BMT Cordah Limited
ENVIRONMENTAL CONSULTANCY
AND INFORMATION SYSTEMS

LAQM Updating and Screening Assessment 2006

A Report for East Renfrewshire Council

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EXECUTIVE SUMMARY

An Updating and Screening Assessment has been conducted for East Renfrewshire Council. The pollutants considered in this assessment are carbon monoxide, benzene, 1,3-butadiene, nitrogen dioxide, sulphur dioxide and particulate material (PM_{10}).

The assessment has concluded that there is no risk of exceeding any of the national air quality objectives for carbon monoxide, benzene, 1,3-butadiene, nitrogen dioxide and sulphur dioxide. Accordingly, there is no requirement for East Renfrewshire Council to proceed to a Detailed Assessment for these pollutants.

The assessment has shown that there may be a risk of exceeding the 2010 PM_{10} annual mean objective at Sheddens Roundabout, Clarkston as a result of road traffic emissions. The potential for exceeding the objective has been identified by monitoring and by a DMRB screening assessment. As there is not yet a full year of monitoring data available, it is recommended that this issue be revisited when the data are available, which will be the beginning of 2007. If these data indicate that the objective is likely to be exceeded, East Renfrewshire Council will conduct a Detailed Assessment at this location.

1 INTRODUCTION

1. BMT Cordah Ltd has been commissioned by East Renfrewshire Council to carry out the 2006 Local Air Quality Management (LAQM) Updating and Screening Assessment (U&SA). The report has been completed in conjunction with personnel from East Renfrewshire Council.

2. The Environment Act 1995 and subsequent regulations require local authorities to assess compliance of air quality in their area with the standards and objectives set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000[1] (NAQS). For local authorities within Scotland further regulations are set out in the Air Quality (Scotland) Regulations 2000 and Air Quality (Scotland) Amendment Regulations 2002.

3. The LAQM framework requires that local authorities carry out regular reviews of air quality. The first round of Review and Assessment commenced in 2000 and comprised a four stage approach to the assessment of air quality.

4. The Review and Assessment process was revised in 2003 and now comprises two phases. The first phase of the Review and Assessment is an Updating and Screening Assessment (U&SA). The U&SA considers any changes that have occurred in pollutant emissions and sources since the last round of Review and Assessment. The second phase can be either a Detailed Assessment or a Progress Report depending upon the outcome of the Updating and Screening Assessment.

5. The LAQM guidance requires that a Detailed Assessment be carried out at any location where a risk of exceeding an air quality objective at a location with relevant public exposure is identified. A Detailed Assessment will consider the risk of exceeding an objective to greater depth in order to determine whether it is necessary to declare an Air Quality Management Area (AQMA).

6. The aim of this U&SA is to provide an update on air quality issues within East Renfrewshire since the last U&SA in 2003. The assessment uses updated information for industrial, transport, commercial and domestic atmospheric emissions combined with current monitoring data to identify areas where there is potential for exceeding the NAQS air quality objectives.

7. The report follows guidance set out in LAQM.TG(03) technical guidance[2], LAQM.PG(04) policy guidance[3] and subsequent guidance amendments[4], hereafter referred to as the "technical guidance".

8. The NAQS details assessment criteria for eight pollutants in the form of atmospheric concentration levels for which an objective deadline is set. Of the eight pollutants identified only seven are required to be assessed by local authorities, ozone being addressed at a national level. The pollutants contained within the NAQS and their relevant objectives for Scotland are shown in Table 1.

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Working together for clean air, Defra, January 2000
[2] Part IV of the Environment Act 1995, Local air quality management technical guidance, LAQM.TG(03), Defra et al, January 2003.
[3] Part IV of the Environment Act 1995, Local air quality management policy guidance, LAQM.PG(03), Defra et al, January 2003.
[4] Part IV of the Environment Act 1995, Local air quality management technical guidance update, LAQM.TG(03) – update: January 2006, Defra et al, January 2006.

Table 1: Pollutant Objectives outlined in the NAQS

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	99.79th percentile of 1-hour means	31 / 12 / 2005
	40 µg/m^3	annual mean	-	31 / 12 / 2005
Particulate matter (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

East Renfrewshire Council

9. East Renfrewshire Council is one of the smallest local authorities in Scotland, covering an area of approximately 67 square miles. Around two thirds of the land is rural farmland, with numerous small villages including Neilston, Uplawmoor, Waterfoot and Eaglesham. The rest of the land consists of suburban residential areas which are mainly concentrated in the north and north-east. The suburban areas include Thornliebank, Giffnock, Newton Mearns and Clarkston and the town of Barrhead. East Renfrewshire is bounded by Glasgow, South Lanarkshire, East Ayrshire, North Ayrshire and Renfrewshire. A map of East Renfrewshire is provided in Figure 1.

Inventory of industrial activities

10. There is little industrial activity in East Renfrewshire. A list of industrial processes which are regulated by the Scottish Environment Protection Agency (SEPA) is presented in Table 2. This list shows that the majority of SEPA regulated processes are petrol stations, with one quarry, a mobile roadstone coater, and a process involved in respraying motor vehicles.

Table 2: Industrial processes in East Renfrewshire regulated by SEPA

Site/Operator	Process Description	Town	SEPA Authorisation
Pace Petroleum Ltd	Unloading of petrol at a service station	Barrhead	APC/W/20372
Petrol Express Ltd	Unloading of petrol at a service station	Barrhead	APC/W/20526
Finefuels Ltd	Unloading of petrol at a service station	Barrhead	APC/W/21030
Esso Petroleum Company Ltd	Unloading of petrol at a service station	Clarkston	APC/W/20307
Eaglesham Garage Ltd	Unloading of petrol at a service station	Eaglesham	APC/W/21005
Shell UK Ltd	Unloading of petrol at a service station	Thornliebank	APC/W/20371
Esso Petroleum Company Ltd	Unloading of petrol at a service station	Newton Mearns	APC/W/20346
BP Express Shopping	Unloading of petrol at a service station	Newton Mearns	APC/W/20360
Sood Enterprises Ltd	Unloading of petrol at a service station	Newton Mearns	APC/W/20525
Safeway Stores Plc	Unloading of petrol at a service station	Giffnock	APC/W/20296
Seven Sisters Service Station	Petrol vapour recovery	Thornliebank	PPC/W/30018
Gordon Cooley Coachbuilders	Respraying of road vehicles	Thornliebank	PPC/W/30042
Tarmac Northern Ltd	Quarrying and concrete batching	Newton Mearns	PPC/W/30063
Colas Ltd	Coating roadstone with bitumen (mobile)	Nr Floak	PPC/W/30072

Description of road network

11. The main trunk route through East Renfrewshire is the M77 motorway which runs through the council area connecting Ayrshire and Glasgow. An extension to the M77 between Malletsheugh in East Renfrewshire and Fenwick in Ayrshire was opened in 2005. The Glasgow Southern Orbital (GSO) is a new dual-carriageway which was constructed at the same time as the M77 extension and connects Malletsheugh with Phillipshill in East Kilbride, South Lanarkshire. There are two other A class roads which pass through East Renfrewshire; the A77 from Glasgow to Ayrshire, and the A726 from Paisley to East Kilbride. These roads pass through many of the urban areas of East Renfrewshire, and one of the reasons for construction of the M77 extension and the GSO was to reduce traffic volume on these roads. These roads can be seen in Figure 1.

12. Information on the number of vehicles using the roads in East Renfrewshire was provided by the Scottish Executive for the M77 and East Renfrewshire Council for the GSO and Sheddens Roundabout, a busy junction at Clarkston. Traffic counts for these roads are presented in Table 3. Traffic data for the M77 was available at a number of locations with a range reported in Table 3.

Table 3: Road traffic count data in East Renfrewshire

Road	Annual Average Daily Traffic (AADT)
M77	15,000 - 46,000
GSO	Supplied by East Renfrewshire Council
Sheddens Roundabout	28,260

Description of other transport

13. East Renfrewshire is served by passenger rail services operated by First Scotrail. There are two main routes which serve locations in East Renfrewshire. One route stops at Thornliebank, Giffnock, Clarkston and Busby, terminating at East Kilbride. The second stops at Barrhead en-route to Kilmarnock and Ayrshire.

Summary of previous assessments

14. The last Review and Assessment report for East Renfrewshire was the Progress Report in 2005. This report, and all preceding reports, concluded that there was little risk of exceeding any of the NAQS objectives for any of the NAQS pollutants.

2 U&SA OF CARBON MONOXIDE

15. The NAQS objective for CO for Scottish local authorities is:

    - the maximum 8-hour running mean not to exceed 10mg/m^3 by 31st December 2003.

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

Monitoring data

17. East Renfrewshire Council does not undertake any monitoring for CO.

18. There are eight locations in Scotland which monitor for CO and are part of the national Automatic Urban and Rural Network (AURN). None of these sites recorded an exceedence of the NAQS objective for CO in 2005[5]. Three of these sites are located in Glasgow city centre, where traffic levels are considerably higher than traffic levels in East Renfrewshire.

Background Concentrations

19. Background air pollutant concentration maps for all NAQS pollutants except lead are available from the LAQM website[6]. CO background concentrations in East Renfrewshire are presented in Figure 2. This figure demonstrates that background CO concentrations in East Renfrewshire are low, between 0.1-0.2mg/m^3 across the majority of the council area, with small pockets of CO concentrations between 0.2-0.3mg/m^3 in the north-east and south-east corners.

Transport sources

Very busy roads or junctions in built up areas

20. The technical guidance advises that exceedences of the CO objectives are only likely at locations close to "very busy" roads or junctions in built up areas. "Very busy" is defined as roads with a daily traffic flow of at least 80,000 vehicles per day.

21. Table 3 shows that the highest daily traffic flow in East Renfrewshire is only 46,000 along parts of the M77, considerably less than 80,000 vehicles per day. It is therefore highly unlikely that there would be exceedences of the CO objectives at these types of locations.

It is concluded that there is no potential for exceeding the NAQS objectives for CO at any location in East Renfrewshire.

[5] http://www.airquality.co.uk/archive/data_and_statistics.php
[6] http://www.airquality.co.uk/archive/laqm/tools.php?tool=background04

3 U&SA OF BENZENE

22. There are two objectives for benzene, one which required to be met by the end of 2003 and one to be met by the end of 2010. A more stringent objective applies in Scotland in 2010 compared to the objective in England and Wales. The objectives for benzene are;

    - the running annual mean not to exceed 16.25µg/m^3 (5ppb) by 31st December 2003; and
    - the running annual mean not to exceed 3.25µg/m^3 (1ppb) by 31st December 2010.

23. The main sources of benzene in the UK are road traffic and from petrochemical works and storage depots.

Monitoring data

24. East Renfrewshire Council do not undertake any monitoring of benzene. As there are no petrochemical processes or storage depots in East Renfrewshire, the main source of benzene is road traffic. Glasgow City Council monitor benzene concentrations at a site in the city centre. The measured annual mean in 2005 was 1.4µg/m^3, below the 2010 objective level.

Background Concentrations

25. Background air pollutant concentration maps for all NAQS pollutants except lead are available from the LAQM website[7]. Benzene background concentrations in East Renfrewshire are presented in Figure 3. This figure demonstrates that background benzene concentrations in East Renfrewshire are low, reaching a maximum of 0.6µg/m^3 in the north-east of the council area, nearest to the Glasgow urban area, and also in the south-east. Concentrations at all other locations are below 0.4µg/m^3.

Transport sources

Very busy roads or junctions in built up areas

26. The technical guidance advises that exceedences of the benzene objectives may occur at locations close to “very busy” roads or junctions in built up areas. “Very busy” is defined as roads with a daily traffic flow of at least 80,000 vehicles per day.

27. Table 3 shows that the highest daily traffic flow in East Renfrewshire is only 46,000 along parts of the M77, considerably less than 80,000 vehicles per day. It is therefore highly unlikely that there would be exceedences of the benzene objectives at these types of locations.

[7] http://www.airquality.co.uk/archive/laqm/tools.php?tool=background04

New industrial sources/industrial sources with substantially increased emissions, or new relevant exposure

28. No new industrial processes which are significant emitters of benzene have commenced operation in East Renfrewshire Council since the last round of Review and Assessment. There are no existing industrial sources of benzene in East Renfrewshire.

Petrol stations

29. The technical guidance advises that there could be exceedences of the NAQS objectives for benzene at locations around petrol stations which are close to "busy roads". "Busy roads" are defined as roads with a traffic volume of greater than 30,000 vehicles per day. The M77 is the only road in East Renfrewshire with a traffic flow of greater than 30,000 vehicles per day, however, there are currently no locations where there is a petrol station close to the M77 and also close to areas of relevant public exposure. There are currently plans to develop a petrol station, hotel and restaurant at the junction of the M77 and the GSO. There are currently no residential properties around this junction, and it is considered unlikely that there would be any risk of exceeding the benzene objectives. This planning application should be monitored, and reviewed again at a later date when more information is available.

It is concluded that there is no potential for exceeding the NAQS objectives for benzene at any location in East Renfrewshire. The planning application for a petrol station at the junction of the M77 and GSO should be monitored and reviewed at a later date if there are likely to be any air quality implications.

4 U&SA OF 1,3-BUTADIENE

30. The objective for 1,3-butadiene for all local authorities, contained within the Air Quality Regulations 2000 and Amendment Regulations 2002 is;

    - the running annual mean not to exceed 2.25µg/m^3 (1ppb) by 31st December 2003.

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

32. East Renfrewshire Council do not undertake any monitoring of 1,3-butadiene. Glasgow City Council monitors 1,3-butadiene concentrations at a site in the city centre. The measured annual mean in 2005 was 0.21µg/m^3, below the 2003 objective level. It is likely that 1,3-butadiene concentrations in East Renfrewshire will be lower that concentrations in Glasgow.

Background Concentrations

33. Background air pollutant concentration maps for all NAQS pollutants except lead are available from the LAQM website[8]. 1,3-butadiene background concentrations in East Renfrewshire are presented in Figure 4. This figure demonstrates that background 1,3-butadiene concentrations in East Renfrewshire are low, reaching a maximum of 0.175µg/m^3 in the north-east of the council area, nearest to the Glasgow urban area, and also in the south-east. Concentrations at all other locations are below 0.125µg/m^3.

New industrial sources/Industrial sources with substantially increased emissions, or new relevant exposure

34. No new industrial processes which are significant emitters of 1,3-butadiene have commenced operation in East Renfrewshire Council since the last round of Review and Assessment. There are no existing industrial sources of 1,3-butadiene in East Renfrewshire.

It is concluded that there is no potential for exceeding the NAQS objectives for 1,3-butadiene at any location in East Renfrewshire.

[8] http://www.airquality.co.uk/archive/laqm/tools.php?tool=background04

5 U&SA OF LEAD

35. Two objectives for lead for all local authorities are contained within the Air Quality Regulations 2000 and Amendment Regulations 2002. The objectives are:

    - the annual mean concentration not to exceed 0.5µg/m^3 by 31st December 2004; and
    - the annual mean concentration not to exceed 0.25µg/m^3 by 31st December 2008.

Monitoring data

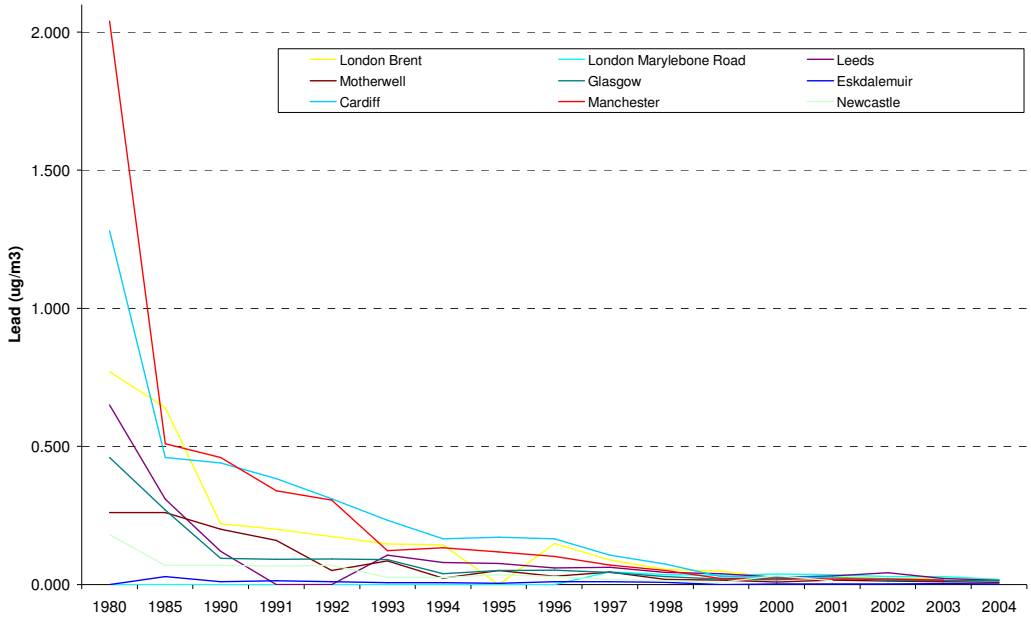
36. There is no monitoring for lead carried out within East Renfrewshire. The use of lead within petrol was banned from 2000, with the result that lead emissions occur from a small number of industrial processes.

37. Monitoring of lead does occur at a number of locations across the UK. The results from this monitoring can be obtained from the national air quality website[9]. Monitoring sites are located at places where ambient lead concentrations may have been elevated in the past. Such locations include areas with high volume of road traffic or close to 'traditional' heavy industries which were large sources of lead, including Glasgow and Motherwell, which are close to East Renfrewshire.

38. Chart 1 shows the results from monitoring at a number of these locations since 1980. It is clear that there has been a significant decrease in lead concentrations with ambient lead concentrations in 2004, the last year for which data are available, below 0.1µg/m^3 at all locations. Ambient concentrations of lead in East Renfrewshire are also likely to be below 0.1µg/m^3, under the NAQS objective.

[9] http://www.airquality.co.uk/archive/data_and_statistics.php

Chart 1: UK Lead Concentrations, 1980 – 2004



New industrial sources/Industrial sources with substantially increased emissions, or new relevant exposure

39. There are no industrial sources of lead in East Renfrewshire.

It is concluded that there is no potential for exceeding the NAQS objectives for lead at any location in East Renfrewshire.

6 U&SA OF NITROGEN DIOXIDE

40. Two objectives for NO_2 for all local authorities are contained within the Air Quality Regulations 2000 and Amendment Regulations 2002. The objectives are:

- the annual mean concentration not to exceed 40µg/m^3 (21ppb) by 31st December 2005; and
- the 1-hour mean concentration not to exceed 200µg/m^3 (105ppb) on more than 18 occasions by 31st December 2005.

Monitoring data

41. East Renfrewshire Council monitor NO_2 concentrations using a network of 21 passive diffusion tubes. The locations of these tubes are shown in Figure 5 and are described in Table 4.

Table 4: NO_2 Diffusion Tubes in East Renfrewshire

Tube Number	Site	Grid reference	Site type
1	Huntly Drive, Giffnock	NS 566 589	Background
2	Eastwood Mains Road, Giffnock	NS 559 583	Roadside
3	Clarkston Toll, Clarkston	NS 572 576	Roadside
4	Sheddens Roundabout, Clarkston	NS 574 570	Roadside
5	Riverside Terrace, Busby	NS 578 565	Roadside
6	Broompark Drive, Newton Mearns	NS 549 566	Background
7	Glasgow Road, Eaglesham	NS 572 523	Roadside
8	Montgomery Street, Eaglesham	NS 574 519	Roadside
9	Greenhags, Newton Mearns	NS 523 544	Roadside
10	Neilston Road, Uplawmoor	NS 435 552	Background
11	Main Street, Neilston	NS 480 573	Roadside
12	Kelburn Street, Barrhead	NS 494 583	Roadside
13	Cross Arthurlie Street, Barrhead	NS 497 592	Roadside
14	Waterside Inn, Barrhead	NS 511 603	Roadside
15	Darnley Road, Barrhead	NS 509 593	Roadside
16	Main Street, Thornliebank	NS 549 595	Roadside
17	Rouken Glen Road, Giffnock	NS 552 584	Roadside
18	Main Street Barrhead (North)	NS 506 592	Roadside
19	Main Street Barrhead (South)	NS 498 587	Roadside
20	Main Street Barrhead (Shops)	NS 505 591	Roadside
21	Main Street Barrhead (Sports)	NS 503 590	Roadside

42. The East Renfrewshire diffusion tubes are analysed by Glasgow Scientific Services, who are accredited for this analytical technique by the UK Accreditation Service. The technical guidance states that before results from diffusion tubes can be compared against the NAQS objectives, a laboratory bias factor should be applied to the measured results. The factor is calculated based on results from a co-location study with diffusion tubes prepared by Glasgow Scientific Services and automatic monitoring. While East Renfrewshire Council do not conduct a co-location study, a bias adjustment factor has been calculated from the results of Glasgow City Council's co-location studies. Glasgow City Council also use Glasgow Scientific Services for diffusion tube analysis. The bias adjustment factor for 2005 for NO_2 diffusion tubes analysed by Glasgow Scientific Services is 0.74[10].

[10] http://www.uwe.ac.uk/aqm/review/guidance_05.html

43. Results of NO_2 diffusion tube monitoring using passive diffusion tubes in East Renfrewshire in 2005 are presented in Table 5. The bias adjustment factor has been applied to the measured concentrations.

Table 5: Measured NO_2 concentrations in East Renfrewshire, 2001-2005

Site Number	Monitoring Location	2005
1	Huntly Drive, Giffnock	6.6
2	Eastwood Mains Road, Giffnock	15.2
3	Clarkston Toll, Clarkston	13.9
4	Sheddens Roundabout, Clarkston	11.7
5	Riverside Terrace, Busby	9.2
6	Broompark Drive, Newton Mearns	5.4
7	Glasgow Road, Eaglesham	6.4
8	Montgomery Street, Eaglesham	8.3
9	Greenhags, Newton Mearns	6.0
10	Neilston Road, Uplawmoor	3.9
11	Main Street, Neilston	7.9
12	Kelburn Street, Barrhead	12.7
13	Cross Arthurlie Street, Barrhead	10.8
14	Waterside Inn, Barrhead	11.0
15	Darnley Road, Barrhead	8.1
16	Main Street, Thornliebank	12.0
17	Rouken Glen Road, Giffnock	10.5
18	Main Street Barrhead (North)	8.6
19	Main Street Barrhead (South)	8.6
20	Main Street Barrhead (Shops)	12.8
21	Main Street Barrhead (Sports)	8.6

44. The diffusion tube monitoring results show that the NAQS annual mean objective was not exceeded at any location. The highest measured concentration was 15.2µg/m^3 at Eastwood Mains Road, Giffnock, which is less than half the objective of 40µg/m^3.

Background Concentrations

45. Background air pollutant concentration maps for all NAQS pollutants except lead are available from the LAQM website[11]. Background concentrations for both NO_x and NO_2 in East Renfrewshire are presented in Figure 6 and Figure 7. This figure demonstrates that highest background NO_x and NO_2 concentrations in East Renfrewshire are found towards the north-east of the region, closest to the Glasgow urban area. Background NO_2 concentrations here are up to 20µg/m^3, while background NO_2 concentrations in the more rural parts of the region are between 4-8µg/m^3.

Transport sources

Narrow congested streets with residential properties close to the kerb

46. The technical guidance advises that exceedences of the NAQS objectives for NO_2 may occur at receptors within 5m of narrow congested streets, as the combination of slow moving traffic and reduced air dispersion lead to elevated NO_2 concentrations. The technical guidance advises that exceedences are only likely near roads with an AADT of greater than 10,000 vehicles. There are no locations in East Renfrewshire where the above conditions exist, so there is no risk of exceeding the NO_2 objectives.

[11] http://www.airquality.co.uk/archive/laqm/tools.php?tool=background04

Junctions

47. The technical guidance advises that there is a risk of exceeding the annual mean NO_2 objectives at receptors within 10m of busy roads and junctions, with "busy" defined as more than 10,000 vehicles per day. A DMRB screening assessment was carried out at Sheddens Roundabout, a busy location for which traffic data are available. Required input data are the year of assessment, background NO_2 and NO_x concentrations, the AADT on each road link, the average vehicle speed, the road type, the percentage of light and heavy vehicles on the road and the distance from the road centre to the receptor points.

48. East Renfrewshire Council conducted traffic counts over 5 days in May 2006, Monday to Friday, at a location to the north of the roundabout, shown in Figure 8. The measured 5-day average traffic flow will be higher than 7-day and AADT flows. East Renfrewshire Council were unable to provide a 7-day flow, so the 5-day flow has been used. In addition, since traffic has only been counted at one location north of the roundabout, the flows on Busby Road south of the roundabout and on Eaglesham Road are unknown. The 5-day flow is therefore likely to over-estimate actual AADT, however there is also likely to be a greater flow around the roundabout from vehicles travelling from Busby Road south of the roundabout to Eaglesham Road and vice versa. Since traffic flow is only known along one route which leads to the roundabout, the roundabout is treated as a single road in this assessment.

49. Background NO_2 and NO_X concentrations were taken from the LAQM website. The concentration of pollutants in each grid square is calculated from emission estimates from all sources within that grid, so care must be taken to avoid double counting of road emissions during the DMRB assessment. For example, the background concentration for the grid square which contains the junction should not be used, as road emissions from this junction were already included when the background grid square concentration was calculated. Background concentrations of 15.8µg/m^3 for NO_2 and 19.9µg/m^3 for NO_X were used Sheddens Roundabout.

50. The average vehicle speed at the junction is set at 25kph (16mph), to account for vehicles moving more slowly than the national speed limit of 30mph on the approach and departure from the junction.

51. The percentages of heavy vehicles and light vehicles using the roads were taken from road transport statistics published by the Department of Trade and Industry[12]. These show that across the UK, approximately 8% of vehicles using A class roads are HGVs.

52. The road type is set to DMRB class A, "motorways and A roads". DMRB uses an internal database to provide a more detailed breakdown of the type of vehicles using each road class.

53. The data used to conduct the DMRB assessment are presented in Table 6.

[12] http://www.dft.gov.uk/stellent/groups/dft_transstats/documents/sectionhomepage/dft_transstats_page.hcsp

Table 6: Input data for Sheddens Roundabout DMRB assessment

Input parameter	Value
Year of assessment	2005
Background NO_2 concentration	15.8µg/m^3
Background NO_x concentration	19.9µg/m^3
AADT	28260
Road type	Class A (Motorways and A class roads)
Average vehicle speed	25kph (16mph)
Percentage of HGVs	8%

54. The predicted NO_2 annual mean concentrations made by the DMRB assessment are presented in Table 7. Predicted concentrations are significantly below the NAQS annual mean objective for NO_2, and it is unlikely that there will be an exceedence of the objective at this location.

Table 7: Predicted NO_2 Concentrations from the DMRB Assessment

Distance from road centre	Predicted NO_2 Annual Mean (µg/m^3)
10m	28.0
20m	25.5
30m	23.6

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

55. There is the risk of exceeding the 1-hour mean objective for NO_2 at busy street locations where people spend one hour or more close to traffic. Such streets are often those with many shops or outdoor cafes and bars. A "busy" street is one with more than 10,000 vehicles per day.

56. The technical guidance recommends conducting DMRB screening assessments at all appropriate locations with a daily traffic flow of more than 10,000 vehicles per day. The only location for which traffic data are available is Sheddens Roundabout, and the DMRB screening assessment for this location is presented below. East Renfrewshire Council have diffusion tubes located on busy streets where people might spend up to one hour close to traffic, such as Main Street, Barrhead. As shown in Table 5, measured concentrations at these locations are below the NAQS objectives. It is unlikely that there are exceedences of the 1-hour mean NO_2 objective at other locations in East Renfrewshire.

Roads with high flows of buses and / or HGVs

57. East Renfrewshire Council advised that they were unaware of any roads where buses and/or HGVs made up a high percentage (>25%) of the total traffic volume.

New roads constructed or proposed since the previous round of R&A / Roads with significantly changed traffic flows, or new relevant exposure

58. Since the previous round of Review and Assessment, the M77 extension and the GSO have been constructed and opened to traffic. A DMRB screening assessment was carried out predicting NO_2 concentrations at increasing distances from these road centres.

59. For the M77, a screening assessment was carried out where the road passes Newton Mearns, as this is where it passes closest to sensitive receptors. This location is shown in Figure 9. The DMRB assessment at the GSO takes place at the south of Newton Mearns, again, where the road comes closest to sensitive receptors. This location is shown in Figure 10.

60. The input data for the DMRB assessments are presented in Table 8. The AADT for the M77 was taken from traffic count data supplied by the Scottish Executive, while East Renfrewshire Council provided data on traffic on the GSO.

Table 8: Input data for NO_2 DMRB assessments at the M77 and GSO

Input parameter	M77	GSO
Year of assessment	2005	
Background NO_2 concentration	11.2µg/m^3	9.7µg/m^3
Background NO_x concentration	14.2µg/m^3	12.4µg/m^3
AADT	34525	Supplied by East Renfrewshire Council
Road type	Class A (Motorways and A class roads)	
Average vehicle speed	100kph (63mph)	
Percentage of HGVs	8%	

61. The results from the DMRB screening assessment at the M77 and GSO are presented in Table 9. The results show that predicted NO_2 concentrations are significantly below the NAQS annual mean objective.

Table 9: Predicted NO_2 Concentrations from the DMRB Screening Assessment

Location	Distance from road centre (m)	Predicted 2005 NO_2 Annual Mean Concentration (µg/m3)
M77	10	23.7
	20	21.2
	30	19.2
GSO	10	17.9
	20	16.7
	30	15.8

Bus stations

62. The technical guidance advises that exceedences of the 1-hour mean NO_2 objective could occur near bus stations with more than 1000 bus movements per day. There are no bus stations in East Renfrewshire. There is a bus depot in Barrhead, however, the number of buses which use the depot is small, and there are not more than 1000 bus movements per day.

Aircraft

63. There is no airport in East Renfrewshire.

Industrial sources

64. There are no industrial sources which are significant sources of NO_2 in East Renfrewshire.

It is concluded that there is no potential for exceeding the NAQS objectives for NO_2 at any location in East Renfrewshire.

7 U&SA OF SULPHUR DIOXIDE

65. Three objectives for SO_2 for all local authorities are contained within the Air Quality Regulations 2000 and Amendment Regulations 2002. The objectives are:

- the 24-hour mean concentration not to exceed 125µg/m^3 (47ppb) on more than 3 occasions by 31st December 2004;
- the 1-hour mean concentration not to exceed 350µg/m^3 (132ppb) on more than 24 occasions by 31st December 2004; and
- the 15-minute mean concentration not to exceed 266µg/m^3 (100ppb) on more than 35 occasions by 31st December 2004.

Monitoring data

66. East Renfrewshire Council do not undertake any monitoring for SO_2. Monitoring of SO_2 is undertaken at a number of locations in Scotland in the AURN programme. There were no measured exceedences of any of the SO_2 objectives in Scotland in 2005 other than some, but less than the permitted amount, exceedences of the 15-minute mean at Grangemouth, as a result of industrial emissions. It is likely that SO_2 concentrations in East Renfrewshire are less than most of these monitoring sites in Scotland.

Background concentrations

67. Background air pollutant concentration maps for all NAQS pollutants except lead are available from the LAQM website[13]. Background concentrations for SO_2 in East Renfrewshire are presented in Figure 11. The SO_2 data on the website is only available for 2001 and following the technical guidance, 2005 SO_2 concentrations are calculated as 75% of 2001 concentrations. This figure demonstrates that background SO_2 concentrations in East Renfrewshire below 2µg/m^3 in the majority of the region.

Industrial sources

68. There are no significant industrial sources of SO_2 in East Renfrewshire.

Domestic sources

Areas of domestic coal burning

69. There are no areas in East Renfrewshire where there is a high density of coal burning dwellings that could lead to exceedences of the SO_2 objectives. Historically, the village of Eaglesham had a high percentage of domestic coal burning houses, and East Renfrewshire Council monitored SO_2 levels in the village. This monitoring ceased operation in 2002/2003 due to the low levels of SO_2 being detected. There is no risk of exceeding the SO_2 objectives as a result of domestic coal burning.

[13] http://www.airquality.co.uk/archive/laqm/tools.php?tool=background04

Small boilers > 5MW(thermal)

70. There is a risk of exceeding the 15-minute mean SO_2 objective from emissions from boilers larger than 5MW burning fuel oil or coal. Since 2003, regulations have limited the sulphur content of fuel oil to a maximum of 1%, meaning that single sources are unlikely to have a significant impact. Previous R&As have concluded that it was unlikely that there would be any exceedences of this objective in East Renfrewshire.

71. The technical guidance recommends that buildings where there may be such boilers are universities, hospitals and other large institutional buildings. There are no such buildings in East Renfrewshire and it is considered unlikely that there will be exceedences of the 15-minute mean SO_2 objective East Renfrewshire as a result of emissions from boilers.

Transport sources

Railway locomotives

72. The technical guidance states that there is a risk of exceeding the SO_2 15-minute mean objective at locations where diesel or steam locomotives are regularly stationary for periods of 15 minutes or more. While there are two rail lines which run through East Renfrewshire, there are no depots or major stations, and there will be no diesel or steam locomotives stationary for periods of 15 minutes or more. There is therefore no risk of exceeding the 15-minute mean objective for SO_2 as a result of emissions from railway locomotives.

It is concluded that there is no potential for exceeding the SO_2 objectives at any location in East Renfrewshire.

8 U&SA OF PARTICULATES

73. There are two objectives for PM_{10}, an annual mean objective and a 24-hour mean objective. 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 objective of 40µg/m^3 by 31st December 2004 and an annual mean objective of 18µg/m^3 by 31st December 2010; and
- the 24-hour mean concentration not to exceed 50µg/m^3 on more than 35 occasions by 31st December 2004 or on more than 7 occasions by 31st December 2010.

Monitoring data

74. East Renfrewshire Council commenced continuous monitoring of PM_{10} at Sheddens Roundabout at the end of November 2005. This roundabout is a busy junction in Clarkston, and previous R&A reports have indicated concerns regarding the air quality in this area. In addition, a local school has been relocated close to the roundabout. The area is shown in Figure 8.

75. PM_{10} monitoring was conducted using a Tapered Element Oscillating Microbalance (TEOM) monitoring device. Following the technical guidance, a factor of 1.3 was applied to the raw monitoring results, to account for the loss of volatile particulate material which is lost due to the use of a heated inlet in the TEOM. Monitoring results for PM_{10} at Sheddens Roundabout are presented in Table 10.

Table 10: PM_{10} monitoring results from Sheddens Roundabout

Dates of monitoring	Data capture (%)	Period mean concentration (µg/m^3)	Number of exceedences of 50µg/m^3	98^{tn} percentile of 24-hour mean concentrations (µg/m^3)	Predicted 2010 Annual Mean Concentration (µg/m^3)
30 November 2005 – 31st May 2006	99.5	22.3	2	41.9	20.7

76. While monitoring has not occurred over a full year, the initial six months of monitoring which is available indicates that the 2010 annual mean objective will be exceeded at this location. It is unlikely that the 24-hour mean objective will be exceeded, with only 2 exceedences and a 98th percentile of 41.9µg/m^3, however this can only be confirmed once a full years monitoring data are available.

Background Concentrations

77. Background air pollutant concentration maps for all NAQS pollutants except lead are available from the LAQM website[14]. Background concentrations for PM_{10} in East Renfrewshire in 2005 are presented in Figure 12. This figure shows that background PM_{10} concentrations across East Renfrewshire are highest in the north-east, closest to the Glasgow urban area. Concentrations here reach a maximum of 16µg/m^3. Concentrations across a wide area of the region, mainly central and northern parts, are between 12-14µg/m^3, with concentrations in the rest of the region between 10-12µg/m^3.

[14] http://www.airquality.co.uk/archive/laqm/tools.php?tool=background04

Transport sources

Busy roads and junctions in Scotland/ Roads close to the objective during the second round of Review and Assessment

78. The technical guidance advises that there is a risk of exceeding the annual mean PM_{10} objectives at receptors within 10m of busy roads and junctions, with "busy" defined as more than 10,000 vehicles per day. A DMRB screening assessment was carried out at Sheddens Roundabout, a busy location for which traffic data are available. The methodology used was the same as the DMRB study for NO_2 at this location. Required input data are the year of assessment, background PM_{10} concentration, the AADT on each road link, the average vehicle speed, the road type, the percentage of light and heavy vehicles on the road and the distance from the road centre to the receptor points.

79. The data used to conduct the DMRB assessment are presented in Table 11.

Table 11: Input data for Sheddens Roundabout DMRB assessment

Input parameter	Value
Year of assessment	2005
Background PM_{10} concentration	14.1µg/m^3
AADT	28260
Road type	Class A (Motorways and A class roads)
Average vehicle speed	25kph (16mph)
Percentage of HGVs	8%

80. PM_{10} concentrations are predicted at increasing distances from the centre of the road. The results of the DMRB assessment are presented in Table 12. Predicted concentrations are projected forward to 2010 following the methodology in the technical guidance.

Table 12: Predicted PM_{10} concentrations at Sheddens Roundabout

Distance from road centre (m)	Predicted 2005 annual mean PM_{10} concentration (µg/m^3)	Number of days >50µg/m^3	Predicted 2010 annual mean PM_{10} concentration (µg/m^3)
10	20.7	4.3	19.2
20	19.1	2.4	17.8
25	18.5	1.8	17.2
30	17.9	1.4	16.7

81. The results indicate that 2010 PM_{10} annual mean concentrations are predicted to be greater than the 2010 objective at distances up to around 20m from the road centre.

82. As discussed earlier, the AADT used in the assessment is the 5-day flow along one road. Another DMRB assessment was conducted to investigate the likely PM_{10} concentrations along this road away from Sheddens Roundabout. The same input data were used except traffic speed was set at the national speed limit 50kph (30mph), representing more free-flowing traffic conditions. The results of this DMRB assessment are presented in Table 13.

Table 13: Results of DMRB assessment on Busby Road away from Sheddens Roundabout

Distance from road centre (m)	Predicted 2005 annual mean PM_{10} concentration (µg/m^3)	Number of days >50µg/m^3	Predicted 2010 annual mean PM_{10} concentration (µg/m^3)
5	19.0	2.3	17.7
10	18.5	1.9	17.2
15	18.0	1.4	16.8
20	17.5	1.0	16.3

83. These results indicate that the 2010 annual mean objective is unlikely to be exceeded at distances up to 5m from the road centre when the traffic is moving at the national speed limit of 30mph.

84. In Figure 8, the red lines mark a distance of 20m from the road centre, indicating that there are a number of receptors within 20m of the road centre around Sheddens Roundabout, where PM_{10} concentrations may exceed the NAQS annual mean objective of 18µg/m^3.

Roads with high flows of buses and / or HGVs

85. East Renfrewshire Council advised that they were unaware of any roads where buses and/or HGVs made up a high percentage (>25%) of the total traffic volume.

New roads constructed or proposed since the previous round of R&A/ Roads with significantly changed traffic flows, or new relevant exposure

86. The new M77 extension and the GSO in East Renfrewshire are two major roads which have been constructed since the last round of Review and Assessment. A DMRB assessment of PM_{10} emissions from these routes was therefore conducted. The DMRB input data used for this assessment was the same as the data used for the NO_2 assessments at these locations. The input data are presented in Table 14.

Table 14: Input data for M77 and GSO DMRB assessments

Input parameter	M77 at Newton Mearns	GSO
Year of assessment	2005	
Background PM_{10} concentration	12.8µg/m^3	12.4µg/m^3
AADT	34525	Supplied by East Renfrewshire Council
Road type	Class A (Motorways and A class roads)	
Average vehicle speed	100kph (63mph)	
Percentage of HGVs	8%	

87. The results from the DMRB assessments of the M77 and the GSO are presented in Table 15.

Table 15: PM_{10} DMRB assessments at the M77 and GSO

Location	Distance from road centre (m)	Predicted 2005 PM_{10} concentration (µg/m^3)	Predicted 2010 PM_{10} concentration (µg/m^3)
M77 at Newton Mearns	10	18.5	17.2
	20	17.1	16.0
	30	16.1	15.1
GSO	10	17.9	16.7
	20	16.7	15.6
	30	15.8	14.8

88. The results presented in Table 15 show that it is unlikely that there will be any exceedences of the 2010 PM_{10} annual mean objectives at receptors close to the M77 or the GSO. Figure 9 and Figure 10 show these locations with distances of 50m from the road centre marked by the red solid lines. These show that the closest receptor at either of these location is at a distance of approximately 50m at Newton Mearns beside the M77. It is unlikely that there will be an exceedence of the PM_{10} annual mean objective at such a distance.

Aircraft

89. There are no airports in East Renfrewshire.

Industrial sources

90. There are no significant industrial sources of PM_{10} in East Renfrewshire.

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

91. There are two quarries in operation in East Renfrewshire; Floak Quarry and Bannerbank Quarry. The technical guidance states that there is a risk of exceeding the PM_{10} objectives at receptors within 200m of the quarrying activity if the background PM_{10} concentration is less than 16µg/m^3. There are no receptors within 200m of either of these quarries, and background PM_{10} concentrations are significantly less than 16µg/m^3. In addition, there is no history of dust complaints as a result of quarrying activity. It is unlikely, therefore, that there will be any exceedences of the PM_{10} objectives near these quarries.

Domestic sources

Areas of domestic coal burning

92. There are no areas in East Renfrewshire were there is a high density of coal burning dwellings, which could lead to exceedences of the PM_{10} objectives. Historically, a large number of dwellings in the village of Eaglesham used coal domestically, however, this is no longer the case. It is unlikely that there will be any risk of exceeding the PM_{10} objectives as a result of domestic coal burning in East Renfrewshire.

Based on monitoring data and a DMRB assessment, it is concluded that there is the potential for exceeding the 2010 NAQS annual mean objective for PM_{10} at receptors close to Sheddens Roundabout. Monitoring data will be reviewed when a full year of data are available, and a Detailed Assessment will take place if monitoring shows an exceedence of the 2010 NAQS objective for PM_{10}.

9 CONCLUSIONS

93. An Updating and Screening Assessment has been conducted for East Renfrewshire Council. The pollutants considered in this assessment are carbon monoxide, benzene, 1,3-butadiene, nitrogen dioxide, sulphur dioxide and particulate material (PM_{10}).

94. The assessment has determined that there is no risk of exceeding any of the national air quality objectives for carbon monoxide, benzene, 1,3-butadiene, nitrogen dioxide and sulphur dioxide. Accordingly, there is no requirement for East Renfrewshire Council to proceed to a Detailed Assessment for these pollutants.

95. The assessment has shown that there may be a risk of exceeding the 2010 PM_{10} annual mean objective at Sheddens Roundabout, Clarkston as a result of road traffic emissions. The potential for exceeding the objective has been identified by monitoring and by a DMRB screening assessment. As there is not yet a full year of monitoring data available. This issue be revisited when the data are available, which will be the beginning of 2007. If these data indicate that the objective is likely to be exceeded, East Renfrewshire Council will conduct a Detailed Assessment at this location.