1.9	Y
28b	**West Port No 62**	Roadside	325166	673242	Yes	Y façade	1.4	Y
28c	**West Port OppNo 50**	Roadside	325184	673261	Yes	Y façade	3.0	Y
28d	**West Port No 42**	Roadside	325203	673250	Yes	Y façade	2.7	Y
	WEST							
56	**Glasgow Road /Drumbrae**	Roadside	319212	672921	No	Y (4.6)	0.57 + 2.0[bc]	Y
57	**Glasgow Road No158**	Roadside	318185	672756	No	Y (8.5)	3.6	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 ?
16	**Glasgow Road No 68**	Roadside	313028	672633	Yes	Y (4.4)	1.8	Y
15	**Glasgow Road Newbridge**	Roadside	312664	672672	Yes	Y (3.8)[c]	1.6 + 2.4 [bc]	Y
58	**Glasgow Road Newbridge**	Roadside	312693	672670	Yes	Y (5.2)[c]	2.8	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[b]	Y
62	**Queensferry Road No 561**	Roadside	318810	674903	No	Y façade	16.9	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
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**[a]	Roadside	319651	672995	Yes	Y (4.15)	1.56	Y
50a	**Whitehouse Rd/Barnton Grove**	Roadside	318571	675028	No	Y (1.57)	3.5	Y
	SOUTH WEST							
76	**Angle Park/Harrison Road**	Roadside	323498	672263	No	Y façade	2.20	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
80	**Gorgie Road / Delhaig**	Roadside	321967	671666	Yes	Y façade	2.6	Y
5	**Gorgie Road/Murieston Road**	Kerbside	323484	672478	Yes	Y (4.9)	0.3	Y
11	**Lanark Road No No610**	Roadside	319527	668420	No	Y (3.7)	1.5	Y
77	**Slateford Road No 97**	Roadside	322960	671846	No	Y façade	2.67	Y
78	**Slateford Road/The Maltings**	Roadside	322772	671606	No	Y façade	2.2	Y

Table 2.2a Details of New Non-Automatic Monitoring Sites 2012 for Nitrogen Dioxide

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 ?
	CITY CENTRE - SOUTH							
138	**Clerk Street No 15**	Roadside	326229	672287	No	Y façade	2.35 +2 [b]	Y
48D	**CowgateNo 148**	Roadside	325845	673480	Yes	Y façade	2.0	Y
48B	**CowgateNo 301**	Roadside	326132	673519	Yes	Y façade	3.8 +2 [b]	Y
48C	**Cowgate Blackfriars**	Roadside	326047	673519	Yes	Y façade	2.4	Y
48E	**CowgateheadNo 2**	Roadside	325537	673405	Yes	Y façade	1.9	Y
79C	**Dundee StreetNo 114**	Roadside	324213	672743	No	Y façade	3.4	Y
79D	**Dundee Street/Yeaman Place**	Roadside	323962	672550	No	Y façade	2.3	Y
79A	**FountainbridgeNo103**	Roadside	324731	672984	No	Y façade	2.2	Y
79B	**Fountainbridge/Grove Street**	Roadside	324438	672859	No	Y façade	2.2	Y
37C	**Grassmarket/Thompsons Court**	Background	325397	673377	Yes	Y façade	21 + 2.1 [b]	N
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
137	**Nicolson Street No 124**	Roadside	326181	672971	No	Y façade	3.4 + 2 [b]	Y
135	**Nicolson Street No 69**	Roadside	326112	673115	No	Y façade	3 + 2	Y
136	**Nicolson Street No 92**	Roadside	326164	673054	No	Y façade	3.74 + 2 [b]	Y
134	**Nicolson St/Surgeons Hall**	Roadside	326072	673234	No	Y façade	3.35	Y
142	**South Clerk Street No 41a**	Roadside	326367	672554	No	Y façade	1.96 + 2 [b]	Y
141	**South Clerk Street No 84**	Roadside	326383	672472	No	Y façade	2.57 + 2 [b]	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 ?
	WEST							
40F	**Hillhouse Road No 118**	Roadside	322478	674406	No	Y (2.57)	2.6	Y
40C	**Hillhouse Road No240**	Roadside	322082	674543	No	Yfaçade	3.2	Y
40A	**Hillhouse Road/Telford Road**	Roadside	321526	674945	No	Y façade	4.5 + 7[b]	Y
40B	**Hillhouse/Craigcrook Terrace**	Roadside	321990	674586	No	Y (4.9)	2.1	Y
40E	**Hillhouse/Marischall PlaceNo1**	Roadside	322153	674470	No	Y façade	2.8	Y
40D	**Hillhouse/Marischall Place No 4**	Roadside	322123	674492	No	Y façade	3.1	Y
64A	**Queensferry RoadNo 552**	Roadside	318698	674964	No	Y façade	10.5	Y
	SOUTH WEST							
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
80C	**Gorgie Road No 87**	Roadside	323265	672394	Yes	Y façade	2.5	Y
80B	**Gorgie Road No 549**	Roadside	321724	671557	Yes	Y façade	2.5	Y
80A	**Gorgie Road Glen Lea**	Roadside	322381	671950	Yes	Y façade	2.6	Y
76D	**Henderson Terrace**	Roadside	323632	672449	No	Y façade	1.8	Y
77A	**Slateford Road No 51**	Roadside	323167	672999	No	Y façade	2.3	Y
77B	**Slateford Road No 93/95**	Roadside	322999	671876	No	Y façade	2.6	Y

[a] Site relocated in 2012 in close proximity to previous site

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

[c] Amendments made to distance measurement following review of site location

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

Data from a number of the automatic monitoring stations has been corrected using DEFRA's Distance Correction Calculator Tool [2] to account for relevant exposure. 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. The Roseburn and Haymarket stations were setback from residential properties, so the tool was used to calculate exposure closer to the roads, in alignment with residential properties.

The automatic monitoring data for 2012, corrected where necessary, complies with the annual and hourly mean nitrogen dioxide objectives except at St John's Road. Data from the Queensferry Road monitoring site is borderline in comparison with the annual mean objective, as the result is 40µg/m^3. Data capture for the year was 87%. There has also been a slight increase in measured concentrations at Queensferry Road passive diffusion tube monitoring sites. This may be attributable to major road-works to accommodate utilities infrastructure work and footway crossing maintenance, resulting in traffic congestion.

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

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

Site ID	Site Name	Within AQMA?	Valid Data Capture forMonitoring Period %[a]	Valid Data Capture 2012 %[b]	Annual Mean Concentration (µg/m^3)				
					2008	2009	2010	2011	2012
1	**Queen Street**	Y	N/A	95	32	33	37	29	28
2	**Haymarket**	Y	N/A	N/A	**41 (49)**	-	N/A	N/A	N/A
3	**Roseburn**	Y	N/A	N/A	28 (31)	26 (28)	30 (33)	24[c]	N/A
4	**Gorgie Road**	Y	N/A	99	**42**	38	**41**	37	39
5	**St John's Road**	Y	N/A	92	**75**	**70**	**71**	**65**	**58**
6	**Currie**	N	N/A	99	-	-	10	6	8
7	**St Leonard's**	N	N/A	99	31	24	31	25	24
8	**Salamander Street**	N	N/A	98	-	30	30	29	30
9	**Queensferry Road**	N	N/A	87	-	-	N/A	41(29)	52**(40)**
10	**Glasgow Road**	Y	98	32	N/A	N/A	N/A	N/A	29[c]

Notes for table;

In bold and red, exceedence of the NO_2 annual mean objective of 40µg/m^{3}and in bold, result of 40µg/m^{3}shown

a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year
b i.e. data capture for the full calendar year
c Mean "annualised" as valid data capture is less than 75%. Calculation for Glasgow Road 2012 is shown in Appendix 5

Data in brackets represents the estimated annual concentration at relevant receptors using the NO2 Fall Off with Distance calculator (DEFRA website, LAQM, Tools, 2013).

Currie air quality monitoring station is not currently supported by the Scottish Government's data ratification programme. The data for this site has therefore not been ratified. See Appendix A6 for further information.

Table 2.3b Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %[a]	Valid Data Capture 2012 %[b]	Number of Hourly Means > 200µg/m^3				
					2008	2009	2010	2011	2012
1	Queen Street	Y	N/A	95	0	0	0	0	0
2	Haymarket	Y	N/A	N/A	1	N/A	N/A	N/A	N/A
3	Roseburn	Y	N/A	N/A	0	0	1	0 (101)[c]	N/A
4	Gorgie Road	Y	N/A	99	0	0 (130)[c]	0 (122)[c]	0	0
5	St John's Road	Y	N/A	92	**166**	**114**	**60**	**52**	**62**
6	Currie	N	N/A	99	N/A	N/A	0	0	0
7	St Leonard's	N	N/A	99	0	0	0	0	0
8	Salamander St	N	N/A	98	0	0 (144)[c]	0	0	0
9	Queensferry Rd	N	N/A	87	N/A	N/A	N/A	0	3
10	Glasgow Road	Y	98	32	N/A	N/A	N/A	0	0

Notes for table;

In bold and red, exceedence of the NO_2 hourly mean objective (200µg/m^3 – not to be exceeded more than 18 times per year)

[a] data capture for the monitoring period, in cases where monitoring was only carried out for part of the year
[b] data capture for the full calendar year
[c] If the data capture for full calendar year is less than 90%, the 99.8th percentile of hourly means is in brackets

Currie air quality monitoring station is not currently supported by the Scottish Government's data ratification programme. The data for this site has therefore not been ratified. See Appendix A6 for further information.

Trends in Annual Mean NO_2 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 and St John's Road and trend lines have been drawn using an Excel simple regression statistical program. Data trends are shown in Figures 2.3 to 2.7 and summarised in Table 2.4.

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

Nitrogen Dioxide Automatic Monitoring Data – Annual Trend			
Monitoring Location	**Site Type**	**Trend in annual mean NO_2 (years included)**	**Concentrations of NO_2**
St Leonard's	Urban background	--- (2004 to 2012)	Flattening
Queen Street	Roadside	↓ (2006 to 2012)	Decreasing
Gorgie Road	Roadside	--- (1999 to 2012)	Flattening
St John's Road	Kerbside	↓ (2007 to 2012)	Decreasing

The annual mean concentration of 24ug/m^3 at the urban background site at St Leonard's is the lowest since monitoring began there in 2004. There is also a flattening trend at Gorgie Road. The data show a downward trend from 1999 to 2005 followed by a significant uptick in 2006 with no falling pattern since. This is coincident with a large upgrade in the bus fleet to Euro 3 engined vehicles.

Monitoring at Queen Street and St John's Road shows a downward trend since it commenced in 2006 and 1999 respectively.

The number of hourly exceedences of nitrogen dioxide have significantly reduced at St John's Road from 166 in 2008 to 62 in 2012. This shows a downward trend although there was a slight increase in exceedences between 2011 and 2012. Exceedances are restricted to the winter months with nine in January, nine in February, three in November and 41 in December of which 29 occurred between 10th to 13th December

An investigation report on Scottish Air Quality website focussed on PM_{10} in Glasgow area stated the following(19) "Weather conditions over the 11th and 12th December, and leading up to this time, was dominated by a high pressure system and air masses sourced from the Arctic and Scandinavia. Air masses from this direction normally bring in clean air however the high pressure system created very cold and dry conditions with temperatures staying around or below freezing throughout both days. It also created very little or no breeze and large pockets of freezing mist. These very poor pollution dispersion conditions caused pollutants to re-circulate and stagnate."

The temporary changes in traffic management for tram construction works continued throughout the city in 2012. Conclusive analysis of trends is therefore difficult to ascertain.

Figure 2.3 Trend in Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) measured at St Leonard's AURN

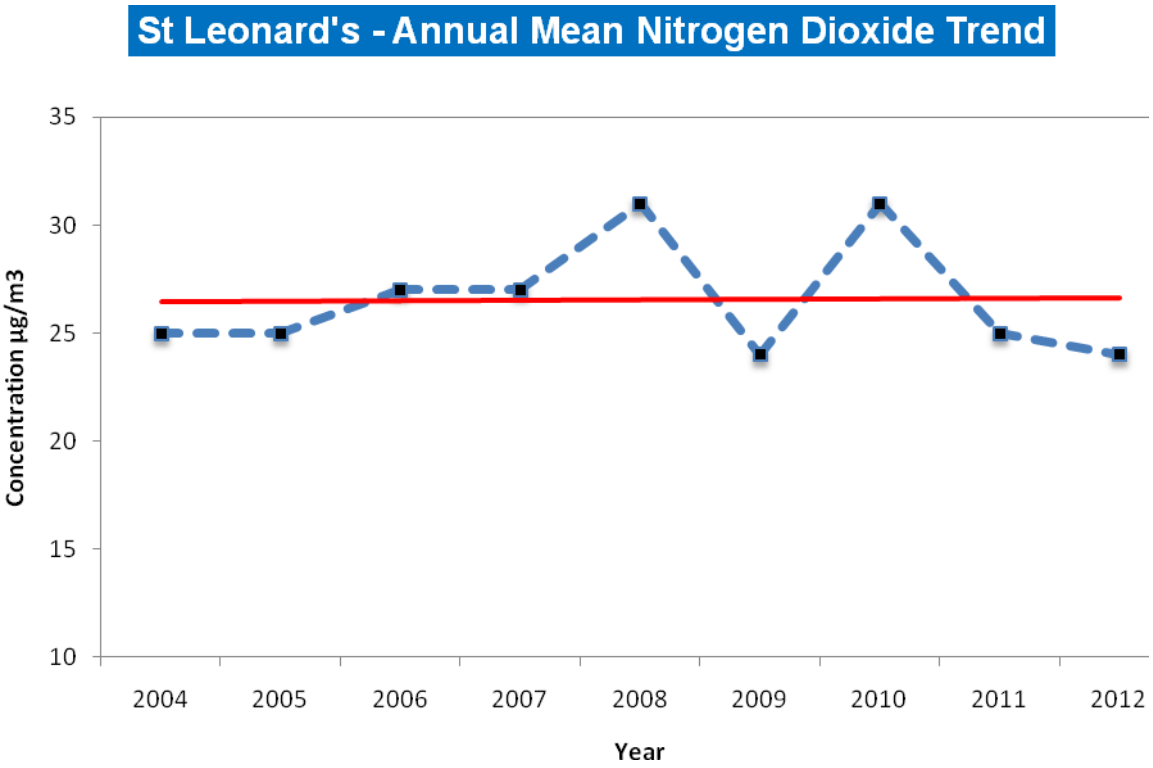


Figure 2.4 Trend in Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) measured at Queen Street

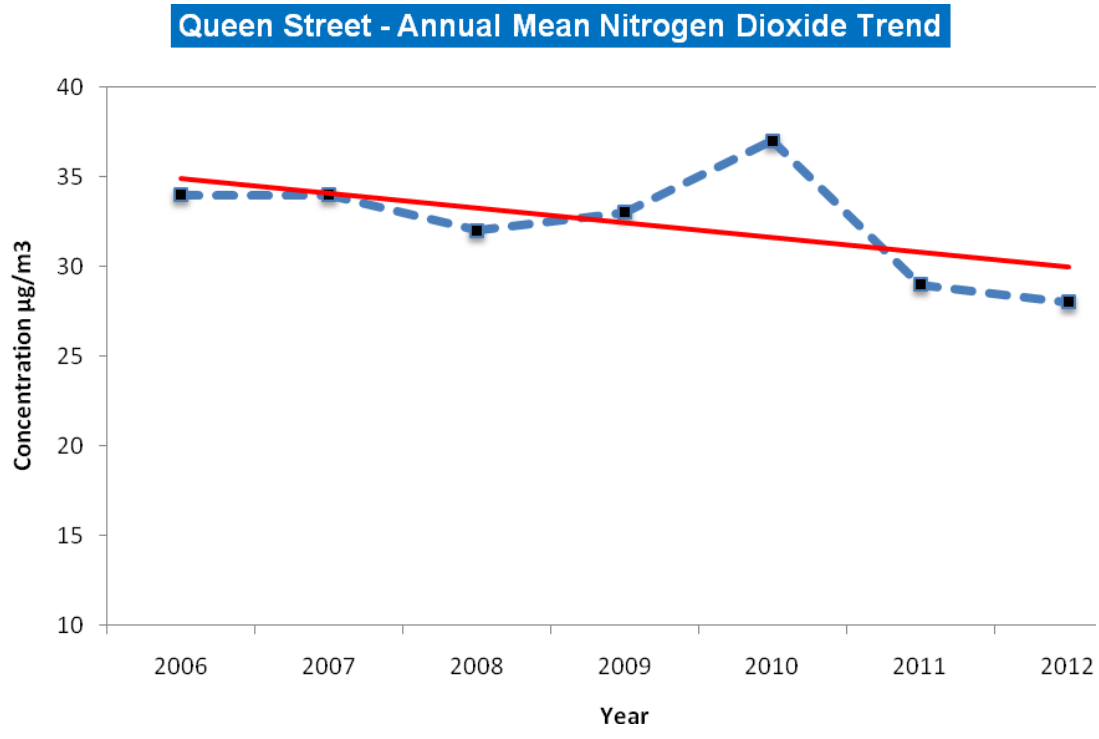


Figure 2.5 Trend in Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) measured at Gorgie Road

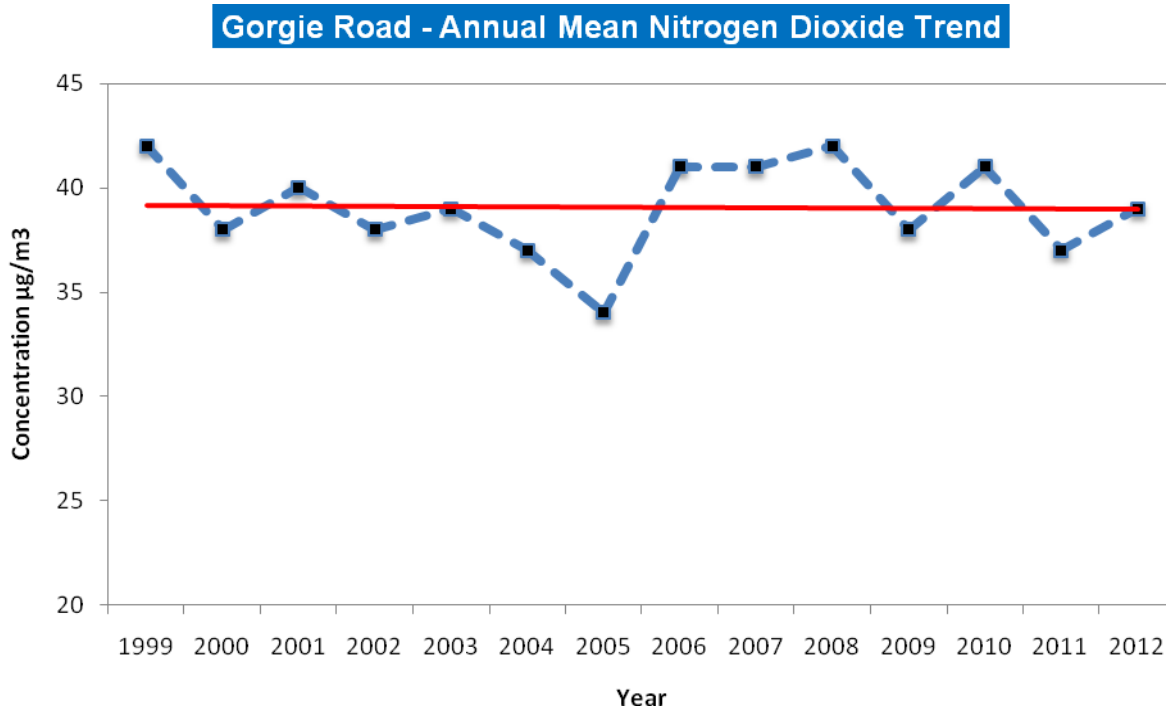


Figure 2.6 Trend in Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) measured at St John's Road

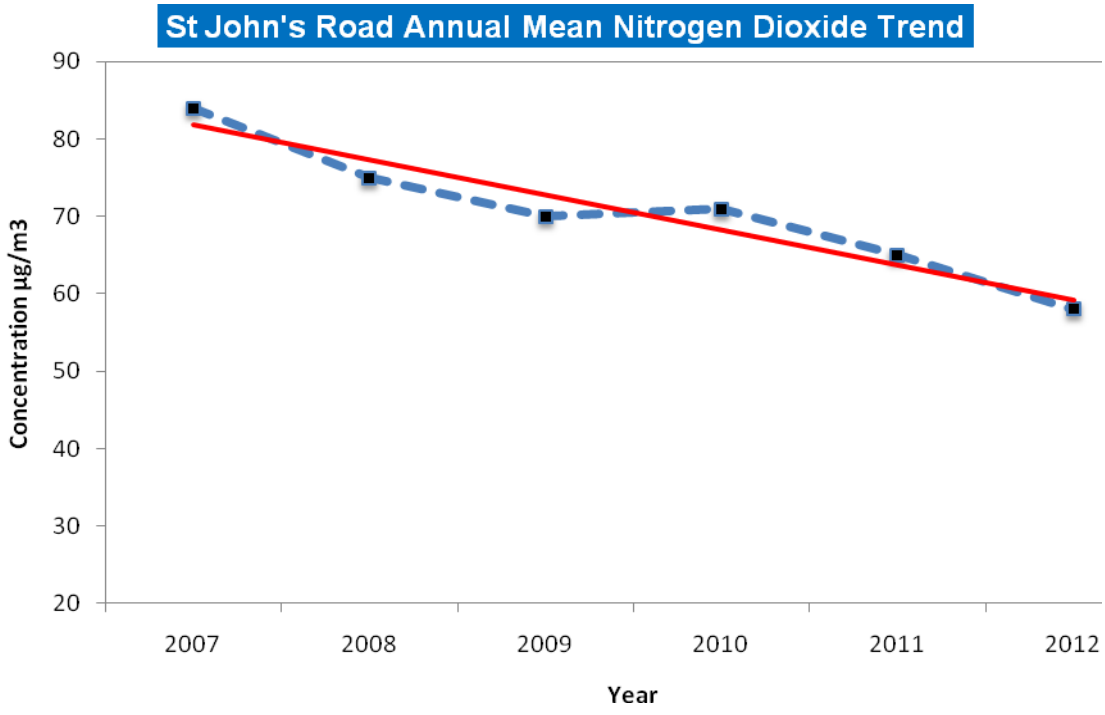
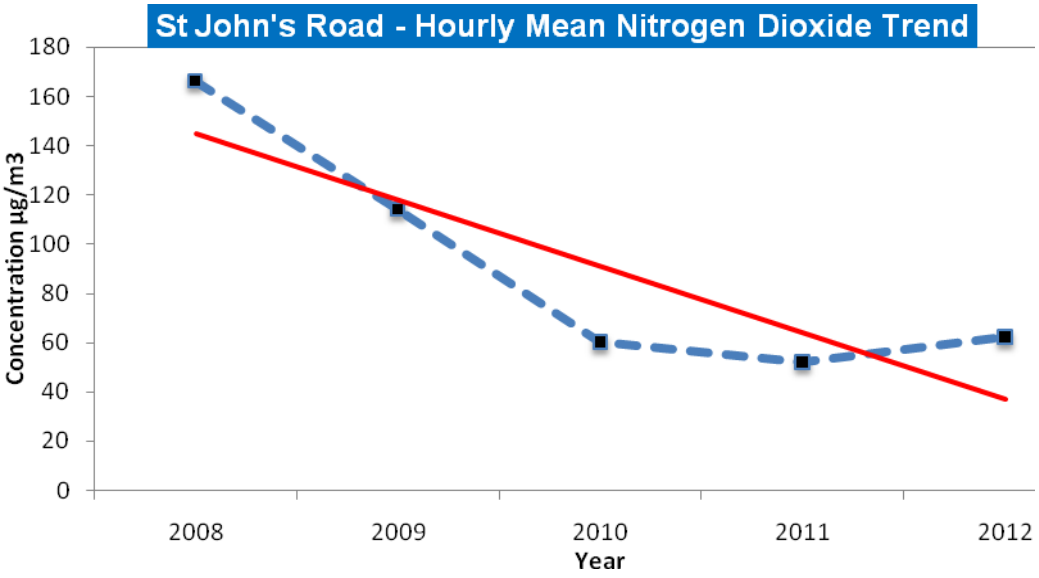


Figure 2.7 Trend in the Number of Exceedences of the Hourly Mean Objective for Nitrogen Dioxide at St John's Road



Non-Automatic (Diffusion Tube) Monitoring Data – Discussion of Results

Exceedences

The passive diffusion tube monitoring for 2012 shows exceedences of the annual mean nitrogen dioxide objective within each of the AQMAs, with likely exceedence of the hourly mean objective in West Port. Results show all the AQMAs remain valid. See Table of Results 2.5 and 2.5a.

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

All these sites are considered in more detail in the Detailed Assessment section below, except Queensferry Road (ID64). Distance corrected monitoring at this roadside location has been showing consistently elevated concentrations (50µg/m^3, 2012) compared to adjacent sites. In August 2012 an additional passive diffusion tube (ID64a) was located at the facade of a property, coincident with the existing site.

Data was collected for five months and an estimated annual concentration derived using annualisation details prescribed in Technical Guidance 09 (TG09) [3]. This resulted in an estimated concentration of 30µg/m^3at ID64a, which is contrary to result at ID64. Monitoring will continue throughout 2013 at these sites to gather further data and investigations with local residents will also be undertaken.

Other monitored concentrations in the Queensferry Road area remain below the annual mean objective, although slightly higher in 2012 than the previous year (comparable with data from the automatic monitoring). This may be attributable to major roadworks to accommodate utilities infrastructure work and footway crossing maintenance, resulting in traffic congestion.

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. The site at Hillhouse Road (ID40) shows a result of 40μg/m^3 and is considered further in the Detailed Assessment section below. A detailed assessment is also carried out at Hope Park Terrace (ID17a, 39μg/m^3).

Data from monitoring at Salamander Street remains close to the annual mean objective; ID51b = 38μg/m^3(and ID51c = 35μg/m^3). The result from the automatic monitoring site was 30μg/m3. Monitoring will continue at these sites.

Areas of Compliance in AQMAs

A review of results from locations within current AQMAs show that some areas have fallen below the annual mean objective and are in borderline compliance. The data is tabulated in Table 2.8b

St John's Road AQMA

Data from 2012 has been plotted on the AQMA map and is shown in Figure 2.8a Exceedances in this year were limited to the prevailing wind protected south side of St John's Road canyon around the Clermiston Road junction. This area appears to be particularly affected by weather conditions such as high pressure events with little air movement causing exceedances of the hourly mean. Discussions are on-going within the Council about further potential measures in addition to the MOTES trial that could be taken to mitigate the idling of traffic at this junction. If the 2013 data shows a continuation of the localisation of the problem on St John's Road the extent of the AQMA boundaries can be reviewed.

Great Junction Street AQMA

Data from 2012 has been plotted on the AQMA map and is shown in Figure 2.8b. All results within the original AQMA boundary were less than the annual mean objective and are in borderline compliance with the objective. The average nitrogen dioxide level has been falling gradually, perhaps due to introduction by Lothian Buses of a number of low emission hybrid buses on the route in 2011. If the 2013 data shows a continuation of the nitrogen dioxide reduction the extent of the AQMA boundaries can be reviewed in future years.

Data from the extended portion of the AQMA shows only the junction at Bernard Street above the annual mean objective. The Transport Infrastructure & Environment Committee at its meeting on 13 September 2012 agreed to a Transport Regulation Order to make the Shore at Bernard Street junction one way only south bound which is expected to reduce the traffic using the junction. At the time of writing work had not yet commenced.

Central AQMA

Due to tram work the majority of Shandwick Place has been closed to traffic for a number of years. The automatic station at Queen Street at Wemyss Place remains well below the annual mean objective and the non-automatic sites on Leith Walk remain in borderline compliance with the objective. A major project of works is on-going around Leith Walk following the tram roadwork's which may impact traffic flow. Further detail is contained within section 3.1. It would be prudent to include these areas in the next review which should be post tram implementation to determine if their inclusion in the AQMA remains valid.

General Notes

Monitoring at George Street (ID74c) ceased in September 2012 due to the post being lost. Data collected was therefore annualised to obtain an estimated annual mean concentration of 56$\mu g/m^3$.

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

Appendix C details the calculations used to estimate annual concentration at relevant receptors using the NO_2 Fall Off with Distance calculator (DEFRA website, LAQM, Tools, 2013).

Appendix A5 (Short-term to Long-term Data adjustment for NO_2) shows the calculations undertaken to estimate the annual mean concentration where data capture was poor, as per instruction in TG09 and with further advice from the LAQM Helpdesk. All monthly periods of data collected in 2012 have been used for the estimation process. With 2011 data, the annualisation calculation was undertaken only with extensive periods of consecutive monthly data.

In 2012, data from a number of sites were not 'annualised' due to the extreme sporadic nature of data capture and concerns about achieving robust and confident estimations. Generally it has been possible to use other monitoring sites in close proximity.

Table 2.5 Results of NO_2 Diffusion Tubes 2012

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2012 %	2012 Annual Mean Concentration (µg/m^3) Bias Adjustment factor = 0.76 [a]
	NORTH					
29	**Bernard Street/CA**	Roadside	Yes	No	100	37
29a	**Bernard Street/King Chamber.**	Roadside	Yes	Yes	88	**40**
29b	**Bernard StreetNo 32**	Roadside	Yes	No	100	33
29c	**Bernard Street/PS**	Roadside	Yes	Yes	92	**44**
7	**Commercial StreetNo 11**	Roadside	Yes	No	92	29
9	**Commercial StreetNo 78**	Roadside	Yes	No	100	35
9a	**Commercial St/PortlandPlace**	Roadside	Yes	No	92	39
52	**Ferry Road No 268**	Roadside	No	No	92	34
53	**Ferry Road/Bowhill Terrace No6**	Roadside	Yes	No	100	35
45b	**Ferry Road/Maderia Street**	Roadside	No	No	92	31
45	**Ferry Road/North Fort Street**	Roadside	No	No	100	36
45d	**Ferry Road/North Junction St**	Roadside	Yes	No	92	37
30b	**Great Junction StreetNo 137**	Roadside	Yes	No	92	38
30c	**Great Junction StreetNo 14**	Roadside	Yes	No	92	38
30e	**Great Junction Street/CG**	Roadside	Yes	No	83	37
30	**Great Junction Street/FV**	Roadside	Yes	Yes	96	38
30d	**Great Junction Street/WC**	Roadside	Yes	No	100	38
55	**Inverleith Row/Ferry Road**	Roadside	Yes	Yes	100	**46**
55c	**Inverleith Row/Montague**	Roadside	Yes	No	100	32
9b	**Ocean Drive/Leith**	Roadside	No	No	83	32
51c	**Salamander Street/Baltic Street**	Roadside	No	No	100	35

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2012 %	2012 Annual Mean Concentration (µg/m^3) Bias Adjustment factor = 0.76 [a]
51b	**Salamander Street/Bath Street**	Roadside	No	No	92	38
14	**Trinity Crescent**	Roadside	No	No	100	28
	EAST					
19	**Baileyfield Road**	Roadside	No	No	100	22
31	**Dalkeith RoadNo 187**	Roadside	No	No	92	29
25	**Easter Road/CH Shop**	Roadside	Yes	No	92	**45**
25b	**Easter Road/Rossie Place**	Roadside	Yes	No	100	35
25c	**Easter RoadNo 105/109**	Roadside	Yes	No	92	**41**
25d	**Easter Road/Bothwick**	Roadside	Yes	No	100	34
25e	**Easter RoadNo 198**	Roadside	Yes	No	100	33
25f	**Easter RoadNo 271**	Roadside	No	No	58	N/A
25g	**Easter RoadNo 327**	Roadside	No	No	75	28
81	**London Rd/East Norton Place**	Roadside	Yes	No	100	**46**
67	**London Road/Earlston Place**	Roadside	Yes	No	100	**46**
68	**Parsons Green Terrace**	Roadside	Yes	No	92	33
69	**London Road/Wolseley Place**	Roadside	Yes	No	82	**42**
70	**London Road/Wolseley Terrace**	Roadside	Yes	No	92	**41**
66	**London Road/Cadzow Place**	Roadside	Yes	No	100	36
46	**London Road/Easter Road**	Roadside	Yes	No	100	**41**
32	**Niddrie Mains RoadNo 28**	Kerbside	No	No	100	30
82	**Piersfield Terrace**	Roadside	No	No	100	28
73b	**Portobello High Street No23**	Roadside	No	No	100	28
73c	**Portobello High Street No 292**	Roadside	No	No	100	24
73	**Portobello High StreetNo 74**	Roadside	No	No	92	25
71	**Portobello High StreetNo 185**	Roadside	No	Yes	83	33

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2012 %	2012 Annual Mean Concentration (µg/m^3) Bias Adjustment factor = 0.76 [a]
73a	**Portobello Road/Ramsay**	Roadside	No	No	100	37
72	**Seafield Road East No 10**	Roadside	No	No	100	37
	CITY CENTRE - NORTH					
43	**Broughton Road**	Roadside	No	No	100	37
44	**Broughton Street**	Roadside	No	No	100	34
13	**Deanhaugh Street**	Kerbside	No	No	92	32
35	**Dundas Street**	Kerbside	No	No	100	31
74f	**George Street No 112**	Roadside	Yes	No	92	**47**
74c	**George Street No 41**	Roadside	Yes	No	67	**56**[b]
74e	**George Street/Charlotte Sq**	Kerbside	Yes	No	75	**43**
75c	**Great Stuart Street No 18**	Kerbside	No	No	100	32
75b	**Great Stuart Street No 7**	Kerbside	No	No	100	31
34	**India Street**	Background	No	No	100	23
55b	**Inverleith Row/Summer Place**	Roadside	No	No	92	32
21	**LeithWalk/Brunswick Road**	Roadside	Yes	No	83	36
20	**Leith Walk/McDonald Road**	Kerbside	Yes	No	100	37
47	**Princes Street (Eastbound)**	Roadside	Yes	No	100	34**(45)**[c]
24	**Princes Street/Mound**	Kerbside	Yes	No	92	38
33	**Queen Street/Hanover Street**	Roadside	Yes	No	67	**49** [b]
75a	**St Colme Street**	Kerbside	No	No	48	38
36	**York Place**	Roadside	Yes	No	83	**41**
	CITY CENTRE - SOUTH					
48	**Cowgate/Gurthrie Street**	Roadside	Yes	No	92	**40**
48a	**Cowgate/Blair Street**	Roadside	Yes	No	100	**40**

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2012 %	2012 Annual Mean Concentration (µg/m^3) Bias Adjustment factor = 0.76 [a]
79	**Fountainbridge/Tollcross**	Roadside	No	No	100	37
37	**Grassmarket/PS**	Roadside	Yes	No	83	35
37a	**GrassmarketNo 41**	Roadside	Yes	Yes	83	**43**
37b	**GrassmarketNo 75**	Roadside	Yes	No	75	39
10	**Home Street**	Roadside	No	No	75	33
17a	**Hope Park Terrace/VS**	Roadside	No	Yes	83	39
38	**Melville Drive**	Roadside	No	No	92	29
42	**Midmar Drive**	Background	No	No	100	18
8	**Morningside Road**	Kerbside	No	No	75	26
49	**Morrison Street**	Roadside	Yes	No	100	**46**
27	**North Bridge – South**	Roadside	Yes	No	100	**52**
3	**Torphichen Place**	Roadside	Yes	No	92	**48**
2	**West Maitland Street**	Kerbside	Yes	Yes	100	**40**
28	**West Port/Grassmarket**	Roadside	Yes	No	42	N/A
28b	**West PortNo 62**	Roadside	Yes	No	83	**61**
28c	**West PortOppNo 50**	Roadside	Yes	No	58	N/A
28d	**West PortNo 42**	Roadside	Yes	No	92	**60**
	WEST					
56	**Glasgow Road /Drumbrae**	Roadside	No	No	100	31
57	**Glasgow Road No 158**	Roadside	No	No	100	36
16	**Glasgow RoadNo 68**	Roadside	Yes	Yes	100	**47**
15	**Glasgow RoadNewbridge**	Roadside	Yes	No	100	**40**
58	**Glasgow RoadNewbridge**	Roadside	Yes	Yes	96	**48**
41	**Hillview Terrace**	Background	No	No	100	21
61	**Maybury Road/Barnton**	Roadside	No	No	100	16

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2012 %	2012 Annual Mean Concentration (µg/m^3) Bias Adjustment factor = 0.76 [a]
40	**Queensferry Rd/Hillhouse Rd**	Roadside	No	No	100	**40**
62	**Queensferry Road No 561**	Roadside	No	No	100	25
63	**Queensferry Road No 544**	Roadside	No	No	100	26
64	**Queensferry Road No 550**	Roadside	No	No	100	**50**
23	**RoseburnTerrace**	Kerbside	Yes	No	75	38
1	**St John's Road SB**	Kerbside	Yes	No	92	38
1b	**St John's Road IR**	Roadside	Yes	No	100	**44**
1d	**St John's RoadNo 131**	Roadside	Yes	No	100	**52**
39	**St John's Road**	Roadside	Yes	No	92	32
50a	**Whitehouse Rd/Barnton Grove**	Roadside	No	No	67	32 [b]
	SOUTH WEST					
76	**Angle Park/Harrison Road**	Roadside	No	No	100	**48**
4	**Calder Road**	Roadside	No	No	100	32
18	**Gorgie RoadNo 8**	Roadside	Yes	Yes	92	**49**
80	**Gorgie Road / Delhaig**	Roadside	Yes	No	100	**42**
5	**Gorgie Road/Murieston Rd**	Kerbside	Yes	No	100	**43**
11	**Lanark Road No 610**	Roadside	No	No	92	24
77	**Slateford RoadNo 97**	Roadside	No	No	100	**43**
78	**Slateford Road/The Maltings**	Roadside	No	No	100	31

See notes for table on Page 53

Table 2.5a Results of New NO_2 Diffusion Tubes 2012

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2012 %	2012 Annual Mean Concentration ($\mu g/m^3$) Bias Adjustment factor = 0.76 [a]
	CITY CENTRE - SOUTH					
138	**Clerk Street No 15**	Roadside	No	N	67	**40** [b]
48D	**CowgateNo 148**	Roadside	Yes	N	17	N/A
48B	**CowgateNo 301**	Roadside	Yes	N	83	33
48C	**Cowgate Blackfriars**	Roadside	Yes	N	67	**43** [b]
48E	**CowgateheadNo 2**	Roadside	Yes	N	58	N/A
79C	**Dundee Street No 114**	Roadside	No	N	33	N/A
79D	**Dundee Street/Yeaman Place**	Roadside	No	N	50	N/A
79A	**FountainbridgeNo 103**	Roadside	No	N	83	39
79B	**Fountainbridge/Grove Street**	Roadside	No	N	75	32
37C	**Grassmarket/Thompsons Court**	Background	Yes	N	92	30
139	**Hope Park Terrace No 5**	Roadside	No	N	100	34
140	**Hope Park Terrace/Clerk Street**	Roadside	No	N	92	35
137	**Nicolson Street No 124**	Roadside	No	N	92	**41**
135	**Nicolson Street No 69**	Roadside	No	N	100	**50**
136	**Nicolson Street No 92**	Roadside	No	N	92	**42**
134	**Nicolson Street/Surgeons Hall**	Roadside	No	N	42	N/A
142	**South Clerk Street No 41a**	Roadside	No	N	92	**42**
141	**South Clerk Street No 84**	Roadside	No	N	92	**44**
	WEST					
40F	**Hillhouse Road No 118**	Roadside	No	N	100	35

Site ID	Site Name	Site Type	In AQMA?	Result is Mean of Duplicate	Data Capture for calendar year 2012 %	2012 Annual Mean Concentration (µg/m^3) Bias Adjustment factor = 0.76 [a]
40C	**Hillhouse Road No 240**	Roadside	No	N	100	30
40A	**Hillhouse Road/Telford Road**	Roadside	No	N	100	28
40B	**Hillhouse/Craigcrook Terrace**	Roadside	No	N	100	26
40E	**Hillhouse/Marischall Pl 1**	Roadside	No	N	83	28
40D	**Hillhouse/Marischall Pl 4**	Roadside	No	N	83	32
64A	**Queensferry Road No 552**	Roadside	No	N	42	30 [b]
	SOUTH WEST					
76C	**Angle Park Terrace No 25**	Roadside	No	N	100	36
76B	**Angle Park Terrace No 74**	Roadside	No	N	100	**51**
76A	**Ardmillan Terrace No 22**	Roadside	No	N	83	32
80C	**Gorgie Road No 87**	Roadside	Yes	N	67	39 [b]
80B	**Gorgie Road No 549**	Roadside	Yes	N	83	33
80A	**Gorgie Road Glen Lea**	Roadside	Yes	N	58	N/A
76D	**Henderson Terrace**	Roadside	No	N	83	38
77A	**Slateford Road No 51**	Roadside	No	N	83	**41**
77B	**Slateford Road No 93/95**	Roadside	No	N	100	**46**

In bold and red, exceedence of the NO_2 annual mean objective of 40µg/m^{3}and in bold, results of 40µg/m^{3}shown

Underlined, annual mean greater than 60µg/m^3, indicating a potential exceedence of the NO_2 hourly mean objective

[a] All data is representative of relevant exposure, except at background sites India Street (ID34), Hillview Terrace (ID41) and Midmar Drive (ID42), 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] Princes Street (ID47) data in brackets represents pavement exposure 2.5m from the kerb. Data without brackets represents concentrations at the facade

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 (µg/m^3)
76	**Angle Park/Harrison Road**	100	**48**
76B	**Angle Park Terrace No 74 ***	100	**51**
137	**Nicolson Street No 124***	92	**41**
135	**Nicolson Street No 69***	100	**50**
136	**Nicolson Street No 92***	92	**42**
64	**Queensferry Road No 550**	100	**50**
142	**South Clerk Street No 41a***	92	**42**
141	**South Clerk Street No 84***	92	**44**
77	**Slateford Road No 97**	100	**43**
77A	**Slateford Road No 51***	83	**41**
77B	**Slateford Road No 93/95***	100	**46**

* New monitoring locations not previously reported

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

Table 2.7 Results of NO_2 Diffusion Tubes (2008 to 2012)

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/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)
	NORTH						
29	**Bernard Street/CA**	Yes	**45.3**	**45.1**	**43.7**	38.9	37
29a	**Bernard Street/King Chambers**	Yes	**48.0**	**42.0**	**44.6**	**41.9**	**40**
29b	**Bernard Street No 32**	Yes	**41.3**	32.9	36.9	32.7	33
29c	**Bernard Street/PS**	Yes	**53.4**	**48.2**	**49.4**	**44.6**	**44**
7	**Commercial Street No 11**	Yes	38.6	34.8	34.2	32.2	29
9	**Commercial Street No 78**	Yes	**40.4**	31.6	36.7	31.2	35
9a	**Commercial Street /Portland Place**	Yes	-	-	38.1	**41.0**	39
52	**Ferry Road No 268**	No	-	32.1	32.4	32.5	34
53	**Ferry Road/Bowhill Terrace No 6**	Yes	-	36.4	34.8	32.5	35
45b	**Ferry Road/Maderia Street**	No	35.3	30.9	33.5	32.7	31
45	**Ferry Road/North Fort Street**	No	**39.6**	35.4	**41.5**	32.6	36
45d	**Ferry Road/North Junction Street**	Yes	**42.4**	**40.9**	38.3	39.6	37
30b	**Great Junction Street No 137**	Yes	38.4	38.5	39.9	**40.0**	38
30c	**Great Junction Street No 14**	Yes	**50.2**	**42.6**	**44.1**	38.4	38
30e	**Great Junction Street/CG**	Yes	**43.1**	**41.9**	38.7	**41.2**	37
30	**Great Junction Street/FV**	Yes	**44.6**	**44.1**	**41.8**	39.1	38
30d	**Great Junction Street/WC**	Yes	39.0	37.1	39.9	33.8	38
55	**Inverleith Row/Ferry Road**	Yes	-	**42.6**	**44.0**	**43.8**	**46**
55c	**Inverleith Row/Montague**	Yes	-	-	-	28.2	32
9b	**Ocean Drive/Leith**	No	-	-	33.0	26.2	32
51c	**Salamander Street/Baltic Street**	No	-	37.1	36.2	38.5	35

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/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)
51b	Salamander Street/Bath Road	No	-	37.4	**40.3**	37.0	38
14	Trinity Crescent	No	28.3	28.6	27.5	28.9	28
	EAST						
19	Baileyfield Road	No	24.6	22.5	27.5	24.3	22
31	Dalkeith Road No 187	No	31.8	28.1	27.8	28.0	29
25	Easter Road/CH shop	Yes	**58.2**	**50.8**	**49.7**	**43.6**	**45**
25b	Easter Road/Rossie Place	Yes	**44.9**	38.8	39.1	35.8	35
25c	Easter Road No 105/109	Yes	**43.8**	38.0	37.7	**41.0**	**41**
25d	Easter Road/Bothwick	Yes	**40.8**	37.3	37.1	32.7	34
25e	Easter Road No 198	Yes	37.3	34.1	34.2	32.0	33
25f	Easter Road No 217	No	35.0	30.1	32.5	27.9	-
25g	Easter Road No 327	No	33.4	27.9	30.3	26.8	28
81	London Road/East Norton Place	Yes	-	-	-	**51.2**	**46**
67	London Road/Earlston Place	Yes	-	**47.9**	**51.3**	**45.5**	**46**
68	London Road /Parsons Green Ter	Yes	-	30.4	36.6	31.5	33
69	London Road/Wolseley Place	Yes	-	**56.2**	**50.6**	**50.4**	**42**
70	London Road/Wolseley Terrace	Yes	-	**47.3**	**46.1**	**42.4**	**41**
66	London Road/Cadzow Place	Yes	-	**43.0**	**40.5**	-	36
46	London Road/Easter Road	Yes	**52.3**	**43.4**	**46.2**	**40.4**	**41**
32	Niddrie Mains Road No 28	No	26.9	30.7	32.5	30.9	30
82	Piersfield Terrace	No	-	-	-	27.8	28
73b	Portobello High StreetNo 23	No	-	-	-	31.2	28
73c	Portobello High StreetNo 292	No	-	-	-	22.9	24

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/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)
73	Portobello High Street East No 74	No	-	26.3	25.5	26.3	25
71	Portobello High Street West No 185	No	-	**43.0**	39.2	36.0	33
73a	Portobello Road/Ramsay Institute	No	-	-	-	**41.6**	37
72	Seafield Road East No 10	No	-	35.0	38.4	33.1	37
	CITY CENTRE – NORTH						
43	Broughton Road	No	**40.4**	38.1	**39.8**	34.6	37
44	Broughton Street	No	37.7	35.1	35.3	32.8	34
13	Deanhaugh Street	No	32.3	30.1	33.0	33.5	32
35	Dundas Street	No	28.9	27.2	31.6	30.6	31
74f	George Street No 112	Yes	-	-	**43.4**	**44.7**	**47**
74c	George Street No 41	Yes	-	-	39.5	**41.1**	**56**
74e	George Street/Charlotte Square	Yes	-	-	**42.6**	**42.5**	**43**
75c	Great Stuart Street No 18	No	-	-	-	32.4	32
75b	Great Stuart Street No 7	No	-	-	36.2	33.4	31
34	India Street	No	22.7	22.6	22.7	23.6	23
55b	Inverleith Row/Summer Place	No	-	-	-	33.7	32
21	Leith Walk/Brunswick Road	Yes	37.3	35.3	35.4	34.2	36
20	Leith Walk/McDonald Road	Yes	**53.1**	36.8	38.1	N/A	37
47	Princes Street East Bound	Yes	**51.7 (64)**[a]	**31.6 (34)**[a]	**47.5 (58)**[a]	38.9 **(45.3)**[a]	34**(45)** [a]
24	Princes Street/Mound	Yes	**51.5**	36.2	**49.3**	N/A	38
33	Queen Street/Hanover Street	Yes	**43.7**	**50.8**	**56.3**	**50.0**	**49**
75a	St Colme Street	No	-	-	38.5	36.5	38
36	York Place	Yes	**40.5**	37.5	39.0	35.4	**41**

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/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)
	CITY CENTRE - SOUTH						
138	**Clerk Street No 15**	No	-	-	-	-	**40**
48	**Cowgate/Guthrie Street**	Yes	**46.6**	39.8	**46.2**	**40.2**	**40**
48	**Cowgate/Blair Street**	Yes	-	-	37.7	31.4	**40**
48B	**CowgateNo 301**	Yes	-	-	-	-	33
48C	**Cowgate Blackfriars**	Yes	-	-	-	-	**43**
79A	**FountainbridgeNo 103**	No	-	-	-	-	39
79B	**Fountainbridge/Grove Street**	No	-	-	-	-	32
79	**Fountainbridge/Tollcross**	No	-	-	**42.0**	36.3	37
37	**Grassmarket /PS**	Yes	35.1	35.4	38.4	32.5	35
37a	**GrassmarketNo 41**	Yes	**42.3**	**40.5**	**60.0**	**42.0**	**43**
37b	**GrassmarketNo 75**	Yes	-	-	-	37.1	39
37C	**Grassmarket/Thompsons Court**	Yes	-	-	-	-	30
10	**Home Street/Tollcross**	No	37.4	32.3	36.5	25.7	33
17a	**Hope Park Terrace/VS**	No	-	38.8	**43.4**	37.4	39
139	**Hope Park Terrace No 5**	No	-	-	**-**	-	34
140	**Hope Park Terrace/Clerk Street**	No	-	-	**-**	-	35
38	**Melville Drive**	No	26.2	25.3	27.6	27.3	29
42	**Midmar Drive**	No	17.4	15.2	18.4	16.1	18
8	**Morningside Road**	No	30.0	27.1	28.8	28.6	26
49	**Morrison Street**	Yes	**61.4**	**44.6**	**49.3**	**48.5**	**46**
137	**Nicolson Street No 124**	No	-	-	-	-	**41**
135	**Nicolson Street No 69**	No	-	-	-	-	**50**

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/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)
136	Nicolson Street No 92	No	-	-	-	-	42
27	North Bridge - South	Yes	52.3	48.4	49.4	48.7	52
142	South Clerk Street No 41a	No	-	-	-	-	42
141	South Clerk Street No 84	No	-	-	-	-	44
3	Torphichen Place	Yes	58.2	26.3	55.6	55.1	48
2	West Maitland St/Palmerston Place	Yes	70.1	45.6	52.4	55.3	40
28	West Port/Grassmarket	Yes	53.3	47.7	51.0	43.5	-
28b	West Port No 62	Yes	72.5	66.7	62.4	57.0	61
28c	West Port OppNo 50	Yes	51.5	43.5	41.5	39.0	-
28d	West Port No 42	Yes	66.6	60.2	54.9	55.2	60
	WEST						
56	Glasgow Road/Drumbrae	No	-	28.6	30.7	29.5	31
57	Glasgow Road No 158	No	-	34.9	36.3	36.5	36
16	Glasgow Road No 68	Yes	42.4	46.8	44.5	43.8	47
15	Glasgow Road Newbridge	Yes	35.7	42.0	37.6	40.9	40
58	Glasgow Road Newbridge	Yes	-	51.1	51.3	51.5	48
40F	Hillhouse Road No 118	No	-	-	-	-	35
40C	Hillhouse Road No 240	No	-	-	-	-	30
40A	Hillhouse Road/Telford Road	No	-	-	-	-	28
40B	Hillhouse/Craigcrook Terrace	No	-	-	-	-	26
40E	Hillhouse/Marischall PlaceNo 1	No	-	-	-	-	28
40D	Hillhouse/Marischall PlaceNo 4	No	-	-	-	-	32
41	Hillview Terrace	No	19.6	21.2	22.4	18.4	21

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/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)
61	Maybury Road/Barnton	No	-	24.2	27.0	25.8	16
40	Queensferry Road/Hillhouse Road	No	44.4	37.4	42.4	34.2	40
62	Queensferry Road No 561	No	-	22.0	25.6	19.2	25
63	Queensferry Road No 544	No	-	27.6	29.4	25.2	26
64	Queensferry Road No 550	No	-	46.8	47.5	43.9	50
64A	Queensferry Road No 552	No	-	-	-	-	30
23	Roseburn Terrace	Yes	49.5	37.2	43.2	34.5	38
1	St John's Road SB	Yes	41.2	36.7	38.6	35.1	38
1b	St John's Road IR	Yes	48.8	44.2	43.5	38.4	44
1d	St John's Road No 131	Yes	84.9	57.8	58.8	56.3	52
39	St John's Road	Yes	31.7	28.2	31.1	30.0	32
50a	Whitehouse Road/Barnton Grove	No	31.4	29.8	32.1	27.8	32
	SOUTH WEST						
76	Angle Park/Harrison Road	No	-	-	52.9	44.4	48
76C	Angle Park Terrace No 25	No	-	-	-	-	36
76B	Angle Park Terrace No 74	No	-	-	-	-	51
76A	Ardmillan Terrace No 22	No	-	-	-	-	32
4	Calder Road	No	29.5	26.3	25.9	31.7	32
80C	Gorgie Road No 87	Yes	-	-	-	-	39
80B	Gorgie Road No 549	Yes	-	-	-	-	33
18	Gorgie Road No 8	Yes	51.5	45.0	54.5	48.2	49
80	Gorgie Road /Delhaig	Yes	-	-	47.4	42.2	42
5	Gorgie Road/Murieston Road	Yes	44.3	42.6	42.9	44.4	43

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/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)
76D	**Henderson Terrace**	No	-	-	-	-	38
11	**Lanark Road No 610**	No	24.8	22.3	23.5	22.5	24
77A	**Slateford Road No 51**	No	-	-	-	-	**41**
77B	**Slateford Road No 93/95**	No	-	-	-	-	**46**
77	**Slateford Road No 97**	No	-	-	**47.6**	38.1	**43**
78	**Slateford Road/The Maltings**	No	-	-	35.9	30.2	31

In bold and red, exceedence of the NO_2 annual mean objective of 40µg/m^{3}and in bold, results of 40µg/m^{3}shown.

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

All data is representative of relevant exposure. Princes Street (ID47) data in brackets represents pavement exposure 2.5m from the kerb. Data without brackets represents concentrations at the facade.

Data expressed in full integer from 2012 onwards.

Table 2.8a 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) μg/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)
43	**Broughton Road**	No	**40.4**	38.1	**39.8**	34.6	37
40	**Queensferry Road/Hillhouse Road**	No	**44.4**	37.4	**42.4**	34.2	**40**
17a	**Hope Park Terrace/VS**	No	**-**	38.8	**43.4**	37.4	39
45	**Ferry Road/North Fort Street**	No	**39.6**	35.4	**41.5**	32.6	36
51c	**Salamander Street/Baltic Street**	No	**-**	37.1	36.2	38.5	35
51b	**Salamander Street/Bath Road**	No	**-**	37.4	**40.3**	37.0	38
79	**Fountainbridge/Tollcross**	No	**-**	-	**42.0**	36.3	37

In bold and red, exceedence of the NO_2 annual mean objective of 40μg/m^{3}and in bold, results of 40μg/m^{3}shown

Data expressed in integer from 2012 onwards.

Table 2.8b Locations within AQMAs where monitoring indicates compliance with Annual Mean Nitrogen Dioxide Objective

Site ID	Site Name	Within AQMA	2008	2009	2010	2011	2012
			Annual mean concentration (adjusted for bias) μg/m^3				
	Great Junction Street AQMA						
30	**Great Junction Street/FV**	Yes	**45**	**44**	**42**	39	38
30b	**Great Junction Street No 137**	Yes	38	39	**40**	**40**	38
30c	**Great Junction Street No 14**	Yes	**50**	**43**	**44**	38	38
30d	**Great Junction Street/WC**	Yes	39	37	**40**	34	38
30e	**Great Junction Street/CG**	Yes	**43**	**42**	39	**41**	37
45d	**Ferry Road/North Junction Street**	Yes	**42**	**41**	38	**40**	37
	Average of sites		**43**	**41**	**40**	**39**	**38**
	Gt Junction Street AQMA Extension						
29	**Bernard Street/CA**	Yes	**45**	**45**	**44**	39	37
29b	**Bernard Street No 32**	Yes	**41**	33	37	33	33
7	**Commercial Street No 11**	Yes	39	35	34	32	29
9a	**Commercial Street /Portland Place**	Yes	-	-	38	**41**	39
9	**Commercial Street No 78**	Yes	**40**	32	37	31	35
	Average of sites		**41**	**36**	**38**	**35**	**35**
	St John's Road AQMA						
1	**St John's Road SB**	Yes	**41**	37	39	35	38
39	**St John's Road**	Yes	32	28	31	30	32
	Average of sites		**36**	**32**	**35**	**33**	**35**
	Central AQMA						
21	**Leith Walk/Brunswick Road**	Yes	37	35	35	34	36
20	**Leith Walk/McDonald Road**	Yes	**53**	37	38	N/A	37
	Average of sites		**45**	**36**	**37**	**34**	**37**
			Annual mean concentration □g/m^3				
1	**Queen Street Automatic Station**	Yes	32	33	37	29	28

Fig 2.8a Monitoring Locations – St John's Road AQMA

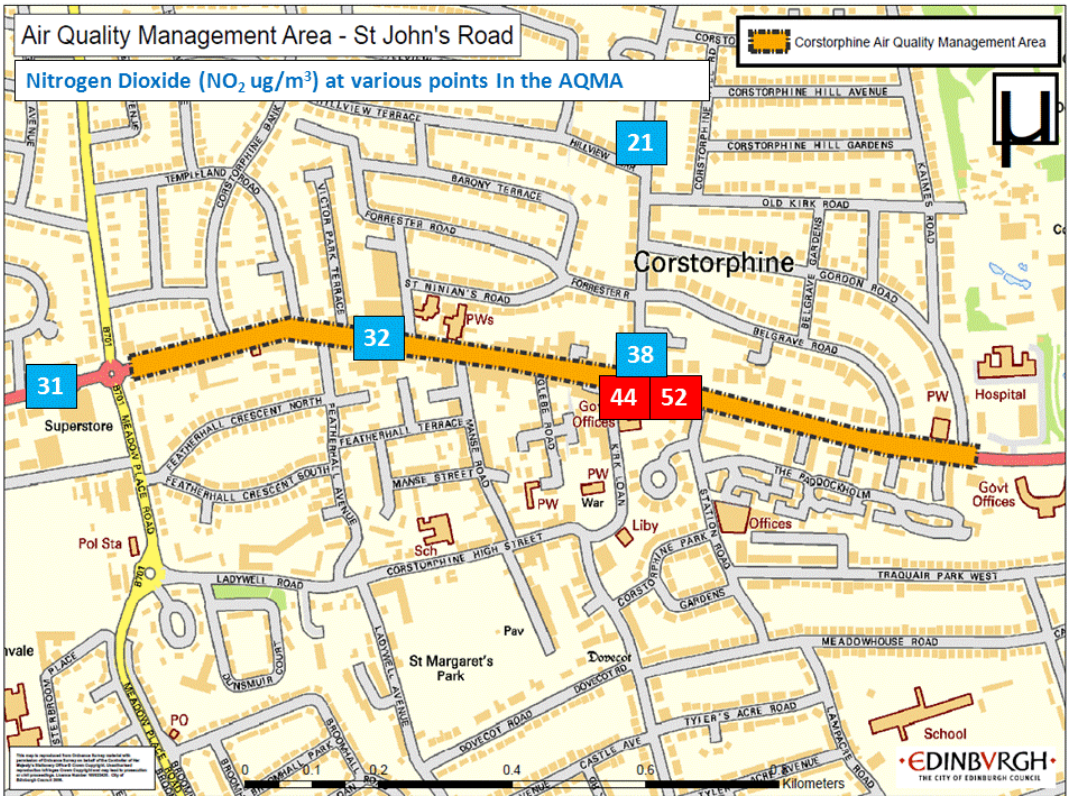


Fig 2.8b Monitoring Locations – Great Junction Street AQMA

Detailed Assessment at Hope Park Terrace/ClerkStreet

Eight additional monitoring sites were established along Nicolson Street, Clerk Street and South Clerk Street and around Hope Park Terrace junction. Figure 2.9 shows the locations. Data capture at one monitoring site, Surgeon's Hall (ID134) was considered poor and was not utilised. The presence of other sites allowed for the assessment to be undertaken.

At Clerk Street, (ID138), the results were annualised as data capture was 67%. All other sites had good data capture.

A summary of the monitoring undertaking in the vicinity since 2009 is summarised in Table 2.9.

Figure 2.9 Monitoring Locations - Hope Park Terrace/Clerk Street Detailed Assessment

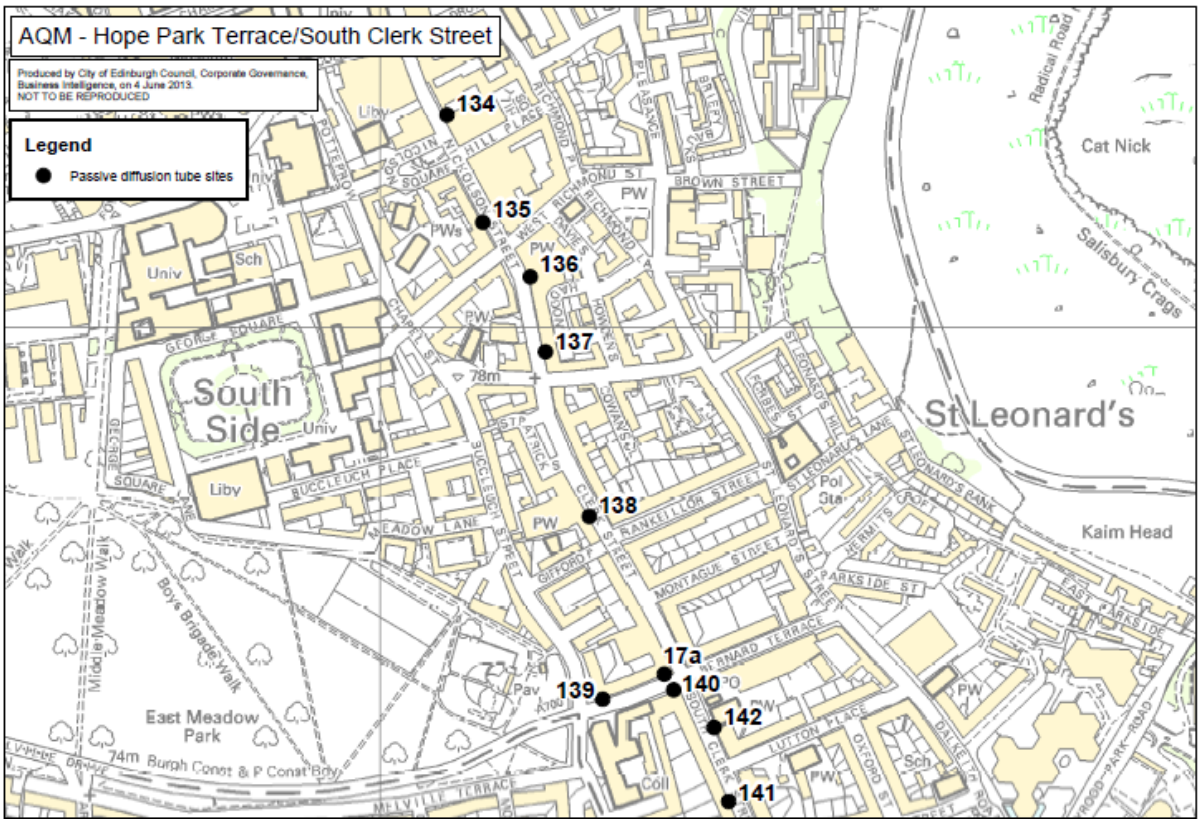


Table 2.9 Monitoring Results - Hope Park Terrace/Clerk Street Detailed Assessment

Site ID	Site Name	Annual mean concentration at relevant receptors, adjusted for bias (μg/m^3) Data capture in brackets (%)[a]=annualised data			
		2009 (bias adjustment factor = 0.86)	2010 (bias adjustment factor = 0.85)	2011 (bias adjustment factor = 0.81)	2012 (bias adjustment factor = 0.76)
134	Nicolson St/Surgeon's Hall	-	-	-	N/A (42%)
135	Nicolson Street No 69	-	-	-	**50**(100%)
136	Nicolson Street No 92	-	-	-	**42**(92%)
137	Nicolson Street No 124	-	-	-	**41**(92%)
138	Clerk Street No 15	-	-	-	**40**[a](67%)
17a	Hope Park Terrace/VS	39(100%)	**43**(100%)	37 (100%)	39 (83%)
140	Hope Park Terrace/Clerk St	-	-	-	35 (100%)
142	South Clerk Street No41a	-	-	-	**42**(92%)
141	South Clerk Street No 84	-	-	-	**44**(92%)
139	Hope Park Terrace No 5	-	-	-	34 (100%)

The monitoring shows exceedences of the annual mean objective at all sites along a main arterial route in and out of the city centre, except at Clerk Street ID138, where the estimated concentration was marginal (40μg/m^3). The other results range from 42μg/m^3 to 50μg/m^3. The monitored concentration at site ID17a was also borderline (39μg/m^3), although at new sites around the Hope Park Terrace junction, ID139 and ID140, concentrations were lower at 34μg/m^3 and 35μg/m^3 respectively. The relevant exposure (residential property) is furthest from the road at these locations and this section of road does not normally experience queuing traffic.

Assessment was complicated due to closure for tram works of Princess Street which is the main east west route for buses and other traffic through the city centre. This resulted in re-routing of traffic up North Bridge towards Nicolson Street.

Monitoring will continue as these extenuating factors unwind with Princess Street now open to some traffic again and plans being made for tram to become operational. The Council have also brought forward proposals to have traffic moving east bound only on Princess Street and west bound on George Street which has the potential to impact traffic flow on the Bridges towards Nicolson Street. More detail on road traffic sources is given in section 3.1 If exceedances continue it will be necessary to extend the Central AQMA to include this area.

Detailed Assessment at Hillhouse Road

Six additional monitoring sites were established along the Hillhouse Road section of Queensferry Road. Figure 2.10 details the location of the sites which were identified as being worse case as they are located in the built-up area of Hillhouse Road or near junctions. Other properties along Hillhouse Road are set far back from the road. There was good data capture at all sites in 2012. A summary of the monitoring undertaken in the vicinity since 2008 is shown in Table 2.10.

Figure 2.10 - Monitoring Locations – Hillhouse Road Detailed Assessment

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Table 2.10 Monitoring Results – Hillhouse Road Detailed Assessment

Site ID	Site Name	Annual mean concentration at relevant receptors, adjusted for bias (μg/m^3) Data capture in brackets (%)				
		2008 (bias adj. factor = 0.88)	2009 (bias adj. factor = 0.86)	2010 (bias adj. factor = 0.85)	2011 (bias adj. factor = 0.81)	2012 (bias adj. factor = 0.76)
40	**Queensferry/Hillhouse Rd**	**44**(92%)	37 (92%)	**42**(92%)	34 (92%)	**40**(100%)
40F	**Hillhouse Road No 118**	-	-	-	-	35 (100%)
40C	**Hillhouse Road No 240**	-	-	-	-	30 (100%)
40A	**Hillhouse Road/Telford Rd**	-	-	-	-	28 (100%)
40B	**Hillhouse/CraigcrookTer**	-	-	-	-	26 (100%)
40E	**Hillhouse/Marischall Pl No1**	-	-	-	-	28 (83%)
40D	**Hillhouse/Marischall Pl No4**	-	-	-	-	32 (83%)

There were no exceedences of the annual mean objective at any of the sites considered in the Hillhouse Road detailed assessment in 2012. The concentration at the long established site at Queensferry Road/Hillhouse Road junction (ID40) was borderline at 40μg/m^3. This site is at the bottom of a dip where the traffic narrows due

to parked vehicles to a single lane from double lanes each way and a pedestrian crossing is installed which halts traffic. It will not be necessary to declare a AQMA at this location, however monitoring will continue.

Detailed Assessment at Angle Park Terrace / Slateford Road

Six additional monitoring sites were identified on Angle Park Terrace, Henderson Road and ArdmillanTerrace ('Ardmillan Triangle') and Slateford Road for the Detailed Assessment and consideration has been given to long- term sites. Figure 2.11 shows location of the monitoring sites which represent worse case locations. A summary of the monitoring in the area since 2010 is shown in Table 2.11. There was good data capture at all sites in 2012.

Figure 2.11 Monitoring Locations- Angle Park Terrace / Slateford Road Detailed Assessment

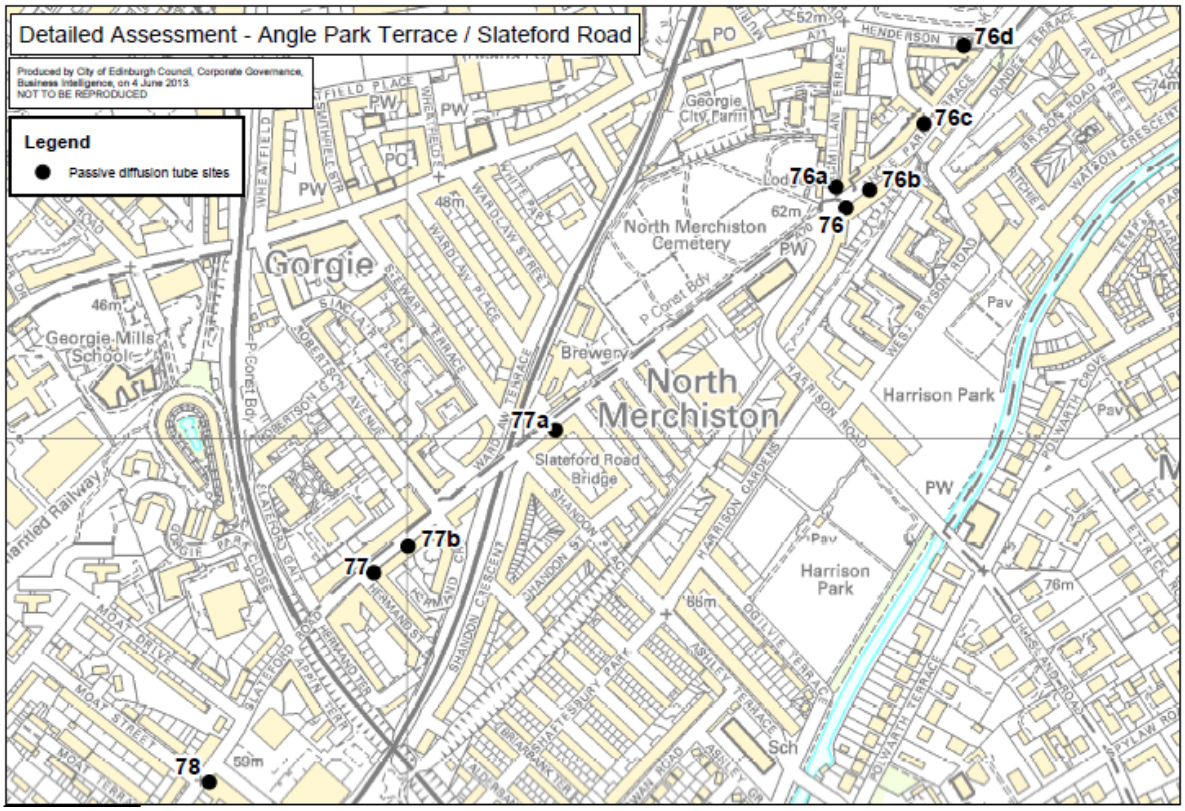


Table 2.11 Monitoring Results - Angle Park Terrace / Slateford Road Detailed Assessment

Site ID	Site Name	Annual mean concentration at relevant receptors, adjusted for bias (μg/m^3) Data capture in brackets (%)		
		2010 (bias adjustment factor = 0.85)	2011 (bias adjustment factor = 0.81)	2012 (bias adjustment factor = 0.76)
78	Slateford Rd/The Maltings	36 (75%)	30 (83%)	31 (100%)
77	Slateford Road No 97	**48** (92%)	38 (100%)	**43** (100%)
77B	Slateford Road No 93/95	-	-	**46** (100%)
77A	Slateford Road No 51	-	-	**41** (83%)
76	Angle Park/Harrison Road	**53** (100%)	**44** (100%)	**48** (100%)
76A	Ardmillan Terrace No 22	-	-	32 (83%)
76B	Angle Park Terrace No 74	-	-	**51** (100%)
76C	Angle Park Terrace No 25	-	-	36 (100%)
76D	Henderson Terrace	-	-	38 (83%)

A number of monitoring sites show exceedence of the annual mean objective, particularly sites close to the Angle Park Terrace and Harrison Road junction and on Slateford Road. Exceedences are high at a number of sites ranging from 46μg/m^3 on Slateford Road (ID77B) to 48μg/m^3 and 51μg/m^3 at Angle Park Terrace (at ID76 and ID76B respectively). The concentration at Henderson Terrace (ID76D) site was borderline at 38μg/m^3.

Assessment was complicated due to extended road works on Gorgie Road, diversions for tram works around Haymarket and Dalry Road area and loss of the SCOOT system at traffic junctions in the area – see section 8.7.1. More detail on changes in road traffic sources is given in section 3.1.

Monitoring will continue as these extenuating factors unwind with plans being made for tram to become operational and removal of road closures and roadworks. If exceedances continue it will be necessary to extend the Central AQMA to include this area.

Detailed Assessment at Fountainbridge / Tollcross

A number of additional monitoring sites were identified in the Fountainbridge area for the detailed assessment (see Figure 2.12); however, data collection was poor for many of the sites. It has not been possible to conclude the assessment with this data, therefore monitoring will continue in the area.

A summary of all the monitoring undertaken since 2008 is shown in Table 2.12.

Figure 2.12 Monitoring Locations – Fountainbridge Detailed Assessment

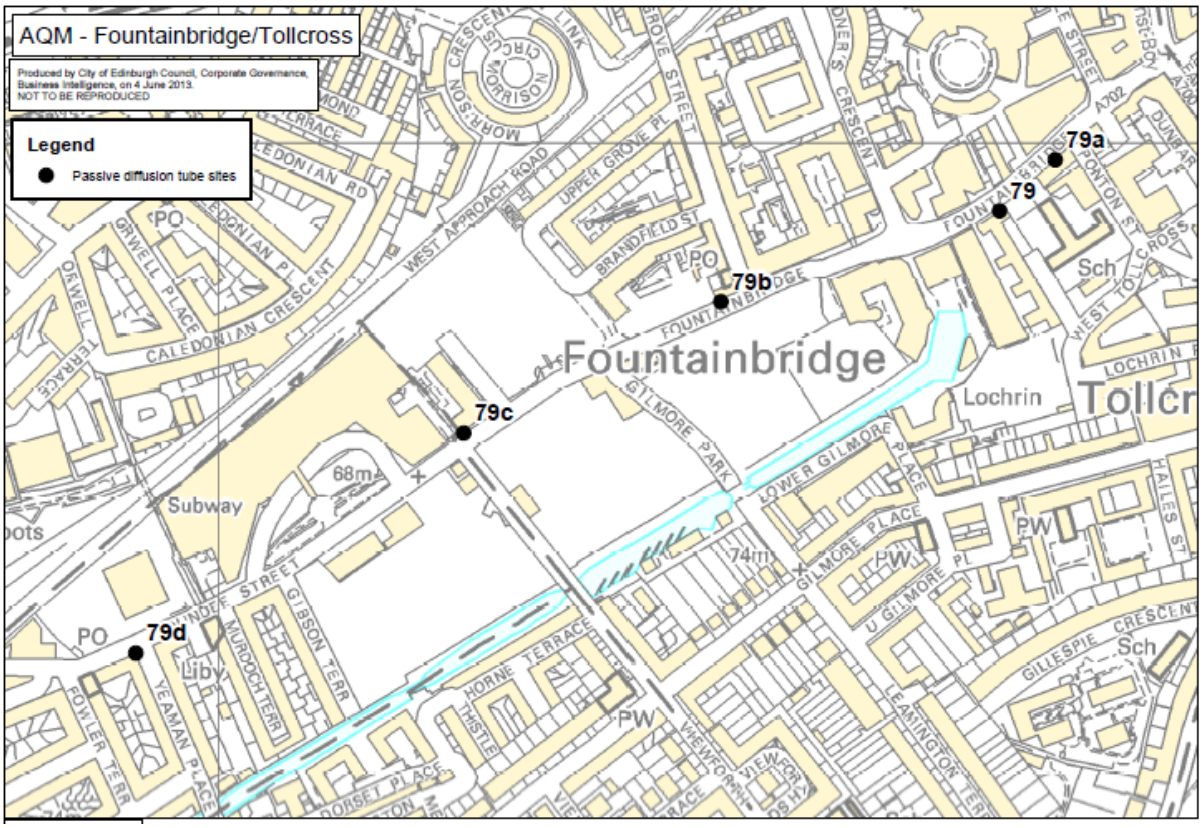


Table 2.12 Monitoring Results - Fountainbridge Detailed Assessment

Site ID	Site Name	Annual mean concentration at relevant receptors, adjusted for bias (µg/m^3) Data capture in brackets (%)				
		2008 (bias adj. factor = 0.88)	2009 (bias adj. factor = 0.86)	2010 (bias adj. factor = 0.85)	2011 (bias adj. factor = 0.81)	2012 (bias adj. factor = 0.76)
79C	Dundee StreetNo 114	-	-	-	-	N/A(33%)
79D	Dundee St/Yeaman Place	-	-	-	-	N/A(50%)
79A	FountainbridgeNo 103	-	-	-	-	39(83%)
79B	Fountainbridge/Grove St	-	-	-	-	32(75%)
79	Fountainbridge/Tollcross	-	-	42 (50%)	36(92%)	37(100%)

Trend Data from Nitrogen Dioxide Passive Diffusion Tubes within AQMAs

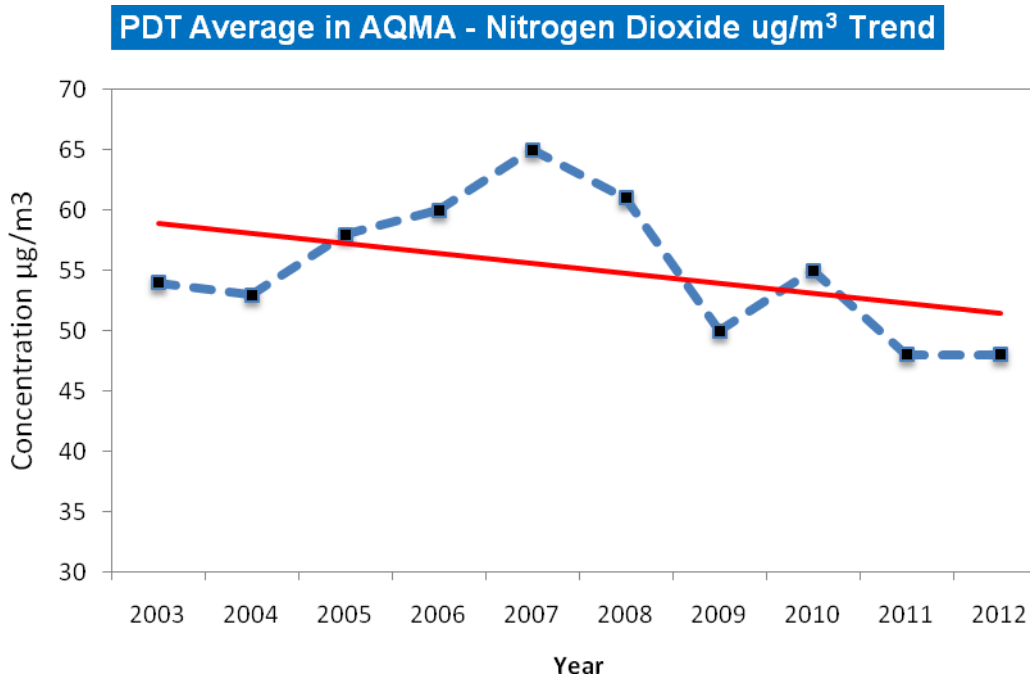
Passive diffusion tube data used in the trend assessment has been corrected for bias and taken from the point of measurement (see Figure 2.13). This is to ensure consistency due to the change in methodology in 2008 for calculating nitrogen dioxide fall off with increasing distance from source.

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. 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 (ID1)
St John's Road (ID1b)
St John's Road (ID1d)
Queen Street (ID33)
Torphichen Place (ID3)
Roseburn Terrace (ID 23)
West Maitland Street (ID2)
Gorgie Road (ID18)
Princes Street (ID 24)
North Bridge (ID 27)
York Place (ID 36)
West Port (ID 28b)
Great Junction Street (ID 30)

The Queen Street (ID33) monitoring site was relocated at the end of 2011 in close proximity to the preview site, however for the purpose of trend analysis, data from this site will no longer be used. Data used to establish the average trend is shown in Appendix D.

Figure 2.13 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites



In 2012 the average data is the same as that monitored in 2011, however there is a general downward trend since analysis began in 2003.

In 2012 the bias adjustment factor was the lowest since monitoring began, but it is in keeping with the previous year's assessment. There was a step change in the bias adjustment in 2011. These factors may be contributing to the downward trend, but general disruption to traffic movements in the city centre is also likely to be a factor. Traffic disruption is due to road closures and traffic diversions associated predominately with construction of Edinburgh Trams. A review of recent air quality review reports by the other three cities in Scotland show that they have also found a falling bias correction factor.

The observed decrease has resulted in the year-on-year trend for diffusion tube monitoring data to exhibit a fall. However, caution should be applied to this considering the significant level of temporary changes in traffic.

2.2.2 Particulate Matter (PM_{10})

St Leonard's (AURN) and Queensferry Road operate a Filter Dynamics Measurement System (FDMS) unit to monitor 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 that the two correction methodologies are comparable. Data is shown in Tables 2.7 and 2.8.

All monitoring locations are representative of relevant public exposure.

PM_{10} data from all monitoring locations in 2012 meet the EU limit values and UK National Objectives. Background sites at St Leonard's and Currie, and roadside locations at Queen Street, Glasgow Road and Queensferry Road also meet the tighter Scottish Air Quality Annual Mean Objective of 18ug/m^3, although monitoring at Queensferry Road (18μg/m^3) shows the concentration of PM_{10} at the objective.

Salamander Street did not meet the annual mean Scottish Air Quality Objective or the permitted number of daily exceedences.

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. There were no metal fragments identified. Further investigations will be undertaken for the city-wide PM_{10} Detailed Assessment including the contribution from road traffic pollution and that derived from other sources.

Based on new and historical data the requirement to progress the city-wide Detailed Assessment remains valid.

Table 2.13 Results of Automatic Monitoring forPM_{10}: Comparison with Annual Mean Objective

Site ID	Site Location & Equipment Type	Within AQMA?	Valid Data Capture 2012 % [a]	Annual Mean Concentration (µg/m^3)				
				2008	2009	2010	2011	2012
1	Queen Street TEOM	Y (NO_2)	96	**19**(vcm) **19**(1.14)	**18**(vcm) **18**(1.14)	**18** (vcm) **19 (**1.14)	16 (vcm) 16 (1.14)	16 (vcm) 16 (1.14)
3	Roseburn TEOM	Y (NO_2)	N/A	16 (vcm) 16 (1.14)	15 (vcm) 15 (1.14)	15 (vcm) 15 (1.14)	15 (vcm) 15 (1.14)	N/A
6	Currie TEOM	N	98	N/A	N/A	11 (vcm) 11 (1.14)	13 (vcm) 11 (1.14)	11 (vcm) 11 (1.14)
7	St Leonard's FDMS	N	68	15	*17*	14	15	*16*
8	Salamander St TEOM	N	96	N/A	***22****(vcm)* ***23****(1.14)*	**26**(vcm) **27**(1.14)	**26**(vcm) **27**(1.14)	**23**(vcm) **24**(1.14)
9	Queensferry Rd FDMS	N	86	N/A	N/A	N/A	***21***	**18**
10	Glasgow Road TEOM	Y (NO_2)	32	N/A	N/A	N/A	N/A	*15 (vcm)* *15 (1.14)*

In bold and red, exceedence of the PM_{10} annual mean objective of 18µg/m^3 and in bold, result of 18µg/m^{3}shown.

In *italic*, poor data capture

[a] Data capture for the full calendar year

Table 2.14 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Data Capture 2012 %	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m^3				
					2008	2009	2010	2011	2012
1	Queen Street TEOM	Y (NO_2)	96	Y	0	1	1	0	2
3	Roseburn TEOM	Y (NO_2)	N/A	Y	0	0	0	0 (34) [a]	N/A
6	Currie TEOM	N	98	Y	N/A	N/A	0	0	0
7	St Leonard's FDMS	N	68	Y	0	2	1	0	2 (40) [a]
8	Salamander St TEOM	N	96	Y	N/A	2 (44) [a]	**19**	**22**	**13**
9	Queensferry Rd FDMS	N	86	Y	N/A	N/A	N/A	2	3
10	Glasgow Road TEOM	Y (NO_2)	32	Y	N/A	N/A	N/A	N/A	0 (35) [a]

In bold and red, exceedence of the PM_{10} daily mean objective 50µg/m^3 – not to be exceeded more than 7 times per year

[a] if data capture for full calendar year is less than 90%, include the 98.1th percentile of 24-hour means in brackets (expressed in µg/m^3)

Trend in Annual Mean PM_{10} concentrations

Uncorrected TEOM data (non-volatile fraction) has been used to assess PM_{10} trends due to changes in gravimetric correction methodology.

The non-volatile fraction of the FDMS data for years 2008 to 2012 at St Leonard's has also been used to ensure a consistent approach. Although non-volatile data was used for the trend assessment at St Leonard's, this has to 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 2.14 and 2.15 are summarised.

Table 2.15 Summary of PM_{10} Annual Mean Trend Data

Monitoring Location / Type	Trend in annual mean PM_{10} (years)	Concentrations of PM_{10}
Queen Street (Roadside)	↓ (1999 to 2012)	Decreasing
St Leonard's (Urban background)	↓ (2004 to 2012)	Decreasing

Downward trends in PM_{10} concentrations are noted at St Leonard's and Queen Street.

The city-wide detailed assessment due for completion in 2013/14 will undertake a full assessment of trend analysis.

Figure 2.14 Trend in Uncorrected Annual Mean Non Volatile Fraction PM_{10} Concentrations (µg/m^3) measured at Queen Street

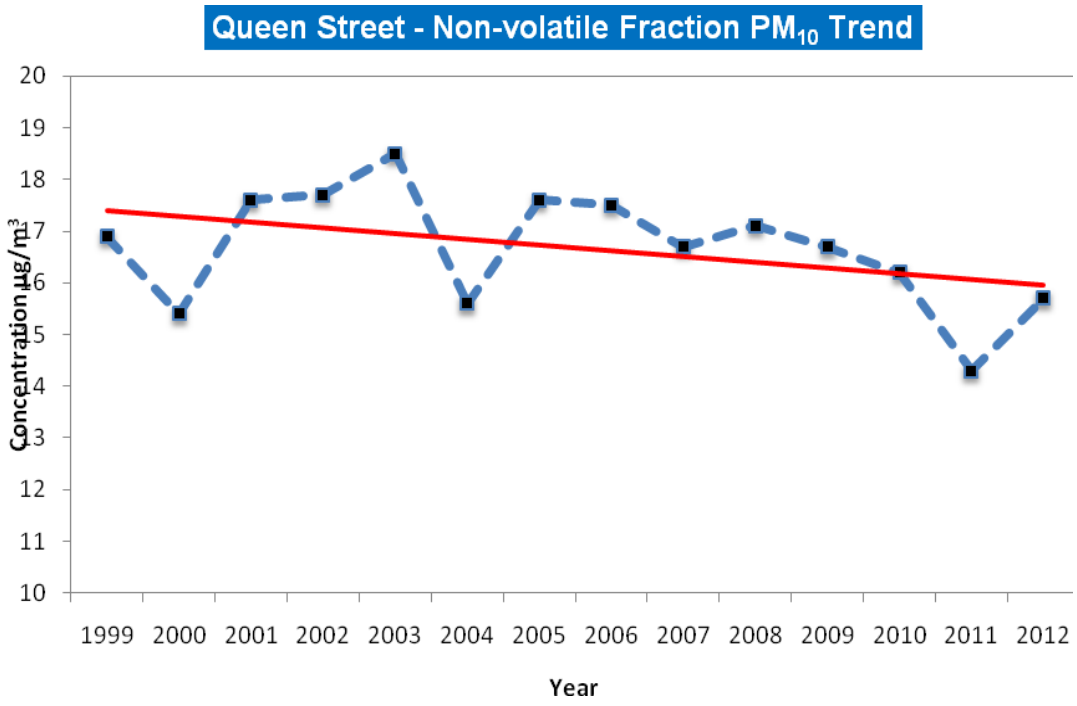
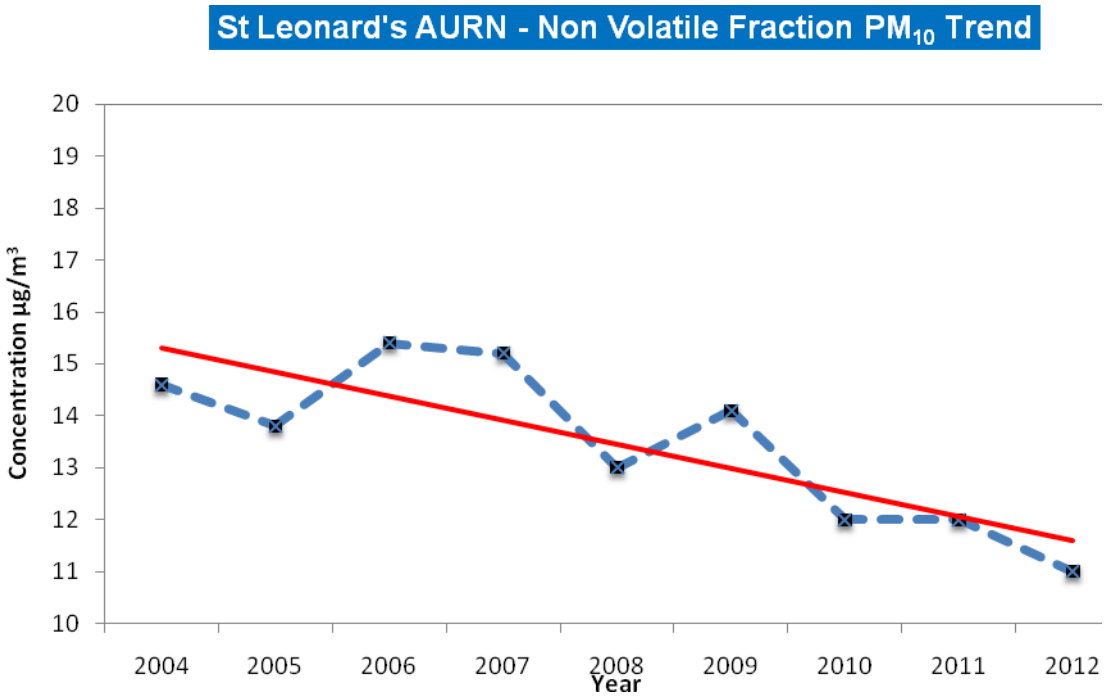


Figure 2.15 Trend in Uncorrected Annual Mean Non Volatile Fraction PM_{10}Concentrations (µg/m^3) measured at St Leonard's



2.2.3 Sulphur Dioxide (SO_2)

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, Table 2.16.

Table 2.16 Results of Automatic Monitoring of SO_2

Site ID	Site Type	Within AQMA?	Monitoring Year (% Data Capture)	Number of Exceedences (percentile in bracket µg/m^3)		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
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

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 $PM_{2.5}$. 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 and 2009, but did meet in 2010 and 2011. In 2012, the objective was not met due to 43 exceedences of the 8-hour running mean being recorded (Table 2.17). These mainly occurred throughout a pollution episode in April and May 2012, which showed increased levels of ozone across the country.

Table 2.17 Number of Ozone exceedences at St Leonard's

St Leonard's Urban Background site	2007	2008	2009	2010	2011	2012
No. of exceedences	**11**	**14**	**12**	0	0	**43**
Ozone Objective 100μgm^{-3} not to be exceeded more than 10 times per year as an 8-hour running mean by 31st December 2005						

2.2.5.2 $PM_{2.5}$

$PM_{2.5}$ monitoring commenced at St Leonard's in November 2008. There was a slight decrease in the annual mean concentration between 2011 and 2012, from the limit value of 12μg/m^3 to 11μg/m^3, however data capture was poor throughout 2012 (72%). See Table 2.18.

Table 2.18 $PM_{2.5}$ Average annual concentrations

St Leonard's Urban Background site	2009	2010	2011	2012
Annual Concentration (μg/m^3)	8	9	**12**	*11*
$PM_{2.5}$ Scottish Objective 12μg/m^3 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 digitel sampler. Results since 2009 are shown in Table 2.19. In 2012 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
Annual Concentration (ngm^{-3})	0.131	0.129	0.099	0.109
BaP Objective 0.25ngm^{-3} as an annual average by 31 December 2010				

2.2.6 Summary of Compliance with AQS Objectives

Edinburgh has measured concentrations of **nitrogen dioxide** and **PM_{10}** above the annual mean and 24-hour mean (PM_{10}) at relevant locations outside of the AQMAs, and **will need to proceed to a Detailed Assessment**, at the following locations:

PM_{10}
City-wide for exceedences of Scottish Objectives as identified in Progress Report 2010 and previous Review and Assessment Reports.

Nitrogen dioxide
Detailed Assessments are being progressed currently at the following locations,

- Angle Park Terrace / Slateford Road
- Fountainbridge
- Hope Park Terrace / Clerk Street
- Portobello Road/Sir Harry Lauder Road junction (additional monitoring commenced in 2012)

3 New Local Developments

The current economic down turn has meant that a number of planning applications with existing permission are being developed with reduced density, which is likely to have a positive impact on air quality. Other major developments such as Pennywell, Western Harbour, Granton Harbour and Caltongate have requested re-granting of permission, to extend the time period requiring these developments to commence. Originally Air Quality Impact Assessments were undertaken; however revised assessments are not being sought by the Local Authority.

3.1 Road Traffic Sources

With the Edinburgh tramline due to begin passenger services in 2014, the Local Authority is currently considering views on proposed changes to the traffic management system within the core city centre area [4].The benefits that may be realised include;

- improved quality of pedestrian experience in the core City Centre area;
- improved access to the City Centre;
- increased space for pedestrian and other uses;
- opportunity for dedicated cycle provision in the area; and
- reduced detrimental impact of vehicles on the City Centre environment.

Proposals include a radical reorganisation of the road network and pavement availability. It is expected that details will be considered in a report to the Local Authority's Transport and Environment Committee on 27th August 2013. Further considerations will be given to the proposal in terms of the impact on air quality.

The Council is progressing a major infrastructure project which involves road, footway and environmental improvements to Leith Walk and Constitution Street. Traffic modelling assessments are currently being undertaken to assess the impact that traffic flow changes might have on Easter Road and Bernard Street (AQMAs).

The issue of potential impacts from cumulative development remains an issue for the Local Authority. In 2012 a number of planning application were consented amid concerns of the methodology for the air quality impact assessment and/or associated mitigation measures. These include developments in areas of rising air quality concern (Ferry Road) and in the south west of the city (Ingles Green Road).

An air quality impact assessment (AQIA) was carried out for a housing development for 121 properties in Ratho Station in August 2010 [5]. The assessment stated that a new junction on the A8, to accommodate the development is likely to increase queuing on both eastbound and westbound carriageways. The Local Authority has since declared the Glasgow Road AQMA along the traffic corridor from Ratho Station to Newbridge roundabout and is currently carrying out Further Assessment work. Funding has also been provided by the Scottish Government to investigate solutions with Newbridge roundabout to improve traffic flow.

3.2 Other Transport Sources

There are no new/newly identified non-road traffic sources since the last Updating and Screening Assessment that require assessment. To update, Edinburgh Airport published an Airport Surface Access Strategy in 2012 which aims to ensure a public transport mode share of 35% of total departing passengers by 2017 [6]. It states the airport's commitment as a member of the Edinburgh International Development Partnership (EIDP) which oversaw production of TISWEP (Transport Infrastructure Study for West Edinburgh); TISWEP identified a series of transport interventions, necessary in order to meet the transport needs of the development proposed within west Edinburgh area over the next 10 years.

The strategy states;

> "Edinburgh Airport recognises and accepts the need for future interventions, many of which are essential to alleviate congestion and improve traffic flows on access roads to the airport and in the surrounding area. The interventions when implemented are expected to meet the needs of both airport growth, and other planned growth in the area..."
>
> *Edinburgh Airport, Airport Surface Access Strategy, 2012*

3.3 Industrial Sources

Leith Docks and Dundee were designated Enterprise Areas (EA) which form the East of Scotland EA that will focus on a manufacturing industry, developing low carbon technologies to support Scotland's off-shore renewable energy industry. In this regard the Local Authority has signed a Memorandum of Understanding with Scottish Enterprise and Forth Ports to work jointly to explore the feasibility of further developing Leith Docks. Currently there is uncertainty as to whether any significant positive or negative effects to air quality would be likely with this proposed change [7].

It is the intention to prepare a new Leith Docks Masterplan to facilitate appropriate development through a combination of a Harbour Revision Order and a planning application(s). Impacts on air quality will need to be considered as a part of these processes.

3.4 Commercial and Domestic Sources

Since the Updating and Screening Assessment 2012 there have been no new biomass combustion installations nor areas identified where the combined impact of several biomass sources may be relevant. The Council issued Interim Planning Policy (2010) that discourages the installation of commercial biomass combustion installations in the city. Albeit a foodstore development at Inglis Green Road received planning permission that would allow development of a biomass unit [8]. The company subsequently withdrew the proposals following further clarity from the Local Authority on the rationale behind the policy.

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 UncontrolledSources

In conjunction with SEPA (the Scottish Environmental Protection Agency), the Local Authority has undertaken qualitative sampling at the Salamander Street monitoring station, to investigate potential contributions to PM_{10} concentrations from a number of fugitive sources - a scrap yard and a cement batching process at Bath Street. Initial results identified fragments of fine silt and sand, amongst a variety of particles of typical background dust. There were no metal fragments identified. Further investigations will be undertaken for the city-wide PM_{10} Detailed Assessment including the contribution from road traffic pollution and that derived from other sources.

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;
- Major road, footway and environmental improvements to Leith Walk and Constitution Street; and
- New road junction on A8 Glasgow Road, at Ratho Station.

Possible fugitive emissions from a scrap yard and a cement batching plant in Leith contributing to exceedences of PM_{10} at Salamander Street, will be investigated further as part of city-wide Detailed Assessment.

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

4 Planning Applications

In terms of the strategic plans for development, the Local Authority is currently seeking representations on a Proposed Local Development Plan, which will cover the whole of the administration area. The Proposed Local Development Plan (LDP) sets out policies and proposals relating to the development and use of land, focusing on four Strategic Development Areas. These areas are consistent with the Strategic Development Plan, prepared by SESPlan (the Strategic Development Planning Authority for Edinburgh and South East Scotland) and the Local Authority's economic strategy [9]. Three of the four areas are in locations where there are current air quality concerns; City Centre, Edinburgh Waterfront and West Edinburgh. The fourth area is South East Edinburgh.

Some of the proposals defined in the Proposed LDP have already received planning permission or been identified in previous plans, others are 'new opportunity' sites. Tables 5.1 and 5.2 describe these sites. The Proposed plan states that new housing is being brought forward in South East and West Edinburgh to meet strategic housing requirements.

Table 4.1 Areas of land previously identified for residential development in the Proposed Local Development Plan (LDP)

LDP Reference	Name	Area of Local Authority	Estimated Total Capacity
HSG1	Springfield, Queensferry	West	150
HSG2	Agilent, South Queensferry	West	400
HSG3	North Kirkliston	West	680
HSG 4	West Newbridge	West	500
HSG 5	Hillwood Road, Ratho Station	West	50-100
HSG 6	South GyleWynd	West	180
HSG 7	Edinburgh Zoo	West	80
HSG 8	Telford College (North Campus)	North	300
HSG 9	City Park	North	200
HSG 10	Fairmilehead Water Treatment Works	South East	275
HSG 11	Shrub Place	East	400
HSG 12	Lochend Butterfly	East	556
HSG 13	Eastern General Hospital	East	270
HSG 14	Niddry Mains	South East	900 -1100
HSG 15	Greendykes Road	South East	145
HSG 16	Thistle Foundations, Craigmillar	South East	170
HSG 17	Greendykes	South East	900 -1000
HSG 18	New Greendykes	South East	1000
CC 2	New Street	Centre	250
CC 3	Fountainbridge	Centre	1200
CC 4	Quartermile	Centre	1000

LDP Reference	Name	Area of Local Authority	Estimated Total Capacity
EW 1a	Leith Waterfront (western Harbour)	North	3000
EW 1b	Central Leith Waterfront	North	5600
EW 1c	Leith Waterfront (Salamander Place)	North	1500
EW 2a	Forth Quarter	North	1800
EW 2b	Central Development Area	North	2050
EW 2c	Granton Harbour	North	3400
EW 2d	North Shore	North	850

Table 4.2 New housing opportunity sites in the Proposed Local Development Plan (LDP)

LDP Reference	Name	Area of Local Authority	Estimated Total Capacity
HSG 19	Maybury	West	1000 -1400
HSG 20	Cammo	West	500 -700
Policy Emp6	International Business Gateway	West	300-400
Policy DtS 5	Edinburgh Park/South Gyle	West	450 -700
HSG 21	Broomhills	South East	425 -595
HSG 22	Burdiehouse	South East	250-350
HSG 23	Gilmerton Dykes Road	South East	50 -70
HSG 24	Gilmerton Station Road	South East	350 490
HSG 25	The Drum	South East	125 -175
HSG 26	Newcraighall North	South East	150 -210
HSG 27	Newcraighall East	South East	275 -385
HSG 28	Riccarton Mains Road	South West	50
HSG 29	Curriemuirend	South West	100
HSG 30	Moredunvale	South	50

Economic growth is a key aim of the Strategic Development Plan, which requires the LDP to retain existing levels of strategic employment land and provide a range and choice of employment sites in accessible locations. The land, which must accommodate businesses of varying types and sizes, includes strategic office locations in the City Centre, Leith and Edinburgh Park, planned industrial estates, areas such as Newbridge and seven different special economic areas.

Table 5.3 details the ‘special economic areas’, all of which are of national or strategic economic importance.

Table 4.3 Special Economic Areas detailed in the Proposed Local Development Plan (LDP)

Name	Location	Area of Local Authority	Size of land (hectares)
Edinburgh Bio-Quarter	East of A7	South East	72 ha
Riccarton University Campus and Business Park	South of A71	South West	153 ha
Edinburgh Airport	North of A8	West	380 ha
Royal Highland Centre	North of A8	West	132 ha
International Business Gateway	North of A8	West	136 ha
RBS Headquarters, Gogarburn	North of A8	West	45 ha
Leith Docks	North & East part of Leith Waterfront	North	128 ha

Leith Docks was also designated an Enterprise Area (EA) in January 2012. Coupled with the Proposed LDP, there is a major shift from the previously planned residential focus in the area. The reduction in volume of traffic associated with this change may bring some benefit to air quality. However, this requires further consideration.

Strategic Environmental Assessment for the Proposed Development Plan

An Environmental Report forming part of the Strategic Environmental Assessment for the proposed LDP recognises air quality as one of the main environmental issues within the Local Authority area where supportive development policies may lead to negative cumulative effects, particularly within key transport corridors..The existing urban area/brown field sites and the four strategic development areas [9].

The report refers to the Local Authority's Air Quality Action Plan which sets out measures to help reduce vehicle emissions in the AQMAs (predominately along traffic corridors). It also states that there are wider environmental considerations that lead to the preference of supporting development within the existing built-up area and that a different strategy of supporting Greenfield release would likely lead to a cumulative negative effect.

In respect to the likelihood of numerous development proposals within close proximity of one another in the four strategic development areas, there is an acknowledgement that there may be short to medium term harmful impacts, which could be exacerbated in the short term where development comes forward in advance of planned public transport infrastructure. This could be of particular concern in the North and West of the city where development of the tram line is currently no longer proceeding. Further analysis of these impacts will need to be considered.

There are policies prescribed in the Proposed LDP that set out mitigation to these cumulative impacts, including environmental, employment, housing and transport policies [7]. These aim to direct major new development to accessible locations as well as supporting a number of public transport improvements. Policy Env22

considers the impact of development on air from new development, however it is considered in the context of protecting natural resources rather than protecting human health. Comments in this regard, will be made during LDP consultation process.

All these policies are discussed further in Chapter 5.

Additionally, the proposed LDP states there are a number of development site briefs and principles which provide further mitigation to support improvements to air quality including; new bus routes linked through new sites, opportunities for a mix of uses including local services within new housing sites and high densities for parts of sites that are closer to public transport hubs [7]. Through their very nature, some of these proposals could be counter-productive, so consideration of the air quality implications would have to be made for individual development site briefs. Principles of good design may need to be applied in some circumstances, which is absent from the proposed LDP.

Comments regarding these elements of the proposed LDP will be made during the consultation process which ends on 14th June 2013.

In December 2013 a draft version of the LDP, taking account of any representations, will be submitted to Scottish ministers for examination before being adopted. It should be noted that the Proposed LDP has been prepared on the basis of a Proposed Strategic Development Plan, which may mean modifications are necessary when the outcome of the SDP examination is known.

5 Air Quality Planning Policies

There are policies described in the Local Authority's Proposed Local Development Plan which is currently out for consultation [9]. Table 5.1 describes the policies which aim to mitigate any cumulative impact that development may have on air quality. Policy Env22 specifically considers the impact of development on air (as a natural resource) from new development.

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
Env 22	Planning permission will only be granted for development where; a) There will be no significant adverse effects for health, the environment and amenity and either; b) There will be no significant effects on air, water or soil quality or c) Appropriate mitigation to minimise any adverse effects can be provided.
Emp1	High quality, office developments, including major developments, will be supported; a) In the City Centre as identified on the Proposal Maps. 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. 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.
Emp 10	Hotel development will be permitted: 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. b) Within the boundaries of Edinburgh Airport, the Royal Highland Centre and the International Business Gateway. c) In locations within the urban area with good public transport access to the city centre.
Hou 4	The Council will seek an appropriate density of development on each site having regard to: a) Its characteristics and those of the surrounding area. b) The need to create an attractive residential environment and safeguard living conditions within the development. c) The accessibility of the site to public transport and other relevant services. d) The need to encourage and support the provision of local facilities necessary to high quality urban living.

	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.
Tra 1	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: a) The accessibility of the sites by modes other than the car. 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. c) Impact of any travel demand generated by the new development on the existing road and public transport networks. 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.
Tra 8	Planning permission will not be granted for development which would: a) Prevent the implementation of proposed cycle paths/footpaths shown on the Proposals Map. b) Be detrimental to a path which forms part of the core paths network or prejudice the continuity of the off-road network generally. c) Obstruct or adversely affect a public right of way unless satisfactory provision is made for its replacement. d) Prejudice the possible incorporation of an abandoned railway alignment into the off-road path network.
Tra 9	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.

The Local Authority also has interim Planning Policy to assist the Council to manage and control the introduction of biomass combustion installations in development proposals in the current absence of proven, cost-effective abatement technologies [10].

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 and Black Carbon, as well as nitrogen dioxide.

In November 2012, the Council's Transport and Environment Committee agreed to continue the interim biomass policy until the outcomes of the delayed city-wide Detailed Assessment of PM_{10} are reported.

6 Local Transport Plans and Strategies

Local authorities are advised in Technical Guidance document LAQM TG (09) to align AQAPs with those local transport polices which contribute towards improving air quality. Key synergistic policies identified in City of Edinburgh Council's Local Transport Strategy 2007 to 2012 (extended to 2013) are listed in Table 6.1.

Table 6.1 Key Air Quality Improvement Policies Contained in the City Of Edinburgh Council's Local Transport Strategy 2007 – 2012

Policy	Statement
Env1	The Council will continue to review transport measures that can contribute to achieving air quality objectives.
Env2	The Council will continue to implement the transport-related measures in the Air Quality Action Plan (AQAP) within available budgets.
Cars3	The Council will consider supporting congestion charging only at a national level for Scotland or the whole UK.The Council will develop a congestion indicator that can be monitored and will set targets in the context of the Regional Transport Strategy.
Cars4	The Council will promote the expansion of the City Car Clubs
Park19	The Council will keep under review the need for new Controlled Parking Zones (CPZs) and /or further extensions to the existing CPZ.
P+R1 Park & Ride	The Council will provide, promote and enlarge Park and Ride (P+R) sites at the edge of urban areas on main radial routes and will work with operators to ensure that the most attractive ticket packages are available to users.
P+R2 Park & ride	The Council will promote access to P+R sites by bus, cycle, and on foot and will seek the provision of high quality public transport services to link P+R sites to major destinations outside the city centre.
PT22	The Council will work in partnership with the rail industry, South East of Scotland Regional Transport Partnership (SEStran), other Councils, the Scottish Executive, Transport Scotland, developers and others to improve services and promote new rail schemes where appropriate including: • Edinburgh Airport link • Borders rail link • Bathgate to Airdrie link • Edinburgh South Suburban line reopening to passengers
PT20	The Council will promote further bus priorities within the city where needed to maintain and improve public transport service quality and reliability and will work with SEStran to develop bus priority schemes that will support orbital bus

Policy	Statement
	services linking key growth areas in and around the city, including considerations of priorities on trunk roads and motorways.
Goods 3	The Council will work with the industry, SEStran and other partners to evaluate the benefits of a Freight Quality Partnership at the regional level.
Goods 4	The Council will support the use of rail and sea freight, in particular through the planning process by: • Safeguarding rail access to key industrial sites • Ensuring that major new freight generating developments are accessible to the rail network where possible • Encouraging developments which are likely to benefit from sea freight to be located so that they are easily accessible to the freight handling ports in the Forth and; • working to ensure multi-modal freight operations where possible.
Goods 5	The Council will make every effort to ensure that Edinburgh's domestic waste continues to be moved out of Edinburgh by rail and will examine other ways in which the council can lead by example.
EX2	The Council will work with GIP and other partners to increase significantly the use of sustainable travel modes for access to Edinburgh Airport, including the provision of rail and tram links.

The Local Authority is currently reviewing the Local Transport Strategy (LTS) and has carried out consultation on a number of 'Issues for Review' for developing the new strategy [11]. These include ten issues, one of which specifically relates to air quality and includes a number of options to deal with concerns - ranging from continuing with voluntary efforts to reduce emissions, to introducing a type of 'Low Emission Zone' to Edinburgh.

The results of this consultation and the draft LTS are expected to be published in August 2013 for a period of consultation before the new strategy is adopted.

Several other significant policy issues are covered by separate processes which will also inform the revised LTS. These include development of Action Plans covering public transport and maintenance and renewals of roads, and a process to come forward with proposals for the City Centre, following operation of the tram.

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.

The proposed Local Transport Strategy will be aligned with the Scottish Government's National Transport Strategy and Regional Transport Strategy [11].

In addition to the LTS, City of Edinburgh Council's Transport 2030 Vision document provides an overarching strategy for the future development of transport in Edinburgh over a 20 year period from 2010 [12]. This document compliments and informs the revision 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

7 Climate Change Strategies

The Council is working with support from the Scottish Government's new agency, Resource Efficient Scotland, to revise the Council's Carbon Management Plan. The effective rolling-out of the revised Carbon Management Plan (CMP) will be part of the Council's response to its commitment under the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme.

The specific objectives of this programme are:

- to update the Council's CMP;
- to quantify the potential carbon savings from Council projects;
- to determine the remaining carbon savings required to meet the Council's carbon reduction target; and
- to develop an Action Plan.

In January 2007 the Council signed Scotland's Climate Change Declaration**.** The Declaration includes commitments both to mitigate the Council's impact on climate change through reducing greenhouse gas emissions and to adapt to predicted climate change impacts. A comprehensive annual report on the Council's progress against these commitments is prepared each year and is available from the Scotland's Climate Change Declaration website. Further targets to achieve a climate responsive city by 2020 were approved in June 2011 as part of the Council's new Sustainable Development Framework "Sustainable Edinburgh 2020". This framework and annual performance reports are published on the Council's website.

Although, climate change initiatives can be beneficial with respect to improving air quality, there is potential for conflict between the two statutory obligations. It is essential that measures proposed to improve air quality and those relating to Climate Change are assessed for possible adverse impacts. The Council will work to avoid such conflicts.

Building on earlier partnership activity, in early 2013 a new Edinburgh Sustainable Development Partnership (ESDP) was established as part of the Edinburgh Partnership structure. A detailed remit for the ESDP is still under development but in general terms the ESDP is likely to contribute to Edinburgh achieving the vision set out in SE2020 by providing a strategic city-wide cross-sector and participative voice for sustainability.

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_X) by 40% [13].

An additional 40% reduction was expected to occur without intervention due to improvements in vehicle technology and subsequent fleet replacement. Therefore the overall reduction in NOx emissions which could be achieved was estimated at 80% of the 2001 baseline.

The level of reduction in roadside NO_x concentrations required to meet the 2005 annual mean air quality objective within the Central AQMA were calculated to be between 33% and 68% [14]. Therefore, the proposed actions within the AQAP 2003 were anticipated to deliver the improvement required.

Source apportionment work undertaken in 2002 within the Central AQMA identified that the majority of NO_X emissions were derived from buses; Leith Walk (56%), Gorgie Road (55%) and West Maitland Street (63%) [14]. 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 citycentre, 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) [15].

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) [16]. The study concluded that, the greatest reductions in NO_X and PM_{10} 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 indentified that buses were the main contributors of NO_X emissions [17].

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 NOx 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 evidenced the anticipated decrease in concentrations of roadside nitrogen dioxide. In addition, there is now a greater than anticipated proportion of diesel-engined vehicles in the national fleet which emit more direct NO_2 compared with petrol-engined vehicles.

It is expected that DEFRA's revised Vehicle Emission factors for each Euro engine class will be more realistic and enable local authorities to gain a more accurate understanding of what level of improvement can be achieved.

The measures and progress made during 2012/13 are summarised in Table 8.1 and supplementary information is described under the headings below:

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_x and PM_{10} 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_x and PM_{10} emissions by 2015 [18].

8.2.2 Bus Improvements 2012/2013

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. More than half of the main service fleet (59%) is Euro 4 or higher. Significant improvements have been made since 2006 with the assistance of Scottish Government funding (see Table 8.1). The company has recently been successful in obtaining £1.5milion funding from the Scottish Government Green Bus Fund (Round 3) for 20 hybrid buses.

Table 8.1 Number of older vehicles retrofitted and number of new buses purchased

Technology	2011 (Funding)	2012(Funding)	2013(Funding)
Retro fit using SCRT (EMINOX) Euro 3 to Euro 5/6 (EEV standard)	43 (A) In service		
New hybrid Double Deck vehicles Euro 5 Standard	15 (B) In service		
New hybrid Single Deck vehicles Euro 5 Standard		10 (C) In service	20 (E)
Double Deck EEV Standard	60 (D) In service		
Single Deck EEV Standard		5 (D) In service	

a Lothian Buses is contributing to total cost £500,000 (Lothian buses £243,000, CEC £50,000 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

Lothian Buses use Euro 5 standard buses on high frequency services (Airlink 100 and the Number 26) which both pass through the Central and St John's Road AQMAs. Service 22 is also a high frequency service and buses are either Euro 4 or Euro 5 standard. This route transits both 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 operating through the Central and Gereat Junction Street AQMAs. The new single deck hybrids are used on the Number 1 route which transits the Central AQMA including the newly extended areas Easter Road and London Road. The degree of improvement in the fleet is illustrated in Tables 8.2 and 8.3.

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 8.2 Euro Standard of Service Bus Fleet (Lothian Buses 2006 to 2013)

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

Data provided by Lothian Buses, May 2013

Table 8.3 Euro Standard of City Tour Bus Fleet (Lothian Bus 2010 to 2013)

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

Data provided by Lothian Buses, May 2013

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 of most of the open top fleet. The tour fleet has a high operational presence in the City Centre AQMA and adjoining areas. 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.

Lothian Buses have indicated that EMINOX have developed a solution which would allow conversion of their 251 Euro 3 double decker buses purchased around 2005/6 to Euro 5/6 standard. This would be a significant step forward in NO_x and PM_{10} reduction from their fleet.

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 8.4

Table 8.4 First Scotland (East) Fleet operating in Edinburgh in 2011 and 2013

Euro Standard	2011	2013
Euro 1	2 (7%)	0
Euro 2	14 (45%)	0
Euro 3	11 (35%)	75 (69%)
Euro 4	3 (10%)	24 (22%)
Euro 5	1 (3%)	10 (9%)
Total vehicles	**330**	**109**

Data provided by First Scotland (East), June 2013

There has been a significant improvement in the emissions 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 9% of the fleet or ten buses are of Euro 5 standard.

Stagecoach

Stagecoach operates approximately 40 buses into Edinburgh. The current Euro standard shows that 90% of the fleet are Euro 4 or better (Table 8.5)

Table 8.5 Current standard of Stagecoach operating in Edinburgh

Euro Standard	2012 (%)	2013 (%)
Euro 1	0 (0%)	0 (0%)
Euro 2	2 (5%)	0 (0%)
Euro 3	4 (10%)	4 (10%)
Euro 4	27 (69%)	27 (64%)
Euro 5	6 (15%)	11 (26%)
Total vehicles	**39**	**42**

Data supplied by Stagecoach June 2013

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 8.6. At the time of reporting City of Edinburgh Council were not in receipt of an update from Citylink.

Table 8.6 Projected standard of Citylink Bus fleet October 2012

Euro Standard	Oct 2012 (%)
Euro 1	0
Euro 2	0
Euro 3	4 (6%)
Euro 4	1(1%)
Euro 5	67(93%)
Total	**72**

Data provided by Citylink, September 2012

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 difficult 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 difficult 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-funding bid, ECOSTARS Edinburgh. This is a voluntary, free to join freight 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 TTR.

The scheme was officially launched in January 2012 and to date 35 operators have joined and a total of 2,900 vehicles have been registered. The majority of member operators are from the freight haulage sector (25) followed by passenger transport sector (8) and public sector (2). A number of other operators have expressed an interest in joining ECOSTARS Edinburgh but have not yet submitted applications.

The scheme is part funded by Intelligent Energy Europe and will run until at least May 2014. This will provide a relatively low-cost, 'partnership' mechanism to assist the Council encourage and facilitate emissions improvements from the road freight sector operating in the city. The targets which have been set are very ambitious and are shown in Table 8.8.

Other Scottish Local Authorities are now engaging in similar schemes which will bring wider benefits.

Table 8.7 Targets for ECOSTARS Edinburgh

Year	Number of vehicles required to become part of scheme
2012 (Year1)	3000
2013 (Year2)	4000
2014 (Year3)	4000

8.4 Improvement in Council Fleet Vehicles

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 (4%). 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 8.8)

Table 8.8 City of Edinburgh Council Fleet (Including hire vehicles) improvement by year

Euro Standard	2003		2011		2012		2013	
	No. of Vehicles	%	No. of Vehicles	%	No. of Vehicles	%	No. of Vehicles	%
Pre Euro	12	1	0	0	0	0	0	0
Euro 1	96	12	0	0	0	0	0	0
Euro 2	374	45	0	0	0	0	0	0
Euro 3	338	41	78	8.3	45	4.6	38	4
Euro 4	12	1	627	67.1	561	58.2	476	50
Euro 5	0	0	227	24.2	348	36.1	430	45
Electric	0	0	3	0.3	10	1.0	10	1.0
Total	**832**	**100**	**935**	**99.9**	**964**	**100**	**954**	**100**

There are plans in 2013 to deliver further fleet efficiencies and savings by reducing fleet numbers and replacing approximately 300 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 5 and Euro 6 engine vehicles. Stop Start technology will be mandatory for replacement like-for-like cars and small vans.

Consideration will be also given to downsizing vehicles where possible, or the use of petrol powered vehicles instead of diesel. The Local Authority also actively seeks financial assistance to off-set costs involved in the purchase of hybrid or electric vehicles. To date, there are a number of vehicles purchased through the Low Carbon Vehicle Procurement Scheme operating in Edinburgh, listed below, although funding is not currently available;

2010/2011

City of Edinburgh Council	2 x Nissan leaf and 1x Mitsubishi
Lothian &Borders Fire & Rescue Service	2x Ashwood diesel electric hybrid vans

2011/2012

City of Edinburgh Council	7x Kangoo electric vans
Lothian and Borders Police	1x Ampera1x Connect
NHS Lothian	2x Citroen C Zeros – leased
Edinburgh Napier University	2 charging points

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. A number of technical and financial considerations delayed the process; however, the Council's current administration restated its commitment to investigate LEZ's following the local elections in 2012.

The Council's intention is to progress the LEZ feasibility study work during 2013, in accordance with the UK Government's recently revised Vehicle Emissions Factors and Local Fleet Profile toolkits.

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

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 25th 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. The Scottish Government indicated they will bring forward stakeholder consultation on creation of a Low Emission Strategy including Low Emission Zones which may be area, region or country specific.

8.6 Electric vehicles / Plugged in places

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.

The United Kingdom Office for Low Emission Vehicles (OLEV) has provided funding for the second wave of its 'Plugged in Places' programme, which part funds electric vehicle infrastructure. The current programme will provide funds to establish charging points in public sector car parks through all 32 of Scotland's Community Planning Partnership areas.

The Central Scotland Plugged in Places Project (PiP) consortium, led by Transport Scotland, submitted a successful bid to the PiP programme. As a result Edinburgh Community Planning Partnership obtained funding and is currently concluding procurement for a number of electric vehicle charging points. Tenders relating to the project specified the installation of Combi-Rapid Chargers at three park and ride sites in the city. This type of charger consists of a 70 or 50 kW (32 Amps) DC and 43 kW (32 Amp) AC combined unit. However, the number of chargers eventually installed will depend on the prices tendered.

Currently there are electric vehicle charging points at nine Council premises, offering 13 charging heads for use by its own and NHS vehicles. Further charging points, at Scientific Services, Seafield and the Drumbrae Hub Garage, will be introduced during 2013, funded by Scottish Government, for use by City of Edinburgh Council and NHS electric vehicles and there are plans to install a charging point in the Quadrangle, City Chambers and further charging points at Waverley Court.

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 is in place on a number of road networks in the city. However, a backlog of loop repairs and validation requirements has prevented the full operational benefits in some areas. Problems associated with the repair and installation of new loops has now been addressed and the following programme of works are being progressed by the Council. The status of SCOOT around the city is detailed in Table 8.9. Implementation and repair work is subject to funding availability.

Gorgie Road
Loops have been re cut at Westfield Road and Robertson Avenue Junction. Following the road re-surfing project loops will be reconnected and SCOOT re-commissioned at these two junctions.

Ferry Road
Repairs will commence on Ferry Road to address the following junctions, Inverleith Row, Granton Road, East Fettes Avenue and Pilton Drive. The majority of loops have been re-cut and programming of further loops is anticipated late 2013.

Ardmillan Triangle
This area encompasses Angle Park Terrace, Henderson Road, Ardmillan and Gorgie Road. Scottish Government funding has enabled SCOOT to be implemented at this junction. Gorgie Road/Dalry junction is part of the Central AQMA and Angle Park Terrace is subject to a Detailed Assessment. Loops have now been cut at the junctions; final work on junction configurations is underway with a view to validating the region in summer 2013.

St John's Road
It is anticipated that SCOOT will be completed and commissioned in 2013 in association with the MOTES trial (see section 8.7.2). Cabling for loops at Manse Road has commenced. Scottish Government funding has been secured for this work.

Table 8.9 Status of SCOOT in Edinburgh 2012

SCOOT Status	Areas	In AQMA/area of concern
Fully operational (Loops all functional)	Causewayside, Dalkeith Road Gorgie Road junction Chesser Avenue/Balgreen Road	No, No Yes
Operational in part (Loops functional but revalidation required)	Bridges St John's Road	Yes Yes
Loops need repaired. (Validation not required)	Lothian Road, Slateford/ Shandon, Ardmillan, Queensferry Road, New Town, Ferry Road, London Road.	Yes (all)
New loops required (Validation required)	Roseburn, Slateford near Union Canal, Bristo Triangle	Yes, Yes No
Never been installed	High St and Mound, Telford Rd, Queensferry St, Morningside, St Mary's St, Stockbridge, Polwarth	No (all)
Unlikely to be reinstalled due to tram receiving priority	Queen Street, Princes Street, Haymarket, Leith Walk, Leith, St Andrew Square	Yes (all)

8.7.2 MOTES (Real-time Remote Sensor system)

MOTES sensors provide instant qualitative real-time NOx data, which can be linked to SCOOT systems and govern traffic signalling with respect to ambient concentrations of NOx.

A trial involving MOTES sensors was commissioned early in 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 will involve the assessment of NOx 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. It is hoped that improvements in traffic flow coupled with the knowledge of real time NOx data will lead to a reduction in hourly exceedences and the annual mean at this location.

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 is being carried out on a collaborative basis with the system provider Masternaut (Cybit) UK Ltd.

The aim is 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 is now being gathered.

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

The trial has recently been completed and a report on the findings will be prepared and submitted to Scottish Government.

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 trafficjourneys by 9174 if operated at maximum capacity (Table 8.10).

Table 8.10 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
Total	**4587**

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 sites 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 these modes of travel. In further support of these ambitions the Council also introduced an Active Travel Action Plan (ATAP) in 2012. 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.

The Council has also secured European funding for a cycling project, '*Managing Energy Reduction through Cycling e**X**cellence'* (MERCX). This project will fund cycling promotion through marketing and promotional activities including the development and distribution of publicity materials and the planning and delivery of workplace initiatives. This project commenced in October 2011 and is due to run for three years. The lead partner is Traject Mobility Management, Ghent, Belgium.

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_2 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.

8.10 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_{10} 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 8.11 Action Plan Progress

No.	Measure	Focus	Lead authority	Planning phase	Implem-ent 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	**Central** 59% NOx **St John's** 48% NOx **GtJunct** 61% NOx Target year **2015** (per TTR study**)**	TTR study completed	Lothian Bus Main Fleet Euro 3 (41%) Euro 4 (13%) Euro 5 (23%) Euro 5/6(23%) First Scotland (East) Euro 3 (69%) Euro 4 (22%) Euro 5 (9%)	Ongoing	Further improvement will require substantial additional funding
1a	Manage bus emissions and potentially emissions from other vehicle classes	Reduce emissions via implementation of a LEZ	CEC SFC/ transport	2010-2012	Feasibilit y study / consultati on outcome s will have influence	Euro 5 by 2015	Not calculated This work will be central to feasibility study **Note** largest reduction in bus NOxemissions identified inLES study would be via **mandatory** scheme	CEC decision to consult with stake holders on feasibilty of LEZ Scottish Govt. support funding secured for consultatio n	Delayed due to national re-evaluation of Vehicle Emission Factors and publication of DEFRA National LEZ Framework (anticipated Spring 2013) Position agreed with Scottish Government – feasibility study delayed until 2013		Revised study in 2011 on buses within AQMAs show significant NOx reductions could be achieved with buses operating at Euro 5. 2013 LEZ feasibility study will also consider other vehicles classes

No.	Measure	Focus	Lead authority	Planning phase	Implem-ent 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 2013 2900 vehicles 35 operators	Recruitment of operators and vehicles ongoing. Membership levels consistent with scheme targets. Increasing emphasis in 2013 on bus and coach operators	June 2014	
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 4% Euro 4 50% Euro 5 45% EEV 1%	Ongoing	
3a	Council Fleet	Reduction in fuel usage	CEC/ SFC			Reductions in fuel		SG funding secured to	15 vehicles selected which	2013	If successful in reducing fuel consumption may be

No.	Measure	Focus	Lead authority	Planning phase	Implem-ent phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	Develop driver eco trainingprog. / carry out trial of vehicle telematics system.	beneficial to air quality	Corporate			consumption		trial vehicle telematics in CEC vehicles; Eco-driving instruction integral component	operate through all AQMAs Baseline for 3 months established (no Intervention) for 10 vehicles Eco driving instruction provided to vehicle operators.		installed on other CEC vehicles Report trial findings, including to Scottish Government, Spring 2013
4	LTS Park and Ride sites establishe d	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(10 40) Ingliston(1 030) Straiton(60 0) N'craighall (565) Sheriffhall(561) Hermiston (470) Wallyford (321)	Hermiston and Ferrytoll sites approaching capacity Council approved additional capacity at: Hermiston (+400) Sheriffhall(+60 0)	Proposals for further additional capacity at Hermiston &Sheriffhall Total 1000 new spaces.	Now utilising minimum Euro 3 std. buses. Further improvements still necessary
5	LTS Differential Parking	Carbon and LAQM pollutants	CEC Transport	2008	Oct 2010	Number of low carbon vehicles registered	Not quantified			Ongoing	

No.	Measure	Focus	Lead authority	Planning phase	Implem-ent phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
6	LTS Tram	Reduced Emissions - Zero at Source	CEC Transport	2008-11 (revised to 2014)	Issues with funding	Patronage	Not quantified		Tram Line 1 will now run between Edinburgh Airport and St Andrews Sq	2014	Not quantified Potential issues with bus and general traffic displacement Possible congestion where tram and bus routes coincide
7	LTS New rail line/stations	One of a package of measures to reduce road traffic entering Edinburgh from Airdrie / Bathgate and Newcraighall	CEC Transport			Passenger numbers	Not quantified	Bathgate / Airdrie and Newcraighall		Lines completed	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)		2014	
9	Traffic Management systems **SCOOT**					Reduce congestion	Not calculated	Ferry Road, majority of loops re-cut and will now programme repairs from 2013. SG funding for loop		2014	SCOOT – damaged systems to be repaired Additional installation subject to funding availability

No.	Measure	Focus	Lead authority	Planning phase	Implem-ent phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	MOTEs (trial)							repairs at St Johns Rd (on-going) Ardmillan 'Triangle' Junction Validation Summer 2013 Trial start date early 2013 in St John's Rd AQMA -.		2014	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	Developm ent of city-wideLand Use and Traffic (LUTi) model	Measure would enable more accurate prediction of air quality impactsfrom 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. Model requires high output resolution to enable meaningful dispersion modelling of AQ pollutants.	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 2012 shows that monitoring locations within each of the AQMAs continue to exceed air quality objectives. Although some monitoring is below the annual mean objective, the AQMAs remain valid.

Exceedences at monitoring locations outwith the AQMAs are identified at the following locations, Queensferry Road, Angle Park Terrace, Slateford Road, Nicolson Street and South Clerk Street. A summary of all locations where monitoring results are at or exceed the objective are shown in Table 9.1.

Table 9.1 Summary of locations where monitoring results are at or exceed the Nitrogen Dioxide objective in 2012

Site ID	Area / Site Name	In AQMA?	Data Capture %	Annual Mean Concentration (µg/m^3) (Bias Adjust. Factor = 0.76)
	NORTH			
29a	**Bernard Street**	Y Gt. Junction St.	88	**40**
29c	**Bernard St/PS**	Y Gt. Junction St.	92	**44**
55	**Inverleith Row/Ferry Rd.**	Y Inverleith Row	100	**46**
	EAST			
25	**Easter Road/CH Shop**	Y Central	92	**45**
25c	**Easter RoadNo 105/109**	Y Central	92	**41**
81	**London Rd/East Norton Pl.**	Y Central	100	**46**
67	**London Rd/Earlston Pl.**	Y Central	100	**46**
69	**London Rd/Wolseley Pl.**	Y Central	82	**42**
70	**London Rd/Wolseley Terr.**	Y Central	92	**41**
46	**London Rd/Easter Road**	Y Central	100	**41**
	CITY CENTRE - NORTH			
74f	**George Street No 112**	Y Central	92	**47**
74c	**George Street No 41**	Y Central	67	**56** [a]
74e	**George Street/Charlotte Sq.**	Y Central	75	**43**
47	**Princes Street (Eastbound)**	Y Central	100	34 **(45)** [b]
33	**Queen Street/Hanover St.**	Y Central	67	**49** [a]
36	**York Place**	Y Central	83	**41**
	CITY CENTRE - SOUTH			
138	**Clerk Street No 15**	No	67	**40** [a]
48C	**Cowgate Blackfriars**	Y Central	67	**43** [a]
48	**Cowgate/Gurthrie Street**	Y Central	92	**40**
48a	**Cowgate/Blair Street**	Y Central	100	**40**
37a	**GrassmarketNo 41**	Y Central	83	**43**

Site ID	Area / Site Name	In AQMA?	Data Capture %	Annual Mean Concentration (µg/m^3) (Bias Adjust. Factor = 0.76)
49	Morrison Street	Y Central	100	46
137	Nicolson Street No 124	No	92	41
135	Nicolson Street No 69	No	100	50
136	Nicolson Street No 92	No	92	42
27	North Bridge – South	Y Central	100	52
142	South Clerk Street No 41a	No	92	42
141	South Clerk Street No 84	No	92	44
3	Torphichen Place	Y Central	92	48
2	West Maitland Street	Y Central	100	40
28b	West PortNo 62	Y Central	83	61
28d	West PortNo 42	Y Central	92	60
	WEST			
16	Glasgow RoadNo 68	Y Glasgow Road	100	47
15	Glasgow Rd Newbridge	Y Glasgow Road	100	40
58	Glasgow Rd Newbridge	Y Glasgow Road	96	48
40	Queensferry/Hillhouse Rd	No	100	40
64	Queensferry Rd No 550	No	100	50
9#	Queensferry Road	No	87	52(40)
1b	St John's Road IR	Y St. John's Rd.	100	44
1d	St John's Road No 131	Y St. John's Rd.	100	52
5#	St John's Road	Y St. John's Rd.	92	58
	SOUTH WEST			
76B	Angle Park Terrace No 74	No	100	51
76	Angle Park/Harrison Road	No	100	48
18	Gorgie RoadNo 8	Y Central	92	49
80	Gorgie Rd / Delhaig	Y Central	100	42
5	Gorgie Road/Murieston Rd	Y Central	100	43
77	Slateford RoadNo 97	No	100	43
77A	Slateford Road No 51	No	83	41
77B	Slateford Road No 93/95	No	100	46

[a] Means "annualised"
[b] Princes Street (ID47) data in brackets represents pavement exposure 2.5m from the kerb, data without brackets represents concentration at the facade
[#] Passive Diffusion Tube analysis except 5# and 9#, which is automatic monitoring

The Detailed Assessment for Nicolson Street, Clerk Street, South Clerk Street and Hope Park Terrace junction shows that there are exceedences of the annual mean objective along this section of road and marginal concentrations at the Hope Park Terrace junction. Assessment was complicated due to closure of Princess Street for tram works and rerouting of traffic up North Bridge towards Nicolson Street. Monitoring will continue as these extenuating factors unwind. If exceedances continue it will be necessary to extend the Central AQMA to include this area.

Monitoring locations established along Hillhouse Road fulfilling Detailed Assessment work show that there is no exceedence of the objective. An AQMA will not be required for this area, however, monitoring will continue as the data from the long term site was marginally close to the objective. (It also previously exceeded the objective in 2008 and 2010.)

Six additional monitoring sites were identified around the 'Ardmillan Triangle' and Slateford Road for the Detailed Assessment and good data capture was achieved. A number of the sites show exceedence of the annual mean objective, particularly sites close to the Angle Park Terrace and Harrison Road junction and on Slateford Road. Assessment was complicated due to extended road works on Gorgie Road, diversions for tram works and loss of the SCOOT system at traffic junctions. Monitoring will continue as these extenuating factors unwind. If exceedances continue it will be necessary to extend the Central AQMA to include this area.

A number of additional monitoring sites were identified in the Fountainbridge area for the Detailed Assessment. However data collection was poor for many of the sites, so it was not possible to make any conclusion. This Detailed Assessment work will continue in this area.

There has been a general increase in nitrogen dioxide concentrations measured at Queensferry Road, although the majority of sites remain below the annual mean objective. Monitoring at the automatic station was marginal when corrected back to the facade of the nearest residential properties. There was major road works and congestion on Queensferry Road associated with gas replacement infrastructure work. This work is now complete. One monitoring location continues to exceed the objective, while coincident sites meet the objective. It is anticipated that there may be local reasons for this and hence further investigations will be carried out and real time monitoring will continue.

There are a number of areas of compliance within the AQMAs. Exceedances in St John's Road AQMA were limited to the prevailing wind protected south side of St John's Road canyon around the Clermiston Road junction. Discussions are on-going within the Council about further potential measures in addition to the MOTES trial that could be taken to mitigate the idling of traffic at this junction.

All results within the original Great Junction Street AQMA boundary were less than the annual mean objective and are in borderline compliance with the objective. The average nitrogen dioxide level has been falling gradually, perhaps due to introduction by Lothian Buses of a number of low emission hybrid buses on the route in 2011. Data from the extended portion of the AQMA shows only the junction at Bernard Street above the annual mean objective.

In the Central AQMA, the majority of Shandwick Place has been closed to traffic for a number of years due to tram work. The automatic station at Queen Street at Wemyss Place remains well below the annual mean objective and the non-automatic sites on Leith Walk remain in borderline compliance with the objective.

If the 2013 data shows a continuation of the nitrogen dioxide reduction the extent of the AQMA boundaries can be reviewed in future years.

9.1.2 Particulate Matter PM_{10}

2012 data from all monitoring locations met with the PM_{10} EU limit values and the UK National Objectives. The background sites at St Leonard's and Currie, and roadside locations at Queen Street and Glasgow Road, met with the Scottish Air Quality Objectives.

Salamander Street did not meet the annual mean Scottish Air Quality Objective or the permitted number of daily exceedences. Monitoring at Queensferry Road shows the concentration of PM_{10} is marginal (18$\mu g/m^3$) in relation to the annual mean objective. The requirement to progress to city-wide Detailed Assessment of PM_{10} remains valid and will be completed in 2013/14.

9.1.3 Trend Data

It has proved difficult to formulate reliable assumptions on data trends for both NO_2 and PM_{10} due to disruptions to normal traffic flows, arising from construction works associated with the Edinburgh Tram project.

The average roadside trend of nitrogen dioxide within the AQMAs (2003 to 2012) using passive diffusion tubes is falling slightly; however, this has to be viewed with caution due to the major traffic disruption. The mean for 2012 is the same as that monitored in 2011.

At the automatic monitoring sites, the AURN background site at St Leonard's show the lowest nitrogen dioxide level (24ug/m^3) since monitoring began at the site in 2004. The roadside site at Gorgie Road shows a flattening trend.

Decreasing annual mean NO_2 concentrations at Queen Street and St John's Road show downward trends. There is also a downward trend in the number of hourly exceedences at St John's Road, although there was a slight increase in the number of exceedences between 2011 and 2012.

Downward trends showing a decrease in PM_{10} concentrations are noted at St Leonard's and Queen Street.

9.2 Conclusions relating to New Local Developments

With the Edinburgh tramline due to begin passenger services in summer 2014, the Local Authority is currently considering views on proposed changes to the traffic management system within the core city centre area. Details will be considered in a report to the Local Authority's Transport and Environment Committee on 27th August 2013.

A major infrastructure project involving road, footway and environmental improvements to Leith Walk and Constitution Street has the potential to impact traffic flow on Easter Road and Bernard Street (AQMAs). Traffic modelling assessments are currently being undertaken.

9.3 Other Conclusions

9.3.1 Implementation of AQAP plans

Steady progress has been made with respect to the two main measures contained in Air Quality Action Plan relating to management of emissions from buses and freight, via informal 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.

Edinburgh ECOStars freight recognition scheme is enabling the Council to engage much more effectively with the road freight sector on local air quality issues and is encouraging an increasing number of fleet operators to improve operational performance and to reduce fuel consumption and tailpipe emissions.

Other Scottish Local Authorities are now engaging in similar schemes which will bring wider benefits.

The Council is also setting a positive example by ensuring that emissions are reduced from its own fleet through operating newer, smaller and cleaner vehicles and undertaking a trial study of in-vehicle telematics to facilitate fuel efficiencies.

SCOOT (Split Cycle Optical Optimisation Technique) Traffic Management systems are being progressed some with Scottish Government air quality grant funding. SCOOT should be re-instated and fully functional at St John's Road and a new system installed at the '*Ardmillan Triangle*' in 2013. Repairs to pre-existing SCOOT systems have also commenced at Ferry Road and Gorgie Road. All locations are in areas where there are air quality concerns. Additional deployment of SCOOT is subject to funding availability, including Scottish Government air quality support grant.

A trial of remote real-time pollutant sensors (MOTEs) is to be incorporated with SCOOT at St John's Road. The combined system will govern traffic signals with respect to qualitative real-time NOx data. It is anticipated that peak concentrations of NO_2 will reduce, leading to a lower number of hourly exceedences and annual mean concentration.

A number of policies within the Council's Local Transport Strategy (to be updated during 2013) aim to reduce traffic levels overall and encourage model shift e.g. Park and Ride, Controlled Parking Zones, Priority Parking Zones and the development and implementation of an Active Travel Action Plan – these benefit local air quality on a city-wide basis.

A revised Air Quality Action Plan will be produced during 2013/14 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.

9.3.2 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 2012 monitoring results show that PAH and $PM_{2.5}$ comply with their specified objectives and Ozone exceeded the national objective.

9.3.3 Planning Applications

The Proposed Local Development Plan focuses on four strategic development areas detailing a number of housing development sites and 'special economic' areas for development, which are considered to be of national or strategic economic importance. All these sites are described in Tables 5.1 to 5.3. Given the desire for continued economic growth in the city and wider region, it remains that radical city-wide transport initiatives and interventions will be required to deal with the impacts on local air quality.

9.4 Proposed Actions

9.4.1 Nitrogen dioxide

Detailed assessment – Work in Progress; Expected completion April 2014
Additional monitoring commenced in January 2012 at Portobello Road/Sir Harry Lauder Road junction to support detailed assessment work.

Detailed assessment – Further investigation
The Detailed Assessment work will continue at Nicolson Street, Ardmillan/Slateford Road area and Fountainbridge.

Further investigation will continue at Queensferry Road where monitoring from one passive diffusion site continues to show exceedence, which is not in keeping with the neighbouring automatic and non-automatic monitoring.

Monitoring will also continue at Hillhouse Road where one marginal result from a passive diffusion tube site was obtained during the detailed assessment (which included six other close sites).

Further Assessment – Expected completion; Summer 2013
Further assessment work is currently being undertaken with regards to the recently declared AQMAs at Inverleith Row/Ferry Road junction and Glasgow Road as well as the extension to the Central and Great Junction Street AQMAs. This includes source apportionment work at Inverleith Row, Glasgow Road, Gorgie Road, Cowgate, Grassmarket, Easter Road, London Road and Bernard Street.

9.4.2 PM_{10}

City-wide Detailed Assessment; Expected completion 2013
Although data capture at the St Leonard's AURN site was poor in 2012, it is anticipated that the city wide assessment for PM_{10} can be progressed and completed in 2013.

9.4.3 Revision of the Air Quality Action Plan

A revised Air Quality Action Plan will be produced during 2013/14 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, anticipated in August 2013. The revised Action Plan will be developed following the outcomes from the Further Assessment (Source Apportionment) work.

10 References

[1] Mid Year Population Estimates (MYPE), produced by National Records of Scotland (formerly General Register Office Scotland), 2011

[2] NO_2 Fall Off with Distance calculator, Tool, LAQM, DEFRA website, 2013

[3] Means “annualised” as in Box 3.2, Technical Guidance, DEFRA, 2009

[4] Building a vision for the city centre, Transport and Environment Committee, City of Edinburgh Council, 19 March 2013

[5] Air Quality Impact Assessment for Proposed Residential at Ratho Station, Newbridge, The Air Shed, August 2010

[6] Edinburgh Airport, Airport Surface Access Strategy, 2012

[7] Edinburgh Local Development Plan, Revised Environmental Report, Volume 1, March 2013 www.edinburgh.gov.uk/localdevelopmentplan

[8] Planning reference number 11/04125/AMC Demolition of all structures and development of food store, petrol filling station, car parking, servicing facilities and associated works approved at 10-12 Ingles Green Road, Edinburgh

[9] Edinburgh Local Development Plan, Proposed Plan, City of Edinburgh Council, March 2013

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[11] Developing a New Local Transport Strategy, Issues for Review, Transport and Environment Committee, City of Edinburgh Council, 15 January 2013

[12] Transport 2030 Vision, City of Edinburgh Council, 2010 http://www.edinburgh.gov.uk/downloads/file/411/transport_2030_vision

[13] Air Quality Action Plan for Area Designated 31st December 2000 July 2003

[14] City of Edinburgh Council: Review and Assessment of Air Quality Stage 4 (2002)

[15] Air Quality Action Plan (Revised 2008)

[16] Edinburgh Low Emission Strategy Feasibility Study. Transport and Travel Research May 2007

[17] Further Assessment Report for the following Air Quality Management Area Declarations: Great Junction Street, St John’s Road, West Port (extension of Central AQMA). August 2011

[18] Edinburgh Low Emission Strategy - bus emission analysis, Transport and Travel Research, March 2011

[19] Particulate Matter pollution episode measured in Greater Glasgow urban area

http://www.scottishairquality.co.uk/documents//news/460121218_PM_Episode_Glasgow.pdf

Appendices

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

A1 Nitrogen Dioxide (NO_2) Diffusion Tube Bias Adjustment Factors

A2 NO_2 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_2

A6 QA/QC of automatic monitoring

A7 QA/QC of Diffusion Tube Monitoring

Appendix B: Raw Passive Diffusion Tube Data

Appendix C: Passive diffusion tube Distance Correction Calculations

Appendix D: Passive diffusion tube data used in Trend analysis

Appendix A: QA/QC Data

A1 Nitrogen Dioxide (NO_2) 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 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 there was a step change so the bias was calculated using a combination of local factors and the factors contained in the National Bias Data Base for Marylebone Road and West Lothian (Edinburgh Scientific Services carried out the analysis of passive diffusion tubes located at both of these sites). This involved undertaking a manual approximate orthogonal regression calculation which resulted in a combined bias factor representing the worse-case scenario bias factor of 0.81 (see Table A1b)

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			0.88	0.93	0.91
Leith Walk	Roadside	0.89					
Currie	Suburban				0.91		
Gorgie	Roadside					0.86	
Roseburn	Roadside					0.92	
Mean		**0.91**	**0.91**	**0.91**	**0.89**	**0.89**	**0.87**

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

Site	Type	2007	2008	2009	2010	2011
Queen Street	Roadside	0.85	0.81	0.83	0.84	0.69
Haymarket	Roadside	0.92	0.87			
Gorgie	Roadside	0.91	0.94			0.87
Roseburn	Roadside		0.91	0.82	0.85	
St. John'sRoad.	Kerbside	0.93	0.86	0.92	0.92	0.79
Salamander	Roadside				0.79	0.77
Queensferry Road	Roadside					0.66
Mean		**0.90**	**0.88**	**0.86**	**0.85**	0.76
Combined Mean*						**0.81***

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

A2 NO_2 Bias Adjustment Factor from Local Co-location Studies

Five automatic monitoring stations were considered for the co-location study during 2012. The monitoring station located at Glasgow commenced operation in September 2012, therefore data capture was insufficient to undertake co-located work at this site. The factors for 2012 studies are shown in Table A2.

Table A2 Bias factors used for 2012 data

Site	Type	Analyser	PDT* Mean	PDT* Precision	DC# % Analyser	Period	Bias Factor A	Bias B (%)
Gorgie Road	Road-side	39	46	4	99	11	0.86	17
Queen Street	Road-side	28	43	6	95	12	0.65	53
Queensferry Road	Road-side	52	73	5	92	10	0.71	41
Salamander Street	Road-side	30	38	4	98	12	0.80	25
St John's Road	Kerb-side	56	76	5	92	11	0.74	35

* 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. As previously mentioned, 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.

In 2012, an annual mean bias factors (Bias A) of 0.75 was calculated. Although in keeping with the 2011 study, checks were carried out with respect to the automated and passive diffusion tube data to assess the reliability of the bias factor. AEA confirmed that there were no issues with the real time data.

With respect to analysis of passive diffusion tubes, Edinburgh Scientific Services stated that there had not been any change in laboratory procedures. Sample results for WASP were submitted and within range for 2012.

The co-located studies showed that overall precision of triplicate tubes and data capture from the automatic sites was good.

In conclusion, a combination of the local factors and the factor available on the National Bias Data Base, for Maryleborne Road was used. A manual approximate orthogonal regression calculation was undertaken using the bias B values in accordance with Air Quality Consultant Guidance document paragraph 2.4 (see Table A3). This method resulted in a combined bias factor of 0.76 and represents the worse-case scenario.

Table A3 Manual approximate orthonogel regression calculation for 2012 bias

Site	Bias A 2012	Bias B 2012	Calculation as AQC Guidance Para 2.4	Bias 2012
Local				
Queen Street	0.65	53%		
Queensferry Road	0.71	41%		
Salamander Street	0.80	25%		
St John's Road	0.74	35%		
Gorgie Road	0.86	17%		
National				
Marylebone Road	0.86	16%		
Mean Local Bias B	**0.75**	34%	0.34+1 = 1.34	
			1/1.34 =	**0.75**
Mean Combined		31%	0.31 +1 = 1.31	
			1/1.31 =	**0.76**

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.

Data from the Currie station was corrected by the Local Authority using the VCM correction spreadsheet provided by Kings College to provide a gravimetric equivalent concentration. The PM_{10} FDMS purge data over the same period was obtained from Ricardo-AEA and included 23 monitoring sites in the Scottish network. Temperature and pressure data were obtained from Edinburgh Airport.

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 inDetailed Assessment Report 2004.

A5 Short-term to Long-term Data adjustment for NO_2

Data from St Leonards monitoring site was used to estimate annual nitrogen dioxide concentrations from short term measurements as it was the only site that met appropriate criteria in 2012. It is located in central Edinburgh and part of the national

Automatic Urban and Rural Network (AURN). Data capture (DC) was also considered to be within acceptable limits. The Bush Estate monitoring site has been used in previous years, however data capture was low during 2012 (76%).

Automatic Monitoring at Glasgow Road

Monitoring at Glasgow Road started on 4th September 2012 after the station was moved from the Roseburn site. The period mean was therefore calculated from 04/09/2012 to 31/12/2012. The annual mean was for a full calendar year January to December 2012. The mean ratio which was used to calculate the estimated annual mean for Glasgow Road was 0.837.

Estimation of Annual Mean Concentration for Nitrogen Dioxide at Glasgow Road.

Site	Site Type	Annual Mean µg/m^3	Period Mean µg/m^3	Ratio
St Leonard's	**Urban background**	24.1	34.0	0.837

Glasgow monitoring data for the period 4/9/12 to 31/12/12 = 33.8µg/m^3(Data capture 98%)

Annual estimated mean 34.0 x 0.837 = 28.5 (**29 µg/m^3**)

Non-Automatic Monitoring (Passive Diffusion Tubes)

The period mean for each diffusion tube exposure period is calculated to approximately noon of the day of exposure. The annual means were calculated from January 2012 until the 4th/5th of January 2013 which was end of exposure for 2012 tubes. The calculation for each tube is detailed in the subsequent tables.

Site ID / Location 33 – Queen Street			
Monitored Periods; 31/1/12 – 24/4/12, 29/5/12 – 37/7/12, 28/8/12 – 27/11/12 **Monitored Mean Value (M)** = 65.3			
Background Site	**Annual Mean**	**Period Mean**	**Ratio (R)**
St Leonard's	24.1	22.9	1.052
Adjusted Mean (M x R) = 68.7			

Site ID / Location 138 – Clerk Street			
Monitored Periods; 5/1/12 – 1/2/12, 29/2/12 – 27/6/12, 26/9/12 – 4/1/13 **Monitored Mean Value (M)** = 57.6			
Background Site	**Annual Mean**	**Period Mean**	**Ratio (R)**
St Leonard's	24.1	26.3	0.916
Adjusted Mean (M x R) = 52.7			

Site ID / Location 48c – Cowgate/Blackfriars			
Monitored Periods; 5/1/12 – 24/4/12, 27/6/12 – 29/8/12, 26/9/12 – 31/10/12, 28/11/12 – 4/1/13 **Monitored Mean Value (M) =** 60.5			
Background Site	**Annual Mean**	**Period Mean**	**Ratio (R)**
St Leonard's	24.1	26	0.927
Adjusted Mean (M x R) = 56.1			

Site ID / Location 64a – Queensferry Road			
Monitored Periods; 1/8/12 – 4/1/13 **Monitored Mean Value (M)** = 44.1			
Background Site	**Annual Mean**	**Period Mean**	**Ratio (R)**
St Leonard's	24.1	26.6	0.906
Adjusted Mean (M x R) = 39.9			

Site ID / Location 50a – Whitehouse Road			
Monitored Periods; 5/1/12 – 1/2/12, 29/2/12 – 26/9/12 **Monitored Mean Value (M)** = 37.9			
Background Site	**Annual Mean**	**Period Mean**	**Ratio (R)**
St Leonards	24.1	20.8	1.159
Adjusted Mean (M x R) = 43.9			

Site ID / Location 74c, George Street			
Monitored Periods; 4/1/12 – 28/8/12 **Monitored Mean Value (M)** = 93.2			
Background Site	**Annual Mean**	**Period Mean**	**Ratio (R)**
St Leonards	24.1	22.1	1.090
Adjusted Mean (M x R) = 101.6			

Site ID / Location 80c, Gorgie Road			
Monitored Periods; 4/1/12 – 31/1/12, 28/2/12 – 37/3/12, 29/5/12 – 26/6/12, 31/7/12 – 3/1/13 **Monitored Mean Value (M)** = 55.1			
Background Site	**Annual Mean**	**Period Mean**	**Ratio (R)**
St Leonards	24.1	26	0.927
Adjusted Mean (M x R) = 51.1			

A6 QA/QC of Automatic Monitoring

All monitoring stations except Currie, 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_x 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_{10} 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.

Data validation and ratification for the Currie Monitoring Station

Data from the Currie Monitoring station is not subject to the independent audit and QA/QC procedures by DEFRA/the Scottish Government (Ricardo/AEA). However some basic checks are made to data on a daily basis (Monday to Friday) by visual examination. If suspicious data e.g. large spikes, is noted then this is flagged to undergo further checks.

PM_{10} data sets which require further investigation are checked with respect to the following:

- Assessment of calibration records for drift precision /accuracy of analyser
- Negative values e.g. during /after TEOM filter change
- Spikes generated by analysers.
- Time/date of manual calibration no out of service switch Mobile AQ unit
- Examination of data gathered from other sites to ascertain if high values are caused by pollution episodes.
- Assessment of local activity construction/roadworks.
- Data capture rates distribution of missing or suspect data.

Nitrogen dioxide data from the Currie station does not undergo such investigation and is therefore raw data.

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 good over the monitoring periods 2008 to 2012.

NO_2 diffusion tube monitoring is conducted in accordance with the quality requirements contained in the UK NO_2 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 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_2 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 and 2012 the factors were 0.75 and 0.76 respectively.

Appendix B: Raw Passive Diffusion Tube Data 2012

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. Other highlighted data was removed due to poor duplicate data.

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	Corrected
1	55.5	49.3	42.7	68.8	M	70.4	49.9	59.6	40.9	61.2	54.6	64.5	**56.1**	
2	90.7	101	102	61.9	60.2	60.3	49.8	53.4	45.6	57.5	49.2	66.7	**66.5**	
2	93.3	99.9	94.3	57.8	57.5	54	47.8	51.4	44.5	58	54.4	59.2	**64.3**	
3	77.7	85.5	INV	69.5	57.4	54.8	57.9	65.1	72.2	76.5	80.8	89.7	**71.6**	
4	52.7	46.1	48.9	55.6	60.8	55.9	51.1	51.9	44.7	55.8	44.8	58.5	**52.2**	
5	65.2	76.8	75.8	68.2	64.6	59.8	64	67.8	38.9	79.6	69.4	89.4	**68.3**	
7	38.3	46.4	40.2	35.6	27.2	25.4	35	40.5	33.3	41.1	58.7	M	**38.3**	
8	M	37.1	40	37.9	36.3	33	24.3	M	28.7	34.6	45.3	M	**35.2**	
9	41.3	34.7	40.1	48.5	54.6	54.2	46	51.5	36.5	51.6	43.5	51.9	**46.2**	
10	M	38.4	M	43.5	49.7	46.8	30.6	44.6	29.4	46	M	55.9	**42.8**	
11	M	33.6	37.8	37	36.7	34.1	28	26.7	27.9	38.1	30.3	42.2	**33.9**	
13	49.2	45.9	M	50.3	32.3	35.7	37.5	41.8	44	48.4	46.4	58.5	**44.5**	
14	48.3	41.4	43.5	31	32.3	33.2	37	35.3	34.8	41.9	48.3	46.6	**39.5**	
15	64.5	68.3	59.7	54.8	38.9	38.5	42.8	49.5	46.2	58.3	79.9	69.3	**55.9**	
16	64.2	54.8	56.8	91.8	79	76.1	84.8	80.7	57.6	89.1	75.2	78.3	**74.0**	
16	59.7	44.8	51.9	73.9	57.3	94.1	77.8	88.7	65	80.1	76.3	71.9	**70.1**	
18	58.3	55.4	67.8	78.7	73.6	48.9	M	67.5	51.2	73.8	64.3	69.4	**64.4**	
18	67.3	57.1	72	70.6	60.1	60.5	M	63.8	46.1	72.3	69.1	80.6	**65.4**	
19	38.4	33.9	36.4	26.8	19.1	18.7	19.4	22.1	24.6	31.6	40.1	38	**29.1**	
20	52.1	42.2	57.7	56.3	45.7	43.9	43.4	45.8	44.3	53.3	53.7	52	**49.2**	
21	58.8	55.1	M	53.6	36.1	39	M	53.5	46.1	53.2	59.8	54.7	**51.0**	
23	NS	45.4	46.1	65.5	77.2	77.1	49.7	58.0	43.2	M	M	71.7	**59.3**	
24	56.2	49.6	44.2	56.9	42.3	39.5	61.3	80.5	81.9	80.7	90.5	101	**65.4**	
25	55.2	46.1	59.7	67.8	70.3	66.2	M	68.9	43.2	61.7	59.5	55.2	**59.4**	
27	60.6	54.8	60.5	76.2	83.8	87.5	64.8	80.7	55.3	63.7	60.4	66.3	**67.9**	
28	M	M	57.2	62.4	53.6	M	51.3	M	46.8	M	M	M	**54.3**	**N/A**
29	54.3	51.7	52.6	50.6	39.5	33.4	42.8	45.8	40.2	52.5	54.3	63.1	**48.4**	

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	Corrected
30	55.3	41.1	41.9	59.4	50.6	49.7	43.6	49.8	38.4	57.5	**36.8**	60.1	**48.7**	**49.8**[a]
30	53.8	38.5	48.2	62.7	51.5	48.2	44	50.9	36.5	51.9	53.6	59.3	**49.9**	
31	47.7	41.8	M	42.5	45.4	46.6	34.6	40.9	31.2	41.5	41.2	48.8	**42.0**	
32	52.5	40.4	50.4	35.1	36.5	38.6	31.7	42.0	39.5	51.4	56.9	52.5	**44.0**	
33	M	64.8	80.1	73.6	M	83.8	61.9	M	49.4	52.1	56.8	M	**65.3**	**68.7**[b]
34	37.8	36.5	31.7	29.1	26	23.1	24.7	30.2	23.1	32.3	35.4	38.2	**30.7**	
35	46.5	46.5	49.7	33.4	33.4	35.3	37.9	49	32.7	55.3	53.8	59.7	**44.4**	
36	56.5	40.8	69.4	72.1	69.7	65.7	52.6	54.6	M	42.7	M	42.6	**56.7**	
37	51.5	M	53.5	60.1	49.2	45.9	40.8	43.0	40.1	M	53.2	60.3	**49.8**	
38	48.1	44.7	41.8	38.9	29.1	26.1	26.9	32.2	M	42.1	48.4	55	**39.4**	
39	46.7	38.9	45.1	44.2	40.1	42.2	38.4	38.9	54.1	M	62.7	68.2	**47.2**	
40	52.6	50.3	52.9	53.4	60.6	58.3	47.3	51.7	35.9	51.7	50.2	61.9	**52.2**	
41	35.7	26.7	23.7	24.3	28.4	34.5	22.9	22.2	18.5	28.9	26.3	33.6	**27.1**	
42	30	29.5	25.5	22.7	18.1	19.1	16.6	18.3	17.7	23.8	23.8	33.9	**23.3**	
43	50.9	47.5	53.9	31.3	42.7	47.3	52.9	58.8	38.1	52.5	50.5	52	**48.2**	
44	42.8	47.4	44.2	40.1	48	45.7	33.6	48.9	37.4	46.6	47.8	57.4	**45.0**	
45	44.1	36.5	48.9	55.5	57.1	52.8	40.1	49.6	36.7	52.6	43.2	56.2	**47.8**	
46	64.5	62.2	55.6	25.8	54.2	52.9	44.5	54.8	50.6	59.2	58.7	57.9	**53.4**	
47	42.1	33.2	40.2	38	34.6	34.1	49.3	M	46.3	58.9	58.8	60.9	**45.1**	
48	55.9	55.1	47.3	56.2	47.5	49.8	47.7	58.9	46.6	M	58.3	58.1	**52.9**	
49	64.4	71	67.8	70.6	76.9	71	62.3	62.0	51.8	74.8	62.2	67.8	**66.9**	
52	53	55.3	53.9	50.6	48.2	M	45.9	48	44.5	57.1	56.3	52.8	**51.4**	
53	57.3	58.7	58.5	37.8	36.3	32.5	40.2	47.3	46.1	54.5	60.4	50.9	**48.4**	
55	61.5	69.2	70.5	59.4	52	54.9	56.9	62.1	57.2	67.3	66.7	68	**62.1**	
55	60.4	65.9	59.6	51.3	56.6	49	52.8	59.6	53.7	66.3	63	65.8	**58.7**	
56	47.2	42.8	39.6	48.1	47.2	38.5	32.7	45.8	36.4	50.5	47.8	52.2	**44.1**	
57	60.8	54.8	66.1	56.4	40.4	37.5	45.8	56.6	52.8	61.3	69.1	71.3	**56.1**	

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	Corrected
58	65.7	71.9	62.9	76.6	52.3	M	60.5	74.8	74.2	77.6	89.5	87.2	**72.1**	
58	62.6	65.8	78.2	69.7	55.1	59.5	63.2	79.4	73.5	75.8	95.8	83.5	**71.8**	
61	46	38.4	25.8	28.7	47.9	43	38.7	46.6	38.4	46.1	45.3	55.3	**41.7**	
62	32.8	22.4	42.8	44.2	37.1	31.9	26.6	28.9	26.1	32.6	26.4	37.1	**32.4**	
63	42.9	41.4	35	32	25.6	23	25.5	31.8	32.8	37.3	43.3	46.2	**34.7**	
64	85.8	74.4	89	96.6	93.1	100	93.2	113	86.3	117	104	106	**96.6**	
66	46.3	47.8	46.8	48.3	54.2	53.9	36.5	44.8	39.4	45.8	41.1	57.5	**46.9**	
67	62.7	63.7	62.4	59.7	57.3	63.7	54.2	54.8	53.1	62.7	64.3	66.9	**60.5**	
68	43.6	48	47.2	48.1	35.1	38.2	34.7	M	38.9	45.1	42.9	50.9	**43.0**	
69	63.3	61.1	**<1.0**	**114**	43.8	47.2	27.2	47.2	53.7	80.5	66.8	62.7	**60.7**	**55.4[a]**
70	66.1	67.8	70.9	51.8	38.6	34.7	39.7	52.7	M	51.3	55.3	58.7	**53.4**	
71	M	52.5	57.6	42.1	28.4	30.4	33.4	45.7	41.5	47.1	66.1	M	**44.5**	
71	M	47	53.7	38.7	28.5	27.2	32.4	41.0	39.4	42.7	59.3	M	**41.0**	
72	49.4	35.3	43.3	44.3	49	63.2	49.1	50.1	36.9	53	49.5	54.2	**48.1**	
73	42.7	32.9	34	35.4	28	25.1	23.6	26.0	27	M	41.1	47.9	**33.1**	
76	69.6	53.5	58.2	62.1	61.9	67.6	62.2	66.6	53.9	68.4	61.7	74	**63.3**	
77	55.2	47.2	52.9	61.2	62.1	60.9	51.6	56.3	41.8	64.2	57.4	62.7	**56.1**	
78	45.6	40	41.8	40	35.7	37.8	35	41.3	27.8	41	46.2	52.4	**40.4**	
79	53.5	47	47.8	46	56.3	48.6	47.3	47.8	30	51.1	54.7	56.4	**48.9**	
80	51.9	47.3	62.1	56.7	59.4	55.7	46.5	56.7	49.8	59.3	55	59.2	**55.0**	
81	72.1	67.7	70	55.5	39.3	40.5	39.2	55.3	59.6	66	77	77.1	**59.9**	
82	45.3	36.6	41	38.3	30.1	30	29.2	32.8	31.8	41.8	37.8	43.8	**36.5**	
134	M	M	54.6	53.2	M	M	M	M	M	49.2	56.9	58.6	**54.5**	**N/A**
135	67.4	67.9	78.6	70.5	62.2	56.1	54.3	66.5	52.9	75.2	74.9	67.9	**66.2**	
136	M	46.5	56.6	65.6	66.1	48	52.9	60.3	47.1	49.7	59.3	57.1	**55.4**	
137	55.3	46.2	49.8	58.4	70.8	63.6	M	57.3	37.1	48.7	52.6	47.7	**53.4**	
138	61.2	M	65.9	52.4	44.7	42.5	M	M	M	59.2	70.2	64.3	**57.6**	**52.7[b]**

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	Corrected
139	44.8	37.8	38.4	47.2	51.7	66.2	24.3	53.4	30.7	54	42.1	49.7	**45.0**	
140	54.6	48.7	45.3	46.3	44.3	45.9	48	62.1	40.5	52.2	53	M	**49.2**	
141	60.5	63.5	63.5	55.2	43.6	M	45.8	56.3	49.6	58.7	67.6	67.9	**57.5**	
142	M	62.5	60.6	54.6	58.3	55.7	43.4	57.5	41.2	48.2	61.7	56.3	**54.5**	
17a	54.5	54	47.1	**<1.0**	**95.5**	55.1	45.5	55.0	42.2	54.3	56.1	52.9	**55.7**	**51.7[a]**
17a	58.4	56.1	52.6	**<1.0**	**55.6**	54.4	45.5	53.7	43.6	48.7	49.2	58.2	**52.4**	**52.0[a]**
1b	55.8	43.5	52.4	75.2	69.4	70.8	56.1	56.8	46	56.3	53.6	61.9	**58.2**	
1d	74.7	73.9	74.2	66.6	50.9	53.7	61.9	68.9	65.8	68.5	83.6	84.2	**68.9**	
25b	30.9	53.3	42.4	52.2	42.7	44.3	43.2	51.6	37.3	51.1	52.2	51.2	**46.0**	
25c	52.5	41.2	52.8	55.3	33.3	56.9	35	**83.6**	44.5	88.8	66.5	64.6	**56.3**	**53.8[a]**
25d	46.6	45.3	41.5	39.4	45.1	43.8	39.8	49.4	35.3	48.9	48	52.9	**44.7**	
25e	46.4	43.7	45.2	41.4	45.2	45.5	37.4	45.9	33.2	44.5	40	46.6	**42.9**	
25f	47.8	46.5	M	32.9	M	27.6	M	29.9	33	**<1.0**	**104**	47.4	**46.2**	**N/A**
25g	45.1	43.5	INV	27.9	M	29.3	26.7	33.4	31.7	INV	48.1	40.5	**36.2**	
28b	M	66	85.7	79	INV	79.4	81.8	84.7	59.3	80.2	97.3	93.7	**80.7**	
28c	M	53.4	55.8	M	53.8	M	53.9	M	47.6	59.8	M	64.7	**55.6**	**N/A**
28d	76	88.9	81.1	74.8	73.1	67.2	66.4	86.9	**8.2**	82.4	90.9	80.5	**73.0**	**78.9[a]**
29a	M	42.4	51	61.7	55	54	50.7	56.9	**36.5**	44.8	53.2	58.9	**51.4**	**52.9[a]**
29a	47.7	43.8	45	53.1	56.6	56.1	50.4	60.2	**54.6**	53.5	63.9	59.1	**53.7**	**53.6[a]**
29b	46.5	37.9	43.1	45.4	45.8	42.6	40.6	45.0	30.9	47.2	49.1	50.1	**43.7**	
29c	58.6	49.3	60.1	57.2	53.8	51.5	58.6	64.4	**51.7**	52.6	73.4	64.9	**58.0**	**58.6[a]**
29c	58.2	44.3	56.5	55.7	50	54.8	50.4	59.0	**36**	63.2	71.1	65.9	**55.4**	**57.2[a]**
30b	59.2	60.8	58.1	46.8	37.6	34.9	41.8	49.6	48.8	M	65.9	50.5	**50.4**	
30c	49.1	50.5	50.4	59.7	58.3	52.6	50.4	M	36.6	31	52.2	61.8	**50.2**	
30d	48.9	44.7	43	59.4	55.8	52.5	44.9	55.4	34.4	49.4	53.8	58.3	**50.0**	
30e	52	56.5	M	49.4	38.9	30	39.9	M	41	52.7	63.1	60.4	**48.4**	
37a	M	59.1	53.6	58.1	57.7	55.8	44.3	61.0	47	73.8	59.4	73.3	**58.5**	

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	Corrected
37a	M	47	64.4	53.8	55.5	57.9	41	59.7	49.7	**97.6**	63.8	**117**	**64.3**	**54.8**[a]
37b	M	45.6	M	M	42.3	51	48.5	61.2	41.4	56.5	54.8	57.1	**50.9**	
37c	41.7	43.8	37.2	M	39.7	34.9	32.4	39.5	31.4	44.6	41.5	49	**39.6**	
40a	44.9	49	38.8	34.2	30.6	27	27.9	37.2	29.1	41.3	41.9	46.4	**37.4**	
40b	42.3	33.5	41.5	42.2	40.7	44.8	41.8	54.9	30.1	47.5	43.2	58.2	**43.4**	
40c	39.4	38	34.7	44.7	41.9	51.5	37.5	39.9	29.1	41.5	35.8	45.7	**40.0**	
40d	51.4	38.7	M	41.3	34.5	35.9	38.8	43.8	37.1	INV	51.6	50.1	**42.3**	
40e	43.6	35.3	M	36.3	31.8	36.1	32.9	41.3	30.2	39.5	39.7	M	**36.7**	
40f	47.2	35.3	37.8	57.9	65.9	68.9	45.5	53.5	37.9	49.9	44	54.7	**49.9**	
45b	52.3	42	M	47.6	42	38.8	21	40.9	31.4	42.9	40.5	45.6	**40.5**	
45d	55.6	48.4	57.5	51.8	40	36.3	41.8	49.4	41.5	47.2	62.3	M	**48.3**	
48a	46.9	42.1	58	50.6	62.6	57.9	52.6	49.9	43.3	53.3	53	57.8	**52.3**	
48b	49	46	45.4	43.7	44.3	38.7	42.2	50.2	36.5	41.7	M	M	**43.8**	
48c	57.9	69	62.4	49.3	M	M	51	65.6	M	61.2	M	67.4	**60.5**	**56.1**[b]
48d	51.7	M	54.5	M	M	M	M	M	M	M	M	M	**53.1**	**N/A**
48e	47.9	49.9	M	66.3	66.2	62.4	M	M	49.7	M	53.8	M	**56.6**	**N/A**
50a	49.2	M	35	38	38.4	33.7	32.5	42.0	34.5	INV	M	M	**37.9**	**43.9**[b]
51b	**N/A**	38.8	40.4	53.1	61.3	59.4	49	56.8	36.9	47	52.7	57.7	**50.3**	
51c	52.9	54.9	53.3	43.8	30	27	36.9	41.1	42.3	46.8	62	55.5	**45.5**	
55b	49.9	57.6	47.2	37.2	29.1	27.1	M	39.4	40.4	40	42.9	53.3	**42.2**	
55c	39.2	33.8	34.8	50.5	60.9	56	41.7	45.9	29.3	42.8	37.8	43.1	**43.0**	
64a	NS	NS	NS	NS	NS	NS	NS	43.5	36.5	45.1	44.1	51.2	**44.1**	**39.9**[b]
73a	57.6	55.7	59.2	44.3	44	40.6	42.4	56.4	46.6	47.8	66	63.8	**52.0**	
73b	50.6	37.4	49.9	32	22.6	20.4	25.6	29.5	34.6	37.3	51.6	44.5	**36.3**	
73c	38.7	30.3	36.5	32.6	30.1	29.7	23.9	29.3	23.2	34.6	35.6	37.5	**31.8**	
74c	101	83.7	99.4	124	112	105	66.4	53.8	M	N/A	N/A	N/A	**93.2**	**101.6**[b]
74e	M	89.5	97.9	89.6	85.1	91.2	M	M	48.5	56.6	72.9	78.6	**78.9**	

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	Corrected
74f	75.1	57.8	78.4	M	71.8	78.7	50.2	47.8	44.9	57.3	58.1	56.5	**61.5**	
75a	60.1	65.6	65	64.9	68.9	73.1	57.2	59.4	49.3	64.3	59.8	M	**62.5**	
75b	60.5	54.1	58.8	44.2	30.4	32.2	33.3	33.2	40.3	46.6	51.9	56.5	**45.2**	
75c	54.4	45.3	51	38.5	48.2	46.8	40.4	44.0	36.6	47.8	52.3	59.9	**47.1**	
76a	43.7	42.9	39.6	42.9	42.6	37.7	M	38.3	38.7	50.1	43.8	M	**42.0**	
76b	72	61.2	71.3	60	62	62.8	63.6	63.0	64.8	72.9	79.4	76.3	**67.4**	
76c	55.8	56.4	52.1	47.2	39.6	39.2	39.5	36.1	44.3	49.8	50.8	51.8	**46.9**	
76d	M	53	56.8	M	48.7	48.3	45.4	50.1	37.9	52.3	51.5	54.3	**49.8**	
77a	55.3	M	56.9	50	M	43.2	40.1	54.8	44.4	64.7	62.7	61.8	**53.4**	
77b	62.9	59	63	55.9	59.1	55.2	55.1	58.2	51.4	64.6	71.1	63.7	**59.9**	
79a	54.8	50.3	49.5	54.3	57.6	55.5	50.1	52.7	39.2	52	M	M	**51.6**	
79b	M	37.4	30.7	46	52.6	45.6	37.5	40.3	M	M	42	47.7	**42.2**	
79c	M	M	M	M	36.7	M	M	M	30.9	M	46.9	51.6	**41.5**	**N/A**
79d	M	59.4	M	62	62.9	M	M	M	M	73.3	74.8	74.2	**67.8**	**N/A**
80a	50.8	48.4	M	M	55.3	46	M	50.8	33	51	M	M	**47.9**	**N/A**
80b	46.9	35.5	48.6	45.8	53.5	M	32.1	46.4	36.2	51.7	38.5	M	**43.5**	
80c	56.6	M	68.3	M	M	45.1	M	57.3	51.2	42	61.2	59	**55.1**	**51.1**[b]
9a	61.5	61.5	66.6	56	58.4	51.3	55.9	58.9	48.1	M	64.5	60.1	**58.4**	
9b	M	36.7	M	46.7	52.9	39.2	37	41	27.3	43	44.1	46.4	**41.4**	

[a] Correction made to mean calculation having regard to outliers or problematic data

[b] Correction related to annualised data, i.e. estimation of annual mean concentrations from short term monitoring

M – Tube missing on collection

INV – Tube inverted on collection; not analysed

NS – Monitoring not started

N/A – Data not used

Figures in bold red – Problematic data not used

Appendix C: Passive diffusion tube Distance Correction Calculations

The following data was used to estimate annual concentration at relevant receptors using the NO2 Fall Off with Distance calculator (DEFRA website, LAQM, Tools, 2013).

SITE NO.	**1**	**2**	**2**	**3**	**4**	**5**	**8**	**9a**	**11**	**13**
Step 1 How far from kerb was measurement made (m)	0.54	0.65	0.65	0.73	1.6	0.3	0.7	1.47	1.5	2.7
Step 2 How far from kerb is receptor in metres (m)	2.34	4.85	4.85	2.28	26.6	5.2	3.5	5.37	5.2	7.8
Step 3 Local background concentration of NO_2	23	24*	24*	24*	28	32	25	25	20	24*
Step 4 Annual mean bias corrected value	42.7	50.5	48.9	54.4	39.7	51.9	26.8	44.4	25.7	33.9
Result; Predicted annual mean at receptor	38.4	40.6	39.6	47.8	32.4	43	26.3	38.9	24.1	31.3

SITE NO.	**14**	**15**	**16**	**16**	**19**	**21**	**23**	**24**	**31**	**32**
Step 1 How far from kerb was measurement made (m)	2	4	1.8	1.6	4.1	1.16	0.23	1	1.8	2.6
Step 2 How far from kerb is receptor in metres (m)	6	7.8	6.2	6.2	7.5	4.56	2.53	10	6.7	7.3
Step 3 Local background concentration of NO_2	21	27.6	25.4	25.4	22.1	29.6	24.8	24*	22.6	20.1
Step 4 Annual mean bias corrected value	30	42.5	56.3	53.3	22.1	38.8	45.1	49.7	31.9	33.4
Result; Predicted annual mean at receptor	27.7	39.7	47.6	45.4	N/A	36.2	37.5	37.8	29.1	30

SITE NO.	**33**	**35**	**36**	**37**	**38**	**39**	**49**	**50a**	**52**	**53**
Step 1 How far from kerb was measurement made (m)	4.2	2.4	5.5	4.1	2.8	1.56	2.2	3.5	1.65	4.6
Step 2 How far from kerb is receptor in metres (m)	6.45	9.7	8.2	9.1	12.8	5.71	4.6	5.07	6.25	6.17
Step 3 Local background concentration of NO_2	24*	24*	24*	24*	26.3	23.2	24*	15.7	20.9	20.9
Step 4 Annual mean bias corrected value	52.2	33.8	43.1	37.8	29.9	35.9	50.8	33.4	39.1	36.8
Result; Predicted annual mean at receptor	48.8	30.5	40.8	34.7	28.5	32.3	46.1	31.6	33.7	35.4

SITE NO.	**55c**	**56**	**57**	**58**	**58**	**61**	**64**	**73a**	**74c**
Step 1 How far from kerb was measurement made (m)	4.28	2.57	3.6	2.8	2.8	2.8	1.49	2.8	0.54
Step 2 How far from kerb is receptor in metres (m)	5.34	7.17	12.1	8	8	15.3	10.69	4.78	4.84
Step 3 Local background concentration of NO_2	22.1	23.2	22.1	27.6	27.6	18.2	18.2	22.1	24*
Step 4 Annual mean bias corrected value	32.7	33.5	42.6	54.8	54.6	31.7	73.4	39.5	77.2
Result; Predicted annual mean at receptor	32	30.9	35.8	47.5	47.4	25.9	49.6	37.1	56.3

SITE NO.	**74e**	**75a**	**75b**	**75c**	**40b**	**40F**	**140**	**47**
Step 1 How far from kerb was measurement made (m)	0.3	0.6	2.5	2.76	2.1	2.6	1.28	9
Step 2 How far from kerb is receptor in metres (m)	5.5	5.7	8.64	9.66	7	5.17	4.78	2.5
Step 3 Local background concentration of NO_2	24*	24*	24*	24*	19.9	22.3	27.0	24*
Step 4 Annual mean bias corrected value	59.9	47.5	34.3	35.8	28.4	37.9	37.4	38
Result; Predicted annual mean at receptor	43	37.8	31.1	32.1	26	35.2	34.5	44.5

*** Measured background data from St Leonard's used**

Appendix D: Passive diffusion tube data used in trend analysis

Data which has been used to establish the average trend is shown below.

	Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	Bias	0.91	0.89	0.89	0.87	0.90	0.88	0.86	0.85	0.81	0.76
Site ID	Site Name										
1	St John's Road	46	45	52	57	54	50	43	47	39	43
1b	St John's Road		41	59	51	51	49	44	44	38	44
1d	St John's Road		66	79	80	82	76	58	59	56	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
18	Gorgie Road	46	43	43	48	47	52	45	55	48	49
21	McDonald Road	41	39	38	42	47	42	40	41	36	39
23	Roseburn Terrace	47	40	49	52	70	67	48	58	41	45
24	Princes Street	84	85	84	87	93	79	46	73		50
27	North Bridge	58	54	49	52	56	52	48	49	49	52
33	Queen Street	44	44	44	46	53	53	51	56	50	
36	York Place	44	42	46	44	52	54	38	41	37	43
30	Gt. Junction Street	40	43	39	43	49	45	44	42	39	38
28b	West Port				68	65	73	67	62	57	61
	Mean	**54**	**53**	**58**	**60**	**65**	**61**	**50**	**55**	**48**	**48**