THE CITY OF EDINBURGH COUNCIL

2014 Air Quality Progress Report for City of Edinburgh Council

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

August 2014

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Executive Summary

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

Nitrogen Dioxide

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

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

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

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

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

Particulate Matter (PM_{10})

PM_{10} data from all monitoring locations in 2013 meet the EU limit values and UK National objectives. The background sites at St Leonards and Currie meet the tighter

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

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

Trend

Historically it has proved difficult to formulate reliable assumption on data trends for both NO_2 and PM_{10} due to disruptions to normal traffic flows, arising from construction work associated with the Edinburgh Trams. With construction now complete, the Local Authority has agreed to undertake a period of monitoring to assess traffic movements. It is anticipated that this will occur over a period of twelve months to allow for conditions to normalise.

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

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

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

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

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

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

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

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

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1 Introduction

1.1 Description of Local Authority Area

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

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

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

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

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

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

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

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

1.2 Purpose of Progress Report

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

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

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

1.3 Air Quality Objectives

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

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	3.25 µg/m^3	Running annual mean	31.12.2011
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2011
	18 µg/m^3	Annual mean	31.12.2011
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

The UK Review and Assessment process of Local Air Quality Management (LAQM) commenced in 1997.

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

Table 1.2 Summary of previous Review and Assessments

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

Round / Report		Date	Outcome
	Assessment Report		AQMA declared for St John's Rd 31.12.2006
3	**Detailed Assessment for Nitrogen Dioxide at Great Junction St and West Port**	2007	AQMA required for NO_2 at Gt. Junction Street and West Port. West Port also likely to not meet hourly NO_2 objective. Council to explore various options to extend existing Central AQMA to cover both areas or West Port. Declare two separate AQMAs. Preferred option to extend Central AQMA.
3	**Air Quality Progress Report.**	2008	NO_2 exceedences within AQMAs. Number of locations also did not meet hourly mean objective. Based on 2007 data predictions EU limit values are likely to be exceeded within AQMAs. Exceedences of NO_2 at Bernard St, Commercial St, Ferry Rd, Easter Rd, London Rd, Hope Park Terrace, Glasgow Rd. Detailed Assessment required. City-wide Detailed Assessment required for PM_{10} due to exceedences of Scottish Air Quality Objectives using 1.14 local gravimetric factor. AQMA declared for Gt. Junction Street 09.03.2009 to include area of exceedence on Ferry Road. Central AQMA amended to include West Port and exceedences of hourly mean NO_2objective.St John's Rd AQMA amended to include exceedence of hourly mean NO_2
3	**Air Quality Action Plan**	2008	Revised, Congestion charge removed as an action. Include St John's Road AQMA
4	**Updating and Screening Assessment**	2009	NO_2 exceedences within AQMAs. Existing AQMAs remain valid. NO_2 annual exceedences noted at Glasgow Rd, Easter Rd, London Rd, Bernard St, Grassmarket, Cowgate, Queensferry Rd/ Barnton and Hillhouse Rd. Potential exceedences of NO_2 at Hope Park Terrace, Broughton Rd and Commercial Street. City-wide Detailed Assessment for PM_{10} required, which will address the four biomass installations and poultry farm complex at Gogarburn. Most congested main roads in

Round / Report		Date	Outcome
			city centre are likely to exceed Scottish annual objective for PM_{10} based on monitoring at Queen Street, Haymarket and DMRB modelling.
4	**Progress Report**	2010	NO_2 exceedences within all 3 AQMAs. AQMAs remain valid. Exceedences of NO_2 at, Portobello High St, Inverleith Row, Bernard Street, Glasgow Road, Easter Road, London Road, Queensferry Road, Grassmarket. Potential exceedences at, Broughton Rd, Commercial St, Hope Park Terrace, Cowgate, Hillhouse Road.
4	**Further Assessment:** **St John's Road** **West Port (extension of Central AQMA)** **Great Junction Street**	2011	NO_2 exceedence within 3 AQMAs, which remain valid. Source apportionment –Within local vehicle fleet, buses contribute the greatest percentage of the measured NO_2 at St John's Rd and Gt. Junction St, whilst at West Port the greatest contribution is attributed to cars. % Range of roadside NO_X reduction required to meet NO_2 Annual Mean Objective ($40\mu g/m^3$). Using both UK and Scottish (SG) background maps. Gt. Junction St UK 40.7% SG49.9% St John's Rd UK 70.6%SG76.8% West Port UK 74.9% SG86.4%
4	**Progress Report**	2011	NO_2 exceedences in all 3 AQMAs. Existing AQMAs remain valid.NO_2 exceedences outwith existing AQMAs – London Road, Easter Road, Grassmarket, Cowgate, Bernard Street, Hope Park Terrace, Queensferry Road, Glasgow Road, Inverleith Row, Hillhouse Road Angle Park Terrace, Slateford Road, Fountainbridge / Tollcross and Gorgie Road / Delhaig.NO_2 potential exceedences identified at Broughton Road, Ferry Road, Commercial Street, Salamander Street/Bath St and Portobello High St. NO_2 Detailed Assessment work being progressed at Queensferry Road, Portobello,

Round / Report		Date	Outcome
			Inverleith Row and required for Hope Park Terrace / Clerk Street junction, Hillhouse Road, Slateford Road, Fountainbridge / Tollcross and Angle Park Terrace Extend Central AQMA and & Great Junction St AQMA for exceedences of NO_2 Declare Glasgow Road/Newbridge for exceedences of NO_2
5	**Updating and Screening Assessment**	2012	NO_2 exceedences in all 3 AQMAs. Existing AQMAs remain valid. Exceedences in proposed new Glasgow Road AQMA and extensions to existing Central and Great Junction Street AQMAs. Other exceedences at Inverleith Row, Queensferry Road, Portobello Road and Angle Park Terrace. Potential exceedences of NO_2 identified at Slateford Road, Fountainbridge/Tollcross, Hope Park Terrace, Hillhouse Road, Salamander Street/Baltic, Salamander Street/Bath Road and Ferry Road. Ongoing Detailed Assessment work at Hope Park Terrace/Clerk Street, Hillhouse Road, Slateford Road, Fountainbridge/Tollcross and Angle Park Terrace. Progress with declaration of Glasgow Road AQMA and extensions of Central and Great Junction Street AQMAs. Declare AQMA at Inverleith Row for exceedences of annual mean objective for NO_2
5	**Progress Report**	2013	**NO_2** exceedences in all 3 AQMAs. Existing AQMAs remain valid. Exceedences outwith AQMAs at Queensferry Road, Angle Park Terrace, Slateford Road, Nicolson Street and South Clerk Street. Potential exceedences of NO_2 identified at Broughton Road, Queensferry Road, Hope Park Terrace, Ferry Road, Salamander Street and Fountainbridge. Detailed Assessment work in relation to Clerk Street & Angle Park Terrace not concluded due to complications originating from temporary traffic management arrangements. Ongoing Detailed Assessment at Portobello Road & Fountainbridge.

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

Table 1.3 Descriptions of AQMAs

Description AQMA / Declaration (Date)	Pollutant / Source	Amendments
Central AQMA **31/12/2000** Includes area of City Centre and main arterial routes leading into the city centre. Exceedences mostly in locations where there are street canyons, high percentage of bus movements and congested traffic. Residential properties at basement, ground, first, second, third, and fourth level, 2 - 4 metres from road edge. Busy shopping areas include Princes Street, George Street, Dalry/Gorgie Rd, Leith Walk, North Bridge, West Port, Grassmarket, London Road and Easter Road. Upwards road gradient Leith Walk, North Bridge (south bound) & West Port.	**NO_2** **Traffic**	***09/03/2009*** Extended to include West Port - Amended to cover hourly breach as well as annual breach of NO_2 air quality objective **26/04/2013** Extended to include Gorgie Road / Chesser, Grassmarket/Cowgate and London Road/Easter Road.
St John's Road **31/12/2006** Part of the A8 route at Corstorphine area. Residential properties at ground, first, second, third and fourth floor level within 2m of kerb edge. Street canyon effect in part. Busy shopping area. Congested flat road with high percentage of bus movements.	**NO_2** **Traffic**	**09/03/2009** Amended to cover hourly breach as well as annual breach of NO_2.
Great Junction Street **09/03/2009** The full length of road to the depth of the building facades, including the Ferry Road Junction area. Residential properties at first, second, third and fourth floor level. Street canyon, congested traffic and busy shopping area.	**NO_2** **Traffic**	**26/04/2013** Extended to include Bernard Street, Commercial Street and North Junction Street.

Description AQMA / Declaration (Date)	Pollutant / Source	Amendments
Receptors close to road edge. High percentage of bus movements.		
Glasgow Road **26/04/2013** Part length of A8, between Newbridge Roundabout and Ratho Station, to the depth of the building facades.	**NO_2** **Traffic**	
Inverleith Row **26/04/2013** The road comprising the junction of Inverleith Row and Ferry Road, to the depth of building facades.	**NO_2** **Traffic**	

Figure 1.1 Map of Central AQMA Boundaries

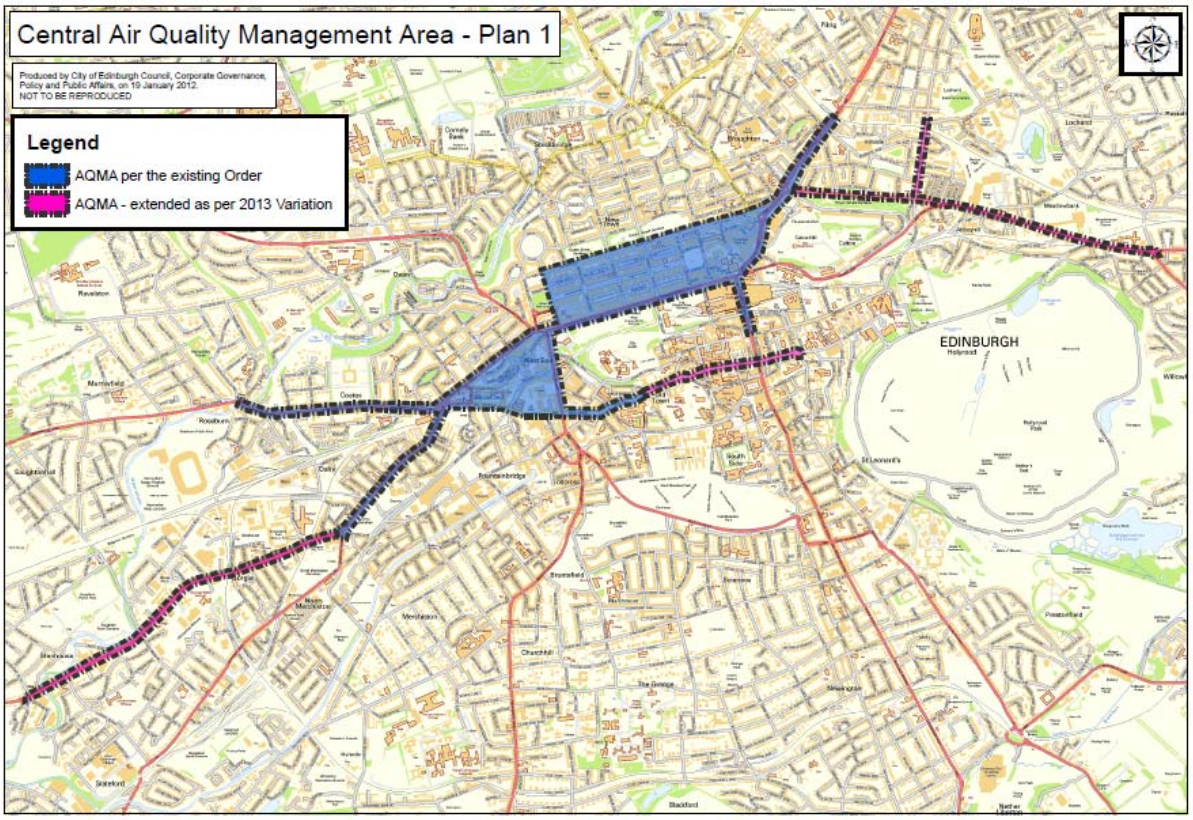


Figure 1.2 Map of St. John's Road AQMA Boundaries

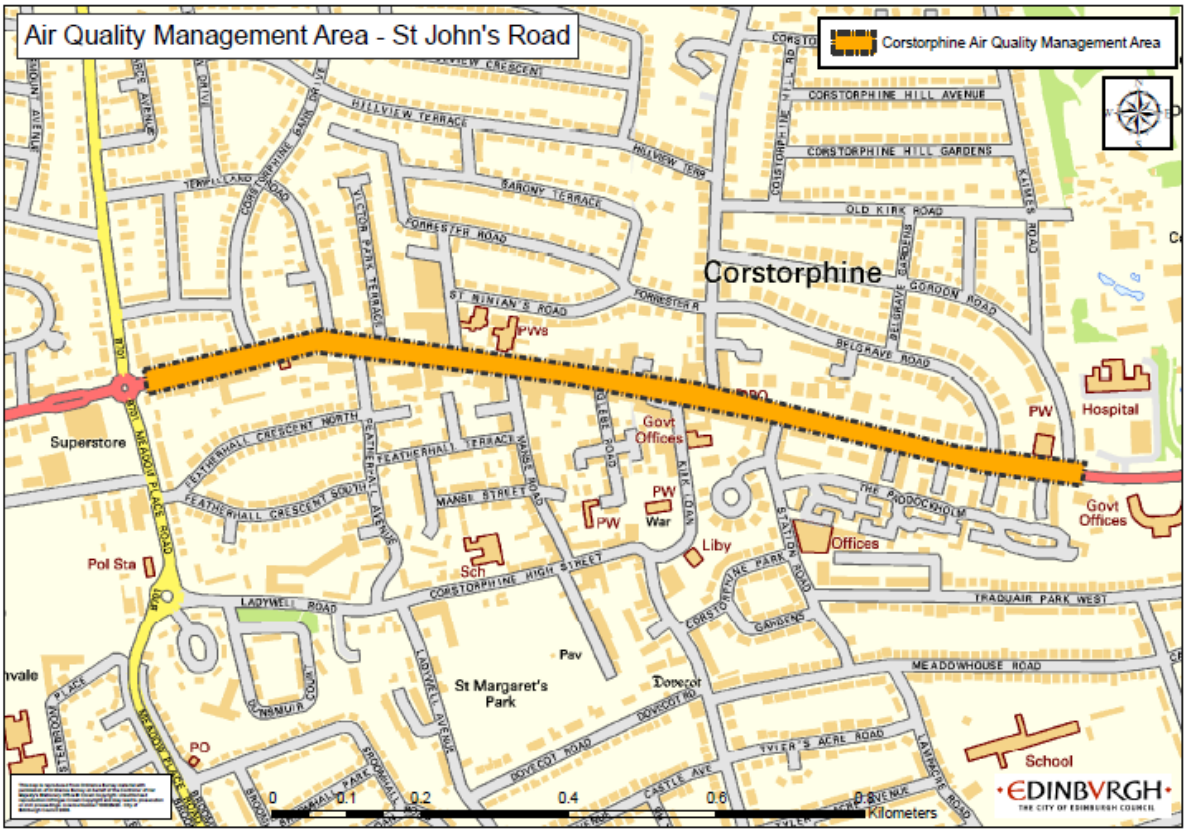


Figure 1.3 Map of Great Junction Street AQMA Boundaries

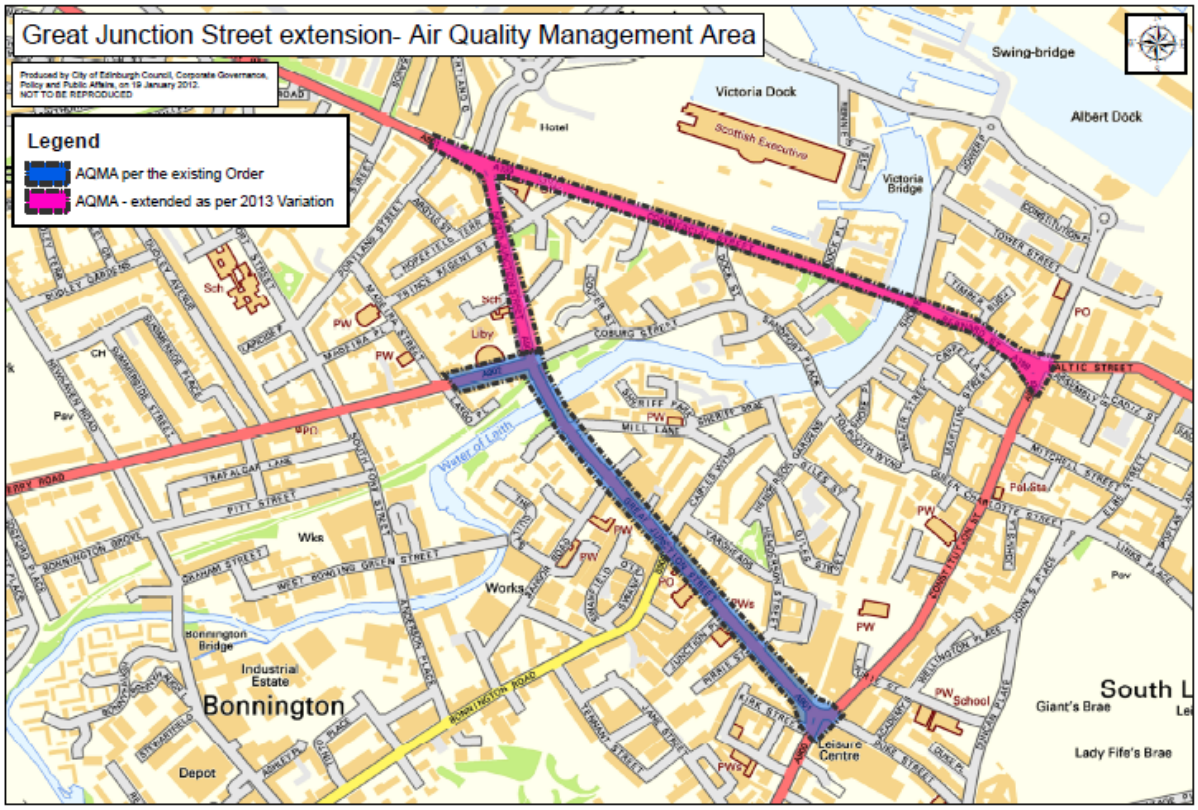


Figure 1.4 Map of Glasgow Road AQMA Boundaries

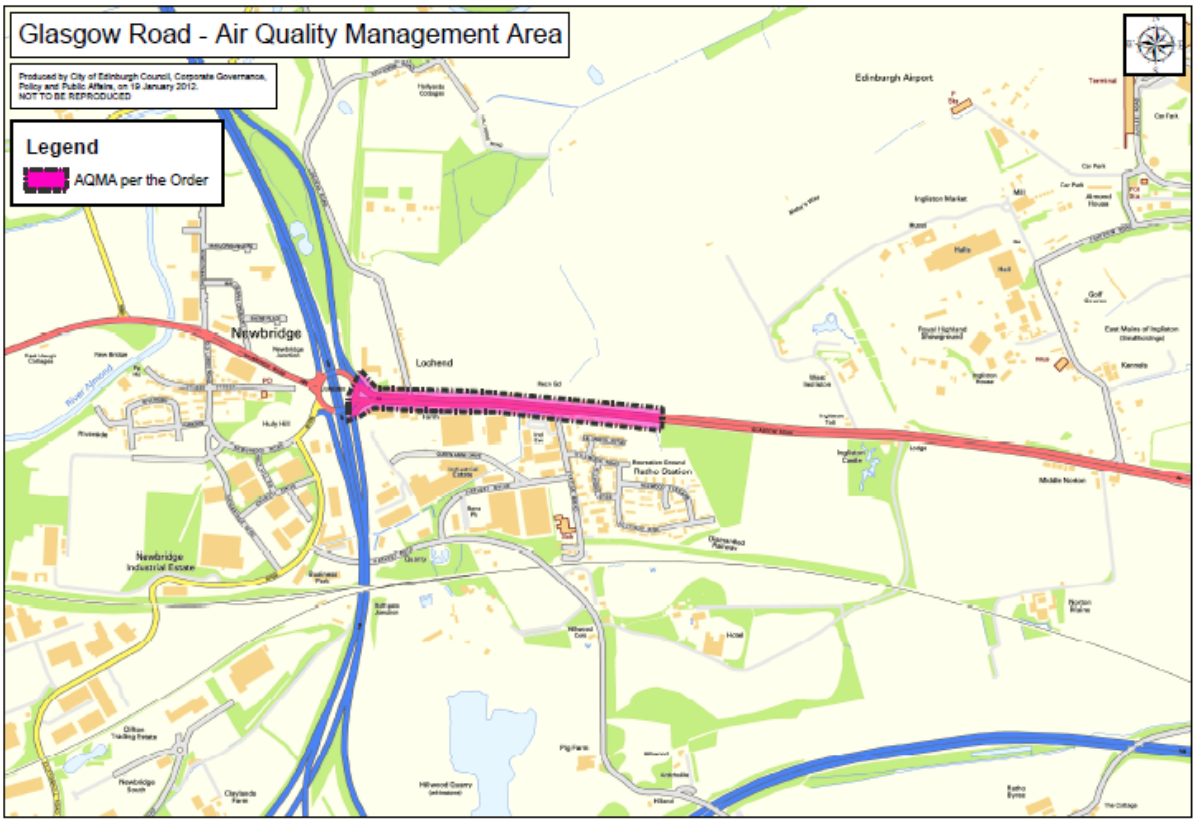
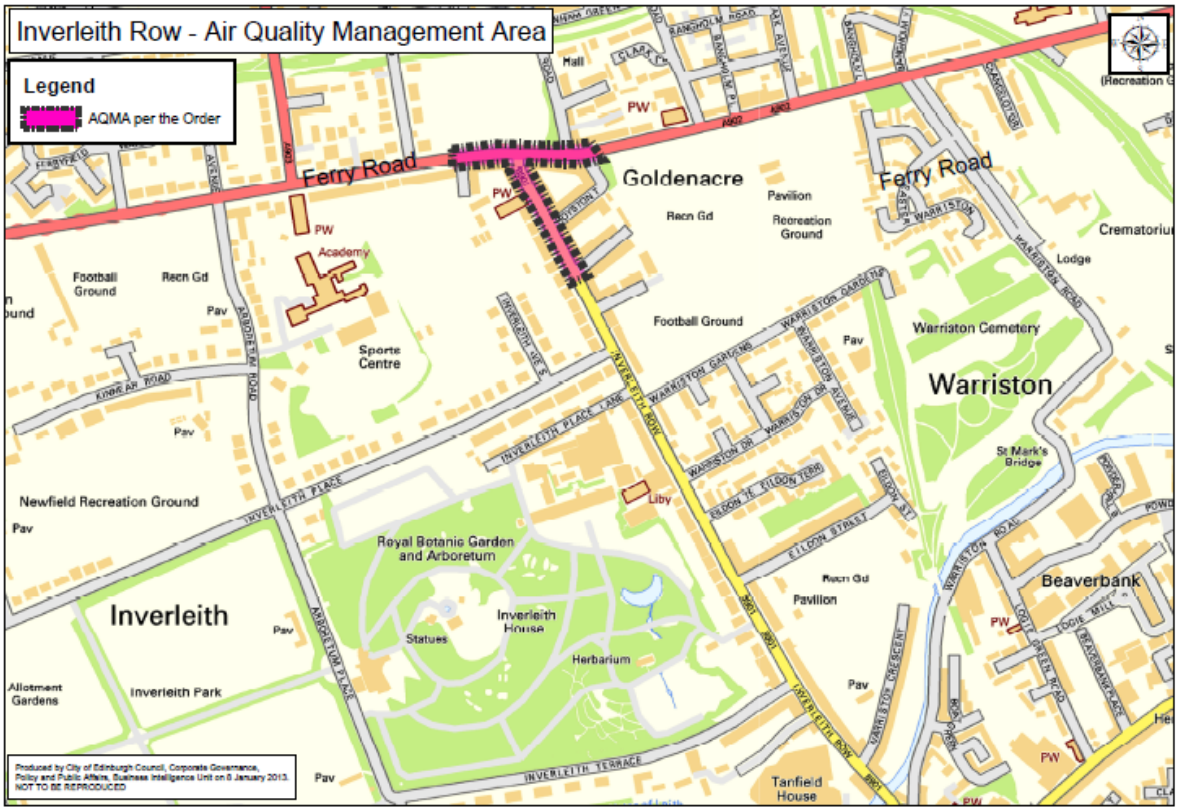


Figure 1.5 Map of Inverleith Row AQMA Boundaries



Developments since Progress Report 2013

Nitrogen Dioxide

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

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

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

A simple visual comparison of the degree of contribution from each vehicle class is provided in Table 1.5 (overleaf). The report concluded that it will be necessary for future action planning to keep most motor vehicle classes under consideration for actions to improve air quality in these areas. The required reduction in NO_x emissions from local roads to attain the annual mean nitrogen dioxide Air Quality Objective were also defined and are reproduced below:

Table 1.4 Required reduction of NO_x from local roads to meet annual mean Nitrogen Dioxide Air Quality Objective

Central AQMA	
Cowgate	17%
Easter Road	26%
Gorgie Road/ Chesser	12%
Grassmarket	25%
London Road	30%

Great Junction Street AQMA	
Bernard Street	21%
Glasgow Road AQMA	
Newbridge junction	43%
Ratho Station	35%
Inverleith Row/Ferry Road AQMA	
Inverleith Row	28%

Table 1.5 Visual comparison of each vehicle class contribution to Overall Local Road NO_2 Concentrations in AQMAs

Degree of Contribution from Vehicle Classes operating in AQMAs					
Receptor		**Cars**	**LGVs**	**HGVs**	**Buses**
Central AQMA extensions					
48	Cowgate	■ ■ ■ ■	■ ■	■ ■ ■	■
37A	Grassmarket	■ ■ ■ ■	■ ■	■ ■ ■	■
25	Easter Road	■ ■ ■ ■	■	■ ■	■ ■ ■
80	Gorgie/Chesser	■ ■ ■	■	■ ■	■ ■ ■ ■
81	London Road	■ ■ ■	■	■ ■	■ ■ ■ ■
Great Junction Street AQMA extension					
29C	Bernard Street	■ ■ ■	■	■ ■ ■ ■	■ ■
Glasgow Road AQMA					
58	Glasgow Road	■ ■ ■ ■	■	■ ■ ■	■ ■
Inverleith Row AQMA					
53	Ferry Road	■ ■ ■ ■	■	■ ■	■ ■ ■
55	Inverleith Row	■ ■ ■	■	■ ■	■ ■ ■ ■

■ ■ ■ ■ = Most significant contribution to local road NO_2

■ ■ ■

■ ■

■ = Least significant contribution to local road NO_2

Particulate Matter PM_{10}

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

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

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

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

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

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

Figure 2.1 Map of Automatic Monitoring Sites

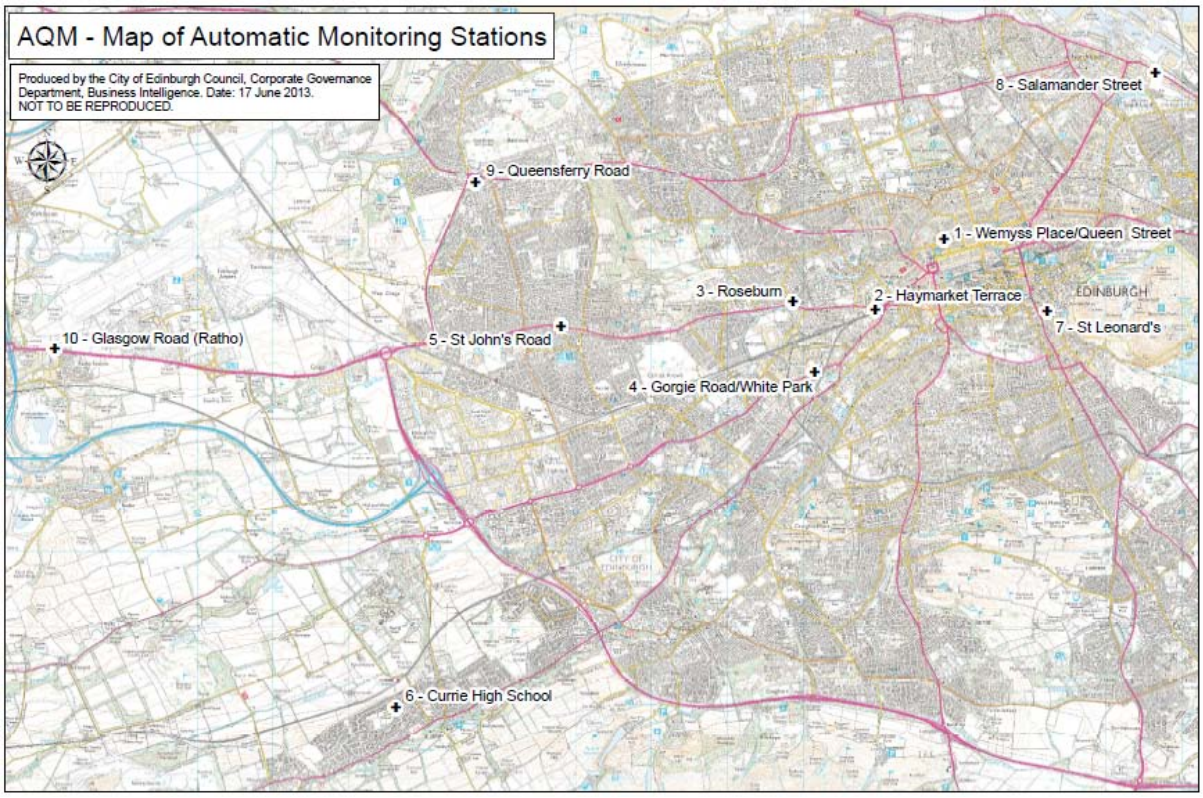


Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
ID1	**Queen Street**	Roadside	324826	674078	2.87	NO_2 PM_{10}	Yes	Chemilum TEOM	Y (façade)	5.2m	Y
ID2	**Haymarket**[1]	Roadside	323896	673197	N/A	NO_2 PM_{10}	Yes	Chemilum TEOM	Y (7m)	9.2m	N
ID3	**Roseburn**[1]	Roadside	322939	673233	n/a	NO_2 PM_{10}	Yes	Chemilum TEOM	Y (4.9m)	7.6m	N
ID4	**Gorgie Road**	Roadside	323121	672314	2.63	NO_2	Yes	Chemilum	Y (façade)	2.5m	Y
ID5	**St. John's Road**	Kerbside	320101	672907	1.98	NO_2	Yes	Chemilum	Y (1.35m)	0.5m	Y
ID6	**Currie High School**	Suburban	317595	667909	3.59 3.24	NO_2 PM_{10}	No	Chemilum TEOM	Y (rear of school)	N/A	N/A

Continued overleaf/...

Site ID	Site Name	Site Type	X OS Grid Ref.	Y OS Grid Ref.	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
ID7	**St. Leonard's**	Urban Back-ground (AURN)	326265	673129	3.4m - 3.2m - 3.1m - 3.4m - 3.4m - 3.4m - 3.4m -	NO_2 PM_{10} $PM_{2.5}$ O_3 CO SO_2 PAH	No	Chemilum FDMS FDMS UV absorp IR absorp UV absorp Digitalsamp	Y (29.0m)	26m	N/A
ID8	**Salamander Street**	Roadside	327615	676333	2.86	NO_2 PM_{10}	No	Chemilum TEOM	Y (façade)[2]	2.13m	Y
ID9	**Queensferry Road**	Roadside	318736	674930	2.96	NO_2 PM_{10}	No	Chemilum TEOM/FDMS	Y (6.5m)	1.7m	Y
ID10	**Glasgow Road**	Roadside	313103	672663	2.84	NO_2 PM_{10}	Yes	Chemilum TEOM	Y (facade) [2]	6m	Y

[1] Historic monitoring location now decommissioned

[2] Adjacent residential properties which are same distance from roadside as the monitoring station

Table 2.1a Description of Automatic Monitoring Locations

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

2.1.2 Non-Automatic Monitoring Sites

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

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

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

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

- A1 Nitrogen Dioxide (NO_2) Diffusion tube bias adjustment factors
- A2 NO_2 Bias Adjustment Factor from Local Co-location studies
- A3 Discussion of Choice of factor to use
- A5 Short-term to Long-term data adjustment for NO_2
- A7 QA/QC of diffusion tube monitoring.

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

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

Table 2.2 Details of Non- Automatic Monitoring Sites

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

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

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

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

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

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

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

Notes for table excluding site ID column:

a Amendments made to details following review

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

c Site relocated in 2013 in close proximity to previous site

d New monitoring location in 2013

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

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

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

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

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

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

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

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

Notes for table;

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

a i.e. data capture for the full calendar year.
b Mean "annualised" as valid data capture is less than 75%.

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

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

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

Notes for table;

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

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

Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites

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

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

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

Monitoring Location	Site Type	Trend in annual mean NO_2 (years included)	Concentrations of NO_2
St Leonard's	Urban background	↓ (2004 to 2013)	Decreasing
Queen Street	Roadside	↓ (2006 to 2013)	Decreasing
Gorgie Road	Roadside	↓ (1999 to 2013)	Slight Decrease
St John's Road	Kerbside	↓ (2007 to 2013)	Decreasing
Salamander St	Roadside	↓ (2009 to 2013)	Slight Decrease

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

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

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

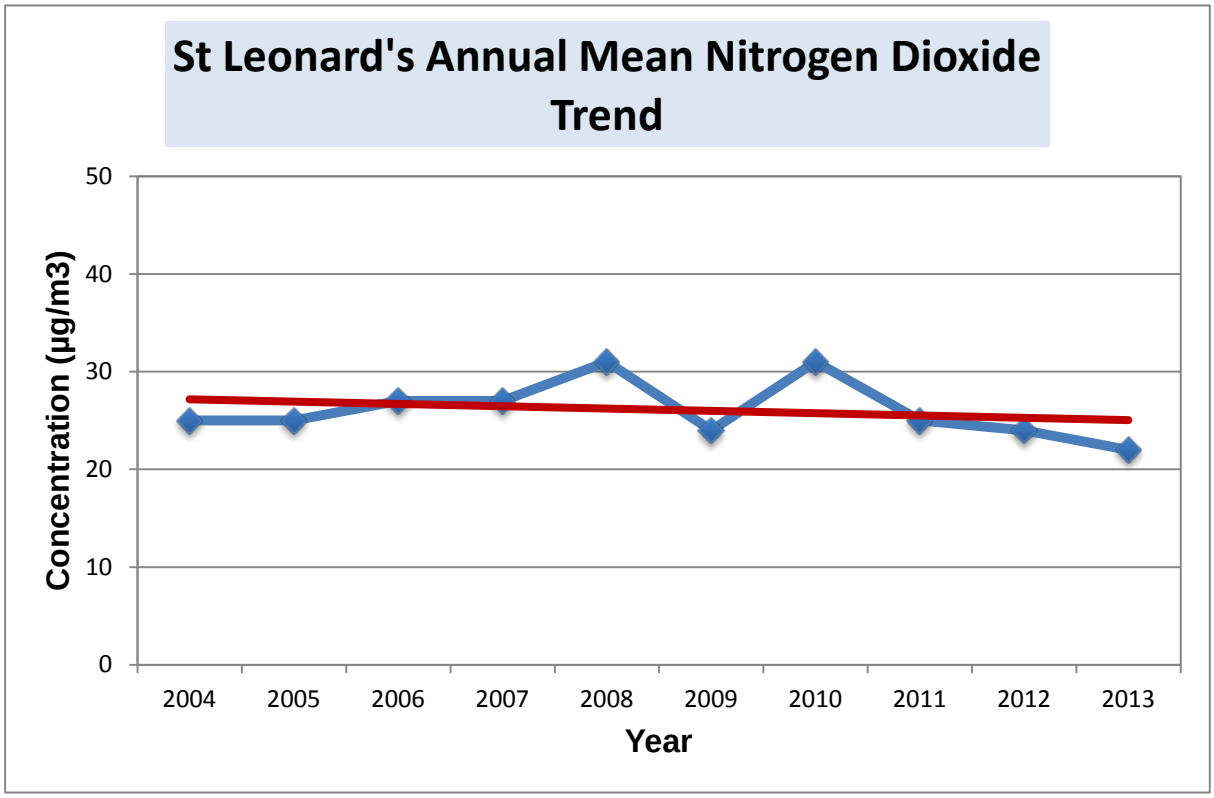


Figure 2.4 Trend in Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) measured at Queen Street

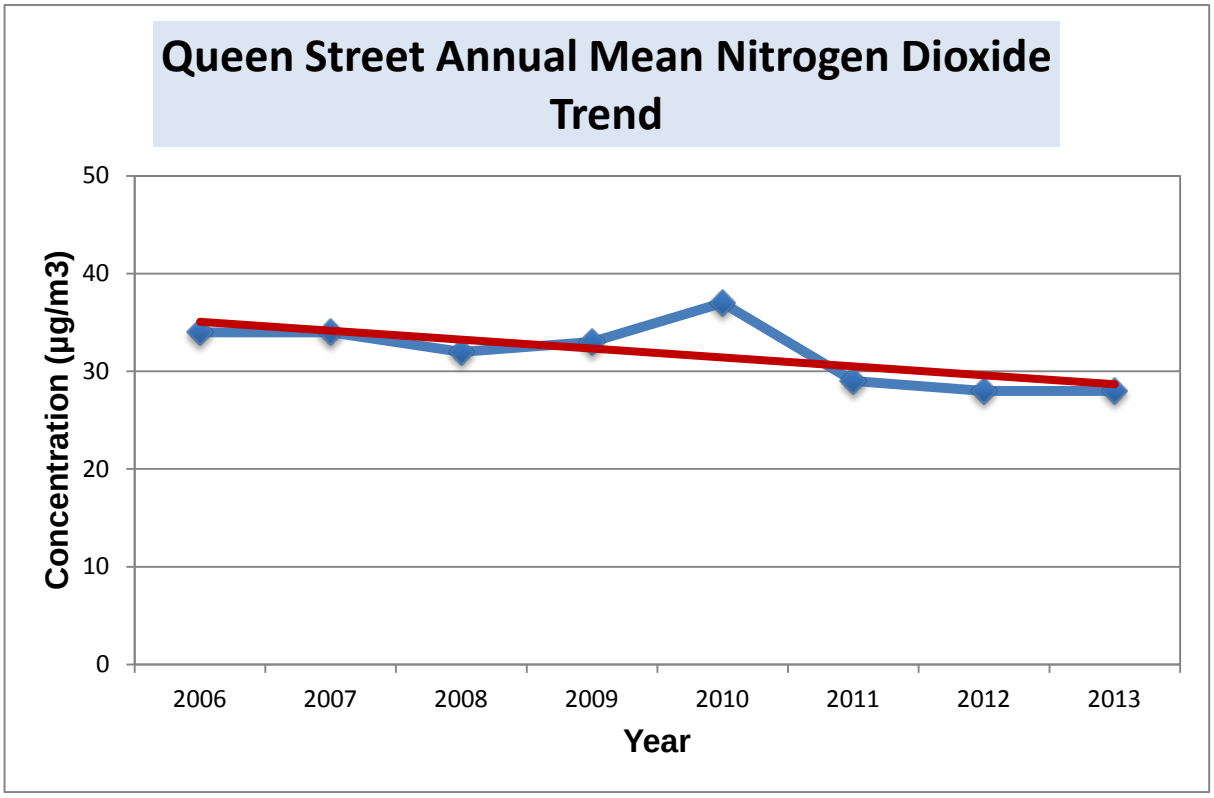


Figure 2.5 Trend in Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) measured at Gorgie Road

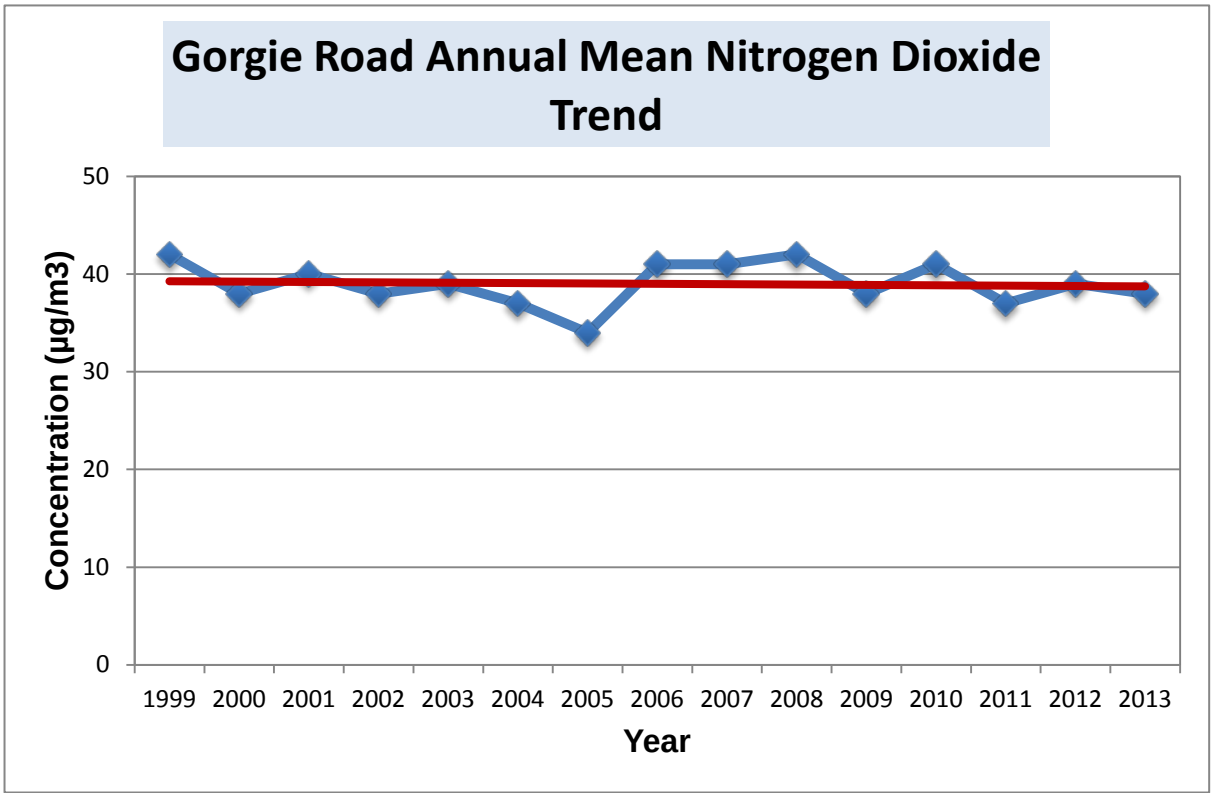


Figure 2.6 Trend in Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) measured at Salamander Street

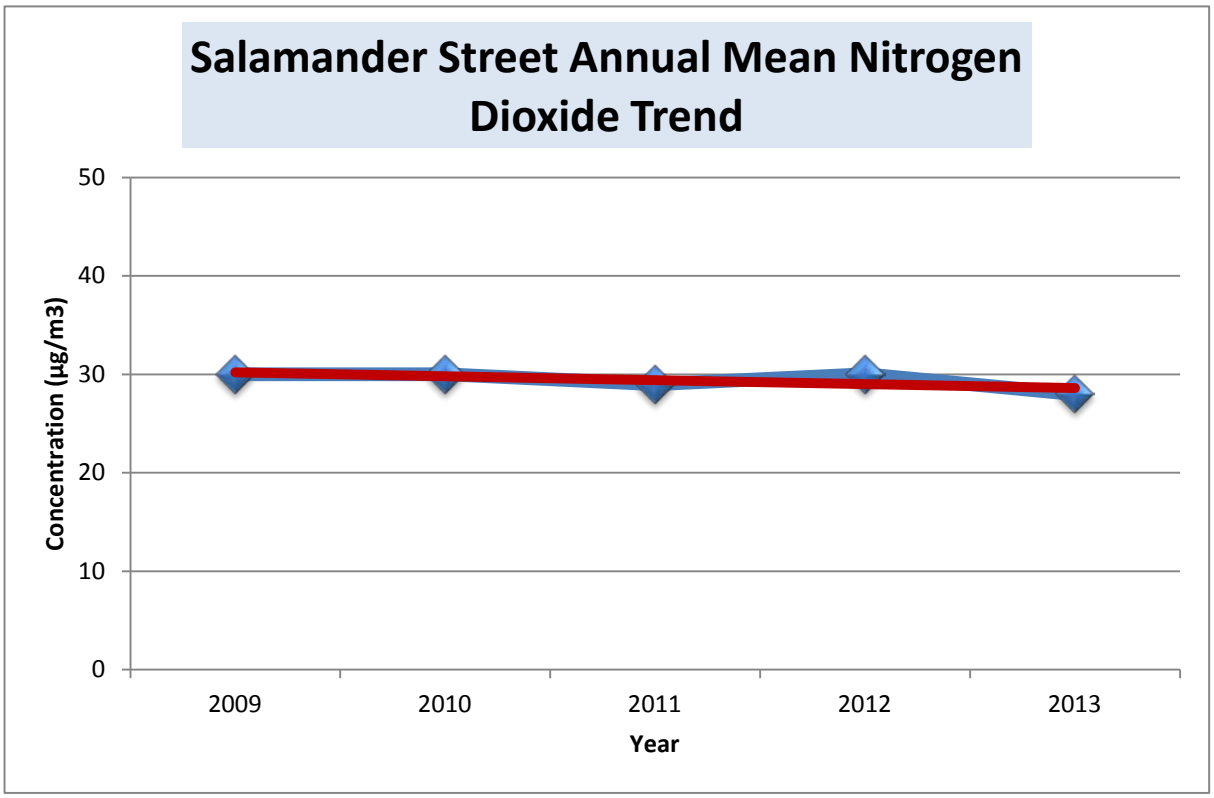


Figure 2.7a Trend in Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) measured at St John's Road

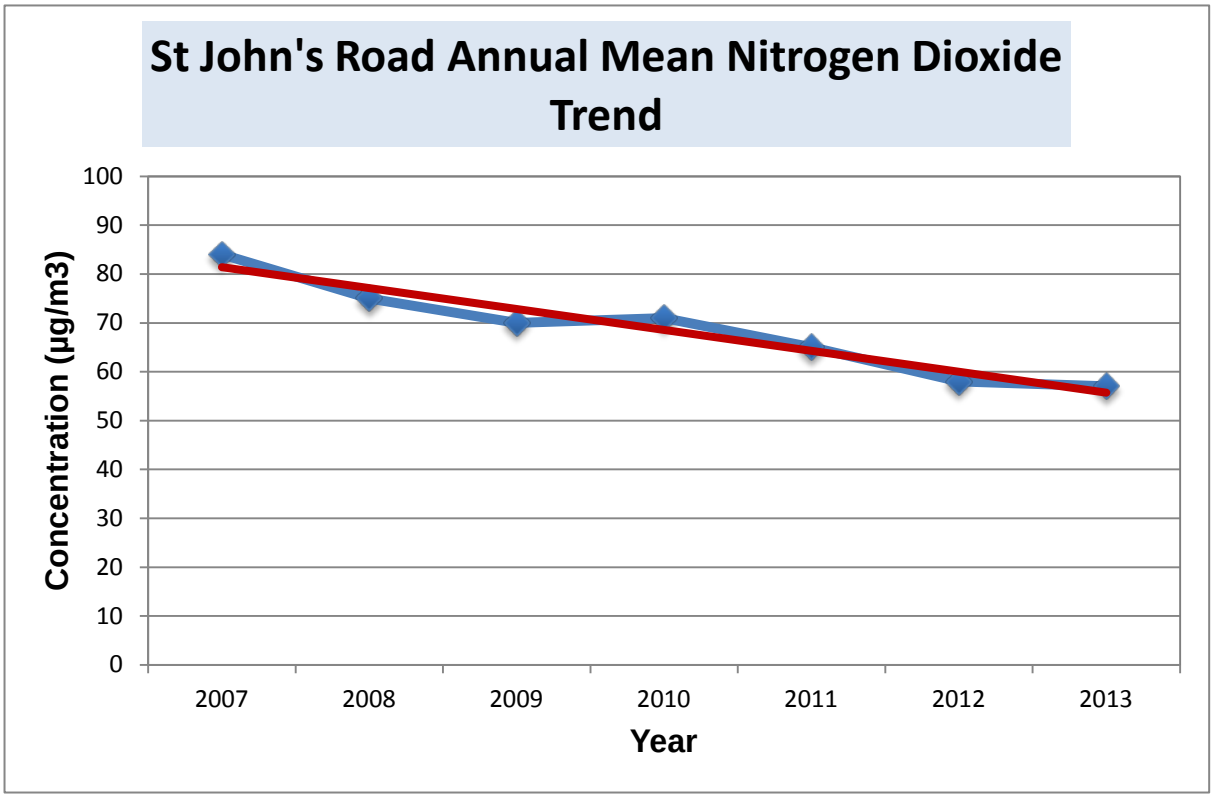
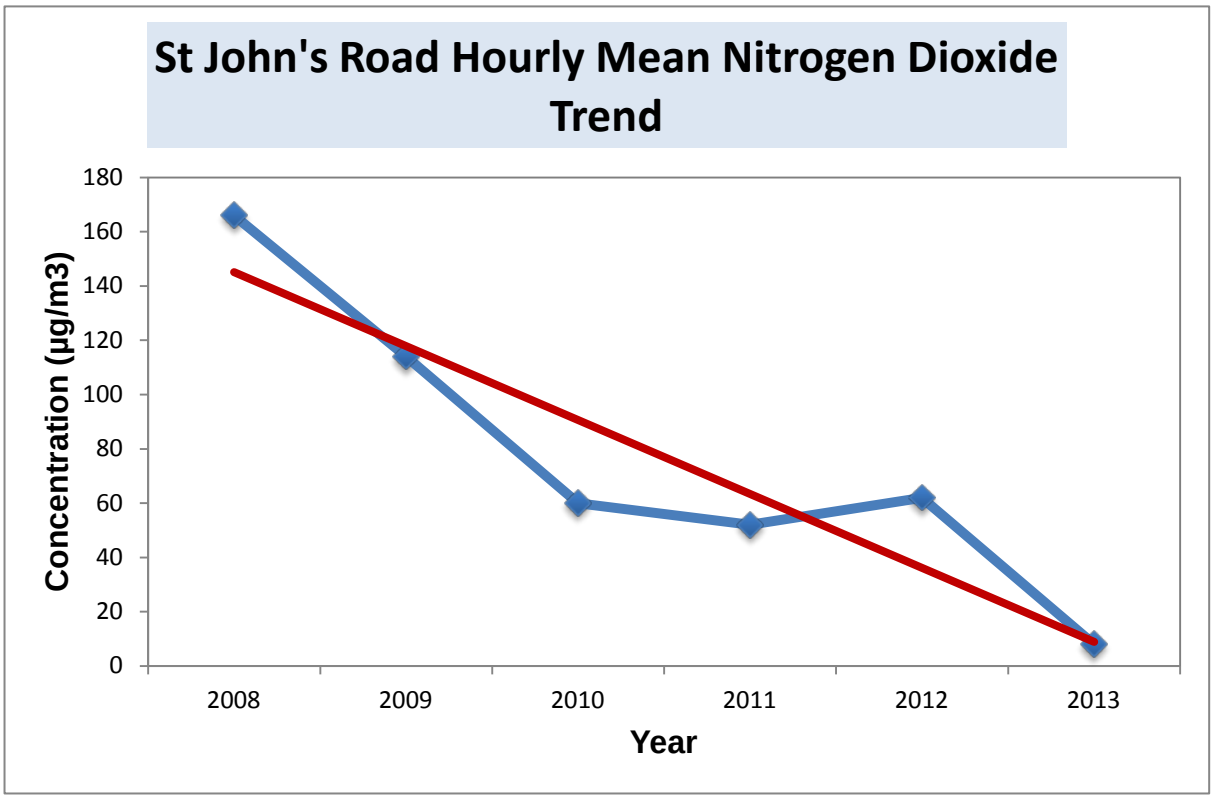


Figure 2.7b Trend in the Number of Exceedences of the Hourly Mean Objective for Nitrogen Dioxide at St John's Road



Diffusion Tube Monitoring Data

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

Exceedences - Within the AQMAs

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

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

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

Exceedences - Outwith the AQMAs

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

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

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

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

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

Potential exceedences

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

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

At Queensferry Road/Hillhouse Road (ID40) and Broughton Road (ID43) monitoring resulted in concentrations of 37μg/m^3 at the nearest relevant receptors. Monitoring will continue at these sites.

New monitoring at Balgreen has resulted in borderline concentrations of 36 and 37μg/m^3, representative of the school/nursery play areas. Monitoring will continue at these locations as a precautionary measure. At Hamilton Place, site ID143a is also

representative of the adjacent school play area. Data shows concentrations well below the annual mean objective (34μg/m^3).

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

General notes

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

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

The bias adjustment factor for 2013 is 0.75 which is the lowest since monitoring commenced. Appendices A2 and A3 describe in detail the assessment involved in

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

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

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

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

Appendix A5 (Short-term to Long-term Data adjustment for NO_2) shows the calculations undertaken to estimate the annual mean concentration where data capture was poor, as per instruction in Technical Guidance 09 and with further advice from the LAQM Helpdesk.

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

Table 2.5 Results of NO_2 Diffusion Tubes 2013

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

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

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

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

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

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

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

Notes for table; In bold and red, exceedence of the NO_2 annual mean objective of 40µg/m^3 and in bold black, results of 40µg/m^3shown.

a All data is representative of relevant exposure, except at background sites [India Street (ID34), Hillview Terrace (ID41), Midmar Drive (ID42) and Baileyfield Road (ID19)] which are not distance corrected.

b Means “annualised” as in Box 3.2 of TG(09), where full calendar year data capture is less than 75%

c New monitoring location 2013

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

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

* New monitoring locations not previously reported

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

Table 2.7 Results of NO_2 Diffusion Tubes (2008 to 2013)

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

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

Site ID	Site Name	Within AQMA ?	Annual mean concentration (adjusted for bias) µg/m^3					
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.81)	2012 (Bias Adjustment Factor = 0.76)	2013 (Bias Adjustment Factor = 0.75)
73a	**Portobello Road/Ramsay Inst**	No	-	-	-	**41.6**	37	37
73d	**Portobello Road/Ramsay F**	No	-	-	-	-	-	38
73e	**Portobello Road/Ramsay 2**	No	-	-	-	-	-	35
73f	**Portobello Road /College Court**	No	-	-	-	-	-	19
73g	**Portobello Road/Inchview Terr**	No	-	-	-	-	-	28
72	**Seafield Road East No10**	No	-	35.0	38.4	33.1	37	36
72a	**Seafield Road East No. 7**	No	-	-	-	-	-	35
	CITY CENTRE - NORTH							
43	**Broughton Road**	No	**40.4**	38.1	39.8	34.6	37	37
44	**Broughton Street**	No	37.7	35.1	35.3	32.8	34	31
13	**Deanhaugh Street**	No	32.3	30.1	33.0	33.5	32	31
35	**Dundas Street**	No	28.9	27.2	31.6	30.6	31	30
74f	**George Street No 112**	Yes	-	-	**43.4**	**44.7**	**47**	34
74e	**George Street/Charlotte Square**	Yes	-	-	**42.6**	**42.5**	**43**	30
75b	**Great Stuart Street 7**	No	-	-	36.2	33.4	31	30
75f	**Great Stuart Street 14**	No	-	-	-	-	-	26
75e	**Great Stuart Street 9**	No	-	-	-	-	-	24
143	**Hamilton Place No 72**	No	-	-	-	-	-	31
143a	**Hamilton Place Library**	No	-	-	-	-	-	34
34	**India Street**	No	22.7	22.6	22.7	23.6	23	21
55b	**Inverleith Row/Summer Place**	No	-	-	-	33.7	32	30
21	**Leith Walk/Brunswick Rd**	Yes	37.3	35.3	35.4	34.2	36	34
20	**Leith Walk/McDonald Rd**	Yes	**53.1**	36.8	38.1	N/A	35	34
47	**Princes Street East Bound**	Yes	**64**	**3**4	**58**	**45.3**	**45**	**50**

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

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

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

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

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

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

All data is representative of relevant exposure.

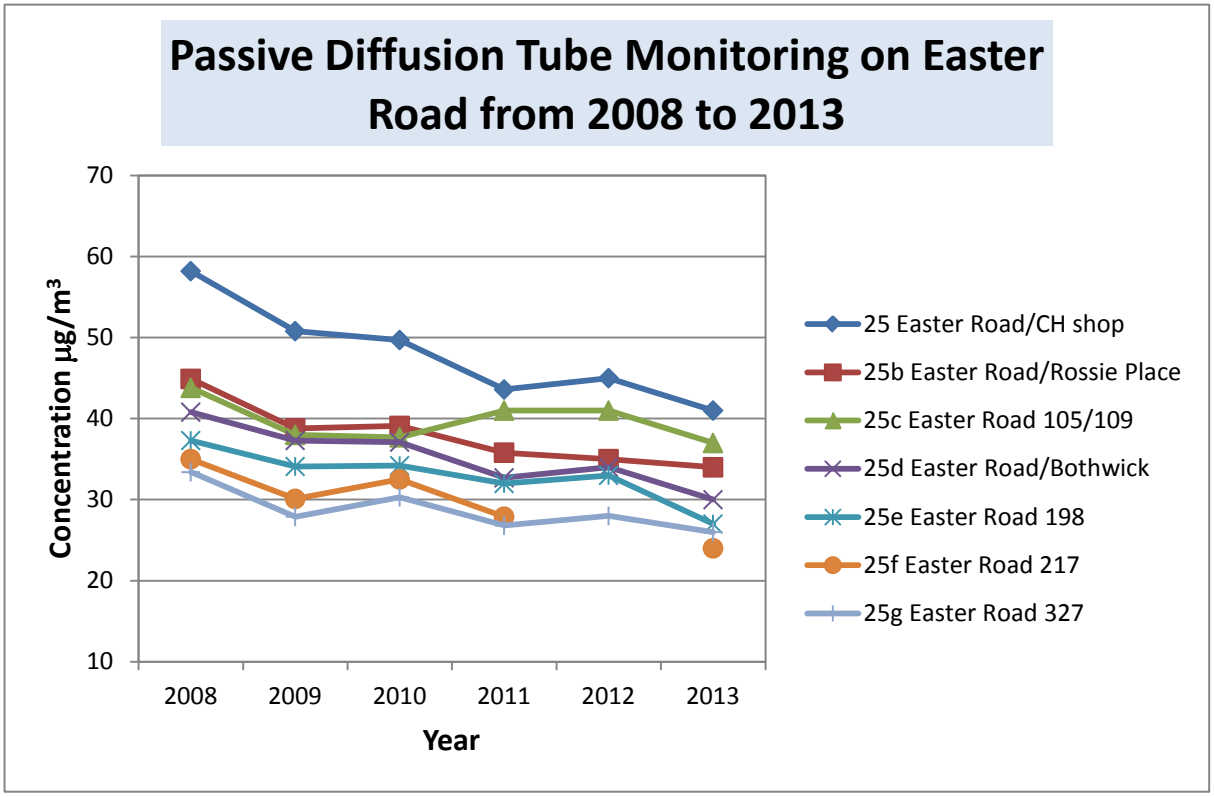
Data expressed in integer from 2012 onwards.

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

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

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

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



Trend Data from Nitrogen Dioxide Passive Diffusion Tubes within AQMAs

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

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

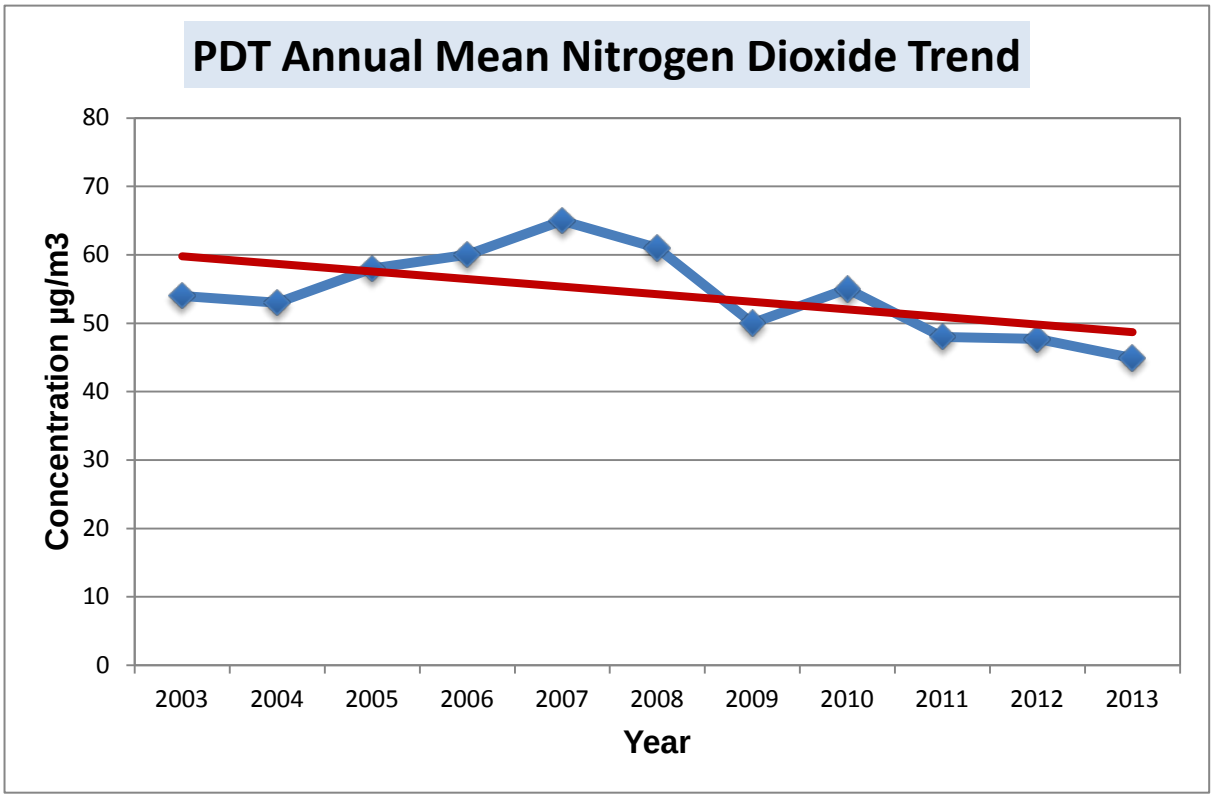
Figure 2.13 shows the trend analysis. The data used is shown in Appendix E.

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

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

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

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



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

Detailed Assessment at Hope Park Terrace, Clerk Street

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

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

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

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

*Duplicate passive diffusion tube

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

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

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

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

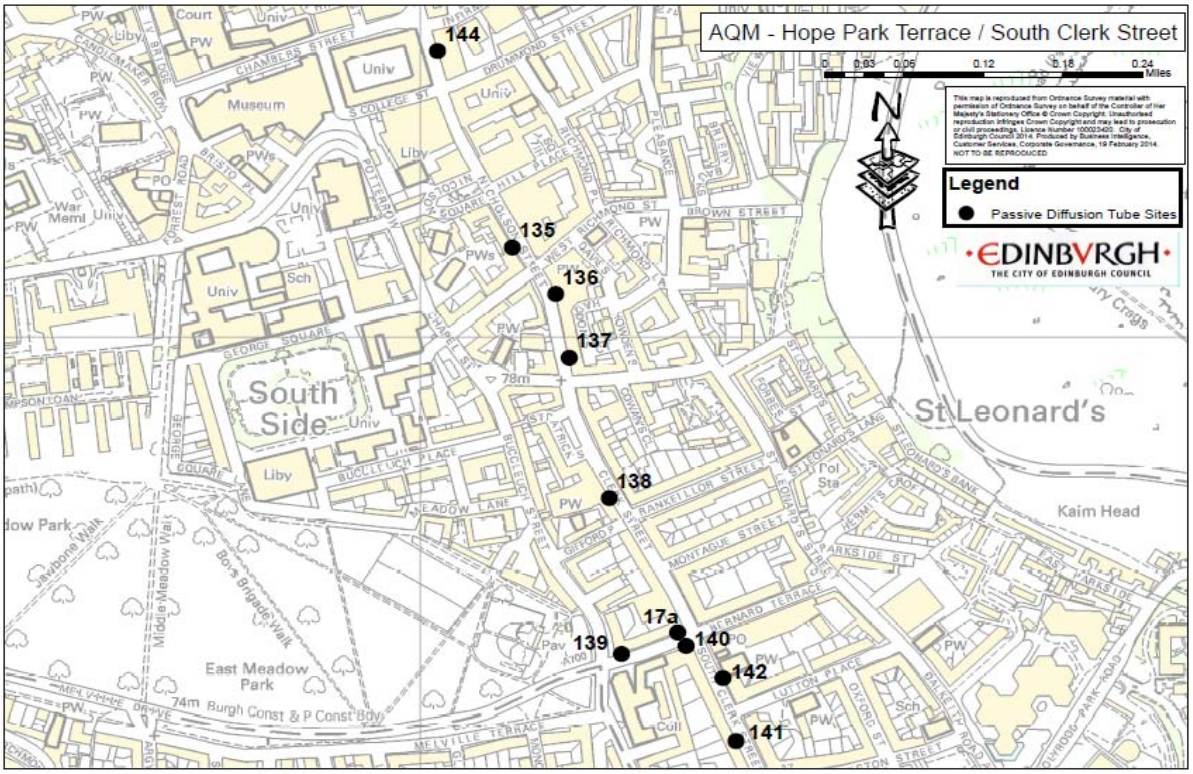
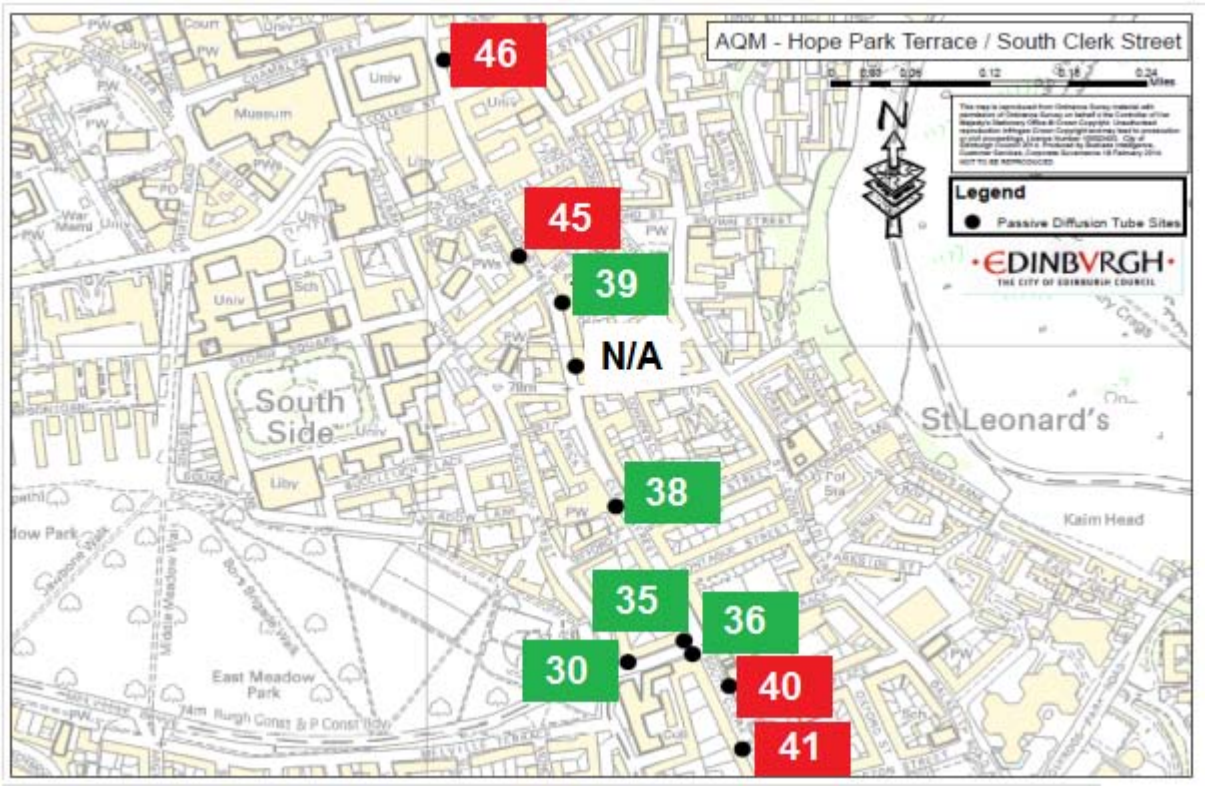


Figure 2.9B Data for Locations in Hope Park Terrace/Clerk St Detailed Assessment



Detailed Assessment at Angle Park Terrace / Slateford Road

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

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

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

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

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

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

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

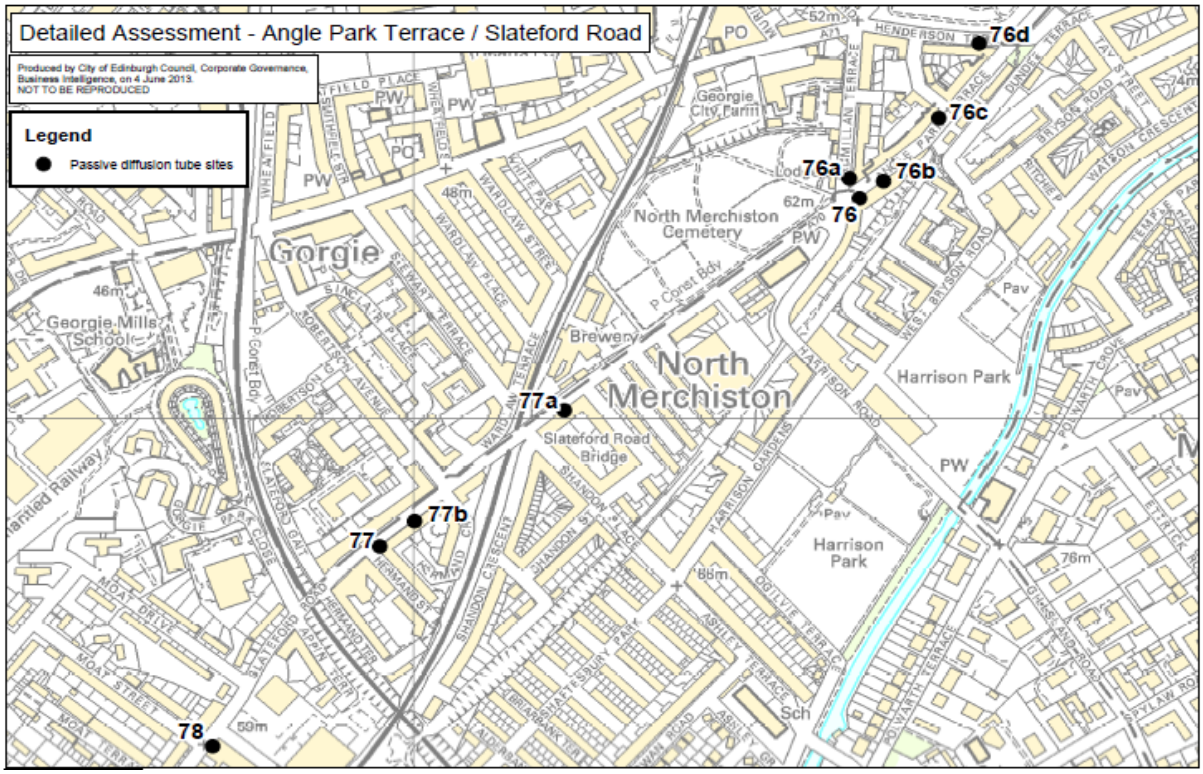
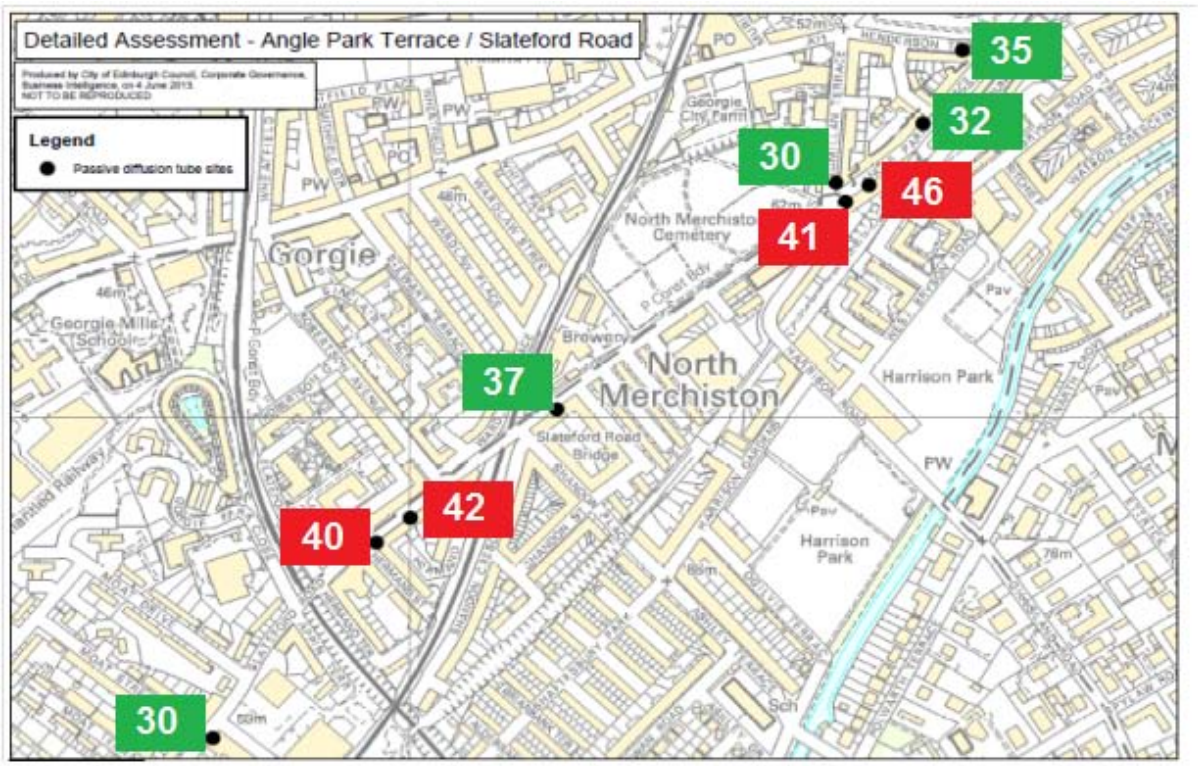


Figure 2.10B Data for Monitoring Locations in Angle Park Terrace / Slateford Road Detailed Assessment



Detailed Assessment Fountainbridge/Dundee Street

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

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

Table 2.11 Monitoring Results for Fountainbridge/Dundee Street Detailed Assessment

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

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

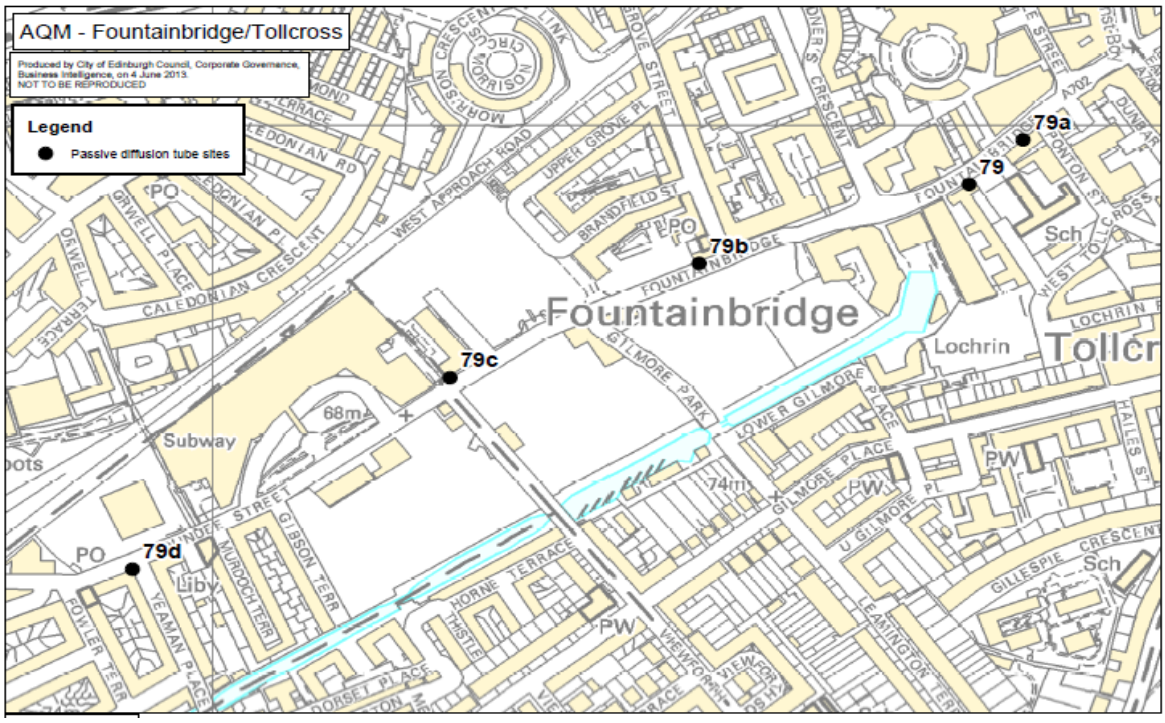
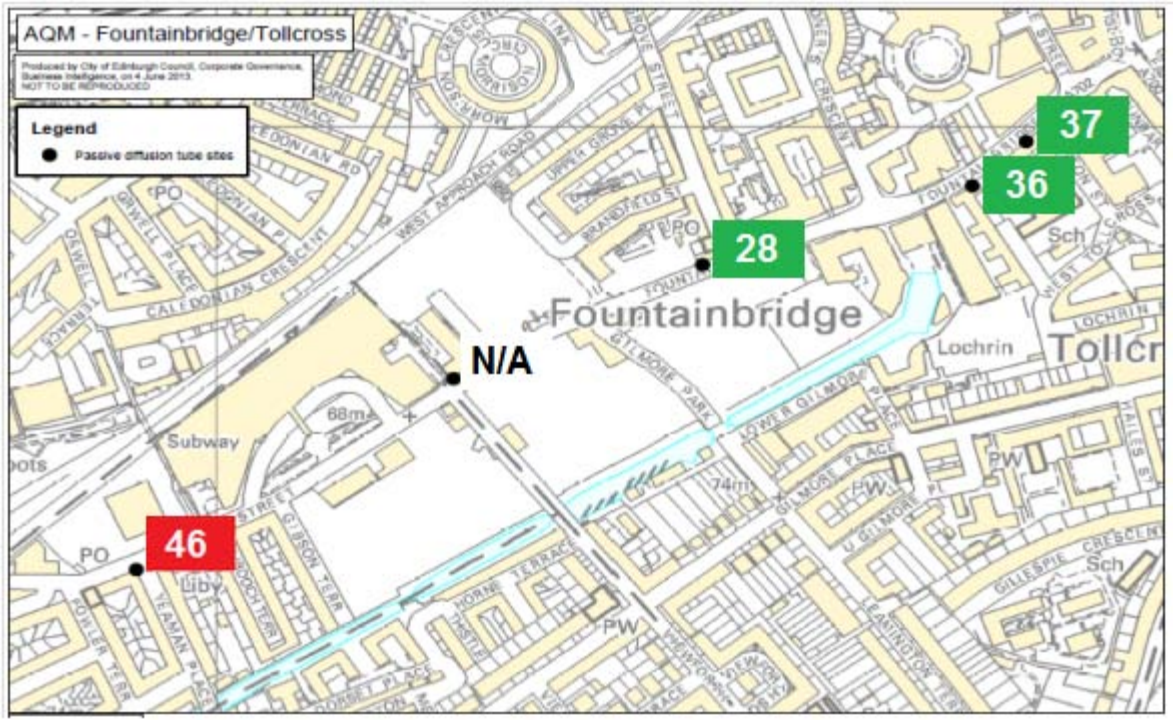


Figure 2.11B Data for Monitoring Locations in Fountainbridge/Dundee Street Detailed Assessment



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

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

Detailed Assessment Portobello Road/Sir Harry Lauder Road

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

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

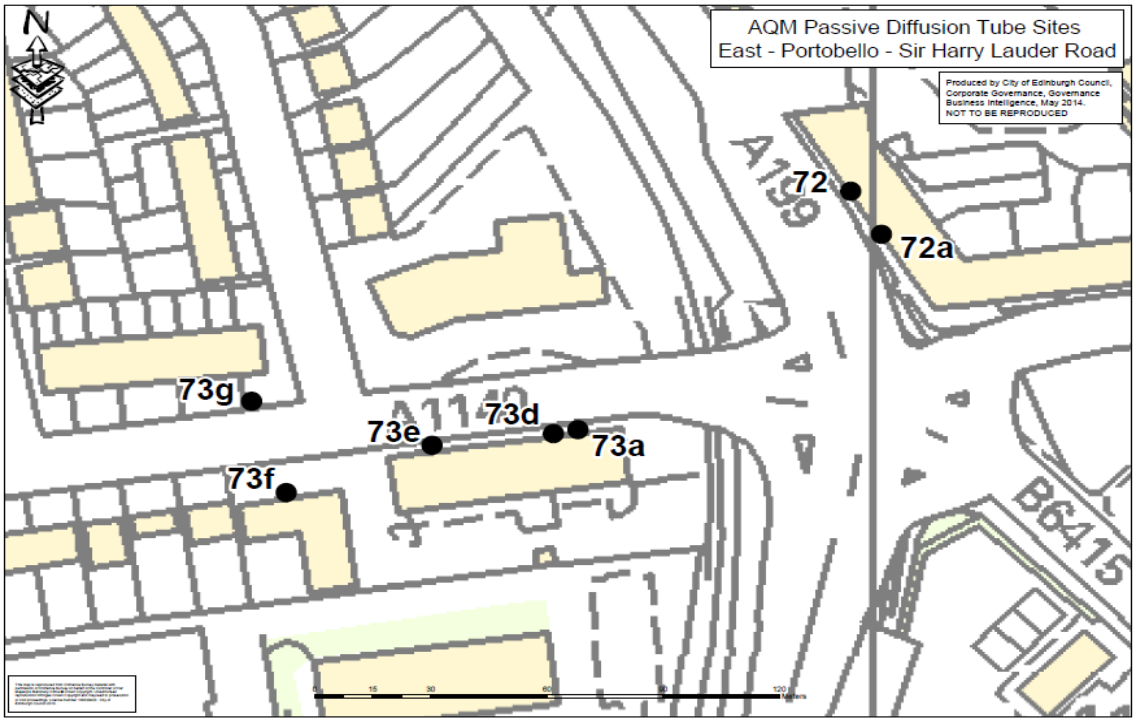


Figure 2.12B Data for Monitoring Locations in Portobello Road / Sir Harry Lauder Road Detailed Assessment

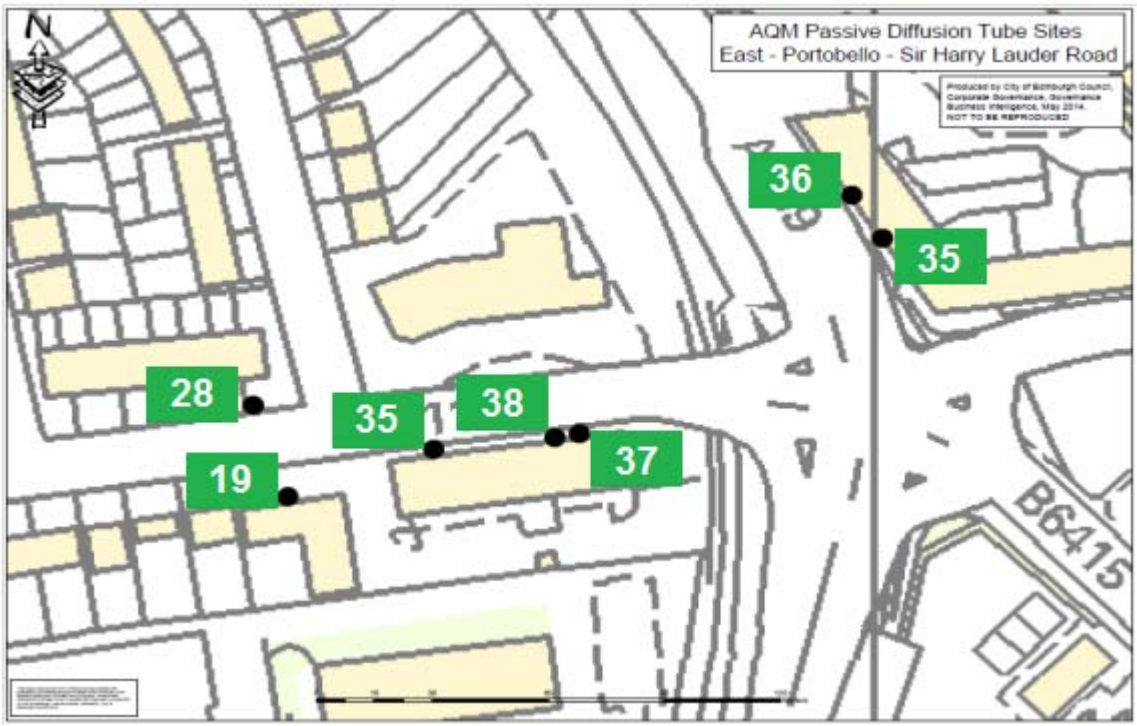


Table 2.12 Monitoring Results for Portobello Road/Sir Harry Lauder Road Detailed Assessment

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

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

2.2.2 Particulate Matter (PM_{10})

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

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

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

All monitoring locations are representative of relevant public exposure.

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

Site ID	Site Name Equipment Type	Within AQMA?	Valid Data Capture 2013 % [a]	Annual Mean Concentration (µg/m^3)					
				2008	2009	2010	2011	2012	2013
1	Queen Street TEOM	Y (NO_2)	96	**19** (vcm) **19** (1.14)	**18** (vcm) **18** (1.14)	**18** (vcm) **19** (1.14)	16 (vcm) 16 (1.14)	16 (vcm) 16 (1.14)	17 (vcm) 17 (1.14)
6	Currie TEOM	N	64	N/A	N/A	11 (vcm) 11 (1.14)	13 (vcm) 11 (1.14)	11 (vcm) 11 (1.14)	*12 (vcm)* *11 (1.14)*
7	St Leonard's FDMS	N	94	15	*17*	14	15	*16*	14
8	Salamander St TEOM	N	94	N/A	***22 (vcm)*** ***23 (1.14)***	**26** (vcm) **27** (1.14)	**26** (vcm) **27** (1.14)	**23** (vcm) **24** (1.14)	**22** (vcm) **22** (1.14)
9	Queensferry Rd FDMS	N	77	N/A	N/A	N/A	***21***	**18**	**19**
10	Glasgow Road TEOM	Y (NO_2)	97	N/A	N/A	N/A	N/A	*15 (vcm)* *15 (1.14)*	16 (vcm) 16 (1.14)

Notes for table:

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

In *italic*, poor data capture

a Data capture for the full calendar year

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

Site ID	Site Type	Within AQMA?	Data Capture 2013 %	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m^3					
					2008	2009	2010	2011	2012	2013
1	Queen Street TEOM	Y (NO_2)	96	Y	0	1	1	0	2	2
6	Currie TEOM	N	64	Y	N/A	N/A	0	0	0	0 (29)[a]
7	St Leonard's FDMS	N	94	Y	0	2	1	0	2 (40) [a]	3
8	Salamander St TEOM	N	94	Y	N/A	2 (44) [a]	**19**	**22**	**13**	5
9	Queensferry Rd FDMS	N	77	Y	N/A	N/A	N/A	2	3	2 (41)[a]
10	Glasgow Road TEOM	Y (NO_2)	97	Y	N/A	N/A	N/A	N/A	0 (35) [a]	1

Notes for table;

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

a if data capture for full calendar year is less than 90%, include the 98.08h percentile of 24-hour means in brackets (expressed in µg/m3)

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

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

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

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

The city-wide Detailed Assessment for PM_{10} will be completed by the end of 2014.

Trend in Annual Mean PM_{10} concentrations

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

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

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

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

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

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

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

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

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

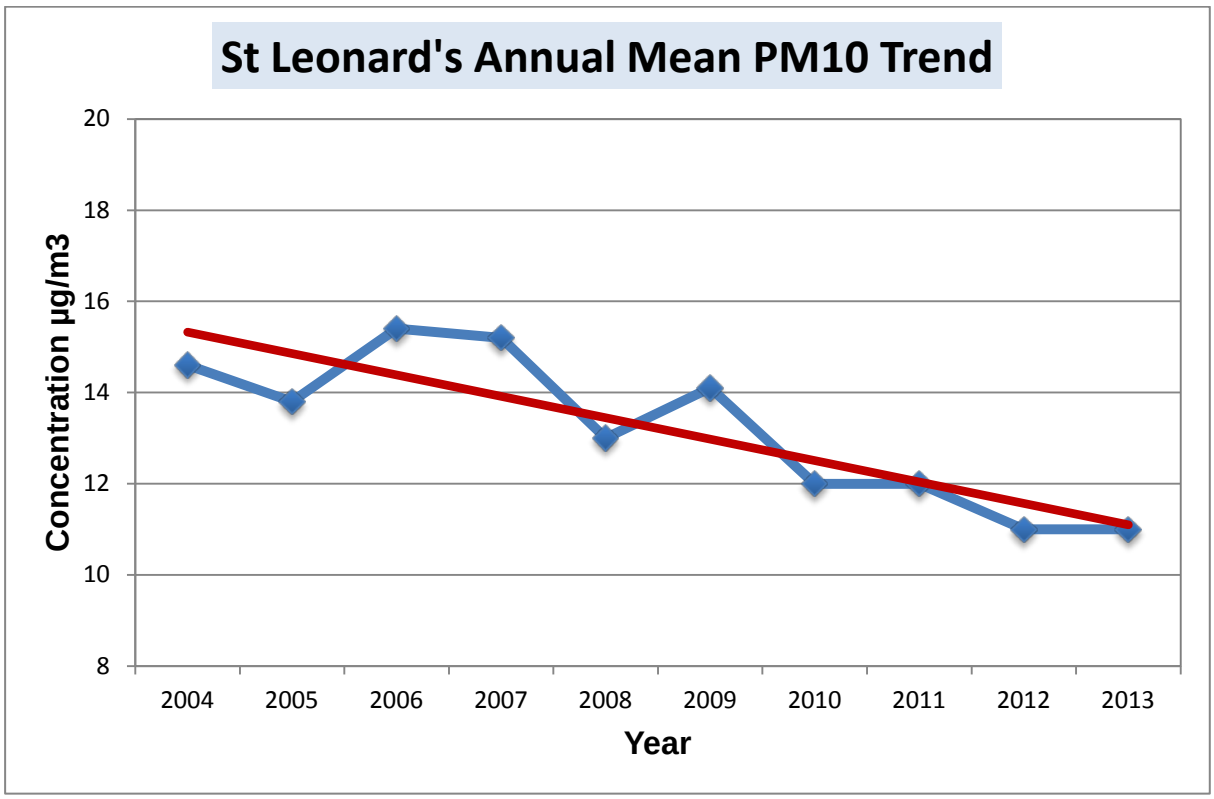
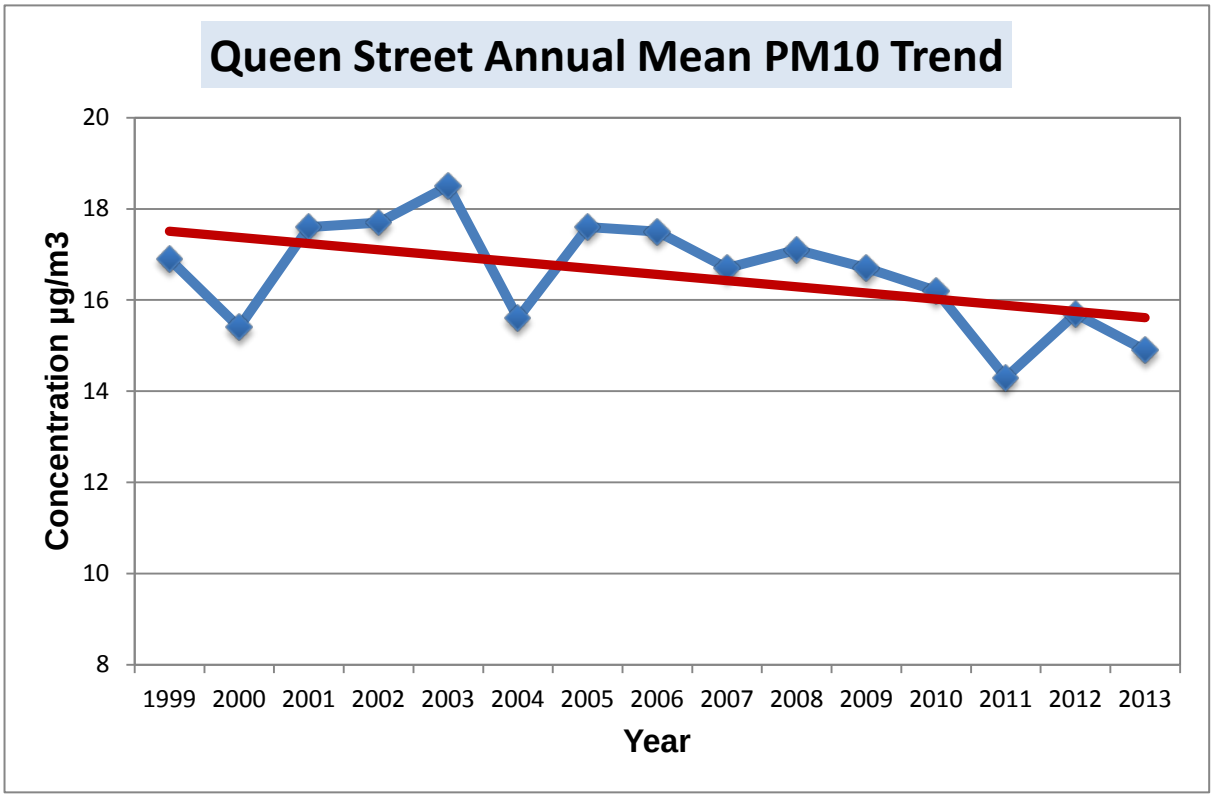


Figure 2.15 Trend in Uncorrected Annual Mean Non Volatile Fraction PM_{10} Concentrations (µg/m^3) measured at Queen Street



2.2.3 Sulphur Dioxide (SO_2)

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

Table 2.16 Results of Automatic Monitoring of SO_2

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

2.2.4 Benzene

Benzene is no longer monitored within the Local Authority area

2.2.5 Other Pollutants Monitored

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

2.2.5.1 Ozone

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

Table 2.17 Number of Ozone exceedences at St Leonard's

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

2.2.5.2 $PM_{2.5}$

$PM_{2.5}$ monitoring commenced at St Leonard's in November 2008. In 2013 the annual mean value is 8$\mu g/m^3$ a reduction on the previous two years. Table 2.18 details monitoring since 2009.

Table 2.18 $PM_{2.5}$ Average annual concentrations at St Leonards

St Leonard's Urban Background site					
Year (Data Capture %)	**2009** (95%)	**2010** (94%)	**2011** (98%)	**2012** (72%)	**2013** (98%)
Annual Concentration ($\mu g/m^3$)	8	9	**12**	*11*	*8*
$PM_{2.5}$ Scottish Objective 12$\mu g/m^3$ annual average (limit) 2010. This target is not in Air Quality Regulations					

2.2.5.3 Polycyclic Aromatic Hydrocarbons (PAHs)

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

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

St Leonard's Urban Background site	2009	2010	2011	2012	2013
Annual Concentration (ngm^{-3})	0.131	0.129	0.099	0.109	0.084
BaP Objective $0.25ngm^{-3}$ as an annual average by 31 December 2010					

2.2.6 Summary of Compliance with AQS Objectives

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

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

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

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

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

3 New Local Developments

3.1 Road Traffic Sources

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

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

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

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

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

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

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

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

3.2 Other Transport Sources

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

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

3.3 Industrial Sources

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

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

3.4 Commercial and Domestic Sources

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

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

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

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

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

3.5 New Developments with Fugitive or Uncontrolled Sources

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

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

Road traffic sources

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

Commercial and Domestic Sources

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

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

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

4 Planning Applications

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

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

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

5 Air Quality Planning Policies

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

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

Policy	Statement
Env 22	Planning permission will only be granted for development where; a) There will be no significant adverse effects for health, the environment and amenity and either; b) There will be no significant effects on air, water or soil quality or c) Appropriate mitigation to minimise any adverse effects can be provided.
Emp1	High quality, office developments, including major developments, will be supported; a) In the City Centre as identified on the Proposal Maps. b) In the other strategic business centres identified on the Proposals Map at Edinburgh Park/South Gyle, International Business Gateway and Leith, preferable as part of business led mixed use proposals. c) At other accessible, mixed use locations in the urban area near to public transport nodes, where the scale of development must be compatible with the accessibility of the location by public transport and the character of the local environment.
Emp 10	Hotel development will be permitted: a) In the City Centre where developments may be required to form part of mixed use schemes, if necessary to maintain city centre diversity and vitality, especially retail vitality on important shopping frontages. b) Within the boundaries of Edinburgh Airport, the Royal Highland Centre and the International Business Gateway. c) In locations within the urban area with good public transport access to the city centre.
Hou 4	The Council will seek an appropriate density of development on each

Policy	Statement
	site having regard to: a) Its characteristics and those of the surrounding area. b) The need to create an attractive residential environment and safeguard living conditions within the development. c) The accessibility of the site to public transport and other relevant services. d) The need to encourage and support the provision of local facilities necessary to high quality urban living. Higher densities will be appropriate within the City Centre and other areas where a good level of public transport accessibility exists or is to be provided. In established residential areas, proposals will not be permitted which would result in unacceptable damage to local character, environmental quality or residential amenity.
Tra 1	Planning permission for major development which would generate significant travel demand will be permitted on suitable sites in the City Centre. Where a non City Centre site is proposed, the suitability of a proposal will be assessed having regard to: a) The accessibility of the sites by modes other than the car. b) The contribution the proposal makes to Local Transport Strategy objectives and the effect on targets in respect of overall travel pa and car use. c) Impact of any travel demand generated by the new development on the existing road and public transport networks. In general, applicants should demonstrate that the location proposed is suitable with regard to access by public transport, cycling and walking that measures will be taken to mitigate any adverse effects on networks and bring accessibility by and use of non-car modes up to acceptable levels if necessary.
Tra 8	Planning permission will not be granted for development which would: a) Prevent the implementation of proposed cycle paths/footpaths shown on the Proposals Map. b) Be detrimental to a path which forms part of the core paths network or prejudice the continuity of the off-road network generally. c) Obstruct or adversely affect a public right of way unless satisfactory provision is made for its replacement. d) Prejudice the possible incorporation of an abandoned railway alignment into the off-road path network.
Tra 9	Planning permission will not be granted for development which would prejudice the proposed new roads and road network improvements listed in Table 9 and shown indicatively on the Proposals Map.

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

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

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

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

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

6 Local Transport Plans and Strategies

Local authorities are advised in Technical Guidance document LAQM TG (09) to align AQAPs with those local transport polices which contribute towards improving air quality. Edinburgh's Local Transport Strategy (LTS) 2014 to 2019 was formally adopted by the Council in January 2014[9].
The strategy recognises air quality has been an issue and the adverse impact that the increasing use of the car is having on the city.

> '*The Council recognises that cars are the most effective way to undertake many journeys. It seeks to implement a transport strategy that enables cars to be used efficiently for those tasks for which they are well suited and at uncongested times and locations. However, there is simply not enough space in the city to accommodate all possible demands for movement by car at all times. It is therefore necessary to manage this demand'*
>
> Edinburgh's Local Transport Strategy (LTS) 2014

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

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

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

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

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

Transport 2030 Vision, City of Edinburgh Council, 2010

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

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

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

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

Policy	Statement
Sustaining a thriving city	
Thrive1	The Council will seek to ensure integration of land use planning and transport policies.
Thrive3	The Council will seek the implementation of travel planning measures proportionate to the scale and nature of developments. The Council will also seek to improve its monitoring of the implementation and impact of travel planning measures.
Protecting our environment	
Env1	The Council will ensure that its Air Quality Action Plan and Local Transport Strategy are adequate to address issues around air quality. It supports the use of emission reduction measures as a means of working towards the air quality standards set down in legislation.
Env2	The Council seeks to support increased use of low emission vehicles through: • working with partners to provide a network of electric charging points; • encouraging the purchase of low emission vehicles through its charges for resident parking permits; and • taking account vehicle emissions in its fleet purchasing policies.
Road Safety	
Safe1	The Council will maintain its commitment to education for young people with regard to road safety, user behaviour, active travel and travel planning by continuing its engagement with primary and secondary schools across Edinburgh. Where appropriate, it will work with partners such as Sustrans, Road Safety Scotland and Cycling Scotland and consider opportunities to involve the local community.
Managing and maintaining our infrastructure	
Streets2	The Council will use its Urban Traffic Control system and other ITS systems to prioritise public transport and facilities for pedestrians and cyclists, whilst ensuring efficient flow of traffic through the city.
Streets3	Before approving any road capacity increase, the Council will seek to ensure that all viable measures for shifting vehicle trips to walking, cycling, public transport and car sharing, or for managing demand have;

Policy	Statement
	• been fully adopted; and • been found not to meet model share or demand reduction needs.
Travel Planning, travel choices and marketing	
TravPlan1	The Council supports the development of flexible working lifestyles including homeworking and teleworking.
TravPlan2	The Council will seek to lead by example in the area of travel planning. In refreshing its Travel Plans, it will set mode targets for travel to work by Council employees in line with the outcomes and targets of this LTS.
TravPlan3	The council will seek the implementation of travel planning measures aimed at reducing the demand for car travel to and from new office, retail and wholly or predominantly residential developments.
Active Travel	
Walk1	The Council will seek opportunities to improve pedestrian facilities and will consider pedestrian priority, or partial or complete pedestrianisation in appropriate streets where there are high levels of pedestrian activity.
Walk2	There will be a presumption in favour of road maintenance, new traffic management schemes, new or revised controlled parking zones and new developments always incorporating measures for pedestrians and cyclists..
PCycle2	There will be a presumption in favour of new traffic management schemes always incorporating measures for cyclists, particularly: • exemptions from road closures • advanced stop lines (ASLs) with approach cycle lanes or cycle lanes where ASLs are not required at traffic signal controlled junctions • all new pedestrian crossings to be considered as potential toucans: and • cycle lanes or, where appropriate , cycle paths, in all schemes involving main roads with speed limits of over 20mph and with no bus lanes.
PCycle9	In the event of a private investor bringing forward proposals in line with the Council's central objectives, the Council would support a pedal/electric bike share scheme in the city.
Public Transport	
PubTrans1	The Council will presume in favour of giving buses and Trams priority over other motorised traffic.
PubTrans2	The Council will seek: • a fully accessible and environmentally – friendly bus fleet ahead of legislative requirements and • marketing of services targeted at persuading regular car

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

Policy	Statement
Park 33	The Council will promote access to P+R sites by bus, cycle and on foot and will support the provision of high quality public transport services to link P+R sites to major destinations outside the city Centre.
Freight	
Freight3	The Council will work with road freight operators in the development of any proposals for emission control measures.
Freight5	The Council will support the use of rail and sea freight, in particular through the planning process. It will: • safeguard rail access to key industrial sites; • safeguard key distribution locations including the former Portobello freightliner terminal; • seek to ensure that any major new freight generating developments, including developments within Leith Docks, are accessible to the rail network; and • seek to ensure that any continuing bulk movement of waste and recycling products from Edinburgh continues to use rail.
Freight6	The Council will seek to ensure that its procurement procedures for freight transport ensure that services purchased have the least environmental and safety impacts.
Edinburgh's Connectivity	
Connect2	The Council will only support major road upgrades to or around Edinburgh, including on the city bypass, where the principle outcome is to prioritise public transport (and, where appropriate, high occupancy vehicles). Improvements should protect vulnerable road users.
Connect 3	The Council supports use of the existing Forth Road Bridge (after completion of the Queensferry Crossing) as a dedicated sustainable transport route carrying public transport, pedestrians and cyclists and possible future adaptation to carry Trams. It would not support further widening of the permitted categories of vehicle.
Connect 4	The Council will continue to support enhanced rail connections to other Scottish Cities, particularly increased capacity of the Edinburgh- Glasgow route as set out in the Edinburgh Glasgow Improvement Project. It supports action to reduce journey times and increase electrification
Connect7	The Council will work with the owners and operators of Edinburgh Airport and other partners to continue to increase significantly the use of sustainable travel modes for access to Edinburgh airport. Its guiding principle will be to seek a balanced package of interventions that minimises the number of motor vehicle movements per air passenger and per trip to work

7 Climate Change Strategies

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

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

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

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

8 Implementation of Action Plans

8.1 Action Plan Summary

City of Edinburgh Council's initial Air Quality Action Plan (AQAP) was approved in 2003 following declaration of the Central AQMA for exceedences of the pollutant nitrogen dioxide. This plan contained a number of radical transport measures including Congestion Charging which if fully implemented were estimated to reduce nitrogen oxides (NO_X) by 40%[11].

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

The required level of reduction in roadside NO_x concentrations to meet the 2005 annual mean air quality objective within the Central AQMA were calculated to be between 33% and 68%[12]. Therefore, the proposed actions within the AQAP 2003 were expected to deliver the required improvement.

Source apportionment work undertaken in 2002 within the Central AQMA identified that the majority of NO_X emissions were derived from buses; Leith Walk (56%), Gorgie Road (55%) and West Maitland Street (63%)[12]. Therefore, the main challenge for the Local Authority was to stimulate a vehicle clean-up programme, targeting bus operators in the city.

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

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

2007 (TTR)[14]. The study concluded that, the greatest reductions in NO_X and PM_{10} emissions for the Council's administrative area would be achieved by implementing a mandatory emission reduction scheme for bus and road freight operators. Voluntary Partnership Agreements were deemed the next best option, depending on the percentage of fleet improvement that could be achieved.

Further Assessment work at St John's Road and Great Junction Street also indentified that buses were the main contributors of NO_X emissions[15].

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

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

8.2 Progress made with Actions

It is well recognised that the expected NO_x emission reductions from improvements in vehicle technology have not been delivered in 'real life' driving situations. This is one of the reasons why Edinburgh like the majority of other cities with air quality issues has not observed the anticipated decrease in concentrations of roadside nitrogen dioxide. In addition, there is now a greater proportion of diesel-engine vehicles in the national fleet which emit more direct NO_2 compared with petrol-engine vehicles.

A new 'Emissions Factor Toolkit' has been prepared by DEFRA and Devolved Administrations which incorporates updated NO_x emission factors and vehicle fleet information. This provides more realistic road traffic emission data.

The measures and progress made during 2013/14 are summarised in Table 8.17 and supplementary information is described under the following headings:

8.2.1 Managing emissions from buses

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

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

Consequently, an update was commissioned in 2011 to take account of these changes. The new study focussed on the total number of bus movements and their NO_x and PM_{10} emissions in each of the three AQMAs. It concluded that the optimistic scenario (Euro 5) as set out in the VERP would provide the greatest reductions in NO_x and PM_{10} emissions by 2015[16].

8.2.2 Bus Improvements 2013/2014

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

Lothian Buses

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

Significant improvements have been achieved since 2006 with the assistance of Scottish Government funding (Table 8.1). The company has been successful in obtaining £1.05 million from the Scottish Government Green Bus Fund (Round 4) which will enable the purchase of 20 single deck hybrid vehicles this year.

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

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

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

Lothian Buses are committed to working towards reducing emissions from their fleet and the purchase of cleaner vehicles. The degree of improvement in the fleet is illustrated in Tables 8.2 and 8.3.

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

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

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

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

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

D Lothian Buses self-funding

E Scottish Government £1.5M Green bus fund round 3

F Scottish Government £1.05M Green bus fund round 4

Table 8.2 shows that five additional Euro 2 buses entered the network in 2012. These vehicles were utilised by Lothian Buses on a temporary basis to provide new services into East Lothian which were previously operated by First Scotland (East). The latter bus company withdrew a number of their services in spring 2012 due to a major business review.

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

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

Table 8.2 Euro Standard of Service Bus Fleet (Lothian Buses 2006 to 2014)

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

Data provided by Lothian Buses, May 2014

Table 8.3 Euro Standard of City Tour Bus Fleet (Lothian Bus 2010 to 2014)

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

Data provided by Lothian Buses, May 2014

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

First Scotland (East)

First Scotland (East) is the second major operator in Edinburgh. However, as previously mentioned a number of their services were withdrawn in Spring 2012 as a result of a company business review. There are now fewer First Scotland (East) buses operating in Edinburgh; the majority of which are now Euro 3 standard vehicles and all Euro 1 and 2 standard vehicles have been removed from routes within the city. The current fleet which operates in Edinburgh is shown in Table 8.4.

Table 8.4 First Scotland (East) Fleet operating in Edinburgh 2011 and 2014

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

Data provided by First Scotland (East), May 2014

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

Stagecoach

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

Table 8.5 Current standard of Stagecoach operating in Edinburgh

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

Data supplied by Stagecoach July 2014

Citylink

The Citylink bus fleet is comprised of 72 buses which operate throughout Scotland. The anticipated fleet standard at October 2012 is shown in Table 8.6. At the time of reporting City of Edinburgh Council were not in receipt of an update from Citylink.

Table 8.6 Standard of Citylink Bus fleet

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

Data provided by Citylink, 2012

8.3 Managing emissions from freight

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

8.3.1 ECOSTARS Edinburgh

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

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

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

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

ECOSTARS provides a relatively low-cost, 'partnership' mechanism to assist the Council encourage and facilitate emissions improvements from the goods and passenger transport sector operating in the city. Progress is detailed in Table 8.7.

Table 8.7 ECOSTARS Progress Achieved from Inception to 2014

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

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

8.4 Improvement in Council Fleet Vehicles

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

All Pre-Euro 1, Euro 1 and Euro 2 vehicles have now been eliminated from the Council's fleet and Euro 3 forms a very small proportion (5%). The Council has been successful in obtaining Scottish Government Funding via the Low Carbon Vehicle Procurement Support Scheme and 1% of the vehicle fleet are now electric. Table 8.8

Table 8.8 City of Edinburgh Council Fleet (Including hire vehicles) Improvement

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

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

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

8.5 Managing traffic emissions via a Mandatory Low Emission Zone

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

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

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

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

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

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

8.6 Electric vehicles / Plugged in places

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

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

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

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

Currently, there are electric vehicle charging points at 20 Council premises, offering 40 charging heads for use by its own and NHS vehicles. See Table 8.9 overleaf.

Table 8.9 Locations and number of charging units installed in Edinburgh

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

[A] Funding obtained from Scottish Government Air Quality Action Plan Grant

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

Progress regarding installation of electric charging infrastructure through the PIP funding scheme is charted in Table 8.10.

Table 8.10 Electric charging infrastructure progress from 2012 to 2014

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

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

8.7 Traffic Management

8.7.1 SCOOT

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

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

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

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

Ongoing programme of SCOOT work

St John's Road AQMA

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

Central AQMA

Ardmillan Triangle

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

Inverleith Row/ Ferry Road junction

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

Proposed SCOOT work in AQMAs for 2014/2015

Central AQMA (Easter Road and London Road)

Loops and cabling work will be repaired at Easter Road and London Road during 2014. Implementation of SCOOT and repair work is subject to funding availability. The current status of SCOOT within AQMAs is detailed in Table 8.11.

Table 8.11 Status of SCOOT in Edinburgh 2014

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

***** Potential Air Quality Management Area Extensions

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

8.7.2 Newbridge Roundabout/ Glasgow Road

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

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

The options were as follows:

Option 1 - Optimisation of Signal Timings

Option 2 - Implementation of Microprocessor Optimised Vehicle Actuation (MOVA)

Option 3 - Road Widening on A8 approach to 3 lanes.

All three options were evaluated with respect to reduction in emissions of NO_x, PM_{10}, total carbon and traffic queue lengths for the PM period on the A8 approach[17].

The modelling study showed significant emission reductions and reduced vehicle queue lengths for all three options. See Table 8.12 and Table 8.13. The Council will evaluate the three proposals with respect to cost and benefit, prior to a decision being made on which option to select.

Table 8.12 Percentage reduction of emissions for afternoon peak period.

Options	NO_x	PM_{10}	CO_2
Option 1	43%	26%	38%
Option 2	44%	26%	40%
Option 3	47%	29%	43%

Table 8.13 Reduction in vehicle queue lengths during afternoon peak period

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

8.7.3 EMote (Real-time Remote Sensor system)

E Mote sensors provide instant qualitative real-time NOx data, which can be linked to SCOOT systems and govern traffic signalling with respect to ambient concentrations of NO_x. It is anticipated that improvements in traffic flow coupled with the knowledge of real time NO_x data will lead to a reduction in hourly exceedences and the annual mean.

A trial involving MOTES sensors was commissioned early 2013 and a number of units were installed in March 2013 along St John's Road (within the AQMA). The initial phase of the trial involved the assessment of NO_x data gathered from a co-located MOTES sensor at the real time air quality monitoring station at St John's Road prior to linking with traffic signalling. The data obtained from the Motes unit has not correlated well with the real time data from the reference analyser. It has transpired that the electrochemical sensor deployed in the unit for measuring NO_2/NO was faulty and this is currently under investigation.

The Council will require assurance that the NO_x data gathered by the sensor units is reliable prior to progressing this trial.

8.8 Telematics Trial

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

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

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

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

A report has been prepared by Masternaut (Cybit) on behalf of the Council and the overall outcomes are positive[18]. These outcomes will require to be evaluated internally within the Council. A summary of the findings is shown in Table 8.14.

Table 8.14 Changes observed following eco driving instruction.

Parameter measured between Benchmark and Go Live	Percentage Change
Decrease in average mileage	30.5%
Reduction in average idling time	26.5%
Reduction in harsh events	18.5%
Improvement in MPG	4.3%
Reduction in average weekly fuel litres	4.1%
Reduction in CO_2 output	4.2%

8.9 Local Transport Strategy Initiatives

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

8.9.1 Park and Ride

Edinburgh is served by a number of Park and Ride locations around the periphery of the city. The current number of spaces available has the potential to reduce the daily work commuter traffic journeys by 9174 if operated at maximum capacity. Table 8.15.

Table 8.15 Park & Ride Sites Serving Edinburgh & Number of Parking Spaces

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

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

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

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

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

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

8.9.2 Promotion of Walking, Cycling and Safe Routes to School

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

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

Several major and smaller cycling/ pedestrian schemes have been delivered and additional schemes are in progress. Table 8.16 below.

Table 8.16 Active Travel Plan Cycling and Pedestrian Schemes.

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

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

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

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

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

8.9.3 Differential Residential Car Parking Permits

In October 2010, the Council implemented a 'Park Green' scheme; a tiered pricing system for residential parking permits with charges based on vehicle CO_2 emissions (or engine size for vehicles registered prior to March 2001). The scheme aims to encourage those living in residential parking zones to buy and run lower emission vehicles. The scheme effectiveness will be assessed through Permit Charges data.

8.9.4 Controlled Parking Zones

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

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

8.9.5 Borders Rail link

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

8.9.6 Trams

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

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

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

8.10.1 Planning Guidance on Biomass Installations in Edinburgh

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

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

8.10.2 Clean Air Act & Smoke Control Areas

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

Table 8.17 Action Plan Progress

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

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

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

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

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

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

Nitrogen Dioxide

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

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

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

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

Site ID	Area / Site Name	In AQMA?	Data Capture 2013 %	Annual Mean Concentration (µg/m^3) 2013 Bias Adjustment factor = 0.75
49	**Morrison Street**	Y Central	100	**42**
135	**Nicolson Street No 69**	No	100	**45**
27	**North Bridge – South**	Y Central	92	**47**
144	**South Bridge No 59**	No	100	**46**
142	**South Clerk Street No 41a**	No	92	**40**
141	**South Clerk Street No 84**	No	92	**41**
3	**Torphichen Place**	Y Central	83	**43**
28b	**West Port No 62**	Y Central	58	**52**
28d	**West Port No 42**	Y Central	75	**58**
	WEST			
16	**Glasgow Road No 68**	Y Glasgow Rd	100	**40**
58	**Glasgow Road Newbridge**	Y Glasgow Rd	100	**46**
64	**Queensferry Road No 550**	No	100	**47**
1b	**St John's Road IR**	Y St John's Rd	100	**41**
1d	**St John's Road No 131**	Y St John's Rd	100	**52**
5	**St John's Rd *Automatic data***	Y St John's Rd	91	**57**
	SOUTH WEST			
76	**Angle Park/Harrison Road**	No	92	**41**
76b	**Angle Park Terrace No 74**	No	100	**46**
18	**Gorgie Road No 8**	Y Central	100	**45**
80c	**Gorgie Road No 87**	Y Central	92	**40**
80	**Gorgie Road / Delhaig**	Y Central	100	**44**
5	**Gorgie Road/Murieston Rd**	Y Central	100	**41**
77b	**Slateford Road No 93/95**	No	100	**42**
77	**Slateford Road No 97**	No	100	**40**

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

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

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

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

Monitoring will also continue at Queensferry Road. Although residential facade monitoring indicated the objectives are met, one roadside monitoring site, when distance corrected, shows exceedence. Further investigations will be undertaken regarding this anomaly.

9.1.2 Particulate Matter 10 (PM_{10})

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

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

9.1.3 Trend Data

Historically it has proved difficult to formulate reliable assumption on data trends for both NO_2 and PM_{10} due to disruptions to normal traffic flows, arising from construction work associated with the Edinburgh Trams. With construction now

complete, the Local Authority has agreed to undertake a period of monitoring to assess traffic movements. It is anticipated that this will occur over a period of twelve months to allow for conditions to normalise.

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

9.2 Conclusions relating to New Local Developments

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

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

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

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

9.3 Other Conclusions

9.3.1 Implementation of Air Quality Action Plan

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

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

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

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

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

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

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

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

9.3.2 Further Assessment 2013

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

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

9.3.3 Additional Monitoring not covered by LAQM

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

The 2013 monitoring results show that PAH and $PM_{2.5}$ complies with their specified objectives and Ozone exceeded the national objective.

9.3.4 Planning Applications

A Second Proposed Local Development Plan was approved by the Local Authority's Planning Committee 19th June 2014. It addressed changes to housing land requirements at Strategic Development Plan level and is accompanied by a Second Proposed Action Programme, which sets out actions intended to mitigate and manage impacts, including those on traffic and hence air quality. Any representation to the Second Plan will be considered by the Council then dealt with by examination

by Scottish Ministers in 2015. It is anticipated the new LDP will then be adopted in early 2016.

9.3.5 Local Transport Strategy

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

9.4 Proposed Actions

9.4.1 Nitrogen dioxide

Extension to the Central AQMA

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

Source Apportionment Work

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

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

Further investigation

Further investigation will continue at Queensferry Road, where monitoring from a roadside-located passive diffusion tube site continues to show exceedence, which is not in keeping with the adjacent facade passive diffusion tube site or roadside automatic monitoring.

9.4.2 PM_{10}

The Local Authority is currently undertaking a Detailed Assessment with regards to PM10 city wide, which will be reported separately in 2014. Currently modelling work is being undertaken by air quality consultants in order to define an AQMA boundary

to deal with fugitive sources near the Salamander Street monitoring location. Transport and industrial sources are also being considered in detail.

9.4.3 Revision of the Air Quality Action Plan

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

10 References

1. NO_2 Fall Off with Distance calculator, LAQM, Tools, DEFRA website 2013
2. Technical Guidance LAQM TG09, Box 3.2, DEFRA, 2009
3. Local Air Quality Management Policy Guidance, Scottish Government, 2009
4. Scottish Annual Concentration (Background) maps, Scottish Air Quality Database Website 2014 [http://www.scottishairquality.co.uk/data/mapping]
5. Scottish Air Quality Maps, Pollutant Modelling for 2010 and Projected concentrations for 2015, 2020, 2025 and 2030: annual mean NO_x, NO_2 and $PM_{10,}$ AEA for the Scottish Government, 8th August 2012
6. Scottish Air Quality Database, Website 2014 [http://www.scottishairquality.co.uk]
7. Building a vision for the City Centre, Transport and Environment Committee, City of Edinburgh Council, 29 October 2013
8. Use of Biomass of 50MW(e) or less in Edinburgh, Planning Committee, City of Edinburgh Council, 30th September 2010
9. Local Transport Strategy, City of Edinburgh Council 2014 [http://www.edinburgh.gov.uk/news/article/1430/a_bold_transport_future_for_edinburgh]
10. Transport 2030 Vision, City of Edinburgh Council, 2010 [http://www.edinburgh.gov.uk/downloads/download/120/transport_2030_vision]
11. Action Plan for Area Designated 31st December 2000 July 2003
12. City of Edinburgh Council: Review and Assessment of Air Quality Stage 4
13. Air Quality Action Plan (Revised 2008)
14. Edinburgh Low Emission Strategy Feasibility Study. Transport and Travel Research. May 2007
15. Further Assessment Report for the following Air Quality Management Area Declarations: Great Junction Street, St John's Road, West Port (extension of Central AQMA). August 2011
16. Edinburgh Low Emission Strategy – bus emission analysis, Transport and Travel Research. March 2011
17. CH2M Hill Newbridge Air Quality Improvement Study. March 2014
18. The City of Edinburgh Council – Trial Findings Masternaut

Appendices

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

A1 Nitrogen Dioxide (NO_2) Diffusion Tube Bias Adjustment Factors

A2 NO_2 Bias Adjustment Factor from Co-location Studies

A3 Discussion of Choice of Factor to Use

A4 PM Monitoring Adjustment

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

A6 QA/QC of automatic monitoring

A7 QA/QC of Diffusion Tube Monitoring

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

Appendix C: Raw Passive Diffusion Tube Data

Appendix D: Passive diffusion tube Distance Correction Calculations

Appendix E: Passive diffusion tube data used in Trend analysis

Appendix A: QA/QC Data

A1 Nitrogen Dioxide (NO_2) Diffusion Tube Bias Adjustment Factors

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

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

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

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

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

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

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

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

A2 NO_2 Bias Adjustment Factor from Local Co-location Studies

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

Table A2 Bias factors used for 2012 data

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

Notes for table; * PDT - Passive Diffusion Tube
DC - Data Capture for periods used

A3 Discussion of Choice of Factor to Use

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

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

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

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

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

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

Table A3 Manual approximate orthonogel regression calculation for 2013 bias

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

A4 PM Monitoring Adjustment

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

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

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

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

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

Automatic Monitoring

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

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

Non-Automatic Monitoring (Passive Diffusion Tubes)

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

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

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

Site ID/Location 33 Queen Street			
Measured Mean Value (M) = 51.6 µg/m^3			
Background Site	**Annual Mean µg/m^3**	**Period Mean µg/m^3**	**Ratio AM/PM (R)**
St Leonard's	22	23.7	0.928
Bush Estate	6	6.9	0.870
		Average Ratio (R_a)	**0.899**
Adjusted Mean (M x R_a) = 46.4 µg/m^3			

Site ID/Location 138 Clerk Street			
Measured Mean Value (M) = 51.0 µg/m^3			
Background Site	**Annual Mean µg/m^3**	**Period Mean µg/m^3**	**Ratio AM/PM (R)**
St Leonard's	22	20.3	1.084
Bush Estate	6	6.5	0.923
		Average Ratio (R_a)	**1.003**
Adjusted Mean (M x R_a) = 51.2 µg/m^3			

Site ID/Location 48e Cowgatehead			
Measured Mean Value (M) = 50.8 µg/m^3			
Background Site	**Annual Mean µg/m^3**	**Period Mean µg/m^3**	**Ratio AM/PM (R)**
St Leonard's	22	21.5	1.023
Bush Estate	6	5.8	1.034
		Average Ratio (R_a)	**1.029**
Adjusted Mean (M x R_a) = 52.3 µg/m^3			

Site ID/Location 2 West Maitland Street			
Measured Mean Value (M) = 66.7 µg/m^3 & 68.6 µg/m^3			
Background Site	**Annual Mean µg/m^3**	**Period Mean µg/m^3**	**Ratio AM/PM (R)**
St Leonard's	22	22.4	0.982
Bush Estate	6	6.1	0.984
		Average Ratio (R_a)	**0.983**
Adjusted Mean (M x R_a) = 65.5 µg/m^3& 67.4 µg/m^3			

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

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

A6 QA/QC of Automatic Monitoring

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

Staff competence

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

Calibration procedures

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

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

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

Servicing

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

The TEOM heads on the automatic PM_{10} units are cleaned monthly and filters are changed regularly - approximately every 2 weeks.

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

A7 QA/QC of Diffusion Tube Monitoring

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

NO_2 diffusion tube monitoring is conducted in accordance with the quality requirements contained in the UK NO_2 Survey Instruction Manual for local/unitary authorities and Government Guidance Document LAQM.TG (09). The kerbside diffusion tubes are located within 1 metre of the kerb edge, roadside locations are greater than 1 metre from the road edge or at the façade of residential property. The tubes are attached to sign posts / lampposts using plastic spacer holders at a height of approximately 2.0m above ground level.

Three diffusion tubes from each monthly batch are used as blanks. These tubes are not exposed and are stored in a refrigerator during the exposure period. They are analysed along with the appropriate batch of exposed tubes. The purpose of blanks is to determine whether or not NO_2 contamination occurred during tube preparation.

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

Appendix B: Raw Passive Diffusion Tube Data 2013

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

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

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

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

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

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

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

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

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

Notes for raw data

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

b Data corrected having regard to outliers or problematic data

M – Tube missing on collection

N/A – Data not used

Figures in bold red – Problematic data not used

INV – Tube inverted on collection; any data not used

Appendix C: Passive Diffusion Tube Distance Correction Calculations

SITE NO.	**1**	**3**	**4**	**5**	**8**	**9a**	**11**	**13**	**14**
Step 1 How far from kerb was measurement made (m)	0.54	0.73	1.6	0.3	0.7	1.47	1.5	2.7	2
Step 2 How far from kerb is receptor in metres (m)	2.34	2.28	26.6	5.2	3.5	5.37	5.2	7.8	6
Step 3 Local background concentration of NO_2	22.0	22*	27.4	31.7	24.3	24.2	19.0	22*	20.3
Step 4 Annual mean bias corrected value	41.6	48.3	35.1	48.5	25.4	40.5	23.2	33.8	29
Result; Predicted annual mean at receptor	36.4	42.6	30.3	40.7	25.1	35.9	22.1	30.6	26.8

SITE NO.	**15**	**16**	***19***	**21**	**23**	**24**	**31**	**32**	**33**
Step 1 How far from kerb was measurement made (m)	4	1.8	*4.1*	1.16	0.23	1	1.8	2.6	4.2
Step 2 How far from kerb is receptor in metres (m)	7.8	5.2	*7.6*	4.56	2.53	11.2	6.7	7.3	6.45
Step 3 Local background concentration of NO_2	26.7	24.6	*21.8*	28.6	22*	22*	21.9	19.4	22*
Step 4 Annual mean bias corrected value	41.4	44.9	*20*	36.2	41.2	59.9	30.1	35.6	34.8
Result; Predicted annual mean at receptor	38.7	40.0	*n/a*	34.0	34.8	41.4	27.6	31.4	33.2

SITE NO.	**35**	**36**	**38**	**39**	**40b**	**40f**	**47**	**49**	**50a**
Step 1 How far from kerb was measurement made (m)	2.4	5.5	2.8	1.6	2.1	2.6	9	2.2	3.5
Step 2 How far from kerb is receptor in metres (m)	7.7	8.2	12.8	5.65	7	5.17	2.5	4.6	5.07
Step 3 Local background concentration of NO_2	22*	22*	25.6	22.5	19.3	21.6	22*	22*	15.2
Step 4 Annual mean bias corrected value	33	29.1	26.4	39.2	30.6	32.9	41	46.8	29.4
Result; Predicted annual mean at receptor	29.9	28.2	26.1	34.5	27.4	31	49.8	42.4	28

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

SITE NO.	52	53	55c	56	57	58	58	61	64
Step 1 How far from kerb was measurement made (m)	1.65	4.6	4.28	2.57	3.6	2.8	2.8	2.8	1.49
Step 2 How far from kerb is receptor in metres (m)	6.25	6.17	5.34	7.17	12.1	8	8	15.3	10.69
Step 3 Local background concentration of NO_2	20.3	20.3	21.4	22.5	21.5	26.7	26.7	17.6	17.6
Step 4 Annual mean bias corrected value	31.9	35.5	31.3	32.8	39	54.8	52	31	68.8
Result; Predicted annual mean at receptor	28.4	34.2	30.7	30.2	33.2	47.3	45.2	25.2	46.7

SITE NO.	73a	73e	73g	74e	75a	75b	80e	140
Step 1 How far from kerb was measurement made (m)								
Step 2 How far from kerb is receptor in metres (m)	2.8	2.5	4.5	0.3	0.6	2.5	2	1.3
Step 3 Local background concentration of NO_2	4.78	4.5	12.9	5.5	5.7	8.6	3.3	4.8
Step 4 Annual mean bias corrected value	21.5	21.5	21.5	22*	22*	22*	31.1	26.2
Result; Predicted annual mean at receptor	39.5	37	31	37.4	42.5	32.8	36.6	37.7
	37.1	34.7	28.1	30.1	34.1	29.5	36	34.5

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

Appendix D: Passive Diffusion Tube data used in trend analysis

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

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

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

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

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

- North
  - Leith
  - Inverleith / Shore

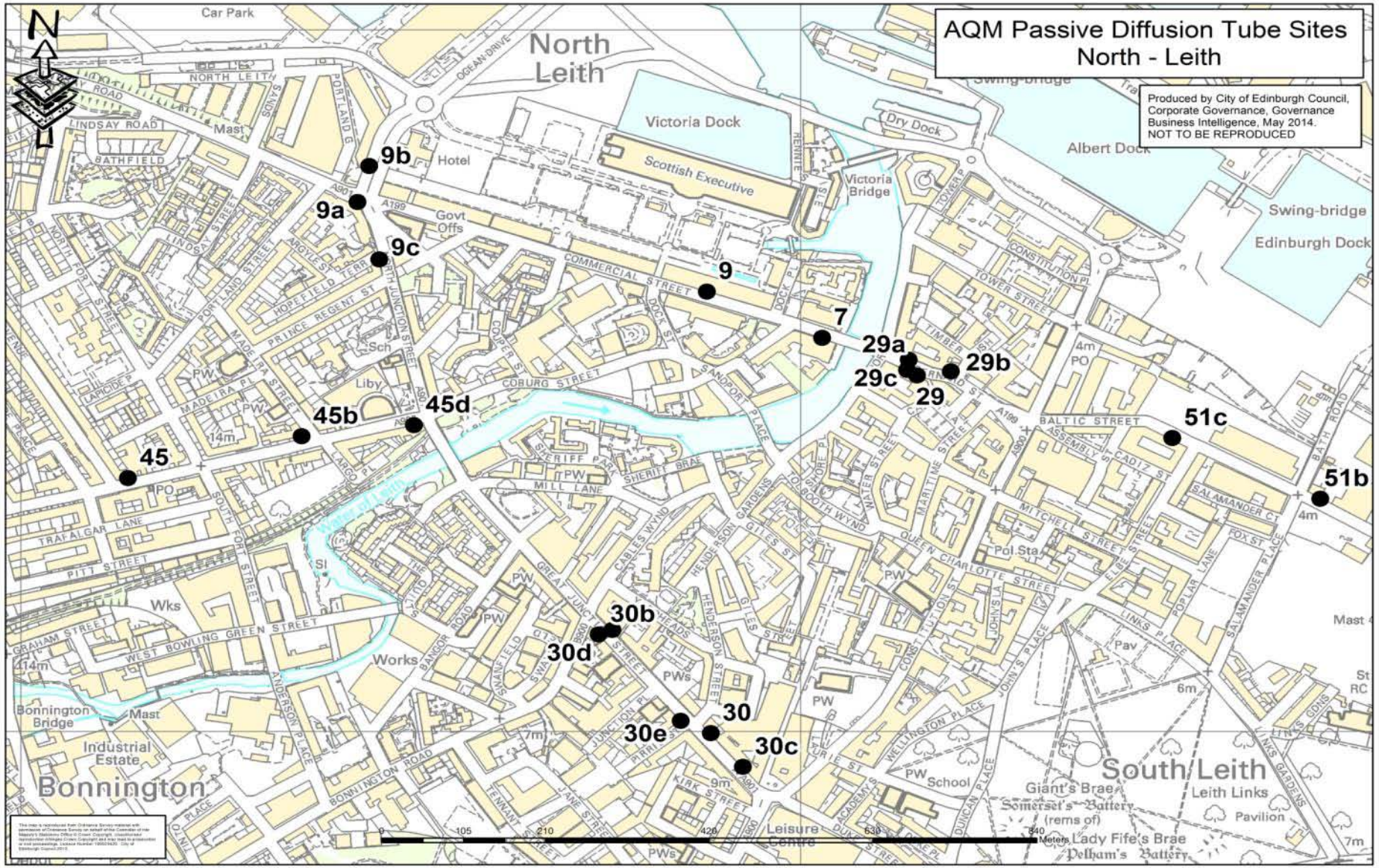
- East
  - Craigmillar
  - Easter Road / London Road
  - Portobello

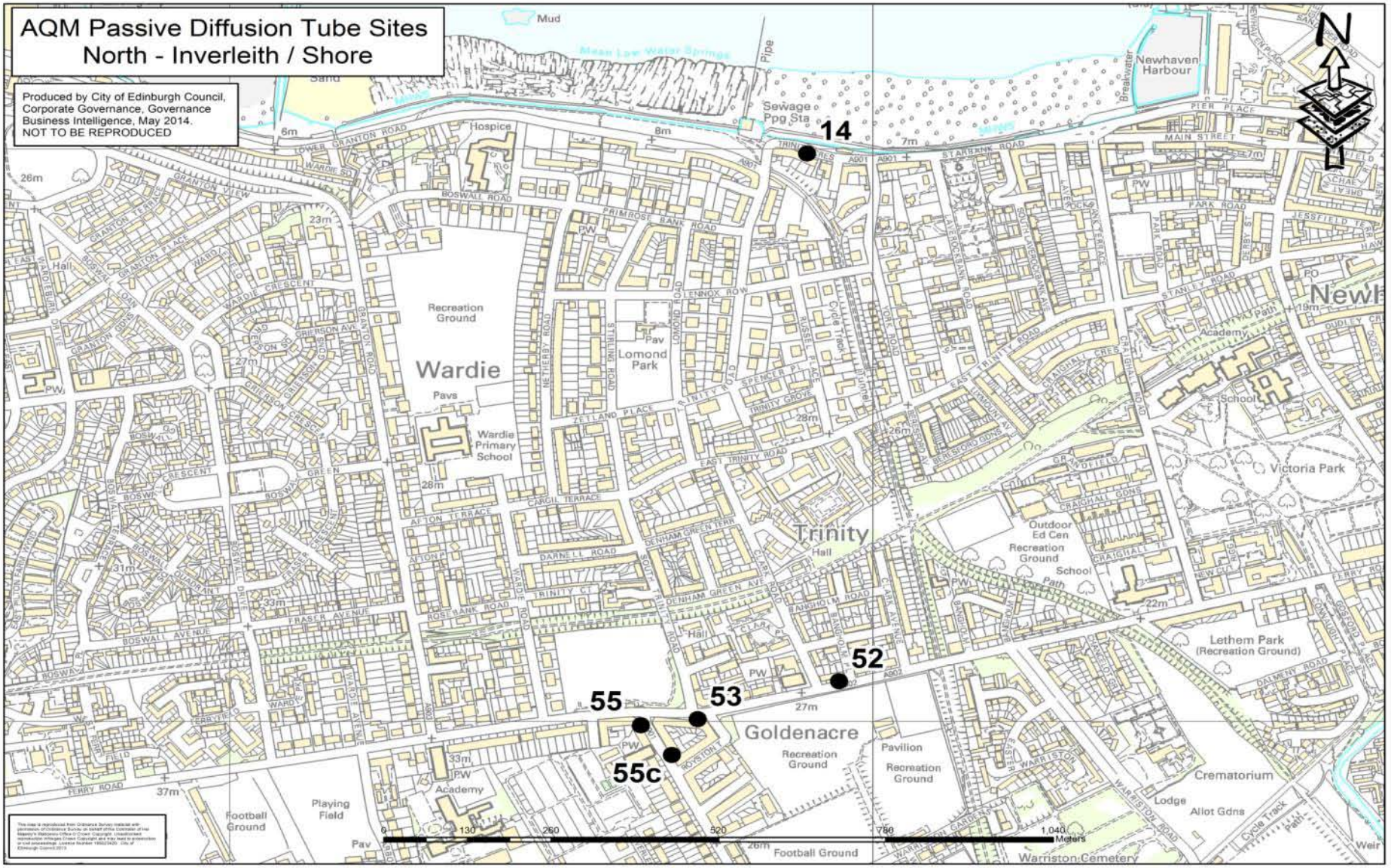
- City Centre North

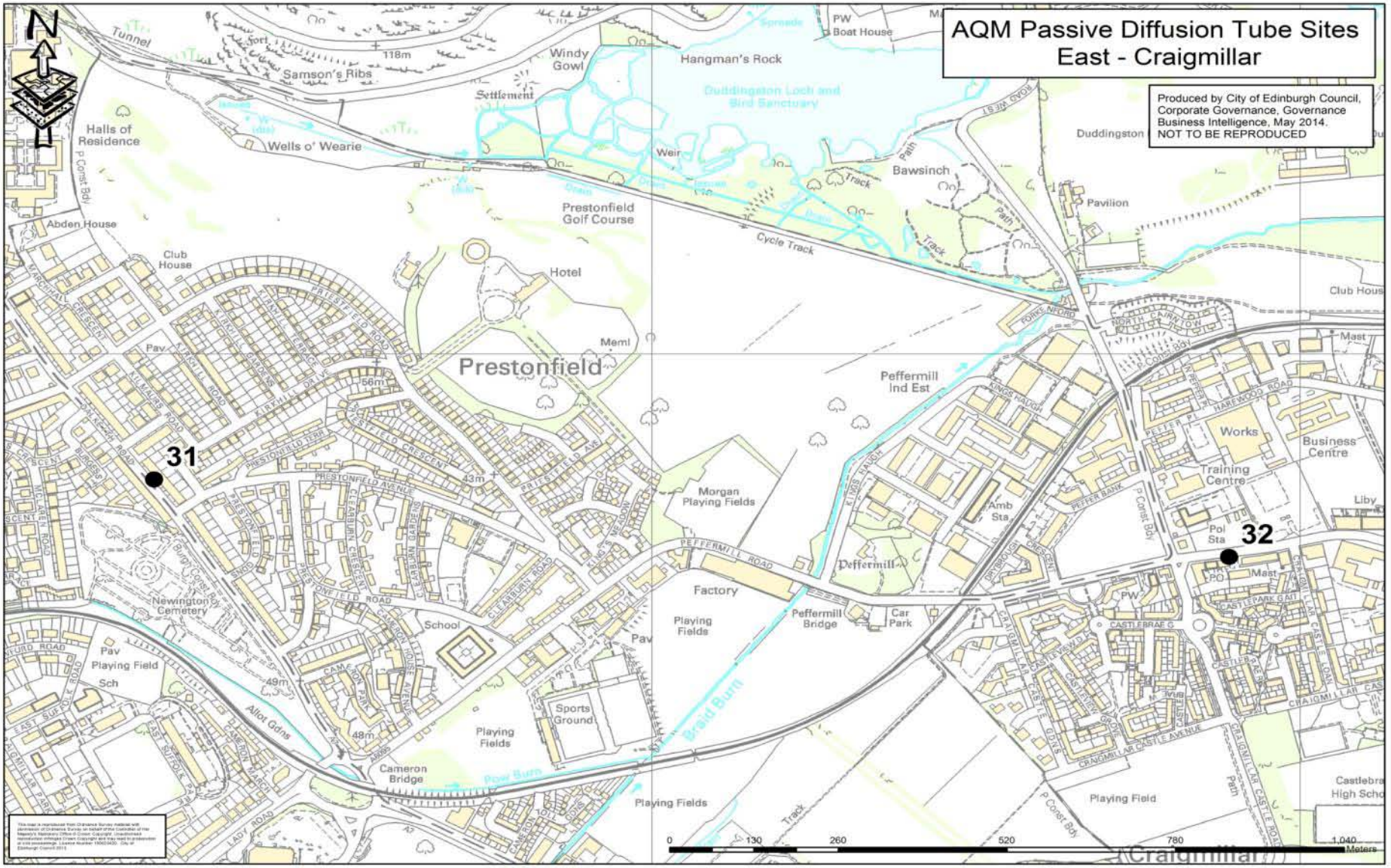
- City Centre South
  - Centre
  - Morningside

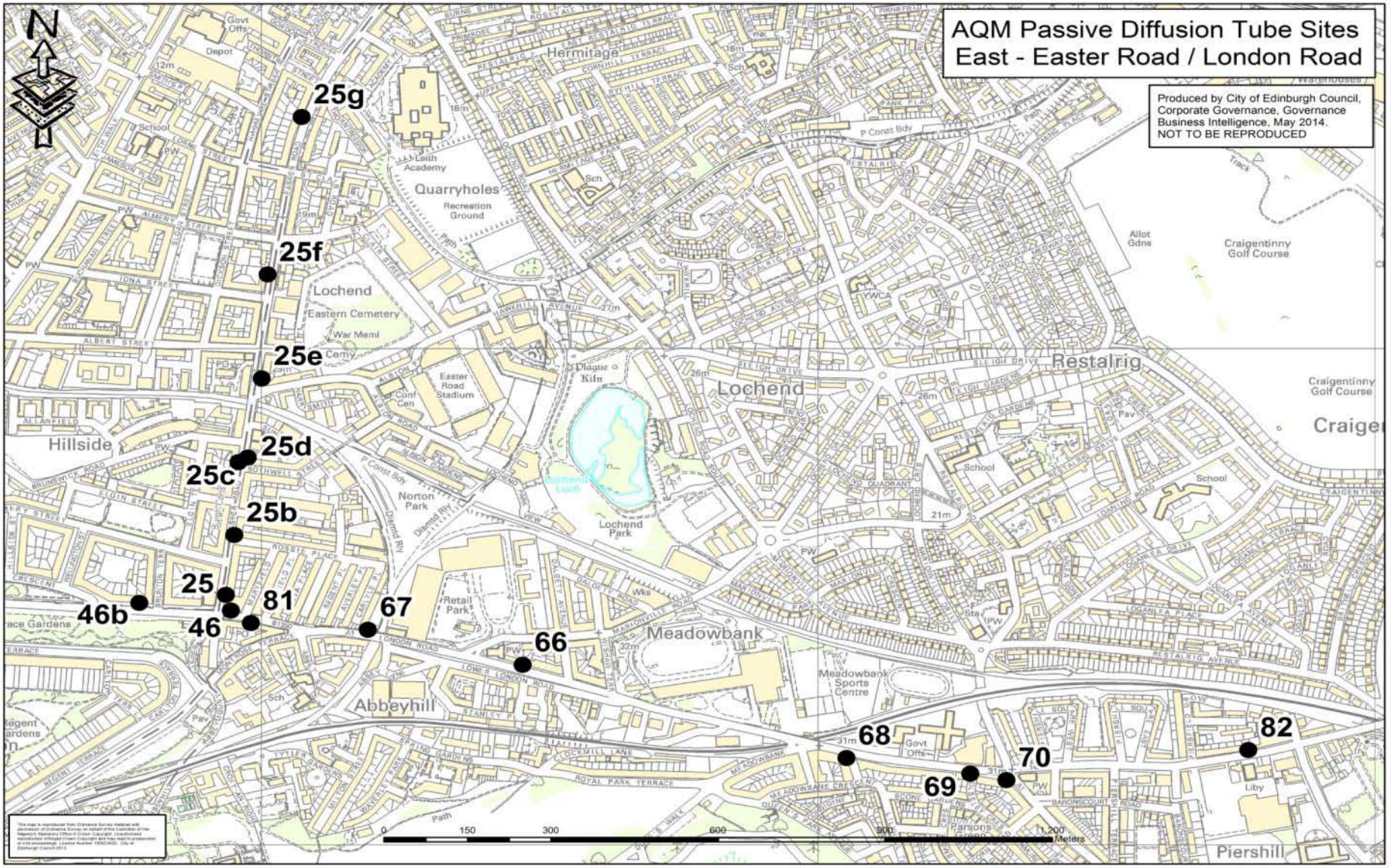
- West
  - Barnton junction / Queensferry Road
  - Queensferry Road / Hillhouse Road
  - St John's Road and Newbridge (insert)

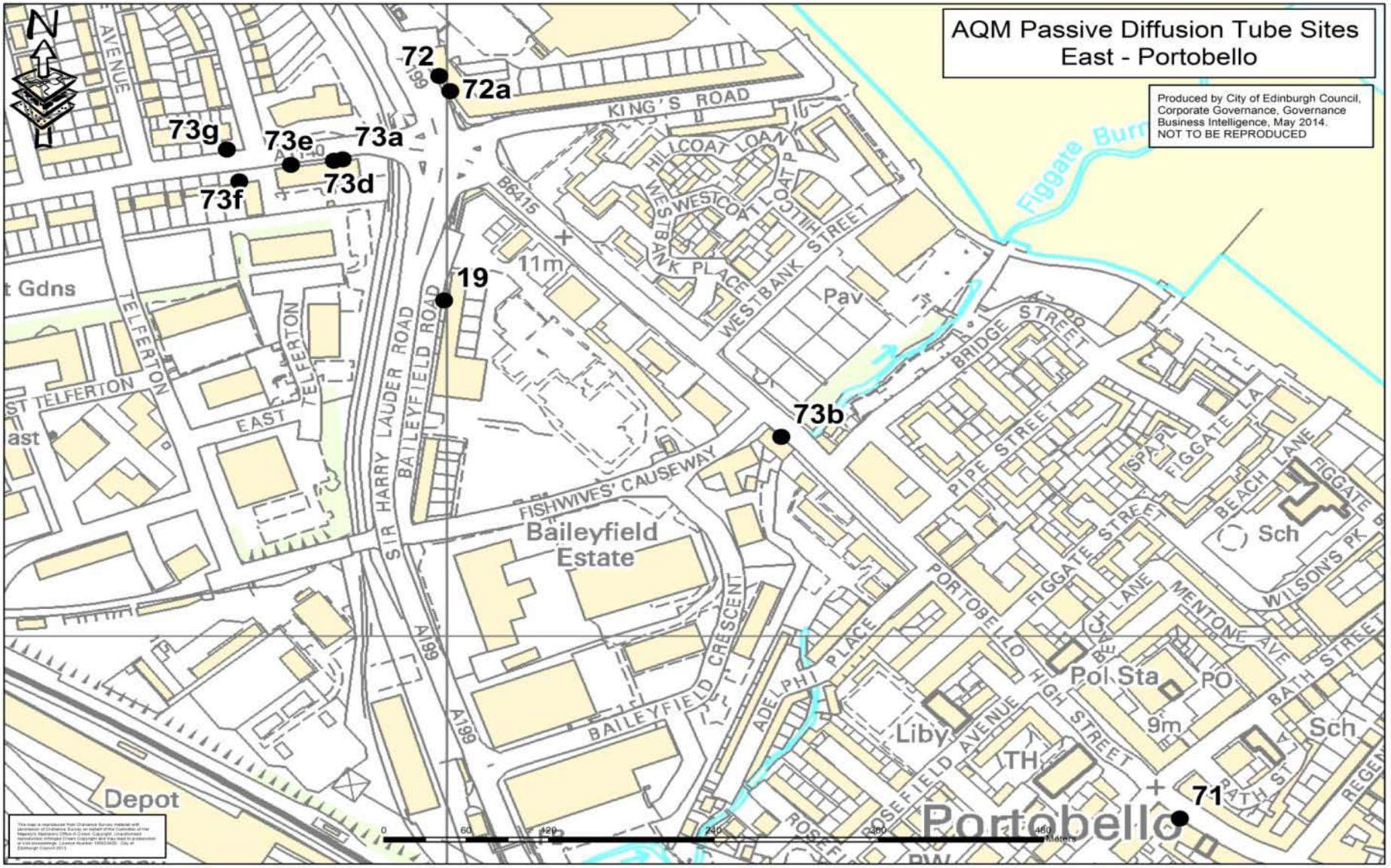
- South West
  - Slateford / Gorgie
  - Lanark & Calder Road

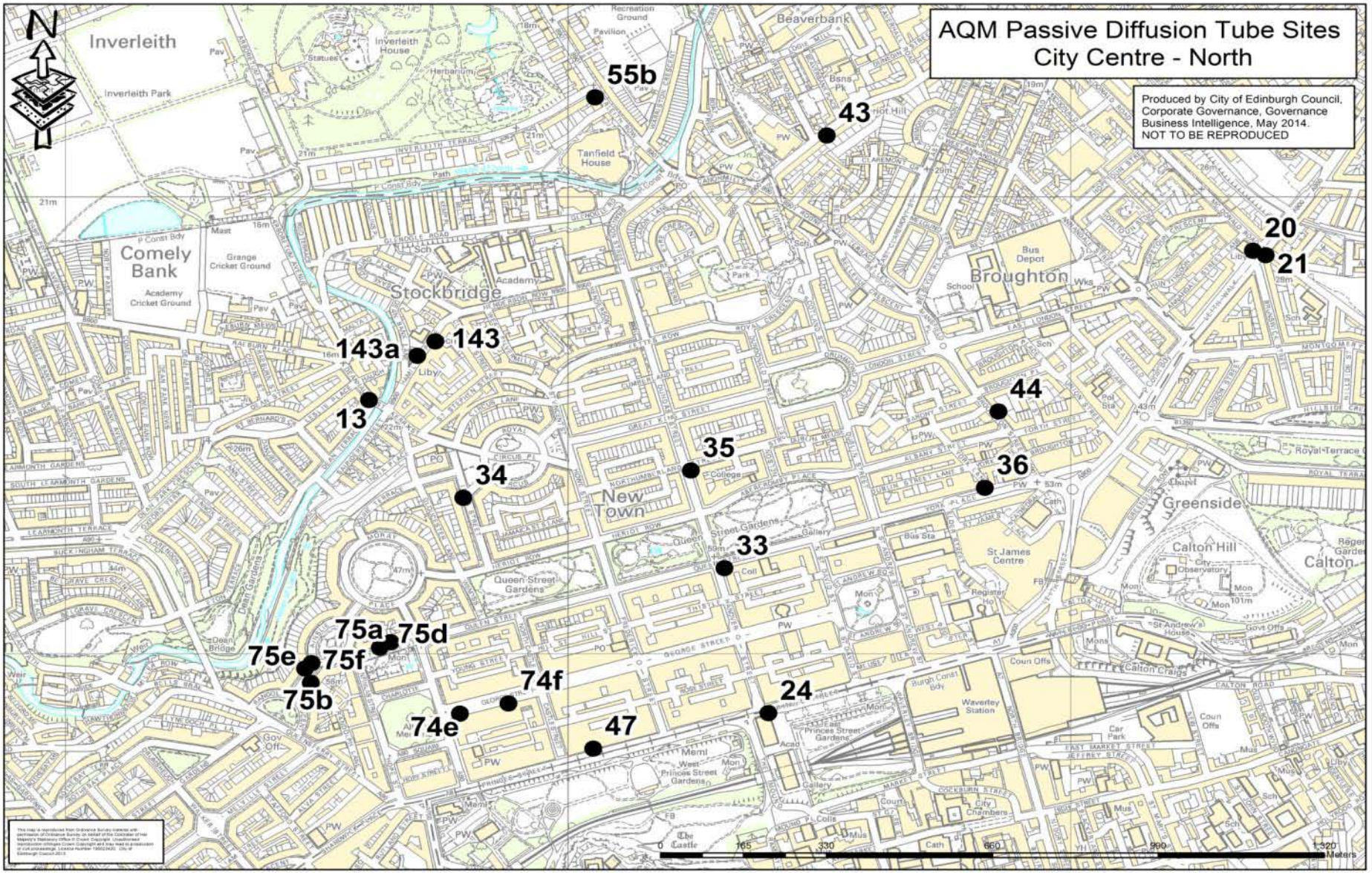

AQM Passive Diffusion Tube Sites
North - Leith
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
North Leith
Victoria Dock
Scottish Executive
Victoria Bridge
Albert Dock
Dry Dock
Swing-bridge
Edinburgh Dock
Hotel
Govt Offs
Car Park
9b
9a
9c
9
7
29a
29b
29c
29
45
45b
45d
51c
51b
30b
30d
30
30e
30c
Bonnington
Industrial Estate
Bonnington Bridge
South Leith
Leith Links
Giant's Brae
Somerset's Battery (rems of)
Lady Fife's Brae
Pelham's Battery
Pavilion
Leisure Centre
Water of Leith
0 105 210 420 630 840 Meters

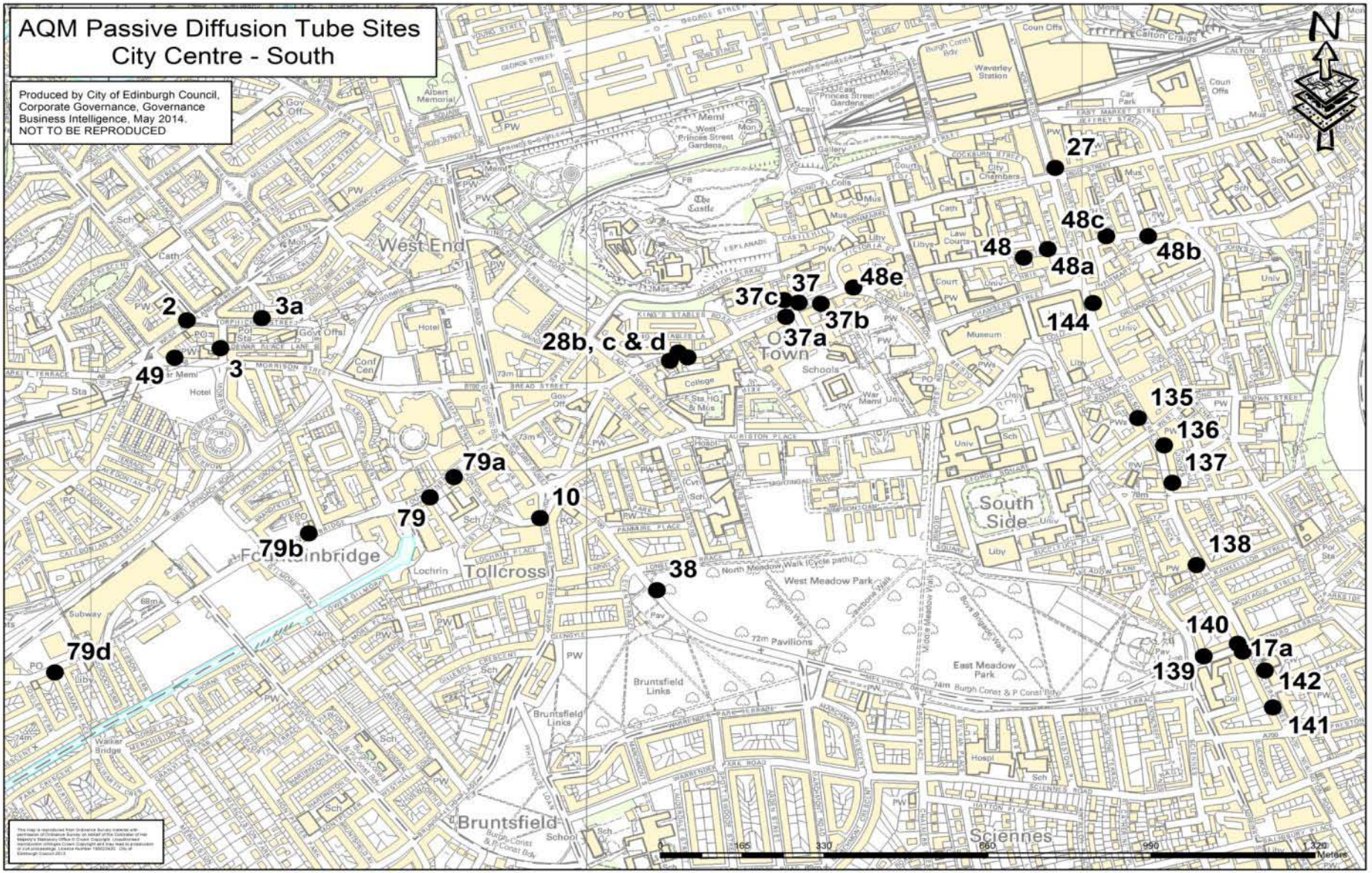

AQM Passive Diffusion Tube Sites
North - Inverleith / Shore
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
14
52
53
55
55c
N
Wardie
Recreation Ground
Wardie Primary School
Lomond Park
Trinity
Goldenacre
Recreation Ground
Pavilion
Recreation Ground
Victoria Park
Outdoor Ed Cen
Recreation Ground
Lethem Park (Recreation Ground)
Crematorium
Newhaven Harbour
Hospice
Sewage Ppg Sta
Academy
Football Ground
Playing Field
Warriston Cemetery
0 130 260 520 780 1,040 Meters

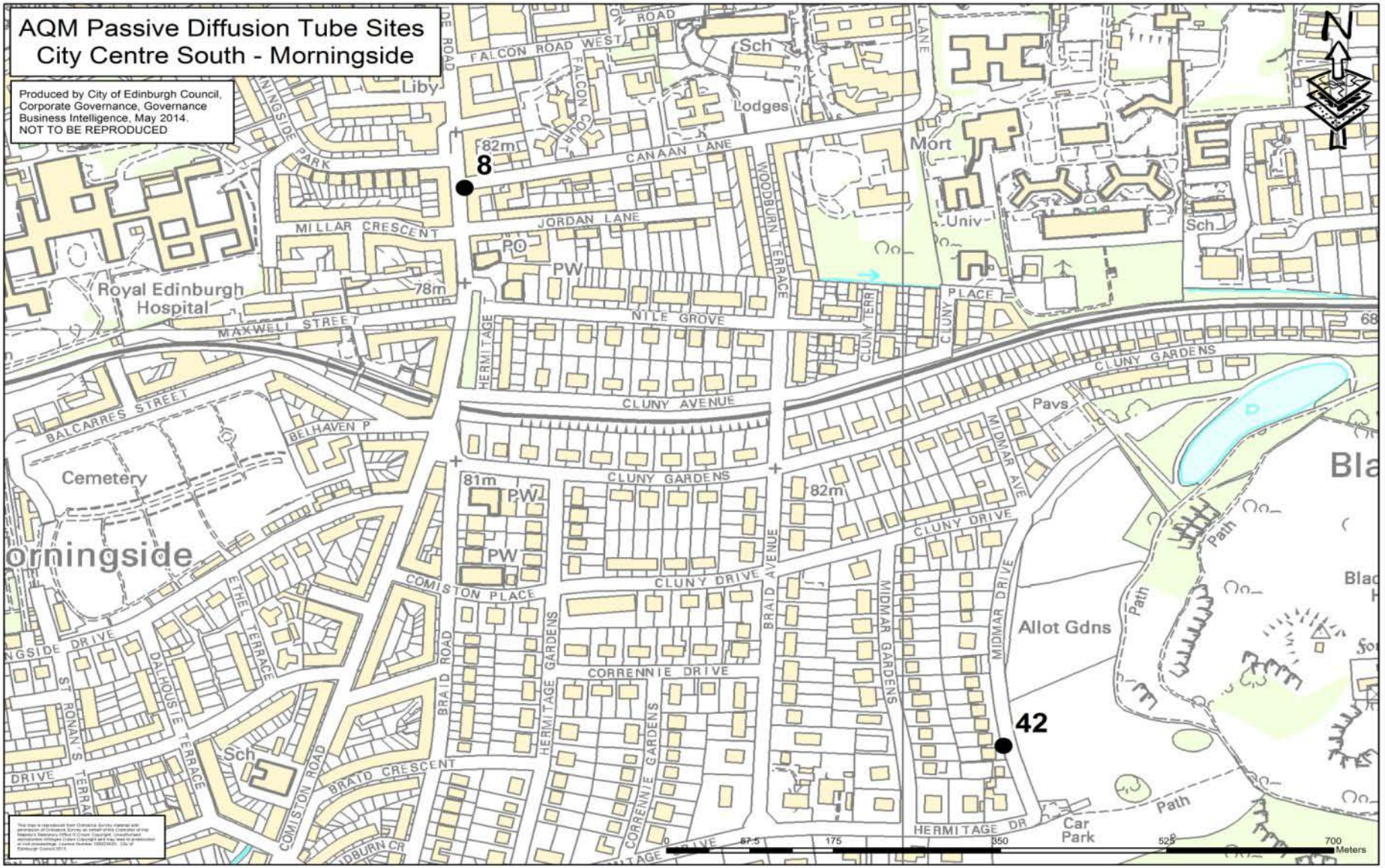

AQM Passive Diffusion Tube Sites
East - Craigmillar
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
31
32
Prestonfield
Hangman's Rock
Windy Gowl
Samson's Ribs
Wells o' Wearie
Halls of Residence
Abden House
Club House
Prestonfield Golf Course
Hotel
Cycle Track
Bawsinch
Pavilion
Duddingston
Peffermill Ind Est
Morgan Playing Fields
Factory
Peffermill Bridge
Car Park
Newington Cemetery
School
Playing Fields
Sports Ground
Cameron Bridge
Braid Burn
Works
Business Centre
Training Centre
Pol Sta
Amb Sta
Castlebrae High School
Playing Field
0
130
260
520
780
1,040
Meters


AQM Passive Diffusion Tube Sites
East - Easter Road / London Road
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
25g
25f
25e
25d
25c
25b
25
81
46b
46
67
66
68
69
70
82
Hermitage
Quarryholes
Lochend
Eastern Cemetery
Hillside
Norton Park
Lochend Park
Restalrig
Craigentinny Golf Course
Meadowbank
Meadowbank Sports Centre
Abbeyhill
Piershill
0 150 300 600 900 1,200 Meters

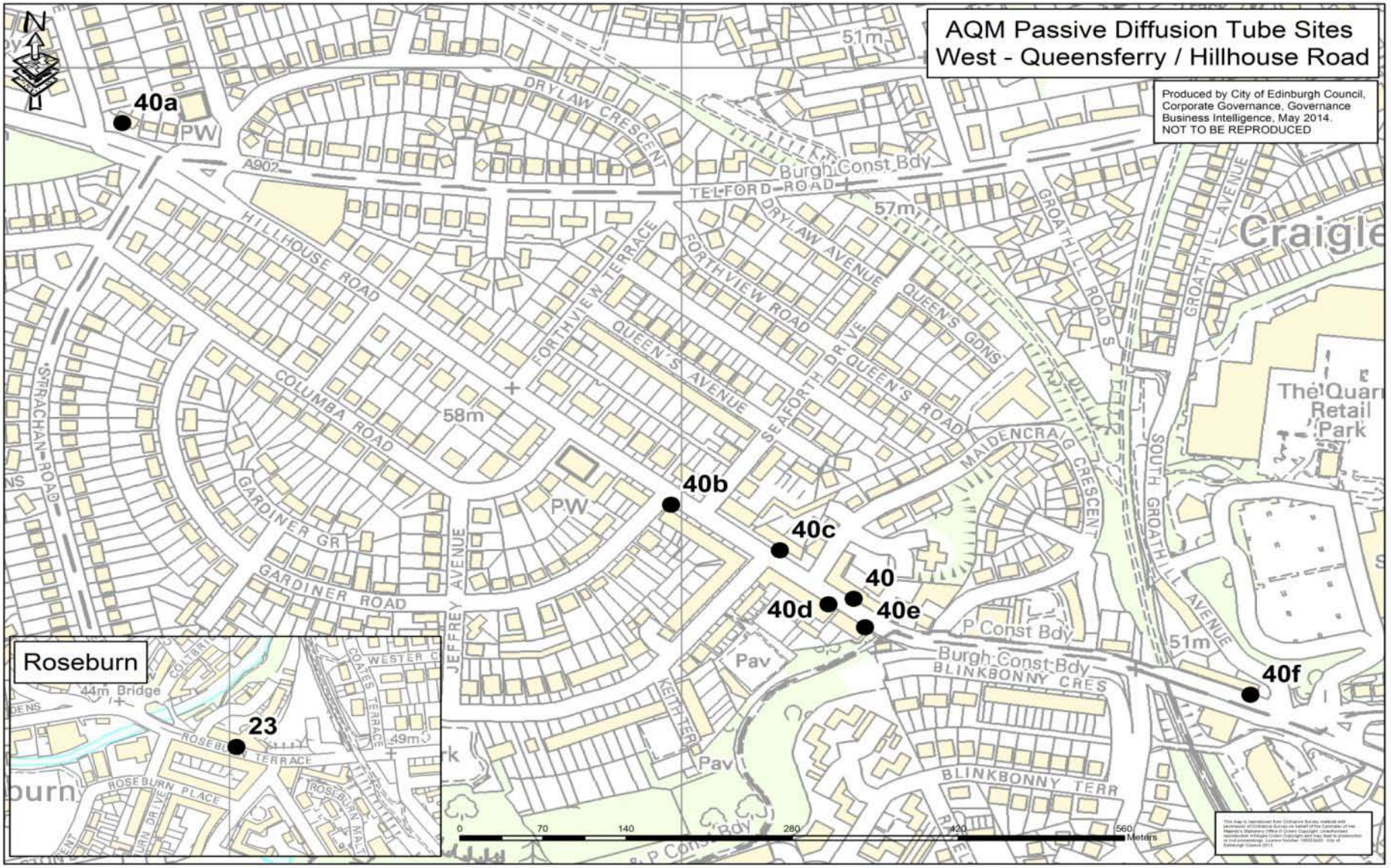

AQM Passive Diffusion Tube Sites
East - Portobello
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
72
72a
73g
73e
73a
73d
73f
19
73b
71
KING'S ROAD
HILLCOAT LOAN
WESTBANK PLACE
WESTBANK STREET
B6415
11m
Pav
Figgate Burn
BRIDGE STREET
PIPE STREET
FIGGATE STREET
BEACH LANE
Sch
WILSON'S PK
MENTONE AVE
BATH STREET
PORTOBELLO HIGH STREET
Pol Sta
PO
9m
Liby
TH
ADELPHI PLACE
ROSEFIELD AVENUE
BAILEYFIELD CRESCENT
FISHWIVES' CAUSEWAY
Baileyfield Estate
SIR HARRY LAUDER ROAD
BAILEYFIELD ROAD
A199
TELFERTON
EAST TELFERTON
ST TELFERTON
Depot
Portobello
Meters

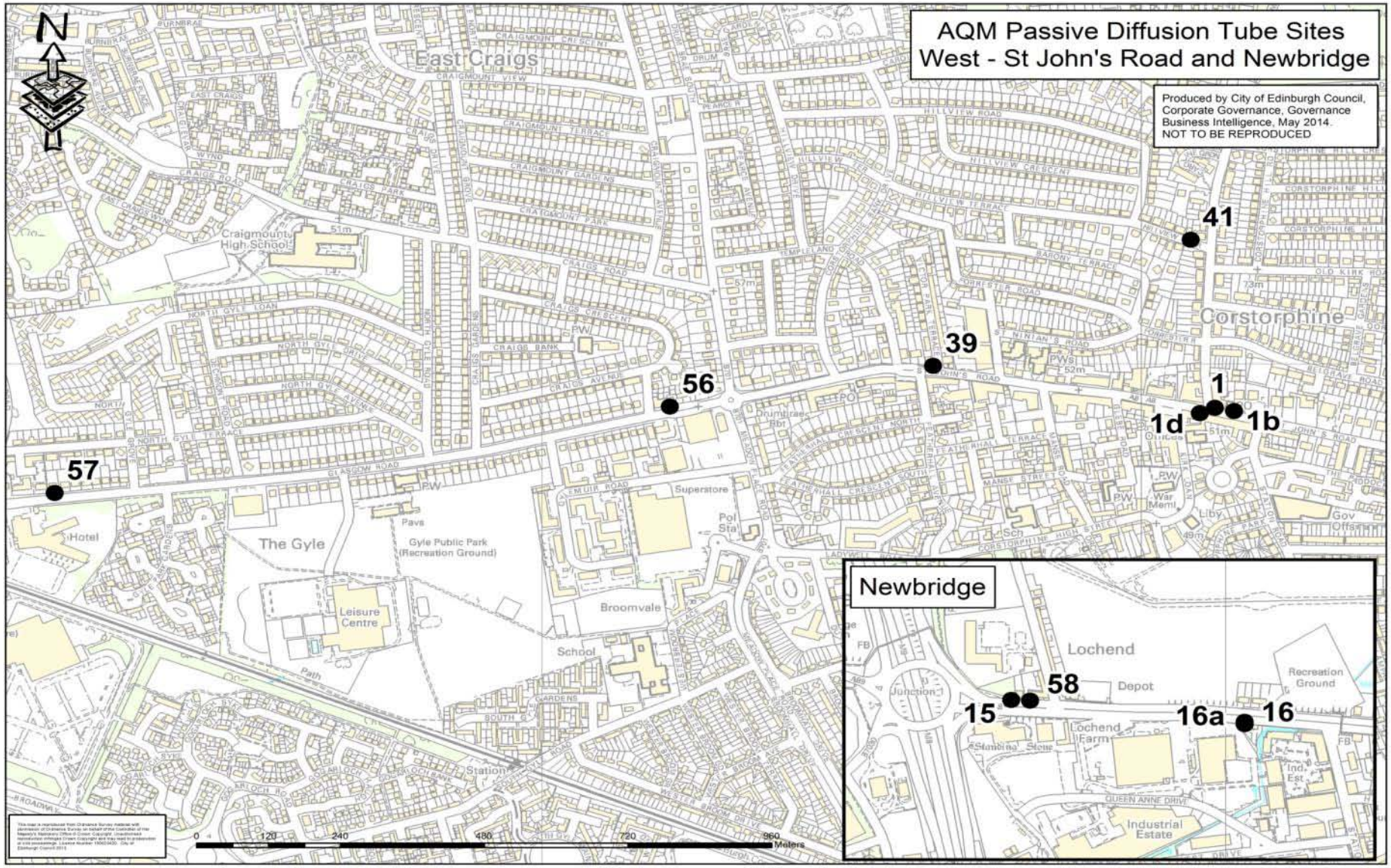

AQM Passive Diffusion Tube Sites
City Centre - North
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
55b
43
20
21
143a
143
13
44
35
34
36
33
75a
75d
75e
75f
75b
74f
74e
47
24
Inverleith
Comely Bank
Stockbridge
Beaverbank
Broughton
New Town
Greenside
Calton Hill
Calton
0
165
330
660
990
1,320
Meters

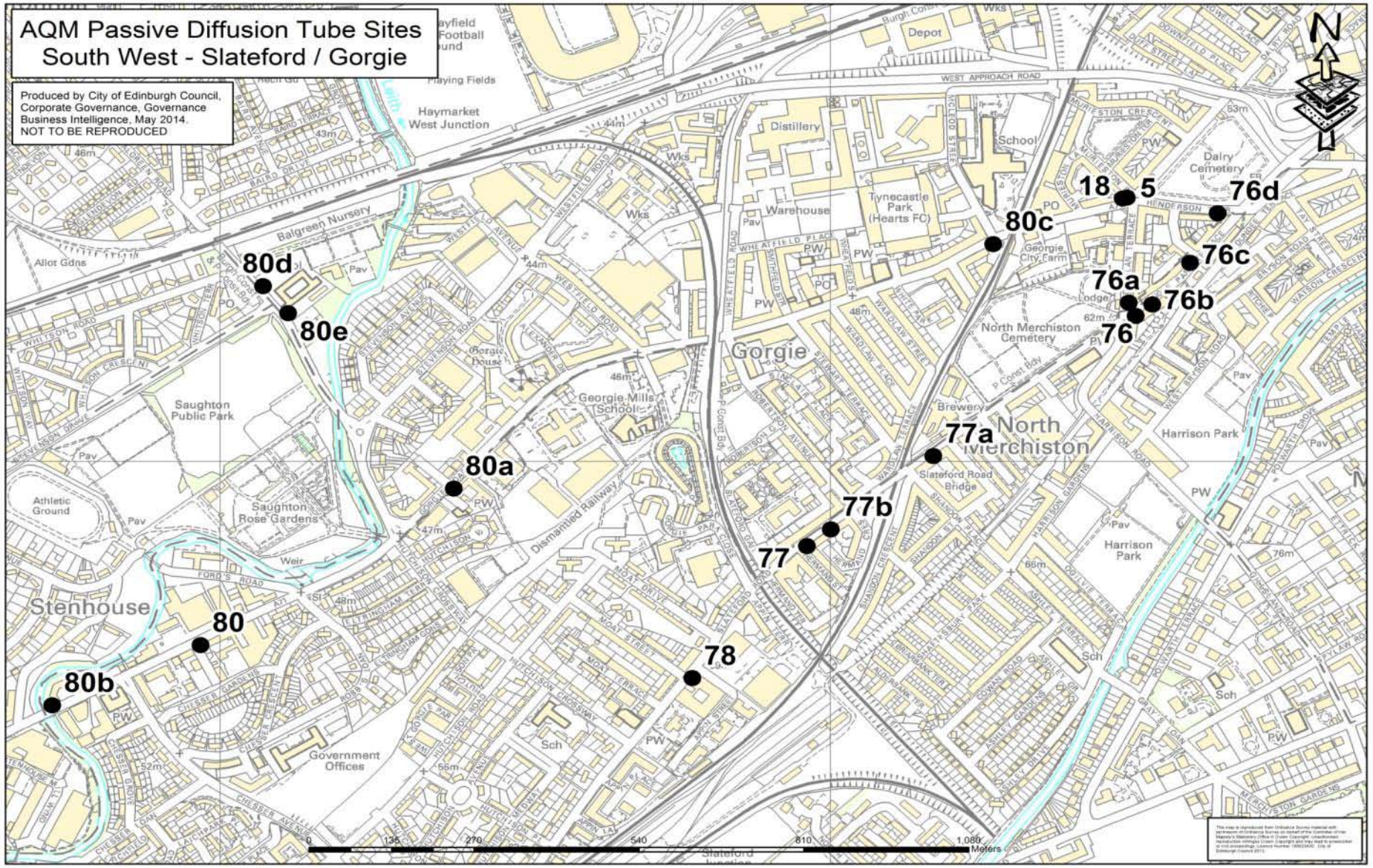

AQM Passive Diffusion Tube Sites
City Centre - South
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
2
3a
49
3
28b, c & d
37c
37
48e
37b
37a
27
48c
48
48a
48b
144
135
136
137
138
140
17a
139
142
141
79a
79
10
79b
38
79d
West End
Town
South Side
Tollcross
Bruntsfield
Sciennes
Fountainbridge
West Meadow Park
East Meadow Park
Bruntsfield Links
0
165
330
660
990
1,320
Meters

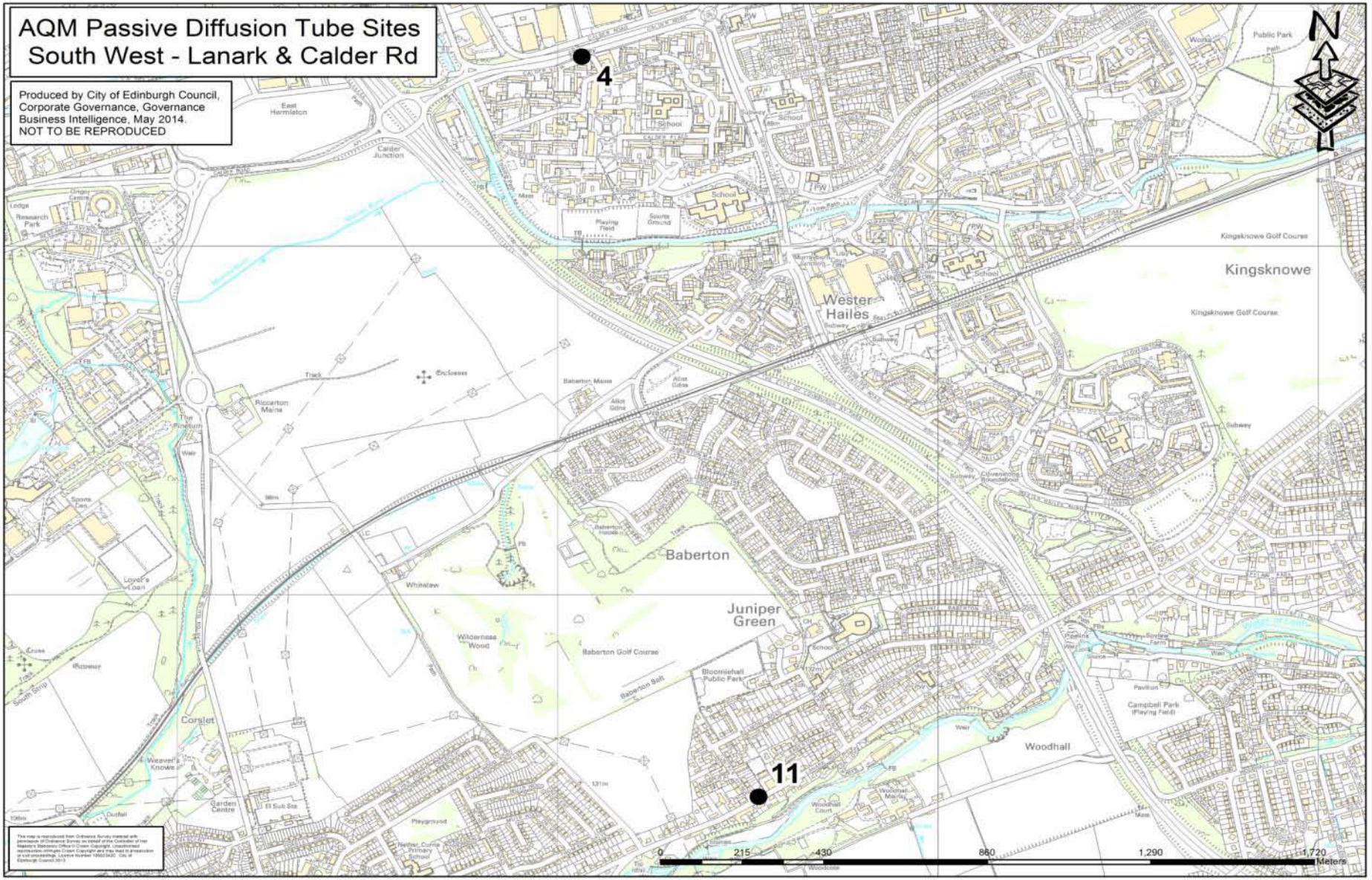

AQM Passive Diffusion Tube Sites
City Centre South - Morningside
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
8
42
82m
78m
81m
82m
FALCON ROAD WEST
CANAAN LANE
JORDAN LANE
MILLAR CRESCENT
MAXWELL STREET
NILE GROVE
CLUNY AVENUE
CLUNY GARDENS
CLUNY DRIVE
CORRENNIE DRIVE
COMISTON PLACE
BRAID ROAD
BRAID AVENUE
BRAID CRESCENT
HERMITAGE GARDENS
MIDMAR GARDENS
MIDMAR DRIVE
HERMITAGE DR
BALCARRES STREET
ETHEL TERRACE
DALHOUSIE TERRACE
COMISTON ROAD
WOODBURN TERRACE
HERMITAGE
Royal Edinburgh Hospital
Cemetery
Allot Gdns
Car Park
Sch
Lodges
Mort
Univ
Pavs
Path
PW
PO
0
87.5
175
350
525
700
Meters


AQM Passive Diffusion Tube Sites
West - Barnton Junction / Queensferry Road
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
Club House
50a
BARNTON GROVE
PO
42m
Hotel
A90
64a
63
64
61
46m
62
Crescent
43m
Barnton Junction
A902
B701
PINEGROVE GDNS
0
30
60
120
180
240
Metres


AQM Passive Diffusion Tube Sites
West - Queensferry / Hillhouse Road
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
40a
40b
40c
40
40d
40e
40f
23
Roseburn
A902
TELFORD ROAD
DRYLAW CRESCENT
HILLHOUSE ROAD
DRYLAW AVENUE
FORTHVIEW TERRACE
FORTHVIEW ROAD
QUEEN'S AVENUE
QUEEN'S GDNS
QUEEN'S ROAD
SEAFORTH DRIVE
COLUMBA ROAD
GARDINER GR
GARDINER ROAD
JEFFREY AVENUE
STRACHAN ROAD
MAIDENCRAIG CRESCENT
GROATHILL ROAD S
GROATHILL AVENUE
SOUTH GROATHILL AVENUE
BLINKBONNY CRES
BLINKBONNY TERR
ROSEBURN TERRACE
ROSEBURN PLACE
ROSEBURN DRIVE
COATES TERRACE
KEITH TERR
Burgh Const Bdy
P Const Bdy
Pav
PW
51m
57m
58m
49m
44m Bridge
Craigle
The Quar Retail Park
0 70 140 280 420 560 Meters


AQM Passive Diffusion Tube Sites
West - St John's Road and Newbridge
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014.
NOT TO BE REPRODUCED
N
East Craigs
Craigmount High School
Corstorphine
The Gyle
Gyle Public Park (Recreation Ground)
Leisure Centre
Broomvale
School
Superstore
Station
Hotel
Newbridge
Lochend
Depot
Recreation Ground
Lochend Farm
Industrial Estate
41
39
56
1
1d
1b
57
58
15
16a
16
0 120 240 480 720 960 Meters


AQM Passive Diffusion Tube Sites
South West - Slateford / Gorgie
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
80d
80e
80a
80
80b
77
77b
78
77a
80c
18
5
76d
76c
76a
76b
76
Gorgie
North Merchiston
Stenhouse
Saughton Public Park
Saughton Rose Gardens
Athletic Ground
Balgreen Nursery
Allot Gdns
Haymarket West Junction
Playing Fields
Distillery
Warehouse
Tynecastle Park (Hearts FC)
Depot
School
Dairy Cemetery
Georgie City Farm
North Merchiston Cemetery
Brewery
Slateford Road Bridge
Harrison Park
Georgie Mills School
Gorgie House
Dismantled Railway
Weir
Government Offices
WEST APPROACH ROAD
Meters


AQM Passive Diffusion Tube Sites
South West - Lanark & Calder Rd
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014.
NOT TO BE REPRODUCED
4
11
N
Kingsknowe
Wester Hailes
Baberton
Juniper Green
Woodhall
Corslet
Kingsknowe Golf Course
Baberton Golf Course
0
215
430
860
1,290
1,720
Meters

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

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

- North
  - Leith
  - Inverleith / Shore

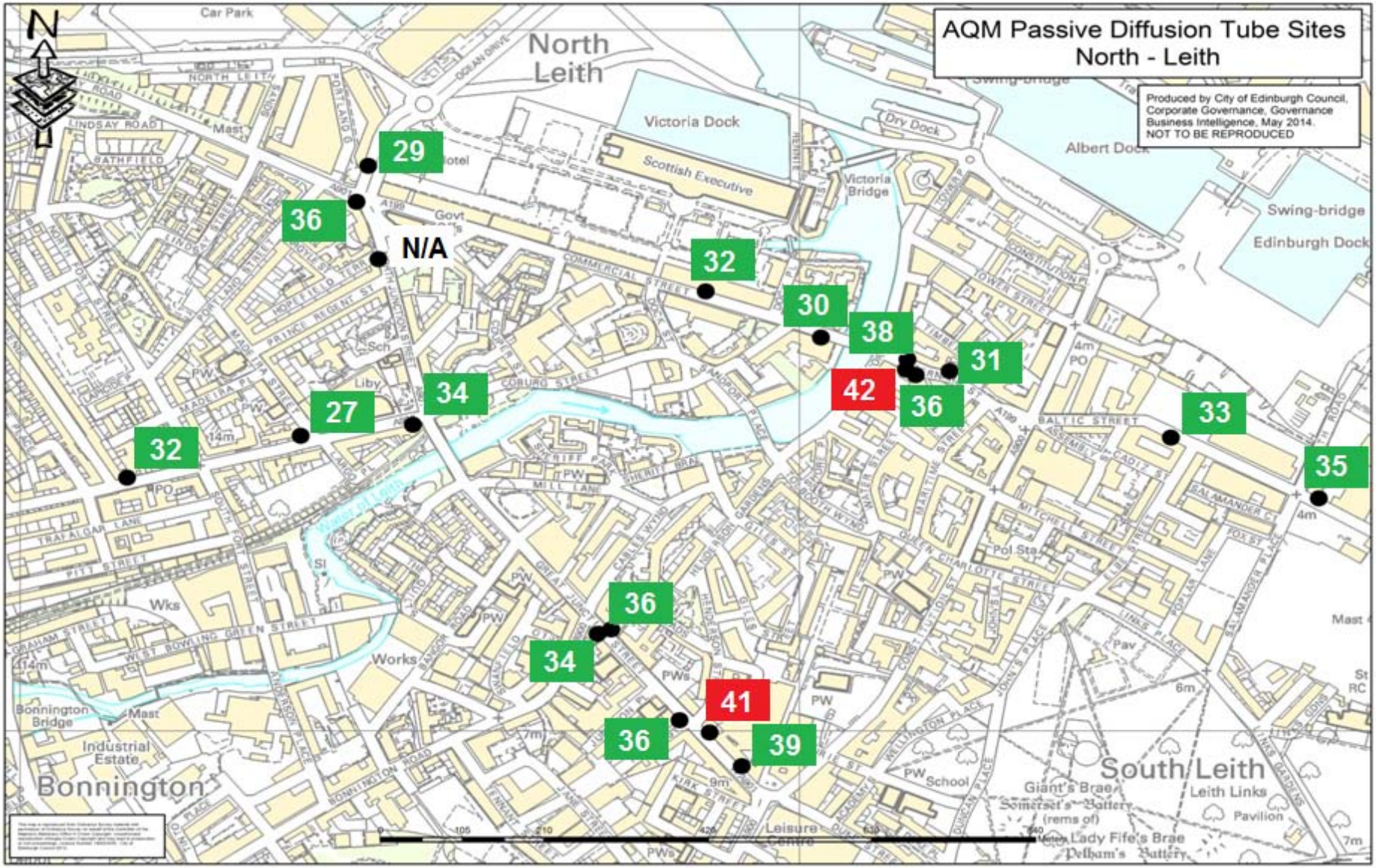
- East
  - Craigmillar
  - Easter Road / London Road
  - Portobello

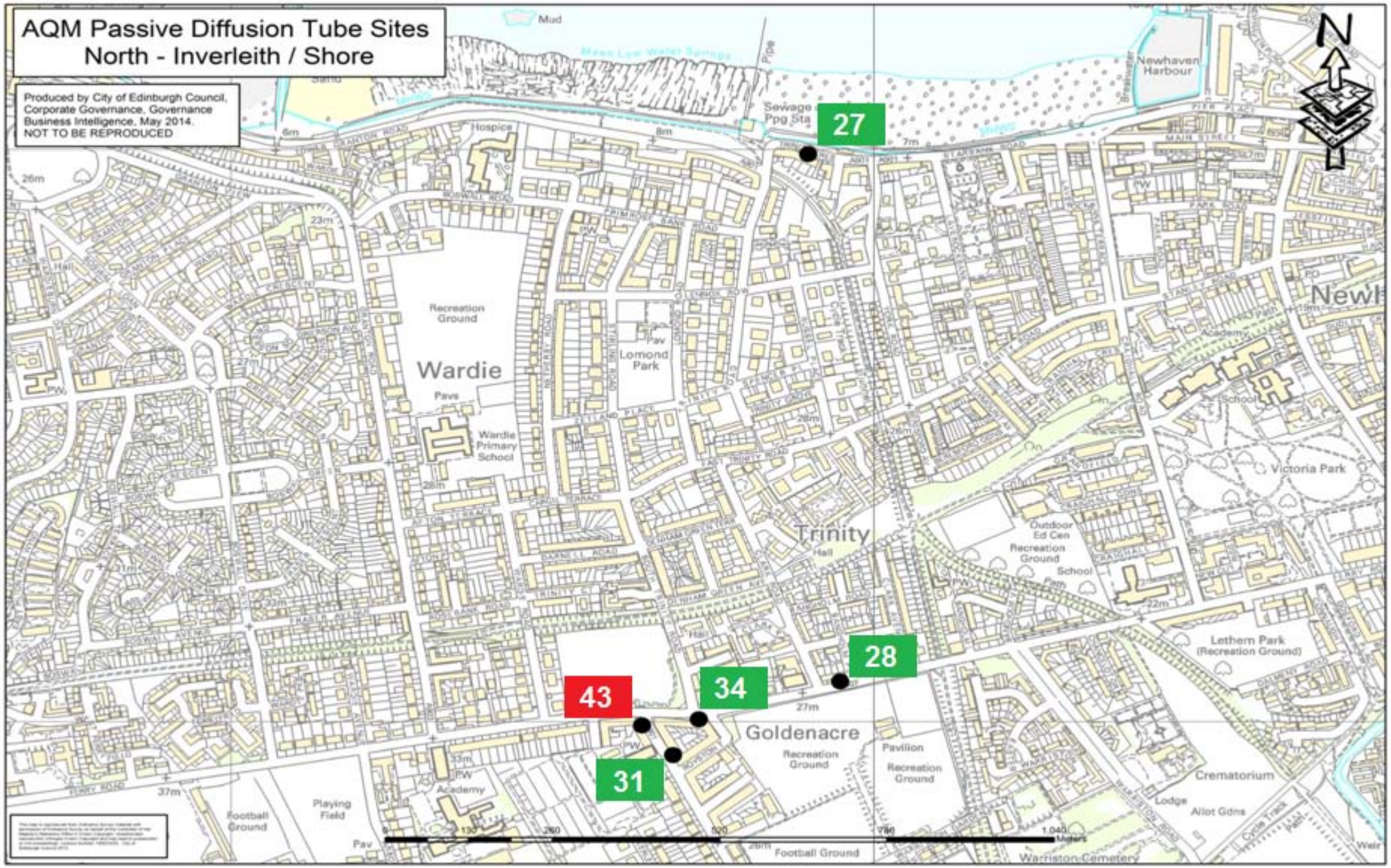
- City Centre North

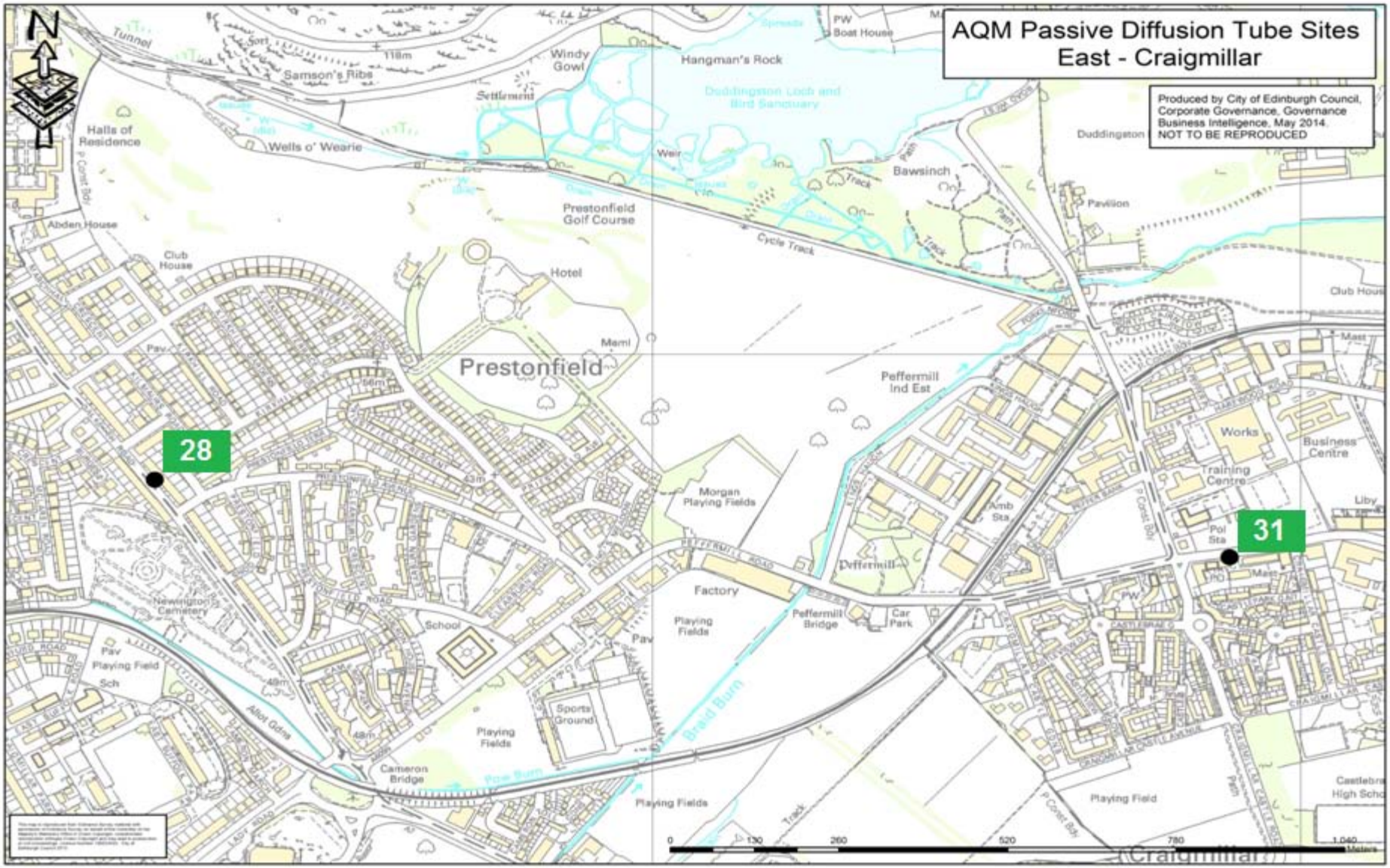
- City Centre South
  - Centre
  - Morningside

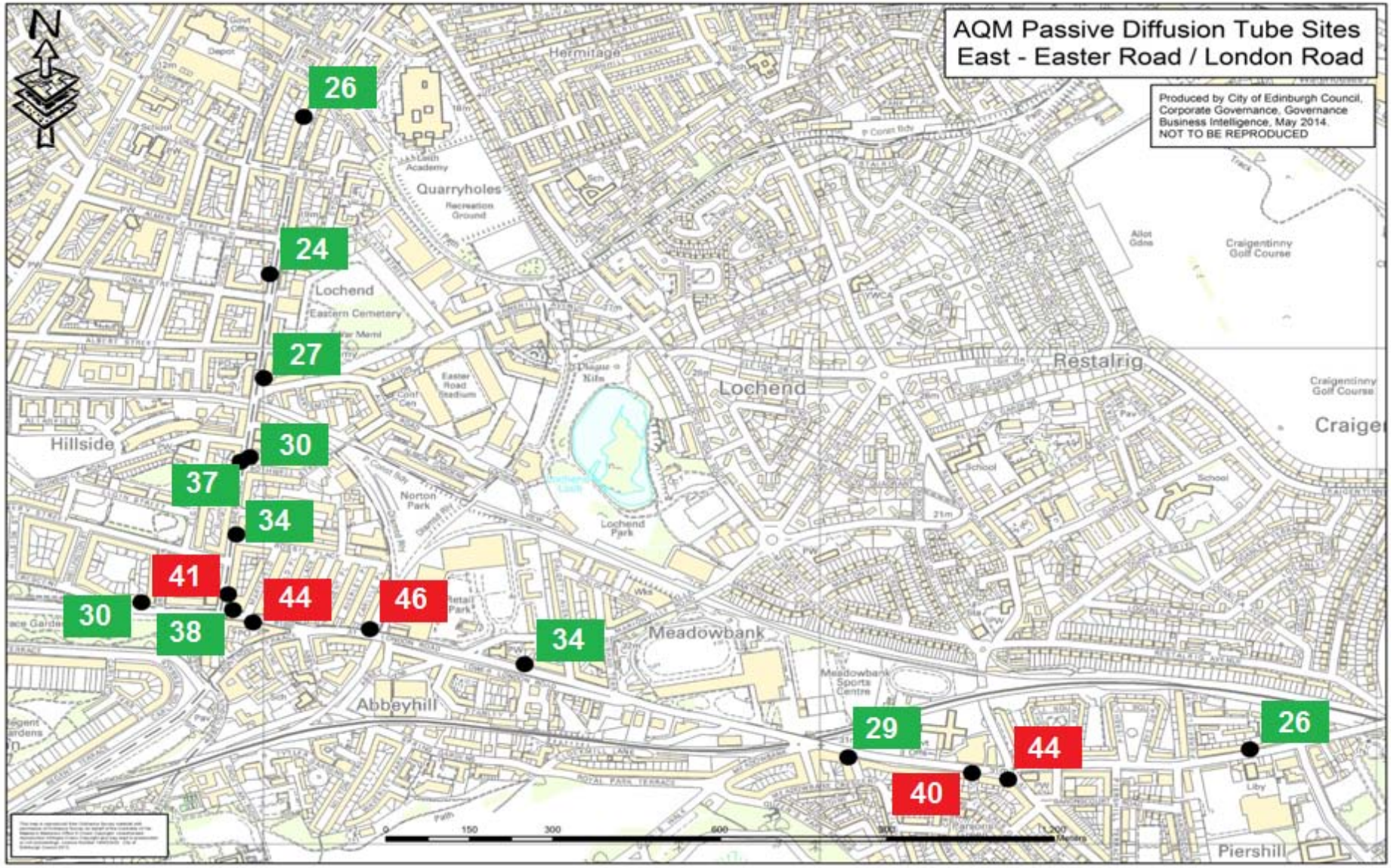
- West
  - Barnton junction / Queensferry Road
  - Queensferry Road / Hillhouse Road
  - St John's Road and Newbridge (insert)

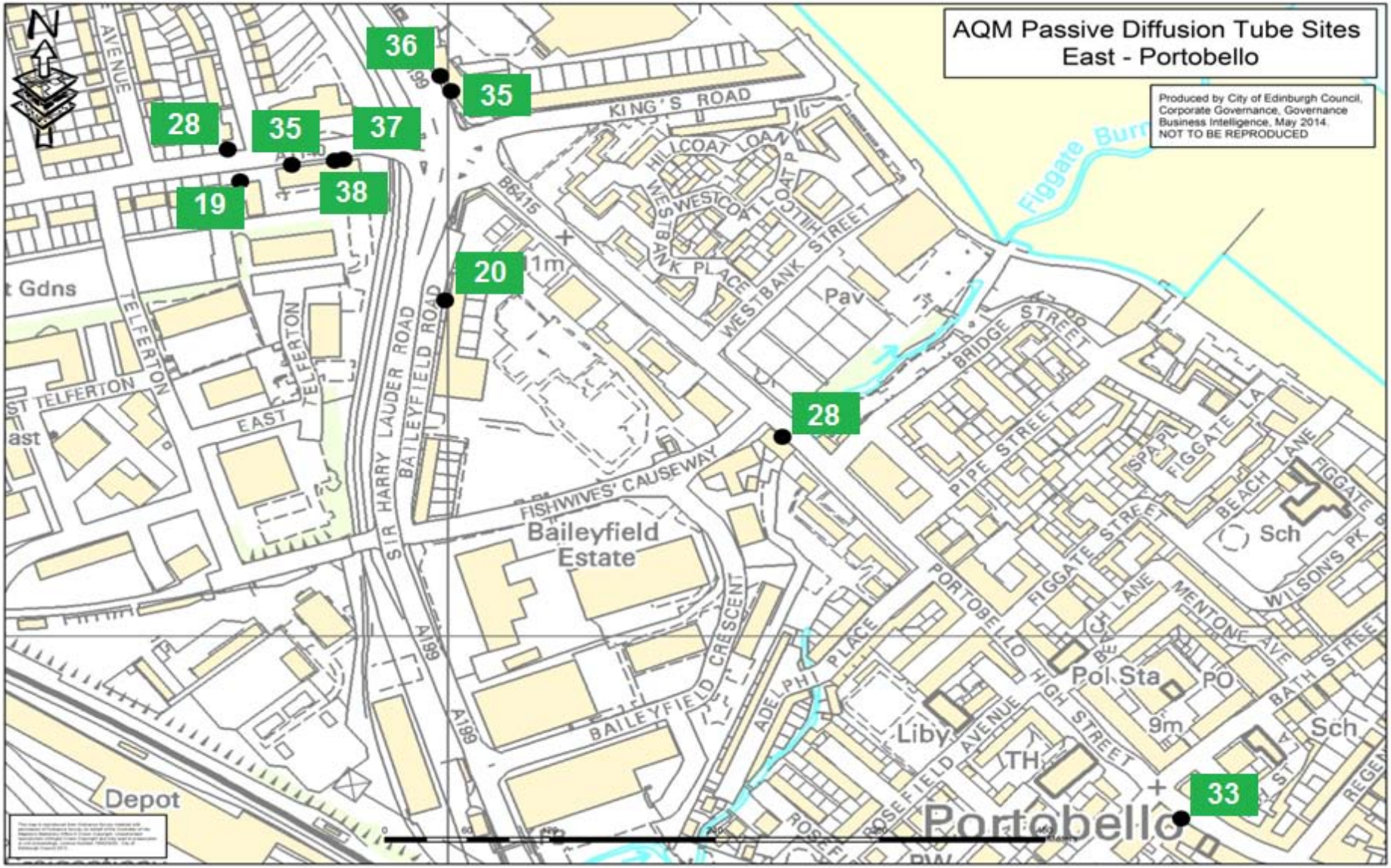
- South West
  - Slateford / Gorgie
  - Lanark & Calder Road

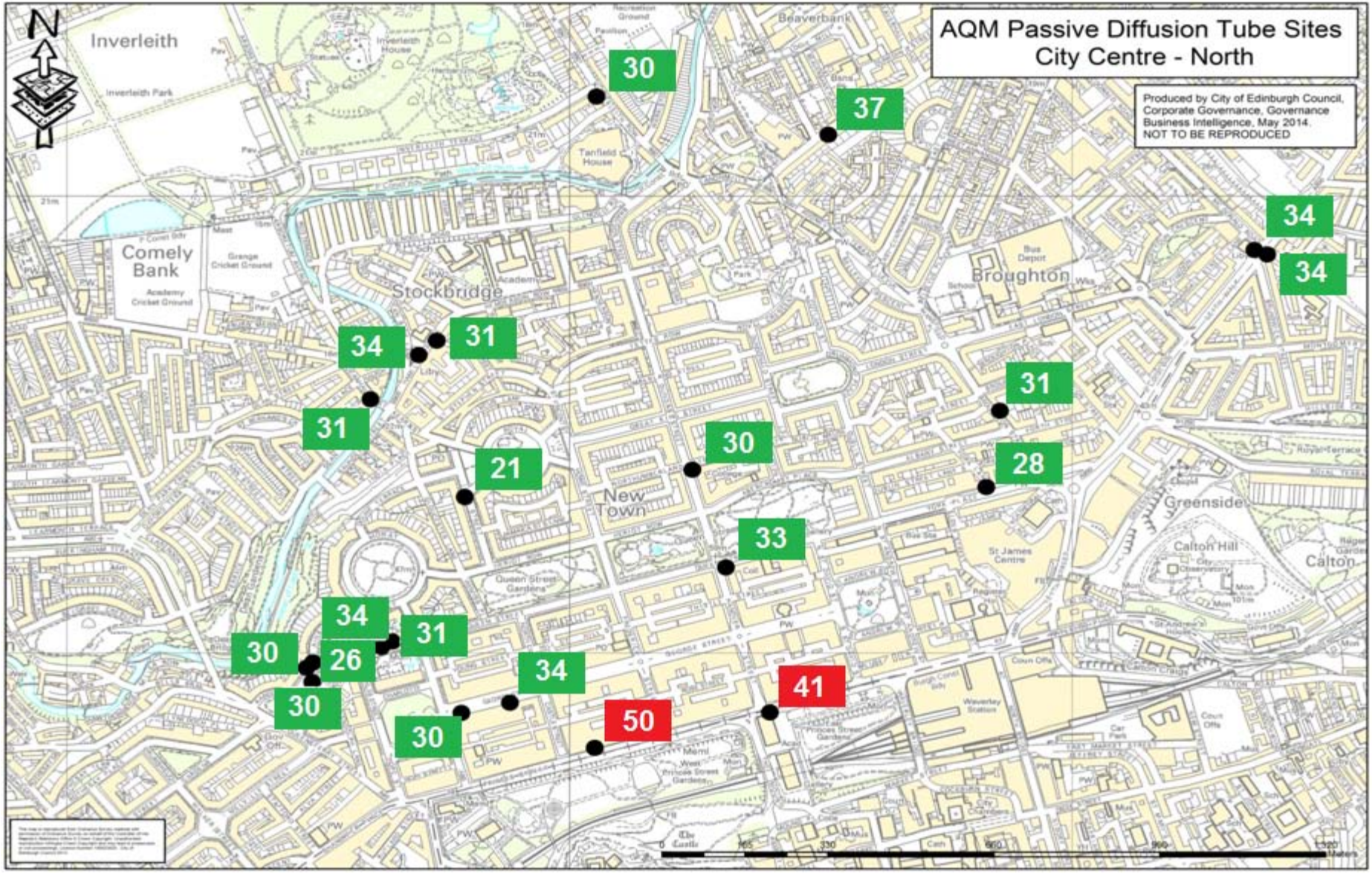

AQM Passive Diffusion Tube Sites
North - Leith
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
North Leith
Victoria Dock
Scottish Executive
Victoria Bridge
Albert Dock
Dry Dock
Swing-bridge
Edinburgh Dock
Bonnington
Industrial Estate
Bonnington Bridge
South Leith
Leith Links
Pavilion
Giant's Brae
Somerset's Battery (rems of)
Lady Fife's Brae
Pelham's Battery
Leisure Centre
29
36
N/A
32
30
38
31
42
36
33
35
34
27
32
36
34
41
36
39

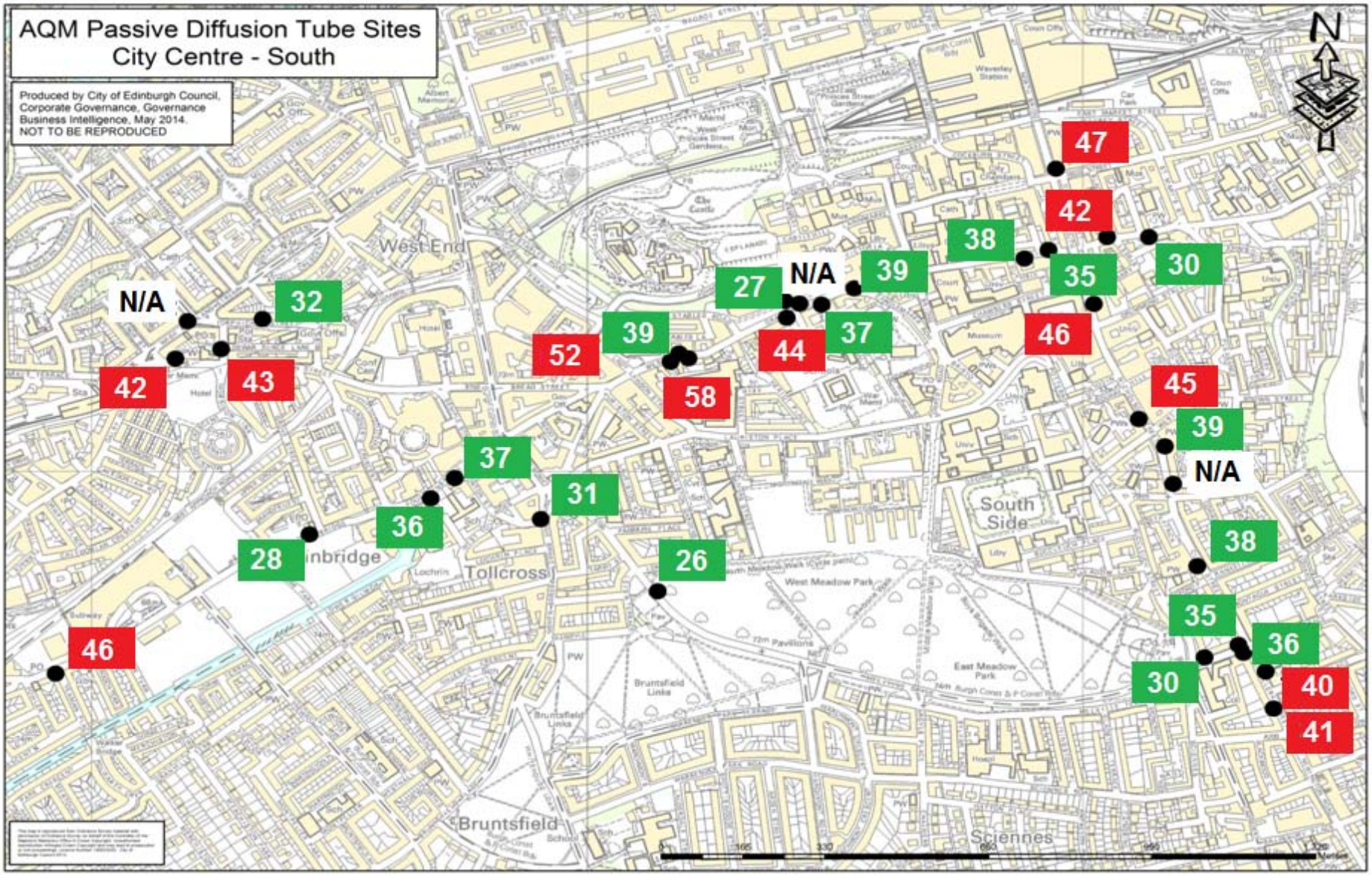

AQM Passive Diffusion Tube Sites
North - Inverleith / Shore
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
27
28
34
43
31
Wardie
Trinity
Goldenacre
Newhaven Harbour
Victoria Park
Lethern Park (Recreation Ground)
Crematorium
Warriston Cemetery
Wardie Primary School
Lomond Park
Recreation Ground
Football Ground
Playing Field
Academy
Hospice
Sewage Ppg Sta
Mud
N

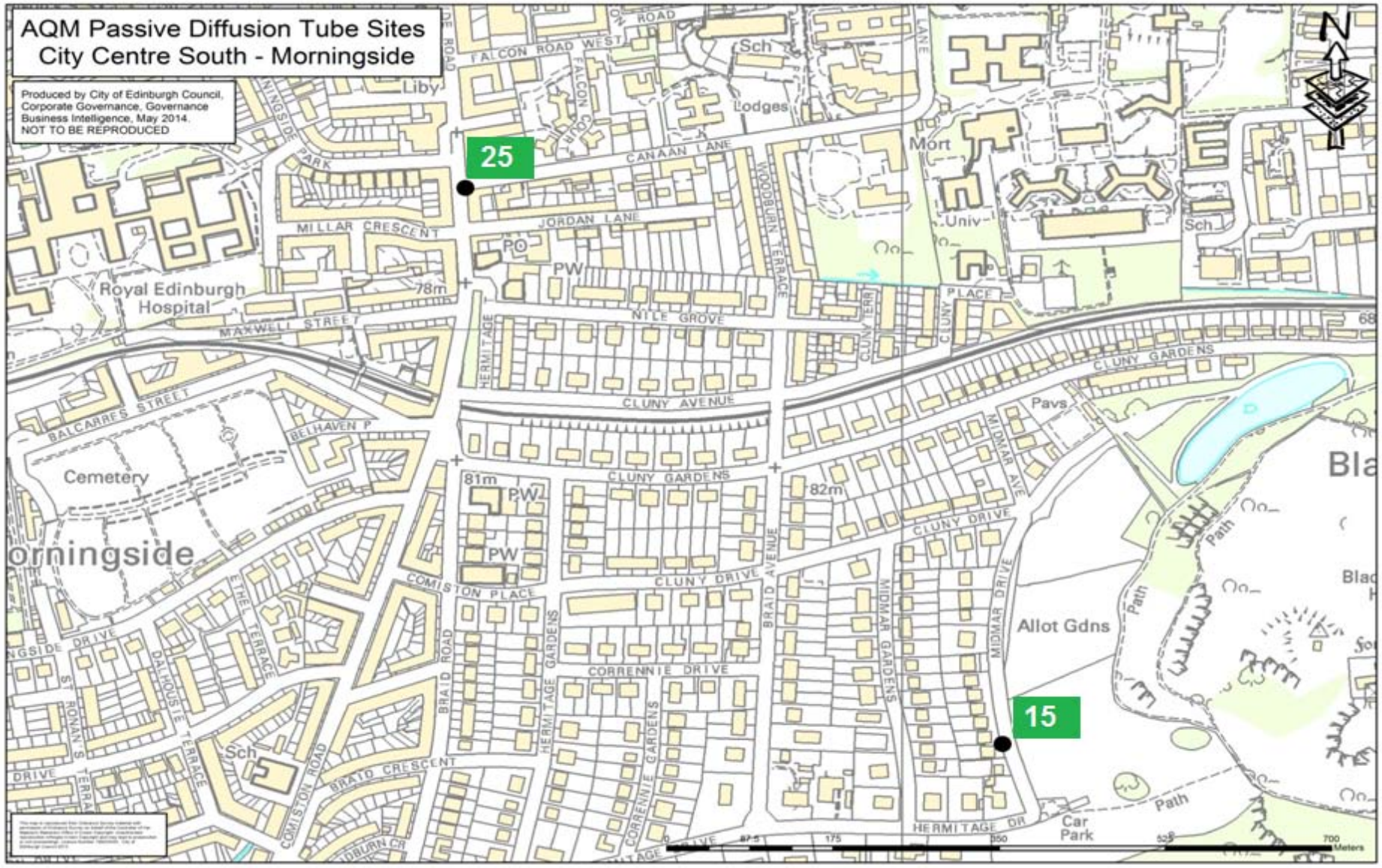

AQM Passive Diffusion Tube Sites
East - Craigmillar
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
28
31
Prestonfield
Hangman's Rock
Windy Gowl
Samson's Ribs
Wells o' Wearie
Halls of Residence
Abden House
Club House
Prestonfield Golf Course
Hotel
Cycle Track
Bawsinch
Pavilion
Peffermill Ind Est
Morgan Playing Fields
Factory
Peffermill Bridge
Car Park
School
Sports Ground
Playing Fields
Braid Burn
Cameron Bridge
Newington Cemetery
Works
Business Centre
Training Centre
Pol Sta
Amb Sta
Craigmillar
0
130
260
520
780
1,040
Metres

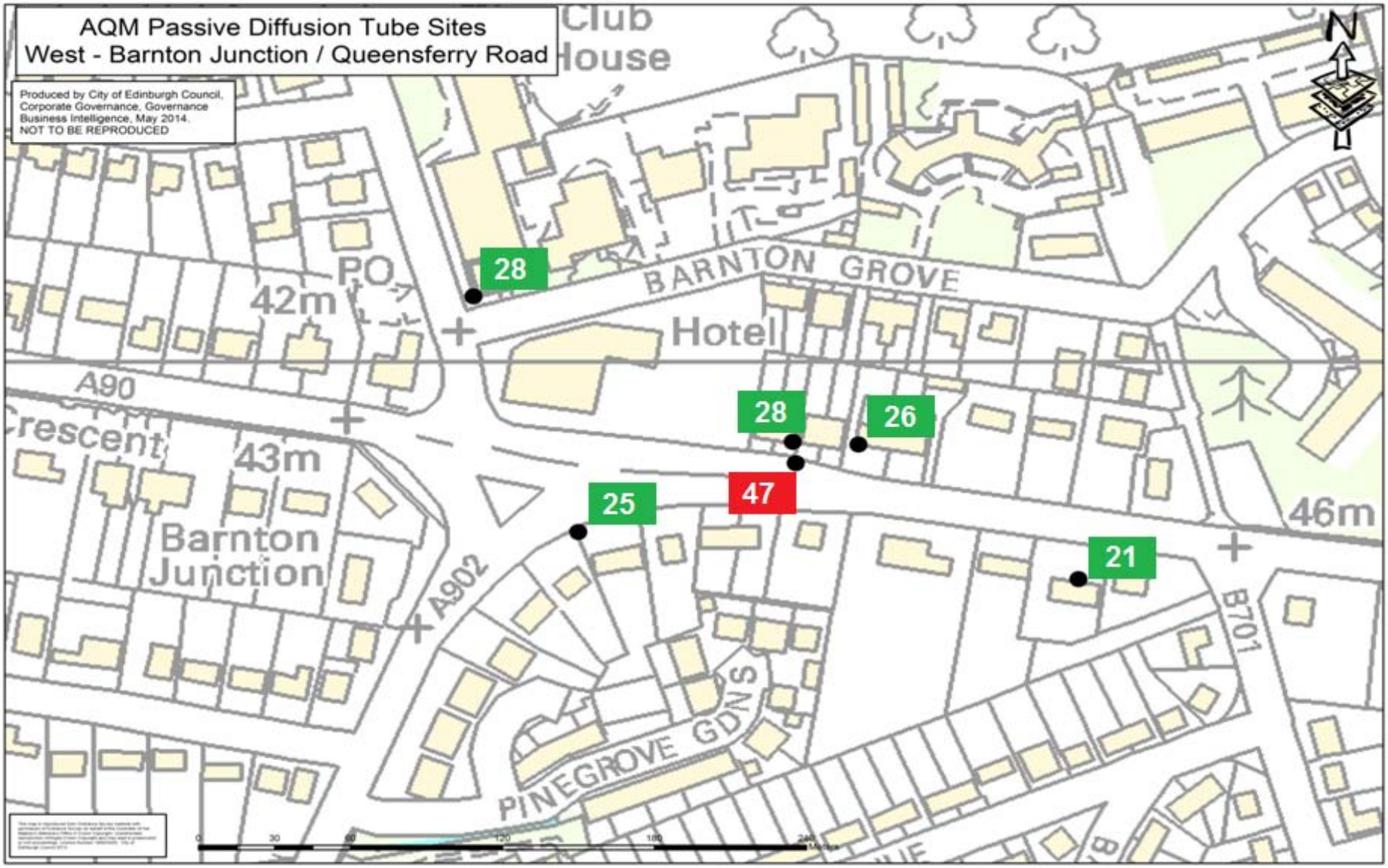

AQM Passive Diffusion Tube Sites
East - Easter Road / London Road
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
26
24
27
30
37
34
41
30
38
44
46
34
29
44
40
26
Hermitage
Quarryholes
Recreation Ground
Lochend
Eastern Cemetery
Easter Road Stadium
Hillside
Norton Park
Lochend Park
Restalrig
Craigentinny Golf Course
Meadowbank
Meadowbank Sports Centre
Abbeyhill
Piershill
0 150 300 600 900 1,200 Metres

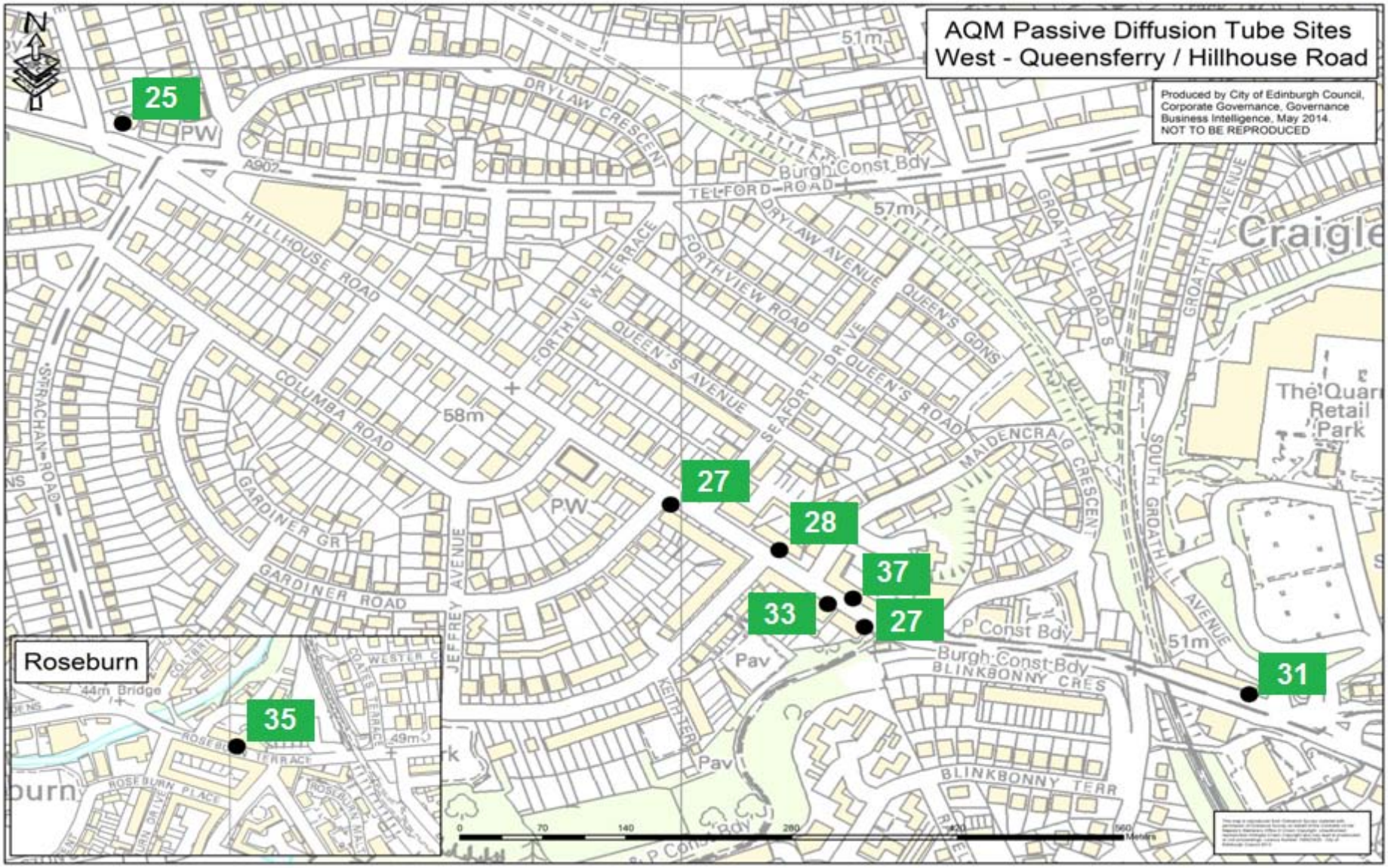

AQM Passive Diffusion Tube Sites
East - Portobello
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
36
35
28
35
37
38
19
20
28
33
KING'S ROAD
HILLCOAT LOAN
WESTBANK PLACE
WESTCOAT LOAT P
SCOTTISH STREET
WESTBANK STREET
B6415
Figgate Burn
Pav
BRIDGE STREET
PIPE STREET
SPAR
FIGGATE LA
BEACH LANE
FIGGATE
Sch
WILSON'S PK
FIGGATE STREET
MENTONE AVE
BATH STREET
PORTOBELLO HIGH STREET
Pol Sta
PO
9m
Liby
TH
Sch
Portobello
ROSEFIELD AVENUE
ADELPHI PLACE
BAILEYFIELD CRESCENT
BAILEYFIELD ROAD
SIR HARRY LAUDER ROAD
FISHWIVES' CAUSEWAY
Baileyfield Estate
A199
Depot
TELFERTON
EAST
AVENUE
Gdns
1m

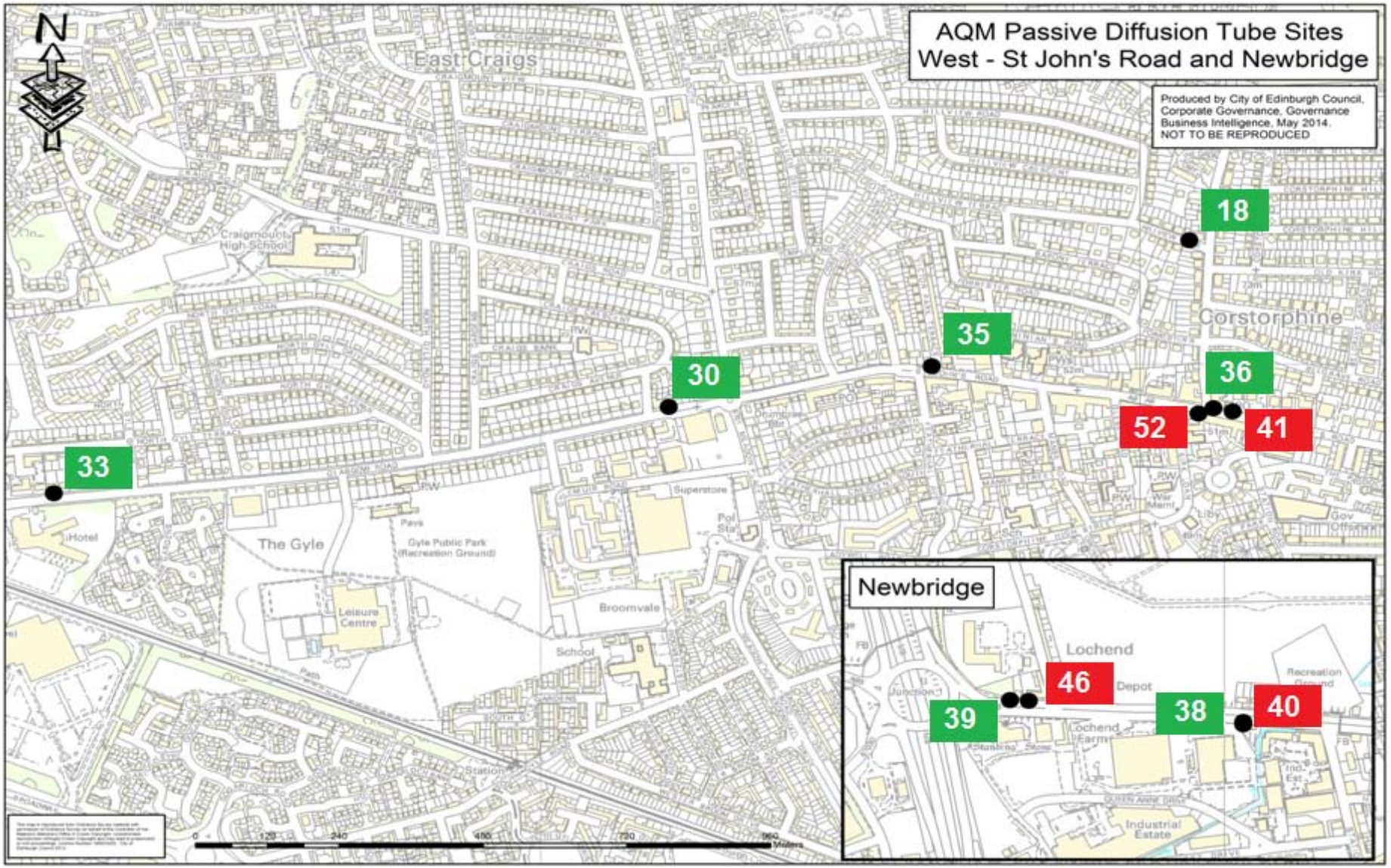

AQM Passive Diffusion Tube Sites
City Centre - North
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
Inverleith
Inverleith Park
Comely Bank
Stockbridge
Beaverbank
Broughton
New Town
Greenside
Calton Hill
Calton
30
37
34
34
34
31
31
31
21
30
28
33
34
31
30
26
30
34
30
50
41

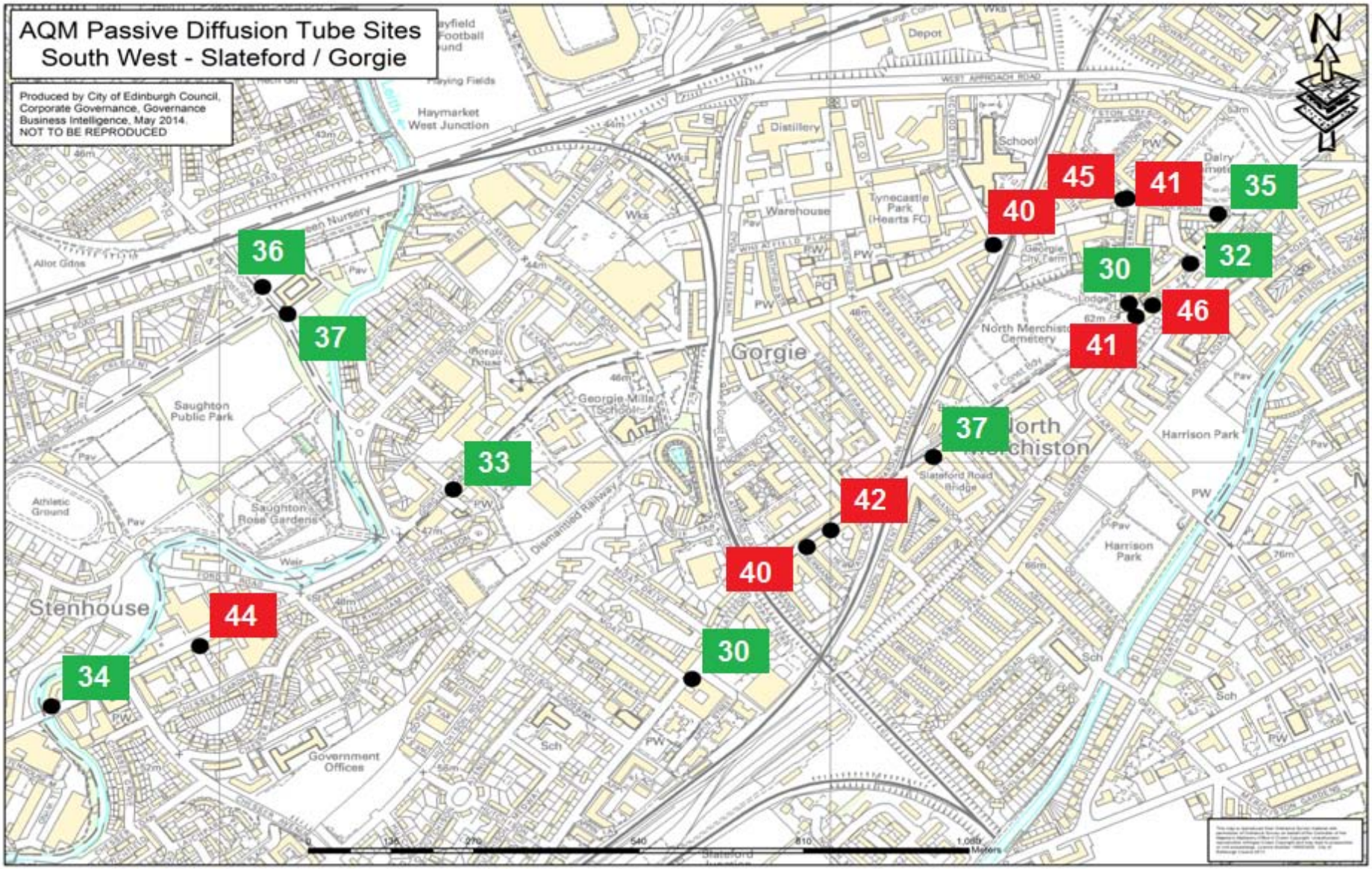

AQM Passive Diffusion Tube Sites
City Centre - South
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
West End
Tollcross
Bruntsfield
South Side
Sciennes
N/A
32
42
43
52
39
58
27
N/A
39
44
37
47
42
38
35
30
46
45
39
N/A
37
31
36
28
26
38
35
36
30
40
41
46

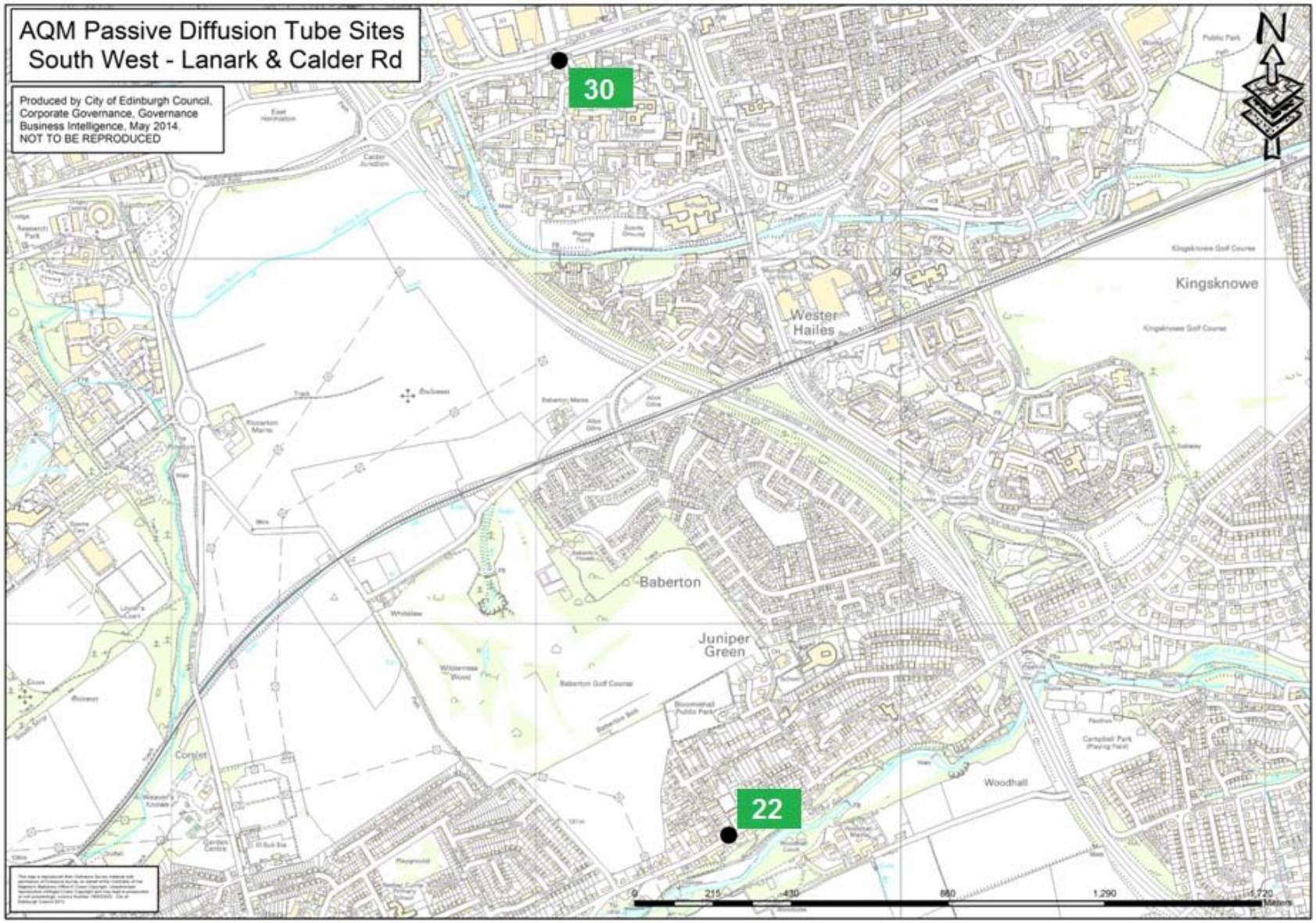

AQM Passive Diffusion Tube Sites
City Centre South - Morningside
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
25
15
N
Royal Edinburgh Hospital
Cemetery
Allot Gdns
Car Park
Univ
Sch
Lodges
Liby
Pavs
PO
PW
78m
81m
82m
MILLAR CRESCENT
JORDAN LANE
CANAAN LANE
NILE GROVE
MAXWELL STREET
BALCARRES STREET
CLUNY AVENUE
CLUNY GARDENS
CLUNY DRIVE
CLUNY PLACE
CLUNY TERR
HERMITAGE
WOODBURN TERRACE
BELHAVEN P
COMISTON PLACE
COMISTON ROAD
BRAID ROAD
BRAID AVENUE
BRAID CRESCENT
CORRENNIE DRIVE
CORRENNIE GARDENS
HERMITAGE GARDENS
HERMITAGE DR
MIDMAR AVE
MIDMAR DRIVE
MIDMAR GARDENS
DALHOUSIE TERRACE
ST RONAN'S DRIVE
FALCON ROAD WEST
Path
0 87.5 175 350 525 700 Meters


AQM Passive Diffusion Tube Sites
West - Barnton Junction / Queensferry Road
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
Club House
28
BARNTON GROVE
PO
42m
Hotel
A90
28
26
47
25
Crescent
43m
Barnton Junction
A902
46m
21
B701
PINEGROVE GDNS


AQM Passive Diffusion Tube Sites
West - Queensferry / Hillhouse Road
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
25
27
28
37
33
27
31
35
Roseburn
HILLHOUSE ROAD
DRYLAW CRESCENT
TELFORD ROAD
DRYLAW AVENUE
FORTHVIEW TERRACE
FORTHVIEW ROAD
QUEEN'S AVENUE
QUEEN'S DRIVE
QUEEN'S ROAD
QUEEN'S GDNS
GROATHILL ROAD S
GROATHILL AVENUE
SOUTH GROATHILL AVENUE
MAIDENCRAIG CRESCENT
SPRAICHAN ROAD
COLUMBA ROAD
GARDINER GR
GARDINER ROAD
JEFFREY AVENUE
BLINKBONNY CRES
BLINKBONNY TERR
KEITH TERR
ROSEBURN TERRACE
ROSEBURN PLACE
COATES TERRACE
44m Bridge
49m
58m
57m
51m
Burgh Const Bdy
P Const Bdy
Pav
PW
A902
Craigle
The Quar
Retail
Park


AQM Passive Diffusion Tube Sites
West - St John's Road and Newbridge
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
East Craigs
Craigmount High School
Corstorphine
The Gyle
Gyle Public Park (Recreation Ground)
Leisure Centre
Broomvale
School
Superstore
Station
Newbridge
Lochend
Depot
Lochend Farm
Industrial Estate
Recreation Ground
18
35
30
36
52
41
33
46
39
38
40
0
120
240
480
720
960
Metres


AQM Passive Diffusion Tube Sites
South West - Slateford / Gorgie
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
N
36
37
33
44
34
42
40
30
37
45
41
40
35
32
30
46
41
Gorgie
Stenhouse
Saughton Public Park
Saughton Rose Gardens
Haymarket West Junction
Tynecastle Park (Hearts FC)
Harrison Park
Government Offices
Georgie Mills School
North Merchiston Cemetery
Dismantled Railway
Slateford Road Bridge
0
135
270
540
810
1,080 Metres


AQM Passive Diffusion Tube Sites
South West - Lanark & Calder Rd
Produced by City of Edinburgh Council, Corporate Governance, Governance Business Intelligence, May 2014. NOT TO BE REPRODUCED
30
22
N
Kingsknowe
Wester Hailes
Baberton
Juniper Green
Woodhall
Colinton
0
215
430
860
1,290
1,720
Metres