BMT Cordah Limited
ENVIRONMENTAL CONSULTANCY
AND INFORMATION SYSTEMS

Local Air Quality Management Updating and Screening Assessment 2006

A Report for Renfrewshire Council

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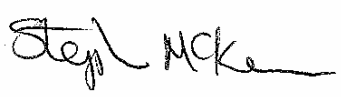

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CONTENTS

Tables

Figures

EXECUTIVE SUMMARY

This report contains the results of the 2006 Updating and Screening Assessment for local air quality within Renfrewshire. It has been produced on behalf of Renfrewshire Council which has an obligation to assess air quality under Part IV of the Environment Act 1995. The Local Air Quality Management Technical Guidance TG.(03) has been followed in order to conduct this assessment.

The assessment discusses seven main air pollutants, namely carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particulates. It has been concluded that it is unlikely that air quality objectives for carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide will be exceeded within Renfrewshire. There is, however, evidence of air quality objectives for nitrogen dioxide being exceeded at two locations and air quality objectives for particulates being exceeded at three locations. Further assessment of these locations is therefore recommended.

1 INTRODUCTION

BMT Cordah Limited has been commissioned by Renfrewshire Council to carry out their 2006 Updating and Screening Assessment (U&SA) of local air quality. The assessment was conducted using data gathered in 2005. The assessment is required under the Local Air Quality Management (LAQM) framework and it follows the guidance set out in the Local Air Quality Management Technical Guidance LAQM.TG(03)[1], hereafter referred to as the 'technical guidance'. The assessment and the report have been completed in collaboration with personnel from Renfrewshire Council and the Scottish Environment Protection Agency (SEPA). It includes updated information on industrial, transportation and domestic emission sources as well as monitoring data in order to identify any changes to local air quality.

2 BACKGROUND

2.1 Local Air Quality Management framework

The LAQM framework is designed to help local authorities review and assess current and future air quality in their area. The LAQM framework was introduced under the Environment Act 1995 and it requires local authorities to assess concentrations of seven air pollutants compliance against their standards and objectives set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland[2]. For local authorities within Scotland further regulations are set out in the Air Quality (Scotland) Regulations 2000 and Air Quality (Scotland) Amendment Regulations 2002. The pollutants contained within these regulations and their relevant objectives are presented in Table 1.

[1] Part IV of the Environment Act 1995, Local Air Quality Management Technical Guidance, LAQM.TG(03), Defra et al (2003).
[2] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Working together for clean air. DETR, Scottish Executive, the National Assembly for Wales and DOE (2000).

Table 1: Air quality pollutants and their relevant objectives

Pollutant	Air Quality Objective			Date to be achieved by
	Concentration	Measured as	Equivalent percentile	
Benzene	16.25 µg/m^3	running annual mean	-	31/12/2003
	3.25 µg/m^3	running annual mean	-	31/12/2010
1,3-butadiene	2.25 µg/m^3	running annual mean	-	31/12/2003
Carbon monoxide (CO)	10 mg/m^3	running 8 hour mean	-	31/12/2003
Lead	0.5 µg/m^3	annual mean	-	31/12/2004
	0.25 µg/m^3	annual mean	-	31/12/2008
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times per year	1-hour mean	99.8th percentile of 1-hour means	31/12/2005
	40 µg/m^3	annual mean	-	31/12/2005
Particulates (PM_{10})	50 µg/m^3 not to be exceeded more than 35 times a year	24-hour mean	90.4th percentile of 24-hour-means	31/12/2004
	40 µg/m^3	annual mean	-	31/12/2004
	50 µg/m^3 not to be exceeded more than 7 times a year	24-hour mean	98th percentile of 24-hour-means	31/12/2010
	18 µg/m^3	annual mean	-	31/12/2010
Sulphur dioxide (SO_2)	125 µg/m^3 not to be exceeded more than 3 times a year	24-hour mean	99th percentile of 24-hour means	31/12/2004
	350 µg/m^3 not to be exceeded more than 24 times a year	1-hour mean	99.7th percentile of 1-hour means	31/12/2004
	266 µg/m^3 not to be exceeded more than 35 times a year	15-minute mean	99.9th percentile of 15-minute means	31/12/2005

The LAQM process was reviewed in 2003 and comprises two phases. The first phase is an U&SA which is a checklist approach designed to review new monitoring data, new objectives, new pollution sources or any significant changes to existing pollution sources which may affect air quality. This is required every 3 years. The second phase is a Detailed Assessment which is required where the Updating and Screening Assessment has shown that there is a risk of an air quality objective being exceeded. If the Detailed Assessment confirms an exceedence of an objective, it is then necessary to designate an Air Quality Management Area (AQMA). A Progress Report is required in the years following the U&SA and/or the Detailed Assessment.

2.2 Summary of previous assessments

Renfrewshire Council completed an U&SA in 2003. Monitoring results from passive diffusion tubes indicated that air quality levels at Central Road and Gordon Street in Paisley town centre were likely to exceed NO_2 annual mean objectives, although neither site was located at an area of relevant public exposure for annual average objective.

The Council also undertook a DMRB (Design Manual for Roads and Bridges) screening assessment of road traffic emissions. The assessment identified potential exceedences of annual mean NO_2 air quality objectives at four roads and one junction. The DMRB assessment also identified exceedences of PM_{10} annual mean objectives at four roads and seven junctions. The U&SA concluded that Detailed Assessments be carried out at these locations. The U&SA also indicated

that SO_2 objectives could be exceeded as a result of domestic fuel burning. It recommended that further information on domestic fuel burning sources be gathered and this issue investigated further.

Renfrewshire Council then undertook a Detailed Assessment in 2004. This assessment consisted of more detailed monitoring at each of the roads and junctions identified in the U&SA as potentially exceeding NAQS objectives. The report presented automatic NO_2 and PM_{10} monitoring data at the Gordon Street/Canal Street/Causeyside Street junction and Glasgow Airport, and automatic NO_2 monitoring data at Central Road.

A full years worth of data for the automatic PM_{10} analyser at the Gordon Street/Canal Street/Causeyside Street junction was not available at the time of the Detailed Assessment and so no data was reported. The assessment of other monitoring data concluded that NO_2 air quality objectives would be met at the Gordon Street/Canal Street/Causeyside Street junction and at Glasgow Airport. The automatic analyser at Central Road recorded 343 exceedences of the 1 hour mean NO_2 objective. In response to this, Central Road was designated an Air Quality Management Area (AQMA).

A Progress Report was produced in 2005 which provided updated monitoring results from the automatic analysers and further information on domestic fuel burning. It concluded that domestic fuel burning within Renfrewshire was unlikely to result in exceedences of the SO_2 air quality objectives. It also concluded that PM_{10} and NO_2 air quality objectives would be met at Gordon Street and at Glasgow Airport. The report also highlighted further exceedences of the NO_2 one hour mean objective at Central Road, thereby supporting the decision to declare an AQMA.

3 RENFREWSHIRE COUNCIL AREA

The Renfrewshire Council area is situated to the west and south-west of Glasgow. It covers approximately 261km^2 and is bordered by Glasgow City, East Renfrewshire, Inverclyde and West Dunbartonshire Council areas. A map of the Renfrewshire Council area is presented in Figure 1. Renfrewshire has a population of around 170,000 which inhabits several main towns including Paisley, Renfrew, Johnstone and Erskine. Paisley is the largest town in Scotland with a population of over 75,000.

3.1 Transport network

There are several main roads running through Renfrewshire including; the M8 motorway, the A737, the A761, the A741, the A726 and several B class roads. The M8 is the busiest road through the region, is situated north of Paisley and provides links to and from Glasgow Airport, the City of Glasgow and other towns and cities to the east and west. The A737 runs from the south west and is the main road linking Irvine, Saltcoats and Kilwinning to the M8. The A737 bypasses Paisley to the north west. The A761 runs from Glasgow, through Paisley and heads towards Port Glasgow and Greenock. The A726 runs from the south east from East Kilbride into Paisley and continues to Glasgow Airport and Erskine. The A741 links Renfrew and Paisley. The A726, A761 and the A741 all meet in Paisley town centre.

There are also several rail links within Renfrewshire Council area. Paisley Gilmour Street is the main station in the area and provides links to Glasgow City Centre, Ayr, Kilwinning, Largs, Greenock and Port Glasgow. It is also used by passengers travelling to Glasgow Airport who transfer to a bus link.

Glasgow Airport is situated north of Paisley and to the west of Renfrew. The M8 is in close proximity to the airport and provides the main access route to the airport. Glasgow airport currently handles around 8.8 million passengers per annum (mppa) but there are plans to extend the airport in order to accommodate up to 24 mppa by the year 2030. There are also plans to build a rail link from Glasgow Central Station to the airport via Paisley Gilmour Street Station.

3.2 Regulated Industrial Processes

Industrial activity within Renfrewshire is regulated by SEPA. An inventory of all industrial processes currently regulated for atmospheric emissions is presented in Table 2. A number of these processes were identified as having commenced operation since the last USA. These are Hitech Equipment Ltd, Tarmac Northern Paisley, Invitrogen Ltd, Malcolm Construction Landfill and J&G Coughtrie Ltd. Of these processes Invitrogen Ltd and J&G Coughtrie do not have any atmospheric emissions of the pollutants which have to be assessed under the LAQM process. The other processes are assessed in Section 9.3 (Hitech Equipment Ltd) and Section 10.6 (Tarmac Northern Paisley and Malcolm Construction Landfill)

Table 2: Inventory of industrial processes within Renfrewshire Council area

Company	Process	Location	Permit number	Atmospheric pollutants
PPC Part A processes				
Ciba Specialty Chemicals PLC	Combustion, production of organic chemicals	Hawkhead Road, Paisley	PPC/A/1013057	CO_2, PM_{10}
Hitech Equipment Ltd	Treatment and transfer of non-hazardous and	Clark Street, Paisley	PPC/A/1004470	PM_{10}, dust, combustion

Company	Process	Location	Permit number	Atmospheric pollutants
	hazardous waste			gases
PPC Part B processes				
Asda Stores Ltd	Unloading petrol at a service station	Phoenix Retail Park, Paisley	PPC/B/1004781	VOC's
PPC Part B processes cont'd				
BP Express Shopping Ltd	Unloading petrol at a service station	Greenock Road, Paisley	PPC/B/1004734	VOC's
BP Express Shopping Ltd	Unloading petrol at a service station	Hawkhead Road, Paisley	PPC/B/1004735	VOC's
C H bull Ltd	Unloading petrol at a service station	Kilmacolm Road, Bridge of Weir	PPC/B/1004815	VOC's
Esso Petroleum Company Ltd	Unloading petrol at a service station	Beith Road, Johnstone	PPC/W/30064	VOC's
Esso Petroleum Company Ltd	Unloading petrol at a service station	Renfrew Road, Paisley	PPC/B/1004536	VOC's
Ian S Burns	Unloading petrol at a service station	Greenock Road, Bishopton	PPC/W/30128	VOC's
J Sainsbury Supermarkets Ltd	Unloading petrol at a service station	Kings Inch Road, Renfrew	PPC/B/1004780	VOC's
Shell UK Ltd	Unloading petrol at a service station	Centreholm Roundabout, Erskine	PPC/B/1004532	VOC's
Shell UK Ltd	Unloading petrol at a service station	Paisley Road, Renfrew	PPC/B/1004529	VOC's
Shell UK Ltd	Unloading petrol at a service station	Main Road, Elderslie	PPC/B/1004531	VOC's
Shell UK Ltd	Unloading petrol at a service station	Kashmir Avenue, Linwood	PPC/B/1004528	VOC's
Sommerfield Stores Ltd	Unloading petrol at a service station	Glenburn Road, Paisley	PPC/B/1004474	VOC's
Sood Enterprises Ltd	Unloading petrol at a service station	Ferguslie Road, Paisley	PPC/B/1004733	VOC's
Wm Morrison Supermarkets Plc	Unloading petrol	Thread Street, Paisley	PPC/B/1003176	VOC's
Wm Morrison Supermarkets Plc	Unloading petrol at a service station	Neilston Road, Paisley	PPC/W/30035	VOC's
BP Oil UK	Unloading petrol at a service station	Whitecary Road, Paisley	APC/W/20245	VOC's
K & M Fuels Ltd	Unloading petrol at a service station	Inchinnan Road, Renfrew.	APC/W/20241	VOC's
Shell UK Ltd	Unloading petrol at a service station	Lonend, Paisley	APC/W/20238	VOC's
Somerfield Stores Ltd	Unloading petrol at a service station	Gleniffer Road, Paisley	APC/W/20189	VOC's
Tesco Stores Ltd	Unloading petrol at a service station	Newmains Road, Renfrew	APC/W/20177	VOC's
Bardon Aggregates Ltd	Production of ready mixed concrete	Meadowside Street, Renfrew	PPC/W/30179	PM_{10}, dust
Hanson Quarry Products Europe Ltd	Bulk cement	Greenhill Road, Paisley	APC/W/00042	PM_{10}, dust
Tarmac Northern Limited	Batching of ready mix concrete	McDowall Street, Paisley	PPC/W/30149	PM_{10}, dust
RMC Russell Plc	Roadstone coating	Branscroft, Kilbarchan	PPC/W/30180	PM_{10}, dust, SO_2
Tarmac Northern Ltd	Roadstone coating and concrete batching	Rannoch Road, Johnstone	APC/W/00063	PM_{10}, dust, SO_2
Invitrogen Limited	Manufacture of organic compounds containing nitrogen	Fountain Drive, Inchinnan Business Park, Inchinnan	PPC/W/20031	VOCs
Paisley Cemetery	Cremation of human	Broomlands Street,	APC/W/00019	dust

Company	Process	Location	Permit number	Atmospheric pollutants
Co.	remains	Paisley		
Malcolm Construction Services	Landfill	Turningshaw Road, Houston	PPC/W/20062	PM_{10}, dust
C H Bull (Coachworks) Ltd	Car spraying	Kilmacolm Road, Bridge of Weir	PPC/W/30162	VOC's
Erskine Hospital Ltd	Spray coating of wooden furniture during manufacture	Erskine Hospital, Bishopton	APC/W/20380	VOC's
Kay-Metzeler Ltd	Adhesive coating	Neilston Road, Paisley	APC/W/00059	VOC's
Malcolm (W H Malcolm Ltd)	Respraying of road vehicles	Burnbrae Drive, Linwood	APC/W/20422	VOC's
Phoenix Bodycentre Ltd	Road vehicle re-finishing at vehicle repair workshop	Pheonix Retail Park, Linwood	APC/W/20080	VOC's
Sneddon Signs	Coating during the course of manufacture	McKean Street, Paisley	PPC/W/30062	VOC's
Bridge of Weir Leather Company Ltd	Leather finishing	Kilbarchan Road, Bridge of Weir	PPC/W/20039	VOC's
N C T Leather	Tannery	Kilbarchan Road, Bridge of Weir	PPC/W/20013	VOC's
Sandyford Abattoir (Paisley) Ltd	Livestock slaughtering	Sandyford Road, Paisley	PPC/W/20066	odour
W J & W Lang Ltd	Tannery	Seedhill, Paisley	PPC/W/20012	VOC's
J&G Coughtrie	Solvent emissions and degreasing unit	Montrose Avenue, Hillington	PPC/B/1000030	VOCs

3.3 Air quality monitoring

Renfrewshire Council operate an extensive air quality monitoring network consisting of three automatic analysers and 49 passive diffusion tubes (PDTs). The locations of each monitoring site are presented in Table 3 and are shown in Figure 2 for the automatic monitoring sites and Figure 3 for the diffusion tube monitoring sites.

Table 3: Inventory of monitoring sites within Renfrewshire Council area

Location	Grid reference	Monitoring method	Pollutants monitored	Site classification
Gordon Street, Paisley	248314 663610	Automatic	NO_2, PM_{10}	Roadside
Central Road, Paisley	248450 664195	Automatic	NO_2	Roadside
Glasgow Airport, Renfrew	248297 666543	Automatic	NO_2, PM_{10}, SO_2	Special
Gilmour Street, Paisley (1)	248350 664082	PDT	NO_2	Urban Centre
Oakshaw Street, Paisley (2)	247925 664052	PDT	NO_2	Urban background
Lochfield Road, Paisley (3)	249004 662142	PDT	NO_2	Urban background
Regent Street, Paisley (4)	249668 664367	PDT	NO_2	Urban background
Central Road (N), Paisley (5)	248432 664208	PDT	NO_2	Kerbside
10 Gordon Street, Paisley (6)	248363 663603	PDT	NO_2	Kerbside
High Street, Johnstone (7)	242914 663198	PDT	NO_2	Kerbside
Hairst Street, Renfrew (8)	250659 667546	PDT	NO_2	Kerbside
Station Road, Bishopton (9)	243947 670550	PDT	NO_2	Roadside
Phoenix Park, Linwood (10)	245061 664425	PDT	NO_2	Urban background
Clippens Rd, Linwood (11)	243225 664685	PDT	NO_2	Urban background
Golf Drive, LInwood (12)	250121 663672	PDT	NO_2	Urban industrial
Greenock Road, Paisley (13)	247371 665674	PDT	NO_2	Urban background
St Andrew Crescent, Paisley	247347 665796	PDT	NO_2	Urban background

Location	Grid reference	Monitoring method	Pollutants monitored	Site classification
(14)				
Montgomery Drive, Paisley (15)	249196 665711	PDT	NO_2	Urban background
Kirklandneuk Road, Renfrew (16)	249433, 667791	PDT	NO_2	Urban background
Tanar Way, Renfrew (17)	251539, 666281	PDT	NO_2	Urban background
Incle Street, Paisley (18)	248654, 664206	PDT	NO_2	Roadside
Linwood Road, Paisley (19)	245709, 663581	PDT	NO_2	Roadside
High Street, Johnstone (20)	242665, 663290	PDT	NO_2	Kerbside
Causeyside St, Paisley [21(1)]	248316, 663312	PDT	NO_2	Roadside
Causeyside St, Paisley [21(2)]	248316, 663312	PDT	NO_2	Roadside
Causeyside St, Paisley [21(3)]	248316, 663312	PDT	NO_2	Roadside
Whirlie Road, Houston (22)	241017, 665935	PDT	NO_2	suburban
Hillington Road, Renfrew (23)	251856, 666650	PDT	NO_2	Roadside
Glasgow Road, Renfrew (24)	251687, 666790	PDT	NO_2	Roadside
French Street, Renfrew (25)	249698, 666863	PDT	NO_2	Urban industrial
Nethergreen Cr, Renfrew (26)	249738, 667134	PDT	NO_2	Urban industrial
Rossland Gardens, Bishopton (27)	243121, 671189	PDT	NO_2	suburban
Hawkhead Road, Paisley (28)	249969, 663290	PDT	NO_2	Roadside
Cartha Cr, Paisley (29)	249546, 663156	PDT	NO_2	Urban industrial
Kintyre Avenue, Linwood (30)	243302, 663998	PDT	NO_2	Urban background
West Walkingshaw (31)	246197, 666132	PDT	NO_2	Roadside
12 Gordon Street 32 (Duplicate)	248363, 663603	PDT	NO_2	Roadside
76 Causeyside St, Paisley (33)	248277, 663524	PDT	NO_2	Roadside
63 Causeyside St, Paisley (34)	248305, 663559	PDT	NO_2	Roadside
Old Sneddon Street, Paisley (35)	248360, 664272	PDT	NO_2	Roadside
Caledonia Street, Paisley (36)	247932, 664696	PDT	NO_2	Roadside
Central Road, Paisley [37(1)]	248438, 664192	PDT	NO_2	Roadside
Central Road Paisley [37(2)]	248438, 664192	PDT	NO_2	Roadside
Central Road Paisley [37(3)]	248438, 664192	PDT	NO_2	Roadside
Paisley Road, Renfrew (38)	250107, 666857	PDT	NO_2	Roadside
Glasgow Airport, Paisley [39(1)]	248297, 666545	PDT	NO_2	Special
Glasgow Airport, Paisley [39(2)]	248297, 666545	PDT	NO_2	Special
Glasgow Airport, Paisley [39(3)]	248297, 666545	PDT	NO_2	Special
Hairst Street, Renfrew (40)	250759, 667631	PDT	NO_2	Roadside
Smithshills Street (west), Paisley (41)	248465, 664187	PDT	NO_2	Roadside
Central Road, (w) Paisley (42)	248371, 664187	PDT	NO_2	Roadside
Smithshill Street (east), Paisley (43)	248480, 664154	PDT	NO_2	Roadside

The monitoring network provides good spatial coverage of the main urban areas and arterial routes. In particular, the monitoring covers all areas of Paisley Town Centre, including areas with no relevant public exposure for long term objectives (i.e. non-residential).

The monitoring station at Glasgow Airport allows the impact of air traffic and associated ground activities on local air quality at the closest receptors to the airport to be assessed.

The automatic NO_2 analysers are chemiluminscent analysers. The PM_{10} monitor at Glasgow Airport is a gravimetric sampler. The PM_{10} monitor at Gordon Street is a TEOM and as such the measured concentrations are adjusted to account for the analyser under-read.

4 CARBON MONOXIDE

The current air quality objective for carbon monoxide (CO) is;

- A running 8-hour mean concentration not to exceed 10mg/m^3 to be achieved by 31st December 2003.

The main source of CO emissions in the UK is road traffic.

4.1 Background concentrations

Background CO concentrations are available from the LAQM website[3]. A map of background CO concentrations within Renfrewshire is presented in Figure 4. Estimated background CO concentrations within Renfrewshire for 2005 ranged between 0.09mg/m^3 and 0.23mg/m^3 with an average of 0.14mg/m^3. These figures are substantially below the objective of 10mg/m^3.

4.2 Monitoring data

Renfrewshire Council does not undertake any monitoring of CO concentrations.

There are eight locations in Scotland which monitor CO and are part of the national Automatic Urban and Rural Network (AURN). The results of the AURN monitoring network are available through the Air Quality Archive website[4]. The results for 2005 indicate that measured concentrations at each of these sites were below the air quality objective.

4.3 Road transport

Very busy roads or junctions in built up areas

The technical guidance indicates that an assessment of CO concentrations is only necessary if the background CO concentration is above 1mg/m^3 and traffic volumes are above certain thresholds which are;

- an Annual Average Daily Traffic Flow (AADT) greater than 80,000 vehicles per day on single carriageway roads, or
- an AADT greater than 120,000 vehicles per day on dual carriageway roads, or
- an AADT greater than 140,000 vehicles per day on motorways.

Since the maximum background concentration for 2005 was 0.23mg/m^3 no further assessment of road traffic emissions is required for CO.

Based on the available data it is concluded that it is unlikely that the air quality objective for carbon monoxide will be exceeded in Renfrewshire.

[3] Local Air Quality Management. LAQM Tools. http://www.airquality.co.uk/archive/laqm/tools.php
[4] The Air Quality Archive. Data and Statistics. http://www.airquality.co.uk/archive/data_and_statistics.php

5 BENZENE

There are two air quality objectives for benzene which are;

- a running annual mean concentration of 16.25µg/m^3 to be achieved by 31st December 2003; and

- a running annual mean concentration of 3.25µg/m^3 to be achieved by 31st December 2010.

5.1 Background concentrations

The estimated background benzene concentrations for 2005 and 2010 for the Renfrewshire Council area were obtained from the LAQM website and are presented in Table 4. A map of background benzene concentrations in Renfrewshire for 2005 is presented in Figure 5. The reported background concentrations are below both the 2003 and 2010 air quality objectives within Renfrewshire.

Table 4: Background benzene concentrations within Renfrewshire

	Maximum	Minimum	Mean
Annual mean concentration 2005 (µg/m^3)	0.49	0.07	0.21
Annual mean concentration 2010 (µg/m^3)	0.42	0.06	0.18

5.2 Monitoring data

Renfrewshire Council does not undertake any monitoring of benzene concentrations. The measured annual mean benzene concentration at the nearest AURN site (Glasgow Kerbside) in 2005 was 1.4µg/m^3, which was below the 2010 objective level. Road traffic levels and building configuration at the Glasgow Kerbside site mean that benzene concentrations are likely to be much higher than will be experienced in Renfrewshire.

5.3 Road transport

Very busy roads or junctions in built up areas

Assessment of benzene emissions from transport sources is required where the 2010 background concentration is expected to exceed 2µg/m^3 and where the road or junction is classed as 'very busy'. The criteria for determining if a road or junction is 'very busy' are:

- an AADT greater than 80,000 vehicles per day on single carriageway roads, or

- an AADT greater than 120,000 vehicles per day on dual carriageway roads, or

- an AADT greater than 140,000 vehicles per day on motorways.

The background concentrations presented in Table 4 indicate that expected 2010 background concentrations are below the threshold value of 2µg/m^3. There are also no roads or junctions within Renfrewshire which meet the criteria for 'very busy'. It is therefore unlikely that the air quality objectives for benzene would be exceeded in Renfrewshire as a result of road traffic emissions.

5.4 Industrial sources

Following consultation with SEPA it was determined that there were no significant sources of benzene emissions within Renfrewshire.

5.5 Other sources

Petrol Stations

The technical guidance indicates that petrol stations with;

- a throughput of more than 2000m^3 of petrol a day;
- with a 'busy road' nearby; and
- with relevant exposure within 10m of the road should be assessed.

A busy road is defined as a road with a traffic flow of greater than 30,000 vehicles per day. There are two main roads within Renfrewshire with traffic volumes greater than 30,000 vehicles per day, namely the M8 and the A737 Johnstone bypass. There is, however, no relevant exposure within 10m of these roads; therefore, there is no need to proceed to a detailed assessment.

Major fuel depots

There are no major fuel depots within Renfrewshire.

Based on the available data it is concluded that it is unlikely that the air quality objectives for benzene will be exceeded in Renfrewshire.

6 1,3-BUTADIENE

The air quality objective for 1,3-butadiene is;

- a running annual mean concentration not to exceed 2.25µg/m^3 by 31st December 2003.

The main source of 1,3-butadiene emissions in the UK is road traffic.

6.1 Background concentrations

The estimated background 1,3-butadiene concentrations for Renfrewshire for 2005 were obtained from the LAQM website. A map of background 1,3-butadiene concentrations within Renfrewshire is presented in Figure 6. The background 1,3-butadiene concentrations are between 0.15µg/m^3 and 0.02µg/m^3 with an average of 0.07µg/m^3. These figures are below the air quality objectives.

6.2 Monitoring data

Renfrewshire Council does not currently monitor 1,3-butadiene concentrations. The nearest AURN monitoring site for 1,3-butadiene is in Glasgow and the results of this monitoring are presented in Table 5. There have been no exceedences of the annual mean air quality objective for 1,3-butadiene at the Glasgow Kerbside monitoring station since 2003. The traffic flow and building configuration at the Glasgow Kerbside site mean that 1,3-butadiene concentrations are likely to be much higher than will be experienced in Renfrewshire.

Table 5: Monitored 1,3-butadiene concentrations for Glasgow Kerbside

Annual mean concentration (µg/m^3)		
2003	**2004**	**2005**
0.42	0.28*	0.22

* Data capture rate <75%

6.3 Industrial sources

New industrial sources/Industrial sources with substantially increased emissions

Following consultation with SEPA, it was determined that there were no sources of 1,3-butadiene emissions within Renfrewshire and no new industrial sources of 1,3-butadiene have become operational since 2003.

Based on the available data it is concluded that it is unlikely that the air quality objective for 1,3-butadiene will be exceeded in Renfrewshire.

7 LEAD

There are two objectives for lead. They are:

- an annual mean of 0.5µg/m^3 to be achieved by 31st December 2004 and,
- an annual mean of 0.25µg/m^3 to be achieved by 31st December 2008.

7.1 Monitoring data

Renfrewshire Council does not currently monitor lead concentrations. Lead concentrations are monitored at three locations throughout the country. These are in Glasgow, Motherwell and Eskdalemuir. The results of lead monitoring at these sites for 2003 to 2005 are presented in Table 6. Table 6 indicates that annual mean lead concentrations within Scotland are below air quality objectives and that there were no exceedences at any site between 2003 and 2005. It is therefore unlikely that lead concentrations will exceed air quality objectives within Renfrewshire.

Table 6: Monitored lead concentrations in Scotland

Site	Annual mean concentration (µg/m^3)		
	2003	**2004**	**2005**
Glasgow	0.015	0.015	0.013
Motherwell	0.010	0.008	0.003
Eskdalemuir	0.003	0.002	0.003

7.2 Industrial sources

New industrial sources/Industrial sources with substantially increased emissions

Following consultation with SEPA, it was determined that there are no sources of lead emissions within Renfrewshire and no new sources of lead emissions have become operational since 2003.

Based on available data it is concluded that it is unlikely that the air quality objectives for lead will be exceeded in Renfrewshire.

8 NITROGEN DIOXIDE

The air quality objectives for nitrogen dioxide (NO_2) are as follows:

- a 1-hour mean concentration of 200µg/m^3 not to be exceeded more than 18 times a year, to be achieved by 31st December 2005; and

- an annual mean concentration of 40µg/m^3 to be achieved by 31st December 2005.

8.1 Background concentrations

Background NO_2 concentrations for 2005 and 2010 for Renfrewshire have been obtained from the LAQM website. A map of 2005 background NO_2 concentrations is presented in Figure 7 and the maximum, minimum and average concentrations from 2005 and 2010 are presented in Table 7. The background concentration map shows that the highest background concentrations are experienced in the east of Renfrewshire at the border with Glasgow City Council. The background concentrations are below air quality objectives.

Table 7: Background NO_2 concentrations within Renfrewshire

	Maximum	Minimum	Mean
Annual mean concentration 2005 (µg/m^3)	25.5	2.7	8.6
Annual mean concentration 2010 (µg/m^3)	22.7	2.2	7.1

8.2 Monitoring data

Monitoring data outside an AQMA

Renfrewshire Council currently operate three automatic air quality monitoring analysers and the results of this monitoring are presented in Table 8. The locations of the automatic monitoring sites within Renfrewshire are presented in Figure 2. Central Road is currently an Air Quality Management Area and so the results of this monitoring station will be discussed separately.

The results of the monitoring at Gordon Street show that the recorded annual mean NO_2 concentration for 2005 was 36.2µg/m^3. This is below the annual mean NO_2 air quality objective. There were 13 recorded exceedences of the one hour mean and a maximum recorded one hour mean concentration of 299.9µg/m^3. However, the data capture rate was less than 90% and so it is preferable to use the equivalent percentile which represents 18 allowable exceedences. The 99.8th percentile represents 18 allowable exceedences and this value was 194.9µg/m^3 which is below the 1 hour mean objective. The results indicate elevated concentrations, therefore continued monitoring is recommended at Gordon Street.

The Glasgow Airport automatic analyser is situated near the receptors on the eastern side of the airport boundary. The prevailing wind in Scotland is westerly to south-westerly which means that the analyser is upwind of the airport for the majority of the time. The results from the Glasgow Airport monitor are presented in Table 8 which shows that the annual mean and 1 hour mean concentration air quality objectives are being met at this site.

Table 8: Results of NO_2 automatic monitoring outside an AQMA within Renfrewshire for 2005

Site	Grid reference	Data capture rate	Annual mean (µg/m^3)	99.8th percentile of 1 hour mean concentration (µg/m^3)	Maximum 1-hour mean concentration (µg/m^3)	No. of exceedences of 1-hour objective
Gordon Street, Paisley	248314 663610	82%	36.2	194.9	299.9	13
Central Road, Paisley	248450 664195	61%	76.5	627.8	795.7	420
Glasgow Airport, Renfrew	248297 666543	78%	16.7	74.8	99.3	0

Renfrewshire Council also operate a network of 49 diffusion tubes throughout the Council area. The locations of the diffusion tubes are presented in Figure 3. The diffusion tubes are prepared and analysed by Glasgow Scientific Services using 20% triethanolamine in water. Glasgow Scientific Services is a UKAS accredited laboratory. Technical guidance recommends that diffusion tubes are co-located with a continuous chemiluminescence monitor in order to determine any laboratory bias within the results. The reported bias adjustment factor for Glasgow Scientific Services for 2005 (0.75) has been applied to all diffusion tube results throughout Renfrewshire.

The results of the diffusion tube monitoring are presented in Table 9. Measured annual average NO_2 concentrations at three sites are exceeding annual mean NO_2 objectives. These are Central Road (North), Paisley, 10 Gordon Street, Paisley, and Smithshill Street (west), Paisley.

The data capture rate for Central Road (North) is less than 90%, therefore the results from this site should be treated with caution. Furthermore, the diffusion tube is not located at a site of relevant public exposure for the annual mean objective.

The Council have advised that the diffusion tube at 10 Gordon Street was located at a kerbside location, and has been re-located to a nearby building façade to be representative of a location of public exposure for the annual mean objective. None of the other diffusion tubes located around this area (#21, #32, #33, #34), which are located at building facades, recorded an exceedence of the NO_2 annual mean objective in 2005.

At Smithhills Street there are no receptors on the western side of the road where the diffusion tube is located. The closest receptor is on the eastern side of the road, where another diffusion tube (#43) measured a concentration of 33µg/m^3, below the objective. It is likely that the higher concentrations on the western side are as a result of bus stops located close to the diffusion tube and queuing bus traffic which has been observed to occur beside the diffusion tube on this side of the road.

Table 9: Results of NO_2 diffusion tube monitoring outside an AQMA within Renfrewshire for 2005

Monitoring site	Annual mean (µg/m^3) corrected for bias (0.75)	Data Capture Rate (%)
Gilmour Street, Paisley (1)	22	92
Oakshaw Street, Paisley (2)	14	100
Lochfield Road, Paisley (3)	11	100
Regent Street, Paisley (4)	16	100
Central Road (N), Paisley (5)	50	67
10 Gordon Street, Paisley (6)	40	92

Monitoring site	Annual mean (µg/m^3) corrected for bias (0.75)	Data Capture Rate (%)
High Street, Johnstone (7)	29	92
Hairst Street, Renfrew (8)	37	100
Station Road, Bishopton (9)	13	100
Phoenix Park, Linwood (10)	20	100
Clippens Road, Linwood (11)	17	92
Golf Drive, Linwood (12)	15	100
Greenock Road, Paisley (13)	21	100
St Andrew Crescent, Paisley (14)	22	100
Montgomery Drive, Paisley (15)	30	92
Kirklandneuk Road, Renfrew (16)	17	75
Tanar Way, Renfrew (17)	28	75
Incle Street, Paisley (18)	36	92
Linwood Road, Paisley (19)	23	100
High Street, Johnstone (20)	30	92
Causeyside Street, Paisley [21(1)]	30	92
Causeyside Street, Paisley [21(2)]	31	92
Causeyside Street, Paisley [21(3)]	30	92
Whirlie Road, Houston (22)	11	92
Hillington Road, Renfrew (23)	24	92
Glasgow Road, Renfrew (24)	22	100
French Street, Renfrew (25)	15	92
Nethergreen Crescent, Renfrew (26)	15	100
Rossland Crescent, Bishopton (27)	8	100
Hawkhead Road, Paisley (28)	21	100
Cartha Crescent, Paisley (29)	12	83
Kintyre Avenue, Linwood (30)	16	92
West Walkingshaw (31)	22	100
12 Gordon Street 32 (Duplicate)	35	100
76 Causeyside Street, Paisley (33)	35	100
63 Causeyside Street, Paisley (34)	33	100
Old Sneddon Street, Paisley (35)	37	100
Caledonian Street, Paisley (36)	31	100
Paisley Rd, Renfrew (38)	30	100
Glasgow Airport, Paisley [39(1)]	18	100
Glasgow Airport, Paisley [39(2)]	19	100
Glasgow Airport, Paisley [39(3)]	19	100
Hairst Street, Renfrew (40)	34	100
Smithshills Street (west), Paisley (41)	47	92
Central Rd, (w) Paisley (42)	33	100
Smithshill Street (east), Paisley (43)	33	100

Monitoring data within an AQMA

Renfrewshire Council currently have an Air Quality Management Area for NO_2 at Central Road in Paisley. As part of the Detailed Assessment carried out in 2004, an automatic analyser was situated at this location. The results of the automatic monitoring from Central Road are presented in Table 10. The results indicate that there were 420 exceedences of the 1 hour mean recorded at Central Road in Paisley in 2005. There is however, a data capture rate (DCR) of less than 90% and so it is preferable to state the results as a percentile. In this case, the equivalent percentile representing 18

allowable exceedences (as defined in the regulations) is 621.4µg/m^3. This is substantially above the objective, therefore it can be concluded that the 1 hour mean air quality objective will not be met at Central Road. The recorded annual mean concentration at Central Road is also above the objectives. The characteristics of Central Road result in such high NO_2 concentrations as it is enclosed by a large car park, and is used solely by buses as one of the main stops in Paisley Town Centre.

Table 10: Results of automatic NO_2 monitoring within an AQMA

Site	Grid reference	Data capture rate	Annual mean (µg/m^3)	99.8th percentile of 1 hour means (µg/m^3)	Maximum 1 hour mean (µg/m^3)	No. of exceedences of 1 hour mean
Central Road, Paisley	248450 664195	61%	76.5	627.8	795.7	420

There are three diffusion tubes co-located with the automatic analyser on Central Road and the results are presented in Table 11. All three tubes demonstrate exceedences of the annual mean objective. It is therefore recommended that the decision to declare an Air Quality Management Area remains valid at this location.

Table 11: Results of diffusion tube NO_2 monitoring within an AQMA

Monitoring site	Annual mean (µg/m^3) corrected for bias (0.75)	Data Capture Rate (%)
Central Rd, Paisley [37(1)]	57	100
Central Rd Paisley [37(2)]	56	100
Central Rd Paisley [37(3)]	58	100

8.3 Road transport

The contribution of road transport to local air pollution should be assessed at certain types of location. These are:

- narrow congested streets with residential properties close to the kerb;
- junctions;
- busy streets where people may spend 1 hour or more close to traffic;
- roads with high flows of buses and/or HGV's;
- new roads constructed or proposed since the previous review and assessment;
- roads close to the objective during the previous review and assessment; and
- roads with significantly changed traffic flows and bus stations.

This section discusses the results of the DMRB Screening assessment which was carried out on certain roads and junctions within Renfrewshire Council area. The DMRB assessment predicts

annual average NO_2 concentrations based on the road type, % HGV's, average speed, Annual Average Daily Traffic (AADT) flow and background NO_2 concentrations.

Road traffic counts were obtained for 73 local roads and 10 trunk roads within Renfrewshire; however, not all of these roads met the requirements for assessment. The roads which were not assessed were screened out for the following reasons: traffic flows were less than 10,000 vehicles per day; traffic volumes had decreased since the 2003 U&SA; or the 2003 DMRB screening assessment found that air quality objectives would be met and traffic volumes had decreased or remained the same.

Twenty five roads were chosen to be assessed using the DMRB Screening Model (v1.01)[5]. These roads included; roads not previously assessed; roads with significantly changed traffic flows; roads close to the objective at the previous review and assessment and roads with high flows of HGVs. The results of the DMRB screening assessment for 2005 and 2010 road traffic flows are presented in Table 12.

Seven junctions were also assessed using the DMRB Screening Model. These junctions were chosen due to the traffic volumes experienced at these sites. The results of the DMRB screening assessment for 2005 and 2010 traffic flows are presented in Table 13.

[5] Design Manual for Roads and Bridges, Volume 11 Section 3, Part 1, Air Quality. The Highways Agency, Scottish Executive Development Department, Welsh Assembly Government and The Department for Regional Development Northern Ireland, The Stationery Office (2003).

Table 12: Results of DMRB assessment for NO_2 for roads within Renfrewshire

Location	Street canyon correction included?	Predicted annual average NO_2 concentration (2005) ($\mu g/m^3$)	Predicted annual average NO_2 concentration (2010) ($\mu g/m^3$)
A737 Johnstone Bypass (Johnstone to sth of Howwood)	No	22.37	18.65
Ferguslie	Yes	39.64	32.05
A726 Mill St (North of Seedhill Rd)	Yes	35.32	28.84
Niddry St (Old Sneddon St/Love St junction)	No	32.10	26.71
Barrhead Rd (West of Lochfield Rd)	No	28.83	32.22
Caledonia Street	Yes	35.48	29.03
George St (East of Maxwellton St)	No	28.39	23.84
George St (West of Maxwellton St)	No	27.87	23.60
B775 Corsebar Rd	No	27.30	23.15
Neilston Rd (north of Lochfield Rd)	No	26.19	22.65
Glasgow Rd (Lacy St/Arkleston Rd)	No	29.48	24.93
Glasgow Rd (West of Lacy St)	No	29.94	25.29
Old Sneddon St (Love St/Niddry St junction)	No	34.09	28.23
Old Sneddon St (New Sneddon St/Smithshills St)	No	30.67	25.86
Neilston Rd (north of Falside Rd)	Yes	37.16	30.68
Love St	Yes	47.90	38.50
Wellmeadow St	Yes	31.91	26.85
Lochfield Rd	Yes	27.79	24.09
Weir St (Incle St/Abercorn St)	No	33.63	27.89
Glasgow Rd (West of Arkleston Rd)	No	32.33	27.55
Paisley Rd (south of Broadloan)	Yes	39.57	32.41
George St	Yes	27.06	22.45
Inchinnan Rd A8	Yes	34.63	28.59
M8 Motorway J26-J27	No	31.38	26.13
St James St (Caledonian Rd/Love St)	Yes	36.08	29.64

Table 13: Results of DMRB assessment for NO_2 for junctions within Renfrewshire

Junction	Predicted annual average concentration (2005) ($\mu g/m^3$)	Predicted annual average concentration (2010) ($\mu g/m^3$)
Maxwellton St/ George St	28.60	24.18
Renfrew Rd/ Niddry St	35.10	28.83
Maxwellton St/ Broomlands St	27.73	23.56
Well St/ Wellmeadow St/ Broomlands St	29.62	25.03
Niddry St/ Old Sneddon St/ St James St	33.62	27.72
George St/ High St/ Macdowell St	23.66	20.08
Glasgow Rd/ Lacy St	27.80	23.62

Narrow congested streets with residential properties close to the kerb

The technical guidance indicates that an assessment of air quality is required where traffic flows are greater than 10,000 vehicles per day on narrow congested streets, with residential properties close (within 5m) of the kerb. The roads which meet these criteria are assessed in this section along with other roads which are classed as street canyons (building height greater than the width of the road). These roads are Ferguslie, A726 Mill Street, Caledonia Street, Neilston Road, Love Street, Wellmeadow Street, Lochfield Road, Paisley Road, George Street Inchinnan Road and St James Street.

Validation work carried out by the Highways Agency identified an under-prediction of NO_2 concentrations by the DMRB model in urban city-centre street canyons[6]. LAQM technical guidance advises that the calculated road traffic contribution should be doubled when conducting DMRB assessments in street canyons.

The results of the DMRB assessment for narrow congested streets indicate that there is a potential for exceeding the NO_2 annual mean objective at Love Street. The DMRB assessment does not predict any exceedences at any of the other locations. The technical guidance states that if a DMRB assessment indicates an exceedence of the NO_2 annual mean objective a Detailed Assessment should be conducted. It is considered, however, that the doubling of the road contribution to account for the street canyon effect may not be suitable at the Love Street. At Love Street, there is only a 20m section of the street which would be classed as a canyon; the rest of the street does not have tall buildings on both sides and does not form a canyon. It is considered that this small canyon section of the street is very different to the large city-centre canyons where the Highways Agency conducted their research, and that a doubling of the road traffic component of the DMRB may not be appropriate in this case. The Council therefore proposes to commence diffusion tube monitoring in Love Street in January 2007, and assess these results before deciding on the need for a Detailed Assessment at Love Street.

[6] Part IV of the Environment Act 1995, Local Air Quality Management Technical Guidance, LAQM.TG(03), Defra et al (2003).

Junctions

The technical guidance indicates that junctions require to be assessed if they are identified as being 'busy'. Busy junctions are deemed to have a traffic flow exceeding 10,000 vehicles per day. The results of the DMRB screening assessment indicate that the NO_2 air quality objectives will be met at all identified junctions.

Busy streets where people may spend 1-hour or more close to traffic

Neilston Road (north of Lochfield Road) was identified as a street where people may spend one hour or more close to traffic. The results of the DMRB assessment predict an annual mean concentration of 26.2µg/m^3 and 22.7µg/m^3 in 2005 and 2010 respectively. It is unlikely that the 1-hour mean air quality objective will be exceeded at this site.

Roads with high flows of buses and/or HGVs

Technical guidance indicates that assessment of roads with high flows of buses and/or HGV's is required where:

- the proportion of these vehicles is greater than 25%;
- if there is relevant exposure within 10m of the road; and
- if the flow of heavy duty vehicles is greater than 2500 vehicles per day.

Three streets were assessed for high flows of HGVs. These were Niddry St (Old Sneddon Street/Love St junction), Old Sneddon Street (Love Street/Niddry Street Junction) and Love Street. There are no predicted exceedences of the NO_2 objectives at Niddry Street or Old Sneddon Street, while Love Street is discussed above.

New roads constructed or proposed since the previous review and assessment

There have been no new roads constructed or proposed since the previous review and assessment.

Roads close to the objective during the previous review and assessment

There were several roads which were identified as having NO_2 concentrations close to air quality objectives during the previous review and assessment. These are Ferguslie, Caledonia Street, Neilston Road, Old Sneddon Street, Love Street, Wellmeadow Street and St James Street. The DMRB assessment indicates that NO_2 concentrations at these locations are below the annual mean NO_2 air quality objectives except at Love Street which is discussed above.

Roads with significantly changed traffic flows

The technical guidance indicates that roads with a large (25%) increase in traffic should be assessed. There were three roads meeting this criterion. These are the A737 Johnstone bypass between Johnstone and south of Howwood, Love Street and Lochfield Road. The results of the DMRB assessment indicate that predicted annual mean NO_2 concentrations these streets are below the NO_2 air quality objectives except at Love Street which is discussed above.

Bus stations

The technical guidance indicates that emissions from bus movements should be assessed where there is a flow of greater than 1000 buses per day. The main bus terminus within paisley has been the subject of poor air quality and as a result, Central Road in Paisley has been designated an Air Quality Management Area. Additional air quality monitoring was set up in this area. Results from this monitoring indicate that NO_2 air quality objectives are being exceeded at Central Road.

8.4 Industrial sources

New industrial sources/Industrial sources with substantially increased emissions

Following consultation with SEPA, it was found that there are no new industrial sources or significant changes to existing industrial sources which would result in any deterioration of local air quality.

8.5 Other sources

Aircraft

It is necessary to assess the impact of aircraft if there is relevant exposure within 1km of an airport boundary and there are more than 5 million passengers per annum (mppa). Glasgow airport is situated within Renfrewshire. Total passenger numbers are now around 8.8 million passengers per annum. There are also receptors within 1km of the airport boundary, therefore more detailed assessment of emissions from aircraft has been conducted using automatic monitoring.

Monitoring results from the airport indicate that the annual mean for 2005 was 16.7µg/m^3. The maximum hourly concentration was 99.3µg/m^3, however the data capture rate was below 90%. The technical guidance indicates that it may be more representative to use the equivalent percentile for allowable exceedences in the event of a data capture rate of less than 90%. The 99.8th percentile recorded at Glasgow Airport was determined to be 74.5µg/m^3. There were no exceedences of the 1 hour mean or the annual mean at Glasgow airport. The Council have advised that Glasgow Airport have recently commenced diffusion tube monitoring of NO_2 around the airport boundary. The Council will review this data when available.

In summary, based on available data it is concluded that the air quality objectives for nitrogen dioxide may be exceeded at two locations within Renfrewshire.

Measured concentrations at Central Road in 2005 were above NAQS objectives levels so the designation of AQMA in this area remains valid. The Council are currently preparing an Action Plan for this area.

A DMRB assessment indicated annual mean NO_2 concentrations in excess of the annual mean objective at Love Street, Paisley. The Council propose to conduct diffusion tube monitoring at this location before identifying whether there is a need for a Detailed Assessment.

Monitoring data and DMRB assessments indicate that there are no predicted exceedences of the NO_2 NAQS objectives at any other location in Renfrewshire.

9 SULPHUR DIOXIDE

There are three air quality objectives for sulphur dioxide (SO_2). These are as follows:

- a 24-hour mean concentration not to exceed 125µg/m^3 on more than 3 occasions by 31st December 2004;
- a 1-hour mean concentration not to exceed 350µg/m^3 on more than 24 occasions by 31st December 2004 and
- a 15-minute mean concentration not to exceed 266µg/m^3 on more than 35 occasions by 31st December 2005.

9.1 Background concentrations

Background SO_2 concentrations for 2005 were obtained from the LAQM website and a map of background SO_2 concentrations in Renfrewshire is presented in Figure 8. Concentrations were estimated to be between 1.29µg/m^3 and 5.74µg/m^3 with an average of 1.61µg/m^3. These figures are below air quality objectives.

9.2 Monitoring data

There is currently no AQMA designated for SO_2 within Renfrewshire.

Sulphur dioxide concentrations are currently monitored at Glasgow Airport and the results of this monitoring are presented in Table 14. The location of the automatic monitor is presented in Figure 2. The automatic analyser is situated near the receptors on the eastern side of the airport boundary. The prevailing wind in Scotland is westerly to south-westerly which means that the analyser is upwind of the airport for the majority of the time. The data capture rates for 2005 are all below 90% and so the results of this monitoring should be treated with caution. Nevertheless, recorded percentile values are all substantially below the objectives. It can, therefore, be assumed that there is no risk of the air quality objectives for SO_2 being exceeded at Glasgow Airport.

Table 14: Results of SO_2 automatic monitoring within Renfrewshire for 2005

Objective	Data capture rate (%)	99th percentile (µg/m^3)	99.7th percentile (µg/m^3)	99.9th percentile (µg/m^3)	Maximum (µg/m^3)	No. of exceedences
24 hour mean	72	24.8	-	-	25.5	0
1 hour mean	74	-	26	-	46	0
15 minute mean	46	-	-	13.7	23.3	0

9.3 Industrial sources

New industrial sources/Industrial sources with substantially increased emissions

Following consultation with SEPA, it was determined that there are no new industrial sources emitting SO_2 within Renfrewshire. CIBA in Paisley is regulated for IPC and had applied for a permit to use gas oil in place of natural gas when economically beneficial to the company. Emissions modelling carried out by the company indicated that the change in fuel use would not substantially increase ground level concentrations of SO_2. There are no other businesses with substantially increased emissions.

Small boilers >5MW (thermal)

There are four premises within Renfrewshire which were identified as having boilers greater than 5MW (thermal). These companies are as follows: Pollock and Cochrane Ltd, Royal Alexandra Hospital, Rolls Royce and G M Watson. Enquires were made to determine if there were any changes since 2003.

Pollock and Cochrane Ltd indicated that the 5MW boiler was still on the premises but was not currently used to full capacity. It is a duel burner boiler with 2 burners, only one of which is currently in use. They also indicated that production had decreased since 2003. The boiler uses gas oil and consumption this year (2006) to date was 170500 litres.

The Royal Alexandra Hospital has three gas fired boilers of around 4.4MW. Two boilers are used in summer and three on occasions in winter. One boiler is usually kept on standby as backup. The main fuel used is natural gas with gas oil being used for the backup boiler. Typical monthly gas usage is around 1,626,280 kWh.

Rolls Royce has moved premises since the 2003 U&SA. The company was previously regulated for IPPC but production has since decreased and outputs are now below regulatory levels. The only boilers in the new premises are used for heating purposes and comprises three gas fired sequenced boilers rated 1.2 MW – 1.86 MW.

The 2003 U&SA indicated that there was a boiler in industrial premises in Napier Street, Linwood. The premises are occupied by G M Watson and are owned and occupied the Reid Gear Company. These companies indicated that there are no boilers larger than 5MW in operation at this site.

There is a boiler plant at Hitech Equipment Ltd, one of the industrial processes which commenced operation since the last USA. This boiler is fuelled by gas oil, and the rating of the boiler is unknown. The annual gas usage was provided in the plants IPPC application, and is 2235MWh, which results in an annual SO_2 emission of 0.47 tonnes (gas oil calorific value 45.6MJ/kg, SO_2 emission rate 2.46kg/tonne fuel consumed[7]). The industrial nomograms from the technical guidance indicate that the emission of SO_2 from a boiler would need to be significantly greater than 0.5 tonnes before there would be a risk of exceeding the SO_2 objectives. It is therefore unlikely that emissions from the Hitech Equipment boiler plant would result in any exceedences of the SO_2 objectives.

[7] National Atmospheric Emissions Inventory Emissions Factor Database www.naei.org.uk)

9.4 Domestic sources

Areas of domestic coal burning

The technical guidance indicates that the impact of domestic coal burning should be investigated where there are more than 100 properties burning solid fuel within a 500m x 500m area. A solid fuel use survey carried out by Renfrewshire Council in 2004 determined that there are around 700 houses burning solid fuel within the Renfrewshire area. These houses are mainly found in rural areas and are not confined to a 500m x 500m area. It is therefore unlikely that these houses would have a detrimental effect on local air quality and further assessment is not required.

9.5 Other sources

Shipping

The technical guidance indicates that emissions from large vessels should be assessed where there is relevant exposure within 1km of berths and if there are more than 5000 vessel movements a year. Clydeport Authority was contacted regarding shipping movements in 2005 at the King George V docks on the River Clyde at the Glasgow boundary, however no response was received. The 2003 U&SA indicated that there were 330 shipping movements in 2003. This is substantially below the threshold for assessment. It has therefore been assumed that shipping movements will not have increased to more than 5000 movements per year.

Railway locomotives

The LAQM technical guidance indicates that assessment of railway locomotives is required where diesel locomotives are regularly stationery for 15 minutes or more and where there is public exposure within 15 metres of the track. The 2003 U&SA highlighted a section of railway where railway locomotives were stationery for periods of 15 minutes or more. A local resident had complained about the stationary locomotives, and agreement had been reached with the train operator to switch off engines at this location after 15 minutes. The complainant has since moved. House, and Renfrewshire Council have confirmed that no further complaints regarding the locomotives had been received and therefore, further assessment is not required.

Based on the available data it is concluded that it is unlikely that the air quality objectives for sulphur dioxide will be exceeded in Renfrewshire.

10 PARTICULATES

There are two objectives for PM_{10}, an annual mean objective and a 24-hour mean objective with separate objectives which have to be achieved by 2004 and in 2010. The annual mean objective for 2010 in Scotland is more stringent than the objective in the rest of the UK. The objectives that apply in Scotland are:

- an annual mean concentration of 40µg/m^3 to be achieved by 31st December 2004; and
- an annual mean concentration of 18µg/m^3 to be achieved by 31st December 2010;
- a 24-hour mean concentration not to exceed 50µg/m^3 on more than 35 occasions by 31st December 2004; and
- a 24-hour mean concentration not to exceed 50µg/m^3 on more than 7 occasions by 31st December 2010.

10.1 Background concentrations

Background concentrations for PM_{10} for 2005 and 2010 within Renfrewshire were obtained from the LAQM website and are presented in Table 15. A map of background concentrations is presented in Figure 9. The estimated background concentrations are below the air quality objectives in both 2005 and 2010.

Table 15: Background PM_{10} concentrations within Renfrewshire

	Maximum	Minimum	Mean
Annual mean concentration 2005 (µg/m^3)	19.2	10.0	12.2
Annual mean concentration 2010 (µg/m^3)	17.9	9.5	11.5

10.2 Monitoring data

There is currently no designated AQMA for PM_{10} within Renfrewshire; however, the 2003 U&SA identified a risk of exceeding air quality objectives within the vicinity of Gordon Street and Causeyside Street. In response to this an automatic PM_{10} monitor was installed in this area. The results of this monitoring were discussed in the 2005 progress report which indicated that there was still a risk of exceeding the 2010 objectives.

The results of 2005 automatic monitoring for PM_{10} are presented in Table 16. Following the technical guidance, the TEOM-measured concentration at Gordon Street has been factored by 1.3 to approximate to a gravimetric concentration.

Table 16: Results of PM_{10} automatic monitoring within Renfrewshire for 2005

Site	Grid reference	Data capture rate (%)	Annual mean (µg/m^3)	90.4th percentile of 24 hour means (µg/m^3)	98th percentile of 24 hour means (µg/m^3)	No. of exceedences of 24 hour mean objective
Gordon Street, Paisley	248314, 663610	88	20.9	32.3	41.9	2
Glasgow Airport	248297, 666543	84	13.4	24.3	42.8	1

The measured annual average PM_{10} concentration at Glasgow Airport in 2005 was below the 2010 NAQS objective level. The measured 24-hour mean concentrations were also below the objective level.

The measured annual average concentration at Gordon Street was above the 2010 NAQS objective level. This is based on adjusting the measured concentration by a factor of 1.3 to account for the under-read of TEOM analysers. Recent Scottish Executive communication[8] has highlighted monitoring by Edinburgh City Council which indicated that use of the 1.3 factor may overestimate the loss of semi-volatile particulates. The communication reported an alternate adjustment factor of 1.14 for annual mean concentrations and recommended this factor also be used. If the 1.14 factor is applied to the measured concentration in preference to the 1.3 factor the measured concentration was 18.3µg/m^3. Based on concentrations using both factors it is considered that PM_{10} concentrations at the junction of Gordon Street and Causeyside Street are above the PM_{10} annual mean objective.

Renfrewshire Council will install FDMS (Filter Dynamics Measurement System) equipment with their TEOM in January 2007. Measurements taken by FDMS/TEOM in 2007 will therefore be directly comparable against the gravimetric PM_{10} objectives, removing the need for adjustment factors and subsequent uncertainties.

Based on the results of the TEOM monitoring, Renfrewshire Council consider there to be a risk of exceeding the 2010 PM_{10} annual mean objective at Gordon Street, and will conduct a Detailed Assessment of PM_{10} at this location. The Detailed Assessment will utilise gravimetric equivalent monitoring data which will be available in 2007 on installation of the FDMS/TEOM.

10.3 Road transport

As discussed in section 7.3, a DMRB screening assessment was carried out for 25 roads and seven junctions within Renfrewshire. This assessment also covered estimation of particulate concentrations for 2005 and 2010, with PM_{10} concentrations calculated at the closest receptor to each road or junction. The results are presented in Tables 17 and 18, with the full DMRB input in Appendix 2.

Road traffic contribution to local air pollution requires to be assessed at certain locations. These are; at busy roads and junctions in Scotland; roads with high flows of buses and/or HGV's; new roads constructed or proposed since the previous review and assessment; roads close to the objective during the previous review and assessment and at roads with significantly changed traffic flows.

[8] Local Air Quality Management: Update on Particles. Scottish Executive, April 2005

Table 17: Results of DMRB assessment for PM_{10} for roads within Renfrewshire

Location	Predicted annual average PM_{10} concentration (2005) ($\mu g/m^3$)	Predicted annual average PM_{10} concentration (2010) ($\mu g/m^3$)
A737 Johnstone Bypass (Johnstone to south of Howwood)	16.09	15.30
Ferguslie	18.91	17.29
A726 Mill St (North of Seedhill Rd)	18.15	16.96
Niddry St (Old Sneddon St/Love St junction)	18.83	17.10
Barrhead Rd (West of Lochfield Rd)	17.62	16.69
Caledonia Street	18.14	16.82
George St (East of Maxwellton St)	17.54	16.53
George St (West of Maxwellton St)	17.27	16.43
B775 Corsebar Rd	17.04	16.38
Neilston Rd (north of Lochfield Rd)	16.82	16.08
Glasgow Rd (Lacy St/Arkleston Rd)	17.83	16.74
Glasgow Rd (West of Lacy St)	18.09	16.91
Old Sneddon St (Love St/Niddry St junction)	20.21	17.85
Old Sneddon St (New Sneddon St/Smithshills St)	18.39	17.06
Neilston Rd (north of Falside Rd)	18.39	17.08
Love St	19.95	17.89
Wellmeadow St	16.83	16.17
Lochfield Rd	16.22	15.77
Weir St (Incle St/Abercorn St)	20.15	17.90
Glasgow Rd (West of Arkleston Rd)	19.06	17.52
Paisley Rd (south of Broadloan)	19.05	17.47
George St	16.26	15.45
Inchinnan Rd A8	17.93	16.92
M8 Motorway J26-J27	18.86	17.49
St James St (Caledonian Rd/Love St)	18.01	16.84

Table 18: Results of DMRB assessment for PM_{10} for junctions within Renfrewshire

Junction	Predicted annual average PM_{10} concentration (2005) ($\mu g/m^3$)	Predicted annual average PM_{10} concentration (2010) ($\mu g/m^3$)
Maxwellton St/George St	18.04	16.98
Renfrew Rd/Niddry St	21.74	18.84
Maxwellton St/ Broomlands St	17.44	16.63
Well St/ Wellmeadow St/ Broomlands St	18.15	16.99
Niddry St/ Old Sneddon St/ St James St	20.92	18.44
George St/ High St/ Macdowell St	17.33	16.18
Glasgow Rd/ Lacy St	17.26	16.42

Busy roads and junctions in Scotland

There are two methods of identifying a 'busy' road for the purpose of assessing PM_{10} concentrations. The first criterion is: roads or junctions with more than 5000 vehicles per day and an expected 2010 background concentration of above 15µg/m^3, and the second criterion is: roads or junctions with more than 10,000 vehicles per day and an expected 2010 background concentration of less than 15 µg/m^3.

There were several roads identified as having a traffic flow of greater than 5000 vehicles per day with estimated background concentrations less than or equal to 15µg/m^3 so these streets were not assessed. All other streets which were assessed had a traffic flow of greater than 10,000 vehicles per day.

The results of the DMRB assessment indicate that all roads and junctions are meeting 2004 annual mean air quality objectives. The assessment predicted that the 2010 annual mean objective would not be met at two junctions, namely the Renfrew Road/Niddry Street junction and the Niddry Street/Old Sneddon Street/St James Street junction. The closest receptors to these junctions are a flat on Renfrew Road and a block of flats on St James Street respectively. In accordance with LAQM technical guidance, it is recommended that the Council conduct a Detailed Assessment of PM_{10} at these locations.

Roads with high flows of buses and/or HGV's

The technical guidance indicates that assessment of roads with high flows of buses and/or HGV's is required where the proportion of these vehicles is greater than 20%, if there is relevant exposure within 10m of the road and the flow of heavy duty vehicles is greater than 2000 vehicles per day. Three streets were assessed for high flows of HGVs. These were Niddry St (Old Sneddon

Street/Love St junction) and Old Sneddon Street (Love Street/Niddry Street Junction). Predicted concentrations at these streets and junctions are below both the 2004 and 2010 PM_{10} annual mean objectives.

New roads constructed or proposed since the previous review and assessment

There have been no new roads constructed or proposed since the previous review and assessment

Roads close to the objective during the previous review and assessment

There were no roads identified as being close to the 2004 air quality objectives in the previous review and assessment. Several roads were previously found to be close to the 2010 annual mean objective. These were; Ferguslie, Old Sneddon Street, Weir Street, Glasgow Road (West of Arkleston) and Paisley Road. These streets were therefore included in the DMRB assessment.

The updated DMRB assessment predicted that 2010 PM_{10} concentrations these locations were close to, but below the 2010 annual mean objective of 18µg/m^3.

Roads with significantly changed traffic flows

The technical guidance indicates that roads with a traffic flow of greater than 10,000 vehicles per day and with a large (25%) increase in traffic should be assessed. There were three roads meeting this criterion. These were the A737 Johnstone bypass between Johnstone and south of Howwood, Love Street and Lochfield Road. The results of the DMRB assessment indicate that the predicted PM_{10} annual mean concentrations are below the 2010 objective at these locations.

PM_{10} concentrations at two junctions in Paisley are therefore predicted to exceed the 2010 annual mean objective, and Detailed Assessment will be conducted at these locations. There are also a number of locations where predicted concentrations are close to, but below the 2010 objective concentration of 18µg/m^3. Detailed Assessments are not required at these locations.

10.4 Industrial sources

New industrial sources/Industrial sources with substantially increased emissions

Following consultation with SEPA, it was determined that there are no new industrial sources of PM_{10} within Renfrewshire.

10.5 Domestic sources

Areas of domestic solid fuel burning

The effect of domestic coal burning should be assessed where there are more than 50 houses within a 500m by 500m area burning solid fuel. A survey carried out by Renfrewshire Council determined that there were 700 houses burning solid fuel and that they were not confined to a 500m by 500m area. It is unlikely that domestic solid fuel burning would have a detrimental effect on local air quality in Renfrewshire.

10.6 Other sources

Quarries/landfill sites/opencast coal/handling of dusty cargo at ports etc

The technical guidance indicates that sources of dust emissions should be assessed where there is an expected 2010 background concentration of less than 16µg/m^3 and relevant exposure within 200m. The 2003 U&SA identified two potential sources of PM_{10} emissions within Renfrewshire. These were Highcraig Quarry and Kilbarchan Quarry. The background concentrations are expected to be less than 16µg/m^3 in the vicinity of these sites and there is no relevant exposure within 200m, therefore there is no need to proceed to a detailed assessment.

Information on regulated industrial processes received from SEPA indicated that since the last USA Malcolm Construction Services have applied for a PPC permit for a new landfill site called the Reilly Quarry Landfill, located near Bishopton, to the north-west of Paisley. The SEPA public register indicates that the site already operates under a waste management license. Background PM_{10} concentrations at this location are less than 16µg/m^3, and currently the nearest receptor is located more than 500m from the site, so it is unlikely that PM_{10} emissions from the landfill site will cause an exceedence of the PM_{10} objectives. It is understood, however, that there are plans to develop the former Royal Ordnance Factory into a mixed residential and commercial development. It is not known at this time whether there are plans to build residential housing within 200m of the landfill site. If there are such plans, however, there would be potential for exceeding the PM_{10} objectives, and a detailed assessment would be required.

Tarmac Northern Ltd has opened a new concrete batching plant at MacDowall Street, Paisley, which will result in fugitive dust and PM_{10} emissions. The operator has developed a management system to minimise dust and PM_{10} emissions, and does not foresee any emissions to air during normal operating procedures. It is considered that there will be a minimal impact on local PM_{10} concentrations, and it is unlikely that there will be any exceedences of the PM_{10} objectives as a result of emissions from this process.

Aircraft

PM_{10} concentrations are currently monitored at Glasgow Airport. The technical guidance states that the results of any monitoring should be used in preference to predicted passenger numbers. The results of this monitoring indicate that there was one exceedence of the 24 hour mean during 2005 and that annual mean air quality objectives for 2005 and 2010 would be met. There is no need for further assessment.

Monitoring data has indicated that the 2010 PM_{10} objective may be exceeded at Gordon Street, while DMRB assessments have indicated that the 2010 PM_{10} annual mean objective may be exceeded at the junction of Renfrew Road and Niddry Street, and at the junction of Niddry Street, Old Sneddon Street and St James Street.

Based on the result of the TEOM monitoring, Renfrewshire Council consider there to be a risk of exceeding the 2010 PM_{10} annual mean objective at Gordon Street, and will conduct a Detailed Assessment of PM_{10} at this location. The Detailed Assessment will utilise gravimetric equivalent monitoring data which will be available in 2007 after installation of the FDMS/TEOM.

Based on the results of the DMRB assessment, Renfrewshire Council will proceed to a Detailed Assessment for PM_{10} at the junctions of Renfrew Road and Niddry Street, and the junction of Niddry Street, Old Sneddon Street and St James Street.

11 CONCLUSIONS

The U&SA has assessed the current and future likelihood of air quality objectives being met within the Renfrewshire Council area for carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particulates. The study has considered new monitoring data, and new information regarding transport and industrial sources of air pollution.

It is concluded that air quality objectives for carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide are likely to be met within Renfrewshire. The assessment identified a risk of air quality objectives being exceeded for nitrogen dioxide and particulates at some locations throughout Renfrewshire. These are summarised as follows:

- Diffusion tube and automatic monitoring show that the 2005 NO_2 annual mean and 1 hour mean objectives are being exceeded at Central Road, Paisley, therefore the decision to declare an AQMA remains valid.

- The DMRB assessment has indicated that there is a risk of exceeding the annual mean NO_2 objective at Love Street. The Council will commence diffusion tube monitoring at this location before assessing the need for a Detailed Assessment.

- PM_{10} monitoring has indicated that Gordon Street is at risk of exceeding the 2010 annual mean objective. The Council will proceed to a Detailed Assessment at this location, utilising FDMS/TEOM monitoring data to make a direct comparison of PM_{10} concentrations against the gravimetric objective.

- The DMRB assessment predicted that the 2010 annual mean PM_{10} objective is at risk of being exceeded at the junction of Renfrew Road and Niddry Street and at the junction of Niddry Street, Old Sneddon Street and St James Street. The Council will proceed to a Detailed Assessment at these locations.

Appendix 1

Traffic Survey Results

Table A1 Trunk roads traffic count

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
M8 Motorway (J26 to J27)	116008	101805	-12
M8 Motorway (J28A to J29)	43750	38492	-12
M8 Motorway (J30 to J31)	26045	24617	-5
A737 Johnstone Bypass J29 of M8 to Linclive junction	57601	58870	2
A737 Johnstone Bypass Linclive to Barrochan	49227	43462	-12
A737 Johnstone Bypass Barrochan to Kilbarchan	29849	33145	11
A737 Johnstone Bypass Johnstone to sth of Howwood	16286	21576	32
A737 Johnstone Bypass Howwood to Lochwinnoch	20407	22637	11
M898 Motorway	28286	25987	-8
Erskine Bridge	27154	26606	-2

Table A2 Paisley traffic count

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
A726 Mill St. (Seedhill Rd./Lonend)	36484	23786	-35
A726 Mill St (North of Seedhill Rd)		20319	
Seedhill Road		5478	
Gauze Street		3510	
Incle Street	33010	26622	-19
Renfrew Rd (north of Niddry St.)	29545	23476	-21
Hurlet Road (NW of B771)	29274	23934	-18
Renfrew Rd (Niddry St/Weir St.)	28681	22031	-23
Ferguslie	27795	32296	16
Abercorn Street (North of Niddry St)		1787	
Abercorn Street (South of Niddry St)		6591	
Niddry St.(Abercorn St./Renfrew Rd)	26997	20255	-25
Niddry St (Old Sneddon St, Love St Junction)		16296	
Weir St. (Incle St/Abercorn St.)	25953	18490	-29
Weir St (East of Incle St Junction)		6281	
New Sneddon Street		2632	
Smithhills Street		2354	
Gilmour Street		3189	
St James St(Caledonia Rd/Love St)	22896	19067	-17
Glasgow Rd (west of Arkleston Rd)	22628	16104	-29
Underwood Rd west of Greenhill Rd	21616	16232	-25
Greenock Road	21076	20955	-1
Barrhead Road (East of Lochfield Rd)	20699	23551	14
Barrhead Road (West of Lochfield Rd)		16446	
Underwood Rd east of Greenhill Rd	20512	16232	-21
Caledonia Street	18500	16029	-13
Hawkhead Road	18086	13578	-25
Maxwellton St (west flank ring Rd)	15756	14210	-10

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
George Street (East of Maxwellton St)		15451	
George Street (West of Maxwellton St)		11053	
B775 Corsebar Road		14563	
Lounsdale Road		6720	
Green Road		7629	
Broomlands Street (West of Maxwellton St)		6452	
Broomlands Street (East of Maxwellton St)		4334	
Neilston Rd (north of Lochfield Rd)	13904	11032	-21
Glasgow Rd(Arkl-nRd to PenileeRd)	13382	11752	-12
Glasgow Rd (east of Penilee Rd)	13114	9694	-26
Glasgow Rd (Lacy St/Arkleston Rd)		11363	
Glasgow Rd (West of Lacy Street)		12797	
Lacy Street		3424	
Old Sneddon Street (Love St/Niddry St Junction)	13060	15761	21
Old Sneddon Street (New Sneddon St/Smithhills St)		12669	
Neilston Rd (South of Falside Road)	12187	7618	-37
Neilston Rd (North of Falside Road)		12487	
Love Street	10631	18650	75
Inchinnan Road	10734	10923	2
Arkleston Road (south of Gall-hill Rd)	10352	10422	1
Caplethill Road	10316	9279	-10
Arkleston Road (north of Gall'hill Rd)	9931	9423	-5
Wellmeadow Street	9914	7062	-29
Falside Road	9375	7458	-20
Barnsford Road	13892	13235	-5
Well St (south of Underwood Rd)	8690	5425	-38
Greenhill Road	6987	6056	-13
Lochfield Road	6133	9887	61
Penilee Road	5115	4462	-13
Gleniffer Road	2759	3348	21

Table A3 Renfrew traffic count

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
Paisley Road (south of Broadloan)	21227	17391	-18
Glasgow Road	20251	19327	-5

Table A4 Erskine Traffic count

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
Southbar Road	17710	17345	-2
Greenock Road	13535	12637	-7
A726 (M898 to Bargarran)	9469	9825	4

Table A5 Johnstone traffic count

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
George Street		11214	

B789 High Street (East of McDowall St)		1648	
B789 High Street (West of McDowall St)		5190	
B787 McDowall Street		7544	

Table A6 Elderslie traffic count

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
Main Rd (East of Glenpatrick Rd)	18215	18706	3
Glenpatrick Road	2866	3071	7

Table A7 Inchinnan traffic count

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
Greenock Road	11704	14199	21
Inchinnan Road A8		14691	
Abbotsinch Road		6120	

Table A8 Bridge of Weir Area

Location	PROJECTED AADT 2005	ACTUAL AADT 2005/2006	% change
Kilmacolm Road	8544	7860	-8

Appendix 2

Results of DMRB Assessment

Table A9 DMRB Assessment of PM_{10} Concentrations

Location	Road type	% HGVs	Average speed (kph)	Distance to receptor (m)	2005 AADT	2005 DMRB results ($\mu g/m^3$)	2010 AADT	2010 DMRB results ($\mu g/m^3$)
A737 Johnstone Bypass (Johnstone to south of Howwood)	A	5.8	80	25	21576	16.09	23278	15.30
Ferguslie	A	6.5	50	10	32296	18.91	34843	17.29
A726 Mill St (North of Seedhill Rd)	A	3.5	45	6	20319	18.15	21922	16.96
Niddry St (Old Sneddon St/Love St junction)	A	22.5	45	36	16296	18.83	17581	17.10
Barrhead Rd (West of Lochfield Rd)	A	4.8	45	17	16446	17.62	17743	16.69
Caledonia Street	A	4.8	40	10	16029	18.14	17293	16.82
George St (East of Maxwellton St)	A	6	45	18	15451	17.54	16670	16.53
George St (West of Maxwellton St)	A	6.1	45	11	11053	17.27	11925	16.43
B775 Corsebar Rd	B	3.5	45	10	14563	17.04	15712	16.38
Neilston Rd (north of Lochfield Rd)	B	9	45	10	11032	16.82	11902	16.08
Glasgow Rd (Lacy St/Arkleston Rd)	A	7.5	45	10	11363	17.83	12252	16.74
Glasgow Rd (West of Lacy St)	A	7.1	45	10	12797	18.09	113806	16.91
Old Sneddon St (Love St/Niddry St junction)	A	23.2	35	30	15761	20.21	17004	17.85
Old Sneddon St (New Sneddon St/Smithshills St)	A	9	45	10.6	12669	18.39	13668	17.06
Neilston Rd (north of Falside Rd)	A	8.7	45	7	12487	18.39	13472	17.08
Love St	B	19.7	45	6	18650	19.95	20121	17.89
Wellmeadow St	B	12	40	5	7062	16.83	7619	16.17
Lochfield Rd	B	2.3	40	5	9887	16.22	10667	15.77
Weir St (Incle St/Abercorn St)	A	14.5	35	20	18490	20.15	19948	17.90
Glasgow Rd (West of Arkleston Rd)	A	7.9	45	11	16104	19.06	17374	17.52
Paisley Rd (south of Broadloan)	A	7.5	50	10	17391	19.05	18763	17.47
George St	A	4.4	45	6	11214	16.26	12099	15.45
Inchinnan Rd A8	A	4	45	8	14691	17.93	15850	16.92
M8 Motorway J26-J27	A	6.6	100	40	101805	18.86	109835	17.49
St James St (Caledonian Rd/Love St)	A	4.4	45	12.6	19067	18.01	20571	16.84

Table A10 DMRB assessment of PM_{10} concentrations at junctions within Renfrewshire

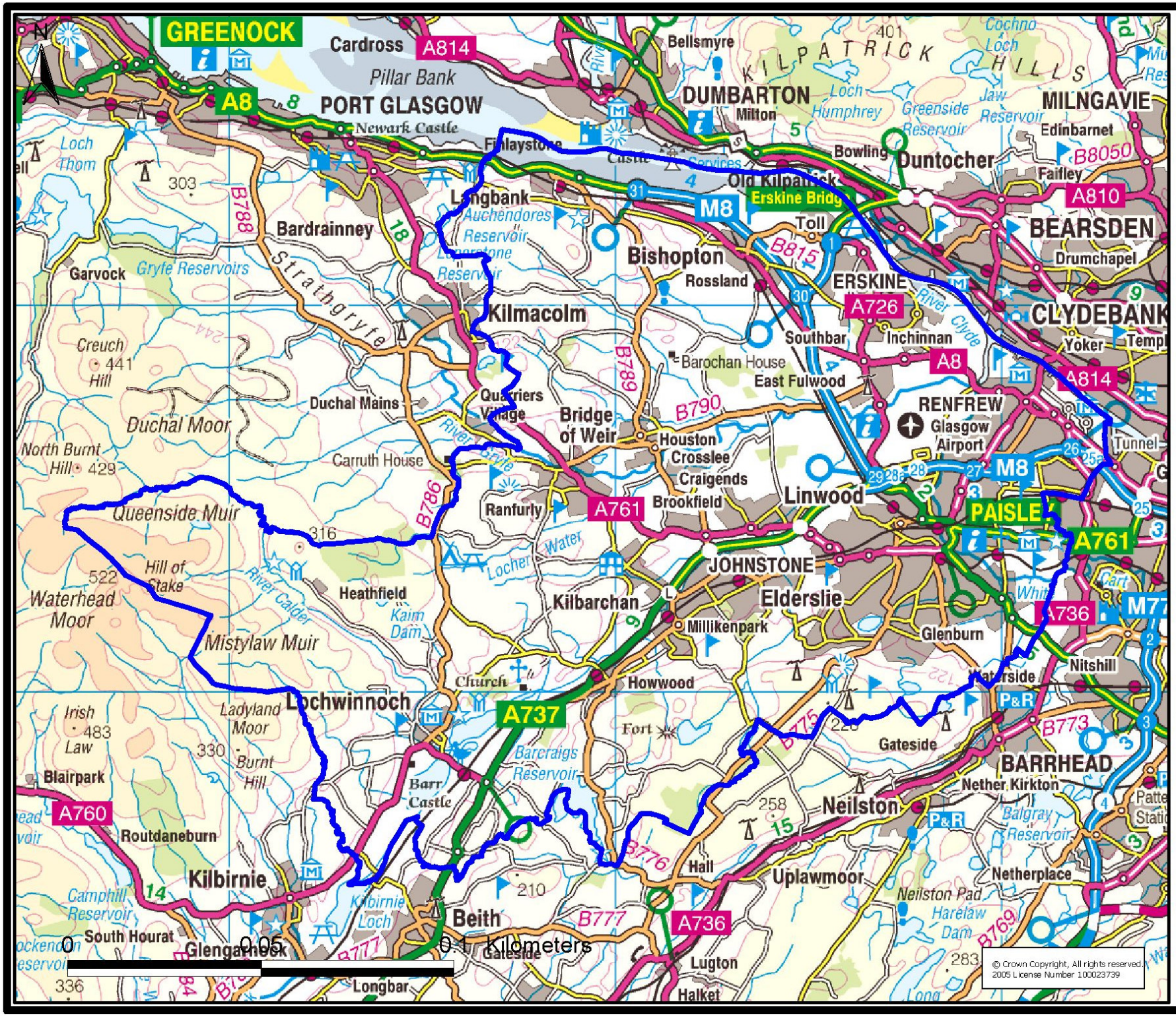
Junction	Road type	% HGVs	Average speed (kph)	Distance to receptor (m)	2005 AADT	2005 DMRB results ($\mu g/m^3$)	2010 AADT	2010 DMRB results ($\mu g/m^3$)
Maxwellton St/ George St	B	6.8	30	18	8084	18.04	8590	16.98
	A	2.8	30	11	8582		9119	
Renfrew Rd/ Niddry St	A	7.5	30	13.1	13236	21.74	14065	18.84
	A	7.3	30	30	21635		22990	
Maxwellton St/ Broomlands St	B	2.7	30	11	8261	17.44	8778	16.63
	B	9.5	30	9	4387		4662	
Well St/ Wellmeadow St/ Broomlands St	B	6.3	30	7	3595	18.15	3820	16.99
	B	11.4	30	10	5254		5583	
	B	14.6	30	6	2707		2877	
Niddry St/ Old Sneddon St/ St James St	A	7.6	30	21	16125	20.92	17135	18.44
	A	3.6	30	12.6	11684		12416	
George St/ High St/ Macdowell St	A	6.1	30	6	6666	17.33	7084	16.18
	B	5.5	30	6	2301		2445	
	B	8.7	30	7	3927		4173	
Glasgow Rd/ Lacy St	A	6	30	14	6538	17.26	6947	16.42
	B	4.5	30	12	3092		3286	

Table A11 DMRB Assessment of NO_2 Concentrations

Location	Road type	% HGVs	Average speed (kph)	Distance to receptor (m)	2005 AADT	2005 DMRB results ($\mu g/m^3$)	2010 AADT	2010 DMRB results ($\mu g/m^3$)
A737 Johnstone Bypass (Johnstone to sth of Howwood)	A	5.8	80	25	21576	22.37	23278	18.65
Ferguslie	A	6.5	50	10	32296	39.64	34843	32.05
A726 Mill St (North of Seedhill Rd)	A	3.5	45	6	20319	35.32	21922	28.84
Niddry St (Old Sneddon St/Love St junction)	A	22.5	45	36	16296	32.10	17581	26.71
Barrhead Rd (West of Lochfield Rd)	A	4.8	45	17	16446	28.83	17743	32.22
Caledonia Street	A	4.8	40	10	16029	35.48	17293	29.03
George St (East of Maxwellton St)	A	6	45	18	15451	28.39	16670	23.84
George St (West of Maxwellton St)	A	6.1	45	11	11053	27.87	11925	23.60
B775 Corsebar Rd	B	3.5	45	10	14563	27.30	15712	23.15
Neilston Rd (north of Lochfield Rd)	B	9	45	10	11032	26.19	11902	22.65
Glasgow Rd (Lacy St/Arkleston Rd)	A	7.5	45	10	11363	29.48	12252	24.93
Glasgow Rd (West of Lacy St)	A	7.1	45	10	12797	29.94	113806	25.29
Old Sneddon St (Love St/Niddry St junction)	A	23.2	35	30	15761	34.09	17004	28.23
Old Sneddon St (New Sneddon St/Smithshills St)	A	9	45	10.6	12669	30.67	13668	25.86
Neilston Rd (north of Falside Rd)	A	8.7	45	7	12487	37.16	13472	30.68
Love St	B	19.7	45	6	18650	47.90	20121	38.50
Wellmeadow St	B	12	40	5	7062	31.91	7619	26.85
Lochfield Rd	B	2.3	40	5	9887	27.79	10667	24.09
Weir St (Incle St/Abercorn St)	A	14.5	35	20	18490	33.63	19948	27.89
Glasgow Rd (West of Arkleston Rd)	A	7.9	45	11	16104	32.33	17374	27.55
Paisley Rd (south of Broadloan)	A	7.5	50	10	17391	39.57	18763	32.41
George St	A	4.4	45	6	11214	27.06	12099	22.45
Inchinnan Rd A8	A	4	45	8	14691	34.63	15850	28.59
M8 Motorway J26-J27	A	6.6	100	40	101805	31.38	109835	26.13
St James St (Caledonian Rd/Love St)	A	4.4	45	12.6	19067	36.08	20571	29.64

Table A12 DMRB assessment of NO_2 at junctions within Renfrewshire

Junction	Road type	% HGVs	Average speed (kph)	Distance to receptor (m)	2005 AADT	2005 DMRB results ($\mu g/m^3$)	2010 AADT	2010 DMRB results ($\mu g/m^3$)
Maxwellton St/ George St	B	6.8	30	18	8084	28.60	8590	24.18
	A	2.8	30	11	8582		9119	
Renfrew Rd/ Niddry St	A	7.5	30	13.1	13236	35.10	14065	28.83
	A	7.3	30	30	21635		22990	
Maxwellton St/ Broomlands St	B	2.7	30	11	8261	27.73	8778	23.56
	B	9.5	30	9	4387		4662	
Well St/ Wellmeadow St/ Broomlands St	B	6.3	30	7	3595	29.62	3820	25.03
	B	11.4	30	10	5254		5583	
	B	14.6	30	6	2707		2877	
Niddry St/ Old Sneddon St/ St James St	A	7.6	30	21	16125	33.62	17135	27.72
	A	3.6	30	12.6	11684		12416	
George St/ High St/ Macdowell St	A	6.1	30	6	6666	23.66	7084	20.08
	B	5.5	30	6	2301		2445	
	B	8.7	30	7	3927		4173	
Glasgow Rd/ Lacy St	A	6	30	14	6538	27.80	6947	23.62
	B	4.5	30	12	3092		3286	



Renfrewshire Council

Legend

Renfrewshire Council boundary

Date	January 2007
Scale	1:3000

Project Title
Renfrewshire Council
Updating and Screening
Assessment 2006

Figure no. 1

Figure title
Renfrewshire Council boundary

BMT Cordah Limited
Doherty Building
Pentlands Science Park
Penicuik, Edinburgh, EH26 0PZ
Website: http://www.bmtcordah.com
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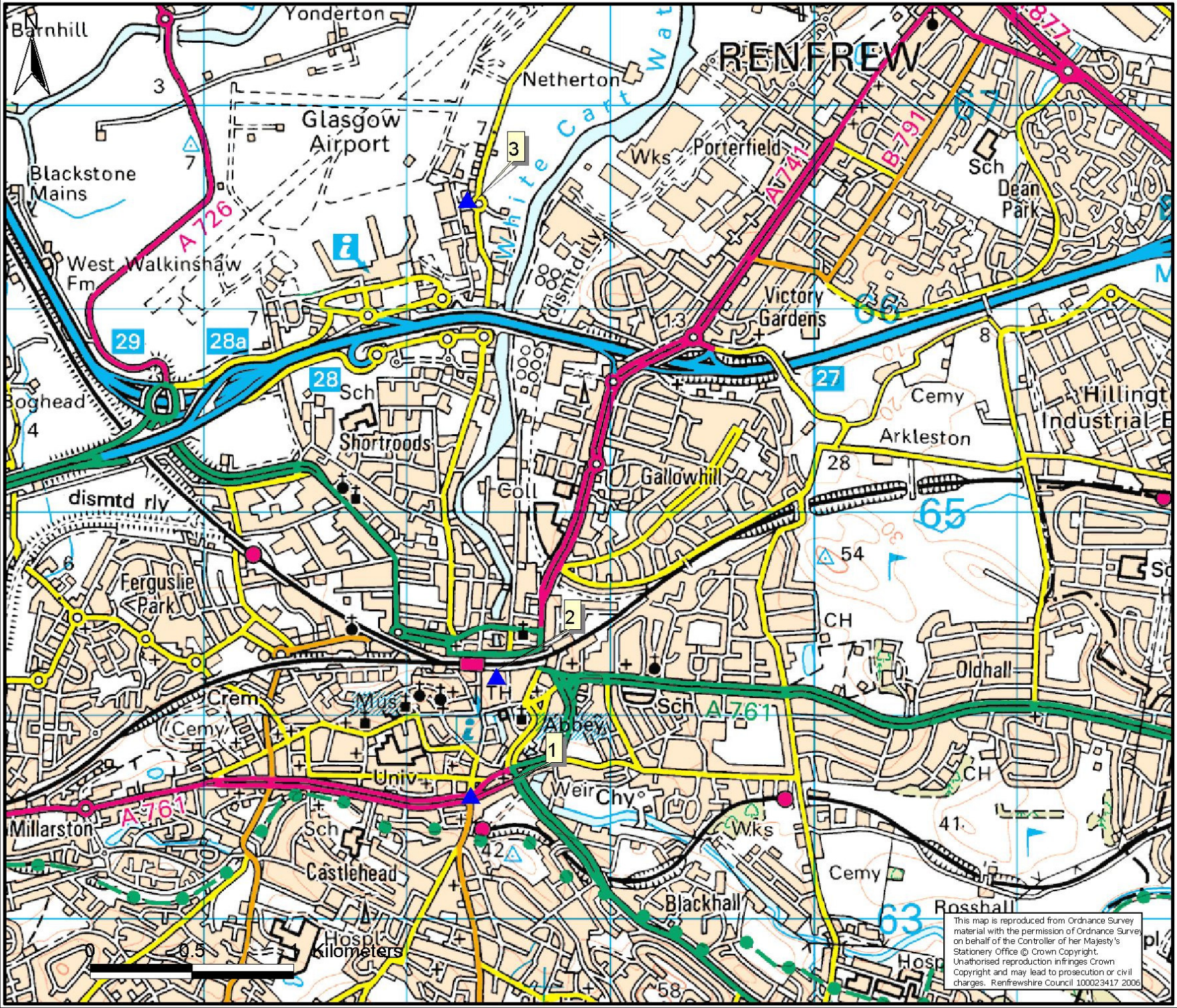

Renfrewshire Council

Legend

▲ Automatic monitoring sites

1 Gordon Street
2 Central Road
3 Glasgow Airport

Date	January 2007
Scale	1:25000

Project Title
Renfrewshire Council
Updating and Screening Assessment 2006

Figure no. 2

Figure title
Automatic monitoring site locations

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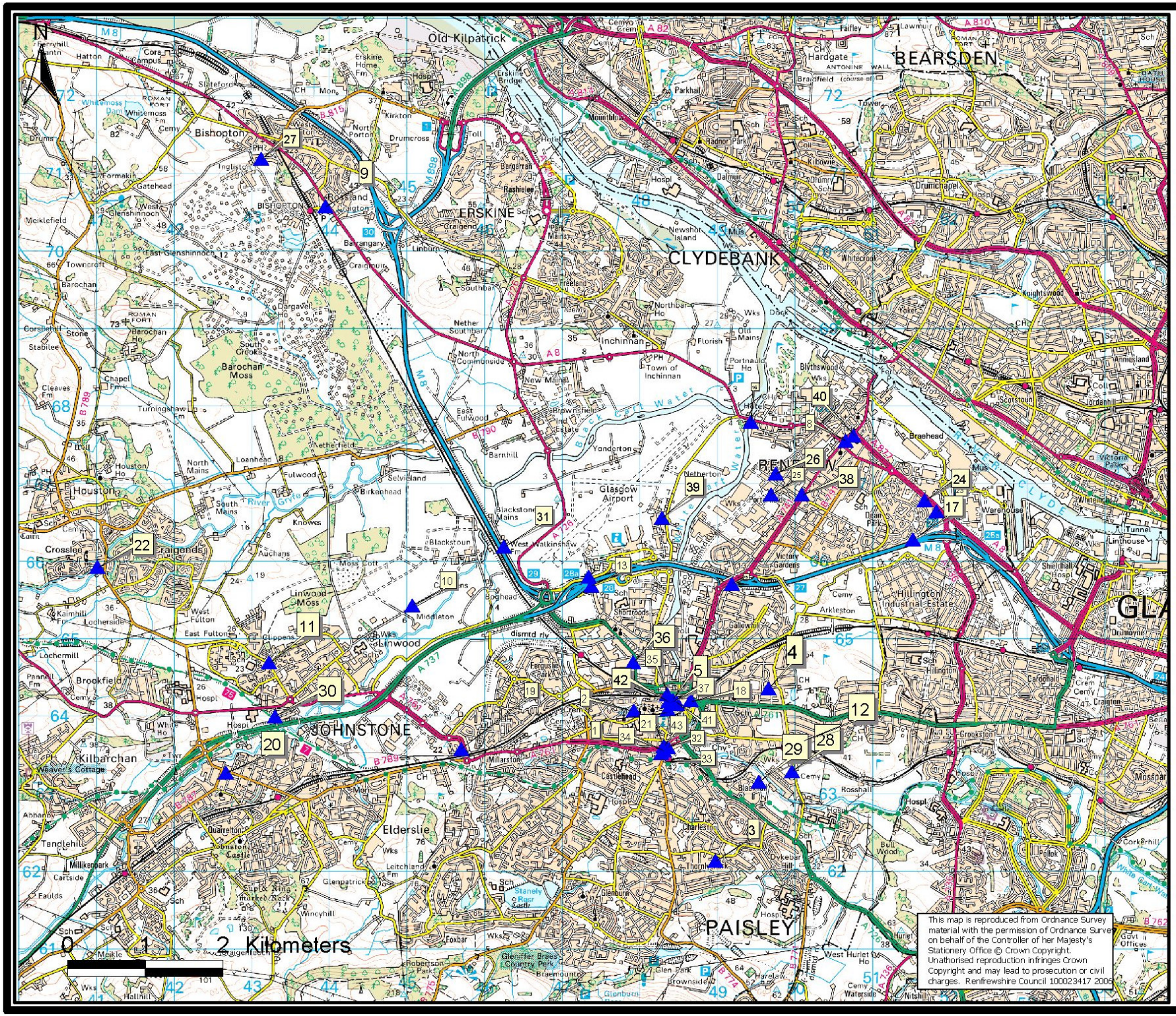

Renfrewshire Council

Legend

▲ NO2 diffusion tube locations

Date	January 2007
Scale	1:65,000

Project Title
Renfrewshire Council
Updating and Screening Assessment 2006

Figure no. 3

Figure title
Nitrogen dioxide diffusion tube locations

BMT Cordah Limited
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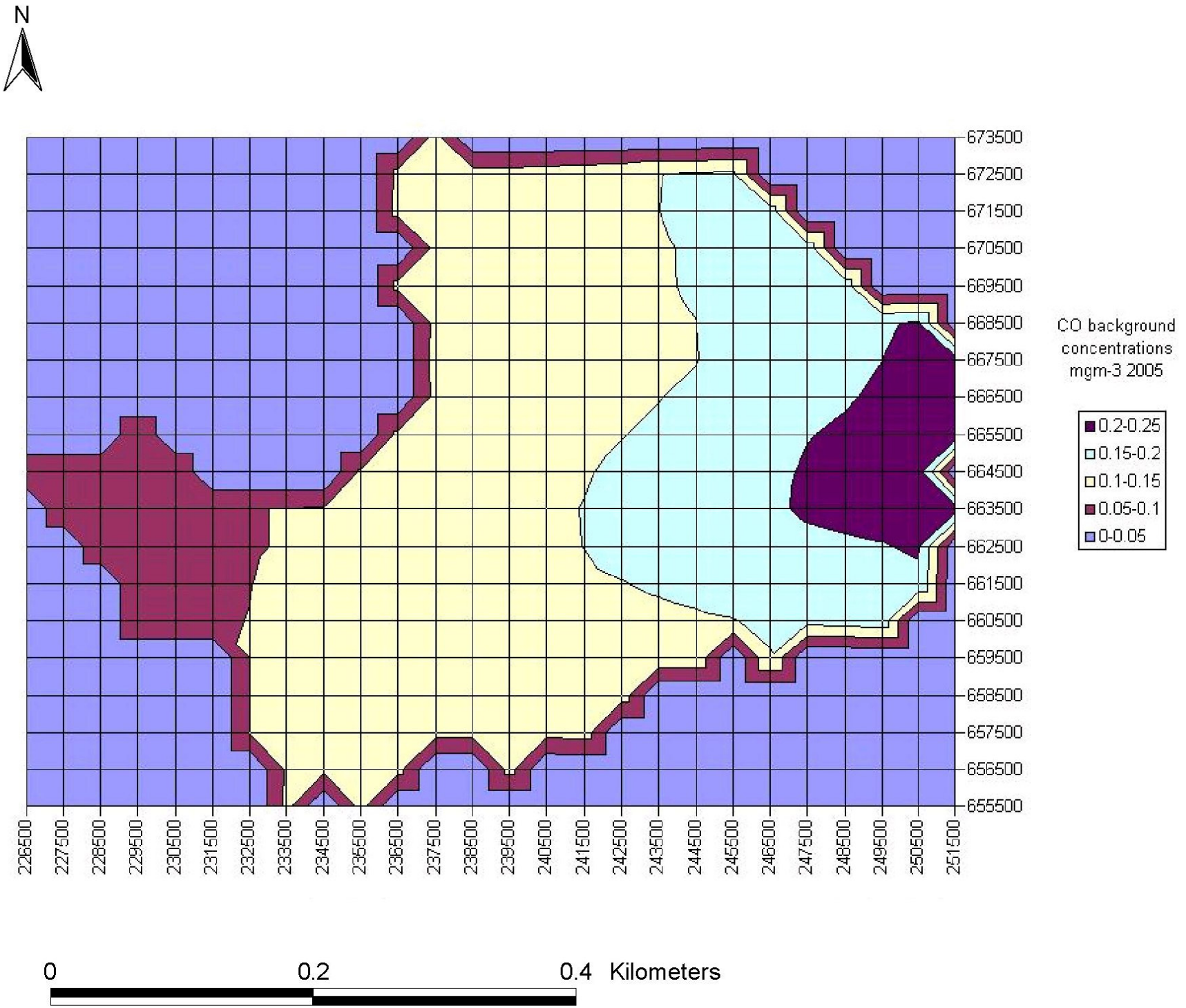

Renfrewshire Council

Date	January 2007
Scale	1:4000

Project Title
Renfrewshire Council
Updating and Screening
Assessment 2006

Figure no. 4

Figure title
Background carbon monoxide concentrations within Renfrewshire

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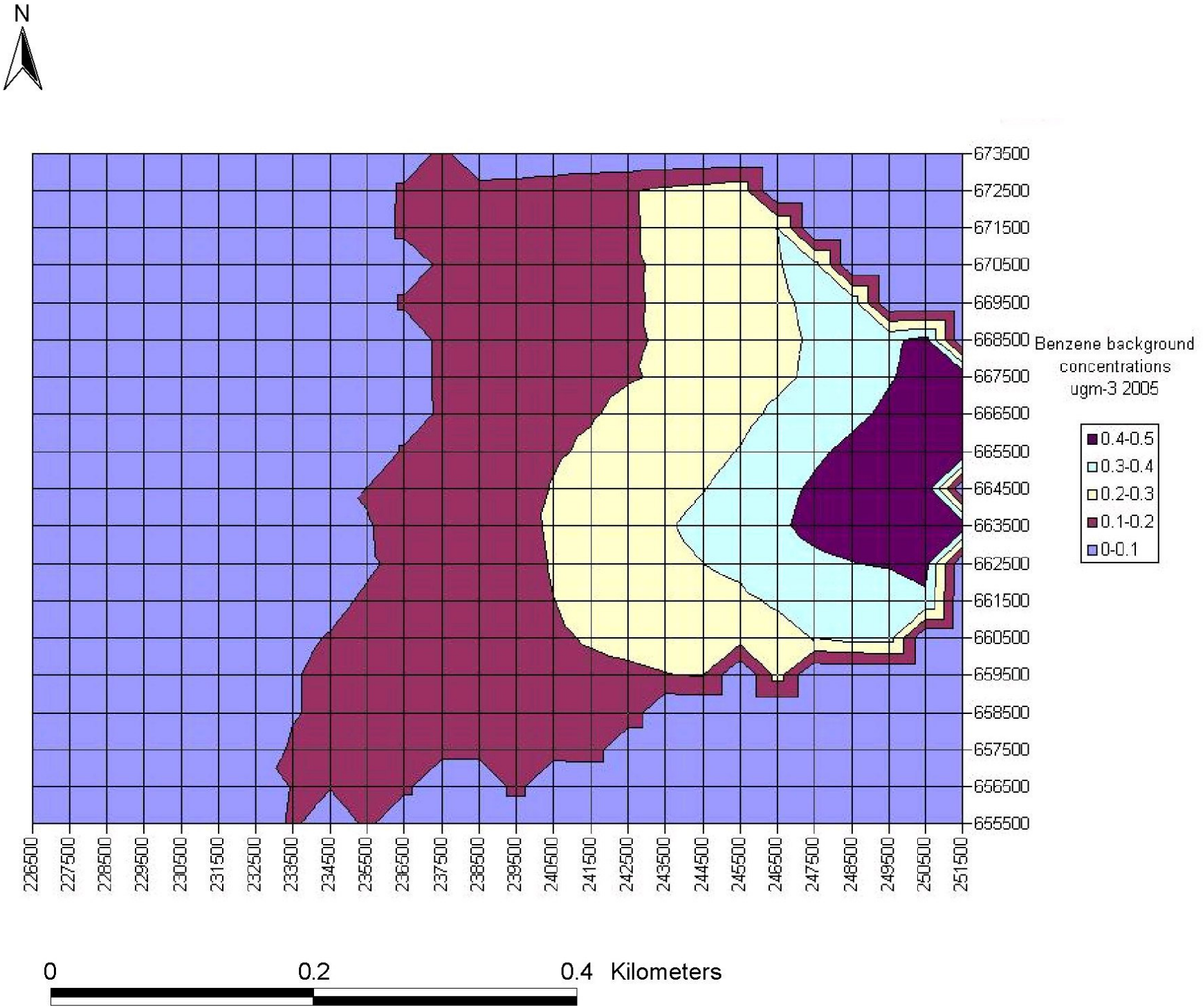

Renfrewshire Council

Date	January 2007
Scale	1:4000

Project Title
Renfrewshire Council
Updating and Screening
Assessment 2006

Figure no. 5

Figure title
Background benzene concentrations within Renfrewshire

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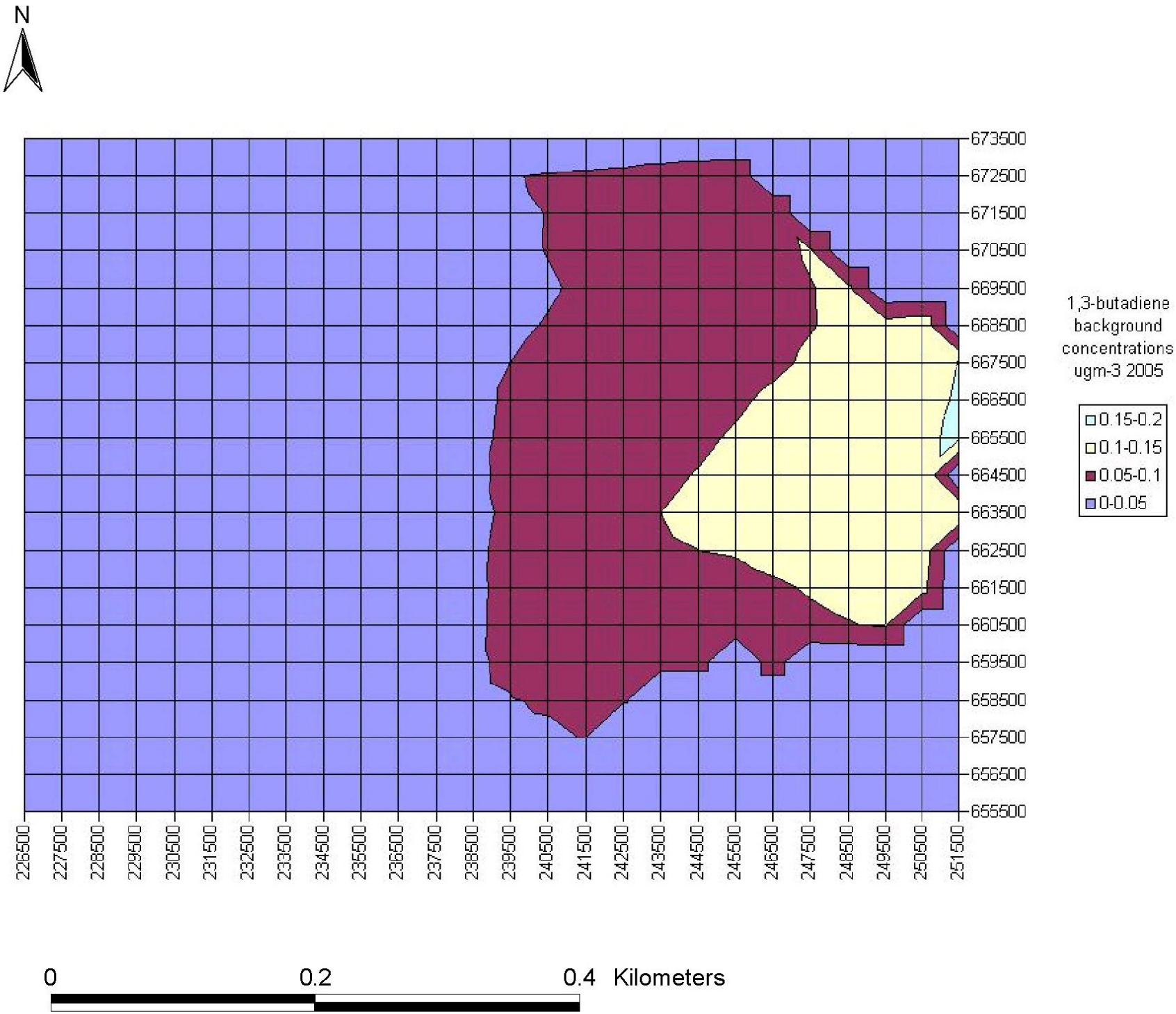

Renfrewshire Council

Date	January 2007
Scale	1:4000

Project Title
Renfrewshire Council
Updating and Screening Assessment 2006

Figure no. 6

Figure title
Background 1,3-butadiene concentrations within Renfrewshire

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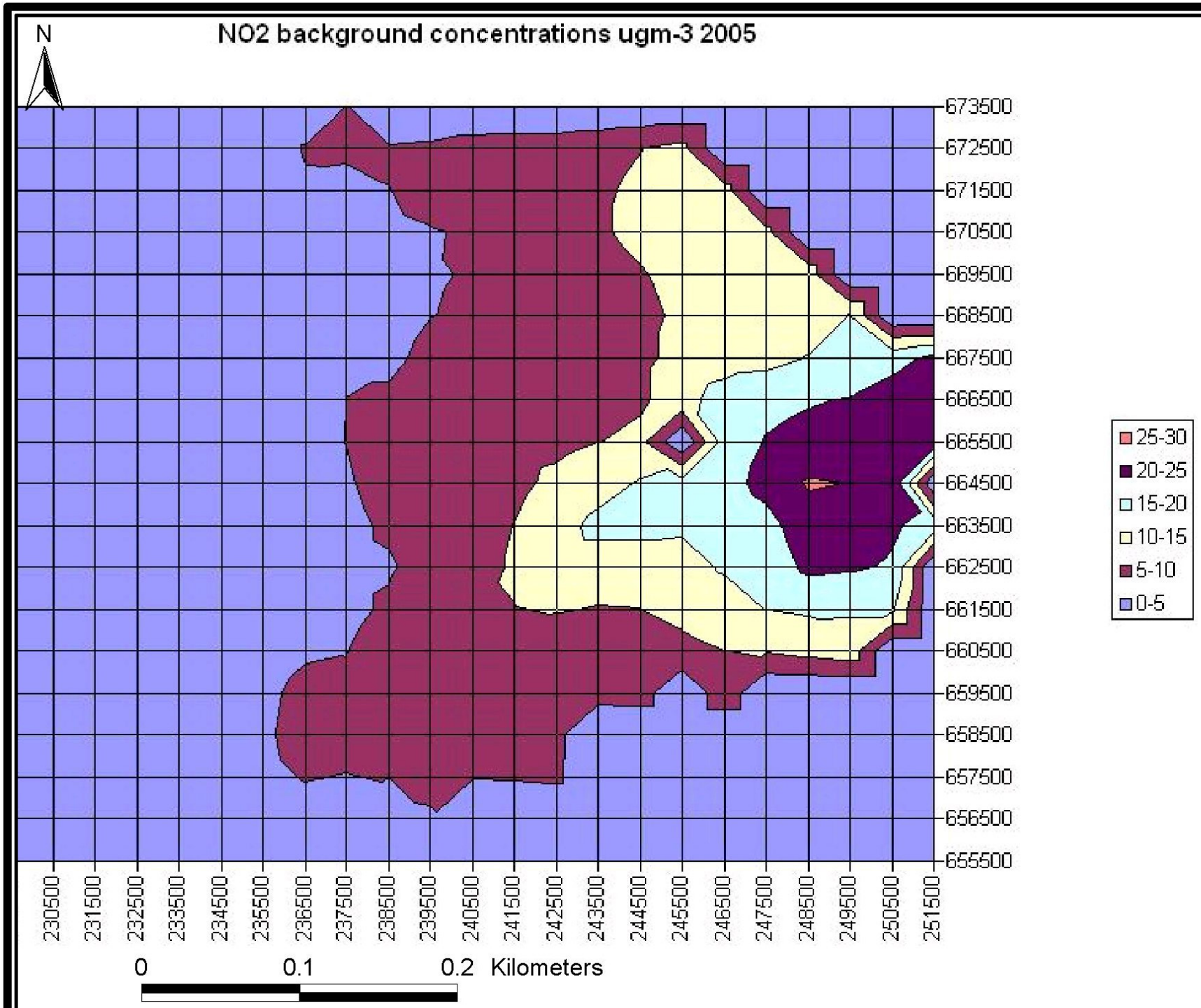

Renfrewshire Council

Date	January 2007
Scale	1:3500

Project Title
Renfrewshire Council Updating and Screening Assessment 2006

Figure no. 7

Figure title
Nitrogen dioxide background concentrations 2005

BMT Cordah Limited
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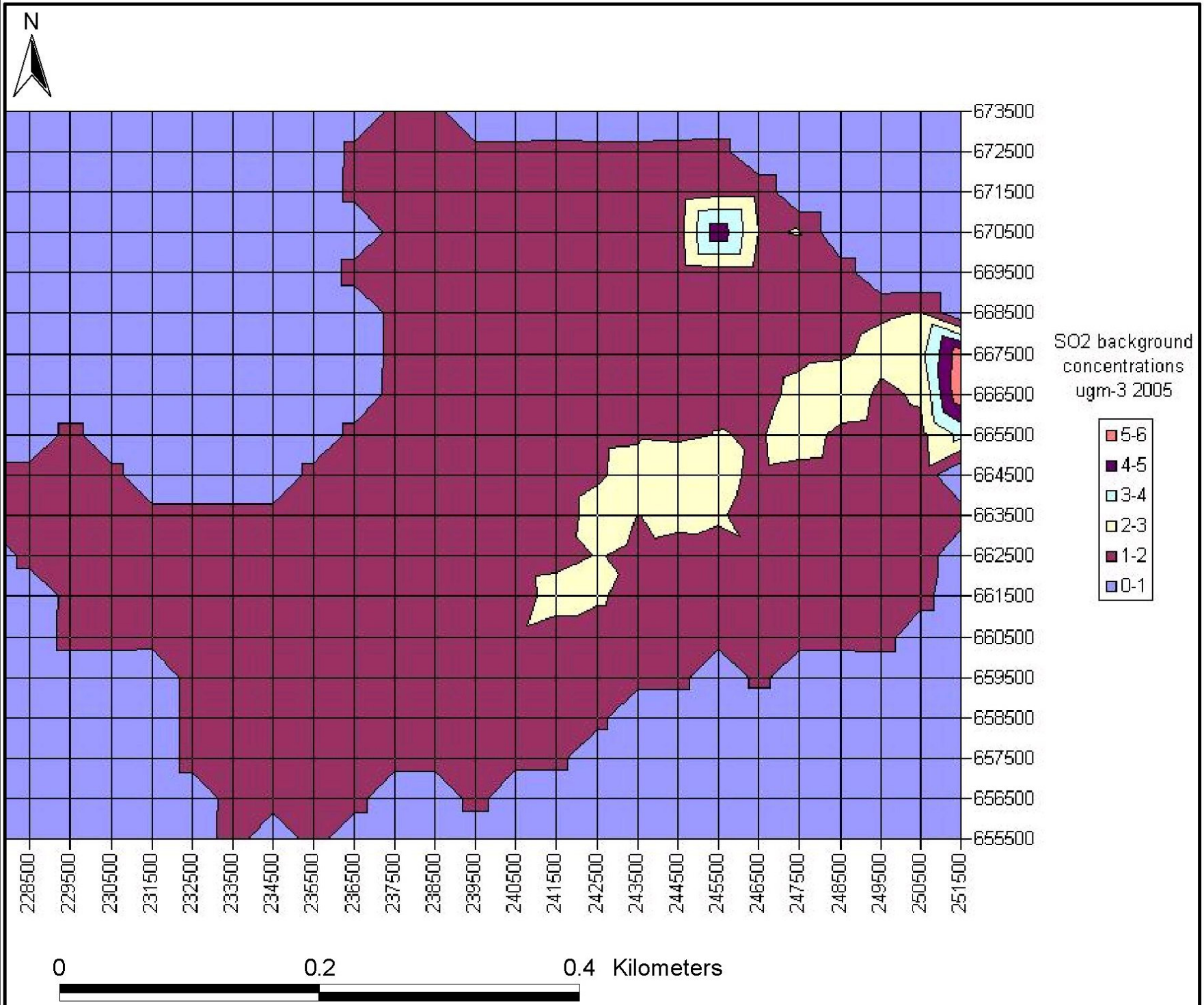

Renfrewshire Council

Date	January 2007
Scale	1:4000

Project Title
Renfrewshire Council
Updating and Screening
Assessment 2006

Figure no. 8

Figure title
Background sulphur dioxide concentrations within Renfrewshire

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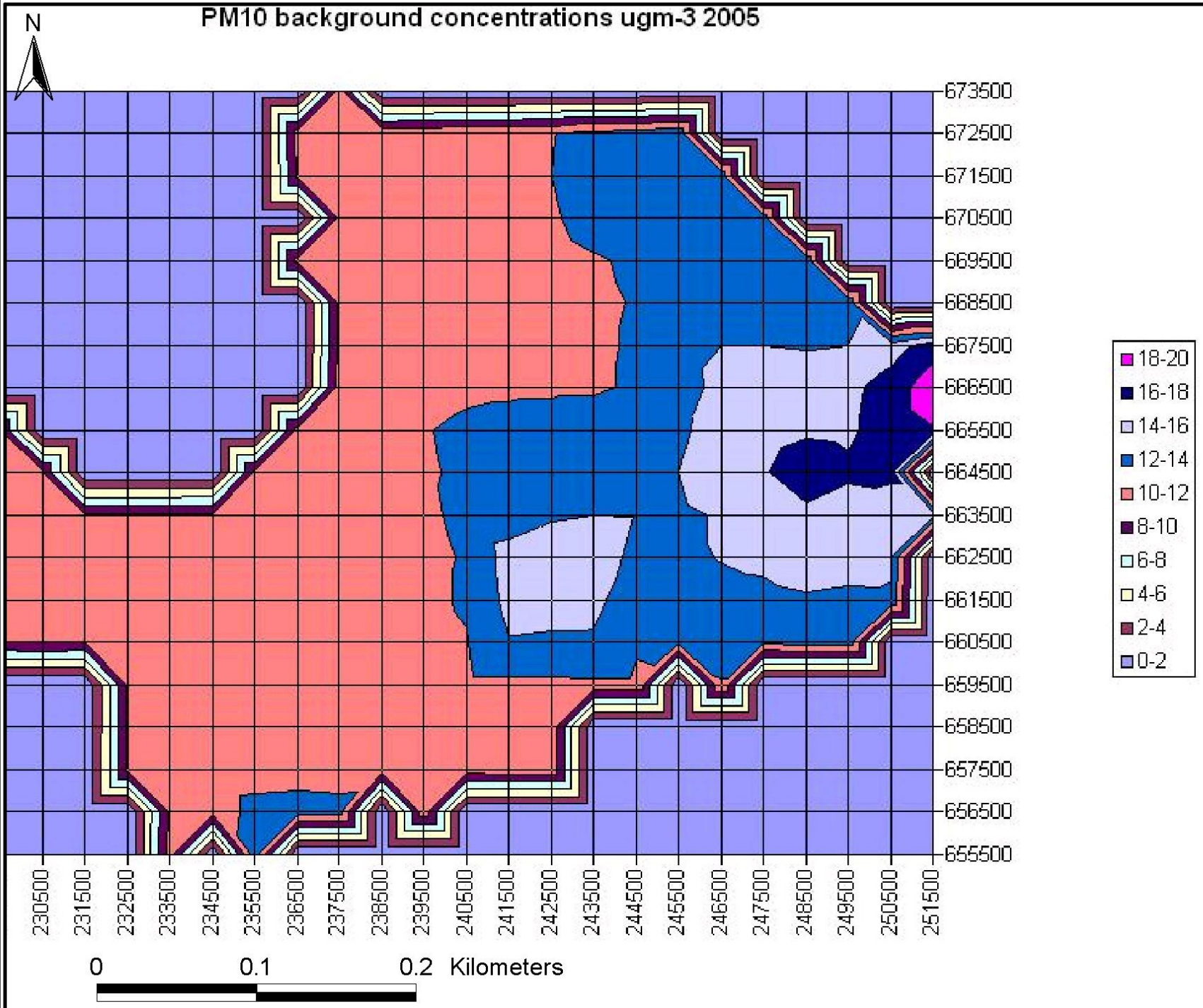
PM10 background concentrations ugm-3 2005



Renfrewshire Council

Date	January 2007
Scale	1:3500

Project Title
Refrewshire Council Updating and Screening Assessment 2006

Figure no. 9

Figure title
Particulate background concentrations 2005

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