Updating and Screening Assessment Report
Review and Assessment of Air Quality

Round 3 Local Air Quality Management 2006

City of Edinburgh Council
Services for Communities

Contents

Executive Summary

This report is the Updating and Screening Assessment (U&SA) of air quality in Edinburgh for 2006. The U&SA is the initial stage of the third round of the review and assessment process relating to Local Air Quality Management (LAQM).

If an exceedence of an air quality objective has been identified at the updating and screening stage, then a Detailed Assessment (DA) is required. This entails further work, to determine if an exceedence will definitely occur. The conclusions from a DA enable a local authority to decide whether an Air Quality Management Area (AQMA) is required and if an existing, AQMA should be revoked or amended.

The findings of the U&SA 2006 are that the pollutants, 1,3-butadiene, benzene, lead, carbon monoxide, particles (PM_{10}) and sulphur dioxide will meet with the air quality objectives and therefore no further assessment is needed.

The objective for the annual mean concentration of nitrogen dioxide continues to be exceeded at a number of hotspots within the Air Quality Management Area (AQMA) and at St Johns Road Clermiston Road junction. Therefore, the report concludes that the existing AQMA is still valid and a further AQMA is required at St Johns Road.

A decision to declare a second AQMA at St Johns Road was made following internal consultation.

The Progress Report 2005 identified possible exceedences of the nitrogen dioxide annual mean at Great Junction Street and West Port. A Detailed Assessment is currently being progressed at both these locations.

The monitoring locations, which are outside the AQMA show a downward trend for nitrogen dioxide Monitoring locations within the AQMA, show varying trends. An upward trend is observed at West Maitland Street, Princes Street, Roseburn Terrace/Street junction. The trend is downward at Queen Street and Leith Walk and Gorgie, indicating that nitrogen dioxide concentrations within the AQMA have increased at some locations and decreased at others.

The report has been undertaken in accordance with Technical Guidance LAQM (03) and updated information supplied by the air quality government help desks.

1.0 Introduction

1.1 Background to the Review and Assessment of Air Quality

Under Part IV of the Environment Act 1995 local authorities must periodically review and assess air quality within their areas. The following pollutants require to be assessed against air quality objectives, which have been prescribed in regulations and set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland.[1]

1,3-butadiene
Benzene
Carbon monoxide
Lead
Sulphur dioxide
Nitrogen dioxide
Particles PM_{10}

If an air quality objective is not likely to be achieved at a relevant location, the local authority must declare an Air Quality Management Area (AQMA) and produce a written Action Plan. The Action Plan should set out measures, which aim to address the level of air quality improvement that is required for the pollutant/s of concern.

The Department of Environment Food and Rural Affairs (DEFRA) and the Devolved Administrations have set a timetable for the review and assessment of air quality. The timetable is structured on a three yearly rolling cycle and currently runs until April 2009. Local authorities have completed the first and second round of the review and assessment process and have now begun the third round.

The review and assessment rounds are a two-stage process. Initially, Local authorities are required to undertake an Updating and Screening Assessment (U&SA) of the aforementioned pollutants. If an exceedence is likely, local authorities must proceed to Detailed Assessment (DA). This assessment involves undertaking a more robust approach to determine that an exceedence will definitely occur and ultimately whether an AQMA or amendments to existing AQMAs are required.

The Act does not place an absolute obligation on local authorities to meet the prescribed air quality objectives, only to demonstrate that they are working towards achieving them. However, the European Union's Air Quality Framework and Daughter Directives prescribe limit values for the above pollutants, which all member states must meet.

This report is the Updating and Screening Assessment of local air quality in Edinburgh for the year 2006.

1 Air Quality (Scotland) Regulations 2000 and the Air Quality (Scotland) Amendment Regulations 2002

1.2 Summary and key points of Round 1 and 2

- The pollutants, particles (PM_{10}), 1,3-butadiene, benzene, lead, carbon dioxide and sulphur dioxide meet with their respective air quality objectives.

- The annual average nitrogen dioxide air quality objective is likely to be exceeded at a number of city centre locations; Queen Street, Princes Street, West Maitland Street, George Street, Leith Walk, North Bridge, Roseburn Terrace and Gorgie Road.

- Exceedences are due to road traffic emissions.

- A single AQMA was declared for the city centre in 2000. Appendix 8 map 1.

- Further work undertaken for Stage 4 identified that buses are responsible for the majority of NO_X emissions within the AQMA.

- The Council's Air Quality Action Plan was produced and approved in July 2003.

- Round 2 U&SA (July 2003) concluded that a DA was necessary city-wide for particles (PM_{10}) due to high background levels and a significant tightening of the air quality objectives for Scotland (from an annual mean of 40µg/m^3 to 18µg/m^3). The annual average nitrogen dioxide objective is also likely to be exceeded at St Johns Road Corstorphine, due to traffic emissions.

- Round 2 DA (2004) report concluded that Edinburgh is likely to meet with the more onerous air quality objectives for PM_{10}. The additional assessment work at St Johns Road/Clermiston Road, Corstorphine showed that there is likely to be a risk of exceeding the annual average nitrogen dioxide target on the westbound side of the road. Therefore, a further AQMA will require to be declared.

- Following an internal consultation exercise, it is the Council's intention to declare a separate AQMA for the St Johns Road/ Clermiston Road area. Appendix 8 map1.

- The Air Quality Progress Report (2005) identified two further locations of likely exceedences of the annual average objective for nitrogen dioxide, West Port and Gt Junction Street. A Detailed Assessment is required at both locations.

- Four locations within the city centre AQMA, West Maitland Street, Princes Street, Torphican Place and Roseburn Terrace and are likely to exceed the EU limit value for the annual average nitrogen dioxide. St Johns Road will also exceed the EU limit value.

- The Air Quality Progress Report raised concerns with respect to the density of development, which is taking place in the city centre and along the North Edinburgh Waterfront, in particular the Leith Dock Development Framework (LDDF) proposal. The LDDF is supplementary planning guidance intended to guide development of Leith Docks over the next 20 years. The scale of proposed development may have an adverse effect on the existing AQMA and might lead to

further AQMAs being declared. An Environmental Statement report is currently being prepared which will include an air quality impact assessment.

Details of the Council's air quality reviews and assessments are contained in the following reports:

Round 1 LAQM

Review and Assessment of Air Quality in the City of Edinburgh Stage1 and 2 (1999)

City of Edinburgh Council Review and Assessment of Air Quality Stage 3 (2000)

City of Edinburgh Council Review and Assessment of Air Quality Stage 4 (2002)

Round 2 LAQM

City of Edinburgh Council Updating and Screening Assessment
Local Air Quality Management Phase 2 (2003)

City of Edinburgh Council Action Plan (2003)

City of Edinburgh Council Detailed Assessment Report (2004)

City of Edinburgh Air Quality Progress Report (2005)

2.0 Approach and Methodology for U&SA Reports

2.1 Guidance

Local authorities are advised to complete the Updating and Screening Assessment, with regard to Technical Guidance document LAQM TG (03) produced by DEFRA and the Devolved Administrations, under section 88(1) of the Environment Act 1995. The document contains a series of checklists for each of the pollutants, their likely sources and conditions that might lead to a Detailed Assessment being carried out. Local authorities are also advised to consult with government help desks, use updated information, the future year adjustment calendar and basic modelling tools, which are available on the government's air quality website (www.airquality.co.uk).

When undertaking work for an U&SA report, local authorities are expected to build upon their knowledge from previous rounds of review and assessment work and take account of areas where there have been significant changes, which might result in a breach of an objective.

Local authorities are required to focus their reviews and assessments at locations where there is likely to be relevant public exposure. Thus, if there is no relevant public exposure then there is no requirement to progress any further. The guidance in TG (03) refers to public exposure for both short-term and long-term objectives. It is generally accepted that the pollution measured at the building façade will be similar to the concentration inside the building. Thus for exposure along a busy road it is considered to be appropriate to measure at the building façade of residential properties that are closest to the road to assess pollutants with 24- hour and annual mean objectives. All monitoring locations in Edinburgh are close to the facades of residential property. Where kerbside monitoring has been undertaken i.e. with respect to passive diffusion tubes, façade corrections have been applied.

2.2 Air quality monitoring locations

2.2.1 Real time monitoring

Edinburgh currently operates five automated (real-time) monitoring stations, which measure nitrogen dioxide and PM_{10} and a station which measures nitrogen dioxide. One of the locations is a background site located on the outskirts of the city. Four of the sites are roadside locations and one an urban centre. The latter is part of the national network and monitors carbon monoxide, sulphur dioxide and ozone.

The monitoring station which measures benzene and 1-3 butadiene is part of the hydrocarbon national network. Monitoring of the latter pollutant ceased in 2001, due to the concentrations being well below the objective.

West Richmond Street Gardens (Edinburgh St Leonards)
OS Reference 326265 : 673129

The national network site (AURN Edinburgh St Leonards) was located in West Richmond Street Gardens January 2004. Prior to this, the monitoring station was in East Princes Street Gardens. The monitoring site is south of the city centre, located in a small car park of a Medical Centre (GP surgery), surrounded by residential properties and 45 metres from a busy road. It is described as an urban centre.

The following pollutants are monitored:
Nitrogen dioxide, PM_{10}, sulphur dioxide, carbon monoxide and ozone.

Haymarket Terrace
OS Reference 323880 : 673203

The air quality monitoring station at Haymarket Terrace is located in a car parking area of Haymarket Station. The unit is line with the façade of adjacent residential tenement property and is 5.5 metres from the main road. Haymarket Terrace has an Annual Average Daily Traffic Flow (AADT) of approximately 25,000 and a high percentage of bus movements. The site is described as a roadside location and monitoring commenced in 1999.

The following pollutants are monitored:
Nitrogen dioxide and PM_{10}

Queen Street / North Castle Street.
OS Reference 324195 : 674052

The air quality-monitoring unit is situated at North Castle Street at the junction of Queen Street. It is line with the façade of adjacent residential tenement property and is 5.8 metres from the road. Queen Street is the busiest main traffic route through the city centre. The AADT is in excess of 37,000 vehicles and the total percentage of HGVs is 2%. This site is described as a roadside location and monitoring commenced in 1999.

The following pollutants are monitored:
Nitrogen dioxide and PM_{10}

Queen Street / Wemyss Place.
OS Reference 324826 : 674078

The monitoring station at Queen Street/ North Castle Street was relocated at the end of March 2005 to facilitate the Central Edinburgh Traffic Management scheme in the the city centre. The new roadside location is on the northbound carriageway of Queen Street at the junction of Wemyss Place

The unit is in line with the façade of adjacent residential property and is 5.2 metres from the road.

The following pollutants are monitored:
Nitrogen dioxide and PM_{10}

Roseburn Terrace
OS Reference 322939 : 673233

This site was established in July 2003. The air quality-monitoring unit is 7.7 metres from the road and is located in a residential area on a footbridge over the Water of Leith close to traffic lights and residential tenement property. The road (A8) is one of the main traffic routes to the west of the city. The site is described as a roadside location. The current AADT is 25,269 and percentage of HGVs is 12.8%. Monitoring commenced in July 2003.

The following pollutants are monitored:
Nitrogen dioxide and PM_{10}

Gorgie Road
OS Reference 323121 : 672314

The monitoring unit is located in a redundant Police Box which is 2.5 metres from the kerbside and close to a children's play area. The road currently has an AADT of 15969 and 8.2% of HGVs. Adjacent buildings are all tenement type properties, and there are a significant numbers of dwellings at ground to fourth storey level.

The following pollutant is monitored:
Nitrogen dioxide.

Currie High School
OS Reference 317595 : 667908

This site was established in 2004 to monitor background PM_{10} concentrations for the Detailed Assessment report. It is situated in an open location at the rear of Currie High School close to residential property on the outskirts of the city. It is described as a suburban background location.

The following pollutants are monitored:
Nitrogen dioxide, PM_{10}, sulphur dioxide and ozone.

Middle Meadow Walk
OS reference 325717 : 673036

This site was established in 1993 to monitor the hydrocarbons, benzene and 1,3-butadiene. The monitoring station is situated opposite Middle Meadow Walk, 147 metres from Forest Road/Lauriston Place junction. It is described as an urban background site and is part of the Hydrocarbon National Network. Due to low concentrations obtained at this location, 1,3- butadiene monitoring was discontinued in 2002. The method of monitoring for benzene changed to a pumped tube system in 2002.

All real time monitoring locations are shown in appendix 8 map2

2.2.2 Passive diffusion tube monitoring locations

Edinburgh has a well-established network of 51 passive diffusion tube sites located throughout the city, which measure nitrogen dioxide. Four of the locations are part of the UK national survey. Historically, Edinburgh has focused its monitoring regime in narrow congested streets flanked by tenement type residential properties. Therefore, the majority of the passive diffusion tubes have been located to provide the worst-case scenario:

- Close to or at the building facades of residential property.
- Within street canyons.
- At busy road junctions which are close to residential property.
- Locations which have a high percentage of buses.

Passive diffusion tube-monitoring locations are shown in appendix 8 maps 3 to 8

2.3 QC QA proceedures.

All data from continuous real-time analysers has been ratified and screened according to LAQM TG (03) Annex 1 . Quality control (QC) and Quality Assurance (QA) proceedures are detailed in appendix 1A. Data capture % for real-time monitoring is detailed in appendix 2A

QC and QA procedures associated with nitrogen dioxide passive diffusion tube samplers is detailed in appendix 1B. Data capture % for passive diffusion tubes is shown in appendix 2B.

Passive diffusion tube data has been biased corrected in accordance with Box 6.4 LAQM TG (03) using data obtained from the Council's own co located passive diffusion tube study. The monthly passive diffusion tubes in Edinburgh over read real-time analysers by factors of 0.9 to 0.88 (8.7% to 12.7 %). Appendix 3

Kerbside monitoring data has been corrected to the building façade of residential properties. Appendix 4

Roadside and background concentrations have been estimated to year 2010 using the year adjustment calendar v 2.2 a

3.0 Review and assessment of carbon monoxide

Air Quality Objective

Running 8 hour mean of 10 mg/m^3 to be achieved by 31.12.2003

Note: In practice, the running 8-hour mean is equivalent to the maximum daily running 8-hour mean.

Previous reports on the review and assessment of air quality produced by this Council have shown that carbon monoxide meets with the above air quality objective. The target for carbon monoxide is unlikely to be exceeded UK wide.

Monitoring data

Monitoring data, gathered from the AURN at St Leonards is detailed below. Table3.1

Table 3.1. Carbon monoxide concentrations mg/m^3 St Leonards.

St Leonards Urban Centre Year	Running 8 hour mean (Daily max) mg/m^3	Exceedences
2004	1.6	None
2005	1.7	None

Table 3.2 Historical carbon monoxide data from mobile monitoring unit located at Haymarket Terrace and Queen Street/North Castle Street.

Location	Discription	Maximum daily running 8-hour mean concentration mg/m^3	
		Max value for 1997	Monitoring period
Haymarket Terr	Roadside	1.8	08.02.97 - 25.03.97
Queen St	Roadside	0.8	07.06.97 - 08.08.97

The maximum carbon monoxide concentration obtained from UK background pollution maps and estimated to 2006 using the year adjustment calendar is shown in table 3.3

Table 3.3 Maximum city centre modelled background carbon monoxide concentration mg/m^3.

Grid Reference	Max concentration mg/m^3 2001	Max estimated current concentration mg/m^3 2006
N 324500 E 673500 City Centre	0.406	0.26

Monitoring data and modelled background concentrations indicate that there are no exceedences of the air quality objective for carbon monoxide.

Road Traffic

Local authorities are required to undertake further assessment work in areas where the current carbon monoxide background concentration is above 1mg/m^3 and where roads and junctions fall under the LAQM guidance definition of 'very busy'. Road traffic data indicates that there are no roads which exceed 80,000 vehicles per day within Edinburgh.

The current (2006) maximum background concentration for carbon monoxide is less than 1mg/m^3. Predicted concentrations and monitoring data, shows that there is not likely to be an exceedence of carbon monoxide.

Information Source : Scottish Executive (Transport)

Conclusion

There is no requirement to progress to a Detailed Assessment for carbon monoxide.

Updating and Screening Assessment Summary Checklist for **Carbon Monoxide**

Item	Response
A) Monitoring data	Monitoring data for 2004 and 2005 is reported in the carbon monoxide section. Data shows that the objectives will be achieved
B) Very busy roads or junctions in built-up areas	There are no busy roads which fit in to the category specified in LAQM.TG(03) nor junctions where the current background concentration is greater than 1mg/m^3

4.0 Review and assessment of benzene

Air Quality Objectives:

Running annual mean concentration of 16.25 μg/m^3 to be achieved by the end of 2003

Running annual mean concentration of 3.25 μg/m^3 to be achieved by the end of 2010 (SCOTLAND ONLY)

EU Directive limit value:

An annual mean of 5 μg/m^3 to be achieved by 1 January 2010

All previous reports on the review and assessment of air quality produced by this Council have shown that benzene meets with the above air quality objectives. There has been one AQMA declared for this pollutant in the UK.

Monitoring data

Current monitoring data and previous data is shown in table 4.1

Table 4.1 Background benzene concentrations μg/m^3 at Middle Meadow walk.

Middle Meadow Walk Medical School Year	**Benzene μg/m^3**
2005	0.64 P
2004	0.84
2003	0.95
2002	0.91
P = provisional data	

Monitoring data using the pumped tube methodology indicates that there are no annual means greater than 3.35μgm/m^3.

Background benzene concentrations have decreased at this monitoring location.

Road Traffic

Local authorities are required to undertake further assessment work in areas where 'very busy' roads and junctions have been identified and where the 2010 background concentrations are greater than 2μg/m^3 .

Measured background benzene concentrations in Edinburgh are well below 2µg/m^3. Modelled 2010 benzene concentrations obtained from UK background pollution maps indicate that the maximum concentration in Edinburgh is 0.59µg/m^3. There are no roads or junctions which were not included in the previous U&SA, which exceed 80,000 vehicles per day.

Industrial Sources

There are no industrial processes in Edinburgh or industrial processes in neighbouring authorities close to the boundary, which emit benzene.

Information source: Scottish Environment Protection Agency

Petrol Stations.

The round 2 assessment of benzene emissions from petrol stations concluded that there would not be any exceedences of the above objectives. Three petrol stations have closed and there are no new petrol stations operating in Edinburgh. Updated list of Petrol Stations is shown in appendix 6

Information source: Survey undertaken for Round 2 U&SA 2003.

Major Fuel Storage Depots

BP Exploration monitors the impact on the local community of the activities at Dalmeny (Crude Oil Storage Tanks) and Hound Point (Storage and filling facility crude oil). Twelve locations between Edinburgh and West Wemyss on both shores of the forth have been monitored for many years for a number of hydrocarbon species, including benzene. The UKAS accredited National Physical Laboratory undertakes the monitoring and reporting of all results.[2.] The monitoring locations in Edinburgh are listed below:

1 Carlowrie Crescent Dalmeny adjacent to the fuel tanks
2 Whitehouse Park South Queensferry
3 Carmolite Road South Queensferry

The monitoring locations have been selected to provide the worse case public exposure. The monitoring data shows that there are no exceedences of benzene at the aforementioned locations from 1998/99 to 2004/05. Table 4.2

There have been no new major fuel storage depots installations since the previous U&SA.

2 Ambient atmospheric survey for hydrocarbons in the vicinity of Hound Point (Test Report for BP Oil Ltd) Reference 106608/QT03E071. Compiled by the National Physical Laboratory.

Table 4.2 Benzene concentrations µg/m^3 monitored in Edinburgh at Dalmeny and South Queensferry close to major fuel storage depot.

Year	Carlowirie Crescent (µg/m^3)	Whitehouse Road (µg/m^3)	Carmolite Road (µg/m^3)
2004/05	0.98	0.98	0.98
2003/04	1.3	1.3	0.98
2002/03	1.3	1.3	0.98
2001/02	0.65	0.98	0.98
2000/01	0.98	1.63	1.30
1999/00	0.98	1.63	0.98
1998/99	1.62	2.28	1.95

Conclusion

There is no requirement to progress to a Detailed Assessment for benzene.

Updating and Screening Assessment Summary Checklist for **Benzene**

Item	Response
A) Monitoring data outside an AQMA	Monitoring is undertaken on behalf of Defra using a pumped tube method. There are no annual means greater than 3.25$\mu g/m^3$. Previous roadside monitoring data showed that air quality objectives were likely to be achieved. Data is reported in the benzene monitoring section
B) Monitoring data within an AQMA	There is no AQMA for benzene
C) Very busy roads or junctions in built up areas	There are no roads which fall into the 'very busy' criteria. The maximum predicted background concentration is 0.59$\mu g/m^3$ (2010) from the modelled netcen pollution maps. There are no roads which were not previously considered Therefore no further assessment is required.
D) New industrial sources.	There are no new industrial sources of benzene in Edinburgh
E) Industrial sources with substantially increased emissions, or new relevant exposure	There are no industrial sources which emit benzene
F) Petrol stations	There are no residential properties within 10m of pumps. Three petrol stations have closed since the previous U&SA. (Round 2). Petrol station assessment is shown in appendix…
G) Major fuel storage depots (petrol only)	There are no new major fuel (petrol) storage depots operating in Edinburgh, nor in authorities which are close to Edinburgh's boundary. Crude Oil stored at Dalmeny and transported from hound point were assesssed previously and were not a problem. Current and previous monitoring data is detailed in this section.

5.0 Review and assessment of 1,3 –butadiene

Air quality objective:

Maximum running annual mean concentration of 2.25 μg/m^3 to be achieved by the end of 2003

All previous reports on the review and assessment of air quality produced by this Council have shown that 1,3 – butadiene meets with the above air quality objectives. There are no AQMAs declared for this pollutant within the UK.

Monitoring Data

All urban background, centre and roadside monitoring locations in the UK have shown that concentrations of 1, 3 – butadiene are well below the objective of 2.25 μg/m^3.

Monitoring for this pollutant at the National Hydrocarbon Network site (urban background) Middle Meadow Walk Edinburgh ceased in 2002. Previous data collected from the site is shown in the table 5.1

Table 5.1. 1, 3 – butadiene concentrations μg/m^3 monitored at Middle Meadow Walk.

Year	1999	2000	2001
Maximum running annual mean concentration μg/m^3	0.21	0.19	0.20

The maximum annual mean background concentration for Edinburgh was obtained from the UK Air Pollution Map year 2003 and estimated to 2006 using the year adjustment calculator. Table 5.2

Table 5.2 Anual mean background 2003 and current 2006 1, 3- butadiene concentrations μg/m^3 Source UK Air pollution maps.

Annual mean maximum background concentration for 2003 = 0.24 μg/m^3 Estimated current background concentration (2006) = 0.18 μg/m^3

Measured and estimated background data is well within the air quality objective.

Industrial Sources

There are no industrial processes in Edinburgh or close to the city's boundary which emit 1, 3-butadiene. It was anticipated that only those local authorities near major industrial processes, which handle, store or emit this pollutant were likely to exceed the objective.

Information source: Scottish Environment Protection Agency

Conclusion

There is no requirement to progress to a Detailed Assessment for 1, 3 – butadiene.

Updating and Screening Assessment Summary Checklist for **1,3-butadiene**

Item	Response
H) Monitoring data	Monitoring data and modelled estimated background data (Netcen maps) shows that concentrations are well below the air quality objective.
I) New industrial sources.	There are no new industrial sources in Edinburgh nor new sources which are close to Edinburgh's boundary.
J) Industrial sources with substantially increased emissions, or new relevant exposure	There are no industrial sources in Edinburgh nor authorities which are close to the boundary which emit 1.3- butadiene.

6.0 Review and Assessment of Lead.

Air Quality Objectives:

Annual mean concentration of 0.5 μg/m^3 to be achieved by the end of 2004

Annual mean concentration of 0.25 μg/m^3 to be achieved by the end of 2008

All previous reports on the review and assessment of air quality produced by this Council have shown that lead meets with the above air quality objectives.

Atmospheric lead concentrations have decreased significantly over the years, due to the reduction of lead in petrol. Emissions of lead are now restricted to a variety of industrial processes such as battery manufacture, paint pigments, glazing, alloys, radiation shielding, tank lining, and piping.

No industrial sources were identified UK wide as likely to give rise to exceedences of the above air quality objectives in previous rounds of review and assessment work.

Local authorities need to consider new industrial sources and existing industrial sources with substantially increased emissions to fulfil the requirements of this assessment.

Monitoring Data

Studies undertaken by the former Edinburgh District Council Environmental Health Department (now Services for Communities) in 1986 and 1992 demonstrated that levels of lead were below 0.1 μg/m^3 and 0.0023 μg/m^3 respectively.[3]

Industrial Sources

Industrial sources were not identified as been likely to give rise to exceedences of the annual mean objective. Emissions from existing industrial sources have not substantially increased since 2003.

There are no new industrial sources in Edinburgh or new relevant exposure close to existing processes which emit lead. Historical emissions from processes in Edinburgh are shown in table 6.1

Information source: Scottish Environment Protection Agency

3 Environmental Health Committee report R 947 Titled : An Investigation into Atmospheric Lead levels in the City of Edinburgh 1990 – 1991.

Table 6.1 Processes and associated lead emissions per annum in Edinburgh 2003

Site	Process	Emissions per annum
Henshaws Russell Road	Melting of non ferrous metals	39 kgm
United Wire Granton Pk Avenue	Copper and alloy process	70 gm
Edinburgh Art College Lauriston Pl	Lead glass manufacturing	art work (small scale)

Conclusion

There is no requirement for Edinburgh Council to progress to a Detailed Assessment for lead.

Updating and Screening Assessment Summary Checklist for **Lead**

Item	**Response**
K) Monitoring data	There is no new monitoring data which has been gathered since the previous review and assessment.
L) New industrial sources.	There are no new industrial sources in Edinburgh or authorities that are close to the boundary which emit lead.
M) Industrial sources with substantially increased emissions, or new relevant exposure	There are no sources which have substantially increased emissions or no new relevant exposure since Round 2 of the Review and Assessment process.

7.0 Review and Assessment of nitrogen dioxide

Air Quality objectives:

Annual mean concentration of 40 μg/m^3 to be achieved by the end of 2005

1 hour mean concentration of 200 μg/m^3 not to be exceeded more than 18 times per year to be achieved by the end of 2005

EU Directive limit values:

Annual mean concentration of 40 μg/m^3 to be achieved by the 1 January 2010

1 hour mean concentration of 200 μg/m^3 not to be exceeded more than 18 times per year to be achieved by the 1 January 2010

The annual mean nitrogen dioxide concentration is exceeded at a number of locations within the city centre. The exceedences are due to traffic related sources of oxides of nitrogen. Four locations within the AQMA. are predicted to fail the EU annual limit value.

This Department is currently seeking approval to declare a further AQMA at St Johns Road /Clermiston junction and is in the process of undertaking a Detailed Assessment at West Port and Gt Junction Street to ascertain if further AQMAs will be necessary.

168 AQMAs have been declared for nitrogen dioxide within the UK, most are for traffic related sources.

Monitoring Data

Monitoring Data outside an AQMA

Continuious chemiluminescent monitoring (realtime)

Two locations outside the AQMA monitor nitrogen dioxide using chemiluminescent detection method.

Corrected data gathered from locations outside the AQMA is shown in table 7.1

Table 7.1 Nitrogen dioxide real time monitoring concentrations µg/m^3 outside an AQMA

Location	2004	2005
St Leonards AURN UC		
Mean µ/m^3	25	25
Number of exceedences	0	0
Currie B		
Mean µ/m^3	10	12
Number of exceedences	0	0
Key		
UC= Urban centre B= Background		

Passive diffusion tube data

A number of passive diffusion tube samplers are located outside the AQMA. The monitoring locations reflect the worst-case scenarios as detailed in Chapter 2.2.

Corrected monitoring data outside the AQMA is shown in tables 7.2 and 7.3

Table 7.2 Passive diffusion tube nitrogen dioxide concentrations (µg/m^3) outside the AQMA

Location	ID	Site Description	2003	2004	2005	2010 estimate
West Port	**28**	Roadside	46	43	46	39
Easter Road	**25**	Roadside Canyon	43	40	41**	35
Bernard St Leith	**29**	Roadside	42	40	37	31
Bernard St Leith	**29a**	Roadside Canyon	-	36	36	30
Bernard St Leith	**29b**	Roadside	-	40	36	30
Gt Junction St	**30**	Roadside Canyon	40	43	39	33
Broughton Road	**43**	Roadside	-	35	35	29
Broughton St	**44**	Roadside Canyon	-	31	30	25
Pier Place	**12**	Roadside	32	31	28	24

Location	ID	Site Description	2003	2004	2005	2010 estimate
Trinity Crescent	**14**	Roadside	36	32	32	27
Commercial St 11	**7**	Roadside	32	34	31	26
Commercial St 78	**9**	Roadside	39	34	39	32
Glasgow Rd 9	**15**	Kerbside	39	34	35	29
Glasgow Rd 68	**16**	Roadside	36	32	31	26
Grassmarket	**37**	Kerbside	29	33	31	26
Morningside Rd	**8**	Kerbside Canyon	37	34	34	28
Home St Tollcross	**10**	Roadside Canyon	34	33	30	25
Deanhaugh St	**13**	Roadside	32	32	36	30
Calder Rd	**4**	Kerbside	28	22	23	19
Hope Park Terr	**17**	Roadside Canyon	32	29	35	29
Dalkeith Rd	**31**	Roadside Canyon	31	30	27	23
Dundas St	**35**	Kerbside	31	30	30	25
Niddrie Mains Rd	**32**	Kerbside	23	23	23	20
Lanark Rd	**11**	Kerbside	23	22	20	17
Baileyfield Rd Portobello	**19**	Roadside	22	21	21	17
Melville Dr	**38**	Roadside	23	22	22	19
India St	**34**	Kerbside	20	20	22	19
Hillhouse Rd*	**40**	Roadside	33	37	35	30

Location	ID	Site Description	2003	2004	2005	2010 estimate
Hillview Terr*	**41**	Urban Background	18	16	16	14
MidmarDrive*	**42**	Urban Background	17	15	18	15
Air Quality Objective = 40 µg/m^3						
*** National network site**						
**** less than 75% of data available.**						
Values shown in red indicate that an exceedence is likely						

The Progress Report 2004 identified that a Detailed Assessment was required for West Port and Gt Junction Street.

The passive diffusion data for the year 2005 shows that Easter Road exceeds the annual average objective. However, less than 67% of available data was available from Easter Road. Monitoring will continue at this location using additional passive diffusion tubes since this location is considered borderline.

Table 7.3 Passive diffusion tube nitrogen dioxide concentrations (µg/m^3) St Johns Road/ Clermiston Road junction

Site	Tube No	ID	2003	2004	2005	2010
St Johns Rd (East bound)	**1/1x**	**1**	44	43	48	41
St Johns Rd (East bound)	**1A****	**39**	34	32	33	28
St Johns Rd (East bound)	**1b**	**1b**	37*	41	59	49
St Johns Rd (Westbound)	**1c/1d**	**1c**	67*	69	78	66
St Johns Rd (Westbound)	**1e**	**1e**	67*	71	74	62
St Johns Rd (Westbound)	**32**	**1d**	69*	76	72	61
St Johns Rd (Westbound)	**35/35a**	**1f**		68	90	76
AIR QUALITY OBJECTIVE = 40 µg/m^3						
* Data 2003/2004 reported in DA						
** National network tube						
Values shown in red indicate that an exceedence in likely						

Nitrogen dioxide concentrations at St Johns Road still continue to exceed the air quality objective and current values are predicted to exceed the EU limit value apart from location ID 39.

Following internal consultation, it is the Council's intention to declare a second AQMA for this area. This is currently being progressed.

Monitoring data within an AQMA

Continuous (chemiluminescent) monitoring data

The data which has been gathered from the continuous monitoring locations within the AQMA meets the annual average objective. Table 7.4

Table 7.4 Nitrogen dioxide concentrations (µg/m^3) automated sites 1999 to 2005

Location	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Gorgie R							
Mean µ/m^3	42	38	40	38	39	37	34
Number of exceedences	0	0	0*	0	0	0	0
Haymarket R							
Mean µ/m^3	38	37	42	42	41	37	38
Number of exceedences	0	0	10	0	0	0	0
Queen St/ North Castle R							
Mean µ/m^3	42	38	39	44	41	37	35**
Number of exceedences	0	0	6	0	0	0	0
Queen St/ Wemyss Pl R	Site relocated from North Castle St to Wemyss Pl						
Mean µ/m^3	Monitoring commenced 08/04/05						31***
Number of exceedences							0
Roseburn R	**Site started 18.07.03**						
Mean µ/m^3					32	33	32
Number of exceedences					0	0	0

* Analyser fault during December 2001 when exceedences occurred

** < 3 months of ratified data 01/01/05 to 14/03/05

*** gathered data from 08/04/05 to 31/12/05 88.6% data capture

R = roadside , UC = Urban Centre , B = Background

Passive diffusion tube data

Passive diffusion tube locations within the AQMA continue to show exceedences. The exceedences are in canyon locations close to busy junctions, where residential properties are within 2 to 3 metres of the road edge. Table 7.5

Table 7.5. Annual passive diffusion tube nitrogen dioxide concentrations (µg/m^3) within the AQMA

Location	ID	Site Description	2003	2004	2005	2010
West Maitland St/ Palmerston Pl	**2**	Kerbside/jun canyon	70	69	77	65
Princes St	**24**	Kerbside	63	64	63	53
Torphichen Pl*	**3**	Kerbside canyon	60	68*	83	70
Roseburn Terr/St	**22**	Kerbside/jun canyon	58	73	69	58
North Bridge (N bound)	**27**	Roadside/ Canyon	58	54	45	38
North Bridge (S bound)	**26**	Roadside/ canyon	54	48	45	38
Gorgie Rd/ Murieston Rd	**5**	Kerbside/jun	50	42	48	40
Gorgie Rd	**18**	Roadside	46	43	43	36
Roseburn Terr	**23**	Kerbside/ canyon	44	38	46	39
Leith Walk/MacDonald Rd	**20**	Kerbside/jun	36	38	39	33
Leith Walk/Brunswick Rd	**21**	Kerbside/jun	39	38	36	30
Queen St/Fredrick St	**33**	Kerbside/jun	39	40	40	33
Queen St/York Pl	**36**	Kerbside	39	38	41	34
Ardmillian Terr	**6**	Kerbside	32	35	33	27

AIR QUALITY OBJECTIVE = 40 µg/m^3

Values shown in red indicate that an exceedence is likely

*** Scaffolding erected at monitoring location**

The following locations are also likely to exceed the annual mean EU limit value:

West Maitland Street / Palmerston Place
Torphichen Place
Princes Street
Roseburn Terrace/Street junction

Data Trends

At established locations (where a minimum of 6 years monitoring data has been collected) annual mean nitrogen dioxide concentrations have been plotted for successive years. Trend lines for each of the locations have been drawn using the simple regression statistical program in excel.

Data trends outside the AQMA

All monitoring locations outside the AQMA show a downward trend of the annual mean nitrogen dioxide concentration, although the city centre location at Dundas Street is less marked.. Figures 1 to 8

Fig1 Annual mean nitrogen dioxide trend Grassmarket (passive diffusion tube data µg/m^3)

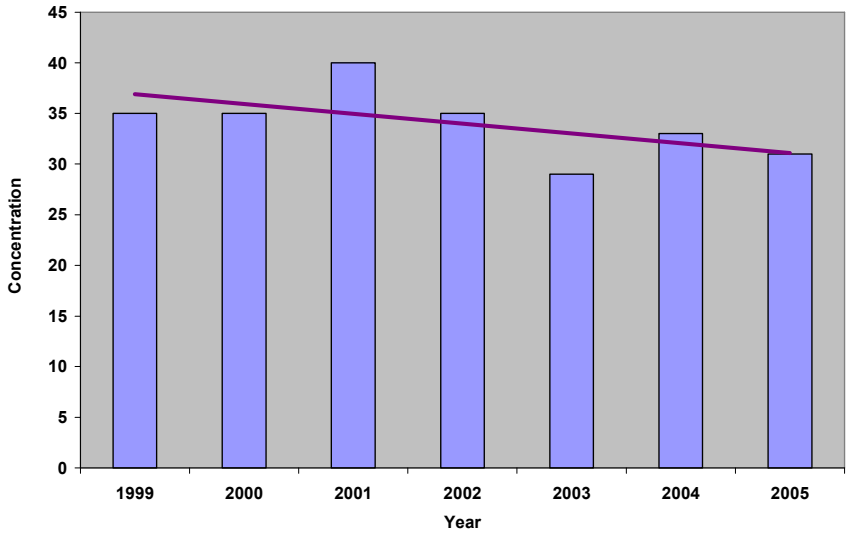


Fig 2 Annual mean nitrogen dioxide trend Morningside Road (passive diffusion tube data µg/m^3)

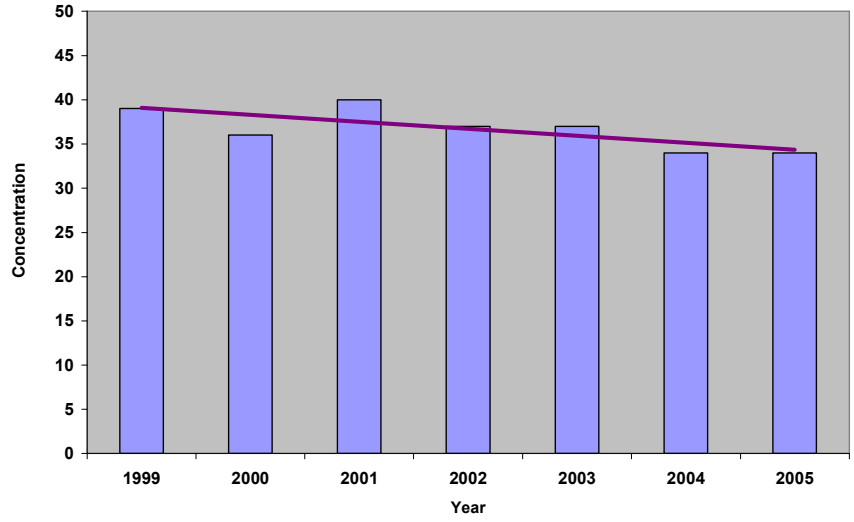


Fig 3 Annual mean nitrogen dioxide trend Home Street (passive diffusion tube data µg/m^3)

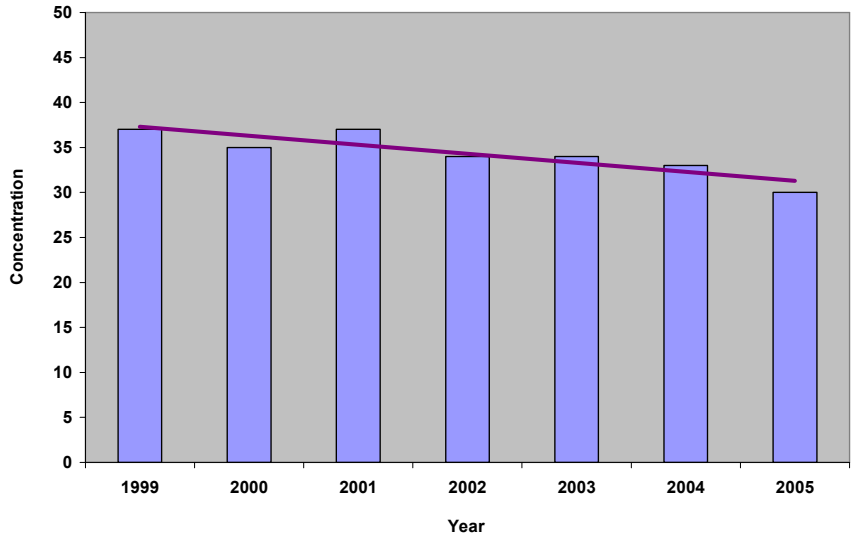


Fig 4 Annual mean nitrogen dioxide trend Deanhaugh Street (passive diffusion tube data µg/m^3)

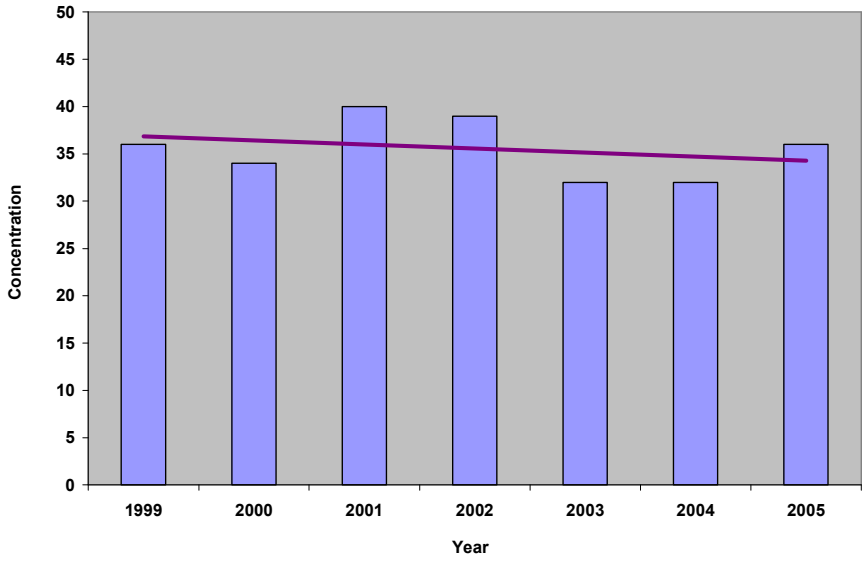


Fig 5 Annual mean nitrogen dioxide trend Calder Road (passive diffusion tube data µg/m^3)

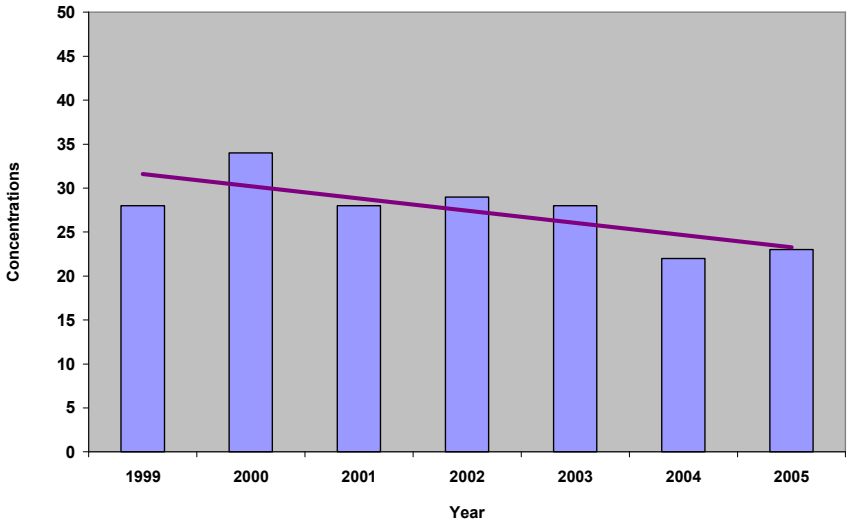


Fig 6 Annual mean nitrogen dioxide trend Hope Park Terrace (passive diffusion tube dataµg/m^3)

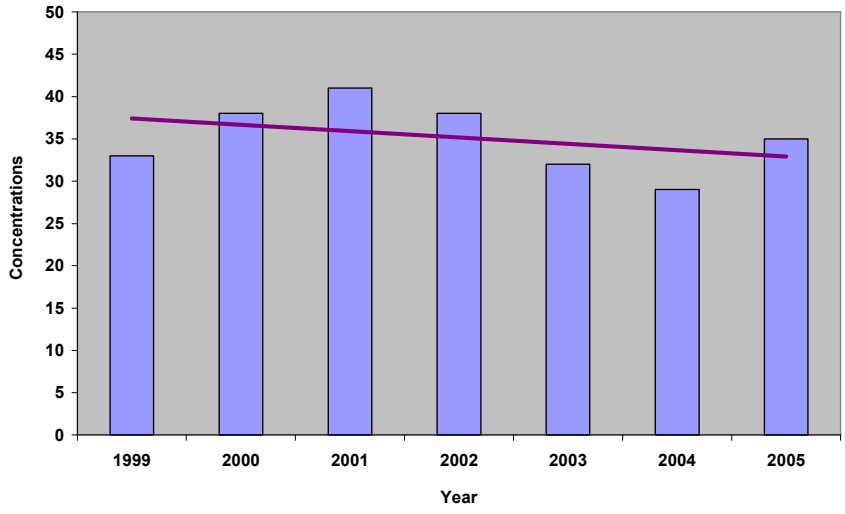


Fig 7 Annual mean nitrogen dioxide trend Dundas Street (passive diffusion tube data µg/m^3)

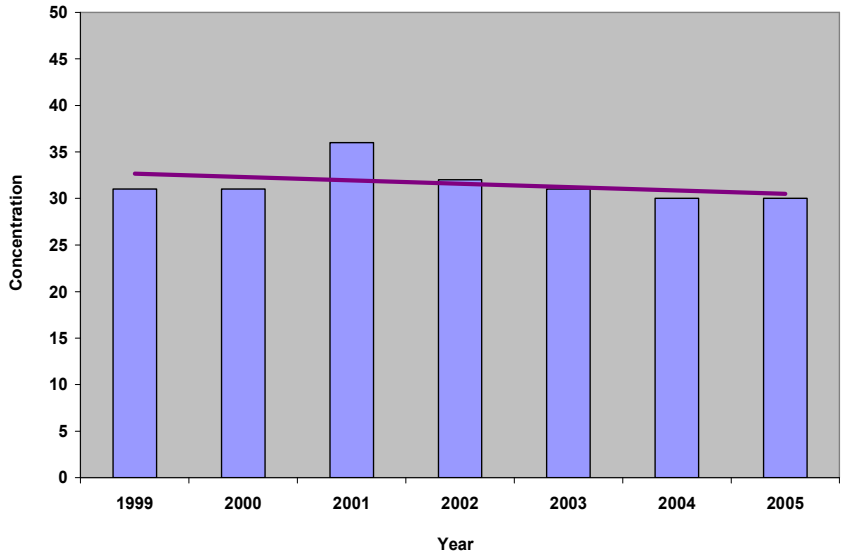
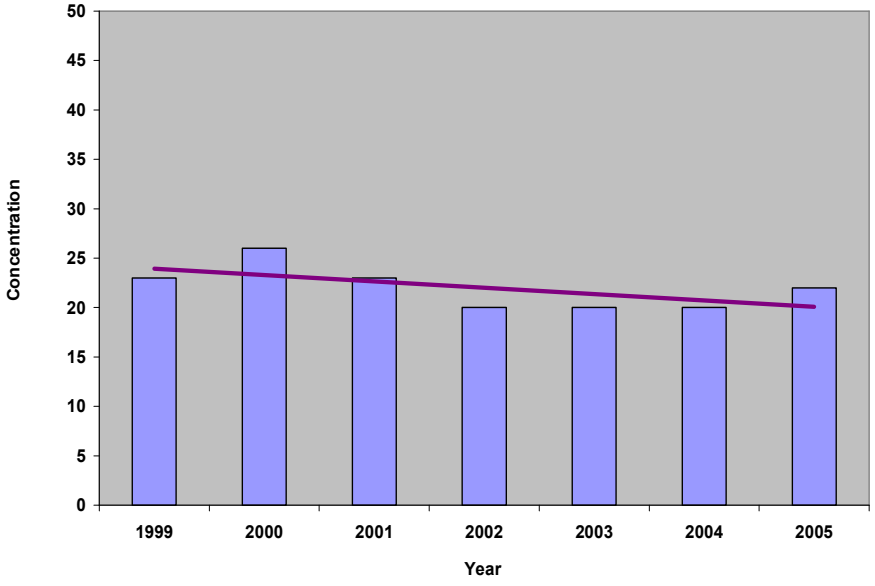


Fig 8 Annual mean nitrogen dioxide trend India Street (passive diffusion tube dataµg/m^3)



Data trends within the AQMA

Annual mean nitrogen dioxide concentrations measured within the AQMA appear to be increasing at West Maitland Street, Princes Street, Roseburn Terrace and York Place (Queen Street). Although the latter location is less marked. Gorgie / Murieston junction and Haymarket have remained the same. A downward trend in nitrogen dioxide concentrations is apparent at, Queen Street / Frederick Street junction, Leith Walk, Gorgie Road /White Park and North Bridge. Figures 9 to 18.

Fig 9 Annual mean nitrogen dioxide trend West Maitland Street (passive diffusion tube data µg/m^3)

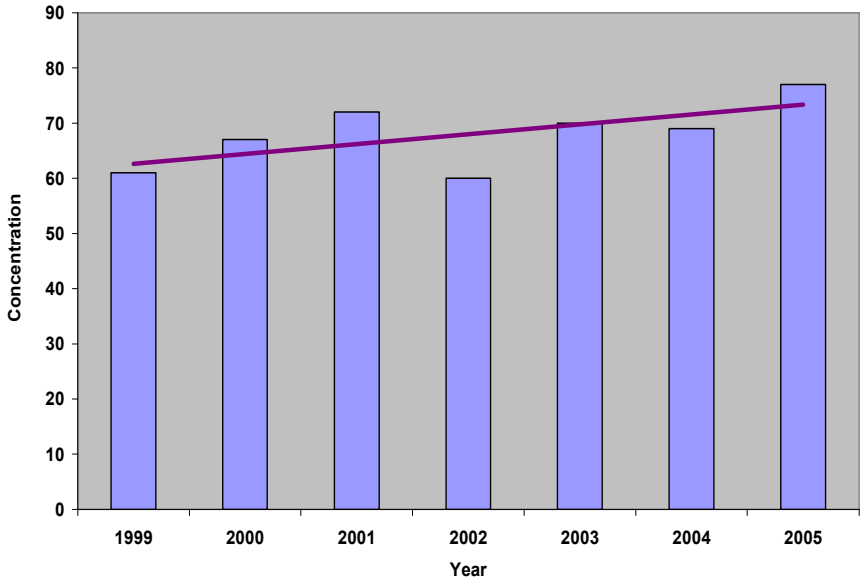


Fig 10 Annual mean nitrogen dioxide trend Princes Street (passive diffusion tube dataμg/m^3)

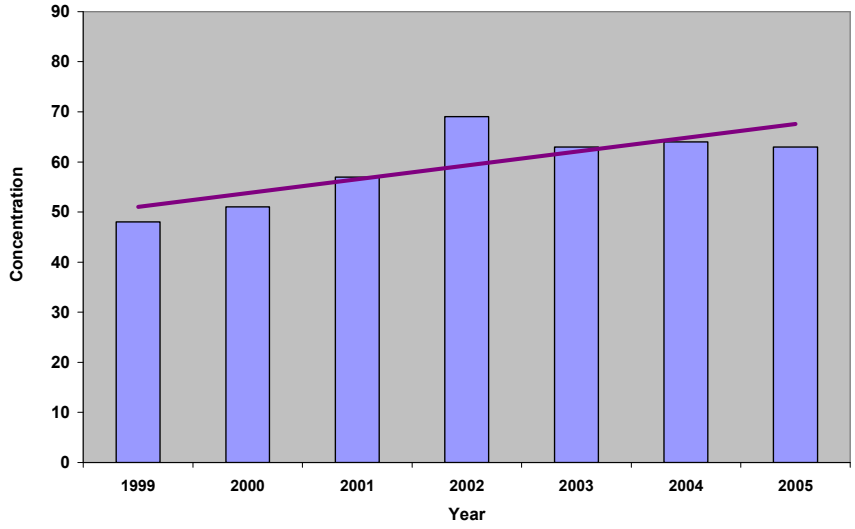


Fig11 Annual mean nitrogen dioxide trend Roseburn Terrace (passive diffusion tube data μg/m^3)

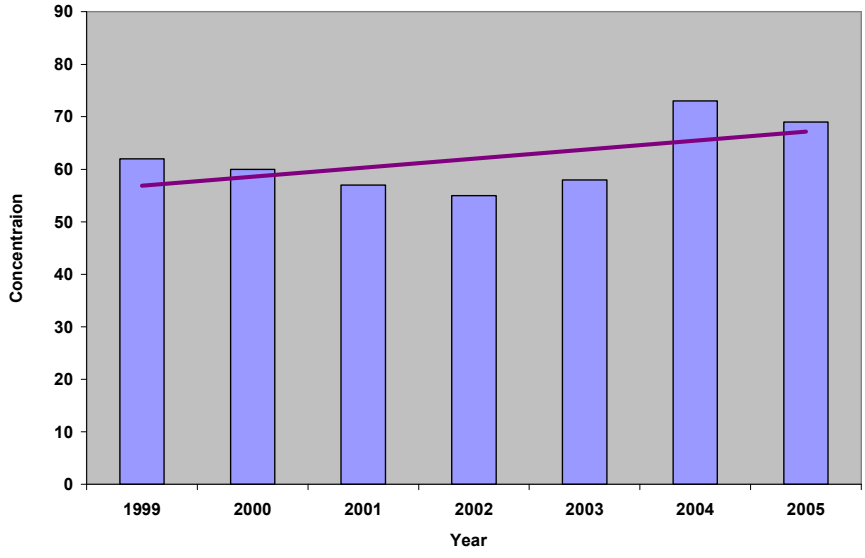


Fig 12 Annual mean nitrogen dioxide trend Gorgie Road Murieston Road junction (passive diffusion tube data µg/m^3)

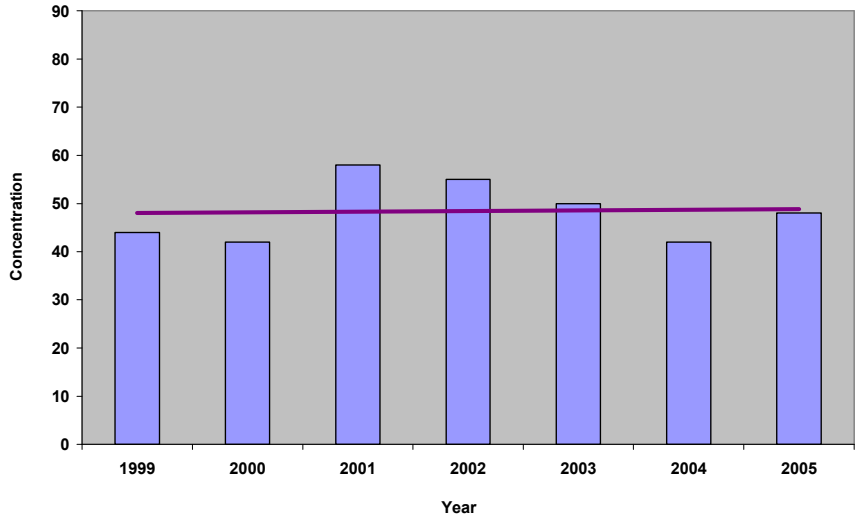


Fig 13 Annual mean nitrogen dioxide trend Queen Street (passive diffusion tube data µg/m^3)

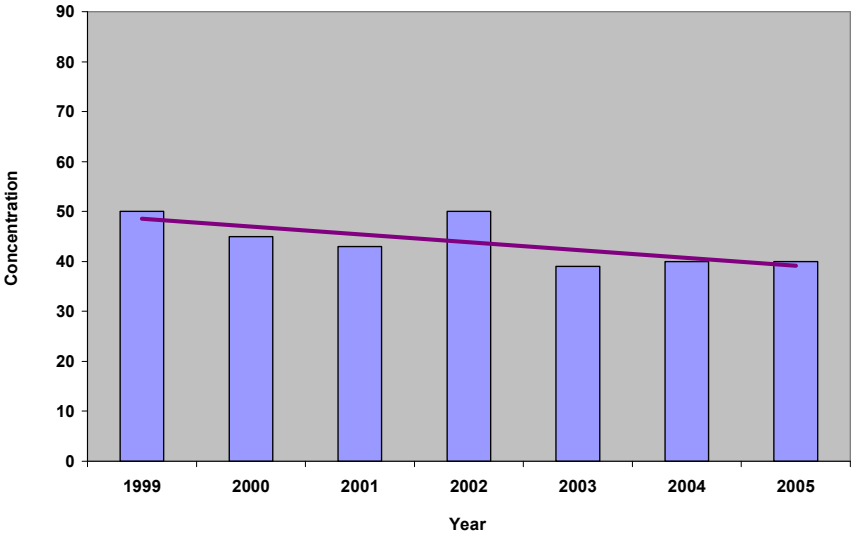


Fig 14 Annual mean nitrogen dioxide trend North Bridge (passive diffusion tube data µg/m^3)

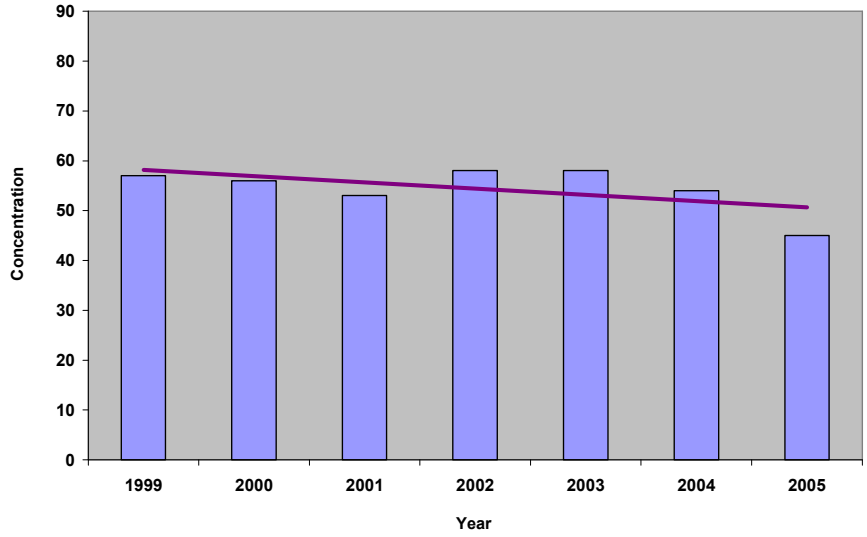


Fig 15 Annual mean nitrogen dioxide trend York Place (passive diffusion tube data µg/m^3)

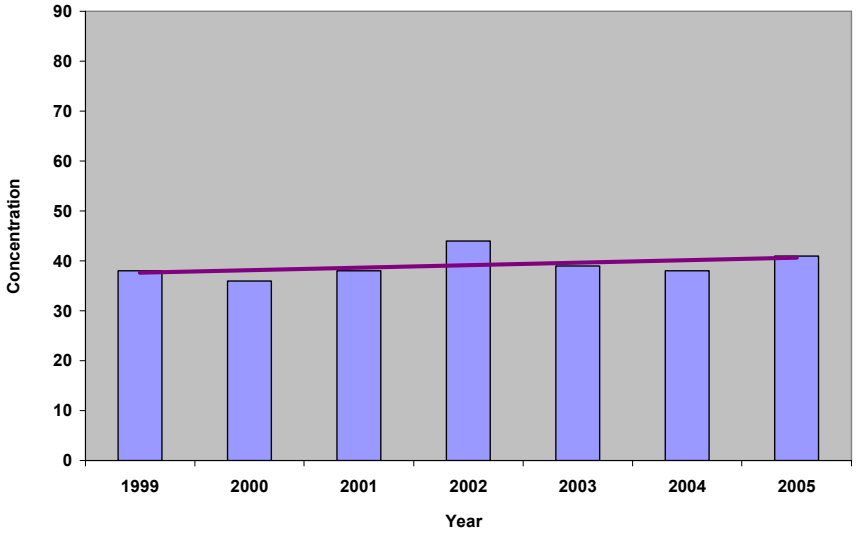


Fig 16 Annual mean nitrogen dioxide trend Leith Walk (passive diffusion tube data µg/m^3)

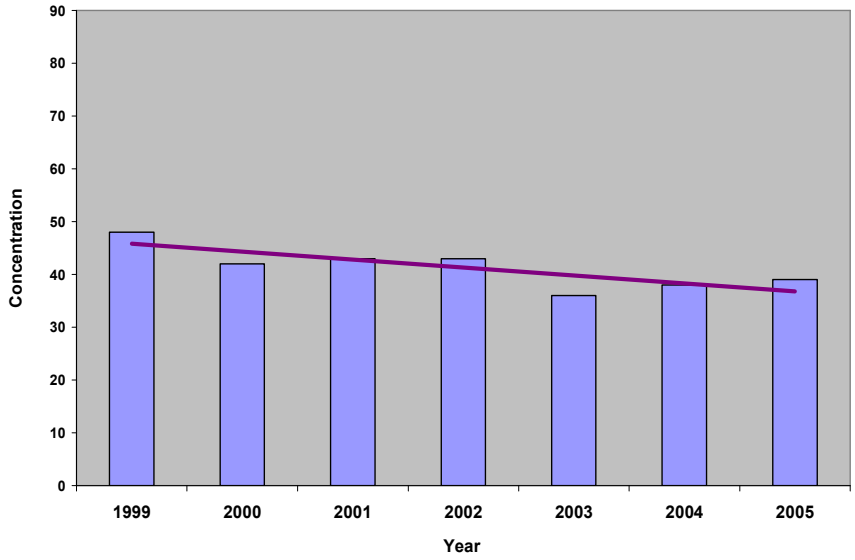


Fig 17 Annual average nitrogen dioxide trend Haymarket (real-time data µg/m^3)

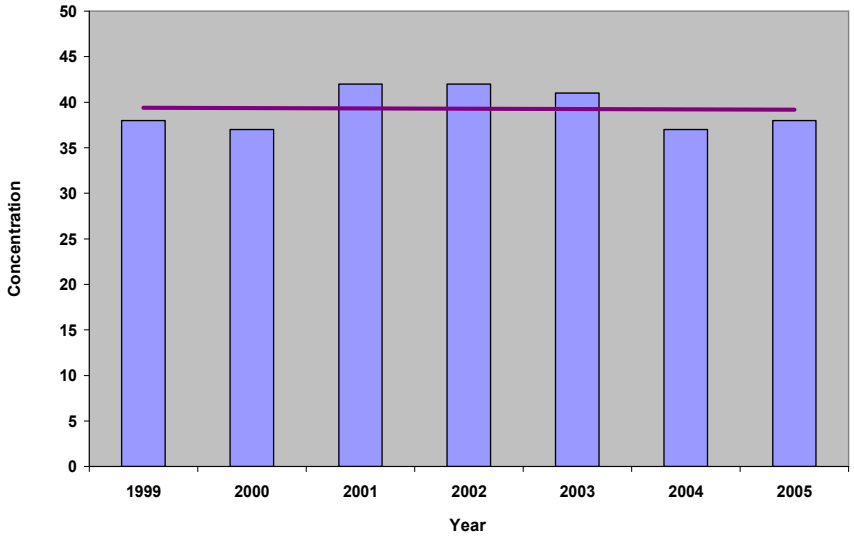
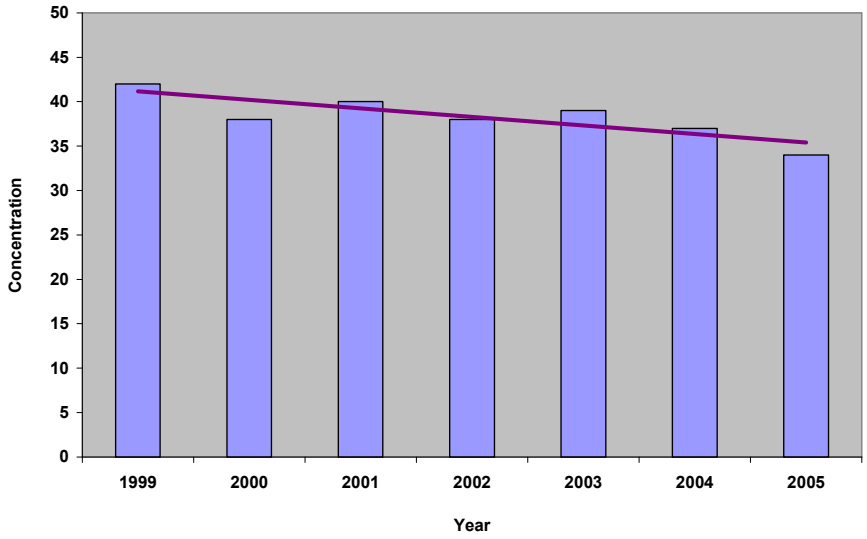


Fig 18 Annual average trend Gorgie Road /White Park (real-time data µg/m^3



Roads with significantly changed traffic flows, or new relevant exposure

Traffic flows in the city centre core have stabilised according to Council Transport Officials. Traffic data gathered from existing sites supports this i.e. there have been no notable increases since 2003. Tables 7.6 and 7.7.

Table 7.6 Annual average daily traffic flows in the AQMA.

Location	2003 AADT	2004 AADT	2005 AADT
Gorgie	16761	16791	15969
Haymarket	24049		
Roseburn	25140	25890	25269
West Maitland St	20728	21865	20785
Leith Walk	26691	26992	26137

Table 7.7 Annual average daily traffic flows at city centre locations.

Location	2002	2005
A8 Gogar Mount	47044	46378
A70 Lanark Road	16977	17335
A90 Barnton	43791	43466

City of Edinburgh City Council (Transport) are in the process of installing additional traffic monitoring sites through out the city on non trunk roads to gather further information on city centre traffic.

Information Source : City Development (Transport) City of Edinburgh Council

Bus Station

The second round of review and assessment concluded that the number of bus movements at St Andrews Square Bus Station would not result in an exceedence of the air quality objectives.
Since the last review and assessment, the number of bus movements including arrivals and departures has decreased from 600 to 560 per weekday.

560 Monday to Friday (daily mean)

470 Saturday

242 Sunday

30 Coach tours.

The bus station in Edinburgh is already within the existing AQMA. Measures in the Action Plan aim to work towards establishing a cleaner bus fleet which will improve the emissions of NO_x at this location.

Information source: Manager St Andrews Bus Station.

Industrial sources

No significant point sources were identified from previous rounds of review and assessment work as being likely to give rise to an exceedence of nitrogen dioxide.

There are no new industrial sources in Edinburgh or sources, which are close to the city's boundary, which emit oxides of nitrogen. Since the previous round, there are also no industrial sources with substantially increased emissions or new relevant exposure.

Information source: Technical Guidance document TG (03) Annex 2, Scottish Environment Protection Agency, Local knowledge.

Aircraft

The previous review and assessment round (2) did not identify likely exceedences from aircraft emissions.

The airport in Edinburgh is adjacent to the A8 Glasgow Road, which currently has a traffic flow of 46,633 AADT (Gogar Mount). The number of airline passengers has increased since the previous round from 5.6 to 8.48 million passengers per annum (mppa) and further growth is expected. Table 7.6

Table 7.6 Aircraft assessment

Year	2005	2002
Passenger throughput mppa	8.48	5.6
Freight lifted (Thousand tonnes)	31,868	18,280
The nearest relevant receptor from the airport boundary	48 metres (Castle Gogar)	

Monitoring

Since the previous U&SA, further monitoring within and around the airport boundary using NO_2 passive diffusion tubes, has been undertaken by AEA Technology (Netcen) [4]. The monitoring period was between November 2003 and June 2004. Data has been 'bias corrected' and an annual mean estimated from the short-term data set, in accordance with LAQM (TG3). Values ranged from 10µg/m^3 to 47µg/m^3. The value at the south boundary wall adjacent to Castle Gogar was 14 µg/m^3. This is the closest relevant receptor to the airport boundary. The highest values were at the coach park entrance 47µg/m^3 and the Internal Arrival building 43 µg/m^3. The remaining monitoring locations all meet with the annual target. Table 7.7

Both of the areas, which fail, are considered not to be relevant locations in terms of public exposure, i.e. the public would need to be present at those locations regularly and for the majority of each day.

Current (2005) concentrations of nitrogen dioxide monitored on the A8 Glasgow Road are 35 and 31µg/m^3.

Table 7.7 Nitrogen dioxide concentrations monitored within and outside the airport boundary

Location	Estimated 2003 mean (based on 2003/04 monitoring data)µg/m^3
Coach Park Entrance	47
Terminal Internal arrivals	43
Term Rd Trans 1*	28
Term Rd Trans 2*	22
Term Rd Trans 3	39
Term Rd Trans 4*	19
Term Rd Trans 5*	17
24 Approach*	28
Aviagen c/p*	30
Lockend Rd west of *	25
Lockend Rd east of	21
Lockend Rd cottages*	28
Fire Training area	21
Fuel Farm	27
Head of Stand 10	34
Main Short Stay car park*	29
G.A.T Terminal	19
CPl*	35
Gogar Castle	14
Crash Gate D	14
Runway 06 approach	21
Farm east of Gogar C*	21
Annual air quality target = 40µg/m^3 * three month study	

Map detailing monitoring locations is contained in appendix 8 map 9

Expansion of Edinburgh Airport

BAA has published a draft master plan for the expansion of Edinburgh Airport. There is a proposal for a new parallel runway to the North by 2030, a new M8 link road and eastern access road.

Studies, which have been undertaken with respect to the future expansion of Edinburgh Airport, have concluded that emissions associated with aircraft movement and increased surface traffic would not exceed air quality targets outside the airport boundary [5].

This Department has concerns in relation to the increased surface traffic. Under the Regional Air Services Case Studies (RASCO) report, major road congestion and traffic flow problems were anticipated [6]. Congestion of the network resulting in slow moving traffic is likely to have an adverse impact on air quality, especially along the A8 corridor at St Johns Road. This area exceeds the air quality target for nitrogen dioxide. Development which is proposed for the west of Edinburgh is likely to generate additional surface traffic. Therefore, further air quality assessment work will be required in the areas of concern.

Conclusion

The annual mean nitrogen dioxide air quality objective is likely to exceed at West Port and Gt Junction Street outside the existing AQMA.

A Detailed Assessment is being undertaken for both the above locations

Easter Road is borderline with respect to meeting the annual mean air quality objective. The concentration for 2005 is 41µg/m^3. However, data capture at this location was less than 67%. Further monitoring using passive diffusion tubes will be undertaken in Easter Road.

St Johns Road continues to exceed the annual air quality objective. An AQMA will be declared for this area of concern and real-time monitoring is currently being progressed.

Monitoring data within the AQMA continues to exceed the annual air quality objective and is likely to exceed the EU limit values at a number of locations. Therefore the Council concludes that the current AQMA is still valid.

4 Air quality monitoring at Aberdeen, Glasgow and Edinburgh Aiports – 2003/04. AEAT/ENV/Issue1 August 2004

5 Edinburgh and Glasgow Airport Study Regional Air Services- (Study 3 Part B – Air Quality Modelling for Scotland contained in Appendix E Air Quality Report) Arup Transport Planning.

Produced for the Department for Transport, Local Government and the Regions (DTLR)

6 The future development of air transport in the United Kingdom:Scotland. Summary Document for Transport. July 2002.

Updating and Screening Assessment Summary Checklist for **Nitrogen Dioxide**

Item	Response
N) Monitoring data outside an AQMA	Monitoring data using passive diffusion tubes has demonstrated that there are likely to be exceedences at a number of locations outside the AQMA. Progress Report 2005 concluded that a Detailed Assessment for possible exceedences of the annual average objective would be required at Gt Junction Street and West Port. Easter Road is considered borderline. However data capture was less than 67%. Additional passive diffusion tubes will be established at this location.
O) Monitoring data within an AQMA	Monitoring data continues to show that the annual nitrogen dioxide concentrations are likely to be exceeded at a number of locations. Concentrations estimated to 2010 indicate that 4 locations will fail the EU limit value.
P) Narrow congested streets with residential properties close to the kerb	The passive diffusion tube network covers streets which fall within this criteria. Futher monitoring using passive diffusion tubes has commenced at Ferry Road using passive diffusion tubes due to increased development at Granton and along the waterfront. Monitoring was undertaken in the Cowgate which was discontinued in 2000 as this area was considered to meet with the targets. This area is currently undergoing further development and therefore it is considered prudent to resume monitoring.
Q) Junctions.	Considered and included in previous round. Monitoring is being continued
R) Busy streets where people may spend 1-hour or more close to traffic	Considered and included in previous round. Monitoring is being continued
S) Roads with high flow of buses and/or HGVs.	All current roads have been considered. Monitoring in Edinburgh is focused in areas where there is a high flow of buses and on main routes with a high flow of HGVs where residential properties are close to the roadside.
T) New roads constructed or proposed since the previous round of R&A	There are no new roads proposed since the last round of review and assessment.
U) Roads with significantly changed traffic flows, or new relevant exposure	There are no roads in Edinburgh with significantly changed traffic flows or new relevant exposure.
V) Bus Stations	St Andrews Bus Station is located in the city centre AQMA. The number of bus movements have decreased since Round 2 from 600 to 560

	(weekday daily mean)
W) New industrial sources.	There are no new industrial sources in Edinburgh or industrial sources close to the city boundary since the previous U&SA (Round 2).
X) Industrial sources with substantially increased emissions, or new relevant exposure	The previous review (round 2) did not indentify any industrial sources which would contribute significantly to nitogen oxide emissions
Y) Aircraft	Monitoring within and at the airport boundary 2003/04 (2003 estimated annual) showed that the annual air quality objective for nitrogen dioxide is likely to be exceeded at the entrance to the coach park and at the terminal building at the roadside. However, both these locations are considered not to be relevant in terms of public exposure . i.e the public would require to be exposed daily over a period of 1year.

8.0 Review and assessment of sulphur dioxide

Air quality objectives:

15 minute mean of 266 μg/m^3 not to be exceeded more than 35 times a year by 2005

1-hr mean of 350 μg/m^3 not to be exceeded more than 24 times a year by 2004

24-hr mean of 125 μg/m^3 not to be exceeded more than 3 times a year by 2004

Previous reports on the review and assessment of air quality produced by this Council have shown that sulphur dioxide meets with the above air quality objectives.

National and local studies indicate that exceedences of the 15 - minute objective may occur in relation to the following sources:

Large coal burning boilers,
Small boilers burning coal/fuel oil 5MW $_{thermal}$
Areas of domestic coal burning.
Shipping movements at major ports.
Railway locomotives

There have been 12 AQMAs declared for this pollutant.within the UK.

Monitoring data

All monitoring data which has been gathered meets with the air quality objectives.Table 8.1

Table 8.1 Sulphur dioxide concentrations μg/m^3 at monitoring locations in Edinburgh.

Site	Monitoring Year	Number of exceedences 15 minute mean	Number of exceedences 1-hr mean	Number of exceedences 24-hr mean
St Leonards **UC**	2004	2	0	0
	2005	0	0	0
Currie **B**	2004	0	0	0
	2005	0	0	0
UC = Urban centre B= Background				

Industrial Sources

The last round of review and assessment did not identify any major industrial sources, which would have a significant impact in terms of exceeding the air quality objectives for sulphur dioxide.

The coal fired station at Cockenzie Prestonpans East Lothian which is 16 Km from the city centre (Princes St) is considered by SEPA not to influence SO_2 concentrations in Edinburgh. This information is based on environmental monitoring at Longniddry and modelling work which has been undertaken by Scottish Power.

There are no new industrial sources or existing industrial sources with substantial increased emissions in Edinburgh or in neighbouring authorities, which are close to the city boundary. Since the last round of review and assessment, new areas of relevant exposure have not been identified.

Information source: Scottish Environment Protection Agengy, local knowledge.

Areas of domestic coal burning

There are no areas in Edinburgh where significant coal burning takes place. The city of Edinburgh has been designated a smoke control area since 1996.

Information source : Local knowledge

Small boilers (> 5MW $_{\text{thermal}}$)

Premises which were assessed (Universities, hospitals, Scottish Courage Brewery, Commonwealth Pool) for the last review and assessment were not considered to give rise to an exceedence of the 15- minute air quality objective due to boilers in this range being gas fired with no or negligible downtime when fuel oil is used.

Regulations limiting the sulphur content of fuel oil to less than 1% 1 January 2003 mean that sources burning fuel oil are unlikely to be significant.

According to records there are no new premises which have applied for burning waste oil.

Information source: Scottish Environment Protection Agency.

Shipping

Sulphur dioxide emissions from shipping were not considered to be significant for the previous round of review and assessment work (round 2)

Further assessment work is required if shipping movements exceed 5,000 movements a year.

The number of shipping movements has decreased in the vicinity of Leith Docks since the last round from 1416 in 2002 to 1322 in 2005. Therefore further assessment work is not required.

Information Source: Harbour Master Forth Outer.

Railway Locomotives.

The second round of review and assessment concluded that idling railway locomotives at Craigentinny Maintenance Depot would not cause an exceedence of the 15- minute objective.

The previous review, identified that Virgin Voyager trains could not be linked to an electricity supply during cleaning and maintenance work. Shoring of trains avoids wastage of fuel and subsequently reduces emissions. The fleet were in the process of being adapted to use a shoring mechanism by the year 2005.

The current position is that twenty-four of the seventy-eight trains will have been adapted to use an electricity supply by the end of May 2006. The remainder of the fleet should be adapted by August 2006. The delay was due to a technical fault in the design of the new system.

The existing (GNER) fleet is to under go a programme of engine replacement. Current engines are thirty years old, the new MTU (German engine system) reduce fuel consumption by 15%. This will serve to improve levels of emissions in this area.

GNER are now EMS ISO 14001 approved. This entails a commitment to continuous improvement and environmental monitoring.

Scientifics Ltd has undertaken short term monitoring for nitrogen dioxide and PM_{10} since 1996 at the request of GNER. The monitoring locations are at the southern boundary, close to residential property. There are no current exceedences of either of these pollutants when compared to their respective objectives[6]. To fulfil their commitment to environmental improvement GNER are proposing to commission a programme of sulphur dioxide monitoring.

Information source : Health and Safety Manager, Craigentinny Depot, Great Northern Eastern Railway (GNER)

Conclusion

There is no requirement to progress to a Detailed Assessment for sulphur dioxide.

6 Report on environmental survey to determine the ambient concentrations of PM_{10} and nitrogen dioxide. July 2002 Ref EKF01774 . Produced by Scientifics Ltd East Kilbride Glasgow

Updating and Screening Assessment Summary Checklist for **Sulphur Dioxide**

Item	Response
Z) Monitoring data outside an AQMA	Data which has been gathered meets with objectives.
AA) Monitoring data within an AQMA	There is no AQMA for this pollutant in Edinburgh
BB) New industrial sources.	According to SEPA there are no new industrial sources in Edinburgh or at the city boundary which emit $S0_2$
CC) Industrial sources with substantially increased emissions, or new relevant exposure	The last review did not indentify any industrial sources which would contribute significantly to SO_2 emissions
DD) Areas of domestic coal burning	The city of Edinburgh has been a designated smoke control area since 1996.
EE) Small Boilers > 5 MW (thermal).	No small boilers that burn coal. All gas fired with fuel oil backup system
FF) Shipping	Current shipping movements are 1322 in the vicinity of Leith Docks
GG) Railway Locomotives	Previous round (2) did not identify this source to result in an exceedence. Further improvements relating to reducing emissions are scheduled.

9.0 Review and assessment of particles PM_{10}

Air Quality Obectives:
(Scotland only)

An annual mean of 18 μg/m^3 (gravimetric) to be achieved by 31.12. 2010

A 24-hour mean of 50 μg/m^3 (gravimetric) not to be exceeed more than 7 times per year by 31.12.2010

All authorities:

An annual mean of 40 μg/m^3 (gravimetric) to be achieved by 31.12.2004

A 24- hour mean of 50 μg/m^3 (gravimetric) not to be exceeded more than 35 times by 31.12.2004

All previous reports on the review and assessment of air quality produced by this Council have shown that PM_{10} meets with the above air quality objectives.

The 2004 objectives relate to the EU Stage 1-limit values. The 2010 objectives are based on indicative EU Stage 2 limits and assessment work carried out by the SE. It is only Scottish Local Authorities who are required to consider the 2010 target for the review and assessment purposes.

Within the UK 71 AQMAs have been declared for particles (PM_{10}).

Monitoring data

The EU limit values and the UK objectives are based upon measurements using a gravimetric sampler, where particulate matter is collected on a filter and weighed. In the UK, the Tapered Element Oscillating Microbalance (TEOM) method of measurement for particles is widely used. There is uncertainty regarding the comparability of the two methods. For the purpose of review and assessment, local authorities are advised to multiply TEOM generated data by 1.3 to provide a gravimetric equivalent concentration.

However, inter comparison studies of the different methods have demonstrated that the under read associated with TEOM instruments is variable and the factor of 1.3 is considered to be conservative. (Personal communication)[7].

This Department undertook additional work for Round 2 DA (2004), to determine whether Edinburgh would meet with the more onerous Scottish air quality objectives. This work involved co-locating a partisol sampler and a TEOM instrument at an existing roadside monitoring location for six months as advised in LAQM TG (03).

The co located study resulted in a gravimetric conversion factor of 1.14 compared to the general 1.3 factor. Using the locally derived gravimetric equivalence factor of 1.14 for the annual average and the 1.3 standard factor for the 24 hour mean, (as advised by the SE) all monitoring sites are likely to meet with the 2010 objectives. All locations meet with the 2004 air quality objectives.

SE, SEPA and the University of West of England have accepted the findings of the study.

PM_{10} data gathered since the DA (2004) report was completed continues to meet with the more stringent objectives apart from Queen Street / Wymess Place. Tables 9.1 and 9.2.

The air quality station at Queen Street/North Castle Street was relocated to the eastbound side of the carriageway on Queen Street at Wymess Place in April 2005 to facilitate the Central Edinburgh Traffic Management scheme.

It is likely that the annual exceedence is due to on going construction work within 5 metres of the air quality station. Stone cutting activities have taken place at this site to replace the façade of an adjacent property and to the renew pavement slabs

For the purposes of this report, PM_{10} data has been corrected using both 1.14 and 1.3 gravimetric equivalence conversion factors (TEOM x 1.14 or 1.3). Data, which is contained in this report, is ratified.

Future particle emissions from road transport and industry are likely to decrease because of EU legislation and national policies. PM_{10} concentrations for 2010 were estimated in accordance with guidance document LAQM TG03 Box 8.6. Since the previous review and assessment (round 2) the portion of coarse PM_{10} fraction used in the calculation has decreased from $10\mu g/m^3$ to $5.8\mu g/m^3$. Previous estimated data for 2010 has been recalculated using the new coarse fraction concentration.The UK pollution maps 2004 (secondary PM_{10}) and the year adjustment calculator v 2.2a were utilised for this exercise.

Estimating future PM_{10} concentrations by this method is only appropriate when the gravimetric equivalence factor of 1.3 has been used to adjust TEOM data. The estimated 2010 concentrations which have been based on Edinburgh's gravimetric factor of 1.14, are considered to be conservative.[9]

An example of the calculation and factors used are detailed in appendix 5.

There is no AQMA for PM_{10} in Edinburgh, although monitoring is undertaken in the AQMA designated for nitrogen dioxide.

7 Richard Maggs Casella Stanger
8/9 Personal communication Review and Assessment government help desk.

Table 9.1. PM_{10} concentrations µg/m^3 at locations in Edinburgh

Location	Monitoring Period	Teom µg/m^3	Teom x1.14 (grav)	Teom x1.3 (grav)	No Exceedences Teom x 1.3	2010 (grav) 1.14	1.3
Princes St	Historical data 01/01/99 to 31/12/99	15	17.1	19.5	3	15.6	17.3
Haymarket Roadside	01.01.04 to 31.12.04 01.01.05 to 31.12.05	14.0 14.0	16.0 16.0	18.2 18.2	1 2	14.9 15.0	16.9 16.9
Queen St/ North Castle Roadside	01.01.04 to 31.12.04 01.01.05 to 14.03.05	15.6* 14.5	17.8* 16.5	20.2* 18.9	2 0	16.6 15.4	18.8 17.6
Queen St/ Wymes Pl Roadside	08.04.05 to 31.12.05	20.7**	23.6**	26.9**	6	21.8	24.8
Roseburn Roadside	18.07.03 to 31.12.03 01.01.05 to 31.12.05	15.2 13.9	17.3 15.8	19.8 18.0	1 1	14.7 15.1	17.3 16.7
St Leonards Urban centre	01.01.04 to 31.12.04 01.01.05 to 31.12.05	14.6 13.8	16.6 15.8	19.0 18.0	0 3	15.5 15.1	17.7 17.1
Currie Background	16.01.04 to 31.12.04 01.01.05 to 31.12.05	9.1 9.2	10.4 10.5	11.8 12.0	0 0	9.8 9.9	11.1 11.3

* Construction works adjacent to monitoring station commenced October 2004 to December 2004

** Construction works ongoing at Wymess Place / Queen Street junction area

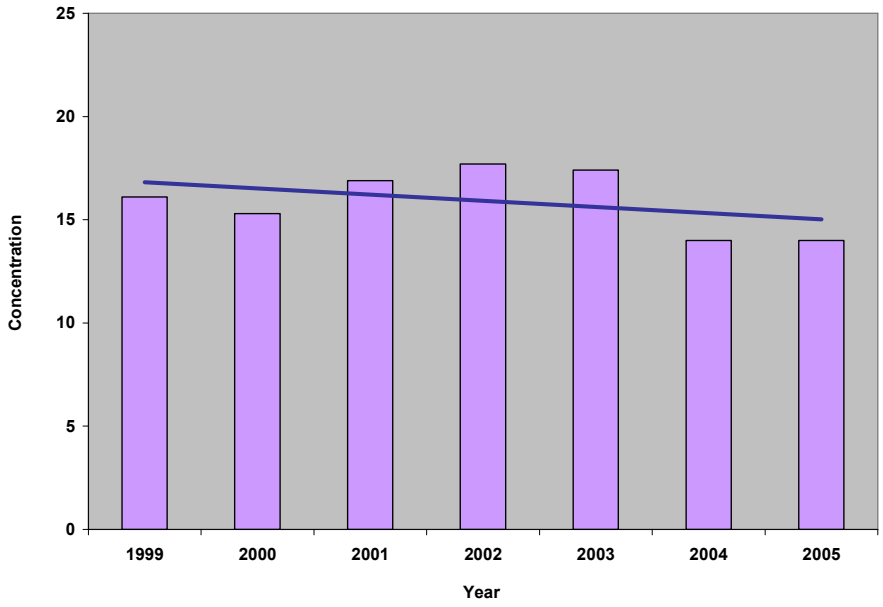
Table 9.2 Concentration of PM_{10} obtained from Partisol gravimetric sampler Haymarket

Location	Monitoring Period	2003/2004 PM_{10} µg/m^3	2010 PM_{10} µg/m^3
Haymarket	22/01/03 to 02/08/04	17.1	16.0

Data trends

The data which has been used to assess the PM_{10} trend at Haymarket has not been corrected for gravimetric equivalence. The PM_{10} trend appears to be downward. PM_{10} data from Queen Street has not being assessed for trend analysis due to relocation of the monitoring station and on going construction activities in close proximity to the site. Figure 19.

Fig 19 PM_{10} trend (TEOM µg/m^3) Haymarket



Modelled background maps

The previous Round (2) DA 2004, concluded that the estimated PM_{10} background concentrations for Edinburgh were too high based on monitoring data gathered from the background site at Currie. Therefore, the background 2010 map for Edinburgh was readjusted to reflect the measured data at this location. SEPA, SE and the University West of England approved of this approach.

The modelled background concentration from the new UK PM_{10} 2005 pollution map is still a fraction higher compared to the measured concentration (1.3 grav) at the same location.

Currie background OS reference: Northing 317595 Easting 667908

1 Km square modelled concentration (µg/m^3) new UK pollution map 2005 = 13.4
1 Km square measured concentration (µg/m^3) 2005 = 11.96

Factor for 2005 = 11.96/13.4 = 0.89.

Multiplying the 2005 PM_{10} new background concentrations by the factor 0.89 reduces the values by approximately 2µg/m^3. Figs 20 and 21

Fig 20 2005 PM_{10} background map (Netcen UK)

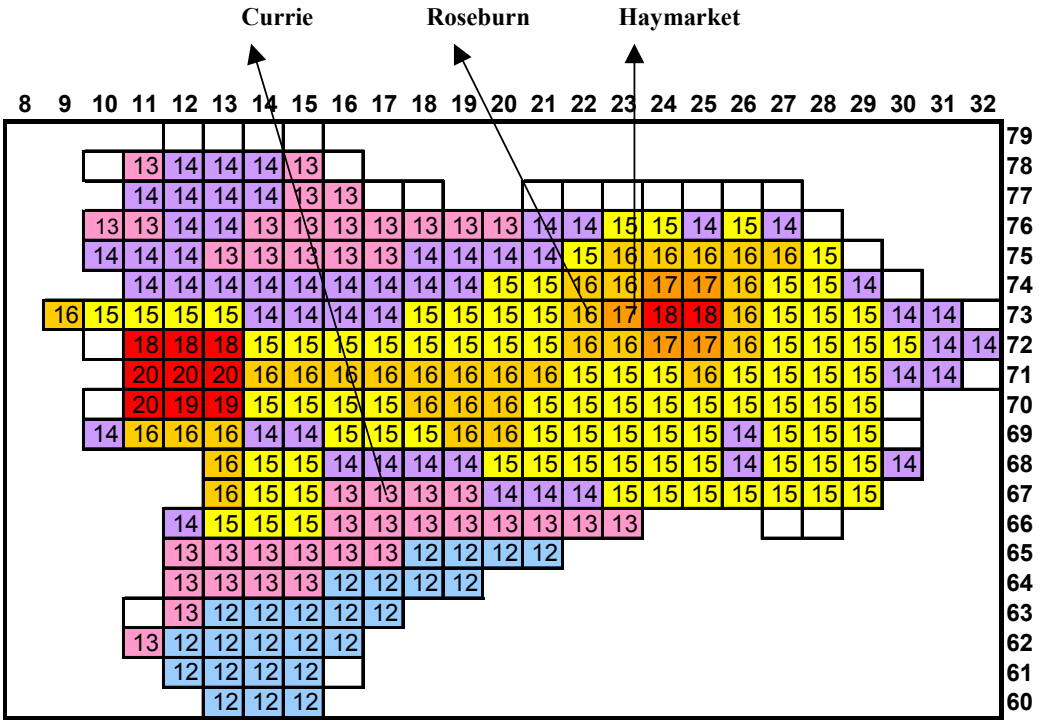
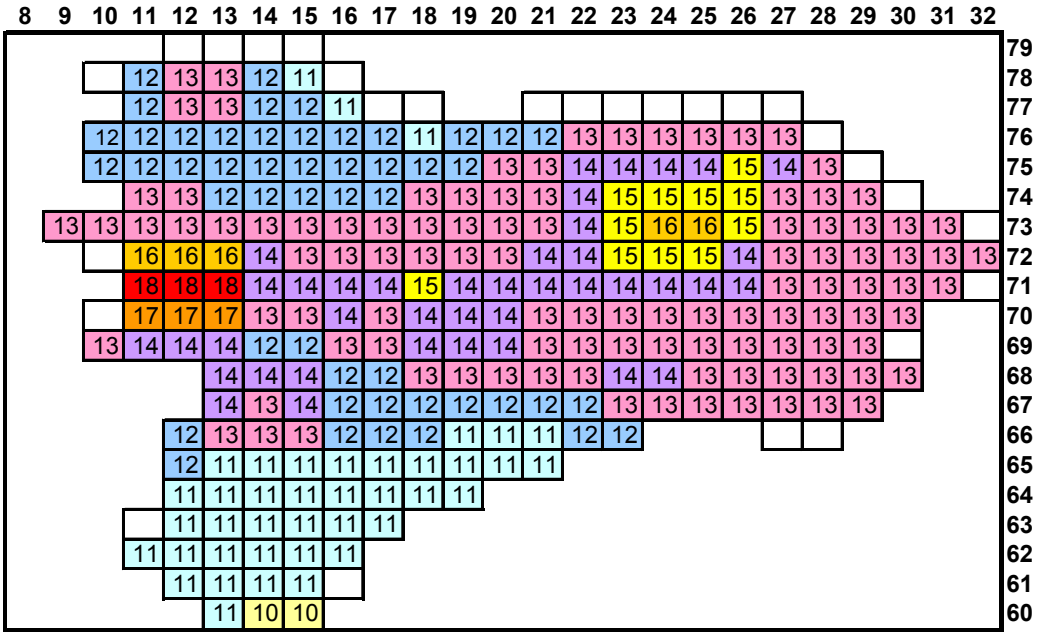


Fig 21 Adjusted 2005 background map (Netcen UK). Background concentrations have been multiplied by 0.89.



Air quality traffic models, such as the screening model Design Manual for Roads and Bridges (DMRB) require the input of background pollution concentrations to assess concentrations from traffic. Annual values obtained from the DMRB model were compared with measured annual PM_{10} concentrations from the monitoring locations at Roseburn and Haymarket. Both 2005 new background and adjusted background values were used in the DMRB model. The measured annual PM_{10} concentrations were lower in each case. Tables 9.4 and 9.5.

This indicates either that the background levels are too high or that the DMRB model overestimates concentrations. In order to obtain a comparable concentration using the DMRB model the background value for Roseburn and Haymarket would need to be 12 µg/m^3. This background PM_{10} concentration on the unadjusted UK background map occurs at the southern tip of Edinburgh, close to the boundary.

Table 9.4 Comparison of 2005 measured concentrations (µg/m^3) and DMRB modelled concentrations at the same location using new 2005 PM_{10} background values

Grid ref Location	Background PM_{10} value used (2005)	Measured PM_{10} 2005 Annual mean	DMRB modelled PM_{10} 2005 Annual mean
N 322939 Roseburn E 673233	15.6	18.0	22.0
N 323880 Haymarket E 673203	16.6	18.2	22.3*
* 2003 Traffic data used in DMRB model			

Table 9.5. Comparison of 2005 measured concentrations (µg/m^3) and DMRB modelled concentrations at the same location using new adjusted 2005 PM_{10} background values.

Grid ref Location	Adjusted background PM_{10} value used	Measured PM_{10} 2005 Annual mean	DMRB modelled PM_{10} 2005 Annual mean
N 322939 Roseburn E 673233	13.9	18.0	20.3
N 323880 Haymarket E 673203	14.8	18.2	20.5*
* 2003 Traffic data used in DMRB model			

Projecting PM_{10} concentrations to 2010

The estimated concentration for the background site at Currie at 2010 is 11.3 (1.3 grav) based on measured data. The modelled background concentration at the Currie site location is 12.6. The adjustment factor for 2010 is:

1 Km square modelled concentration (µg/m^3) new UK pollution map 2010 = 12.6
1 Km square measured concentration (µg/m^3) 2010 = 11.3

Factor 11.3/12.6 = 0.90

Multiplying the 2010 PM_{10} new background concentrations by the factor 0.90 reduces the values by approximately 1.5 µg/m^3. Figs 22 and 23.

Fig 22 2010 background map (Netcen Uk)

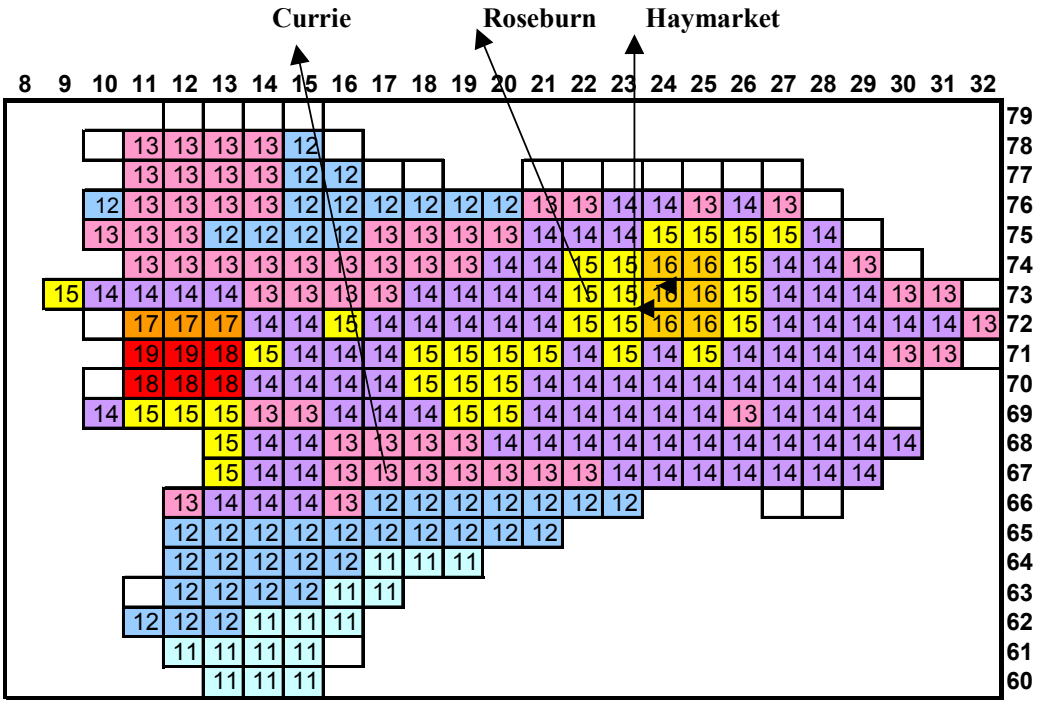
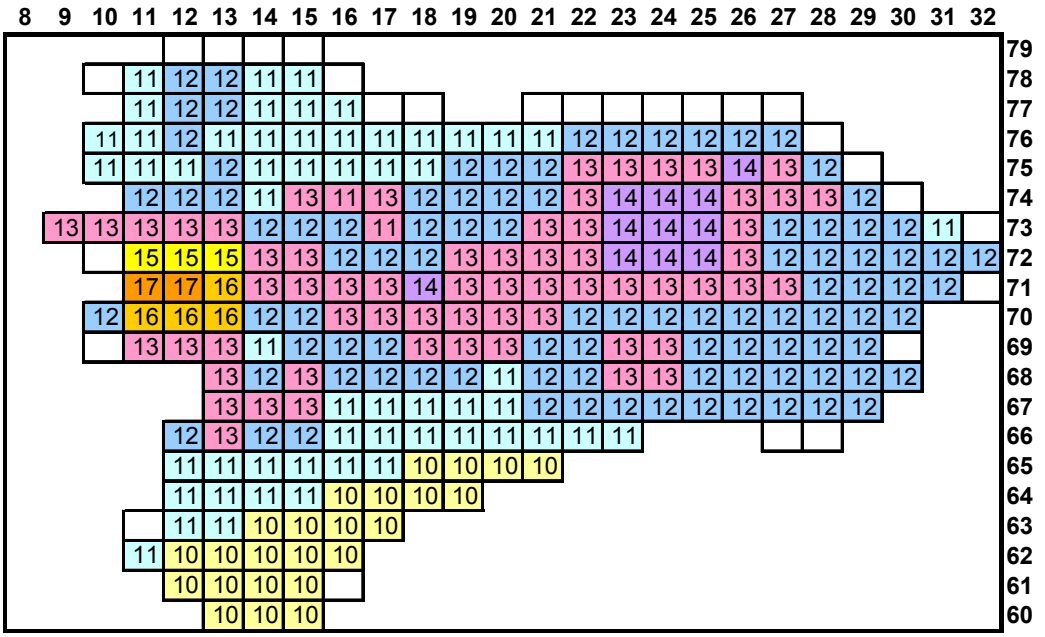


Fig 23 Adjusted 2010 background map (Netcen UK). Background concentrations have been multiplied by 0.90.



Measured 2005 data projected to 2010 gives lower PM_{10} concentrations than those predicted with the DMRB model to year 2010 using unadjusted background concentrations. The 2010 concentrations are comparable when the adjusted background concentrations have been used in the DMRB model. Tables 9.6 and 9.7.

Table 9.6 Comparison of 2010 PM_{10} estimated concentrations ($\mu g/m^3$) from measured data and the DMRB model using new unadjusted background values.

Grid ref Location	Background PM_{10} value (2010)	Estimated 2010 annual mean based on 2005 measured values PM_{10}	DMRB modelled PM_{10} 2010 annual mean
N 322939 Roseburn E 673233	14.6	16.7	18.1 18.2**
N 323880 Haymarket E 673203	15.4	16.9	18.8*
* 2003 Traffic data used in DMRB model ** 10% Traffic increase			

Table 9.7 Comparison of 2010 PM_{10} estimated concentrations ($\mu g/m^3$) from measured data and the DMRB model using adjusted background values.

Grid ref Location	Adjusted 2010 background PM_{10} value	Estimated 2010 annual mean based on 2005 measured values PM_{10}	DMRB modelled PM_{10} 2010 Annual mean
N 322939 Roseburn E 673233	13.1	16.7	16.6 16.7**
N 323880 Haymarket E 673203	13.9	16.9	17.0*
* 2003 Traffic data used in DMRB model ** 10% Traffic increase			

Measured PM_{10} 2005 data and associated projected values to 2010 at Roseburn and Haymarket. have been compared graphically to values obtained from the DMRB model . Figs 24 and 25.

Fig 24 Comparison of measured PM_{10} concentrations and the DMRB model using both adjusted and unadjusted background concentrations at Roseburn.

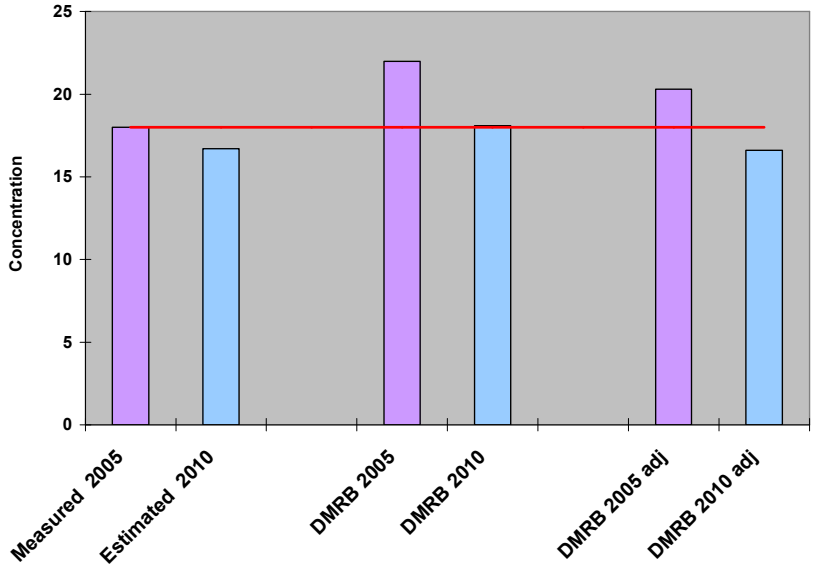
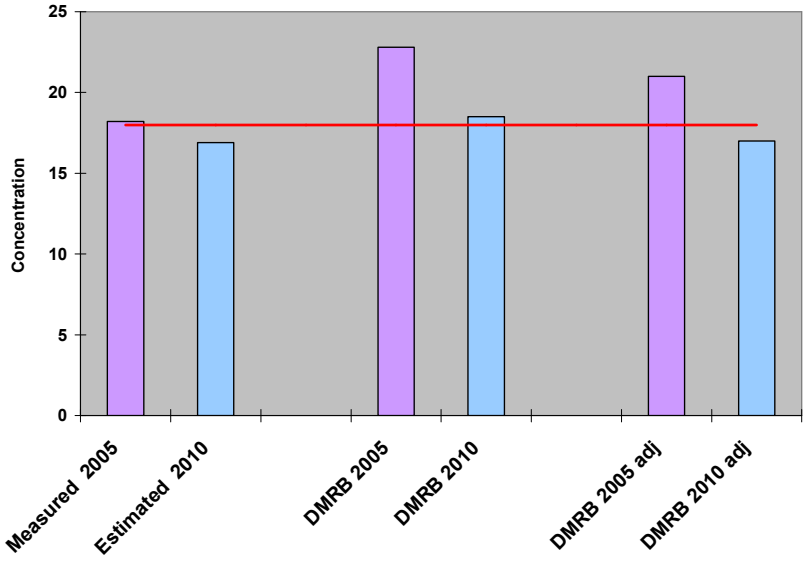


Fig 25 Comparison of measured PM_{10} concentrations µg/m^3 and the DMRB model using both adjusted and undjusted background concentrations at Haymarket



Busy roads and junctions

The second round of review and assessment considered busy roads and junctions. Monitoring which has been undertaken at locations in the city centre with the highest volumes of traffic and where the percentage of bus movements are greater than 10%, currently meet with both the 2004 and 2010 air quality objectives.

Assessments carried out using the DMRB model for busy roads where monitoring is not undertaken, concluded that the 2004 and 2010 objectives would be achieved.

Local authorities in Scotland have been advised to recalculate traffic related PM_{10} concentrations using the (DMRB) based on the new PM_{10} background maps.

Estimated traffic associated PM_{10} concentrations using the DMRB model.

The DMRB model version 1.02 (November 2003) was used to estimate traffic related sources of PM_{10}. Roads were selected as for the DA 2004 (Round 2) report i.e those which have an excess AADT of 10,000 vehicles and where relevant public exposure is within 10 metres of the kerb. The adjusted and unadjusted new 2010 PM_{10} background concentrations for Edinburgh were used in the DMRB model. Table 9.8

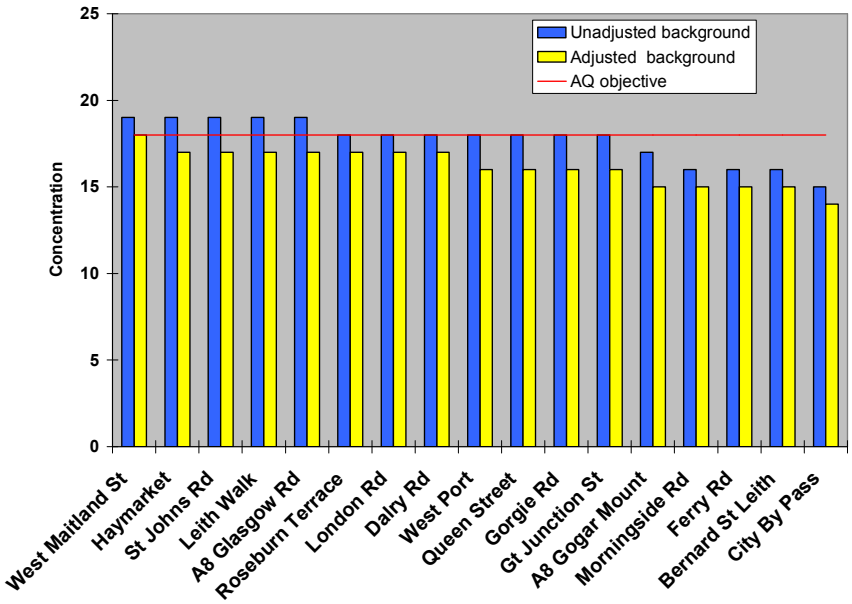
Table 9.8 DMRB model estimated 2010 PM_{10} annual mean concentraions µg/m^3 at relevant receptors using unadjusted and adjusted background concentrations.

Location	Annual mean 2010 Unadjusted background	Expected Exceedences	Annual mean 2010 Adjusted background	Expected Exceedences
City By Pass*	15.2	0	13.9	0
Glasgow Road A8 Gogar Mt	16.7	1	15.3	0
A8 Glasgow Rd Newbridge	18.5	2	16.8	1
St Johns Road	18.7	2	17.3	1
Leith Walk	18.6	2	17.1	1
London Rd	18.1	1	16.6	1
Ferry Road	16.2	0	14.8	0
West Maitland St	19.3	3	17.7	1
Haymarket	18.5	1	17.0	1
Roseburn	18.1	1	16.6	1
Westport	17.9	1	16.3	0
Bernard St	16.1	0	14.8	0
Gorgie Rd	17.7	1	16.2	0
Dalry Rd	18.3	2	16.7	1

Dalkeith Road	15.8	0	14.4	0
Gt Junction Street	17.5	1	16.0	0
Morningside Road	16.2	0	14.8	0

Inputs used in the DMRB model are shown in appendix…..

Fig 7 Comparison of 2010 DMRB modelled data using unadjusted and adjusted background PM_{10} concentrations.



As previously discussed, it is apparent that the modelled concentrations using the DMRB model are much higher than measured data. Annual values obtained from using the adjusted background PM_{10} concentrations in the 2010 DMRB model are comparable to 2010 concentrations estimated from measured data. Therefore, it is considered that using the adjusted new background concentrations in the DMRB model provide a more accurate assessment of traffic related PM_{10} concentrations.

Local authorities are advised that where measured data is available this should always be used in preference to modelled data. Based on current measured data both Haymarket and Roseburn meet with the 2010 air quality objectives and therefore other locations in Edinburgh are expected to also achieve the target.

New roads constructed or proposed .

There are no new or proposed roads since the second round of review and assessment.

Information Source:Scottish Executive, City of Edinburgh Council City Development Transport.

Roads with significantly changed traffic flows or new relevant exposure.

City Development (Transport) Edinburgh City Council has advised that traffic flows in the city centre have now stabilised. Section 7.0 Review and Assessment of nitrogen dioxide.

Roads close to the objective during the second round of review and assessment

Measured data at the monitoring locations continues to meet with the air quality objectives.

Industrial Sources

New Industrial sources
Having regard for the potential significant point source processes against those listed in Annex 2 of the Technical Guidance TG(03), there are no new sources that require further assessment.

Information source: Technical Guidance TG (03), SEPA. Local information through planning process.

Industrial sources with substantially increased emissions
Following consultation with SEPA there are no sources which require further assessment.

The second round of review and assessment considered that the coal-fired power station at Cockenzie, which is outside Edinburgh's boundary, might influence PM_{10} concentrations. However, recent modelling studies, which have been undertaken by Scottish Power, suggest that this is extremely unlikely. SEPA support this view.

Information source: Scottish Environment Protection Agency.

Areas of domestic solid fuel burning

Edinburgh is a smoke controlled area and therefore an assessment is not required.

Information source: Local knowledge.

Quarries /landfill sites/ Concret batching plants

There are two quarries, which are located at the periphery of the city, Hillwood and Ravelrig. The previous review and assessment round (Round 2) concluded that that quarrying activities were not likely to result in any exceedences of the air quality objectives.

The quarries were reassessed taking into account the new adjusted 2010 background map for PM_{10}.

In the absence of any local monitoring data adjacent to quarries it is recommended that local authorities apply the following criteria to determine if there is a need to progress to a Detailed Assessment at such locations. Table 9.9

Table 9.9 Assessment criteria requirement for quarries

Relevant exposure from Source distance in metres	**2004 PM 10 background level**	**2010 PM10 background level**
1000 or > than	No reqirement to proceed to a detailed assessment (DA)	
400 - 1000	< 27 No requirement for DA	< 17 No requirement for DA
200 - 400	< 26 No requirement for DA	< 16 No requirement for DA

For this assessment, distances from the quarry operations to the nearest relevant receptor were measured using the Geographical Information System (GIS).

Quarrying operations require to be assessed if the 2010 PM_{10} background concentration is 16 $\mu g/m^3$ or greater. The new adjusted background concentrations for both Ravelrig and Hillwood are less than 16$\mu g/m^3$. Therefore it can be assumed that quarrying activities with the new adjusted background PM_{10} concentrations are not likely to result in any exceedences of the air quality objectives. Table 9.10

Table 9.10 Quarry reassessment

Quarry location	**Closest relevant exposure**	**PM_{10} background concentration 2004**	**PM_{10} background concentration 2010 Adjusted**
Ravelrig	Hoggs Cottages 232 metres from source	14.9	12.5
Hillwood	Hillwood N 313253 Cottage E 671963 232 metres from source	18.2	15.0

Aircraft

The second round of review and assessment concluded that emissions from aircraft were not significant based on work undertaken by AEA technology and the adjusted PM_{10} background map concentrations.

Conclusion

There is no requirement to progress to Detailed Assessment for PM_{10}.

Updating and Screening Assessment Summary Checklist for **PM_{10}**

Item	Response
HH) Monitoring data outside an AQMA	Data meets the 2004 and the 2010 air quality objectives.
II) Monitoring data within an AQMA	There is no AQMA for PM_{10}
JJ) Busy roads and junctions in Scotland	Roads were reassessed using DMRB with the new adjusted background PM_{10} concentrations. Locations meet with the air quality objectives.
KK) Junctions.	Junctions reassessed using DMRB with the new adjusted background concentrations where traffic data available meet with the air quality objective.
LL) Roads with high flow of buses and/or HGVs.	Monitoring is undertaken on roads where there is a high flow of buses and relevant exposure. Additional roads where monitoring is undertaken were assessed using the DMRB
MM) New roads constructed or proposed since last round of R&A	No new roads have been constructed since the previous Round (2)
NN) Roads with significantly changed traffic flows, or new relevant exposure.	There are no roads with significant changed traffic flows (25% increase in AADT) or relevant exposure.
OO) Roads close to the objective during the second round of Review and Assessment	Monitoring and DMRB modelling continue to show that the 2004 air quality objective is achieved. Monitoring data shows that the more onerous 2010 air quality objectives are currently achieved and that there are not likely to be exceedences by 2010.
PP) New industrial sources.	According to information supplied by SEPA here are no new industrial sources in Edinburgh or sources at the city boundary which emit PM_{10}.
QQ) Industrial sources with substantially increased emissions, or new relevant exposure	The previous review did not identify any industrial sources which would contribute significantly to PM_{10} emissions.
RR) Areas of domestic solid fuel burning	The city of Edinburgh has been designated a smoke control area since 1996, therefore there are no areas of domestic solid fuel burning.
SS) Quarries / landfill sites / opencast coal / handling of dusty cargoes at ports etc.	Previous Round (2) concluded that operations at Ravelrig and Hillwood quarries would not result in an exceedence. Both quarries were reassessed for this round (3) using the new adjusted background PM_{10} background concentrations The reassessment concluded the same.

	background concentrations The reassessment concluded the same.
TT) Aircraft	Aircraft emissions were not considered to be significant at the last review and assessment round based on work undertaken by AEA technology and adjusted PM_{10} background map concentrations.

10.0 Future Air Quality and Traffic Monitoring

Ferry Road is one of the main arterial routes, which connects North Edinburgh with the rest of the city. Traffic is likely to increase on this route due to committed and proposed development along Edinburgh Waterfront. Monitoring commenced at Ferry Road early 2005. Data from these sites will be reported in the Progress Report 2007.

Passive diffusion tubes will also be located in the Cowgate. Monitoring discontinued in 2000 as the area met with the targets. However, this location is currently undergoing further development and therefore it is considered prudent to resume monitoring.

A real-time continuous monitoring air quality unit is currently being installed at St Johns Road for nitrogen dioxide. According to passive diffusion tube monitoring this location now has the highest annual average nitrogen dioxide concentrations in Edinburgh.

Traffic counters will be installed at the following North Edinburgh locations to monitor traffic flows.

Ferry Road

Lower Granton Road

Queen Street (Site to be reinstated, monitoring discontinued in 2002 due to road works).

11.0 Conclusion

The U&SA 2006 report (Round 3) concludes that benzene, carbon monoxide, sulphur dioxide, lead and PM_{10} meet their respective air quality objectives. Therefore, there is no requirement to progress to a Detailed Assessment for these pollutants.

Nitrogen dioxide concentrations continue to exceed the air quality objectives at various hotspots within the AQMA; and the following sites are likely to fail the EU limit value by 2010 should the measures contained in the Action Plan fail to be implemented.

- West Maitland Street / Palmerston Place
- Roseburn Terrace/ Street junction
- North Bridge (North Bound)
- Torphichen Place
- Princes Street

The current city centre AQMA is considered to be valid.

New monitoring data at St Johns Road/Clermiston Road junction continues to exceed the annual average nitrogen dioxide objective and in due course an AQMA will be declared to cover this area of concern.

Monitoring data from locations outside the AQMA show that concentrations of nitrogen dioxide continue to meet the objectives, apart from West Port and Great Junction Street. This Council is currently progressing Detailed Assessments at these locations.

The monitoring location at Easter Road is considered borderline and additional monitoring will commence at this location using passive diffusion tubes. Data collection at this location was less than 67% for the year 2005.

Nitrogen dioxide concentrations within the AQMA show both increasing and decreasing trends from 1999 to 2005. Table 11.1

Table 11.1 Annual average nitrogen dioxide trends at locations within the AQMA.

Location	Monitoring Method	Trend
Westmaitland St/Palmerston Place	Pdt	Upward
Princes St	Pdt	Upward
Roseburn Terrace/Street junction	Pdt	Upward
York Place	Pdt	Upward
Gorgie Rd/Murieston Rd junction	Pdt	Same
Haymarket Terrace	Real-time	Same
Queen St/Fredrick St junction	Pdt	Downward
Leith Walk	Pdt	Downward
North Bridge	Pdt	Downward
Queen Street/North Castle St	Real time	Downward
Gorgie/WhitePark	Real-time	Downward

Nitrogen dioxide concentrations at monitoring sites outside the AQMA show a downward trend. Table 11.2

Table 11.2 Annual average nitrogen dioxide trends at locations outside the AQMA.

Location	Monitoring method	Trend
Calder Road	Pdt	Downward
Grassmarket	Pdt	Downward
Morningside Road	Pdt	Downward
Home Street	Pdt	Downward
Deanhaugh St	Pdt	Downward
Hope Park Terrace	Pdt	Downward
India Street	Pdt	Downward
Dundas Street	Pdt	Downward

The trend for PM_{10} concentrations has remained the same at Haymarket. However, adjacent construction activities during 2001 to 2003 will have influenced the degree of change.

Appendix 1A QA /QC procedures real time analysers

Staff competence

Two officers are trained as local site operators in relation to the management of the Defra National Network site and undertake the necessary calibrations and basic maintenance at all the automated sites. Both operators have been trained to fulfil the requirements associated with passive diffusion tube samplers.

Real-Time Analysers

Calibration procedures

The three 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 weekly, apart from the National Network site, which is visited fortnightly 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 for the mobile monitor and British Oxygen Company (BOC) for the Rollalongs

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 to be 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.

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

Site details and type of equipment used for the Council automated analysers table 1

Table 1 Council's automated monitoring equipment used for the

Site	**NO_x analyser Model**	**PM_{10}**	**Supplier**	**Software**
Queen St Nrth Castle St Queen St/Wymess Pl Rollalong	ML 9841B	TEOM Operated at 50 ^{oc}	Casella ETI (E.M.C)	Enview Data collected daily via modem
Haymarket Terrace Rollalong	ML 9841B	TEOM Operated at 50 ^{oc}	Casella ETI (E.M.C)	Enview Data collected daily via modem
Currie Mobile Trailer	AP1 M200A	TEOM Operated at 50 ^{oc}	Casella ETI (E.M.C) E.T NOx	Enview Data collected daily via modem
Roseburn Terrace Rollalong	ML 9841B	TEOM Operated at 50 ^{oc}	Casella ETI (E.M.C)	Enview Data collected daily via modem
Gorgie Road Housing Police Box	Model 42 Model 142 (auto cal)	-	Thermo Onix	ESC E- Das Ambient Data downloaded Weekly via lab top

Additional analysers located within mobile trailer:

Analyser	**Model**
Carbon monoxide	AP1 M300 Series Gas Filter Correlation CO analyser
Sulphur dioxide	AP1 100A series Fluorescent SO_2 analyser

Appendix 1B QC/QA procedures passive diffusion tubes

Passive diffusion tubes were 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 considered to be satisfactory over the monitoring periods 2004 and 2005

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 method has remained unchanged during the monitoring periods. Acrylic diffusion tubes were used for the exposure periods.

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 (03). The diffusion tubes are located within 1 metre of the edge of the kerb or close to the façade of residential property. The tubes are attached to sign posts/lampposts, 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.

Appendix 2A % Data capture real time analysers 2004 and 2005

Site	Pollutant	2004	2005
Gorgie	NO_2	86%	98%
Haymarket	NO_2 PM_{10}	93% 92%	99% 96%
Queen Street	NO_2 PM_{10}	95% 93%	97% 89%* 99% 91%*
Roseburn	NO_2 PM_{10}	95%	97% 99%
Currie	NO_2 PM_{10} SO_2 CO	92% 91% 82% 90% (Progress Report)	94% 97% 98% Faulty analyser
St Leonards	NO_2 PM_{10} SO_2 CO	90% 93% 93% 93%	96% 98% 97% 99%

Appendix 2B Passive diffusion tube % data capture 2004 2005.

Location	Tube No	2004	2005
St Johns Rd	1	92%	75%
St Johns Rd	1x	92%	92%
St Johns Rd	1b	67%	67%
West Maitland St	2	92%	75%
West Maitland St	2b	75%	92%
Torphican Pl	2x	100%	92%
Calder Rd	3	83%	100%
Gorgie Rd/Murieston Rd	4	92%	83%
Admillan Terr	4x	92%	100%
Commercial St	5	83%	92%
Morningside Rd	6	83%	83%
Morningside Rd	6x	92%	92%
Commercial St	7	92%	75%
Home St	8	83%	100%
Lanark Rd	9	92%	92%
Pier Pl	10	100%	100%
Deanhaugh St	11	83%	83%
Trinity Cres	12	100%	92%
Newbridge/Glasgow Rd	13	100%	100%
Newbridge/Glasgow Rd	14	92%	100%
Hope Pk Terr	15	75%	100%
Gorgie Rd	16x	100%	75%
Gorgie Rd	16	100%	100%
Baileyfield Rd	17	100%	100%
McDonald Rd	19	100%	100%
McDonald Rd	19x	100%	100%
Roseburn Terr/St	20	67%	75%
Roseburn Terr	20x	83%	75%
Princes St	21	83%	67%
Easter Rd	23	92%	67%
Westport	25	75%	92%
Bernard St	26	92%	100%
Gt Junction St	27	83%	100%
Dalkeith Rd	28	92%	92%
Niddrie Mains Rd	29	83%	83%
Broughton Rd	30	92%	100%
Broughton Rd	30x	92%	92%
Broughton St	40	92%	100%
North Bridge 1	24	100%	92%
North Bridge 2	24x	100%	92%
Queen St	33	92%	925%
Queen St	33x	83%	92%
India St	34	100%	100%
Dundas St	37	100%	100%
York Pl	39	92%	75%
Melville Dr	44	83%	92%
Melville Dr	46	100%	92%

Melville Dr	47	92%	100%
Grassmarket	45	66%	75%
Grassmarket	45x	66%	83%
St Johns Rd	1A	100%	75%
Hillhouse Rd	2A	75%	83%
St Johns Rd	1c	83%	75%
St Johns Rd	1d	67%	92%
St Johns Rd	1e	83%	92%
St Johns Rd	32	75%	83%
St Johns Rd	35	83%	92%
St Johns Rd	35a	75%	92%
Bernard St	26a	100%	100%
Bernard St	26b	100%	92%

Background

Hillview Terr	3A	100%	100%
Midmar Dr	4A	100%	83%

Appendix 3 Passive diffusion tube bias corrections 2004/ 2005

Passive diffusion tubes are exposed in triplicate on the sampler head cage of the air quality monitoring stations on the side closest to the road. The data from the triplicate sets which show the best agreement are used to calculate the passive diffusion tube mean. Passive diffusion tube bias has been calculated according to Box 6.4 Approach to bias correction of nitrogen dioxide diffusion tube data LAQMA. TG(03).

Queen Street Site 1
2004

	Start	End	analyser	Mean pdt
Jan	31.12.03	04.02.04	40	40.6
Feb	04.02.04	03.03.04	47	45.3
Mar	03.03.04	31.03.04	43	42
Apr	31.03.04	05.05.04	34	36.5
May	05.05.04	02.06.04	35	34
Jun	02.06.04	30.06.04	33	32
Jul	30.06.04	04.08.04	32	45.6
Aug	04.08.04	01.09.04	42	49.3
Sept	01.09.04	29.09.04	28	38.3
Oct	29.09.04	03.11.04	41	51.3
Nov	03.11.04	01.12.04	39	40
Dec	01.12.04	06.01.05	33	39.5
Mean			**37.2**	**41.2**
% Difference			**10.7% overread**	
Bias			**0.9**	

Haymarket Site 2
2004

	Start	End	analyser	Mean pdt
Jan	30.12.03	03.01.04	39	47.5
Feb	03.01.04	02.03.04	41	47
Mar	02.03.04	30.03.04	40	44.5
Apr	30.03.04	04.05.04	36	37
May	04.05.04	01.06.04	36	32.5
Jun	01.06.04	29.06.04	34	43
Jul	29.06.04	03.08.04	32	39
Aug	03.08.04	31.08.04	39	50
Sep	31.08.04	28.09.04	28	35.6
Oct	28.09.04	02.11.04	41	48
Nov	02.11.04	30.11.04	41	39
Dec	30.11.04	05.11.05	35	35.5
mean			**36.9**	**41.5**
%bias				**12.5%**
bias				**0.88**

Currie School 3
2004

	Start	End	analyser	Pdt mean
Jan				
Feb	04.02.04	03.03.04	12.8	15
Mar	03.03.04	31.03.04	8.0	11.3
Apr	31.03.04	05.05.04	3.4	7
May	05.05.04	02.06.04	8.4	8.6
Jun	02.06.04	30.06.04	5.2	8
Jul	30.06.04	04.08.04	10.5	10.3
Aug	04.08.04	01.09.04	14.1	16.3
Sep	01.09.04	29.09.04	11.1	11.6
Oct	29.09.04	03.11.04	14.1	14.3
Nov	03.11.04	01.12.04	15.5	14
Dec	01.12.04	06.01.05	12.6	9.6
mean			**10.5**	**11.5**
%bias				**8.7**
bias				**0.91**

Mean Bias 2004
0.9
0.88
0.91
=0.89 over read

Queen Street Site

	Start	End	Analyser	Mean pdt	
Jan	06.01.05	02.02.05	35.9	39.5	
Feb	02.02.05	03.03.05	36.1	38.3	
Mar	03.03.05	31.03.05			Relocation of AQ unit
Apr	31.03.05	04.05.05	26.5	26.5	data capture 41%
May	04.05.05	01.06.05	28.5	36.5	
Jun	01.06.05	29.06.05	26.3	28.3	
Jul	29.06.05	03.08.05	22.3	28	
Aug	03.08.05	31.08.05	26.2	43	
Sep	31.08.05	05.10.05	26.9	35.3	
Oct	05.10.05	02.11.05	33	43	
Nov	02.11.05	30.11.05	40.3	38	
Dec	30.11.05	05.01.06	46	57	
Mean			**31.6**	**37.6**	
% bias				**11.7%**	
bias				**0.84**	

Haymarket

	Start	End	Analyser	Mean pdt
Jan	05.01.05	01.02.05	40.5	46
Feb	01.02.05	02.03.05	41.1	43
Mar	02.03.05	30.03.05	43.7	48
Apr	30.03.05	03.05.05	38.9	37
May	03.05.05	31.05.05	34.8	37.5
Jun	31.05.05	28.06.05	31.5	32.7
Jul	28.06.05	02.08.05	29.8	40.5
Aug	02.08.05	30.08.05	29.2	36.7
Sep	30.08.05	04.10.05	34.4	46
Oct	04.10.05	01.11.05	42	50.7
Nov	01.11.05	29.11.05	45.6	34
Dec	29.11.05	04.01.06	50.8	43
Mean			**38.5**	**41.3**
% bias				**7.2%**
bias				**0.93**

Gorgie **Police Box**

	Start	End	Analyser	Mean pdt
Jan	05.01.05	01.02.05	41.6	44
Feb	01.02.05	02.03.05	44.3	47
Mar	02.03.05	30.03.05	39.5	48
Apr	30.03.05	03.05.05	29.8	42
May	03.05.05	31.05.05	31.3	28
Jun	31.05.05	28.06.05	28.8	35
Jul	28.06.05	02.08.05	25.4	30
Aug	02.08.05	30.08.05	27.7	39
Sep	30.08.05	04.10.05	28.8	35
Oct	04.10.05	01.11.05	33.4	41
Nov	01.11.05	29.11.05	43.4	45
Dec	29.11.05	04.01.06	43.7	49
Mean			**34.8**	**40.3**
% bias				**15.8**
bias				**0.86**

Roseburn

	Start	End	Analyser	pdt
Jan	05.01.05	01.02.05	40.7	47
Feb	01.02.05	02.03.05	35.1	30
Mar	02.03.05	30.03.05	35.7	34.5
Apr	30.03.05	03.05.05	25.9	27.2
May	03.05.05	31.05.05	25.2	23.5
Jun	31.05.05	28.06.05	25.2	29.7
Jul	28.06.05	02.08.05	21	23.7
Aug	02.08.05	30.08.05	26.5	32.3
Sep	30.08.05	04.10.05	28.4	30.7
Oct	04.10.05	01.11.05	29	52
Nov	01.11.05	29.11.05	43.9	42
Dec	29.11.05	04.01.06	49	42.3
Mean			**32.1**	**34.6**
%bias				**7.80%**
bias				**0.92**

Mean bias 2005

0.84	
0.93	
0.86	
0.92	
Mean	**0.89**

Appendix 4 Passive diffusion tube kerb to façade distance corrections

Site number	Code	Location	Distance pdt from kerb (m)	Distance from pdt to façade (m)	Factor used
1	1	St Johns Rd	0.54	1.9	0.95
1	1x	St Johns Rd (Duplicate)	0.54	1.9	0.95
2	2	West Maitland St Palmerston Pl	0.65	4.2	0.90
3	2x	Torphican Place	0.30	2.7	0.95
4	3	Calder Rd	1.75	> 20	0.75
5	4	Gorgie Rd/Ardmillan Terr	0.3	4.9	0.90
6	4x	Ardmillan Terr /Gorgie- Dalry	0.6	3.8	0.95
7	5	Commercial St no 11	2.47	at façade 0.4	
8	6	Morningside Rd	0.45	2.6	0.95
8	6x	Morningside Rd Duplicate	0.45	2.6	0.95
9	7	Commercial St at no 78	2.6	at facade	
10	8	Home St / Toll Cross	2.8	at facade 0.4	
11	9	Lanark Rd at no 610	1.0	3.6	0.95
12	10	Pier Place at Alien Rock	2.15	2.7	0.95
13	11	Deanhaugh St	0.6	3.6	0.95
14	12	Trinity Crescent	4.0	4.3	
15	13	Glasgow Rd at no 9 (East bound)	1.1	4.4	0.90
16	14	Glasgow Rd at no 68	1.8	4.4	0.90
17	15	Hope Park Terrace	0.3	4.5	0.90
18	16	Gorgie Rd close to facade	2.4	1.0	
19	17	Baileyfield Rd (Portobello)	2.0	3.5	0.95
20	19	Mc Donald Rd /Leith Wlk	1.0	4.6	0.90
21	19x	Leith Wlk / Brunswick Rd	1.0	3.3	0.95
22	20	Roseburn Terr/ St	0.57	1.54	0.95
23	20x	Roseburn Terr	0.35	2.14	0.95
24	21	Princes St	0.47	10.5	0.75
25	23	Easter Rd	2.32	at facade	
26	24	North Bridge Pizza Hut	3.5	at facade	
27	24x	North Bridge Clydesdale Bank	3.5	at facade	
28	25	West Port opposite no38	1.7	at facade	
29	26	Bernard St	2.35	at facade	
29a	26a		2.10	at facade	
29b	26b		2.18	at facade	

30	27	Gt Junction St	2.82	at facade	
31	28	Dalkeith Rd 187	1.8	4.9	0.90
32	29	Niddrie Mains Rd / Craigmillar Castle	1.2	4.3	0.90
33	33	Queen St/Frederick St	1.0	4.4	0.90
33	33x	Queen St/Frederick St Duplicate	1.0	4.4	0.90
34	34	India St	0.4	6.55	0.90
35	37	Dundas St	0.4	7.12	0.90
36	39	York Place at no 49	0.75	8.2	0.90
37	45	Grass Market	1.2	18	0.75
38	44	Melville Drive	2.83	> 20	0.75
38	46	Melville Drive	2.83	> 20	0.75
38	47	Melville Drive	2.83	> 20	0.75
39	1A	St Johns Rd /Victor Park Terr	1.7	9.0	0.90
40	2A	Queensferry Rd	2.0	at façade 0.4	
41	3A	Hillview Terrace at no 10	1.0	9.0	
42	4A	Midmar Drive 28-30	1.45	9.4	
43		Broughton Rd	2.03	at facade	
44		Broughton St	2.03	at facade	

The factors used are based on advice provided for the Stage 3 Review and Assessment report from Duncan Laxen (Air Quality Consultants Ltd) personal communication:

0 - 2m x 0.95

2 - 5m x 0.90

> 5m x 0.75

However, more conservative factors have since been advised which are :

2 - 5m x 0.95

5 - 10m x 0.90

10- 20m x 0.75

For the purpose of this report the following factors were used:

0 - 4m x 0.95

4 - 10m x 0.90

10 - 20m x 0.75

Note In all cases the factors err on the side of caution

Appendix 5 Estimating future concentrations of PM_{10}

Example of calculation.

Primary fraction is calculated by subtracting the secondary fraction of same year and the coarse fraction.

Future concentrations of secondary and primary PM_{10} fractions have been calculated using the year adjustment calculator obtained from www airquality.co.uk v2.2a

2010 estimated PM_{10} concentrations are calculated by adding the coarse fraction, estimated 2010 primary and 2010 secondary fractions together

Coarse fraction = 5.8 $\mu g/m^3$
Secondary fraction 2004 = 4.03 $\mu g/m^3$
2005 = 3.93 $\mu g/m^3$
2010 = 3.43 $\mu g/m^3$

Measured Year	PM_{10} (1.3)	Primary PM_{10} calculation	PM_{10} 2010 estimated calculation	2010 PM_{10}
2005 Haymarket	18.2	18.2 - 5.8 - 3.93 = 8.47	8.47 (2005) = 7.7 (2010) 7.7 + 5.8 + 3.43 = 16.9	16.9
2005 Roseburn	18.0	18.0 - 5.8 - 3.93 = 8.27	8.27 (2005) = 7.52 (2010) 7.52 +5.8 + 3.43 = 16.8	16.8
2005 Queen St/ North Castle	18.9	18.9 - 5.8 - 3.93 = 9.17	9.17 (2005) = 8.33 (2010) 8.33 + 5.8 + 3.43 = 17.6	17.6
2005 Queen St/ Wymes Pl	26.9	26.9 -5.8 - 3.93 = 17.17	17.17 (2005) = 15.61(2010) 15.61 + 5.8 + 3.43 = 24.8	24.8
2005 Currie	12.0	12.0 - 5.8 - 3.93 = 2.27	2.27 (2005) = 2.06 (2010) 2.06 + 5.8 + 3.43 = 11.3	11.3
2004 Haymarket Partisol	17.1	17.1- 5.8 - 4.03 = 7.27	7.27 (2004) = 6.72 (2010) 6.72 + 5.8 + 3.43 = 15.95	16.0

Appendix 6 Inputs DMRB to estimate 2010 PM_{10} concentrations

Location	PM_{10} bckgrnd	Speed km/hr	Distance from link centre to receptor	AADT combined	Road type	% HGV	Link
City By Pass Dreghorn	13.5 12.2 A	60	25.0	72868	A	4	1
Glasgow Rd Gogar Mount	14.0 12.6 A	50	180	46633	A	10	1
Roseburn Terrace	14.6 13.1 A	30	16.0	25269	A	12.8	1
Queen St	15.7 14.1 A	40	14.0	37356	A	2	1
Haymarket Terrace	15.4 13.9 A	40	14.2	24049	A	13.5	1
West Maitland St	16.1 14.5 A	40	12.1	20785	A	14.0	1
St Johns Road Clermiston Road	14.1 12.7A	30 30	8.2 8.8	24852 9840	A B	9.8 0.1	2
Ferry Road	13.9 12.5A	40	9.2	19000	A	8.1	1
London Road	15.1 13.6A	40	9.2	18184	A	11.7	1
Leith Walk	15.3 13.8A	40	14	26137	A	13.9	1
Dalry Road	16.1 14.5 A	40	8.8	15404	B	12.0	1
Gorgie Road	15.4 13.9 A	30	7.1	15969	B	8.2	1
West Port	16.1 14.5 A	30	5.3	13000	B	5.2	1
Gt Junction St (Leith)	15.3 13.8 A	30	9.4	12992	B	12.2	1
Bernard St (Leith)	13.4 12.1 A	30	5.8	18946	B	9.2	1
Morningside Road	14.1 12.7 A	30	8.6	15887	B	6.5	1
Dalkeith Road	14.1 12.7 A	40	8.8	15674	B	6	1

A8 Glasgow Rd Newbridge	16.8 15.1A	50	18.1	44262	A	3.1	1

Key

A = Adjusted PM_{10} 2010 background concentrations.

NOTE All traffic Data was supplied by City Development and the Scottish Executive based on 2004 and 2005 counts.

City centre traffic is considered to be stablised. Tram route will go through AQMA.

Appendix 7 Assessment of petrol stations regarding their impact on atmospheric concentrations of benzene.

Site	Address	Distance to closest relevant receptor metres	Throughput of petrol litres x10^6	Traffic volume 24 AADT
Canonmills (Esso)	23 Canonmills	16	5.8	17076
Parkgrove (Shell)	527 Queensferry Rd	47	2.8	42469
Craigleith (Shell)	135-139 Craigleith Rd	30	1.2	<30000*
Sainsburys	185 Craigleith Rd Retail park	92	8.4	<30000*
Safeway Stores	791 Ferry Rd	57	7.4	19000
Circle (Shell)	143 Crewe Rd South	30	2.7	< 20000*
Windmill (Esso)	102 Queensferry Rd	33	3.5	42469
Ferry Rd (BP)	77 Ferry Rd	16	2.04	19000
Bonnington fuels	14 Ashley Pl	50	Diesel only	
Leith (Shell)	7 Seafield Rd	77	4.6	24039
Abbeymount	11-23 Montrose Terr	18	2.03	<20000*
Steven Turner	126 Restalrig Rd	20	0.30	<20000*
Safeway Stores	4 Piersfield Terr	21	4.8	18184
Braefoot (Tesco)	226 Willowbrae Rd	28	3.7	20119
Kennett (Shell)	2- 40 Ratcliffe Terr	20	3.9	<20000*
BP Links	21- 23 Barclay Pl	12.7	2.34	16726
Braidburn	166 Comiston Rd	55	4.7	14554
Star (Texaco)	187 Slateford Rd	38	2.39	23654
Stenhouse (Shell)	1 Stenhouse Rd	23	3.68	27010
Dalry (Shell)	209 Dalry Rd	25	2.21	<30000*
Napier (BP)	382 Calder Rd	27	3.01	36280
Westfield	27 Westfield Rd	70	1.04	<30000*
Drum Brae	30 Drum Brae South	25	2.9	20860
Bowmac (Shell)	21 Glasgow Rd	31	5.7	46968
Safeway Stores	47 Gyle Avenue	259	8.4	>30000*
Maybury (Shell)	166 Glasgow Rd	78	3.6	46968
Tesco Stores	Meadow Pl Rd	43	8.8	<30000*
Dreghorn	50 Dreghorn Link	97	5.0	53860
Firrhill	Colinton Mains Dr	60	5.9	<30000*
Tesco Stores	14- 32 Colinton Mains Dr	20	8.3	<30000*
Rosebank	57 Lanark Rd West	14.6	3.28	16562
Wester Hailes	50 Murrayburn Rd	96	2.0	<30000*
Thimblehall	23 Lanark Rd	27	2.5	17000
Asda	100 Jewel	130	7.8	>30000*
Claymore (Jet)	5-15 Portobello High St	40	2.5	<30000*
Safeway Stores	406 Gilmerton Rd	50	4.96	12982
Savacentre	Cameron Toll Lady Rd	80	5.9	<30000*
Liberton (Shell)	31 Liberton Rd	30	2.28	<30000*
Jet Liberton	105 Liberton Gdns	20	2.6	<30000*
Little France	211 Old Dalkeith Rd	20	3.0	15575
Ingliston (BP)	Glasgow Rd	56	4.0	44262
Cliftonhall	1 Cliftonhall Rd	174	2.33	
Forth Rd (Shell)	1 Ferrymuir Gait	41	5.0	
Leith STS service	Leith Terminal Imperial Dock	>300	>5.0	Site vehicles

Appendix 8 Maps