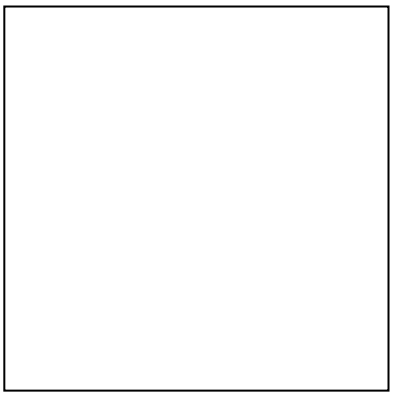

2010 Air Quality Progress Report for City of Edinburgh Council

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

September 2010

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Executive Summary

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act 1995 and the UK National Air Quality Strategy 2007. The report has been completed in accordance with DEFRA Technical Guidance LAQM.TG (09) Document.

The report concludes the following:

Monitoring Data

Concentrations of nitrogen dioxide within the three Air Quality Management Areas (AQMAs) continue to exceed targets at the majority of monitoring locations; and therefore the current AQMAs remain valid.

A Detailed Assessment for traffic sources of nitrogen dioxide (NO_2) is being progressed at the following locations, Glasgow Road, Easter Road, London Road, Bernard Street Grassmarket, Queensferry Road/Barnton.

Two new monitoring sites established at Portobello High Street and Inverleith Row marginally exceed the annual mean objective for NO_2 consequently the Council will require to proceed to a Detailed Assessment in both these areas.

Potential exceedences of the NO_2 annual mean objective attributed to traffic emissions have been identified at the following locations; Hope Park Terrace, Broughton Road, Cowgate, Commercial Street and Hill House Road.

From historical and current monitoring data, it is anticipated that the majority of heavily-trafficked roads within the city centre are likely to exceed the Scottish Government annual objective for particles (PM_{10}). Monitoring data from the new automatic station at Salamander Street (located outwith the city centre) also indicates exceedence of this Objective. Consequently, it remains appropriate to continue with the city-wide Detailed Assessment of this pollutant, as indicated in the Council's Updating & Screening Assessment 2009.

Trend

It has proved difficult to formulate reliable assumptions on data trends for both NO_2 and PM10 due to disruptions to normal traffic flows, arising from construction works associated with the Edinburgh Tram project.

New Local Developments (Industrial)

Concern is raised with respect to proposals to establish a 200MW(e) biomass power plant (combusting mainly wood fuel) at Leith Docks, due to its close proximity to existing high-density residential properties, and adjacent to land allocated for major housing development. The site is also near to an area of existing poor air quality. If approved by Scottish Ministers, a power plant of this scale, in this location, could present serious challenges for the regulation and control of emissions in order that Scottish Government ambient air quality targets for PM_{10} and $PM_{2.5}$ are met.

Air Quality Planning Policies

The City of Edinburgh Council's (CEC) Planning committee has approved interim Planning Policy to limit the quantum of biomass combustion, which can be introduced through development in the city. This policy gives underpinning to the Council's stance on biomass during the last three years. It is an essential tool to assist the Council manage and control the amount of additional combustion-derived fine particle emissions in the city. The policy will be reviewed following completion of the city-wide Detailed Assessment of PM_{10}.

Local Transport Plans and Strategies

The current Local Transport Strategy (LTS) is due for revision in 2012. It is anticipated that the updated strategy will be formulated in accordance with the Council's recently published Transport 2030 Vision. It is essential that air quality continues to be addressed, and that full and meaningful consultation takes place with those responsible for Local Air Quality Management in the City.

Air Quality Action Plan

The focus of the Council's Air Quality Action Plan 2008 to 2010 was based on findings from the Low Emission Strategy Feasibility study, commissioned in 2007. The study concluded that the greatest reductions in NOx and PM_{10} emissions for the Council administration area would be achieved by implementing a Mandatory Emissions 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.

Buses

The two major bus companies operating in Edinburgh advised that they would not be able to meet the terms of the draft Voluntary Agreement in the absence of substantial funding. Albeit no formal agreements have been reached to date, the largest operator, Lothian Buses, with the support of 30% grant funding obtained by the CEC from the Scottish Government in 2010, are currently progressing a program to retrofit 23 Euro 2&3 vehicles with SCRT emission reduction equipment. This will upgrade the vehicles to Euro 5 standard.

Road Freight

This sector is historically more fragmented and disparate than the bus sector. Many companies are sizeable private commercial concerns, with complex logistical and routing operations serving large geographic areas, often UK-wide. The majority of the operators have company headquarters outwith the CEC administrative area, which generally makes them more difficult to contact.

In an attempt to encourage road freight operators to voluntarily reduce their emissions, in May 2010 CEC became a partner in a EU project-funding bid. The project, ECOStars Europe, involves operators voluntarily joining a self-assessment quality-grading scheme, which awards them a 'star rating', depending on how well they perform across a range of indicators that include emissions standards and fuel efficiency. The project is an extension of a similar scheme, which has been trialled successfully by a consortium of South Yorkshire local authorities in partnership with Transport and Travel Research (TTR). If the EU funding bid is approved, it 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 bid outcome is due to be announced November 2010.

However, due to the general lack of funding available to all sectors (and especially for non-local authority owned vehicles) it is recognised that voluntary emission reduction partnerships, on their own, are unlikely to provide the level of emissions improvements required.

Following an update report to the Council's Transport, Infrastructure & Environment Committee (September 2009) on progress with the Air Quality Action Plan, members instructed its officers to initiate consultation with stake-holders on the feasibility of establishing a Low Emission Zone for the city.

Given the political desire for continuing economic growth in the city and wider region, and the inevitable additional demand for all modes of transport that this will bring, a reversal of the currently deteriorating trend in local air quality will require the adoption of radical city-wide initiatives and interventions.

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1 Introduction

1.1 Description of Local Authority Area

Edinburgh is located in the South East of Scotland's Central Belt area and is the second largest city in Scotland. It is bounded by the firth of Forth, which lies, to the North and the Pentland Hills to the South. The latter comprises of 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 described as a financial, commercial and tourist centre.

The residential population is estimated to be 477, 660 (2009) with an overall population density of 1,811 persons per square kilometre. Edinburgh is a unique city in that a large number of people live within the core of the city centre. The city is a popular tourist destination and attracts 1 million overseas visitors annually. During the summer months, the number of visitors can be equal to the population.

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 Edinburgh. There has been a substantial growth of residential flats within these locations of the city due to the development of former industrial sites. The southern and western peripheral areas of the city have predominantly detached and semi detached housing.

Many of Edinburgh's main streets and 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 2m.

The main means of transport within Edinburgh is via the road network. Currently, 30% of the population use the bus to get to work and 25% walk or cycle. The main East Coast rail line is routed through the city centre and there are further rail links to Glasgow and Fife.

As a major employment centre, Edinburgh attracts a substantial amount of commuter road and rail traffic.

Smoke Control Orders cover the entire Edinburgh 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.

The major cause of poor air quality in Edinburgh as in many urban environments is related to traffic.

1.2 Purpose of Progress Report

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

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

1.3 Air Quality Objectives

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

Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in Scotland.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	3.25 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	50 $\mu g/m^3$, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	40 $\mu g/m^3$	Annual mean	31.12.2004
	18 $\mu g/m^3$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

The review and assessment process of Local Air Quality Management commenced in 1997. A summary of Edinburgh's previous findings and description of Air Quality Management Areas are detailed in Table 1.2 and Table 1.3.

Table 1.2 Summary of Edinburgh's previous review and assessments

Report Title and Brief Outcomes	Date
Round 1	
Review and Assesment of Air Quality in the City of Edinburgh Stage 1 and Stage 2 • Potential exceedences of nitrogen dioxide (NO_2) and Particles (PM_{10})	**1998**
City of Edinburgh Council Review and Assessment of Air Quality Stage 3 • Exceedences of NO_2 at Princes St, West Maitland St, North St, Roseburn, North Bridge, George St, Gorgie Rd and Leith Walk. AQMA required. • Sources attributed to traffic emissions • AQMA declared for City Centre 31.12. 2000	**2000**
City of Edinburgh Review and Assessment of Air Quality Stage 4 • Source apportionment work identified that buses were the major source of NO_2 within the AQMA	**May 2002**
Round 2	
City of Edinburgh Council Updating and Screening Assessment Local Air Quality Management Phase 2 • Detailed Assessment city-wide for PM_{10} due to high background concentrations and tightening of air quality objectives for Scotland • Detailed Assessment required for NO_2 at St Johns Rd Corstorphine	**July 2003**
Detailed Assessment Report • AQMA not required for PM_{10} using new adjusted background maps and local gravimetric conversion factor of 1.14 • AQMA required for NO_2 St Johns Road	**Dec 2004**

Air Quality Progress Report • Identified 2 potential areas of exceedence of NO_2 at West Port and Great Junction Street • 4 locations in Central AQMA likely to fail EU limit West Maitland St, Torphican Place Princes St and Roseburn Terrace. • Concerns were raised with respect to density of development in city centre and North Edinburgh Waterfront.	**May 2005**
Round 3 **Updating and Screening Assessment Report. Review and Assessment of Air Quality. Round 3 Local Air Quality Management** • Nitrogen dioxide annual mean objective continues to be exceeded within the AQMA. • Nitrogen dioxide exceeded at St Johns Road • Separate AQMA for St Johns Road declared 31.12.2006 **Detailed Assessment for Nitrogen dioxide at Great Junction Street and West Port** • AQMA required for Great Junction Street and West Port • West Port likely to fail hourly nitrogen dioxide objective as well as annual. • Various options to be explored by Council – extend existing Central AQMA to cover both areas of exceedences, extend to cover West Port. Declare two separate AQMAs for areas of concern. **Air Quality Progress Report. Round 3 of Local Air Quality Management** • Nitrogen dioxide continue to exceed annual objectives within AQMAs • Number of locations now fail the hourly objective. • Monitoring locations within the AQMAS are likely to fail EU Limit values based on 2007 data predictions. • Detailed Assessment required for Nitrogen dioxide at the following locations; Bernard Street, Commercial St, Ferry Road, Easter Road, London Road, Hope Park Terrace and Glasgow Road. • Detailed Assessment required city-wide for PM_{10}. Concentrations fail to comply with Scottish Air Quality objectives using Edinburgh's local gravimetric factor (1.14) • Nitrogen dioxide concentations not falling in line with predicted UK forecasts. Increases noted at monitoring locations within and outwith AQMAs. • New AQMA declared for Gt Junction Street 09.03.2009 • Central AQMA amended to include West Port and exceedence of hourly mean nitrogen dioxide. • St Johns Road amended to include exceedence of hourly mean nitrogen dioxide •	**May 2006** **April 2007** **June 2008** **August**

Updating and Screening Assessment Round 4 • Nitrogen dioxide continue to exceed annual objectives within AQMAs and therefore remain valid. • NO_2 annual exceedences noted at Glasgow Road, Easter Road, London Road, Bernard Street, Grassmarket,Cowgate, Queensferry Road/Barnton and Hillhouse Road. • Detailed Assessment required with respect to moving diesel trains at Haymarket close to residential property. • Potential exceedences of NO_2 at Hope Park Terrace, Broughton Road and Commercial Street. • Most of the congested main roads in the city centre are likely to exceed the Scottish annual objective for PM_{10} based on monitoring undertaken at Queen Street and Haymarket and assessments made using the DMRB screening model. • A city-wide Detailed Assessment for PM_{10} required which will also address the four biomass installations and the poultry farm complex at Gogarbank.	**2009**

Table 1.3 Description of Edinburgh's AQMAs

Description AQMA / Declaration	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. Locations include Princes St, Leith Walk, Gorgie Rd, Queen St, Roseburn St, North Bridge. Residential properties at ground, first, second, third, fourth and basement level. Receptors close to road edge. Busy shopping areas include Princes Street, George Street, Gorgie Road, Roseburn Terrace. Leith Walk. North Bridge.	**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
St Johns Road 31/12/2006 Part of the A8 route to building facades at Corstorphine with residential properties at ground, first, second, third and fourth floor level. Canyon effect. Busy shopping area. Receptors close to road edge. 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 length of road to building façades covering the junction area of Ferry Road. 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**	

Maps of City of Edinburgh Councils three AQMAs are shown in Figures 1.1, 1.2 and 1.3

LAQM (Review and Assessment) progress to date

Further Assessment

Further Assessment work is required at St Johns Road, West Port and Great Junction Street. Classified automated traffic counters have now been installed at St Johns Road and West Port to undertake the source apportionment element of this work. However, a manual count will be necessary at Great Junction Street, due to the degree of traffic congestion and unsuitablitlty of automated traffic counters at this location.

Detailed Assessments NO_2

Additional monitoring has been undertaken to progress the Detailed Assessment work for Easter Road/London Road, Bernard Street, Queensferry Road/Barnton, Glasgow Road and Grassmarket

Detailed Assessment PM_{10}

The automatic monitoring station at Currie has been operational since March 2010, this will provide valuable background data to use in this study.

A new automatic monitoring station has been installed on Queensferry Road to monitor PM_{10} and NO_2. This will also support the Detailed Assessment work required for nitrogen dioxide.

Figure 1.1 Central AQMA (amended to include West Port).

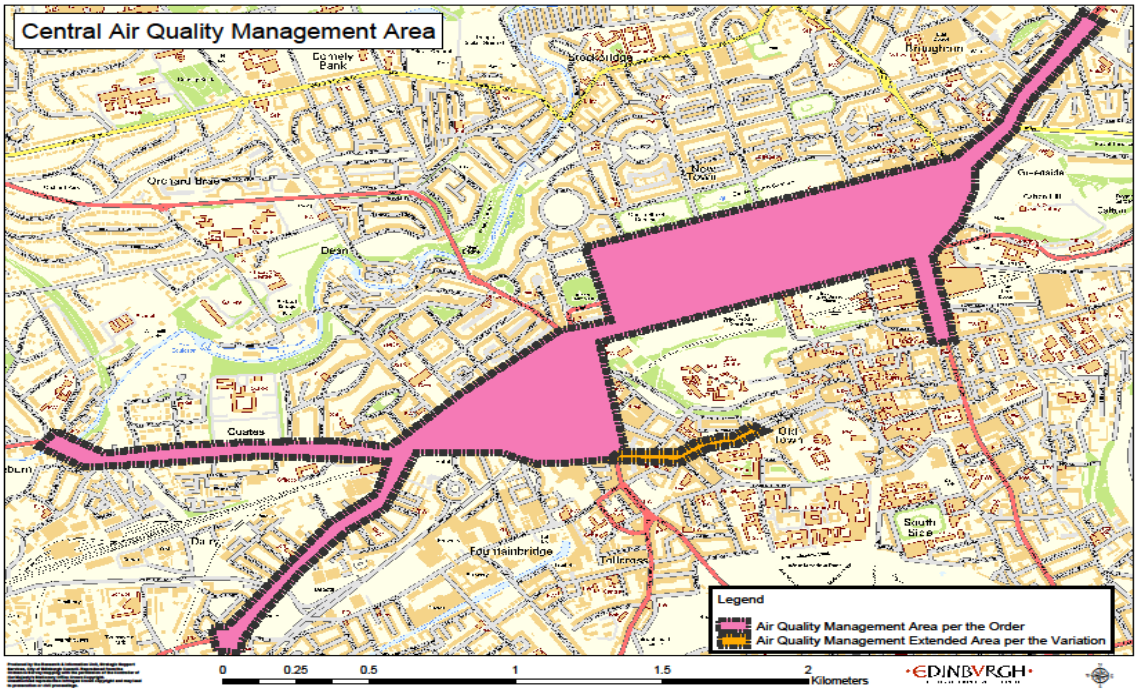


Figure 1. 2 St Johns Road AQMA

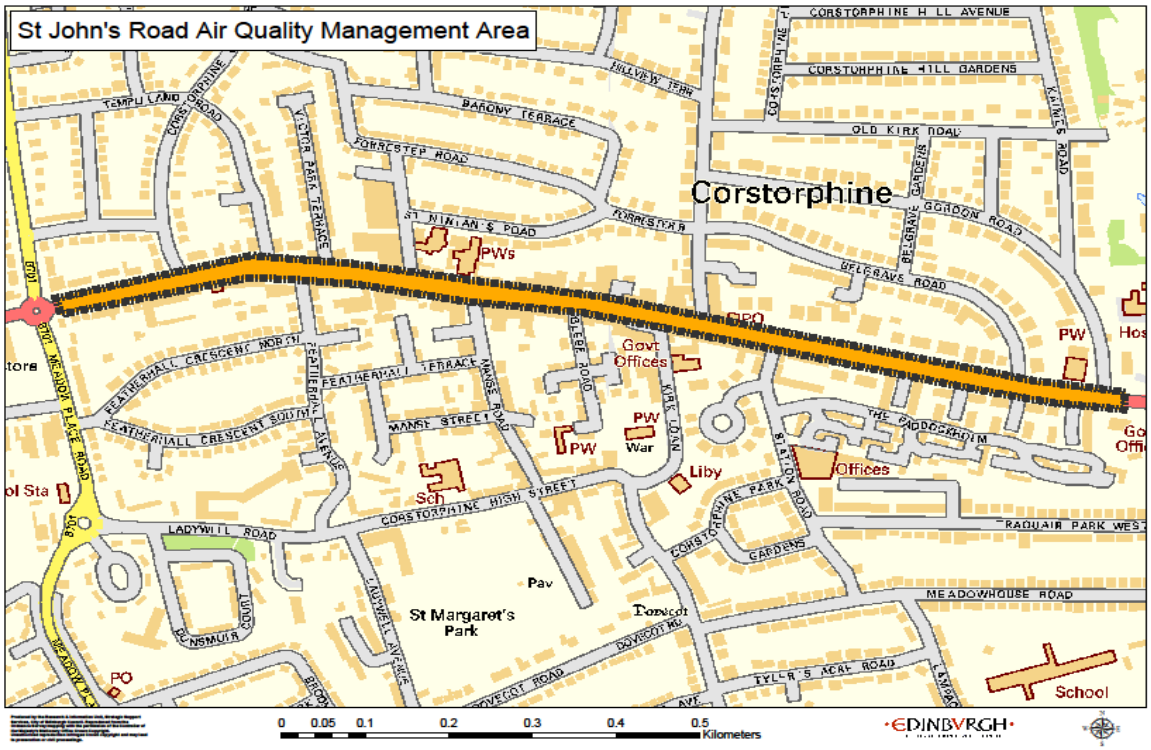
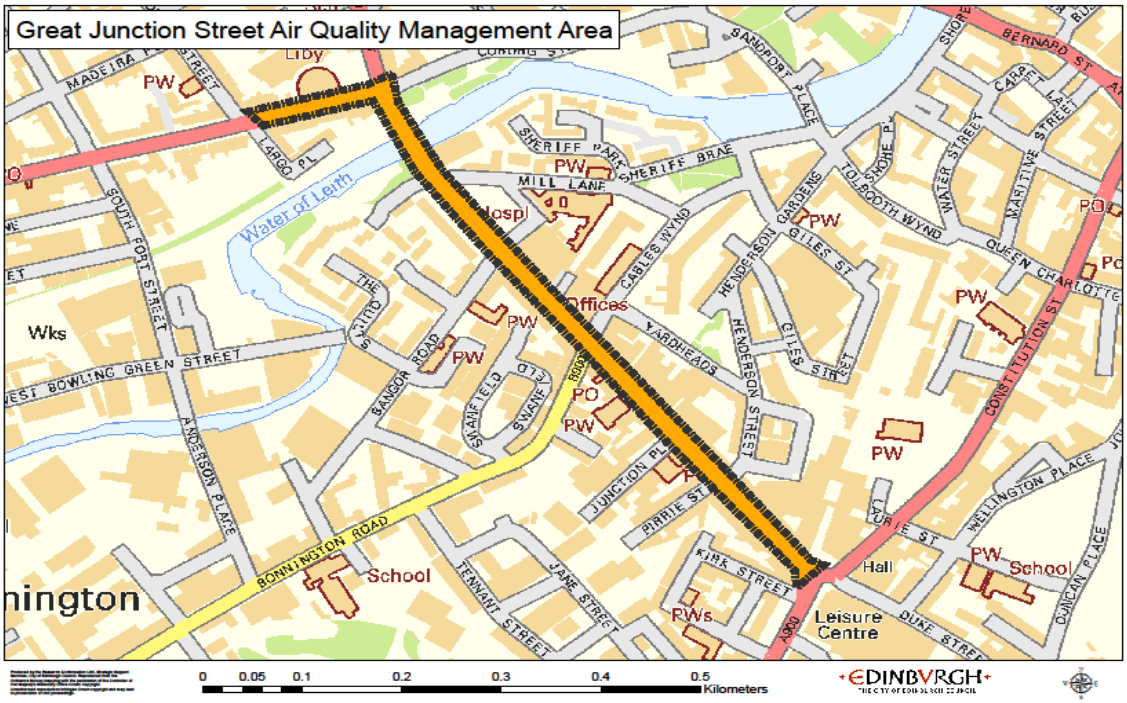


Figure 1. 3 Great Junction Street AQMA



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Edinburgh has seven automatic (real-time) monitoring stations. One of the stations (St Leonards) is part of the UK Automated Urban and Rural National Network (AURN). Six of the seven units were operational during 2009.

The suburban background monitoring station at Currie High School was decommissioned in 2006 due to major construction work at the school. In order to reduce monitoring and servicing costs the unit now only measures the two pollutants of concern, NO_2 and PM_{10}. This unit has now been reinstated and data will be reported in the next Air Quality Progress report (2011).

The automatic site at Haymarket was decommissioned in January 2009 (due to Tram works) and was relocated to Salamander Street (North Leith). This unit has been operational since September 2009.

The automatic monitoring locations represent relevant exposure, although not necessarily worst-case location. This is due to the difficulties of locating the monitoring stations on pavements, which are often narrow, and the requirement to have access to an electrical supply. A description of the automatic stations is provided below in table 2.3a.

Table 2.1a Description of automatic monitoring locations

Location	Description of automatic monitoring location
St Johns Road ID 5	Pavement (kerbside) of busy shopping street . Residential properties within 2.1 m of kerb edge. Takes account of junction and street canyon. Relevant exposure and worst-case location
Queen Street/Wemyss Pl ID 1	Pavement in line with residential property located 5.2m from road edge. No buildings at rear of monitoring unit. Relevant exposure.
Roseburn ID 3	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.
Gorgie Road/White Park ID 4	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, but not worst- case location.
Salamander Street ID 8	Located on pavement 2.13m from road edge, 5.4 m in front of residential property.
St Leonards ID 7	Located in small park area adjacent to Medical centre 45.0m from main road. Representative of urban exposure.
Currie High School ID 6	Located adjacent to school building at rear of school. Representative of suburban/ semi-rural exposure.
Haymarket Decommissioned ID 2	Located in a car parking bay at Haymarket station distance from the main road is 9.2m The location is set back from the façade of residential property. Not in street canyon.

Both Haymarket and Roseburn automatic monitoring units are set back from the relevant receptor locations. The concentrations are likely to be lower here than at the facades of the adjacent residential tenement block. At these monitoring sites, the receptor distance calculator as described in LAQM TG (09) has been used to estimate the likely concentrations at the relevant receptor locations.

Details of automatic monitoring sites are shown in table 2.1b

QC/QA proceedures on the automated monitoring sites are shown in appendix A6.

A map showing the automatic monitoring sites is too detailed to include in the report and is available as an attached document.

Table 2.1b Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
St Leonards	Urban Background AURN	X326265	Y673129	NO_2 PM_{10} $PM_{2.5}$ O_3 CO SO_2 PAH	Chemilum FDMS FDMS UV absorp IR absorp UV absorp Digitalsamp	N	Y 29.0m	45.0m	N/A
Haymarket Relocated to Salamander St	Roadside	X323896	Y673197	NO_2 PM_{10}	Chemilum TEOM	Y	Y 7.0m	9.2m	N
Queen St/Wemyss Pl	Roadside	X324826	Y674078	NO_2 PM_{10}	Chemilum TEOM	Y	Y facade	5.2m	Y
Gorgie Road	Roadside	X323121	Y672314	NO_2	Chemilum	Y	Y façade	2.5m	Y (not in canyon)
Roseburn	Roadside	X322939	Y673233	NO_2 PM_{10}	Chemilum TEOM	Y	Y 4.9m	7.6m	N
St Johns Road	Kerbside	X320101	Y672907	NO_2	Chemilum	Y	Y 1.35m	0.5m	Y
Salmander Street	Roadside	X327615	Y676333	NO_2 PM_{10}	Chemilum TEOM	N	Y 5.4m	2.13m	Y
Currie High School	Suburban	X317595	Y667909	NO_2 PM_{10}	Chemilum TEOM	N	N/A	N/A	N/A

Currie High School new data will be available from March 2010.

2.1.2 Non-Automatic Monitoring

Edinburgh has an extensive network of passive diffusion tube samplers, which monitor nitrogen dioxide. The samplers are located both within and out with the AQMAs. The majority of the locations are in street canyons where tenement-style residential property is within 2 to 3 metres of the road edge. Most of the passive diffusion tubes are sited at the building facades of residential property. Table 2.2.

New monitoring locations were established in 2009 to address areas of concern that were identified via the Review and Assessment process. The sites were selected to assess potential exceedences of nitrogen dioxide associated with road traffic, apart from Distillery Lane, which was established to assess emissions from moving diesel trains.

New monitoring locations are highlighted in blue in table 2.2.

Monitoring commenced in 2010 at Fountain Bridge/Slateford, Lindsay Road/North Junction Street and Ocean Drive following the conclusions outlined in the Updating and Screening Assessment 2009 report. This data will be reported in the next Progress Report 2011.

A review of passive diffusion tube locations concluded that it would be appropriate to reduce monitoring at St Johns Road and Morrison Street.

Locations 1c, 1e, 1f and 39 at St Johns Road and 49a and 49b at Morrison Street were discontinued in 2009. These sites are highlighted in red in table 2.2.

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

A1 Diffusion tube bias adjustment factors
A2 Factor from local co-location studies
A3 Discusion of factor of choice
A7 QA/QC of diffusion tube monitoring

Map(s) of Non-Automatic Monitoring Sites are too detailed to include in this report and are available as attached documents.

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

Site Name	Site Type	OS Grid Ref		Site ID	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance m to kerb of nearest road (N/A if not applicable)	Worst-case Location?
St Johns Rd	Kerbside	X 320122	Y 672917	1	Y	Y (1.8)	0.54	Y
St Johns Rd	Roadside	X 320154	Y 672911	1b	Y	Y facade	2.0	Y
St Johns Rd	Roadside	X 320084	Y 672910	1c	Y	Y facade	2.1	Y
St Johns Rd	Roadside	X 320096	Y 672907	1d	Y	Y facade	2.1	Y
St Johns Rd	Roadside	X 320070	Y 672912	1e	Y	Y facade	2.1	Y
St Johns Rd	Kerbside	X 320099	Y 672907	1f	Y	Y (1.9)	0.2	Y
St Johns Rd	Roadside	X 319677	Y 672991	39	Y	Y (9.0)	1.7	Y
West Maitland St	Kerbside	X 324192	Y 673332	2	Y	N (4.2)	0.65	Y
Torphichen Pl	Roadside	X 324260	Y 673270	3	Y	N (1.55)	0.73	Y
Princes St Mound	Kerbside	X 325397	Y 673869	24	Y	Y (10.2)	1.0	Y
Princes St	Roadside	X 325049	Y 673791	47	Y	Y facade	9.0	Y
RoseburnSt/Terr	Kerbside	X 323040	Y 673174	22	Y	Y (1.6)	0.55	Y
Roseburn St	Kerbside	X 323007	Y 673198	23	Y	N (2.3)	0.23	Y
North Bridge N	Roadside	X 325918	Y 673687	26	Y	Y facade	5.1	Y
North Bridge S	Roadside	X 325944	Y 673670	27	Y	Y facade	3.5	Y
Gorgie Rd	Kerbside	X 323484	Y 672478	5	Y	N (4.9)	0.3	Y
Gorgie Rd	Roadside	X 323477	Y 672476	18	Y	Y facade	2.4	Y
Queen St/Hanover St	Roadside	X 325310	Y 674186	33	Y	Y facade	6.0	Y
York Pl	Kerbside	X 325828	Y 674362	36	Y	Y (2.7)	5.5	Y
Leith Wlk/Brun	Roadside	X 326366	Y 674872	21	Y	Y (3.4)	1.16	Y
Leith Wlk/ Mac	Kerbside	X 326365	Y 674878	20	Y	Y (4.6)	1.0	Y
Ardmillian Terr	Kerbside	X 323498	Y 672457	6	Y	N (3.8)	0.6	Y
West Port	Roadside	X 325192	Y 673261	28	Y	Y facade	1.7	Y
West Port	Roadside	X 325166	Y 673242	28b	Y	Y facade	1.4	Y
West Port	Roadside	X 325184	Y 673261	28c	Y	Y facade	3.0	Y
West Port	Roadside	X 325203	Y 673250	28d	Y	Y facade	2.7	Y

Table 2.2 Details of Non- Automatic Monitoring Sites For Nitrogen Dioxide continued

Site Name	Site Type	OS Grid Ref		Site ID	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance m to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Gt Junction St	Roadside	X 326884	Y 675997	30	Y	Y facade	2.8	Y
Gt Junction St	Roadside	X 326740	Y 676138	30b	Y	Y facade	2.9	Y
Gt Junction St	Roadside	X 326925	Y 675949	30c	Y	Y facade	2.8	Y
Gt Junction St	Roadside	X 326757	Y 676144	30d	Y	Y facade	2.8	Y
Gt Junction St	Roadside	X 326845	Y 676015	30e	Y	Y facade	2.7	Y
Morrison St	Roadside	X 324167	Y 673249	49	Y	Y (2.4)	2.2	Y
Morrison St	Roadside	X 324202	Y 673247	49a	Y	Y facade	2.2	Y
Morrison St	Roadside	X 324183	Y 673231	49b	Y	N facade	2.1	Y
Easter Rd	Roadside	X 326934	Y 674503	25	N	Y facade	2.3	Y
Easter Rd	Roadside	X 326950	Y 674624	25b	N	Y facade	3.3	Y
Easter Rd	Roadside	X 326958	Y 674770	25c	N	Y facade	3.25	Y
Easter Rd	Roadside	X 326978	Y 674809	25d	N	Y facade	3.8	Y
Easter Rd	Roadside	X 326999	Y 674940	25e	N	Y facade	3.95	Y
Easter Rd	Roadside	X 327010	Y 675149	25f	N	Y facade	2.8	Y
Easter Rd	Roadside	X 327071	Y 675467	25g	N	Y facade	3.0	Y
Easter Rd	Roadside	X 326917	Y 674483	25h	N	Y facade	2.1	Y
London Rd	Roadside	X 326944	Y 674472	46	N	Y facade	5.6	Y
London Rd	Roadside	X 326939	Y 674469	46a	N	Y (3.46)	2.2	Y
Ferry Rd	Roadside	X 326136	Y 676361	45	N	Y facade	3.7	Y
Ferry Rd	Roadside	X 326150	Y 676341	45a	N	Y facade	3.5	Y
Ferry Rd	Roadside	X 326359	Y 676420	45b	N	Y façade	7.5	Y
Ferry Rd	Roadside	X 326461	Y 676426	45c	Y	Y façade	3.1	Y
Ferry Rd	Roadside	X 326503	Y 674436	45d	Y	Y facade	3.1	Y
Queensferry Rd/Barn	Roadside	X 318662	Y 674960	50	N	N (8.7)	1.3	Y
Whitehouse Rd/Barn	Roadside	X 318571	Y 675028	50a	N	N (1.57)	3.5	Y

Table 2.2 Details of Non- Automatic Monitoring Sites For Nitrogen Dioxide continued

Site Name	Site Type	OS Grid Ref		Site ID	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Whitehouse Rd	Roadside	X 318536	Y 675069	50b	N	N (8.5)	1.8	Y
Bernard St Leith	Roadside	X 327148	Y 676507	29	N	Y facade	2.2	Y
Bernard St Leith	Roadside	X 327137	Y 676529	29a	N	Y facade	2.1	Y
Bernard St Leith	Roadside	X 327192	Y 676513	29b	N	Y facade	2.2	Y
Bernard St Leith	Roadside	X 327135	Y 676515	29c	N	Y facade	2.1	Y
Broughton Rd	Roadside	X 325513	Y 675134	43	N	Y facade	2.0	Y
Broughton St	Roadside	X 325855	Y 674527	44	N	Y facade	4.5	Y
Pier Pl	Roadside	X 325424	Y 677048	12	N	N (2.7)	2.2	Y
Trinity Cres	Roadside	X 324896	Y 676991	14	N	N (4.0)	2.0	Y
Commercial St	Roadside	X 327009	Y 676565	7	N	Y façade	2.47	Y
Commercial St	Roadside	X 326879	Y 676626	9	N	Y façade	2.6	Y
Glasgow Rd	Roadside	X 312664	Y 672672	15	N	Y (4.5)	1.6	Y
Glasgow Rd	Roadside	X 313028	Y 672633	16	N	Y (4.4)	1.8	Y
Grassmarket	Roadside	X 325436	Y 673374	37	N	Y (5.0)	2.0	Y
Grassmarket	Roadside	X 325401	Y 673340	37a	N	Y facade	3.4	Y
Cowgate	Roadside	X 325881	Y 673471	48	N	Y façade	4.5	Y
Morningside Rd	Kerbside	X 324538	Y 671166	8	N	Y (2.8m)	0.7	Y
Home St	Roadside	X 324905	Y 672893	10	N	Y façade	2.8	Y
Deanhaugh St	Kerbside	X 324603	Y 674555	13	N	N (5.1)	0.6	Y
Calder Rd	Roadside	X 319062	Y 670543	4	N	Y (25)	1.6	Y
Hope Park Terr	Kerbside	X 326308	Y 672607	17	N	N (4.5)	0.6	Y
Dalkeith Rd	Roadside	X 327231	Y 671782	31	N	Y (4.9)	1.8	Y
Dundas St	Kerbside	X 325243	Y 674400	35	N	Y (7.3)	0.3	Y

Table 2.2 Details of Non- Automatic Monitoring Sites For Nitrogen Dioxide continued

Site Name	Site Type	OS Grid Ref		Site ID	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Niddrie Main Rd	Roadside	X 328889	Y 671649	32	N	Y (1.2)	4.3	Y
Lanark Rd	Roadside	X 319527	Y 668420	11	N	Y (3.7)	1.5	Y
Baileyfield Rd	Roadside	X 329997	Y 674274	19	N	N (3.5)	2.0	Y
Melville Dr	Roadside	X 325141	Y 672733	38	N	Y (10.0)	2.8	Y
India St	Kerbside	X 324790	Y 674341	34	N	N (6.6)	0.4	Y
Hillhouse Rd	Roadside	X 322144	Y 674497	40	N	Y facade	2.0	Y
Hillview Terr	Backgrnd	X 320081	Y 673232	41	N	N (9.0)	1.0	N/A
Midmar Drive	Roadside	X 325105	Y 670511	42	N	N (9.0)	1.4	Y
NEW TUBE SITES								
Salamander St/Pl	Roadside	X 327780	Y 676251	51a	N	N (0.85)	1.2	Y
29b Salamander St	Roadside	X 327665	Y 676331	51b	N	Y facade	1.8	Y
10 Salamander St	Roadside	X 327476	Y 676418	51c	N	Y facade	2.25	Y
268 Ferry Rd	Roadside	X 324946	Y 676070	52	N	Y (4.6)	1.65	Y
6 Bowhill Terr	Roadside	X 324726	Y 676004	53	N	Y (1.57)	1.75	Y
FerryRd/Inverleith Gdn	Roadside	X 324527	Y 675999	54	N	Y (8.7)	1.3	Y
FerryRd/Inverleith Row	Roadside	X 324638	Y 675993	55	N	Y facade	4.65	Y
Glasgow Rd 18-20	Kerbside	X 319212	Y 672921	56	N	N (4.6)	0.57	Y
Glasgow RD GFC 11	Kerbside	X 319191	Y 672914	56a	N	N (6.0)	0.57	Y
Glasgow Rd 158	Roadside	X 318185	Y 672756	57	N	Y (8.5)	3.6	Y
Glasgow Rd GFC 319	Roadside	X 312693	Y 672670	58	N	Y (4.9)	2.8	Y
Telford Rd	Roadside	X 322463	Y 674942	59	N	Y (10.0)	2.6	Y
Maybury Rd/Barnton	Roadside	X 318551	Y 674902	60	N	N (17.0)	3.0	Y
Maybury Rd/Barnton	Roadside	X 318612	Y 674924	61	N	N (12.5)	2.8	Y
561 Queensferry Rd	Roadside	X 318810	Y 674903	62	N	Y facade	16.9	Y
544 Queensferry Rd	Roadside	X 318723	Y 674963	63	N	Y facade	13.6	Y

Table 2.2 Details of Non- Automatic Monitoring Sites For Nitrogen Dioxide continued

Site Name	Site Type	OS Grid Ref		Site ID	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
550 Queensferry Rd	Roadside	X 318698	Y 674955	64	N	N (9.2)	1.49	Y
Distillery Lane	Roadside	X 323926	Y 673103	65	N	Y (5.0)	8.0	Y
Hope Park Terrace	Roadside	X 326312	Y 672614	17a	N	Y facade	5.0	Y
London Rd/Cadzow Pl	Roadside	X 327112	Y 674442	66	N	Y facade	2.7	Y
London Rd/Earlston Pl	Roadside	X 327190	Y 674433	67	N	Y facade	2.7	Y
Parsons Green Terr	Roadside	X 328049	Y 674174	68	N	Y facade	2.7	Y
London Rd/Wolsley Pl	Roadside	X 328272	Y 674143	69	N	Y facade	2.62	Y
London Rd/Wolsley Terr	Roadside	X 328293	Y 674138	70	N	Y facade	3.3	Y
Portobello High St W	Roadside	X 330533	Y 673850	71	N	Y facade	3.0	Y
Seafield Rd East	Roadside	X 329993	Y 674457	72	N	Y facade	4.5	Y
Portobello High St E	Roadside	X 330366	Y 674057	73	N	Y facade	3.1	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

New automated monitoring data (2009) shows that the following roadside locations meet with the nitrogen dioxide annual mean and 1-hour mean objectives, Queen Street, Salamander Street and Roseburn. The background site at St Leonards also meets the targets. However, both air quality objectives fail at St Johns Road and Gorgie Road is borderline with respect to meeting the annual mean.

Data capture was low at Gorgie Road site due to a fault, which developed on the NOx analyser. The majority of this missing data occurred during the months of November and December. High concentrations were recorded at all sites during the month of December. For example, St Leonards urban background location recorded a monthly value of 48 µg/m^{-3}. Therefore, not having data for this month at Gorgie may have resulted in a lower overall value. Automatic data is shown in table 2.3a and 2.3b.

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

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture for full calendar year 2009 [b] %	Annual mean concentrations (µg/m^3)		
					2007	2008	2009
1	Queen St/W	Y		98.2	34	32	33
2	Haymarket	Y		N/A	41	41 (49)	-
3	Roseburn	Y		99.7	32	28 (31)	26 (28)
4	Gorgie Rd	Y		84.9	41	42	38
5	St Johns Rd	Y		96.5	93	75	70
7	St Leonards	N		97.6	27	31	24
8*	Salamander St	N	96%		N/A	N/A	30 (27)

NOTE

* Annual mean for Salamander Street has been estimated based on data gathered from 19.09.2009 to 31.12.2009 in accordance with Box 3.2 LAQM TG09. Calculations are shown in appendix A5

Annual mean exceedences are highlighted in red.

Where the period of valid data is less than 90% for a full year this is highlighted in blue.

Data in brackets represents the estimated annual concentration at the receptor using the NO_2 drop off with distance calculator on the LAQM Defra site under 'Tools'.

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

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2009 %	Number of Exceedences of hourly mean (200 μg/m^3) If the period of valid data is less than 90% of a full year, include the 99.8th percentile of hourly means in brackets.		
					2007	2008	2009
1	Queen St	Y		98.2	0	0	0
2	Haymarket	Y		N/A	2	1	N/A
3	Roseburn	Y		99.7	0	0	0
4	Gorgie Rd	Y		84.9	2	0	0 (130)
5	St Johns Rd	Y		96.5	**362**	**166**	**114**
7	St Leonards	N		97.6	0	0	0
8	Salamander St	N	96%		0	0	0 (141)

NOTE
1-hour objective exceedences are highlighted in bold red.
Where the period of valid data is less than 90% for a full year this is highlighted in blue.

Trends from automatic data

Trend analysis has been undertaken at monitoring locations where five or more years of valid data was available. Annual mean nitrogen dioxide concentrations have been plotted for successive years at the following listed sites and trend lines have been drawn using the simple regression statistical program in Excel.

Gorgie Road 1999 to 2009
Haymarket 1999 to 2008
Roseburn 2003 to 2009
St Leonards 2004 to 2009

The monitoring station at St Johns Road has being operational since 2007, Salamander Street was commissioned in 2009 and North Castle Street/Queen Street relocated in mid 2005 to Wemyss Place/Queen Street. Therefore, there are insufficient years of valid data to undertake trend analysis at these locations.

Data trends are shown in Figs 2.31 to 2.34 and the findings are summarised in the table 2.3c.

Table 2.3c Trend summary for automatic data

Location		Trend	Concentrations of NO_2
St Leonards	Urban background	↑	Increasing
Haymarket	Roadside	↑	Increasing
Gorgie	Roadside	same	No change
Roseburn	Roadside	↓	Decreasing

Figures 2.31 to 2.34 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Automatic Monitoring Sites.

Fig 2.31 St Leonards AURN (Urban background site)

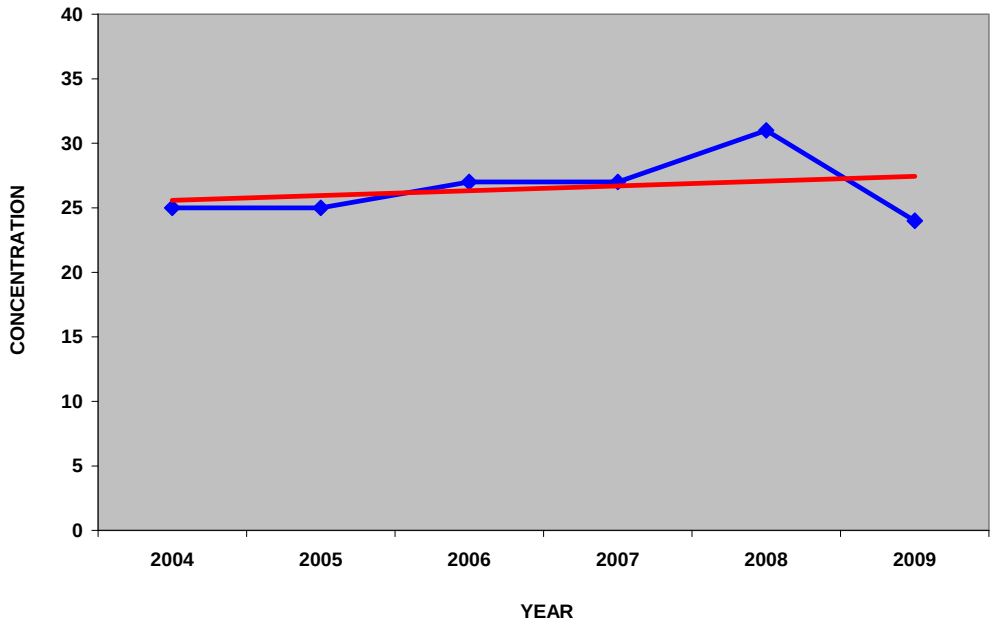


Fig 2.32 Haymarket (Roadside site)

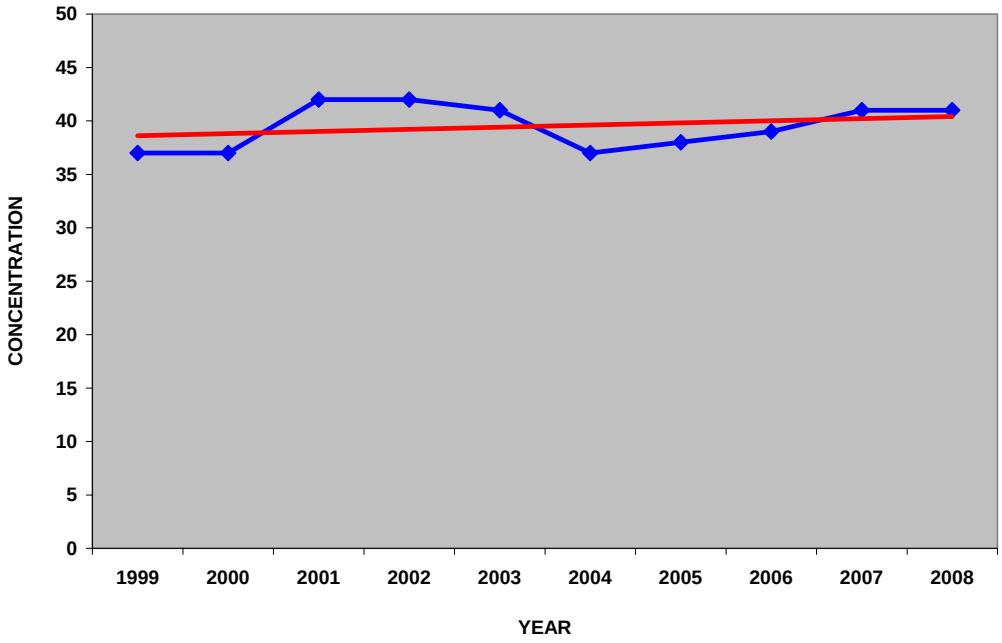


Fig 2.33 Gorgie (Roadside site)

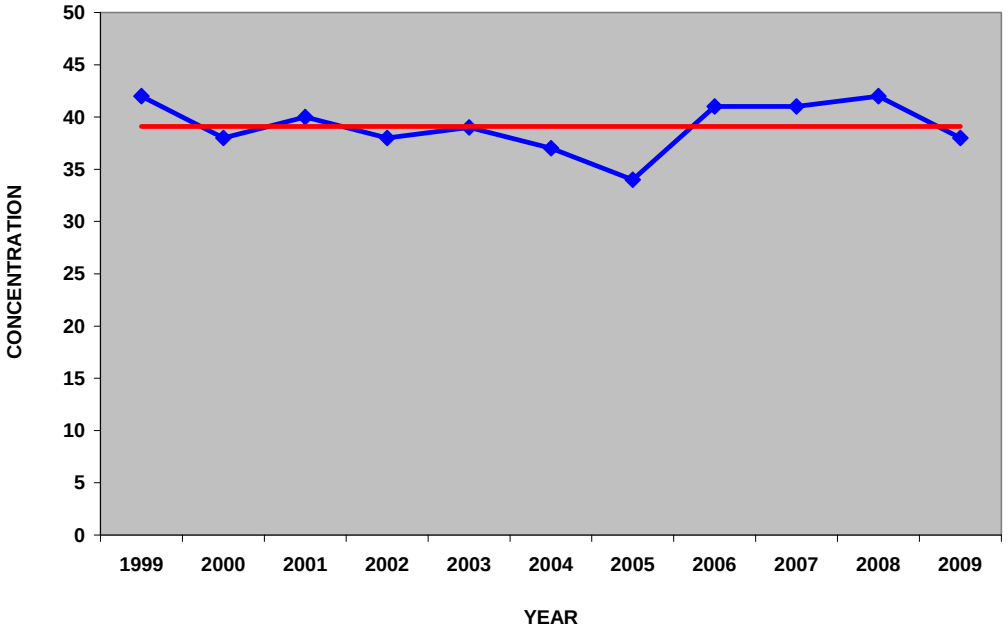
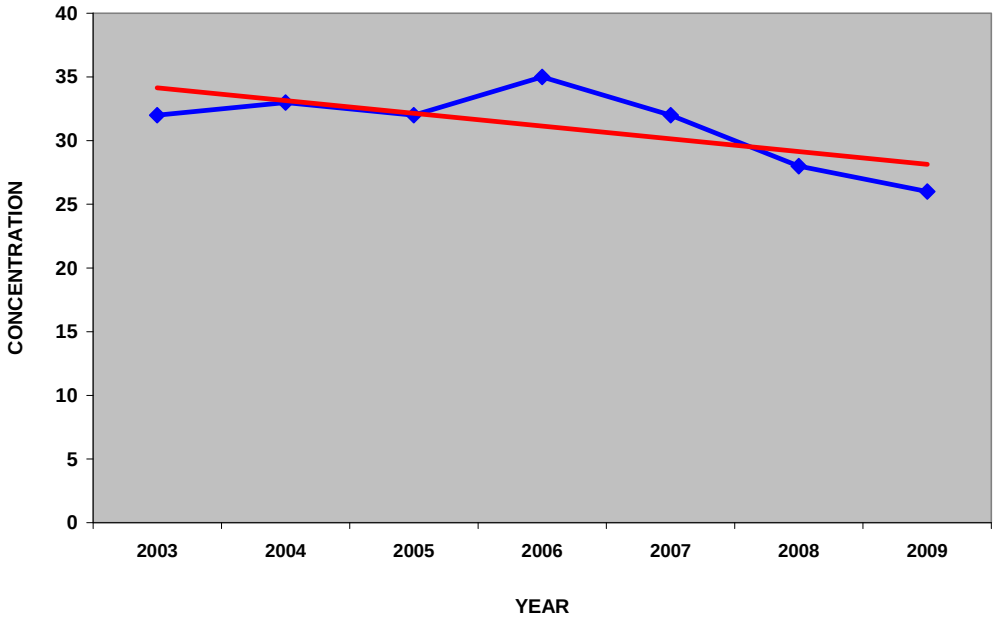


Fig 2.34 Roseburn (Roadside site)



Diffusion Tube Monitoring Data

The majority of passive diffusion tubes are located at the building façade of residential properties. Where monitoring is not carried out at the facade, nitrogen dioxide concentrations have been estimated to represent relevant public exposure as detailed in Box 2.3 of LAQM TG (09).

Historical and new (2009) passive diffusion tube monitoring data is shown in table 2.4a.

The new monitoring data gathered within the three AQMAs exceed the annual mean objective and based on current guidance it can be assumed that the 1-hour objective for nitrogen dioxide is unlikely to be met.

A number of previously-identified monitoring locations outwith the AQMAs also show exceedences of the annual mean objective. These locations have been summarised in table 2.4b.

A summary of those locations which are considered borderline with respect to meeting the air quality objectives (based on new and historical monitoring data) are shown in table 2.4c.

Monitoring locations which were discontinued are highlighted in red and new locations are highlighted in blue.

Raw monthly passive diffusion tube data is shown in appendix B.

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture for full calendar year 2009 %	Annual mean concentrations (µg/m^3)		
				2007	2008	2009
1	St Johns Rd	Y	91.7	51.1	41.2	36.7
1b	St Johns Rd	Y	83.3	50.5	48.8	44.2
1c	St Johns Rd	Y	91.7	**81.5**	**74.4**	-
1d	St Johns Rd	Y	N/A	**95.9**	**84.9**	57.8
1e	St Johns Rd	Y	N/A	**80.1**	**77.1**	-
1f	St Johns Rd	Y	N/A	**93.1**	**77.2**	-
39	St Johns Rd	Y	91.7	37.0	31.7	28.2
2	West Maitland St	Y	100	**93.6**	**70.1**	45.6
3	Torphichen Pl	Y	91.7	**82.3**	58.2	56.3
24	Princes St Mound	Y	66.7	**69.9**	51.5	36.2
47	Princes St	Y	66.7	51.8	51.7 (64)	31.6 (34)
22	RoseburnSt/Terr	Y	41.7	**69.1**	**63.6**	49.3
23	Roseburn St	Y	83.3	**66.6**	49.5	37.2
26	North Bridge N	Y	83.3	55.8	51.7	48.5
27	North Bridge S	Y	58.3	50.2	52.3	48.4
5	Gorgie Rd	Y	91.7	51.9	44.3	42.6
18	Gorgie Rd	Y	96	47.4	51.5	45.0
33	Queen St/Hanover	Y	100	47.3	43.7	50.8
36	York Pl	Y	91.7	46.8	40.5	37.5
21	Leith Wlk/Brun	Y	66.7	44.8	37.3	35.3
20	Leith Wlk/ Mac	Y	83.3	42.6	53.1	36.8
6	Ardmillian Terr	Y	100	32.8	35.5	31.2
28	West Port	Y	50	44.5	53.3	47.7
28b	West Port	Y	83.3	**64.9**	**72.5**	**66.7**
28c	West Port	Y	58.3	47.6	51.5	43.5
28d	West Port	Y	83.3	**73.2**	**66.6**	**60.2**
30	Gt Junction St	Y	75.0	48.9	44.6	44.1
30b	Gt Junction St	Y	66.7	36.6	38.4	38.5
30c	Gt Junction St	Y	66.7	43.9	50.2	42.6
30d	Gt Junction St	Y	91.7	38.4	39.0	37.1
30e	Gt Junction St	Y	75.0	44.4	43.1	41.9
49	Morrison St	Y	100	**62.4**	**61.4**	44.6
49a	Morrison St	Y	N/A	**75.4**	**71.9**	-
49b	Morrison St	Y	N/A	**78.8**	**76.2**	-
25	Easter Rd	N	83.3	54.9	58.2	50.8
25b	Easter Rd	N	100	47.4	44.9	38.8
25c	Easter Rd	N	91.7	39.9	43.8	38.0
25d	Easter Rd	N	75.0	34.9	40.8	37.3
25e	Easter Rd	N	91.7	35.6	37.3	34.1
25f	Easter Rd	N	100	33.6	35.0	30.1
25g	Easter Rd	N	91.7	27.5	33.4	27.9
25h	Easter Rd	N	41.7	47.9	49.3	38.0

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture for full calendar year 2009[b] %	Annual mean concentrations (μg/m^3)		
				2007	2008	2009
46	London Rd	N	91.7	52.3	52.3	43.4
46a	London Rd	N	75.0	52.0	50.8	43.1
45	Ferry Rd	N	83.3	38.2	39.6	35.4
45a	Ferry Rd	N	91.7	35.8	40.2	32.1
45b	Ferry Rd	N	75.0	36.7	35.3	30.9
45c	Ferry Rd	Y	25.0	40.2	38.6	38.4
45d	Ferry Rd	Y	100	41.4	42.4	40.9
50	Queensferry Rd	N	100	N/A	52.6	46.4
50a	Whitehouse Rd	N	91.7	N/A	31.4	29.8
50b	Whitehouse Rd	N	100	N/A	21.2	20.6
29	Bernard St Leith	N	50.0	44.6	45.3	45.1
29a	Bernard St Leith	N	66.7	45.0	48.0	42.0
29b	Bernard St Leith	N	83.3	39.2	41.3	32.9
29c	Bernard St Leith	N	50.0	51.7	53.4	48.2
43	Broughton Rd	N	100	38.9	40.4	38.1
44	Broughton St	N	100	32.4	37.7	35.1
12	Pier Pl	N	100	33.2	29.7	27.0
14	Trinity Cres	N	100	32.2	28.3	28.6
7	Commercial St	N	66.7	35.0	38.6	34.8
9	Commercial St	N	83.3	42.0	40.4	31.6
15	Glasgow Rd	N	91.7	44.4	35.7	42.0
16	Glasgow Rd	N	83.3	39.4	42.4	46.8
37	Grassmarket	N	66.7	38.5	35.1	35.4
37a	Grassmarket	N	58.3	41.2	42.3	40.5
48	Cowgate	N	83.3	40.0	46.6	39.8
8	Morningside Rd	N	91.7	29.6	30.0	27.1
10	Home St	N	100	35.9	37.4	32.3
13	Deanhaugh St	N	91.7	34.3	32.3	30.1
4	Calder Rd	N	100	29.4	29.5	26.3
17	Hope Park Terr	N	66.7	41.0	36.4	34.7
31	Dalkeith Rd	N	100	31.2	31.8	28.0
35	Dundas St	N	100	31.9	28.9	27.2
32	Niddrie Mains Rd	N	100	32.4	26.9	30.7
11	Lanark Rd	N	83.3	25.1	24.8	22.3
19	Baileyfield Rd	N	100	24.9	24.6	22.9
38	Melville Dr	N	83.3	25.8	26.2	25.3
34	India St	N	91.7	22.2	22.7	22.6
40	Hillhouse Rd	N	91.7	38.7	44.4	37.4
41	Hillview Terr	N	66.7	19.0	19.6	21.2
42	Midmar Dr	N	100	19.4	17.4	15.2

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Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes (New Site locations)

Site ID	Location	Within AQMA ?	Data Capture for full calendar year 2009 %	Annual mean concentrations (μg/m^{-3}) 2009
51a	Salamander St/Pl	N	66.7	23.6
51b	Salamander St	N	100	37.4
51c	10 Salamander St	N	83.3	37.1
52	268 Ferry Rd	N	66.7	32.1
53	6 Bowhill Terr	N	91.7	36.4
54	Inverleith Gnds	N	83.3	32.1
55	Inverleith Row	N	75	42.6
56	Glasgow Rd 18-20	N	100	28.6
56a	Glasgow Rd gfc11	N	91.7	27.9
57	Glasgow Rd 158	N	100	34.9
58	Glasgow Rd gfc319	N	100	51.1
59	Telford Rd	N	83.3	30.5
60	Maybury Rd/Barn	N	91.7	22.1
61	Maybury Rd/QFR	N	100	24.2
62	561 QSferry Rd	N	100	22.0
63	544 QSferry Rd	N	100	27.6
64	550 QSferry Rd	N	91.7	46.8
65	Distillery Lane	N	100	32.7
15a	Hope Park Terr	N	100	38.8
66	London Rd/Regent	N	58.3	43.0
67	London Rd/Earlsn	N	66.7	47.9
68	Parsons Grn Terr	N	100	30.4
69	Wolseley Pl	N	83.3	56.2
70	Wolseley Terr	N	75	43.7
71	Portobello High St W	N	83.3	43.0
72	Seafield Rd East	N	100	35.0
73	Portobello High St E	N	75	26.3

NOTES
All passive diffusion tube data has been adjusted for bias, and where necessary to the nearest relevant exposure receptor using the spreadsheet calculator based on the specified procedure in Box 2.3.

Bias factors used for the indicated years:
2007 = 0.90
2008 = 0.88
2009 = 0.86

Annual mean concentrations which exceed the annual objective are highlighted in red; those that are likely to exceed the 1-hour objective are highlighted in bold red. (Which are locations where the annual mean is 60μgm^{-3} or greater)

Where the period of valid data is less than 90% for a full year this is highlighted in blue

Princes Street data (ID47) in brackets represents pavement exposure 2.5m from the kerb, data for the location without brackets represents concentrations at the façade.

Table 2.4b Monitoring locations outwith AQMAs where exceedences of the annual mean nitrogen dioxide objective have been identified.

Location	2009 annual mean NO_2 concentration ($\mu g/m^3$)	Data Capture %
Bernard Street*		
ID 29	45.1	50.0
ID 29a	42.0	66.6
ID 29c	48.2	50.0
Glasgow Road*		
ID 15	42.0	91.7
ID 16	46.8	83.3
ID 58	51.1	100
Easter Road*		
ID 25	50.8	83.3
London Road*		
ID 46	43.4	91.7
ID 46a	40.5	75.0
ID 66 (London Rd/ Regent Terrace)	43.0	58.3
ID 67 (London Rd/ Earlston Place)	47.9	66.7
ID 69 (London Rd / Wolseley Pl)	56.2	83.3
ID 70 (London Rd/ Wolseley Terr)	43.7	75.0
Queensferry Road*		
ID 50	46.4	100
ID 64	46.8	91.7
Grassmarket*		
ID 37a	40.5	58.3
Inverleith Row/Ferry Road junction		
ID 55	42.6	75.0
Portobello High St West bound		
ID 73	43.0	75.0

NOTE
New monitoring locations established in 2009 are highlighted in blue
Where the period of valid data is less than 90% for a full year this is highlighted in blue.
* Locations where Detailed Assessments are being progressed

Table 2.4c Locations where monitoring indicates potential exceedences of the annual mean nitrogen dioxide objective.

Location	Annual mean nitrogen dioxide concentration (μg/m^3) (Data capture %)		
	2007	2008	2009
Broughton Road ID43	38.9 (100%)	40.4 (100%)	38.1 (100%)
Commercial Street ID9	42.0 (100%)	40.4 (100%)	31.6 (66.7%)
Hope Park Terrace ID15	41.0 (75%)	36.4 (75%)	34.7 (66.7%)
Hope Park Terrace ID15a	N/A	N/A	38.8 (100%)
Cowgate ID48	40.0 (88%)	46.6 (100%)	39.8 (83.3%)
Hillhouse Road ID40	38.7 (83%)	44.4 (91.7%)	37.4 (91.7%)

NOTE
All passive diffusion tube data has been adjusted for bias, and where necessary to the nearest relevant exposure receptor using the spreadsheet calculator based on the specified procedure in Box 2.3.

Bias factors used for the indicated years:
2007 = 0.90
2008 = 0.88
2009 = 0.86

Annual mean concentrations which exceed the annual objective are highlighted in red

Where the period of valid data is less than 90% for a full year this is highlighted in blue

Trend data from passive diffusion tubes within the AQMAs

The passive diffusion tube data, which has been used in the trend assessment, has been corrected for diffusion tube bias, and taken from the point of measurement. This is to ensure consistency due to the change in methodology for calculating the NO_2 drop 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 the same method as previously described on page 24.

Annual data for 2009 shows a significant decrease compared with earlier data gathered at specific locations in the Central AQMA. For example, Princes Street (at the relevant receptor) was 36 μgm^{-3} in 2009 compared to 51 μgm^{-3} in 2008 and West Maitland Street 46 μgm^{-3} in 2009 compared to 70 μgm^{-3} in 2008.

Both these changes can be attributed to the fact that Princes Street was closed to traffic for most of 2009, due to tram construction work. At West Maitland Street a 4- metre 'buffer zone' was created during tram works. This moved vehicles away from the kerbside into the centre

of the carriageway therefore the tail pipe emissions would have moved further from the monitoring site.

The trend data is based on the average mean concentrations obtained from passive diffusion tube monitoring at the following locations each year, St Johns Road, West Maitland Street, Torphichen Place, Gorgie Road, MacDonald Road, Roseburn Terrace, Princes Street, North Bridge, Queen Street, York Place, Gt Junction Street and West Port. Data which has been used to establish the average trend is shown in appendix C

The mean average value of the aforementioned sites decreased significantly in 2009 from 62 μgm^{-3} in 2008 to 49 µgm-3 in 2009. Due to the anomolous traffic situation during 2009 trend data has been compiled for two discrete periods;

2003 to 2009
2003 to 2008

Figures 2.4a and 2.4b respectively.

Trend analysis for years 2003 to 2009 indicates a slight upward trend. However, this requires to be tempered with major traffic rerouting in the city centre. Figure 2.4a.

Excluding 2009 data, due to the anomolous traffic situation the upward trend is more pronounced. Figure 2.4b.

Figure 2.4a Trend in the annual mean nitrogen dioxide concentration measured at diffusion tube monitoring sites located within AQMAs for years 2003 to 2009.

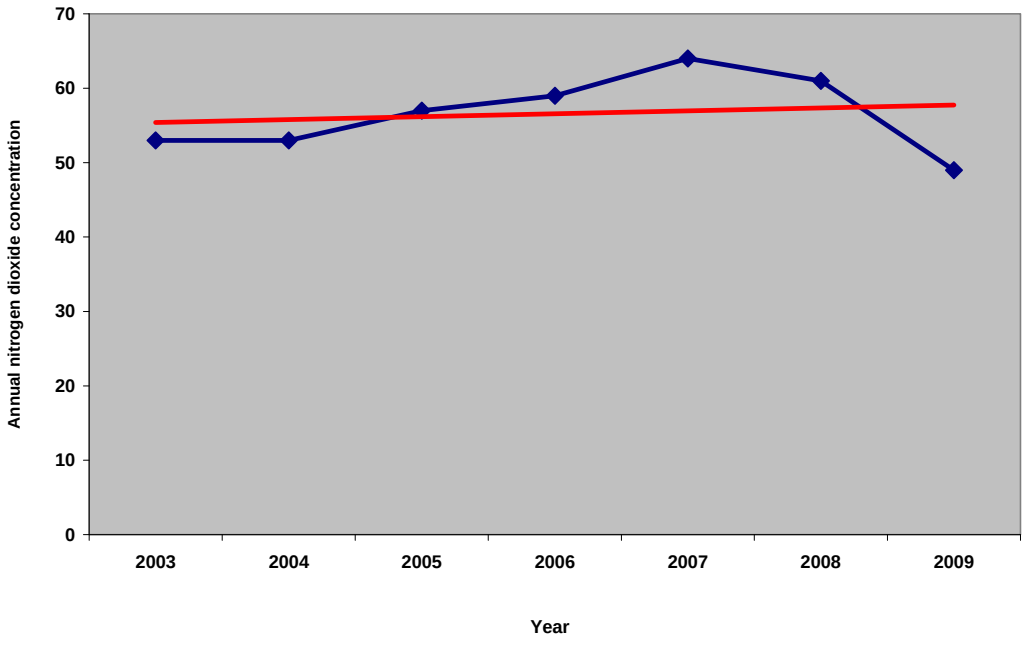
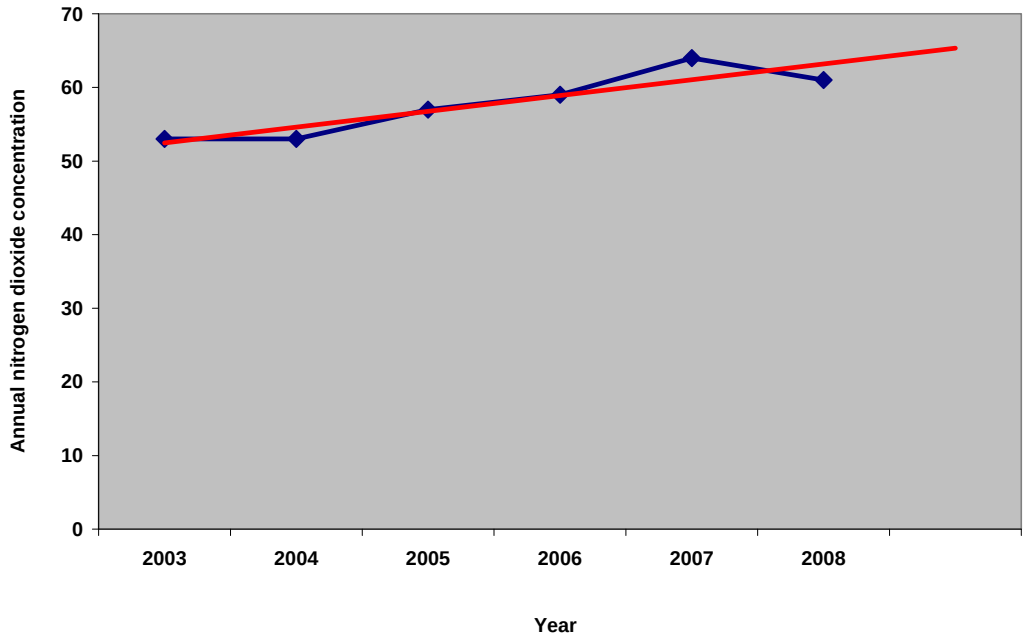


Figure 2.4b Trend in the annual mean nitrogen dioxide concentration measured at diffusion tube monitoring sites located within AQMAs for years 2003 to 2008.



2.2.2 PM_{10}

PM_{10} monitoring is undertaken using Tapered Element Oscillating Microbalance (TEOM) instruments, apart from the AURN site at St Leonards, which operates a Filter Dynamics Measurement System (FDMS) unit.

The PM_{10}TEOM monitoring data at Queen Street, Roseburn and Salamander Street 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 (1.14) for comparison and continuity with historical data. [1]

Monitoring commenced at the newly established site at Salamander Street in mid September 2009. This short-term data could not be corrected to provide an estimated annual mean due to insufficient data available from the FDMS unit at the local background site at St Leonards. The FDMS instrument developed a fault during July, which continued until January 2010.

The new monitoring data shows that the Roseburn site meets the Scottish Government Annual Objective. Queen Street and St Leonards are both close to the objective, and are considered borderline. Based on 4 months of data, Salamander Street exceeds the Scottish annual mean objective.

All locations currently meet the 24 hourly mean Scottish Government objective.

The Updating and Screening 2009 report concluded that a city-wide Detailed Assessment was required for PM_{10}. From both new and historical monitoring data the requirement to progress the citywide Detailed Assessment remains valid.

The data shows that the two correction methodologies are comparable. Data is shown in the tables 2.5a and 2.5b.

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

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2009 %	Annual mean concentrations ($\mu g/m^3$)		
					2007	2008	2009
1	Queen St TEOM	Y NO_2		96.4	1.14 20.0	vcm 18.7 1.14 19.1	vcm 18.4 1.14 18.0
3	Roseburn TEOM	Y NO_2		98.9	1.14 16.0	vcm 15.6 1.14 15.7	vcm 15.2 1.14 14.5
2	Haymarket TEOM	Y NO_2		NA	1.14 19.0	vcm 19.5 1.14 19.6	NA
8	Salamander St TEOM	N	97.0		NA	NA	vcm 22.0 1.14 23.0
7	St Leonards FDMS	N		63.2	1.14 18.0	15.0	17.0
Note AQMA has not been declared for PM_{10}							

* Annual mean for Salamander Street is based on data gathered from 19.09.2009 to 31.12.2009
Where the period of valid data is less than 90% for a full year this is highlighted in blue.
Data for 2007 was calculated using the 1.14 (Edinburgh's local gravimetric factor as defined in the Council's Detailed Assessment report December 2004).

Exceedences are highlighted in red.

In July 2007, the TEOM unit at St Leonards was replaced with FDMS instrument. The data was considered unreliable due to instrument faults. (Three separate units were installed prior to gathering stable data).

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

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2009 %	Number of Exceedences of daily mean objective (50 μg/m^3) If data capture < 90%, include the 90th percentile of daily means in brackets.		
					2007	2008	2009
1	Queen St	Y NO_2		96.4	4	0	1
3	Roseburn	Y NO_2		98.9	6	0	0
2	Haymarket	Y NO_2		NA	7	2	NA
8	Salamander St	N	97%				2 (44)
7	St Leonards	N		63.2	6	0	2 (N/A)
Note AQMA has not been declared for PM_{10} Exceedences for the year 2007 have been gravimetricaly calculated using the national 1.3 factor advised by the Scottish Government.							

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Trend data

PM_{10} data trends are based on uncorrected TEOM data due to changes associated with the gravimetric correction methodolgy. The non volatile fraction of the FDMS data from years 2008 and 2009 at St Leonards has been used to ensure a consistant approach.

Trend data has been compiled for the following sites;

St Leonards background (2004 to 2009)
Haymarket roadside (1999 to 2008)
Roseburn roadside (2005 to 2009)

Although, non-volatile data was used for the trend assessment at St Leonards (2008 and 2009) this has to be tempered with the fact that the TEOM instrument was replaced with an FDMS system.

Salamander Street was commissioned in 2009 and North Castle Street/Queen Street relocated in mid 2005 to Wemyss Place/Queen Street. Therefore, there are insufficient years of valid data to undertake trend analysis at these locations.

The data trends are shown in Figs 2.5a to 2.5c and the findings are summarised in the table 2.5c.

Figure 2.5a . PM_{10} trend St Leonards (Urban background site)

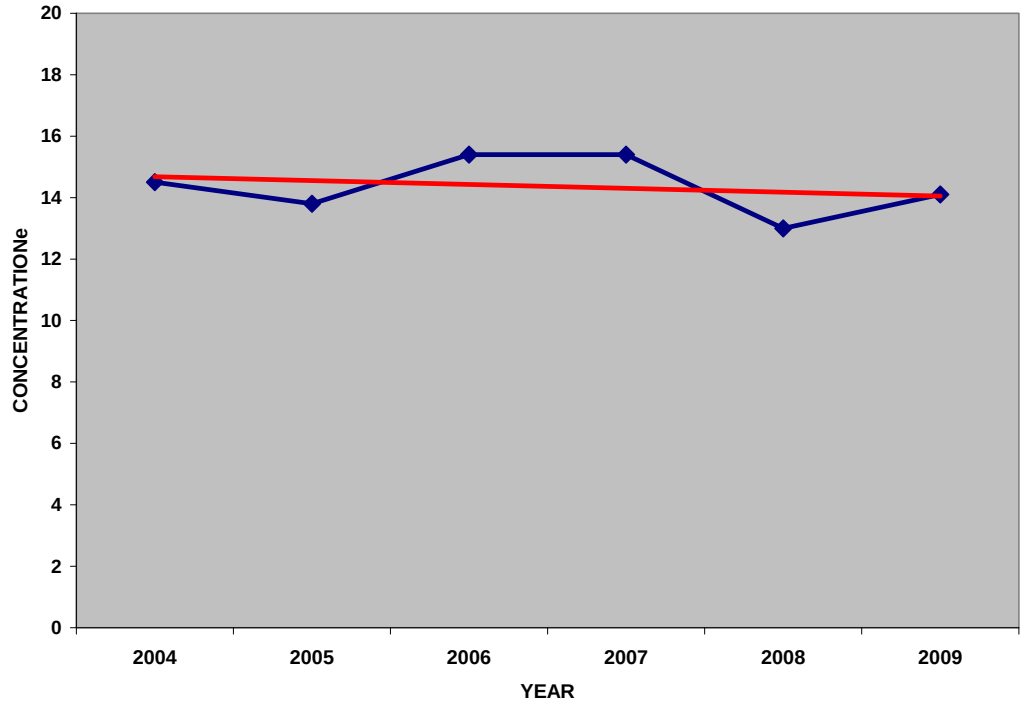

Figure 2.5b PM_{10} trend Haymarket (Roadside site)

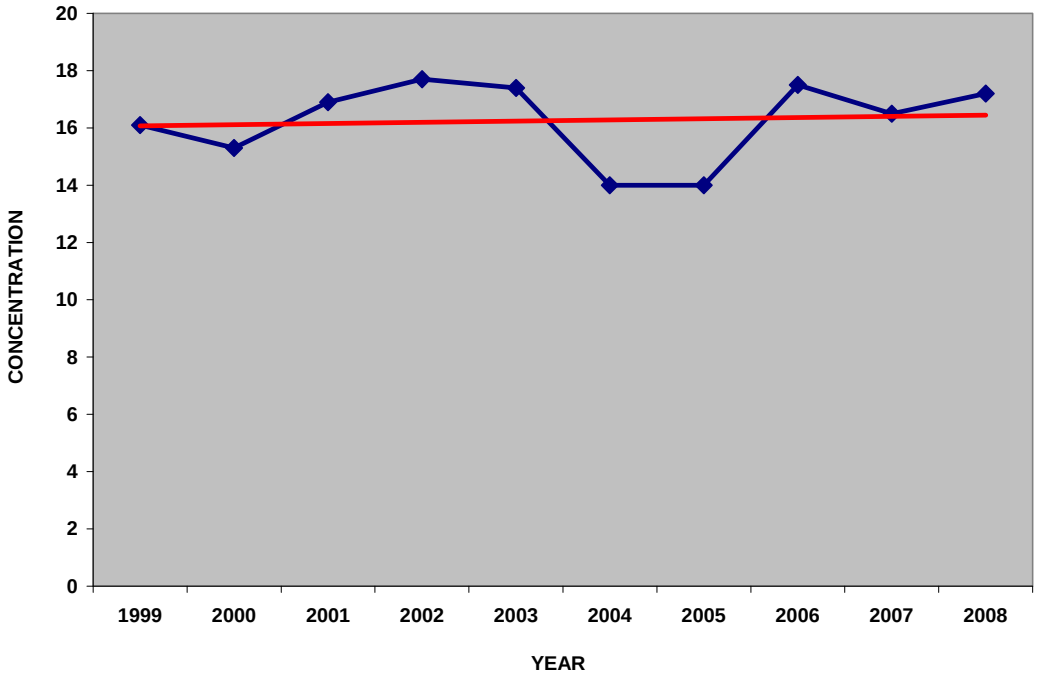

Figure 2.5c PM_{10} trend Roseburn (Roadside site)

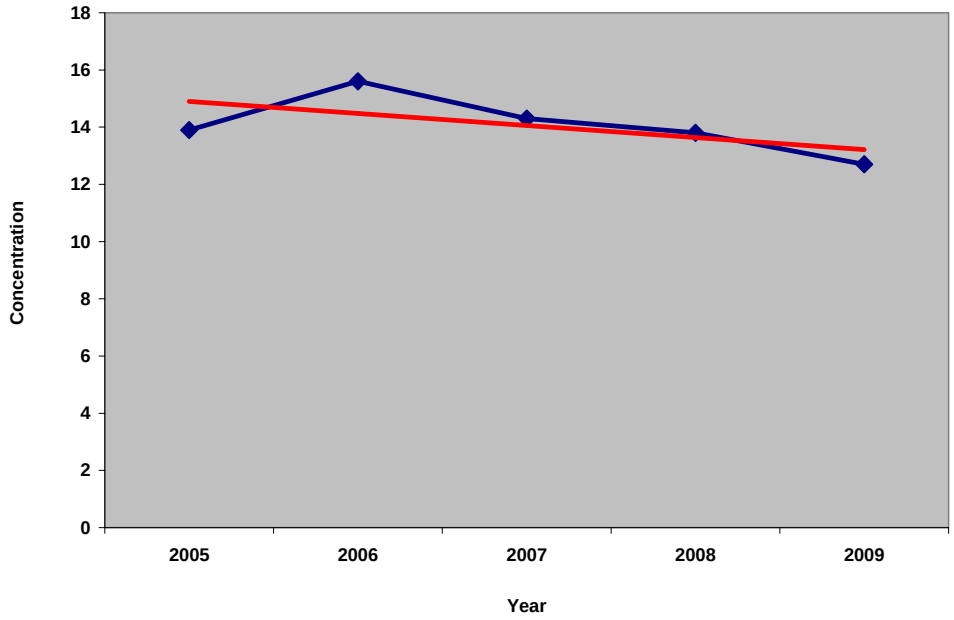

Table 2.5c Trend summary for PM_{10} data

Location	Trend	Concentration of PM_{10}
St Leonards (Urban background)	↓	Decreasing
Roseburn (Roadside)	↓	Decreasing
Haymarket (Roadside)	↑	Increasing

2.2.3 Sulphur Dioxide

Sulphur dioxide is monitored at the AURN urban background site at St Leonards. This location continues to comply with the objectives. Table 2.6.

Table 2.6 Results of SO_2 Automatic Monitoring: Comparison with Objectives

Site ID	Location	Within AQMA	Data Capture 2009 [b] %	Number of Exceedences of: (μg/m^3)		
				15-minute Objective (266 μg/m^3)	1-hour Objective (350 μg/m^3)	24-hour Objective (125 μg/m^3)
7	St Leonards	N	95.1	0	0	0

2.2.4 Benzene

Monitoring data using the pumped tube methodology obtained from the urban background (AURN) site at St Leonards has not identified any running annual means greater than 3.25μg/m^3. Monitoring ceased at this site on 27.11.2007. Data is reported in the Air Quality Progress Report 2008.

2.2.5 Other pollutants monitored

The UK Government and Devolved Administrations are responsible for monitoring Ozone, Polycyclic Aromatic Hydrocarbons (PAHs) and $PM_{2.5}$. The AURN urban background site at St Leonards monitors the aforementioned pollutants.

Ozone

Ozone concentrations measured at the above location in Edinburgh fail to meet with the UK objective.

Table 2.7 Results of Ozone Automatic Monitoring: Comparison with Objectives

St Leonards Urban background	2007	2008	2009
Number of exceedences	11	14	12
Ozone Obective 100μgm^{-3} not to be exceeded more than 10 times a year as an 8 hour running mean by 31st December 2005			

Polycyclic Aromatic Hydrocarbons PAHs

There are many different PAHs; however, the component, used as a marker, is benzo (a) pyrene (B (a) P). The concentrations monitored at St Leonards currently meet with the UK objective. Monitoring is undertaken using a digital sampler. Concentrations are shown in table 2.8.

Table 2.8 PAH (B(a)P) monitoring: Comparison with objectives

St Leonards	**2008**	**2009**
Annual Concentration (ngm^{-3})	0.124	0.115
B(a)P Objective 0.25ngm^{-3} as an annual average by 31 December 2010		

$PM_{2.5}$

$PM_{2.5}$ monitoring commenced in November 2008 at St Leonards urban background location. The annual 2009 data meets the Scottish Government proposed target of 12μgm^{-3} as shown in table 2.9.

Table 2.9 $PM_{2.5}$ Automatic monitoring: Comparison with proposed Scottish objective

St Leonards	**2009**
Annual Concentration (μgm^{-3})	8
$PM_{2.5}$ Scottish Objective 12μgm^{-3} annual average (limit) 2010 This target is not in regulations.	

Carbon monoxide is also monitored at St Leonards. Data from this site continues to meet with the objectives as described in previous reports and is considered not to be an issue UK wide.

2.2.6 Summary of Compliance with AQS Objectives

Edinburgh has measured concentrations of **nitrogen dioxide** and **PM_{10}** above the annual mean outside of the AQMAs and **will need to proceed to Detailed Assessment**, at the following locations

Nitrogen dioxide
(New locations identified)
Inverleith Row
Portobello High Street

(Where Detailed Assessment is being progressed).
Glasgow Road
London Road
Easter Road
Bernard Street
Queensferry Road
Grassmarket

PM_{10}
City-wide as identified in Updating and Screening Assessment Report 2009.
Currently being progressed.

3 New Local Developments

3.1 Road Traffic Sources

The Updating and Screening Assessment 2009 identified that the proposed Forth Road Replacement Crossing may impact on local air quality.

The proposals have now been approved in principle by the Scottish Government and were subject to an Environmental Statement (ES). This included an air quality impact assessment, which addressed nitrogen dioxide and fine particulate matter (PM_{10} and $PM_{2.5}$). The work involved monitoring nitrogen dioxide for one year using passive diffusion tubes in the study area, detailed dispersion modelling using ADMS Roads, and an assessment of data supplied by the relevant local authorities.

The report concluded that the, *' annual mean NO_2 concentration contours for 2017 and 2032 for both the Do-Minimum and Do-Something scenarios show that NO_2 concentration objectives and limit values are met everywhere within the study area except at a small stretch on the M8, which has no relevant exposure (i.e. there are no sensitive properties where the air quality objectives would apply within the exceedance area) t*he '*predicted impacts on local air quality are generally very small*, *therefore no mitigation measures are proposed with respect to operational traffic'*.

The monitoring data gathered during 2008/2009 for the study was below the air quality objectives. The modelled PM10 data for the base case year (2005) failed to meet the Scottish Air Quality Objectives. However, based on national projection factors estimated concentrations of PM_{10} and $PM_{2.5}$ are predicted to meet the Scottish objectives by 2017 and 2032.

The study was undertaken by Jacobs Arup and the full report can be found on the following web site www.forthreplacementcrossing.info

3.2 Other Transport Sources

The Updating and Screening 2009 report identified the requirement to proceed to Detailed Assessment work with respect to potential exceedences of the nitrogen dioxide objectives associated with the movement of diesel trains at Haymarket Station. Passive diffusion tube monitoring commenced in January 2009 at Distillery Lane. This location was identified as representing the 'worst-case' exposure. The lane is a cul de sac with a small number of car and van movements. The nearest residential property is 8m from the rail line adjacent to the monitoring site. The monitoring location selected was 8m from the rail line with residential property directly behind at 5m from the monitoring location. The data shows that moving diesel trains will not result in an exceedence of the NO_2 objectives. Table 3.1.

Table 3.1 Annual mean nitrogen dioxide concentration at Distillery Lane

Location Distillery Lane ID 65	**Nitrogen dioxide μgm^{-3} Annual mean**
Residential @ 8m from rail line	33.9 measured
Residential @ 13m from rail line	32.7 estimated
Nitrogen dioxide 'drop off tool' was used to calculate the concentration at 13m Background NO_2 value used in calculation = 26.7 Data capture 100% : Bias factor used 0.86	

3.3 Industrial Sources

A biomass power station (200MWe) combusting mainly wood fuel has recently been proposed at Leith Docks. The site will be in close proximity to existing high-density residential properties and adjacent to land which has been allocated for future residential development. It is also close to an area of poor air quality. The proposal is currently at 'Scoping' stage and will be subject to a full Environmental Assessment. The planning decision will lay with the Scottish Ministers. Concerns have been raised by Services for Communities regarding the impact that this large installation may have on local air quality in terms of the emissions arising from, the combustion process, transport with respect to delivery of fuel and removal of waste and fugitive emissions associated with open-air storage of wood material.

3.4 Commercial and Domestic Sources

The North British Distillery Company (adjacent to Gorgie Road) propose to change from natural gas to a combination of both natural gas and biogas from the sugar wash of the distilling process. Waste heat from the biogas will be reused in the process and the remainder will be used to heat an adjacent school. Proposals have been submitted and SEPA will be responsible for regulating emissions. Concerns were initially raised due to close proximity of the Central AQMA. However, an Environmental Impact Assessment predicted that there would be no exceedences of any of the NAQS objectives where there was relevant exposure.[2]

3.5 New Developments with Fugitive or Uncontrolled Sources

Open storage of woody biomass material for the biomass power station proposal in Leith may give rise to additional emissions of fugitive sources of PM_{10}.

Edinburgh has identified the following new local development which may impact on air quality in the Local Authority area.

Biomass (wood fuelled) power station 200MWe at Leith Docks.
Direct emissions of NOx and fine particles from the combustion process, transport emissions associated with fuel delivery and removal of waste and fugitive sources arising from the open storage of wood material.

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

4 Planning Applications

Many areas within Edinburgh are subject to major regeneration proposals in locations where there are current air quality concerns. According to the Council's State of the Environment Report 2008, the city-region of Edinburgh has the fastest growing population in Scotland and one of the fastest in the UK, (9% growth is projected from 2005 to 2024). There is strong political desire for economic growth in the city region. However, due to the current economic downturn the projected rate of growth may now be slower.

The Edinburgh City Local Plan (approved January 2010) outlines areas for residential use and commercial development. Tables 4.1 and 4.2

Table 4.1 Proposed areas of residential development as detailed in Edinburgh City Local Plan

Local Plan Ref Number	Site location	Area of Edinburgh	Estimated Capacity Units
WAC 1a	Leith Waterfront (Western Harbour)	North	2400
WAC 2	Granton Waterfront	North	6000
CA 4*	Quartermile	Central	1000
HSG 1	Craigs Road (SASA)	West	280
HSG 2	Chesser Avenue	South	500
HSG 3	Hyvots	South	310
HSG 4	Lochend Butterfly	South	356
HSG 5	New Greendykes	South	810
HSG 6	Greendykes	South	990
HSG 7	Niddrie Mains	South	600
HSG 8	Castlebrae High School	South	145
HSG 9	Thistle Foundation	South	170
WAC 1b	Leith Waterfront (Leith Docks)	North	18000
WAC 1c	Leith Waterfront (Salamander Pl)	North	800
CA 2	Calton Gate	Central	250
CA 3	Fountainbridge	Central	1200
HSG 10	Clermiston Campus	West	295
HSG 11	Telford College (North Campus)	North	300
HSG 12	Telford College (South Campus)	North	350
HSG 13	Eastern General Hospital	North	274
HSG 14	Newcraighall North	South East	200
HSG 15	Newcraighall East	South East	200
HSG 16	Edinburgh Zoo	West	80
HSG 17	South Gyle Wynd	West	180
HSG 18	Shrub Place	Central	400
HSG 19	City Park	North	200
HSG 20	Fairmilehead Water Treatment Wks	South	300

Note

WAC 1a to HSG 9 are sites identified in the Structure Plan base supply and previous local plans
WAC 1b to HSG 15 are sites to meet Strategic Housing land Requirements
HSG 16 to HSG 20 are sites that have been identified to make a useful contribution

Locations that are in AQMAs and areas of air quality concern are highlighted in red.

Table 4.2. Proposed commercial development described in Edinburgh City Local Plan.

Local Plan Ref Number	Site location	Area of Edinburgh	Site Hectares
BUS 1	Centre for biomedical research	South East	40
BUS 2	Edinburgh Park	West	16
BUS 3	Leith Eastern Industrial Area	North	20
S1	Westerhailes Centre	West	
S2	Harvesterway Westerhailes	West	4.3
S3	Hermiston Gate Centre	West	3.4
S4	Niddrie Main Road	South East	
S5	Granton Waterfront	North	
S6	Leith Waterfront	North	
S7	Fountainbridge	Central	
CA 1	St James Centre (expansion of existing)	Central	
CA 2	Caltongate	Central	
CA 4	Quartermile	Central	

Locations that are in AQMA and areas of air quality concern are highlighted in red.
St James Centre is within the Central AQMA. The expansion of this retail centre will result in additional car parking spaces from aproximately 600 to 1800.

Table 4.3 Leith Docks development proposals as detailed in Outlne Application

Land use	Phase 1 (2015)	Phase 2 (2025+)	Total
Residential (units)	2,935	13,079	16,014
Office (m^2)	4,740	87,328	92,068
Port activities (m^2)	0	12,120	12,120
Ocean Terminal Extention (m^2)	64,900	0	64,900
Retail- local shops (m^2)	5,428	13,416	18,844
Bar/Restaurant (m^2)	2,250	4,500	6,750
Leisure (m^2)	576	9,337	9,913
Education (m^2)	0	5,620	5,620
Cultural/public/ performance arena /car parking for above land uses	0	14,014	14,014

Land has become available for development at Portobello/Baileyfield, which is not identified in Edinburgh City Local Plan. A planning application has recently been submitted comprising 550 residential units and 30.000sq ft retail development. This former industrial site is adjacent to Portobello High Street, recently identified as requiring a Detailed Assessment for the pollutant nitrogen dioxide. The proposal will be subject to an Air Quality and Traffic Impact assessment

In addition to the Edinburgh City Local Plan, there is also the Rural West Edinburgh Local Plan (RWELP) and the West Edinburgh Framework Area. The WEFA incorporates a range of major development proposals e.g. expansion of Edinburgh Airport, redevelopment and expansion of the Royal Highland Showground and adjacent land at Ingliston - including new hotels and office accommodation, the creation of an International Business Gateway at land to the east of the airport, the Edinburgh Tram terminus and link to the city. Major housing developments are also being advanced at Kirkliston, Newbridge and Ratho Station.Table 4.4

The annual mean nitrogen dioxide objective is exceeded on the A8 close to the Newbridge roundabout. This road is a main arterial route into the Edinburgh from the west.

Although, AQMAs have not been declared in the Rural West, traffic generated from residential and commercial development has the potential to impact on the existing poor air quality on the A8 .

Table 4.4 Strategic Housing Allocation proposals contained in RWELP

Ref RWELP	Site Location	Estimated Capacity Units
HSP1	North Kirkliston	610*
HSP2	Main Street West, Kirkliston	90
HSP3	Kirkliston Distillery, Kirkliston	103
HSP4	Newbridge Nursery Newbridge	25
HSP5	Hillwood Road, Ratho Station	50*
HSP6	Craigpark Quarry Ratho	80
HSP7	Freelands Road Ratho	100

* Both these areas are green field sites and '*housing should not be occupied before the West Edinburgh tram to Newbridge is operational or it's funding has been committed to, or in the event of this not being delivered after strategic (or strategically significant) improvement in public transport accessibility to the area have been secured'.*

In addition there are further areas for residential development which are not detailed in Rural West Local Plan which have planning approval Table 4.5

Table 4.5 Residential development proposals not identified in the RWELP

Location	Estimated Capacity Units
Newbridge Continental Tyre factory	490
North Kirkliston	176
East Kirkliston	62

5 Air Quality Planning Policies

The City of Edinburgh Council's Planning Committee recently approved a report calling for the introduction of interim Planning Policy to limit the introduction of unabated biomass combustion in the city.

The report, entitled 'Use of Biomass of 50 MW(e) or less in Edinburgh'[3] highlights increasing concerns about the potential cumulative impacts on local air quality and health of unabated emissions - especially of fine particles PM_{10} / $PM_{2.5}$ from a potential proliferation in biomass uptake. The approved report effectively provides the Planning Authority with policy support to assist the Council manage and control the introduction of biomass combustion installations in development proposals in the current absence of proven, cost-effective abatement technologies.

The approved Planning report's key recommendations are that:

(a) 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), and

(b) This position will be reviewed once the city-wide study of fine particles has reported in 2011.

This is the first time an administration in Edinburgh has introduced Planning Policy directly aimed at influencing levels of specific air pollutants in the city. Due to the financial attractiveness to developers of biomass over alternative methods of potentially carbon-neutral technologies, it is a safe prediction that levels of combustion-derived PM_{10} and $PM_{2.5}$ in the city would increase in its absence, potentially compromising the Council's ability to meet the Scottish Government's air quality targets for PM_{10}.

6 Local Transport Plans and Strategies

Local authorities are advised in Technical Guidance document LAQM TG (09) to refer to measures which are outlined in the Local Transport Strategy that specifically relate to bringing about improvements in air quality.

Edinburgh's current Local Transport Strategy (LTS) covers the period 2007-2012. The LTS contains a number of policy measures which mirror those in the Air Quality Action Plan 2008-2010. In essence, the LTS provides a framework of policies and measures to help bring the Action Plan to fruition. It is anticipated that collectively they will assist in delivering the air quality improvements needed.

The key policies in the LTS which are associated with air quality are listed in table 6.1 below.

Table 6.1 Key air quality improvement policies in Edinburgh's LTS 2007 to 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 reveiew the need for new Controlled Parking Zones (CPZs) and /or further extensions to the existing CPZ.
P+R1 Park and 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 and 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 realiability and will work with SEStran to develop bus priority schemes that will support orbital bus 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 acessible to the rail network where possible. Encouraging developments likely to benefit from sea freight are sited to be easily accessible to the freight handling ports in the Forth and working to ensure muliti-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 BAA 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.

Road Traffic Reduction

The current LTS set a target of no more than 10% traffic growth between 2001 and 2010 and states, '*that longer term traffic targets can be considered only after the context of National and Regional Transport strategies become clearer and decisions on some of the major transport projects affecting the city are made.'*

Promotion of Walking, Cycling and Safe routes to school.

The LTS contains numerous cycling and walking policies to encourage these modes of travel.

Tram

The tram proposals are seen as a positive measure for air quality at point of use, as they will be electric and therefore emissions to air will be zero. Phase 1 will pass through a number of air quality hotspots within the Central AQMA, Leith Walk/ MacDonald Road, Queen Street, Princes Street, West Maitland Street and Haymarket. However, the tram also takes up road space and will be given road priority especially during peak travel times. Consequently traffic queuing may be exacerbated on certain stretches of the road network.

Progress with the Edinburgh tram is currently affected by contractual and legal issues.

In addition to the LTS, City of Edinburgh Council's recently approved Transport 2030 Vision provides an overarching strategy for the development of transport in Edinburgh over the next 20 years. [4]

The Transport 2030 Vision will compliment and inform the regularly updated LTS. The document has a number of outcomes and indicators which include, reductions in traffic

volumes, nitrogen dioxide and CO_2. City of Edinburgh Council will monitor, review and report upon progress against the vision outcomes.

The measures **which** would assist in delivering the outcomes associated with improving air quality are:

- Low emission zones if other measures do not make the necessary progress towards improved air quality.
- Working with operators towards an emission free public transport fleet and supporting initiatives for electric and hybrid vehicles.
- Air quality improvements in partnerships with the public transport and freight industries
- Active traffic management to mitigate pollution hot spots.
- Working through planning and economic development initiatives to foster low impact development that reduces the need to travel by car.
- Engaging with the Scottish Government and other partners to encourage a shift to low carbon transport including supporting use of electric vehicles.
- Parking permit charges based on vehicle emissions
- Green procurement when purchasing new Council fleet vehicles
- Promotion of eclogical driving and slower speeds
- Creating walkable and cyclable neighbourhoods through 20mph speed limits.
- Promote smarter travel through support for behaviour change programmes including travel plans
- Targeting the school run – school travel plans and safe routes to school
- Improved cross – Forth services to Fife
- Expansion of Park and Rides
- Supporting growth of City Car Club

City of Ediburgh Council's LTS is currently being revised.

7 Climate Change Strategies

The City of Edinburgh Council prepared its first Carbon Management Plan (CMP) in 2008 as part of Phase 5 of the Carbon Trust's Local Authority Carbon Management Programme (LACMP). This enabled the Council to build on work already started, use the expertise and knowledge of the consultants assigned to Edinburgh by the Carbon Trust and learn from Councils who had participated in previous programmes. The CMP is now under review. The Council is also preparing to meet its legislative obligations under the Carbon Reduction Commitment.

In terms of the broader climate change mitigation and adaptation agenda the Council is preparing a range of challenging short term actions as part of a broader Sustainable Development Strategy (SDS). It is likely that the SDS will be finalised towards the end of 2010.

Like all Scottish Local Authorities the Council will be required to respond to Part 4 of the Climate Change (Scotland) Act which places duties on public bodies relating to climate change. These duties come into force on 1st January 2011 and will mean that the Council must, in exercising its functions, act:

- in the way best calculated to contribute to delivery of the Act's emissions reduction targets;
- in the way best calculated to deliver any statutory adaptation programme; and
- in a way that it considers most sustainable.

Although climate change initiatives can be beneficial with respect to improving air quality, the use of Biomass is now recognised to have an adverse impact especially in urban areas which have high background concentrations relative to air quality objectives. Scotland has much tighter objectives for PM_{10} than the rest of the UK and based on local monitoring data, Edinburgh has very little headroom to currently support a wide uptake of biomass in the urban areas.

The Council has recognised the implications of increased biomass uptake over natural gas fuelled systems, particularly in the urbanised areas of the city. Consequently, Interim Planning Policy on the use of biomass up to 50MW (e) was recently approved. This formally sets out the Council's precautionary approach to the adoption of biomass installations that require planning approval, until the citywide study of PM_{10} has been reported.

8 Implementation of Action Plans

Edinburgh's first Air Quality Action Plan (AQAP) 2003 if fully implemented was estimated to reduce NOx by 40% on top of the expected 40% reduction, which would occur without intervention. A key element of the plan was the introduction of congestion charging. In addition, to reducing traffic and congestion levels in the city centre, the scheme would have improved air quality by using a proportion of the revenue generated to provide grants for the 'clean up' of older more polluting vehicles.

The AQAP was revised in 2008 to take account of the outcome of the referendum on congestion charging. This current plan contains a number of initiatives to assist in meeting the air quality objectives. It does not contain the estimated percentage reductions for each of the initiatives listed.

The focus of the current (AQAP) is a reduction in exhaust emissions from bus and road freight vehicles operating in the city. A Low Emission Strategy Feasibility study was commissioned by the Council and undertaken by Transport and Travel Research 2007 (ttr).[5] The study concluded that, the greatest reductions in NOx 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.

The AQAP also incorporates a number of transport and traffic management initiatives as identified in the LTS as well as to ensure that the Council's own vehicle fleet is as 'clean' as practical.

The AQAP highlighted the issue of cumulative impacts associated with development and the short comings of Air Quality Impact Assessments undertaken on behalf of the developer to support their proposals. This issue was put forward as a Policy Initiative in the AQAP. Three key actions were described, viz a series of internal seminars on Air Quality, establish a citywide inventory of development sites and develop Land Use and Traffic modelling capability to assess air quality impacts of development.

Progress to date and planned action

Voluntary Partnerships

Freight

The road freight sector is historically more fragmented and disparate than the bus sector. Many companies are sizeable private commercial concerns, with complex logistical and routing operations serving large geographic areas, often UK-wide. The two largest national representative organisations are the Road Haulage Association (RHA) and the Freight Transport Association (FTA) which combined only account for 50% of operators. The majority of the operators have company headquarters outwith the CEC administrative area, which generally makes them more difficult to contact.

Therefore, the most feasible option to achieve a reduction in emissions from road freight vehicles was via the Regional Freight Quality Partnership established by the South East of Scotland Regional Transport Partnership (SEStran). The Council has met with representatives of the Road Haulage Association and Freight Transport Association. A sub group has been established to facilitate closer working with the aforementioned Partnership.

In an attempt to encourage road freight operators to voluntarily reduce their emissions, in May 2010 CEC became a partner in a EU project-funding bid. The project, ECOStars Europe, involves operators voluntarily joining a self-assessment quality grading scheme, that awards them a 'star rating', depending on how well they perform across a range of indicators, include emissions standards and fuel efficiency. 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. If the EU funding bid is approved, it 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 bid outcome is due to be announced November 2010.

Bus

Following a number of meetings and discussions in 2009, all bus companies operating services in the city were invited to enter into a Voluntary Emissions Reduction Partnership with the Council. The key elements of the draft proposal were:

- Eliminate vehicles below Euro 4 standard from the AQMAs by October 2012
- Increase the number of Euro 5 standard buses incrementally throughout the period of this agreement, with the aim of achieving 100% Euro V standard operating in the AQMAs by October 2015.
- Organise the use of vehicles in the AQMAs to minimise emissions maximising the use of the least polluting vehicles
- Provide the Council with data on the bus entries to each of the AQMAs, and of total fleet composition operating in Edinburgh, by engine Euro standard on a 6-monthly basis.

The two main bus companies operating in the city considered the proposal too onerous in the absence of substantial financial support, and no formal agreement has been reached.

Update of Edinburgh Low Emission Strategy (LES) Feasiblity Study

The Low Emission Strategy Feasibility Study undertaken in 2007 was based on the bus fleet profile in 2005/006. Since 2007, there has been an improvement in the standard of the bus fleet. In addition, Park and Ride services have been introduced and bus frequency has increased on some routes. Therefore, it is essential that the study is revised to take account of these changes.

The study will focus on distance travelled and the bidirectional flows of the current bus fleet through each of the AQMAs. A baseline of NOx and PM_{10} emissions will be established and the level of improvement determined with the accelerated introduction of the Euro 5 standard against the business as usual fleet replacement scenario.This revised study is a slightly different approach, as the previous work addressed the city as a whole rather than focus on the bus movements through the AQMAs.

Bus Fleet Improvement

Although, no formal agreement has been reached with respect to the draft Voluntary Emissions Reduction Partnership, Lothian Bus, (the largest operator in the city) has made some improvement to their fleet. All Pre Euro and Euro 1 vehicles have been eliminated from the main fleet and 136 Euro 5 vehicles have been purchased since the standard was introduced in 2009.Table 8.1

Support funding was secured via Scottish Government's 'Local authority vehicle emissions reduction grant scheme 2010/11 to assist Lothian Bus (Council owned) to retrofit emission reduction SCRT technolgy to 23 of their Euro 2&3 vehicles. This will upgrade the vehicles to Euro 5 Standard.

A large number of the 'City Tour' buses (which are managed by Lothian Buses) operate within the Central AQMA. The current fleet is comprised of Pre Euro and Euro 2 vehicles. Table 8.2.

Lothian buses are currently trialling the same retrofit SCRT technology on a pre Euro Routemaster Tour Bus. If this is successful, it is their intention to extend the technology to the entire fleet.

Table 8.1 Improvements in main bus fleet (Lothian)

Bus Standard	Lothian Bus base line LTS (2006)	Lothian bus Sept 2010 Main Fleet
Pre Euro	63	0
Euro 1	33	0
Euro 2	202	64
Euro 3	317	307
Euro 4	0	79
Euro 5	0	136
EEV (5/6)		1
Total	**615**	**587**

Table 8.2 City Tour Bus Fleet Sept 2010

Bus Standard	Lothian bus Sept 2010 City Tour Fleet
Pre Euro	9
Euro 1	0
Euro 2	37
Euro 3	0
Euro 4	0
Euro 5	0
Total	46

Using the least polluting vehicles through the AQMAs

In Edinburgh, most bus services pass through the Central AQMA**.** Lothian Buses has attempted to improve emissions by using the cleanest vehicles on those services, which have the highest frequency. The service routes which have been selected are the 26, the Airlink (route 100) and the Park and Ride (route 48). The services are now operating buses which are Euro 5 standard other than the Park and Ride which is Euro 3. The aforementioned services travel through both the Central AQMA and St Johns Road AQMA.

Route 22 buses are either Euro 4 or Euro 5 standard. This route passes through the Central AQMA and Great Junction Street AQMA.

The improvements to the Airlink service were implemented in the current year (2010). The other service improvements were introduced between between April and June 2009.

Differential Residential Car Parking Permits

A report to introduce a banding system for residential parking permits with fees based on CO_2 emissions or size of engine, was endorsed by Committee Members of the Transport, Infrastructure and Environment Committee in February 2009. The scheme has yet to be implemented.

Controlled Parking Zoning

The boundaries of the city centre Controlled Parking Zone (CPZ) were extended in 2006 - 2007. The requirement of new CPZ or further extentions to existing ones will be kept under review.

SCOOT

Spilt Cycle Offset Optimisation Technique (SCOOT) systems are automatically responsive to traffic flow and demand, and therefore help to ease congestion by having effective control over traffic signals. This system is in place on a number of road networks in the city. Unfortunately, cabling connections are down at most of the sites, but it is hoped that subject to funding these will be reinstated and additional ones installed.

It is anticipated that the SCOOT system will be operational by March 2011 at St Johns Road.

Scottish Funding has been granted to trial 'Motes' deployment at St Johns Road. The system provides instant qualitative real time NO_2 data, which can be linked to SCOOT and therefore will enable traffic signalling to be governed with respect to ambient concentrations of NO_2.

This trial will involve the co- location of a motes system longside the automatic monitoring unit at St Johns Road, to determine agreement with ambient air quality data and set a base concentration to initiate signalling changes.

Council's own fleet

It is the Council's intention to ensure that the average age of its fleet is as 'clean' as practicable.

The Council has recently submitted a bid to the Scottish Government in a joint venture with NHS Lothian, Fire& Rescue Service and Lothian and Borders Police to obtain funding from the Low Carbon Vehicle Procurement Support Scheme. If successful it will provide support towards the purchase of 2 hybrid vans, a hybrid mini bus and 4 electric cars, as well as the installation of 6 electric vehicle charging points.

Electric Charging facilities (New initiative)

The Scottish Government recently announced its commitment to low emission vehicles with regards to sustainable transport for the future.

City of Edinburgh Council has recently reviewed its policy on Parking Standards. The Policy now states that, developers should incorporate a provision to encourage electric vehicle charging infrastructure throughout all types of development.

Where deemed appropriate planning conditions are attached to consents, requiring that the Developer provides electric charging infrastructure for minimum 20% of the total parking allocation.

The Council has also, submitted a bid via Transport Scotland to establish 10 publicly accessible vehicle charging facilities under the Plugged in Places scheme (The Electric Vehicle Charging Infrastructure Framework).

Land Use and Transport Model to help address cumulative impact from development

Little progress has been achieved in developing a citywide Land Use and Transport Model primarily because of the high captial and revenue costs involved for establishing and maintaining such a system.

Current financial contraints mean that it is unlikey that such a model will be forthcoming in the foreseeable future.

A summary of measures and progress is shown in table 8.3.

Table 8.3 Action Plan Progress

No.	Measure	Focus	Lead authority	Planning phase	Implemen-tation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Estimated completion date	Comments relating to emission reductions
1	Manage bus emissions	Reduce emissions via bus voluntary partnership scheme	CEC SFC	2009 - 2011	2011 - 2014	Euro 4 by 2012. Euro 5 by 2014	Not calculated on Euro 4/ 5 . Information will be available after revision of LES study.	Various meetings held. Draft letter sent to all bus companies 2009. Response from two major operators in area stated that without substantial financial support would not be able to meet with draft agreement	End 2014	City wide reductions calculated for LES 2007 study at 10% uptake to Euro 3 std = 15.3 tonnes NOx 0.9 tonne PM10 per year. Mandatory Controls Reductions 87.5 tonnes NOX 4.5 tonnes of PM10
1A New	Manage bus emissions and potentially emissions from other vehicle classes	Reduce emissions via implementation of a LEZ	CEC SFC/ transport	2010 - 2011	Will depend on outcome from consultation & political will of CEC	As above	Not calculated . Work will be included as part of consulatation exercise. **Note** Largest reduction in bus NOx emissions as indentified in LES study would be via mandatory scheme.	Instruction from Committee members for CEC to consult with stake holders on the feasibilty of a LEZ. Funding secured for Consultation	Report 2011	Not calculated yet

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Estimated completion date	Comments relating to emission reductions
2	Establish a Freight Quality Partnership in the city.	Reduce emissions	SEStran	On going	On going	Euro 5 std or equivalent	Not quantified in AP	EU Funding Applied for Ecostars Europe project CEC has met with representatives of the Road Haulage association and Freight transport association to establish a means of disseniating information to their members. Air Quality Freight Sub group has been formed. This will help progress implement freight related emission improvements	On going	A regional Freight Quality Partnership has been established by the South East of Scotland Regional Transport Partnership (SEStran) actions and progress will be monitored and reported on via CAQWG
3	Council Fleet Cleaner vehicles Develop driver eco training programme	Reduction in fuel usage seen as being beneficial to air quality	CEC Corporate	2008 and continuing	On going	To be developed	Not quantified	Difficulities due to Alternative Business Model ABM process		Not quantified
5	LTS Completion and expansion of two new	Ease road congestion at peak times. Reduce NOX	CEC Transport		Completed	Patronage rates	Not quantified. Older buses intially were serving P&R.	Ferry Toll **1040** Ingliston **1085** Hermiston	Completed	Euro 3 buses now being used. But further improvement is required.

No.	Measure	Focus	Lead authority	Planning phase	Implemen-tation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Estimated completion date	Comments relating to emission reductions
	park and ride sites.	emissions.					Now replaced with Euro 3	**450** Newcraighall **560** Straiton **600** Sheriffhall **580** **TOTAL 4315**		
6	LTS Differential Parking	Carbon and LAQM pollutant reductions	CEC Transport	Sept 2008	Not yet implemented	Ratio of permits with respect to emissions	Not quantified	The Transport, Infrastructure and Environment Committee at its meeting on 10 February 2009 considered a report on "Residential Parking Permits - Update on Proposed Alterations to Charging Mechanisms Linked to Environmental Concerns". The Committee agreed to introduce a banding system for residents' permits with fees based on the CO2 emissions or engine size of the vehicle. It is anticipated that the new charging regime will be introduced in July 2010.	On going	Not quantified

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Estimated completion date	Comments relating to emission reductions
7	LTS Tram line 1	Reduce emissions .Zero at source	CEC Transport	2008-11	2012	Patronage	Not quantified	On hold issues with contract	?	Not fully quantified
8	LTS New Rail lines/stations	One of a package of measures to reduce traffic entering Edinburgh Ardrie Bathgate/ New craighall	CEC Transport Scotland			Passenger numbers	Not quantified	Completed Bathgate-Ardrie 2008 New Craighall 2009 station	Completed	Passenger Growth recorded for all stations
9	LTS City wide bike scheme/ cycle share scheme	Reduce emissions	CEC Transport	To be decided		Model shift	Not quantified	Report completed Committee Approval		Not quantified
10	Infra structure installation for electric vehicle charging via the planning system electric charging provison also included in draft CEC Parking Stds Policy	Reduce CO_2 Emmisions and LAQM pollutants	CEC		On going	20% of all new parking spaces to be provided with electric charging infra structure via planning applications	Not quantified		On going	Not quantified.
11	Traffic Management SCOOT MOTES	Reducing emissions via reducing congestion and idyling times	CEC Transport			Traffic congestion levels	Not quantified	Installation disruption at most sites Extent of trial being discussed	On going	Scoot systems To be reinstated when funding becomes available

No.	Measure	Focus	Lead authority	Planning phase	Implemen-tation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Estimated completion date	Comments relating to emission reductions
12	Develop city centre traffic land use model	Progress on this action has been limited due primarily to high capitaland revenue costs involve in establishing a city wide land use and transport model with sufficient output resolution to enable meaningful air quality dispersion modelling. Work continues to explore sources of external funding support.	CEC SFC				Not quantified	None		This measure was to address cumlative impact on development

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

Nitrogen dioxide

New monitoring data has shown that the air quality objectives for the pollutant nitrogen dioxide continue to be exceeded at a number of locations within each of the AQMAs. Therefore, the AQMAs remain valid.

Additional passive diffusion tube monitoring was established at the start of 2009 to progress the Detailed Assessment work and identify potential exceedences in areas of concern. A number of the new monitoring sites fail to meet the nitrogen dioxide annual mean objective.

All locations, which fail to meet the nitrogen dioxide objectives, are summarised in table 9.1.

Locations which are considered borderline with respect to nitrogen dioxide objectives are; Broughton Road, Commercial Street, Hope Park Terrace, Cowgate and Hiillhouse Road.

It will be necessary to progress to a Detailed Assessment at Portobello and Inverleith Row based on 2009 monitoring data. The requirement to continue the Detailed Assessment work at London Road, Easter Road, Bernard Street, Grassmarket, Glasgow Road and Queensferry Road remains valid based on current data.

Nitrogen dioxide concentrations have decreased significantly at a number of key locations in the Central AQMA , which could be due to a number of factors. In 2009, Tram works disrupted the main routes into the city centre. Princes Street was closed to all traffic from Feb 2009 until late November 2009. The carriageway on West Maitland Street was reduced to 2 lanes rather than 3 which provided an approximate 4m buffer zone at the monitoring location from the main traffic stream.

The annual mean nitrogen dioxide concentration from the automatic monitoring station at St Johns Road decreased from 75 μgm^{-3} to 70 μgm^{-3} and the number of exceedences of the hourly average decreased from 166 to 114.

Other factors which will may have influenced concentrations in general are:

- Lower bias factor for passive diffusion tube corrections 0.86 (2009) compared with 0.88 (2008)
- Improvement in the Lothian bus fleet through the AQMAs
- General reduction in traffic entering the city centre. From available information traffic reduced by around 30% along arterial routes where closures and diversions for tram works have been in place.

Table 9.1 Summary of locations which exceed nitrogen dioxide objectives in 2009

Site ID	Location	Within AQMA?	2009
1b pdt	St Johns Rd	Y (St Johns Rd)	44.2
1d pdt	St Johns Rd	Y (St Johns Rd)	57.8
5 automatic	St Johns Rd	Y (St Johns Rd)	**70.0**
2 pdt	West Maitland St	Y (Central)	45.6
3 pdt	Torphichen Pl	Y (Central)	56.3
22 pdt	RoseburnSt/Terr	Y (Central)	49.3
26 pdt	North Bridge N	Y (Central)	48.5
27 pdt	North Bridge S	Y (Central)	48.4
5	Gorgie Rd	Y (Central)	42.6
18	Gorgie Rd	Y (Central)	45.0
33	Queen St/Hanover	Y (Central)	50.8
28	West Port	Y (Central)	47.7
28b	West Port	Y (Central)	**66.7**
28c	West Port	Y (Central)	43.5
28d	West Port	Y (Central)	**60.2**
49	Morrison St	Y (Central)	44.6
30	Gt Junction St	Y (Gt Junction St)	44.1
30c	Gt Junction St	Y (Gt Junction St)	42.6
30e	Gt Junction St	Y (Gt Junction St)	41.9
45d	Ferry Road	Y (Gt Junction St)	40.9
25	Easter Rd	N	50.8
46	London Rd	N	43.4
46a	London Rd	N	40.5
50	Queensferry Rd	N	45.9
29	Bernard Street	N	45.1
29c	Bernard Street	N	44.8
15	Glasgow Rd	N	42.0
16	Glasgow Rd	N	46.8
37a	Grassmarket	N	40.5
58	Glasgow Rd	N	51.1
64	Queensferry Rd	N	46.8
66	London Rd /Regent Terr	N	43.0
67	London Rd/Earlston Pl	N	47.9
69	London Rd/Wolseley Pl	N	56.2
70	London Rd/Wolseley Terr	N	43.7
71	Portobello High St	N	43.0
55	Inverleith Row	N	42.6

Note Locations which are highlighted in blue are new monitoring sites

PM_{10}

There are exceedences of the annual Scottish Government objective for PM_{10} at Salamander Street based on 4 months of data. Roadside concentrations at Queen Street and the background site at St Leonards are borderline (18.4 $\mu gm^{-3}$and 17 μgm^{-3} respectively). Based on current and historical data and earlier DMRB modelling work it is considered appropriate to progress with the city- wide Detailed Assessment for $PM_{10.}$

Sulphur dioxide

Sulphur dioxide is monitored at the AURN urban background site at St Leonards. This location continues to comply with the air quality objectives.

Trends

It is very difficult to formulate reliable assumptions on the data trends due to the construction work for Edinburgh Tram, which has resulted in various traffic diversions, narrowing of road space and temporary road closures. This was highlighted in the Updating and Screening Assessment 2009 report. Consequently, trend analysis requires to be viewed cautiously.

9.2 Conclusions relating to New Local Developments

Concern is raised regarding the proposal to build a 200MWe biomass power plant (mainly combusting wood) at Leith Docks. The site will be in close proximity to existing high-density residential properties and adjacent to land which has been allocated for future residential development. It is also close to an existing area of poor air quality. Emissions of pollutants will arise from the combustion process, open storage of wood fuel and traffic movements associated with fuel deliveries and removal of waste.

A power plant of this scale, in this location, could present serious challenges for the regulation and control of emissions in order that Scottish Government ambient air quality targets for PM_{10} and $PM_{2.5}$ are met locally. The planning decision regarding this installation will lay with the Scottish Government Ministers.

9.3 Other Conclusions

Air Quality Action Plan

The Council has made progress with respect to engaging with the bus operators and with the help of Scottish Government support funding, Lothian Bus are currently progressing a program to retrofit SCRT emission reduction equipment to a number of Euro 2&3 buses. This will upgrade the vehicles to Euro 5 standard.

Engagement of road freight operators has been more difficult, as this sector is historically more fragmented than the bus sector. Therefore, the most feasible option to achieve a reduction in emissions from road freight vehicles was via the Regional Freight Quality Partnership established by the South East of Scotland Regional Transport Partnership (SEStran). CEC has met with representatives of the Road Haulage Association and Freight Transport Association. A sub group has been established to facilitate closer working with the aforementioned Partnership.

City of Edinburgh Council has recently become a partner in a joint European project funding bid (ECOStars Europe) to help support the establishment of a voluntary scheme to improve

the standard and quality of road freight vehicles operating in the city. The outcome of the bid will be announced in November 2010.

Due to the general lack of funding available to all sectors (and especially for non-local authority owned vehicles), it is recognised that voluntary emission reduction partnerships are not likely to deliver the level of improvements required.

Following an update report to the Council's Transport Infrastructure and Environment Committee (September 2009) on progress with the Air Quality Action Plan, members instructed its officers to initiate consultation with stake-holders on the feasibility of a Low Emission Zone for the city. Scottish Government funding has been secured for this work.

The Council will produce a revised Air Quality Action Plan 2011/2012. This will focus on the Council's progress with the Low Emission consultation study and an air quality strategy for the city.

Planning applications

The majority of applications shown in tables 4.1 to 4.5 have full or outline planning consent.

Given the political desire for continuing economic growth in the city and the wider region and the inevitable additional demand for all modes of transport that this will bring, a reversal of the currently deteriorating trend in local air quality will require the adoption of radical citywide initiatives and interventions.

Local Transport Strategies

The current LTS has a number of policies which will help towards improving the city's air quality. This strategy will be revised in keeping with the Transport (2030) Vision document. It is important that there is full Council consultation on each of the 'vision outcomes' to ensure that air quality will be adequately addressed from traffic sources.

In order to progress certain aspects of the Transport (2030) Vision document relating to traffic volume reductions, comprehensive counting and monitoring of traffic volumes will be essential.

Planning Policy

The City of Edinburgh Council's Planning committee has approved interim Planning Policy to limit the quantum of biomass combustion, which can be introduced through development in the city. The policy gives underpinning to the Council's stance on biomass during the last two years. It is an essential tool to assist the Council manage and control the amount of additional combustion-derived fine particle emissions in the city until the city-wide Detailed Assessment of PM_{10} has been reported.

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 monitoring results show that PAH and $PM_{2.5}$ meet with their specified objectives and that Ozone exceeds the 100μgm^{-3} target.

9.4 Proposed Actions

AQMAs

The new nitrogen dioxide monitoring data has identified exceedences within each of the three AQMAs and therefore they remain valid. Following completion of the current Detailed Assessment work it may be necessary to extend the Central AQMA to cover the following locations, Grassmarket, London Road to Willowbrae junction, and Easter Road to Albion Place.

Due to additional dispersed locations where nitrogen dioxide exceedences have been identified, for practical reasons it may be prudent to declare a single AQMA for the Council's Administrative areas. However, this would require Council direction.

Further Assessments. Expected completion: December 2010

Outstanding work relating to source apportionment is required at St Johns Road (AQMA), West Port (Central AQMA), and Great Junction Street (AQMA). Automated classifed traffic counters have now been installed and are operational at St Johns Road and West Port. A manual count will be required for Great Junction Street due to difficulties in collecting reliable automatic traffic data at this location.

Detailed Assessments Expected completion : June 2011

Nitrogen dioxide

Detailed Assessment for exceedences of nitrogen dioxide are being progressed at the following locations;

Glasgow Road,
London Road
Easter Road
Bernard Street
Queensferry Road
Grassmarket

Automatic traffic counters have also been installed at Easter Road, and London Road in preparation for extension of the Central AQMA and the subsequent source apportionment work required.

Traffic Counters will also be installed at Bernard Street

New areas of nitrogen dioxide exceedeences. Expected completion : January 2012

Additional passive diffusion tube monitoring will be required to progress Detailed Assessment work at Portobello High Street and Inverleith Row.

PM_{10} City-wide Expected completion 2011/2012.

With respect to the monitored PM_{10} data, DMRB modelling work undertaken for the Upating and Screening Assessment 2009 report and a existing high urban background concentration

in relation to Scottish Government objectives, the Council consider that it is necessary to progress the city-wide Detailed Assessment for this pollutant.

New passive diffusion tube monitoring

A number of additional roadside locations were identified in the Updating and Screening Assessment 2009 report as areas of concern. Monitoring has now commenced at Slateford Road, Fountain Bridge and Lindsay Road/North Junction Street (Leith). Data will be reported in the next Air Quality Progress Report 2011.

Data capture during 2009 for many of Edinburgh's passive diffusion tube locations was below 90%, which was due to the tubes being stolen. A full review of the locations will be conducted prior to 2011 and methods will be investigated to secure the tubes in their holders.

10 References

1 City of Edinburgh Council Detailed Assessment Report (Local Air Quality Management Round 2) 2004

2 Anaerobic digestion plant: Air quality and odour impact assessment. Client North British Distillery 16 June 2010 BMT Cordah.

3 Use of Biomass of 50MW(e) or less in Edinburgh Planning Committee 30th September 2010

4 Transport 2030 Vision

5 Edinburgh Low Emission Strategy Feasiblity Study . Transport and Travel Research Ltd in association with AEA Technology May 2007.

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Appendices

Appendix A: QC/QA data

A1 Diffusion Tube Bias adjustment factors
A2 Factor from Local Co-location Studies
A3 Discussion of Choice of Factor to Use
A4 PM Monitoring Adjustment
A5 Short-term to Long-term Data adjustment (Nitrogen dioxide)
A6 QA/QC of automatic monitoring
A7 QA/QC of diffusion tube monitoring

Appendix B:

Raw monthly passive diffusion tube data 2009

Appendix C

Data used for trend analysis within AQMAs

Appendix A: QA:QC Data

A1 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 Triethanolanine (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 calander supplied by AEA. The method has remained unchanged during the monitoring periods.

The annual mean data from the co-location studies always show that passive diffusion samplers over read the real time analysers by average factors from 0.86 to 0.91.

Table A1 Historical bias data used in previous reports

Site		2001	2002	2003	2004	2005	2006	2007	2008
Queen St	R	0.91	0.91	0.91	0.90	0.84	0.83	0.85	0.81
Haymarket	R	0.93			0.88	0.93	0.91	0.92	0.87
Leith Walk	R	0.89							
Currie	SB				0.91				
Gorgie	R					0.86		0.91	0.94
Roseburn	R					0.92			0.91
St Johns Rd	K							0.93	0.86
MEAN		**0.91**	**0.91**	**0.91**	**0.89**	**0.89**	**0.87**	**0.90**	**0.88**

A2 Factors from Local Co-location Studies

The automatic monitoring stations which were considered for the co-location study during 2009 are shown in table A2.

Haymarket was out of commission for most of 2009 this was reinstated at Salamander Street September 2009. Gorgie Road had poor data capture for months November and December Therefore these automatic monitoring stations were not used for the co-location study.

Table A2 Bias factors used for 2009 data

Site	Type	Analyser	Pdt mean	Pdt precision	DC Analyser	Period	Bias Adjust Factors
Queen St	Roadside	33	40	Good	95%	12	0.83
Roseburn	Roadside	26	32	Good	100%	12	0.82
St Johns Rd	Kerbside	70	76	Good	97%	12	0.92
MEAN All							0.86

A3 Discussion of Choice of Factor to Use

Edinburgh co-locates triplicate passive diffusion tubes on the sampler head cages of each air quality monitoring station. The analysis has been undertaken for a number of years using Edinburgh Scientific Services Laboratory and the preparation of tubes during this time has

remained the same. Historical data shows that the annual mean bias factors range from 0.87 to 0.91. The passive diffusion tubes have always given higher concentrations than the real time analysers over an annual time scale. The national factors which included Edinburgh's submitted data when averaged give a higher factor value. The national factors in the data base for Scientific Services is influenced by the inclusion of West Lothian's co-location study, whereby factors of 1.24 and 1.13 are reported for 2006 and 2007 respectively. The data at this site is lower than the concentrations at the majority of Edinburgh's pdt sites

All Edinburgh's pdts are prepared in one batch for each monthly exposure and are analysed on the same day.

A4 PM Monitoring Adjustment

The unadjusted 2009 TEOM data for Queen Street, Roseburn and Salamander Street was used in the VCM correction spread sheet provided by Kings College to provide a gravimetric equivalent concentration. The FDMS purge data over the same period was obtained from the following two AURN sites, St Leonards Edinburgh and Grangemouth . The latter location is approximately 25miles from Edinburgh centre. The FDMS unit at St Leonards developed a fault during July therefore data after this time period was not used in the model. The meterological data was obtained from the weather station 31660 Edinburgh Gogarbank It was considered appropriate to use local data for the adjustment . Personal communication with David Green, Kings College.

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 during 2004. [1]

A5 Short-term to Long-term Data adjustment (Nitrogen dioxide)

The monitoring location at Salamander Street was established in September 2009. This monitoring station was previously located at Haymarket Terrace. Data collection started on the 19 September 2009. The long-term sites selected for this calculation are within 50 miles of Edinburgh and classed as urban background and rural locations. The annual mean and period means have been calculated for 2009. The mean ratio which was used to calculate the estimated annual mean for Salamander Street was 0.761. The period means were calculated from 19.09.2009 to 31.12.2009. The annual mean were for a full calander year January to December 2009. Data capture (DC) was considered to be within acceptable limits for both annual means and period means for each of the selected sites.

Site	Site Type	Annual Mean μgm^{-3}	Period Mean μgm^{-3}	Ratio
St Leonards	Urban backgrnd	24 (DC = 98%)	31.66 (DC = 99.2%)	0.758
Bush	Rural	7.2 (DC = 85%)	9.43 (DC = 99.4%)	0.763
			Average	0.761

Salamander Street monitoring data for the period 19.09.2009 to 31.12.2009 = 39 μgm^{-3}
Annual estimated mean 39 x 0.761 = 29.67 (30 μgm^{-3})

A6 QA/QC of automatic monitoring

Staff competence

Three officers are trained as local site operators in relation to the management of the Defra AURN National Network site and undertake the necessary calibrations and basic maintenance at all the Edinburgh automated sites.

Calibration procedures

The four ML 9841 B NO_x analysers perform an autocalibration each day with zero air and NO gas. Warning limits are set at +/- 5 % on the software program All sites are visited fortnightly, apart from the National Network site, 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. NO cylinders are supplied by Air Liquide UK.

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).
All visits to the monitoring stations, actions which are taken and activities adjacent to the site are recorded in the site logbook.

Data validation and ratification

All data, including calibration data is scrutinised on a daily basis (Monday to Friday) by visual examination, to see if they contain unusual measurements. Any data which is considered to be suspicious i.e large spikes, is flagged to undergo further checks. Data sets which are considered to require further investigation are checked with respect to the following:
Assessment of calibration records for drift precision /accuracy of analyser

- Negative values ie 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.

Any data, which is considered erroneous, is deleted.

The monitoring station located at St Leonards since 2004, is part of the Automated Urban and Rural Network, (AURN). All AURN sites are subject to an independent audit and stringent QA/QC procedures which are undertaken by Casella Stanger and A.E.A Technology on behalf of DEFRA.

Since 2007 AEA on behalf of the Scottish Government has undertaken QC and QA of all monitoring data and data assessment. This is carried out to the same standard required by DEFRA at the AURN stations.

Details of manual calibration checks, precision and accuracy of instruments are available on request either in electronic or paper format.

A7 QA/QC of diffusion tube monitoring

Three local site operators have been trained to fulfil the requirements associated with passive diffusion tube samplers. Passive diffusion tubes are supplied and analysed by Analytical and Scientific Services, City of Edinburgh Council. The laboratory 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 2007, 2008 and 2009.

NO_2 diffusion tube monitoring has been 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 diffusion tubes are located at the kerbside within 1 metre of the edge of the kerb or close 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. All exposure times and dates are recorded and retained as paper documents. Copies of which are sent with the exposed diffusion tubes to the laboratory.

Three diffusion tubes from each monthly batch are used as blanks. These tubes are not exposed and are stored in the refridgerator 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 by factors of 0.86 to 0.91

Appendix B

Raw Monthly Passive Diffusion Tube Data

Note data which is marked red was removed from the final data set, due to very low concentrations or extremly high values which are not in keeping with the monitoring location.

Start Date	ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	corr mean
St Johns Rd	1	59	41	16	65	50.9	68.3	48.1	34.5		54.3	49.5	58.9	**49.6**	**52.95**
St Johns Rd	1	50	55	26	61	42.8	52	38.4	34.6		50.3	56.7	61.8	**48.1**	
St Johns Rd	1b	55	55	21	68	48.8	51.7	52			54.2	50.6	57.2	**51.4**	
St Johns Rd	1c	84	73	58	69	66.3	49.3	57.4	69.8		78.9	80.5	64.2	**68.2**	
St Johns Rd	1c	59	69	79	73	59.1	48.2	51.3	66.6		70.4		79.3	**65.5**	
West Maitland St	2	72	74	50	85	76.3	69.3	51.6	50.9	72.6	58.4	76	70.5	**67.2**	
West Maitland St	2	78	86	39	68	52.2	62.7	62	51.4	67.8	62.1	68.6	81.6	**65.0**	
Torphican Pl	3	76	86	63	87	50.8	48.2	78.9	68.2	100.7	85.9	80.1		**75.0**	
Calder Rd	4	38	45	31	46	20.6	51.3	49.1	27.5	47.9	43.4	42.4	54.9	**41.4**	
Murieston Rd	5	77	82	51	64	4.6	61.2	67	52.9	75.8	57.1	66.6	98.4	**63.1**	**68.5**
Murieston Rd	5	78	90	76	62	59.1	50.8	64.7	53.0	73.4	61.6	67.2		**66.9**	
Ardmillian	6	46	39	23	43	34.9	48.8	40.4	30.1	40.7	43.2	41.6	58.6	**40.8**	
Commercial St	7	47	42	36	46	37.8	30.2					41	44.1	**40.5**	
Cannan Lane	8	41	43	30	38	25.6	21.9	31.8	24.1		33.9	34.7	48.2	**33.8**	
Cannan Lane	8	49	40	35	39	27.9	27.4	31.3	28		40.6	40	58.8	**37.9**	
Commercial St	9	53	30	24	48	37.5	41	40	24.6	30.2		80.4	39.9	**40.8**	**36.8**
Home St	10	52	39	19	41	33.9	32.4	39.7	32.5	28.4	40.5	48.6	43.9	**37.6**	
Lanark Rd	11	29	39	26	25	26.1	25.6	25.2		23.1		42.7	46.7	**30.8**	
Pier Place	12	45	39	30	37	31.6	27.2	29.1	26.3	17.3	39.9	42.4	45.2	**34.2**	
Deanhaugh St	13	49	55	40		32.5	27.9	35.1	34.1	39.1	48.5	43.2	56.9	**41.9**	
Trinity Cres	14	50	31	26	38	33.3	33.4	34.5	27.9	42	46.4	46.9	45.5	**37.9**	
Newbridge	15	70	71	55	103	47.5	25.1	60.8	48.3	60.2	55.7	54.2	67	**59.8**	
Newbridge	16	64	56		114	55.3	68.5	52.3	58.1	57.8	61.7	72.5	72.8	**66.6**	
Hope Park Terrace	17	54	57	31		50		40.1		48.3	60.9		70.6	**51.5**	
Gorgie Rd	18	55	34	29	48	49.3	64.2	47.5		45.3	52.2	56.8	62.3	**49.4**	
Gorgie Rd	18	61	63	28	65	39.4	56.3	57.6	54.1	58.2	50.4	56.6	72.8	**55.2**	
Baileyfield Rd	19	35	40	29	21	14.1	18.1	24.5	23.5	19.7	34	34	39.6	**27.7**	
MacDonald Rd/Leith Wlk	20	59	53	34	56	45.1	44.2	45.8	41.2			58.3	72	**50.9**	
Brunswick Rd/Leith Wlk	21	57	51	20	54	48.4	31.6	50.3					59.3	**46.5**	
Roseburn	22	77	83	42	67							71.4		**68.1**	
Roseburn	23	59	56	30	75			68	43.9	47.4	51.3	60.6	61.1	**55.2**	

Princes St	**24**	91			39	32.1	47.8	39.7	21.2			65.6	93.1	**53.7**	
Princes St	**47**	47	60	23	33	29.8	23.7	28.7	21.2			41.5	59.6	**36.8**	
Easter Rd	**25**	67	52	43	74		70.5	55.2	48.9	56		62.7	65.3	**59.5**	
Easter Rd	**25**	67	60	41	74		68.6	55.2	47.7	45.9		58.4	66.8	**58.5**	
Easter Rd	**25b**	63	49	25	59	40.4	38.4	52.7	34	35.4	42.8	46.8	55.2	**45.1**	
Easter Rd	**25c**	45	42	36	51	36.8		46.3	38.2	45.6	44.7	49.9	51	**44.2**	
Easter Rd	**25d**				51	41.5	34.6	43	40.8	36.3	44.5	50.3	48.5	**43.4**	
Easter Rd	**25e**	52	39	27	48		40.4	39.1	25.5	30.2	41	43.4	49.6	**39.6**	
Easter Rd	**25f**	41	46	13	40	33.2	21.8	36.8	27.7	32.3	36	47.5	44.6	**35.0**	
Easter Rd	**25g**	44	40	18	34	26.3	19.7	31.2	23		35.9	39.5	45.2	**32.4**	
Easter Rd	**25h**			5	51			28.8	43.7	45.1		52.3	6.2	**33.2**	**44.2**
North Bridge	**26**	51		47	74	60.8	81.5	61.1	47.1	51.9	57.2		57.1	**58.9**	**56.4**
North Bridge	**27**		65	55			46.8		58.1		51.3	59.5	58.1	**56.3**	
West Port	**28**	47	62	71		50	50.1					52.6		**55.5**	
West Port	**28**		65	54		50.7	39.1					50.5		**51.9**	
Bernard St/Leith	**29**	59	56	43				55.3				47.8	53.3	**52.4**	
Bernard St/Leith	**29a**	54	48	49		46.5		48.5			41.7	45.5	57.2	**48.8**	
Bernard St/Leith	**29b**	42	40	38	41	28.3	32.1	39.7		32.4	49.1		39.7	**38.2**	
Bernard St/Leith	**29c**		56	58				46			53.2	54.8	68.7	**56.1**	
Gt Junction St	**30**	49	40	40	59		74.5	50.4		45.8				**51.2**	
Gt Junction St	**30**	59	46	43	66		73.3	52	37.6	39.4	45			**51.3**	
Dalkeith Rd	**31**	47	32	17	44	33.6	38.8	53.7	23.8	31.6	42.9	42	57.2	**38.6**	
Niddre Mains Rd	**32**	38	40	36	29	27.3	27	28.7	28.9	37.5	40.5	66.2	47.2	**37.2**	
Broughton Rd	**43**	56	44	33	46	37.6	40.7	38.5	40.1	38	47.1	47.6	57.8	**43.9**	
Broughton Rd	**43**	51	49	31	56	37.8	40.1	37.4	37.7	42.6	47.4	50.6	54.6	**44.6**	
Queen St	**33**	64	79	70	54	55.5	43.3	70	47.1	52.8	54.3	61.5	67.2	**59.9**	
Queen St	**33**	78	66	55	49	46.3	44.1	73.9	47.1	53.2	56.5	61.7	68.5	**58.3**	
India St	**34**	34	33	23	28	18.3	16.7	22.4	21.1		31.1	31.4	40.4	**27.2**	
Dundas St	**35**	44	34	30	34	28.1	25.9	31.3	26.1	29.8	36.7	36.7	51.7	**34.0**	
York Place	**36**	40	58	42	57	45.5		43.9	34.3	18	46.7	47.8	68.6	**45.6**	
Broughton St	**44**	47	40	33	43	37.1	40.3	42.4	28.9	33.4	39	55.5	50.4	**40.8**	
Melville Drive	**38**	34	51	34	30	28.1	23.3	27.6	28.5	31.6		32.6		**32.1**	
Grass Market	**37**	54		47	47	33.5					40.9	42.1		**44.1**	
Grass Market	**37**	48	69	42	40	37.9					37.9	48.2	55	**47.3**	
Melville Drive	**38**	37	51	41	31	26.7	24.6	34.2	28.3	39.1		33		**34.6**	

Melville Drive	**38**	38	50	35	25	28.9	21.5	34.5		40.2		41		**34.9**	
Ferry Rd	**45**	40	52	46	50	28.3	51.3	40.1	29.3	29.3		46		**41.2**	
Ferry Rd	**45a**	56	44	34	48	27.9	37.8	34	33.7	23.3	19.3	51.9		**37.3**	
Ferry Rd	**45b**	36			28	28.9	33.7	24.7	34.7	31.1	43.6	62.2	112.8	**43.6**	**35.9**
Ferry Rd	**45c**	53		41				39.7						**44.6**	
Ferry Rd	**45d**	49	51	47	50	36.4	36.1	42.4	53.3	39	42.5	74.6	48.1	**47.5**	
Gt Junction St	**30b**		47	39	52	43.2	35.3	47.1	45.6		12.5		49.3	**41.2**	**44.8**
Gt Junction St	**30c**	61	42	39		47.7		64.1	35.6		48.9		57.4	**49.5**	
Gt Junction St	**30d**	39	49	32	46	42.8	50.8	46.1	33.5	38.9	48.4		47.8	**43.1**	
Gt Junction St	**30e**	54	50	45	46		36.3	51.8		44.2	52.8		58	**48.7**	
West Port	**28b**		87	69	81	72.7	84.3	74.4	67.6	77.2		69.9	92.1	**77.5**	
West Port	**28c**	48	55	38		42.7	50.1			44.4	75.7			**50.6**	
West Port	**28d**	72	81	68	71	73.6		67.3	65.1	71.5		62.3	67.7	**70.0**	
Grassmarket	**37a**	44	49	38	40	36.1	49.1			73.6				**47.1**	
Cowgate	**48**	43	56	45	47	42.2	50.4	45.5	42	44.1		47.9		**46.3**	
London Rd	**46**	54	57	31	53	49.4	46.8	54	40	54.1	51.9		64.8	**50.5**	
London Rd	**46a**	55	66	26	56	59.7	59.3	57.4	37.6			62.3		**53.3**	
Morrison Street Trial	**49**	66	70	43	72	61.8	66.6	55.8	41.8	47.7	51.3	63.8	46	**57.2**	
	49	68	64	22	72	66	70.1	58.3	37.4	53.7	51.1	32.8	64.7	**55.0**	
Whitehouse Rd/Quferry	**50**	95	99	74	90	65.7	87.6	78.2	70.4	90.5	94.5	50	93	**82.3**	
	50a	43		38	39	27.4	36.4	32.8	30.9	28.6	40.9	36.2	49.5	**36.6**	
	50b	35	33	30	28	18.6	25	23.2	21	22.7	31.2	43.5	33	**28.7**	
Salamander St/ Place	**51a**	32	31			18.9	25.6	25.5	20.2	24.1			42.1	**27.4**	
Salamander St/Bath	**51b**	46	45	41	50	29.6	59.3	42.1	30	37.1	48.7	44.7	48.4	**43.5**	
SalamanderSt/Baltic St	**51c**		52	48		39	29.8	46.3	36.7	40.5	47	44.8	47.3	**43.1**	
Ferry Road	**52**	55	8	45		26.9	43.3			42.6	41.7	39.3	64	**40.6**	**44.7**
Bowhill Terrace/Ferry Rd	**53**	55	56	49	40	33.2	37.9	37.1		41.2	47.8	51.9	59.2	**46.2**	
Inverleith Gnds	**54**	44	55	48	58	46.6	59.5	31.6			43.4	48.1	70.7	**50.5**	
Inverleith Row	**55**	47	49	9	62	37.3	47.1	36.5			48.6	59.1	58.5	**45.4**	**49.5**
Glasgow Rd 18-20	**56**	49	47	34	45	31.7	38.3	34	27.9	38.2	42.2	47.3	63.7	**41.5**	
	56a		43	36	48	38.7	42.1	33.9	28	32.3	47.5	55.9	52.7	**41.6**	
Glasgow Rd 158	**57**	58	66	38	48	40.9	34	52.1	39.6	47.9	59.3	71.3	65	**51.7**	
Glasgow Rd GFC 319	**58**	71	84	60	59	60.4	61.6	73.4	61.1	83.2	74.2	67.8	82.2	**69.8**	
Glasgow Rd GFC 319	**58**	82	70	77		56.9	61.8	83.4	80.3	80	86.1	60.5	76.2	**74.0**	
Telford Road	**59**	53			50	38.1	59.9	39.5	32.1	37.6	46.5	46	53.2	**45.6**	

Maybury Rd/Barnton jnct	**60**	37	32	24	41	29	45.6	32.1	26.0	26	40.1	44.1		**34.3**	
Maybury Rd/Quferry Rd	**61**	47	36	35	38	33	34.8	36.5	18.4	32.6	44	39.2	46.4	**36.7**	
Queensferry Rd	**62**	27	23	24	27	16.9	30.5	21.9	15.4	20.1	29.8	29.6	34.5	**25.0**	
Queensferry Rd	**62**		24	23	26	15.1	27.5	22.4	17.3	17.8	29	48	37.8	**26.2**	
Queensferry Rd	**63**	34	37	28	29	22.6	22.3	29.4	24.6	34	37.6	33.7	52.8	**32.1**	
Quferry Rd	**63**	36	32	35	29	24.7	20	29.6	26.6	29.3	31.9	37.3	54	**32.1**	
Queensferry Rd	**64**	78	80	81	78	66.6	90	91	61.2	87.6	98.4		101.5	**83.0**	
Distillery Lane	**65**	34	47	43	42	19.7	52	40.1	25.6	31.6	36.3	53.4	48.1	**39.4**	
Hope Park Terrace	**15a**	46	51	35	48	28.3	45.8	45.3	34.7	38.4	49.8	48.7	62.8	**44.5**	
Hope Park Terrace	**15a**	42	46	18	46	38.9	50.1		32.5	34.9	48.2	51	66.9	**43.1**	**45.7**
London Rd/Regent Pl	**66**	60	62	12				35.7	40.1	56.2		38.5	57.7	**45.3**	**50.0**
London Rd/Earlston Pl	**67**	62	62	31		57.5	63.4	56			56.8		56.5	**55.7**	
Parsons Green Terr	**68**	36	50	13	36	35.5	37.7	33	23.6	43.5	34.5	33.9	48.1	**35.4**	
Wolseley Pl HBOS	**69**	80	55	57	61	58	83.3	48.8		56.7	62.4		91.9	**65.4**	
Wolseley Terr	**70**		57	40	51	51.6		41.2	36.9		81.9	44.6	53.4	**50.8**	
Portobello High St	**71**	69	73	54		41.6	22.1	39.6	42.1		58.4	47.4	53.1	**50.0**	
Seafield Rd East	**72**	43	38	25	51	33	52.5	42.2	30.5	33	42.1	43.9	53.7	**40.7**	
Portobello High St	**73**	38	48	15	25		22.2	27.2	24.2		30.5	1.5	44.9	**27.7**	**30.6**
St Johns Rd	**39**	45	47	28	39	32.7	36.3	39.5	28.7		45.3	44	63.7	**40.8**	
Hillhouse Rd	**40**	48	48	27		41.6	44.3	48.8	33.4	40.4	45.8	51	50.2	**43.5**	
Hillview Terrace	**41**	29	26				24.5	15.1	13.5		24.2	27.9	37.1	**24.7**	
Midmar Dr	**42**	24	20	17	16	10.1	14.4	12.1	11.4	16.1	17.8	21.7	32	**17.7**	

Appendix C

Data used for trend analysis within AQMAS

	2002	2003	2004	2005	2006	2007	2008	2009
1 St Johns Rd	49	46	45	52	57	54	50	43
1b St Johns Rd			41	59	51	51	49	44
1c St Johns Rd			66	79	80	82	76	58
2 West Maitland St	67	78	77	85	96	104	97	57
3 Torphican Pl		63	72	87	77	87	67	65
18 Gorgie Rd		46	43	43	48	47	52	45
20 MacDonald Rd	42	41	42	43	45	47	64	44
23 Roseburn Terr	46	47	40	49	52	70	67	48
24 Princes St	92	84	85	84	87	93	79	46
27 North Bridge	60	58	54	49	52	56	52	48
33 Queen St	55	44	44	44	46	53	53	51
36 York Place	49	44	42	46	44	52	54	
30 Gt Junction Street		40	43	39	43	49	45	44
28 West Port		46	43	46	47	44	53	46
MEAN	57	53	53	57	59	64	61	49