Report

Air Quality Updating and Screening Assessment

A report produced for Perth and Kinross Council

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Executive Summary

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality which culminated in the Environment Act, 1995. The Air Quality Strategy provides a framework for air quality control through air quality management and air quality standards. These and other air quality standards[a] and their objectives have been enacted through the Air Quality Regulations in 1997, 2000 and 2002[3]. The Environment Act 1995 requires Local Authorities to undertake air quality reviews. In areas where an air quality objective is not anticipated to be met, Local Authorities are required to establish Air Quality Management Areas and implement action plans to improve air quality.

The second round of air quality Review and Assessments has been completed by Perth and Kinross Council and an Air Quality Management Area (AQMA) covering the whole of Perth was declared in May 2006 for nitrogen dioxide and PM_{10}. A Further Assessment of Air Quality and an Air Quality Action Plan (AQAP) are currently being developed for the AQMA. These will consider and assess the sustainability of all options available to the Council for alleviation of elevated levels of nitrogen dioxide and PM_{10},, integrate the AQAP with other Council policies and strategies, and ensure that air quality is not addressed in isolation but included as a material consideration in other decision making processes.

The Council are now required to proceed to the third round of Review and Assessment in which sources of emissions to air are reassessed to identify whether the situation has changed since the second round, and if so, what impact this may have on predicted exceedences of the air quality objectives.

The third round of Review and Assessment is to be undertaken in two steps, essentially following the format of the second round. The first step is an Updating and Screening Assessment, which updates the findings of the previous Review and Assessment cycle, undertaken for all pollutants identified in the Air Quality Regulations. Where a significant risk of exceedence is identified for a pollutant, and an Air Quality Management Area for that pollutant has not already been declared, it will be necessary for the local authority to proceed to a Detailed Assessment the following year. Where a local authority does not need to undertake a Detailed Assessment, a progress report is required instead.

This report is an Updating and Screening Assessment for Perth and Kinross Council as outlined in the Government's published guidance.

[a] Refers to standards recommended by the Expert Panel on Air Quality Standards. Recommended standards are set purely with regard to scientific and medical evidence on the effects of the particular pollutants on health, at levels at which risks to public health, including vulnerable groups, are very small or regarded as negligible.

This Updating and Screening Assessment has concluded that Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, PM_{10} or sulphur dioxide.

Levels of PM_{10} and nitrogen dioxide in the AQMA are being considered in detail through the ongoing Further Assessment of Air Quality and Air Quality Action Plan (AQAP). The identification of additional areas of exceedence of the annual mean objective for nitrogen dioxide and the 2010 annual mean objective for PM_{10} by this updating and screening assessment has vindicated the council's decision to designate the whole of Perth as an AQMA. That decision was taken to ensure that a holistic approach was adopted towards local environmental management through consideration of locations which are close to the objectives in addition to the locations of identified exceedence for these pollutants.

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Acronyms and definitions used in this report

AADTF	Annual Average Daily Traffic Flow
ADMS	an atmospheric dispersion model
AQDD	an EU directive (part of EU law) - Common Position on Air Quality Daughter Directives, commonly referred to as the Air Quality Daughter Directive
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
AURN	Automatic Urban and Rural Network (Defra funded air quality monitoring network)
CO	Carbon monoxide
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EPA	Environmental Protection Act
EPAQS	Expert Panel on Air Quality Standards (UK panel)
EU	European Union
GIS	Geographical Information System
kerbside	0 to 1 m from the kerb
Limit Value	An EU definition for an air quality standard of a pollutant listed in the air quality directives
NAEI	National Atmospheric Emission Inventory
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NRTF	National Road Traffic Forecast
ppb	parts per billion
receptor	In the context of this study, the relevant location where air quality is assessed or predicted (for example, houses, hospitals and schools)
roadside	1 to 5 m from the kerb
SEPA	Scottish Environment Protection Agency
SO_2	Sulphur dioxide
TEA	Triethanolamine
TEOM	Tapered Element Oscillating Microbalance

1 Introduction to the Updating and Screening Assessment

1.1 PURPOSE OF THE UPDATING AND SCREENING ASSESSMENT

The second round of air quality Review and Assessments is now complete and all local authorities should have completed all necessary stages. Where the likelihood of exceedences of air quality objectives have been identified in areas of significant public exposure, an air quality management area should have been declared, followed by a Further (formerly 'Stage 4') Assessment and the formulation of an action plan detailing measures intended to reduce or to eliminate exceedences.

Local authorities are now required to proceed to the third round of Review and Assessment. The updating and screening assessment reassesses sources of emissions to air to identify whether the situation has changed since the second round of Review and Assessment. Changes are reviewed to assess the potential impact on predicted exceedences of the air quality objectives. Such changes might include significant traffic growth on a major road, which had not been foreseen, construction of a new industrial plant with emissions to air, or significant changes in the emissions of an existing plant.

The third round of Review and Assessment is to be undertaken in two steps. The first step is an Updating and Screening Assessment. This Assessment updates the findings of the previous Review and Assessment cycle, undertaken for all pollutants identified in the Air Quality Regulations. Where a significant risk of exceedence is identified for a pollutant it will be necessary for the local authority to proceed to a Detailed Assessment. Where a local authority does not need to undertake a Detailed Assessment, a progress report is required instead by the following year.

1.2 STRUCTURE OF THE REPORT

The report is structured as follows:

- **Section 1** summarises the aims of the updating and screening assessment, the approach adopted for the assessment, the pollutants and air quality objectives;
- **Section 2** summarises the UK Air Quality Strategy and the function of an updating and screening assessment;
- **Section 3** summarises the conclusions of air quality Review and Assessment work to date, identifies data used in support of this assessment as well as relevant background information on the Council area, and relevant emissions-to-air sources

and highlights significant changes in emissions to air within the city since the last round of Review and Assessment;

- **Sections 4-10** present the Review and Assessment for each of the seven pollutants included in the Air Quality Regulations;
- **Section 11** presents conclusions and recommendations for further work, where required, for each of the seven pollutants;

1.3 OVERVIEW OF APPROACH TAKEN

The general approach taken to this Updating and Screening Assessment was to:

- Identify the conclusions of the last round of Review and Assessment for each of the seven pollutants included in the air quality regulations;
- Identify significant sources of emissions to air for the seven pollutants included in the air quality regulations, including major roads and industrial plant;
- Identify new sources not previously considered in the first and second rounds of Review and Assessment;
- Identify any sources for which emissions have changed significantly since the last round of Review and Assessment;
- Identify and interpret the significance of air quality monitoring data made available since the last round of Review and Assessment;
- Assess the risk of exceedences of the air quality objectives in locations where relative public exposure may exist using screening models and nomograms; and
- Where necessary, identify locations and pollutants for which further detailed assessment of air quality will be required.

1.4 RELEVANT GUIDANCE DOCUMENTATION

This report takes into account the guidance in LAQM.TG(03)[1], published January 2003, and the update to this guidance[2], published January 2006.

1.5 POLLUTANTS CONSIDERED IN THIS REPORT

All pollutants included in the Air Quality Regulations and the Air Quality (Scotland) Amendment Regulations[3] for the purposes of Review and Assessment have been considered in this report (Table 1.1).

Table 1.1 Objectives included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene All authorities	16.25 μg m^{-3}	running annual mean	31.12.2003
Authorities in England and Wales only	*5.00 μg m^{-3}*	*annual mean*	*31.12.2010*
Authorities in Scotland and Northern Ireland only[a]	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 *Authorities in England, Wales and Northern Ireland only[a]*	*10.0 mg m^{-3}*	*maximum daily running 8-hour mean*	*31.12.2003*
Authorities in Scotland only	10.0 mg m^{-3}	running 8-hour mean	31.12.2003
Lead	0.5 μg m^{-3} 0.25 μg m^{-3}	annual mean annual mean	31.12.2004 31.12.2008
Nitrogen dioxide[b]	200 μg m^{-3} not to be exceeded more than 18 times a year 40 μg m^{-3}	1 hour mean annual mean	31.12.2005 31.12.2005
Particles (PM_{10}) (gravimetric)[c] All authorities	50 μg m^{-3} not to be exceeded more than 35 times a year 40 μg m^{-3}	24 hour mean annual mean	31.12.2004 31.12.2004
Authorities in Scotland only[d]	50 μg m^{-3} not to be exceeded more than 7 times a year	24 hour mean	31.12.2010

	18 μg m^{-3}	annual mean	31.12.2010
Sulphur dioxide	350 μg m^{-3} not to be exceeded more than 24 times a year	1 hour mean	31.12.2004
	125 μg m^{-3} not to be exceeded more than 3 times a year	24 hour mean	31.12.2004
	266 μg m^{-3} not to be exceeded more than 35 times a year	15 minute mean	31.12.2005

a. Air Quality (Northern Ireland) Regulations 2003
b. The objectives for nitrogen dioxide are provisional.
c. Measured using the European gravimetric transfer sampler or equivalent.
d. These 2010 Air Quality Objectives for PM10 apply in Scotland only, as set out in the Air Quality (Scotland) Amendment Regulations 2002.

2 The UK Air Quality Strategy

2.1 NATIONAL AIR QUALITY STANDARDS

The Government prepared the Air Quality Strategy for England, Scotland, Wales and Northern Ireland for consultation in August 1999. It was published in January 2000 (DETR, 2000)[4] with an addendum issued in February 2003. The Air Quality Strategy uses national air quality standards and objectives against which air quality can be measured and assessed. The strategy also provides the timescales for the achievement of objectives. The objectives are to be achieved between 2003 and 2010 (Table 1.1). Table 1.1 shows the objective values in mass concentrations ($\mu g\ m^{-3}$ or $mg\ m^{-3}$), the relevant averaging period and the number of exceedences that are permitted (where applicable).

2.2 TIMESCALES TO ACHIEVE THE OBJECTIVES FOR THE POLLUTANTS IN AIR QUALITY STRATEGY

In most local authorities in the UK, objectives were (or will be) met for most of the pollutants within the timescale of the objectives shown in Table 1.1. It is important to note that the objectives for NO_2 remain provisional. The Government has recognised the problems associated with achieving the standard for ozone and this is therefore not a statutory requirement. Ozone is a secondary pollutant and transboundary in nature and it is recognised that local authorities themselves can exert little influence on concentrations as they are the result of regional primary emission patterns.

2.3 AIR QUALITY REVIEWS – THE APPROACHES AND EXPECTED OUTCOMES

Technical Guidance has been issued in 'Review and Assessment: Technical Guidance' LAQM.TG (03)[1,2] to enable air quality to be monitored, modelled, reviewed and assessed in an appropriate and consistent fashion. An update to this document was published in January 2006. This updating and screening assessment has considered the procedures set out in both of these documents.

The primary objective of undertaking a review of air quality is to identify any areas that are unlikely to meet national air quality objectives and ensure that air quality is considered in local authority decision-making processes. The complexity and detail required in a review depends on the risk of failing to achieve air quality objectives and it has been proposed therefore that reviews should be carried out in two steps. Both steps of Review and Assessment may be necessary and every authority is expected to undertake at least a first stage Review and Assessment of air quality in their authority area. The steps are briefly described in Table 2.1.

Table 2.1 Brief details of steps in the third Round of the Air Quality Review and Assessment process

Level of Assessment	Objective	Approach
Updating and Screening	To identify those matters that have changed since the last Review and Assessment, which might lead to a risk of an air quality objective being exceeded	Use a checklist to identify significant changes that require further consideration. Where such changes are identified, then apply simple screening tools to decide whether there is sufficient risk of an exceedence of an objective to justify a Detailed Assessment
Detailed Assessment	To provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposure. This should be sufficiently detailed to allow the designation or amendment of any necessary AQMAs	Use quality-assured monitoring and validated modelling methods to determine current and future pollutant concentrations in areas where there is a significant risk of exceeding an air quality objective.
Annual Progress reports	Local authorities should prepare annual air quality Progress Reports between subsequent rounds of reviews and assessments. The concept is that this will ensure continuity in the LAQM process.	The precise format of the progress report is left up to the local authority to decide, but guidance on what it should cover is available in LAQM.PRG(03)[5], published in 2003. It is envisaged that these Progress Reports could be useful for the compilation of annual 'state of the environment' reports that many authorities already prepare.

The current deadline for completion of updating and screening assessments is April 2006, and for detailed assessments April 2007.

2.4 LOCATIONS THAT THE REVIEW AND ASSESSMENT MUST CONCENTRATE ON

For the purpose of Review and Assessment, the authority should focus their work on locations where members of the public are likely to be exposed over the averaging period of the objective. Table 2.2 summarises the locations where the objectives should and should not apply.

Table 2.2 Typical locations where the objectives should and should not apply

Averaging Period	**Pollutants**	**Objectives *should* apply at …**	**Objectives should *not* generally apply at …**
Annual mean	• 1,3 Butadiene • Benzene • Lead • Nitrogen dioxide • Particulate Matter (PM_{10})	All background locations where members of the public might be regularly exposed.	Building facades of offices or other places of work where members of the public do not have regular access.
		Building facades of residential properties, schools, hospitals, libraries etc.	Gardens of residential properties.
			Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term
24 hour mean and 8-hour mean	• Carbon monoxide • Particulate Matter (PM_{10}) • Sulphur dioxide	All locations where the annual mean objective would apply.	Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
		Gardens of residential properties.	

Averaging Period	Pollutants	Objectives *should* apply at …	Objectives should *not* generally apply at …
1 hour mean	• Nitrogen dioxide • Sulphur dioxide	All locations where the annual mean and 24 and 8-hour mean objectives apply.	Kerbside sites where the public would not be expected to have regular access.
		Kerbside sites (e.g. pavements of busy shopping streets).	
		Those parts of car parks and railway stations etc. which are not fully enclosed.	
		Any outdoor locations to which the public might reasonably be expected to have access.	
15 minute mean	• Sulphur dioxide	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

It is unnecessary to consider exceedences of the objectives at any location where public exposure over the relevant averaging period would be unrealistic. Locations should also represent non-occupational exposure.

3 Information used to support this assessment

3.1 THE FIRST AND SECOND ROUNDS OF REVIEW AND ASSESSMENT OF AIR QUALITY FOR PERTH AND KINROSS COUNCIL

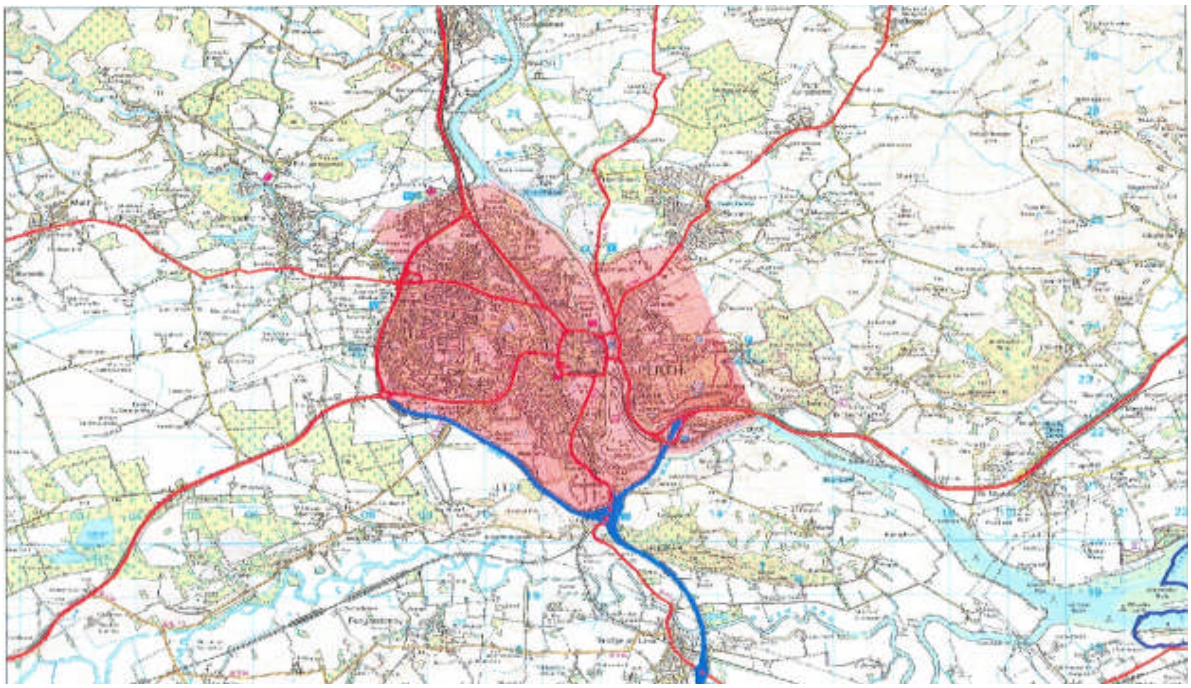
Perth and Kinross Council has completed the following Review and Assessments of air quality to date:

- Stage 1 (March 1999), Stage 1 (revised) and Stage 2 (September 2002)
- Updating and Screening Assessment (2003)
- Detailed Assessment (2004)
- Progress Report (2005)

The previous assessments of the air quality in Perth and Kinross concluded that there were likely exceedences of the annual mean objective for NO_2 as a result of traffic sources in Perth. Projections also indicated likely exceedences of the annual mean objective for PM_{10} in 2010.

Following detailed modelling of the NO_2 and PM_{10} concentrations in Perth, the whole of Perth was declared as an AQMA for both pollutants in May 2006. Figure 3.1 shows the extent of the AQMA.

Figure 3.1 Perth AQMA



3.2 PROPOSED DEVELOPMENTS WHICH MAY AFFECT AIR QUALITY

Any new developments in the local authority or in surrounding areas that may impact on local air quality need to be considered.

3.2.1 Industry

Two new energy from waste plants have been proposed – one in Perth, and the other in Glenfarg. These are both still at the planning stage, and the implications on local air quality will be assessed when more information becomes available.

Two new industrial processes have started since the previous round of Review and Assessment – these are assessed in the relevant sections of this report.

3.2.2 Housing and redevelopment

A new housing development of 150 homes has been built at Balgarvie Mill, Scone. This is in a commuter area outside Perth, and is served by a new Park and Ride site situated close by. The effect of this development on traffic flows on the Angus Road route has been assessed and has not been found to be significant.

A new B&Q Superstore due to open in September 2006 is under construction adjacent to Crieff Rd and Newhouse Rd, Perth. There are no receptors on the primary access routes to the superstore, traffic management is already in place to

minimise congestion at this location and monitoring will continue at existing diffusion tube sites in the vicinity.

Planning permission is currently being sought for the installation of biomass boilers at a number of locations throughout Perth and Kinross. The implications of these relative to PM10 objectives is being evaluated and appropriate control measures will be installed if necessary to minimise any potentially significant impact of these installations.

3.2.3 Transport

Some changes to the road network in central Perth have taken place, such as alterations to the one way systems in operation. The effects of these changes have been taken into account by the use of up to date traffic counts (2005) from the SCOOT monitors mounted at traffic lights in the town.

A new Park and Ride site has also been opened in Scone since the last screening assessment. Buses from the Park and Ride sites at Broxden and Scone serve central Perth and the Leonard Street bus station in Perth.

3.3 AIR QUALITY MONITORING

During 2005, automatic monitoring of NO_2 and PM_{10} has been carried out at two sites in the Perth and Kinross Council area. These are located on Atholl Street and High Street in Perth town centre. Nitrogen dioxide is measured using a chemiluminescence analyser, and PM_{10} is monitored using a TEOM.

Diffusion tube monitoring of nitrogen dioxide has also been carried out at a number of locations within the Perth and Kinross Council area, with the analysis undertaken by Dundee City Council Scientific Services. Co-location studies have been carried out at both of the automatic monitoring sites. The higher of the two bias adjustment factors calculated from these two studies has been applied to the rest of the diffusion tube results as a worst-case scenario. No bias adjustment factors for this laboratory in 2005 have been published on the UWE Review and Assessment website.

3.4 MAPS AND DISTANCES OF RECEPTORS FROM ROADS

Roads have been assessed using worst-case receptor distances of 5m for all A roads and 15m for motorways. This is measured as the distance from the road centre to the façade of the nearest relevant building. Where this indicated an exceedence of the objective, more accurate receptor distances were estimated from the electronic maps provided by Perth and Kinross Council.

3.5 ROAD TRAFFIC DATA

3.5.1 Summary of traffic data provided

This section summarises the information used in this report; detailed information is given in Appendix 2. Appendix 2 lists the locations of the traffic flow and speed measurement points, flow and speed data and other relevant traffic statistics. Data were collated from a range of sources, including:

- Data provided by Perth and Kinross Council. This includes manual traffic counts, and automatic counts in central Perth.
- Data from Transport Scotland for trunk roads.
- Data held in the National Atmospheric Emissions Inventory (NAEI, 2004) where no other data were available.

Where no average speed data were available, estimated speeds were used near receptors and junctions. Speeds slower than the national speed limits have been assigned to sections of roads in areas close to junctions.

3.5.2 Proportion of HDVs

The data from Perth and Kinross Council included the proportions of HDVs for most road links. Where these data were not available, estimates were made based on the 2004 NAEI traffic database, or a conservative estimate of 10% was used.

3.5.3 Base year for traffic

The base year for traffic from the NAEI database is 2004. The data from Perth and Kinross Council were compiled from a number of surveys over several years, from 1999 to 2005. SCOOT traffic count data and trunk roads data were for 2005.

3.5.4 Traffic growth

Traffic growth has been based on the National Road Traffic Forecast (NRTF) factors for projections to 2005 and 2010.

3.5.5 Distance from the centre of the road to the kerbside and to the receptors

Road widths and the distances of receptors from the road have been estimated from the electronic maps provided by Perth and Kinross Council.

3.6 PART A AND B INDUSTRIAL PROCESSES

There are many Part A and Part B industrial processes in Perth and Kinross. These are listed in Appendix 4.

Two new processes have been permitted since the previous round of Review and Assessment. These were a petrol station and a quarry. These are assessed in the relevant sections of this report.

3.7 SCREENING TOOLS

Appendix 3 includes outline details of the DMRB and other screening tools used in the assessment.

4 Updating and Screening Assessment for Carbon Monoxide

4.1 THE NATIONAL PERSPECTIVE

The main source of carbon monoxide in the United Kingdom is road transport, which accounted for 49% of total releases in 2003. Annual emissions of carbon monoxide have been falling steadily since the 1970s, and are expected to continue to do so. The automatic monitoring network recorded no exceedences of the objective in 2005 at any location across the UK.

4.2 STANDARD AND OBJECTIVE FOR CARBON MONOXIDE

The Government and the Devolved Administrations originally adopted an 8-hour running mean concentration of 11.6 mgm^{-3} as the air quality standard for carbon monoxide. A new objective was then set at a slightly tighter level of 10 mgm^{-3} as a running 8-hour mean concentration, to have been achieved by the end of 2003, bringing it into line with the second Air Quality Daughter Directive limit value.

4.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR CARBON MONOXIDE

The 2003 Updating and Screening Assessment concluded that the risk of exceeding the objective for carbon monoxide in the Perth and Kinross Council area was low. A Detailed Assessment was not required and no AQMAs have been declared for CO.

4.4 SCREENING ASSESSMENT OF CARBON MONOXIDE

4.4.1 Screening check list

The Technical Guidance LAQM.TG(03)[1,2] requires assessment of carbon monoxide to consider the following sources, data or locations:

- Monitoring Data
- Very Busy Roads or junctions in built up areas

These are described in the following sections.

4.4.2 Background Concentrations of carbon monoxide

The average background annual mean concentration for carbon monoxide in 2005, estimated from the UK background maps[7] and the year adjustment factors

published in LAQM.TG(03)[1,2] was 0.1mg m^{-3}, with a maximum concentration of 0.17mg m^{-3} at locations in Perth town centre.

4.4.3 Screening assessment of monitoring data

No monitoring of carbon monoxide has been carried out in Perth during 2005. Monitoring carried out between 1999 and 2001 using a Groundhog mobile monitoring station indicated that all running eight hour mean concentrations measured were less than 3.5mgm^{-3}, which is well within the 10mgm^{-3} objective for CO. Carbon monoxide concentrations are expected to have decreased since 2001.

4.4.4 Screening assessment for very busy roads

The guidance document LAQM.TG(03)[1,2] requires assessment of CO only at 'very busy roads', or junctions in built up areas. A 'very busy' road is defined as a single carriageway road with a daily average traffic flow greater than 80,000 vehicles. Very busy dual carriageways and motorways have daily average traffic flows greater than 120,000 and 140,000 respectively. In addition to this, the guidance also states that these will only need to be assessed in areas where the estimated background concentration is expected to be above 1mg m^{-3}.

No roads have been identified as 'very busy' in the Perth and Kinross Council area, and the background concentration of CO is also well below the threshold for assessment.

4.5 CONCLUSIONS FOR CARBON MONOXIDE CONCENTRATIONS IN COUNCIL AREA

No monitoring of CO has been carried out in Perth and Kinross since the last round of Review and Assessment, but the background maps indicate low concentrations. There are no 'very busy' roads in the Council area. A detailed assessment is not required for Perth and Kinross Council.

Table 4.1 Updating and Screening Assessment Summary Checklist for Carbon Monoxide

Item	Response
Monitoring data	No monitoring of CO has been carried out
Very busy roads or junctions in built-up areas	No 'very busy roads,' and background concentration is below the threshold

5 Updating and Screening Assessment for Benzene

5.1 THE NATIONAL PERSPECTIVE

The main sources of benzene emissions in the UK are petrol-engined vehicles, petrol refining, storage and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems. A number of policy measures already in place, or planned for future years, will continue to reduce emissions of benzene. Since January 2000, EU legislation has reduced the maximum benzene content of petrol to 1%, from a previous upper limit of 5%. The European Auto-Oil programme will further reduce emissions for cars and light-duty vehicles, and emissions of benzene from the storage and distribution of petrol are controlled by vapour recovery systems. The UK automatic monitoring network recorded no exceedences of the 2003 objective in 2003, or later years. Whilst the 2010 objectives are expected to be met at all urban background, and most roadside locations, there is the possibility for some remaining exceedences, which will require additional measures at a local level.

5.2 STANDARD AND OBJECTIVE FOR BENZENE

The Government and the Devolved Administrations have adopted a running annual mean concentration of 16.25 μgm^{-3} as the air quality standard for benzene, with an objective for the standard to have been achieved by the end of 2003. However, in light of the health advice from EPAQS and the Department of Health's Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC) to reduce concentrations of benzene in air to as low a level as possible, additional tighter objectives have also been set. The additional objective is for an annual mean of 3.25 μgm^{-3} to be achieved by the end of 2010 in Scotland and Northern Ireland.

5.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR BENZENE

The following conclusions were given for benzene in the First and Second Stage Review and Assessment for Perth and Kinross Council.

- There are no major industrial processes which have the potential, individually or cumulatively, to result in elevated levels of benzene in relevant locations in the Perth and Kinross Council Area

The national policies were expected to deliver the air quality objective for benzene and hence there was no need to undertake a detailed assessment for benzene. No AQMAs have been declared for benzene.

5.4 SCREENING ASSESSMENT OF BENZENE

5.4.1 Screening check list

The Technical Guidance LAQM.TG(03)[1,2] requires assessment of benzene to consider the following sources, data or locations:

- Monitoring Data outside an AQMA
- Monitoring Data within an AQMA
- Very Busy Roads or Junctions in Built-up Areas
- New Industrial Sources
- Industrial sources with substantially increased emissions or new relevant exposure
- Petrol Stations
- Major Fuel Storage Depots (Petroleum only)

These are described in the following sections.

5.4.2 Background concentrations for benzene

The average background benzene concentration in Perth and Kinross, estimated from the UK 2003 background maps[7] was 0.05 μgm^{-3}, with a maximum concentration of 0.27 μgm^{-3}. This was well below the objective, and the projected concentrations for 2010 are even lower, with an average concentration of 0.04μgm^{-3}, and a maximum 0.22μgm^{-3}.

5.4.3 Screening assessment of monitoring data

No monitoring of benzene has been carried out in the Perth and Kinross Council area.

5.4.4 Screening assessment of very busy roads

The guidance document LAQM.TG(03)[1,2] requires assessment of benzene only at 'very busy roads', or at junctions in built up areas, with a predicted background concentration of more than 2 μgm^{-3} (Appendix 2 Table A2.1).

The traffic flow data provided by Perth and Kinross Council indicates that there are no roads in the area which can be classified as 'very busy,' and the background concentration is also estimated to be below the threshold.

5.4.5 Screening assessment of industrial sources

The Guidance LAQM.TG(03)[1,2] lists the following processes as significant potential sources of benzene:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Petroleum processes (73)
Petrochemical processes (2)
Carbonisation processes (12)
Cement/lime manufacture (7)
Gasification processes (5)

Part B
Processes for the storage and unloading of petrol at terminals

None of the existing Part A or Part B industrial processes in Perth and Kinross operate these processes or have the potential to emit benzene. There are no new industrial processes planned in the Council area with the potential to emit benzene.

5.4.6 Screening assessment of Petrol Stations

There are a number of petrol stations in Perth and Kinross, which are authorised as Part B processes. The guidance requires petrol stations to be considered only if they are near a busy road, that is with more than 30,000 vehicles per day and have a throughput greater than 2 million litres.

From the traffic data provided, there are only two roads in the Perth and Kinross Council area with an AADTF of more than 30,000. These are the A90 and the M90. There are two petrol stations along these routes – Inchmichael Garage, and Bullionfield Filling Station – both on the A90. Based on the GIS data supplied by Perth and Kinross Council, there are no relevant receptors within 10m of the pumps at either location.

The new petrol station permitted since the last Updating and Screening Assessment is not located on a very busy road and has therefore not been assessed.

5.4.7 Screening assessment of Fuel Storage Depots

There are no major fuel storage depots in the Perth and Kinross council area.

5.5 CONCLUSIONS FOR BENZENE IN COUNCIL AREA

There are no very busy roads in the Perth and Kinross area, or industrial processes meeting the criteria specified for assessment.

Perth and Kinross Council is not required to carry out a Detailed Assessment for benzene.

Table 5.1 Updating and Screening Assessment Summary Checklist for 1,3-butadiene

Item	Response
Monitoring data outside an AQMA	No monitoring of benzene has been carried out
Monitoring data within an AQMA	No AQMAs have been declared for benzene
Very busy roads or junctions in built up areas	No 'very busy roads' and background concentration is below the threshold
New industrial sources.	New petrol station has been considered, but is not significant
Industrial sources with substantially increased emissions, or new relevant exposure	None present
Petrol stations	None meeting the criteria with relevant exposure
Major fuel storage depots (petrol only)	None present

6 Updating and Screening Assessment for 1,3-Butadiene

6.1 THE NATIONAL PERSPECTIVE

The main source of 1,3-butadiene in the United Kingdom is emissions from motor vehicle exhausts. 1,3-butadiene is also an important industrial chemical and is handled in bulk at a small number of industrial premises. Maximum running annual mean concentrations of 1,3-butadiene measured at all urban background/centre and roadside locations in the national network are all well below the 2003 objective of 2.25 μgm^{-3}. The increasing numbers of vehicles equipped with three way catalysts will significantly reduce emissions of 1,3-butadiene in future years. Recently agreed further reductions in vehicle emissions and improvements to fuel quality are expected to further reduce emissions of 1,3-butadiene from vehicle exhausts.

6.2 STANDARD AND OBJECTIVE FOR 1,3-BUTADIENE

The Government and the Devolved Administrations have adopted a maximum running annual mean concentration of 2.25 μgm^{-3} as an air quality standard for 1,3-butadiene. The objective is for the standard to have been achieved by the end of 2003.

6.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR 1,3-BUTADIENE

Previous rounds of Review and Assessment for Perth and Kinross concluded that:

- There are no major industrial sources of 1,3 butadiene

Emissions from vehicles were also expected to decrease. A detailed assessment for 1,3-butadiene was not required. No AQMAs have been declared for 1,3-butadiene.

6.4 SCREENING ASSESSMENT OF 1,3-BUTADIENE

6.4.1 Screening check list

The Technical Guidance LAQM.TG(03)[1,2] requires assessment of 1,3-butadiene to consider the following sources, data or locations:

- Monitoring Data
- New Industrial Sources

- Existing Industrial Sources with Significantly Increased Emissions, or new relevant exposure

These are described in the following sections.

6.4.2 Background concentrations for 1,3-Butadiene

The average background 1,3-butadiene concentration for 2005, estimated from the UK background maps[7] and the year adjustment factors, was 0.02 μgm^{-3} in Perth and Kinross with a maximum concentration of 0.07 μgm^{-3}.

6.4.3 Screening assessment of monitoring data

No monitoring of 1,3-butadiene has been undertaken in Perth and Kinross, or in any neighbouring authorities.

6.4.4 Screening assessment of industrial sources

The Guidance LAQM.TG(03)[1,2] lists the following processes as significant potential sources of 1,3-butadiene:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Petroleum processes (2)
Petrochemical processes (95)
Organic chemical manufacture (3)

Part B
Rubber processes

None of the above processes was identified in the Perth and Kinross Council area or in adjacent authorities, or is believed to have the potential to emit 1,3-butadiene.

6.5 CONCLUSIONS FOR 1,3-BUTADIENE CONCENTRATIONS IN COUNCIL AREA

Estimated background concentrations indicate that the objective for 1,3-butadiene was achieved by the end of 2003, and the 2005 values show that the standard is continuing to be met. There are no significant industrial sources that have the potential to emit 1,3-butadiene.

Consequently, Perth and Kinross Council is not required to carry out a Detailed Assessment for 1,3-butadiene.

Table 6.1 Updating and Screening Assessment Summary Checklist for 1,3-butadiene

Item	Response
Monitoring data	No monitoring of 1,3-butadiene has been carried out
New industrial sources.	None present

Item	Response
Industrial sources with substantially increased emissions, or new relevant exposure	None present

7 Updating and Screening Assessment for Lead

7.1 THE NATIONAL PERSPECTIVE

The agreement reached between the European Parliament and the Environment Council on the Directive on the Quality of Petrol and Diesel Fuels (part of the Auto-Oil Programme) led to the ban on sales of leaded petrol in the United Kingdom with effect from 1 January 2000. Emissions of lead are now restricted to a variety of industrial activities, such as battery manufacture, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping.

Detailed assessments of the potential impact of lead emissions from industrial processes have been undertaken by the Government and the Devolved Administrations, based upon both monitoring and sector analysis studies. The former has included a 12-month monitoring survey in the vicinity of 30 key industrial sites in the UK, which has been used to supplement information already provided from the non-automatic monitoring networks. These monitoring data have generally indicated no exceedences of the 2004 or 2008 objectives, although locations in proximity to non-ferrous metal production and foundry processes were deemed to be at risk.

7.2 STANDARD AND OBJECTIVE FOR LEAD

The Government and the Devolved Administrations adopted an annual mean concentration of 0.5 μgm^{-3} as the air quality standard for lead, with an objective for the standard to have been achieved by the end of 2004. In addition, a lower air quality objective of 0.25 μgm^{-3} has also been set to be achieved by the end of 2008.

7.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR LEAD

The following conclusions were given for lead in the First and Second Stage Review and Assessment for Perth and Kinross:

- Two potential sources of lead emissions were identified in Perth and Kinross and neighbouring authorities, but further investigation concluded that these were not significant for local air quality.

No AQMAs have been declared for lead.

7.4 SCREENING ASSESSMENT OF LEAD

7.4.1 Source checklist

The Technical Guidance LAQM.TG(03)[1,2] requires assessment of lead to consider the following sources, data or locations:

- Monitoring Data
- New Industrial Sources
- Existing Industrial Sources with Significantly Increased Emissions or new relevant exposure

These are described in the following sections.

7.4.2 Screening assessment of monitoring data

No monitoring of lead has been undertaken in the Perth and Kinross Council area.

Annual average lead concentrations for 2004 at all sites on the national lead monitoring network[10] were below both the 2004 objective of 0.5 $\mu g\ m^{-3}$ and the 2008 objective of 0.25 $\mu g\ m^{-3}$. The lead concentration in Perth and Kinross is not expected to be higher than at the sites monitored in this network.

7.4.3 Screening assessment of industrial sources

The Guidance LAQM.TG(03)[1,2] lists the following processes as significant potential sources of lead:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Iron and steel (37)
Non-ferrous metals (23)
Manufacture of organic chemicals (35)

Part B
Non-ferrous metal furnaces
Electrical furnaces
Blast cupolas
Aluminium processes
Zinc Processes
Copper processes
Lead glass manufacture

There are no new potential sources of lead in the Perth and Kinross Council area that have not been considered in previous reviews. No existing sources have reported significant increases in emissions, and no new receptors have been located in the vicinity of these sources.

7.5 CONCLUSIONS FOR LEAD CONCENTRATIONS IN COUNCIL AREA

Emissions of lead from industrial processes in and around the Perth and Kinross Council area are not likely to exceed the objectives for lead to be achieved in 2004 and 2008.

The Council is not required to carry out a Detailed Review and Assessment for lead.

Table 7.1 Updating and Screening Assessment Summary Checklist for lead

Item	Response
Monitoring data	No monitoring of lead has been carried out in Perth and Kinross
New industrial sources.	None present
Industrial sources with substantially increased emissions, or new relevant exposure	None present

8 Updating and Screening Assessment for Nitrogen Dioxide

8.1 THE NATIONAL PERSPECTIVE

The principal source of NO_x emissions is road transport, which accounted for about 40% of total UK emissions in 2003. Major roads carrying large volumes of high-speed traffic (such as motorways and other primary routes) are a predominant source, as are conurbations and city centres with congested traffic. Within most urban areas, the contribution of road transport to local emissions will be much greater than for the national picture.

Meeting the annual mean objective for 2005, and the corresponding limit value in 2010, is considerably more demanding than achieving the 1-hour objective. By 2005, the annual mean objective was being achieved at all urban background locations outside of London, but being exceeded more widely at roadside sites throughout the UK in close proximity to busy road links. Projections for 2010 indicate that the EU limit value may still be exceeded at urban background sites in inner London, and at roadside locations in other cities.

8.2 STANDARDS AND OBJECTIVES FOR NITROGEN DIOXIDE

The Government and the Devolved Administrations have adopted two Air Quality Objectives for nitrogen dioxide, as an annual mean concentration of 40 μgm^{-3}, and a 1-hour mean concentration of 200 $\mu g\ m^{-3}$ not to be exceeded more than 18 times per year. The objectives were to be achieved by the end of 2005.

8.3 CONCLUSIONS OF THE FIRST AND SECOND ROUNDS OF REVIEW AND ASSESSMENT FOR NITROGEN DIOXIDE

The following conclusions were given for nitrogen dioxide in the first round of Review and Assessment reports for Perth and Kinross:

- The Updating and Screening Assessment of road traffic and monitoring data indicated that there were likely to be some exceedences of the annual mean objective for NO_2 at relevant locations in central Perth, near busy junctions and street canyons.
- The Detailed Assessment that followed included detailed modelling of the area and indicated some exceedences of the objective in Perth at the junction of Barrack Street and Atholl Street, and along Atholl Street.

An AQMA covering the whole of Perth Town was declared in May 2006, in order to cover other areas that were close to the objectives and to allow the Action Plan to take in a wider area. The AQMA area is illustrated in Figure 3.1.

8.4 SCREENING ASSESSMENT OF NITROGEN DIOXIDE

8.4.1 Screening checklist

The Technical Guidance LAQM.TG(03)[1,2] requires assessment of nitrogen dioxide to consider the following sources, data or locations:

- Monitoring data outside an AQMA
- Monitoring data within an AQMA
- 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 flow of buses and/or HGVs
- New roads constructed or proposed since last round of Review and Assessment
- Roads with significantly changed traffic flows or new, relevant exposure
- Bus Stations
- New industrial sources
- Industrial sources with substantially increased emissions or new relevant exposure
- Aircraft

These are evaluated in the following sections.

8.4.2 Background concentrations for nitrogen dioxide

The estimated average background nitrogen dioxide concentration for 2005 was 2.4μgm^{-3} with a maximum concentration of 11.6μgm^{-3}, at locations close to Perth town centre.

8.4.3 Screening assessment of monitoring data

8.4.3.1 Automatic monitoring data

Automatic monitoring data in Perth was available in 2005 at two sites – Perth 1 and Perth 2, located on Atholl Street and High Street, Perth. These sites are both within the designated AQMA, and are classified as 'roadside' sites.

Both monitoring sites are operated and managed by **netcen**, and data is ratified to the same standard as the AURN sites. Data from both sites covers all 2005, and data capture at both locations was high. Data from these sites is summarised in table 8.1.

Table 8.1 Summary of automatic NO_2 data

Site Name	Type	Grid Ref	Annual Mean	Data Capture
Perth 1 – High Street	Roadside	311700,723516	28 µg m^{-3}	99.2%
Perth 2 – Atholl Street	Roadside	311575,723917	54 µg m^{-3}	99.1%

The monitoring data has been ratified to the end of June 2005, and the data after this point may be subject to further quality control. The data indicates an exceedence of the annual mean objective at the Atholl Street site. The concentration measured here is high due to congested and queuing traffic and the 'street canyon' effect of the buildings on both sides of the road. This is within one of the areas previously modelled in the Detailed Assessment, which concluded that exceedences of the annual mean objective were likely in this area.

The measurements at the High Street site indicate a concentration well below the objective. No exceedences on the hourly mean objective were recorded. This area was also modelled in Detailed Assessment in 2004, and this concluded that exceedences were unlikely at this location.

8.4.3.2 Diffusion tube monitoring data

Diffusion tube monitoring has been undertaken at 34 locations within the Perth AQMA, and at 8 further locations within the Perth and Kinross Council area. The tubes are analysed by Dundee Scientific Services using a 20% TEA in water preparation method. Data capture at all of the sites was high, with at least ten months data at all sites.

Collocation studies have been carried out at both of the automatic monitors in Perth, where diffusion tubes have been exposed in triplicate and the measured concentrations compared with the monthly results from the automatic monitor. This was carried out using the **netcen** spreadsheet (available from http://www.airqualityarchive.co.uk/archive/laqm/tools.php). The calculations are summarised in table 8.2. Both collocation studies indicate that the diffusion tube measurements are fairly accurate, as they are both close to one. For the purposes of this screening study, the higher of the two factors has been applied to the other results to give a 'worst-case' scenario. No bias adjustment factor for this laboratory in 2005 has been published on the UWE website for comparison. The range of values published for 2002-2004 is 0.81-0.83, confirming that the factor of 1.02 applied is likely to be somewhat conservative.

Table 8.2 Bias adjustment factor calculation

Site Name	Diffusion Tube Mean	Automatic Analyser Mean	Bias Adjustment Factor
High Street	31	28	0.93 (0.88-0.98)
Atholl Street	53	54	1.02 (0.95-1.1)

Concentrations measured at locations inside of the AQMA are detailed in table 8.3.

Table 8.3 Annual Mean Nitrogen Dioxide Concentrations at sites within the AQMA, μgm^{-3} (2005)

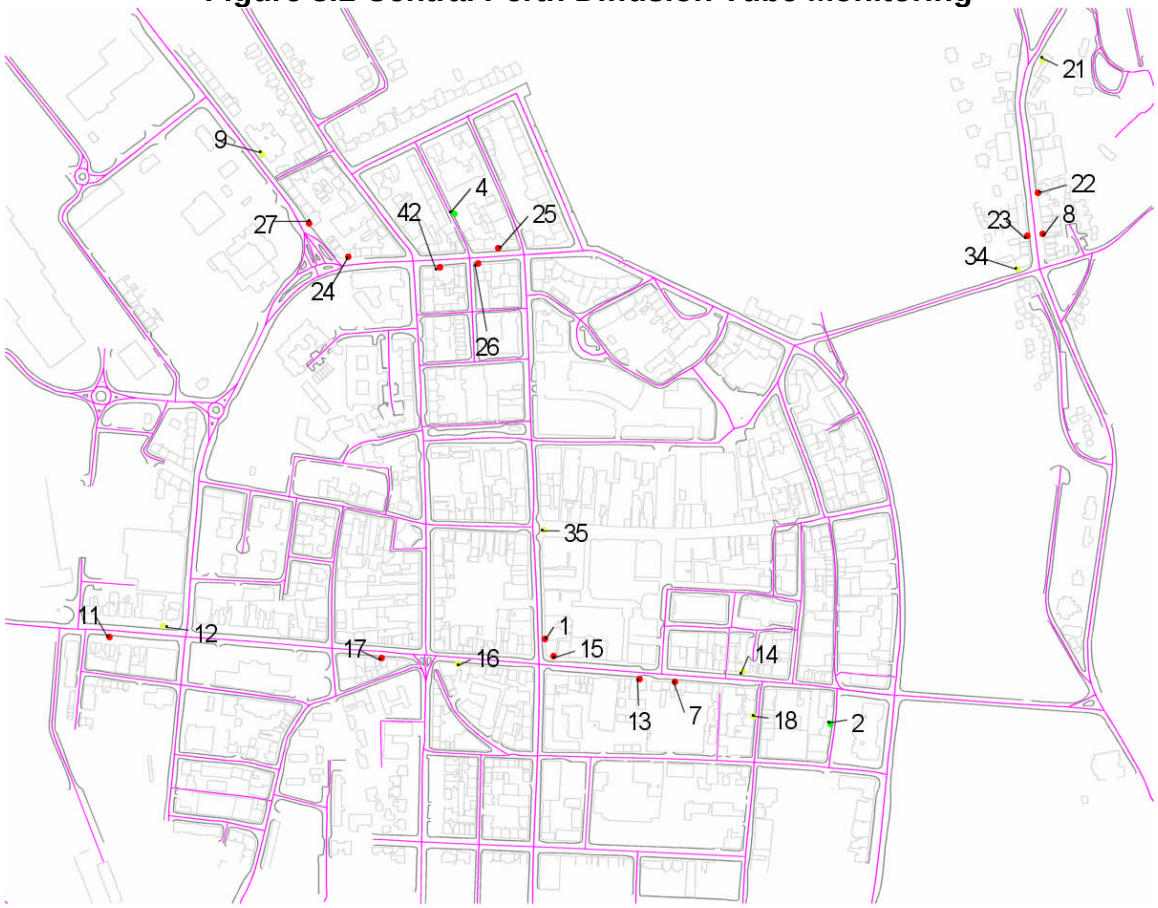
ID	Site Name	Type	Grid Reference	Raw Mean	Bias Adjustment Factor	Adjusted Mean
1	42 Scott St, Perth, PH1 5PH	R	NO117235	43	1.02	**44**
2	17 Speygate, Perth, PH2 8PJ	UC	NO120234	27	1.02	28
3	15 Murray Cres, Perth, PH2 0HU	UB	NO105228	21	1.02	22
4	8 Stormont St, Perth, PH1 5NW	UC	NO116239	23	1.02	24
5	41 Mull Place, Perth, PH1 3DP	UB	NO105257	15	1.02	15
6	257 Rannoch Rd/Newhouse Road Roundabout, Perth, PH1 2DW	UC	NO089244	20	1.02	20
7	86/88 South Street Perth PH2 8PD	R	NO118234	40	1.02	**41**
8	9 Main St, Bridgend, Perth, PH2 7HD	R	NO122239	40	1.02	**41**
9	St Ninian's School ,Dunkeld Rd, Perth, PH1 5RF	R	NO113241	34	1.02	35
10	2 Crieff Road Perth PH1 5RT	R	NO110243	30	1.02	30
11	28 York Place Perth PH2 8EH	R	NO111234	45	1.02	**46**
12	37 York Place Perth PH2 8EH	R	NO112235	40	1.02	40
13	104 South St, Perth, PH2 8PA	R	NO117234	42	1.02	**43**
14	45-47 South St, Perth, PH2 8PD	R	NO119234	34	1.02	35
15	135 South St, Perth, PH2 8PA	R	NO117234	42	1.02	**42**
16	216 South Street Perth PH2 8NY	R	NO116234	39	1.02	40
17	10 County Place, Perth, PH2 8EE	R	NO115234	49	1.02	**50**
18	17 Princes St, Perth, PH2 8NG	R	NO119234	33	1.02	33
19	51 Glasgow Rd, Perth, PH2 0PE	R	NO107235	34	1.02	34
20	Riggs Rd, Perth, PH1 1PR	R	NO108236	32	1.02	32
21	93-109 Main St Bridgend, PH2 7HE	R	NO122241	32	1.02	32
22	39 Main St, Bridgend, PH2 7HD	R	NO122240	45	1.02	**46**
23	18 Main St, Bridgend, PH2 7HB	R	NO122239	45	1.02	**46**
24	76 Atholl St, Perth, PH1 5NL	R	NO114239	51	1.02	**52**
25	26-28 Atholl St, Perth, PH1 6NP	K	NO116239	48	1.02	**49**
26	17 Atholl St, Perth, PH1 5NH	R	NO116239	52	1.02	**53**
27	22 Barrack St, Perth, PH1 5RD	K	NO114239	43	1.02	**44**
28	Ballantine Place, Perth PH1 5RR	UC	NO110243	28	1.02	28
29	204 A Crieff Rd, Perth, PH1 2PE	R	NO093248	29	1.02	30
30	5 East Huntingtower, Perth, PH1 3JJ	R	NO083248	22	1.02	22
31	30 Edinburgh Rd, Perth, PH2 8BX	R	NO114218	26	1.02	27
34	2 West Bridge St, Bridgend, Perth, PH2 7HA	R	NO122239	32	1.02	33
35	Real Time Monitor adjacent to 176 High St, Perth PH1 5EW	R	NO115239	31	1.02	32
42	Atholl St, Perth real time monitor	R	NO117235	53	1.02	**54**

* measured exceedences of the 2005 annual mean objective of 40μg m^{-3} are shown in **bold** text

Of the 34 monitoring sites set up within the AQMA, 14 have measured concentrations greater than 40μgm^{-3}. These are all located within the central Perth area. Figure 8.1 maps the diffusion tube monitoring sites in the centre of Perth. Red markers indicate a concentration greater than 40μg m^{-3}, yellow indicates that the concentration is between 30 and 40μg m^{-3}, and green represents those below 30μg m^{-3}. The exceedences are centred around three locations – Atholl Street in the north, South Street in the centre and Main Street to the east of the river. All of these areas have tall buildings on both sides of the road, as illustrated by the map, which leads to a 'street canyon' effect, increasing the impact of NO_2 from traffic on the air quality.

Each of these areas were modelled in the Detailed Assessment in 2004. However, exceedences of the annual mean objective were only predicted at the Atholl Street and Barrack Street junction area. This is the area where the diffusion tube measurements were highest for 2005. Modelling along South Street found that exceedences of the objective were unlikely in this area, and modelling of the Main Street/Perth Bridge junction predicted concentrations no higher than 36 μg m^{-3}. These locations will be reconsidered in the Further Assessment of the Perth AQMA, which will be carried out later this year.

Figure 8.1 Central Perth Diffusion Tube Monitoring



Concentrations measured outside of the AQMA are detailed in table 8.3.

Table 8.3 Annual Mean Nitrogen Dioxide Concentrations at sites outside the AQMA μgm^{-3} (2005)

Site Name	Raw Mean	Bias Adjustment Factor	Adjusted Mean
Opp Wood'n Garden, Glencarse, PH2 7LX	25	1.02	25
Linden Garden Centre, Glencarse, PH2 7LX	26	1.02	27
7 West High St, Crieff	37	1.02	38
39, High St, Crieff	35	1.02	36
The Highland Trading Company, 62, High St, Crieff	31	1.02	31
9 East High St, Crieff	36	1.02	37
12 Dunkeld Street, Aberfeldy	26	1.02	26
Highland Gift Shop, Bridgend, Aberfeldy	20	1.02	20

No exceedences of the annual mean objective for nitrogen dioxide have been measured outside of the AQMA. A number of sites in Creiff have measured concentrations greater than 35μg m^{-3} – these site should be monitored carefully in the future to see if these concentrations increase.

8.4.4 Screening assessment of road traffic sources

Traffic flow data were taken from the NAEI 2004 roads database, traffic count data for trunk roads in Perth and Kinross for 2005, and traffic count data from minor roads from surveys between 1999 and 2005. Appropriate receptor distances based on the closest property where public exposure was likely and annual average speeds for the road were used. National Road Traffic Forecast (NRTF) factors have been used to project traffic flows forward (where necessary) to 2005 and 2010.

8.4.4.1 Narrow and congested streets with residential properties close to the kerb

A number of narrow and congested streets have been identified, both in central Perth and in other towns in the Perth and Kinross area. These have been assessed using the DMRB model and, where necessary, the road traffic component has been doubled to account for the effect of street canyons. The results of this assessment are summarised in Table 8.4. The model has identified an exceedance of the objective on Atholl Street, where the traffic is very congested.

Diffusion tube monitoring at East High Street, Crieff, measured a concentration of 37 μg m^{-3}, which is much higher than the modelled concentration from the DMRB. The AADTF along this road has been estimated from count points either side of Crieff because no traffic counts have taken place at this location. This might lead to an underestimation of the traffic flow at this point. The high measured concentration could also be a result of heavy congestion and queuing in the area,

or because the High Street is on a hill. None of these factors are accounted for by the model.

Table 8.4 NO_2 concentrations in narrow and congested streets in 2005 ($\mu g\ m^{-3}$)

Street	AADTF	Receptor Distance	Speed	NO_2 Concentration
East High Street, Crieff*	5552	2	20	16.4
Princes Street, Perth*	2195	5	30	15.4
South Street, Perth*	13237	5	30	32.1
Atholl Street, Perth*	27334	5	20	**42.9**
Main Street, Perth*	15252	5	30	34.5
Dundee Road, Perth	12333	5	30	21.0

*Street canyon – road traffic emissions have been doubled.

8.4.4.2 Junctions

Busy junctions throughout Perth and Kinross have been considered, and the results of this assessment are summarised in table 8.5. A number of the junctions are in very built up areas, and the road traffic component has been doubled to account for this. Most of the junctions identified are within the AQMA in Perth, as traffic flows through most of the other towns and villages were not very high.

The model indicated exceedences of the annual mean objective at four locations. These were all 'street canyon' locations, within the Perth AQMA. The first three junctions assessed are in the Atholl Street area, where modelling for the Detailed Assessment had predicted exceedences of the annual mean objective. The County Place and King Street junction was assessed for the Detailed Assessment, but at this time, no exceedences were predicted. This area will be reassessed in the Further Assessment later this year.

No exceedences were predicted outside of the AQMA, or outside of the areas which were assessed in the Detailed Assessment in 2004. The exceedences all correspond to areas where measured concentrations from the diffusion tube monitoring were greater than $40 \mu g\ m^{-3}$. Modelled concentrations for junctions in Crieff were much lower than the measured concentrations, which may be a result of queuing and congestion, or an under-representation of the total traffic flow.

Table 8.5 NO_2 concentrations at busy junctions in 2005 ($\mu g\ m^{-3}$)

Junction	Link	AADTF	Receptor Distance	NO2 Concentration
Atholl Street/Melville Street*	1	27334	8	48.81
	2	3101	8	
Atholl Street/North Methven Street*	1	16599	9	48.22
	2	6598	9	
Atholl Street/Kinnoull Street*	1	16599	9	40.78
	2	769	4	

Junction	Link	AADTF	Receptor Distance	NO2 Concentration
County Place/King Street*	1	13237	9	43.20
	2	4629	7	
Scott Street/South Street*	1	6501	7	37.19
	2	7106	9	
Crieff Road/Dunkeld Road	1	22193	20	27.40
	2	10252	9	
Barrack Street/Atholl Street/Caledonian Road	1	22997	9	28.57
	2	2754	9	
Charlotte Street/Tay Street/Perth Bridge	1	17863	12	30.53
	2	9675	12	
Marshall Place/Edinburgh Road	1	13508	20	23.02
	2	2387	7	
Glasgow Road/Caledonian Road	1	16114	10	30.58
	2	10983	17	
Tay Street/Queen's Bridge	1	5953	10	27.1
	2	11897	7	
Main Street/Perth Bridge	1	12228	8	33.0
	2	17712	10	
Queen's Bridge/Dundee Road	1	12333	13	25.0
	2	11897	13	
Main Street/Isla Road	1	17712	16	28.0
	2	6632	10	
Main Street/Strathmore Street	1	17712	15	32.5
	2	13632	9	
High Street/Boat Brae, Blairgowrie	1	5468	5	14.5
	2	11223	5	
Balmoral Road/Boat Brae, Blairgowrie	1	3497	5	13.4
	2	11223	5	
Burrell Street/ Broich Road, Crieff	1	7315	5	16.83
	2	2245	5	
A85/A822, Crieff	1	4400	2	15.98
	2	7913	10	

*Street canyon – road traffic emissions have been doubled.

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

The main busy streets in central Perth have been assessed in section 8.4.4.1. These streets have commercial premises and shops at street level, but residential property above. The main shopping street in Crieff was also assessed in this section and no exceedences were indicated. No other locations where people are likely to spend 1-hour or more close to the road, and where the AADTF is greater than 10,000 have been identified.

8.4.4.4 Other road traffic sources

One road with greater than 25% HDVs has been identified – Spens Crescent in Perth. However, the total traffic flow on this road is only approximately 400 vehicles per day, so it is unlikely that this will have a significant effect on the local air quality.

No new roads have been constructed or proposed since the last round of Review and Assessment. The main changes to the road layout have been alterations to Perth's one way systems, and the effect of this has been considered in the assessment of busy streets and junctions above.

A new Park and Ride site has been set up, leading to changes in the traffic flows at a number of locations. The site is situated in Scone and serves both the Leonard Street bus station and Mill Street in Perth town centre. The number of bus movements is estimated at 160 per day. Manual traffic counts for 2005 have been carried out on Mill Street and Leonard Street. These locations have both been assessed using the DMRB and the results are summarised in table 8.7. No exceedences of the objectives for NO_2 have been indicated by the model.

Table 8.6 NO_2 concentrations on the main bus routes 2005 ($\mu g\ m^{-3}$)

Street	AADTF	HDV%	Receptor Distance	Speed	NO_2 Concentration
Mill Street	3389	5.71	5	30	13.4
Leonard Street	3060	17.3	5	30	15.4

A screening assessment of the major trunk roads in Perth and Kinross has been undertaken, and the results detailed in Appendix 2. This used worst case receptor (5m) distances and speeds (30kmph on all A roads, 112 kmph on motorways). No exceedences of the annual mean objective for NO_2 were indicated in this assessment.

8.4.5 Screening assessment of industrial sources

The Guidance LAQM.TG(03)[1,2] lists the following processes as significant potential sources of nitrogen dioxide:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Iron and steel (19)
Petroleum processes (16)
Combustion processes (34)
Cement/lime manufacture (9)
Carbonisation (6)
Gasification (4)
Inorganic chemicals (4)

Part B
Glass manufacture

No new industrial sources have started operating in the Perth and Kinross Council area since the last round of Review and Assessment with the potential to emit significant quantities of nitrogen dioxide.

Hydrochafer and Dundee Energy Recycling have both been considered previously, but were not found to be significant sources. These processes have not reported substantially increased emissions to SEPA.

8.4.6 Screening assessment of other transport sources

Bus Stations : The number of bus movements from Perth bus station on Leonard's Street is estimated at around 400 per day. This is less than the threshold figure of 1000 movements per day, and therefore does not need to be assessed.

Airports: There are no airports in Perth and Kinross, or in neighbouring authorities that have a throughput of 5 million passengers per year (or equivalent).

8.5 CONCLUSIONS FOR NITROGEN DIOXIDE CONCENTRATIONS IN COUNCIL AREA

There are no significant industrial sources of NO_2 in the Perth and Kinross Council area. Monitoring and modelling of nitrogen dioxide concentrations in central Perth has indicated some exceedences of the annual mean objective. However, no exceedences outside of the existing AQMA have been measured or modelled.

Perth and Kinross Council is not required to proceed to a detailed assessment for NO_2 as a result of this assessment because exceedences of the annual mean objective for nitrogen dioxide are already being assessed in detail through the ongoing Further Assessment and Action Planning process within the AQMA and will be the subject of annual reports on progress of the Action Plan.

Comparison of modelled concentrations using the DMRB, and measured concentrations using diffusion tubes has indicated some discrepancies between the modelled and measured values in the Crieff area. At this location, estimated traffic counts were used because no data were available, which may lead to a source of error. In addition to this, the diffusion tubes are located on a hill, which would lead to increase emissions from vehicles, which is not accounted for by the model. It is recommended that traffic monitoring should be carried out in this area in order to further investigate the high NO_2 values measured by the diffusion tubes here.

Table 8.7 Updating and Screening Assessment Summary Checklist for Nitrogen Dioxide

Item	Response
Monitoring data outside an AQMA	No exceedences outside of the AQMA have been measured
Monitoring data within an AQMA	14 Exceedences of the objective have been measured within the AQMA, using both automatic and diffusion tube monitoring
Narrow congested streets with residential properties close to the kerb	Five locations have been identified and assessed, and one exceedance of the annual mean objective was indicated.
Junctions	A number of locations have been identified and assessed using DMRB. Exceedences were predicted at a number of locations, but none were outside of the existing AQMA
Busy streets where people may spend 1-hour or more close to traffic	Relevant locations in Perth have been assessed, no relevant locations elsewhere were identified. No exceedences were indicated.
Roads with high flow of buses and/or HGVs.	No roads with a high flow of HDVs have been identified
New roads constructed or proposed since the previous round of R&A	No new roads have been constructed or proposed

Item	Response
Roads with significantly changed traffic flows, or new relevant exposure	The effects of one way systems in Perth have been assessed, and the effects of the new Park and Ride site. Exceedences have been predicted at a number of busy junctions.
Bus Stations	Number of movements is below threshold
New industrial sources.	None present
Industrial sources with substantially increased emissions, or new relevant exposure	None present
Aircraft	No large airports in Perth and Kinross or neighbouring authorities.

9 Updating and Screening Assessment for Sulphur Dioxide

9.1 THE NATIONAL PERSPECTIVE

The main source of sulphur dioxide in the United Kingdom is power stations, which accounted for 69% of emissions in 2004. There are also significant emissions from other industrial combustion sources. Emissions from domestic sources fell by 34% in 2002-2003, but these can still have a significant effect locally. Road transport currently accounts for less than 1% of emissions.

Local exceedences of the objectives (principally the 15-minute mean objective) may occur in the vicinity of small combustion plant (less than 20 MW), which burn coal or oil, in areas where solid fuels are the predominant form of domestic heating, and in the vicinity of major ports.

9.2 STANDARD AND OBJECTIVE FOR SULPHUR DIOXIDE

The Government and the Devolved Administrations have adopted a 15-minute mean of 266 μgm^{-3} as an air quality standard for sulphur dioxide, with an objective for the standard not to be exceeded more than 35 times in a year by the end of 2005.

Additional objectives have also been set which are equivalent to the EU limit values specified in the First Air Quality Daughter Directive. These are for a 1-hour mean objective of 350 μgm^{-3}, to be exceeded no more than 24 times per year, and a 24-hour objective of 125 μgm^{-3}, to be exceeded no more than 3 times per year, to be achieved by the end of 2004.

9.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR SULPHUR DIOXIDE

The First and Second Stage Review and Assessment report for Perth and Kinross concluded that:

- There are no significant sources of sulphur dioxide in the Perth and Kinross Council area, or in adjacent local authority areas.

No AQMAs have been declared for SO_2 in Perth and Kinross.

9.4 SCREENING ASSESSMENT OF SULPHUR DIOXIDE

9.4.1 Source checklist

The Technical Guidance LAQM.TG(03)[1,2] requires assessment of sulphur dioxide to consider the following sources, data or locations:

- Monitoring data outside an AQMA
- Monitoring data within an AQMA
- New industrial sources
- Industrial sources with substantially increased emissions, or new relevant exposure
- Areas of domestic coal burning
- Small boilers (>5MW (thermal)) burning coal or oil
- Shipping
- Railway Locomotives

These are evaluated in the following sections.

9.4.2 Background concentrations for sulphur dioxide

The estimated average background sulphur dioxide concentration for 2001 was 0.85μgm^{-3} with a maximum concentration of 18.5 μgm^{-3}.

9.4.3 Screening assessment of monitoring data

No monitoring of sulphur dioxide has been carried out in Perth and Kinross since the last round of Review and Assessment. Monitoring between 1999 and 2001 indicated maximum 1-hour values well within the objective. Concentrations are not expected to have increased.

9.4.4 Screening assessment of industrial sources

The Guidance LAQM.TG(03)[1,2] lists the following processes as significant potential sources of sulphur dioxide:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Iron and steel (9)
Petroleum processes (15)
Combustion processes (45)
Cement/lime manufacture (3)
Carbonisation (10)
Non-ferrous metals (7)
Ceramic Production (9)

Part B
Combustion plant 20-50 mwth

Furnaces 20-50 mwth
Copper processes
Refractory goods
Glass manufacture
Roadstone coating

No new potential sources of SO_2 have begun operating since the last round of Review and Assessment. None of the sources considered previously were found to be significant, and no changes in these processes have been reported.

9.4.5 Small Boilers

No new small boilers have been identified in Perth and Kinross. The previous Updating and Screening Assessment identified one small boiler process greater than 5MW, but the emissions from this source were well below the threshold. No changes to this process have been reported.

9.4.6 Domestic coal burning

Domestic coal burning was assessed for the last round of Review and Assessment. Based on data about gas availability, knowledge of council housing stock, and the frequency of deliveries of solid fuels, it was considered unlikely that there were any areas with more than 100 households in a 500m square burning coal. The use of solid fuel is expected to have declined since 2004. No further assessment of this source is considered necessary.

9.4.7 Screening assessment of other transport sources

Shipping : There are approximately two hundred shipping movements each year from Perth Harbour. This is significantly less than the threshold of 5000 which would require a Detailed Assessment.

Railways : No locations were identified within the Perth and Kinross Council area where locomotives are stationary for prolonged periods and where members of the public would be exposed.

9.5 CONCLUSIONS FOR SULPHUR DIOXIDE CONCENTRATIONS IN COUNCIL AREA

There are no significant industrial sources of sulphur dioxide, and although there are a number of areas where solid fuel is used in homes, no areas have been identified with a high density of coal use.

Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for sulphur dioxide.

Table 9.1 Updating and Screening Assessment Summary Checklist for Sulphur Dioxide

Item	Response
Monitoring data outside an AQMA	No monitoring of SO_2 has been carried out
Monitoring data within an AQMA	No AQMAs declared for SO2
New industrial sources.	None present
Industrial sources with substantially increased emissions, or new relevant exposure	None present
Areas of domestic coal burning	No areas of high density coal use identified
Small Boilers > 5 MW (thermal).	No new small boiler processes identified
Shipping	Fewer than the threshold number of movements from Perth Harbour
Railway Locomotives	No relevant locations identified

10 Updating and Screening Assessment for PM_{10}

10.1 THE NATIONAL PERSPECTIVE

National UK emissions of primary PM_{10} have been estimated as totalling 141,000 tonnes in 2003. Of this total, around 27% was derived from road transport sources. It should be noted that, in general, the emissions estimates for PM_{10} are less accurate than those for the other pollutants with prescribed objectives, especially for sources other than road transport.

The Government established the Airborne Particles Expert Group (APEG) to advise on sources of PM_{10} in the UK and current and future ambient concentrations. Their conclusions were published in January 1999 (APEG, 1999). APEG concluded that a significant proportion of the current annual average PM_{10} is due to the secondary formation of particulate sulphates and nitrates, resulting from the oxidation of sulphur and nitrogen oxides. These are regional scale pollutants and the annual concentrations do not vary greatly over a scale of tens of kilometres. There are also natural or semi-natural sources such as wind-blown dust and sea salt particles. The impact of local urban sources is superimposed on this regional background. Such local sources are generally responsible for winter episodes of hourly mean concentrations of PM_{10} above 100 $\mu g\ m^{-3}$ associated with poor dispersion. However, it is clear that many of the sources of PM_{10} are outside the control of individual local authorities and the estimation of future concentrations of PM_{10} are in part dependent on predictions of the secondary particle component.

10.2 STANDARD AND OBJECTIVE FOR PM_{10}

The Government and the Devolved Administrations have adopted two Air Quality Objectives for fine particles (PM_{10}), which are equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives are 40 μgm^{-3} as the annual mean, and 50 μgm^{-3} as the fixed 24-hour mean to be exceeded on no more than 35 days per year, to have been achieved by the end of 2004. In addition there is an objective of 50 μgm^{-3} as the fixed 24-hour mean to be exceeded on no more than 7 days per year and 18 μgm^{-3} as the annual mean to be achieved by the end of 2010. The objectives are based upon measurements carried out using the European gravimetric transfer reference sampler or equivalent.

The Commission is currently consulting on a new consolidated Directive on Ambient Air Quality, which is likely to see changes to the above Limit Values, though the nature of these changes cannot be confirmed at this time.

10.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR PM_{10}

The following conclusions were given for PM_{10} in the second round of Review and Assessment for Perth and Kinross:

- The Updating and Screening Assessment concluded that exceedences of the daily mean objectives for 2004 and 2010 may occur, and the annual mean objective for 2010 was likely to be exceeded at relevant locations close to busy roads and junctions.
- Modelling of PM_{10} for the detailed assessment confirmed the extent of the likely exceedences.

An AQMA covering the whole of Perth town has been declared for PM_{10}.

10.4 SCREENING ASSESSMENT OF PM_{10}

10.4.1 Checklist for PM_{10}

The Technical Guidance LAQM.TG(03)[1,2] requires assessment of PM_{10} to consider the following sources, data or locations:

- Monitoring data outside an AQMA
- Monitoring data within an AQMA
- Busy roads
- Junctions
- Roads with high flow of buses and/or HGVs
- New roads constructed or proposed since last round of Review and Assessment
- Roads close to the objective during the last round of Review and Assessment
- Roads with significantly changed traffic flows, or new relevant exposure
- New industrial sources
- Industrial sources with substantially increased emissions, or new relevant exposure
- Areas with domestic solid fuel burning
- Quarries, landfill sites, opencast coal, handling of dusty cargoes at ports etc
- Aircraft

These are evaluated in the following sections.

10.4.2 Background concentrations for PM_{10}

The estimated average background PM_{10} concentration for 2005 was 9.7 μgm^{-3} in Perth and Kinross with a maximum concentration of 15.4 μgm^{-3}. In 2010, these values are projected to have decreased – the average is projected as 9.2 μgm^{-3} and the maximum 14.2 μgm^{-3}.

10.4.3 Screening assessment of monitoring data

Monitoring of PM_{10} has been carried out at both of the monitoring sites in Perth town centre. PM_{10} is monitored using a TEOM and the values have been adjusted to the gravimetric equivalent for comparison with the objectives by scaling up by a factor of 1.3 as detailed in TG(03)[1,2]. The site is managed by **netcen**, and the data ratified to the same standards as the AURN.

Table 10.1 Summary of PM_{10} Monitoring data (2005)

Site	Annual Mean	Maximum Daily Mean	Number of exceedences of daily mean objective
Perth 1 – High Street	18	52	1
Perth 2 – Atholl Street	25	60	4

The 2004 annual objective was not exceeded at either site, and the number of exceedences of the daily mean objective were within the permitted amount.

Projecting these concentrations forward to 2010 gives a concentration of 17 μgm^{-3} at the High Street site and 23 μgm^{-3} at the Atholl Street site. This suggests that the 2010 annual mean objective for PM_{10} will be exceeded at the Atholl Street monitoring site. This is within the existing AQMA for PM_{10}.

10.4.4 Screening assessment of road traffic sources

Traffic flow data were taken from the NAEI 2004 roads database, traffic count data for trunk roads in Perth and Kinross for 2005, and traffic count data from minor roads from surveys between 1999 and 2005. Appropriate receptor distances based on the closest property where public exposure was likely and annual average speeds for the road were used. National Road Traffic Forecast (NRTF) factors have been used to project traffic flows forward (where necessary) to 2005 and 2010. Busy roads and junctions

The Guidance in LAQM.TG(03)[1,2] requires the assessment of all roads and junctions in Scotland where the AADTF is expected to be greater than 10,000 in 2010, and with relevant exposure within 10m.

All census points with a flow of more than 10,000 from both the NAEI traffic database, and the data provided by Transport Scotland have been assessed. Receptor distances of 15m for motorways and 5m for all A roads have been assumed, and the results are summarised in Table 10.2. Average speeds have been estimated using local knowledge where measured speeds have not been available. No exceedences of the 2004 or 2010 annual mean objectives have been predicted, and the number of exceedences of the daily mean is within the permitted number of days at all locations.

Table 10.2 Annual mean PM_{10} concentrations ($\mu g\ m^{-3}$) close major roads, and daily mean exceedences in 2005 and 2010

						2005		2010	
Source	Road name	Receptor Distance	AADTF (2005)	Speed (kmph)	HDV %	Mean	Days	Mean	Days
NAEI	M90	15	31498	112	10.0	17.7	1	14.8	0
NAEI	A9	15	14181	80	8.8	12.6	0	11.0	0
NAEI	A9	15	25610	80	14.4	15.5	0	12.9	0
NAEI	A93	15	10229	30	5.7	13.7	0	12.2	0
NAEI	A93	15	12603	30	9.8	17.0	1	14.9	0
NAEI	M90	15	29755	112	8.9	15.4	0	13.2	0
NAEI	A9	15	13221	80	11.0	14.4	0	12.5	0
NAEI	A90	15	32590	80	12.8	18.8	2	15.0	0
NAEI	M90	15	29745	112	13.7	19.4	3	16.1	0
NAEI	A912	5	9849	30	4.6	13.8	0	12.2	0
NAEI	A9	15	23033	80	15.0	18.0	1	14.1	0
NAEI	M90	15	27023	112	9.3	16.9	1	13.9	0
NAEI	A85	15	16938	30	3.2	15.2	0	13.5	0
NAEI	A912	15	11313	30	5.3	17.4	1	15.4	0
NAEI	M90	15	28615	112	10.4	18.2	2	14.9	0
NAEI	A9	15	13977	80	9.3	14.1	0	11.9	0
NAEI	A90	15	34172	80	12.5	17.6	1	14.9	0
NAEI	A90	15	34101	80	14.1	16.3	0	13.4	0
NAEI	M90	15	34278	112	11.3	18.8	2	15.6	0
NAEI	A989	15	17911	30	2.6	15.2	0	13.5	0
NAEI	A85	15	11813	30	6.3	15.1	0	13.5	0
NAEI	M90	15	33564	112	13.9	17.4	1	14.5	0
NAEI	A85	15	10252	30	5.0	15.5	0	13.9	0
NAEI	A85	15	11919	30	7.2	14.3	0	12.8	0
NAEI	A989	15	11037	30	7.6	15.2	0	13.7	0
NAEI	A93	15	11223	30	4.0	13.6	0	12.2	0
NAEI	A94	15	19995	30	5.6	15.8	0	13.8	0
NAEI	M90	15	26781	112	6.6	16.7	1	14.3	0
NAEI	A85	15	15375	30	4.7	17.1	1	14.9	0
NAEI	A912	15	11993	30	5.3	17.1	1	15.1	0
NAEI	A85	15	12039	30	7.2	15.4	0	13.4	0
NAEI	A90	15	12039	80	7.2	15.4	0	13.4	0
NAEI	A93	5	9997	50	4.8	16.4	0	14.5	0
NAEI	A9	15	23185	80	14.2	18.0	1	14.4	0
NAEI	A9	15	22167	80	14.8	18.2	2	14.4	0
NAEI	A9	15	24605	80	14.9	18.3	2	14.4	0
NAEI	A9	15	28263	80	8.6	18.1	1	15.0	0

						2005		2010	
Source	**Road name**	**Receptor Distance**	**AADTF (2005)**	**Speed (kmph)**	**HDV %**	**Mean**	**Days**	**Mean**	**Days**
NAEI	A93	15	10984	30	4.8	17.6	1	15.6	0
NAEI	A85	15	21570	30	6.1	18.3	2	15.7	0
NAEI	A912	15	19908	30	7.1	16.8	1	14.3	0
NAEI	A989	15	16114	30	4.4	17.3	1	15.2	0
NAEI	A9	15	25310	80	13.5	17.9	1	14.2	0
NAEI	A9	15	23719	80	10.3	18.5	2	15.3	0
Transport Scotland	M90 N of B9097	15	27557	112	10.0	18.5	2	15.7	0
Transport Scotland	M90 N of A91	15	30329	112	10.0	18.7	2	15.8	0
Transport Scotland	M90 Friarton Bridge - S of A85	15	31407	112	10.0	18.8	2	15.9	0
Transport Scotland	A9 N of A924/B8019	15	9999	80	10.0	15.8	0	13.8	0
Transport Scotland	A9 S of A827/Ballinluig	15	10785	80	10.0	16.0	0	13.9	0
Transport Scotland	A9 N of A822/Dunkeld	15	13308	80	10.0	16.8	1	14.4	0
Transport Scotland	A9 N of Inveralmond	15	23424	80	10.0	18.2	2	15.1	0
Transport Scotland	A9 Broxden - SW of M90	15	25313	80	10.0	18.3	2	15.2	0
Transport Scotland	A9 Blackford Bypass	15	25345	80	10.0	18.3	2	15.2	0
Transport Scotland	A9 SW of A822/Greenloaning	15	28406	80	10.0	18.6	2	15.4	0
Transport Scotland	A9 Greenloaning N of A822	15	25292	80	10.0	18.3	2	15.2	0
Transport Scotland	M90 J6 - J7	15	28283	112	10.0	18.5	2	15.7	0
Transport Scotland	A90 - West of Dundee near BP Garage	15	36791	50	10.0	19.2	3	15.7	0
Transport Scotland	A90 - East of Kinfauns Castle	15	35181	80	10.0	19.1	2	15.7	0
Transport Scotland	M90 Junction 9 to 10	15	35494	112	10.0	19.1	2	16.1	0
Transport Scotland	A9 - Perth Western By-pass (North)	15	25401	80	10.0	18.3	2	15.2	0
Transport Scotland	A9 - Perth Western By-pass (South)	15	22648	80	10.0	18.1	1	15.1	0

						2005		2010	
Source	**Road name**	**Receptor Distance**	**AADTF (2005)**	**Speed (kmph)**	**HDV %**	**Mean**	**Days**	**Mean**	**Days**
Transport Scotland	M90 - Southern Arm 1 Mile from Junction with A9	15	13243	112	10.0	16.7	1	14.6	0
Transport Scotland	A9 - North of Auchterarder - South of B934	15	25999	80	10.0	18.4	2	15.3	0
Transport Scotland	A9 - North End of Auchterarder By-pass	15	22954	80	10.0	18.1	1	15.1	0
Transport Scotland	A9 - Southwest of Auchterarder	15	24657	80	10.0	18.3	2	15.2	0
Transport Scotland	A90 Kinfauns - NE of B958/Glencarse	15	33440	70	10.0	19.0	2	15.6	0
Transport Scotland	M90 S of A912 - at Glenfarg (N of Junc 8)	15	26162	112	10.0	18.3	2	15.6	0
Transport Scotland	A9 North of Auchterarder bypass	15	25711	80	10.0	18.4	2	15.3	0
Transport Scotland	A90 INCHMARTINE - SW OF B953	15	32382	80	10.0	18.9	2	15.6	0
Transport Scotland	A9 Luncarty	15	15993	80	10.0	17.4	1	14.7	0
Transport Scotland	A9 Dunkeld	15	13133	80	10.0	16.7	1	14.3	0
Transport Scotland	A9 Moulinearn	15	13162	80	10.0	16.7	1	14.3	0
Transport Scotland	A9 Killiecrankie	15	9415	80	10.0	15.6	0	13.7	0
Transport Scotland	A90 Longforgan	15	34809	80	10.0	19.1	2	15.7	0
Transport Scotland	A9 Blackford	15	25742	80	10.0	18.4	2	15.3	0
Transport Scotland	A9 Birnam	15	13174	80	10.0	16.7	1	14.3	0
Transport Scotland	M90S J6 Main Carriageway	15	11042	30	10.0	16.1	0	14.0	0
Transport Scotland	A9 West of M90 J11	15	25772	80	10.0	18.4	2	15.3	0
Transport Scotland	M90 J10 to J9	15	18000	112	10.0	17.6	1	15.1	0

A number of junctions meeting the criteria have been identified and assessed for both 2005 and 2010. The results of this assessment are summarised in table 10.3.

No exceedences of the 2004 objectives have been predicted. The 2010 annual mean objective is predicted to be exceeded at 11 of the locations assessed.

PM_{10} concentrations along Atholl Street were modeled for the Detailed Assessment in 2004 and exceedances of the 2010 annual mean were predicted. The other locations where exceedances have been predicted in this report were not modelled in the Detailed Assessment, and should be assessed in the Further Assessment later this year. All of the predicted exceedances are within the boundary of the existing AQMA.

Table 10.3 Annual mean PM_{10} concentrations ($\mu g\ m^{-3}$) close to junctions, and daily mean exceedences in 2005 and 2010

Junction	Link	AADTF	Receptor Distance	Mean 2005	Days 2005	Mean 2010	Days 2010
Atholl Street/Melville Street	1	27334	8	26.23	15.52	**19.89**	3.27
	2	3101	8				
Atholl Street/North Methven Street	1	16599	9	25.97	14.83	**19.63**	2.96
	2	6598	9				
Atholl Street/Kinnoull Street	1	16599	9	22.86	7.84	17.85	1.29
	2	769	4				
County Place/King Street	1	13237	9	23.83	9.77	**18.81**	2.10
	2	4629	7				
Scott Street/South Street	1	6501	7	21.50	5.49	17.43	1.00
	2	7106	9				
Crieff Road/Dunkeld Road	1	22193	20	24.86	12.07	**19.45**	2.76
	2	10252	9				
Barrack Street/Atholl Street/Caledonian Road	1	22997	9	25.06	12.55	**19.23**	2.53
	2	2754	9				
Charlotte Street/Tay Street/Perth Bridge	1	17863	12	26.80	17.09	**20.31**	3.79
	2	9675	12				
Marshall Place/Edinburgh Road	1	13508	20	20.72	4.33	16.97	0.72
	2	2387	7				
Glasgow Road/Caledonian Road	1	16114	10	26.84	17.22	**20.33**	3.82
	2	10983	17				
Tay Street/Queen's Bridge	1	5953	10	23.84	9.79	**18.58**	1.88
	2	11897	7				
Main Street/Perth Bridge	1	12228	8	29.16	24.53	**21.46**	5.42
	2	17712	10				
Perth Bridge/Dundee Road	1	12333	13	22.18	6.61	17.63	1.13
	2	11897	50				
Main Street/Isla Road	1	17712	16	24.60	11.45	**18.89**	2.18
	2	6632	10				

Junction	Link	AADTF	Receptor Distance	Mean 2005	Days 2005	Mean 2010	Days 2010
Main Street/Strathmore Street	1	17712	15	28.66	22.84	**21.19**	5.02
	2	13632	9				
High Street/Boat Brae, Blairgowrie	1	5468	5	17.37	0.96	14.51	0.00
	2	11223	5				
Balmoral Road/Boat Brae, Blairgowrie	1	3497	5	16.57	0.53	14.04	0.00
	2	11223	5				
Burrell Street/ Broich Road, Crieff	1	7315	5	20.18	3.63	15.25	0.15
	2	2245	5				
A85/A822, Crieff	1	4400	2	24.48	11.18	15.90	0.28
	2	7913	10				

10.4.4.1 Other road traffic sources

One road with greater than 25% HDVs has been identified – Spens Crescent in Perth. However, the total traffic flow on this road is only approximately 400 vehicles per day, so it is unlikely that this will have a significant effect on the local air quality.

No new roads have been constructed or proposed since the last round of Review and Assessment. The main changes to the road layout have been alterations to Perth's one way systems, and the effect of this has been considered in the assessment of busy streets and junctions above.

A new Park and Ride site has been set up, leading to changes in the traffic flows at a number of locations. The site is situated in Scone and serves both the Leonard Street bus station and Mill Street in Perth town centre. The number of bus movements is estimated at 160 per day. Manual traffic counts for 2005 have been carried out on Mill Street and Leonard Street. These locations have both been assessed using the DMRB and the results are summarised in table 10.4. No exceedences of either the 2004 or 2010 objectives have been predicted.

Table 10.4 Annual mean PM_{10} concentrations ($\mu g\ m^{-3}$) on main bus routes and daily mean exceedences in 2005 and 2010

Street	AADTF	HDV%	Receptor Distance	Speed (kmph)	Mean 2005	Days 2005	Mean 2010	Days 2010
Mill Street	3389	5.71	5	30	14.98	0	13.59	0.00
Leonard Street	3060	17.3	5	30	15.71	0	13.96	0.00

10.4.5 Screening assessment of industrial sources

The Guidance LAQM.TG(03)[1,2] lists the following processes as significant potential sources of PM_{10}:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)

Iron and steel (61)
Petroleum processes (4)
Combustion processes (13)
Cement/lime manufacture (7)
Carbonisation (2)
Gasification (4)
Non-ferrous metals (4)
Fertilizer production

Part B
Combustion plant 20-50 mwth
Furnaces 20-50 mwth
Coal and coke processes
Quarry Process
Roadstone coating
Rubber processes
China and clay processes
Coating powder
Coil coating

One new industrial process which has not previously been considered has begun operating since the last round of Review and Assessment. This is a quarry process and is considered in section 10.4.7. SEPA have confirmed that there have been no significant changes to any of the industrial processes already in operation.

10.4.6 Quarries and landfill sites

One new quarry process which has not previously been assessed is now in operation in the Perth and Kinross Council area – Marlee Quarry, near Blairgowrie. There are no relevant locations for public exposure within 200m of this site. Perth and Kinross Council have received no complaints about dust relating to any of the mineral processes in their area in 2005.

10.4.7 Domestic solid fuel burning

Domestic solid fuel burning was assessed for the last round of Review and Assessment. Based on data about gas availability, knowledge of council housing stock, and the frequency of deliveries of solid fuels, it was considered unlikely that there were any areas with more than 50 households in a 500m square burning solid fuels. The use of solid fuel is expected to have declined since 2004. No further assessment of this source is considered necessary.

10.4.8 Screening assessment of other transport sources

There are no large airports in Perth and Kinross or neighbouring authorities which are likely to impact on the local air quality.

10.5 CONCLUSIONS FOR PM_{10} CONCENTRATIONS IN COUNCIL AREA

Monitoring data did not record any exceedences of the 2004 objectives for PM_{10} in 2005. However, projecting these PM_{10} concentrations forward to 2010 indicates that this objective is not likely to be met at the Atholl Street monitoring site. DMRB modelling of roads and junctions indicated no exceedences of the 2004 objectives, but the 2010 objective is not likely to be met at a number of junctions in Perth centre. No other potential sources have been identified. All projected exceedences are within the existing AQMA for PM_{10}.

Perth and Kinross Council is not required to proceed to a Detailed Assessment for PM_{10} as a result of this assessment because exceedences of the 2010 annual mean objective for $PM_{10}$are already being assessed in detail through the ongoing Further Assessment and Action Planning process within the AQMA and will be subject of annual reports on progress of the Action Plan.

Table 10.5 Updating and Screening Assessment Summary Checklist for PM_{10}

Item	Response
Monitoring data outside an AQMA	No monitoring has been carried out outside of the AQMA
Monitoring data within an AQMA	No exceedences were measured within the AQMA, but projected concentrations for 2010 indicate exceedences of the 2010 annual mean objective
Busy roads and junctions in Scotland	The screening assessment of busy roads indicated no exceedences.
Junctions.	A number of exceedences at busy junctions have been predicted for 2010. These are all within the existing AQMA.
Roads with high flow of buses and/or HGVs.	No roads with a high flow of HDVs have been identified

Item	Response
New roads constructed or proposed since last round of R&A	No new roads have been constructed since the last round of Review and Assessment.
Roads with significantly changed traffic flows, or new relevant exposure.	The effects of changes to one way systems in Perth, and of the increased buses from the new Park and Ride site have been assessed.
Roads close to the objective during the second round of Review and Assessment	All roads have been reassessed with new traffic data
New industrial sources.	None present (except for new quarry)
Industrial sources with substantially increased emissions, or new relevant exposure	None present
Areas of domestic solid fuel burning	No areas with a high density of homes using solid fuel have been identified
Quarries / landfill sites / opencast coal / handling of dusty cargoes at ports etc.	None of the quarries and landfill sites have relevant public exposure within 200m. No complaints of dust nuisance have been received by the council.
Aircraft	There are no large airports in or around Perth and Kinross.

11 Conclusions

11.1 CARBON MONOXIDE

There are no roads in the Perth and Kinross Council area which can be classified as 'very busy' according to the criteria in the guidance. Consequently, Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for carbon monoxide.

11.2 BENZENE

There are no roads in Perth and Kinross that can be classified as 'very busy' according to the criteria in the guidance. There are no petrol stations with a throughput greater than 2 million litres and with relevant exposure within 10m of the pumps. Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for benzene.

11.3 1,3-BUTADIENE

Estimated background concentrations indicate that the 2003 objective for 1,3-butadiene is being achieved in Perth and Kinross. There are no significant industrial sources that have the potential to emit 1,3-butadiene. Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for 1,3-butadiene.

11.4 LEAD

Emissions of lead from industrial processes in and around Perth and Kinross are not likely to exceed the objectives for lead to be achieved in 2004 and 2008. Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for lead.

11.5 NITROGEN DIOXIDE

There are no significant industrial sources of nitrogen dioxide in the Perth and Kinross Council area. Monitoring, using both diffusion tubes and automatic methods, has indicated a number of exceedences of the annual mean objective for nitrogen dioxide. The DMRB also predicted a number of exceedences of the objective at busy junctions in Perth. All predicted and measured exceedences were inside of the existing AQMA.

Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for nitrogen dioxide as a result of this assessment. Exceedences of the annual mean objective for nitrogen dioxide are already being assessed in detail

through the ongoing Further Assessment and Action Planning process within the AQMA and will be subject of annual reports on progress of the Action Plan.

11.6 SULPHUR DIOXIDE

There are no significant industrial or domestic sources of sulphur dioxide in Perth and Kinross. Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for sulphur dioxide.

11.7 PM_{10}

Monitoring data and DMRB modelling indicated no exceedences of the 2004 objectives for PM_{10} in the Perth and Kinross Council area. Projections to 2010 indicated that the annual mean objective of 18μg m^{-3} is unlikely to be met at a number of locations close to junctions in Perth. No significant industrial or domestic sources have been identified. All projected exceedences of the 2010 annual mean objective are located within the existing AQMA for PM_{10}.

Perth and Kinross Council is not required to carry out a Detailed Review and Assessment for PM_{10} as a result of this assessment. Exceedences of the 2010 annual mean objective for $PM_{10}$are already being assessed in detail through the ongoing Further Assessment and Action Planning process within the AQMA and will be subject of annual reports on progress of the Action Plan.

11.8 SUMMARY AND RECOMMENDATIONS

A Detailed Assessment is not required for benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide or PM_{10} as a result of this assessment. Exceedences of the annual mean objective for nitrogen dioxide and of the 2010 annual mean objective for PM_{10} are already being assessed in detail through the ongoing Further Assessment and Action Planning process within the AQMA and will be subject of annual reports on progress of the Action Plan.

DMRB modelling of traffic emissions in Crieff High Street indicates NO_2 concentrations much lower than the measured concentrations from the diffusion tube monitors, which were close to the objective. It is recommended that more detailed traffic monitoring is carried out in Crieff so that the NO_2 concentrations can be more effectively modelled.

12 References

1. Part IV of the Environment Act 1995. Local Air Quality Management. Technical Guidance LAQM.TG(03) January 2003.

2. LAQM.TG(03) – Update. January 2006

3. The Air Quality Regulations (2000) and The Air Quality (Scotland) Amendment Regulations 2002.

4. DETR (2000) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Department f the Environment, Transport and the Regions. Cm 4548, SE 2000/3, NIA 7

5. Part IV of the Environment Act 1995. Local Air Quality Management. Progress Report Guidance. LAQM.PRG(03). 2003

6. Air Quality Detailed Assessment. 2004, AEA Technology plc, Report AEAT/ENV/R1708 Issue 1

7. Maps of Estimated Ambient Air Pollution
http://www.airquality.co.uk/archive/laqm/tools.php

8. Design Manual For Roads and Bridges, Highways Agency, 2003

9. EA (1998b) Guidance for estimating the air quality impact of stationary sources. Guidance Note 24. Environment Agency

10. National Lead Monitoring Network
http://www.airquality.co.uk/archive/data/metals/metals_data.xls

Appendices

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Appendix 1
Detailed Monitoring data

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A1.1 Monthly average NO_2 concentrations from diffusion tube measurements(2005)

Site Name	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05
42 Scott St, Perth, PH1 5PH	47	43	44	37	39	37	37	36	40	51	49	58
42 Scott St, Perth, PH1 5PH	45	48	49	38	40	36	41	30	40	49	49	54
42 Scott St, Perth, PH1 5PH	45	43	50	47	38	35	43	29	38	50	49	55
17 Speygate, Perth, PH2 8PJ	34	30	35	23	15	16	21	20	25	31	34	43
15 Murray Cres, Perth, PH2 0HU	23	23	24	16	15	13	13	14	20	25	26	38
15 Murray Cres, Perth, PH2 0HU	27	23	25	15	14	16	15	14	19	26	25	40
8 Stormont St, Perth, PH1 5NW	32	26	26	19	17	16	15	17	27	27	29	33
8 Stormont St, Perth, PH1 5NW	31	23	25	17	18	19	14	20	24	28	28	32
41 Mull Place, Perth, PH1 3DP	21	16	18	9	9	9	8	8	13	17	19	28
257 Rannoch Rd/Newhouse Road Roundabout, Perth, PH1 2DW	19	21	22	19	14	12	16	13	17	25	25	32
86/88 South Street Perth PH2 8PD	42	40	45	38	36	34	30	34	39	51	47	51
86/88 South Street Perth PH2 8PD	41	43	44	38	36	34	38	36	40	45	47	x
9 Main St, Bridgend, Perth, PH2 7HD	33	40	43	41	38	37	42	30	35	42	42	48
9 Main St, Bridgend, Perth, PH2 7HD	37	45	45	49	40	35	40	29	37	45	36	46
9 Main St, Bridgend, Perth, PH2 7HD	39	44	47	42	39	38	41	29	40	46	42	44
St Ninian's School ,Dunkeld Rd, Perth, PH1 5RF	36	38	37	24	29	25	26	24	38	45	38	46
2 Crieff Road Perth PH1 5RT	32	28	33	24	27	22	27	20	30	35	38	42
28 York Place Perth PH2 8EH	47	45	49	44	39	35	38	32	45	59	51	53
37 York Place Perth PH2 8EH	40	42	50	37	30	x	38	26	36	46	42	49
104 South St, Perth, PH2 8PA	41	40	43	41	37	36	41	38	43	45	48	54
104 South St, Perth, PH2 8PA	48	40	47	42	39	39	38	34	44	42	47	56
104 South St, Perth, PH2 8PA	49	43	45	34	37	37	40	35	41	46	45	56
45-47 South St, Perth, PH2 8PD	39	42	40	32	27	21	33	25	29	38	38	46
135 South St, Perth, PH2 8PA	46	48	47	39	38	32	37	29	39	45	47	53
216 South Street Perth PH2 8NY	42	41	44	35	34	26	31	31	38	46	47	53
10 County Place, Perth, PH2 8EE	44	47	43	49	49	46	46	44	54	56	53	60
10 County Place, Perth, PH2 8EE	51	44	46	59	46	49	46	42	53	45	52	62
17 Princes St, Perth, PH2 8NG	37	36	39	25	28	26	31	31	33	35	40	x
51 Glasgow Rd, Perth, PH2 0PE	38	34	38	30	30	27	28	22	31	36	44	47
Riggs Rd, Perth, PH1 1PR	35	31	36	28	27	26	21	22	31	38	41	44
93-109 Main St Bridgend, PH2 7HE	31	32	35	33	30	28	32	22	28	40	32	35
39 Main St, Bridgend, PH2 7HD	42	47	50	48	43	41	46	31	46	52	44	46
39 Main St, Bridgend, PH2 7HD	45	48	55	53	40	41	45	27	44	52	49	51
18 Main St, Bridgend, PH2 7HB	48	46	46	42	39	39	43	38	48	46	45	56
18 Main St, Bridgend, PH2 7HB	49	49	51	37	43	39	47	44	46	45	48	56
76 Atholl St, Perth, PH1 5NL	39	58	57	55	42	45	54	33	43	57	54	63
76 Atholl St, Perth, PH1 5NL	53	56	57	57	44	42	44	34	46	61	58	64
26-28 Atholl St, Perth, PH1 6NP	48	57	53	41	45	40	46	39	47	48	53	63

Site Name	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05
17 Atholl St, Perth, PH1 5NH	52	51	54	50	48	51	49	48	55	56	58	59
17 Atholl St, Perth, PH1 5NH	51	53	51	46	51	56	56	44	55	54	54	48
17 Atholl St, Perth, PH1 5NH	56	53	54	37	51	52	52	46	55	54	54	61
22 Barrack St, Perth, PH1 5RD	45	47	44	38	34	33	35	31	40	51	52	55
22 Barrack St, Perth, PH1 5RD	47	48	50	41	37	37	35	29	39	56	56	55
Ballantine Place, Perth PH1 5RR	29	29	31	x	21	18	20	x	20	35	33	40
204 A Crieff Rd, Perth, PH1 2PE	25	32	30	30	25	27	26	21	26	36	34	42
5 East Huntingtower, Perth, PH1 3JJ	22	11	25	23	18	24	19	18	22	36	9	33
30 Edinburgh Rd, Perth, PH2 8BX	x	29	31	24	18	20	22	16	25	36	29	40
2 West Bridge St, Bridgend, Perth, PH2 7HA	38	36	36	29	26	27	29	24	30	36	41	37
Real Time Monitor adjacent to 176 High St, Perth PH1 5EW	36	40	34	25	26	24	26	23	29	34	37	42
Real Time Monitor adjacent to 176 High St, Perth PH1 5EW	36	39	35	27	28	22	24	21	30	33	35	41
Real Time Monitor adjacent to 176 High St, Perth PH1 5EW	37	41	38	25	27	24	20	23	26	34	40	44
Atholl St, Perth real time monitor	58	51	50	51	53	53	56	48	56	59	56	51
Atholl St, Perth real time monitor	57	50	49	55	49	53	52	50	58	59	55	56
Atholl St, Perth real time monitor	50	52	50	51	49	46	51	50	61	58	60	52
Opp Wood'n Garden, Glencarse, PH2 7LX	21	22	25	27	19	23	22	19	27	34	22	33
Linden Garden Centre, Glencarse, PH2 7LX	22	36	22	28	22	22	26	18	27	35	26	34
7 West High st, Crieff	39	x	31	39	38	34	36	31	x	42	37	44
39, High St, Crieff	34	33	38	37	35	29	34	32	31	42	36	39
The Highland Trading Company, 62, High St, Crieff	32	35	31	32	28	23	32	25	22	36	35	38
9 East High St, Crieff	31	x	39	36	33	33	34	32	34	42	41	44
9 East High St, Crieff	34	x	38	36	35	31	36	30	34	45	39	44
12 Dunkeld Street, Aberfeldy	25	28	27	22	23	22	25	20	28	27	28	32
Highland Gift Shop, Bridgend, Aberfeldy	20	20	22	19	21	17	18	17	21	23	20	23
Highland Gift Shop, Bridgend, Aberfeldy	20	20	23	20	17	16	15	15	21	23	19	23

Notes :
1. All concentrations are µg m^{-3} expressed as NO_2 .
2. These data have not been bias adjusted

A 1.2 Perth 1 Automatic Monitoring Data (High Street)

PERTH

01 January to 31 December 2005

These data are provisional from 01/07/2005 and may be subject to further quality control

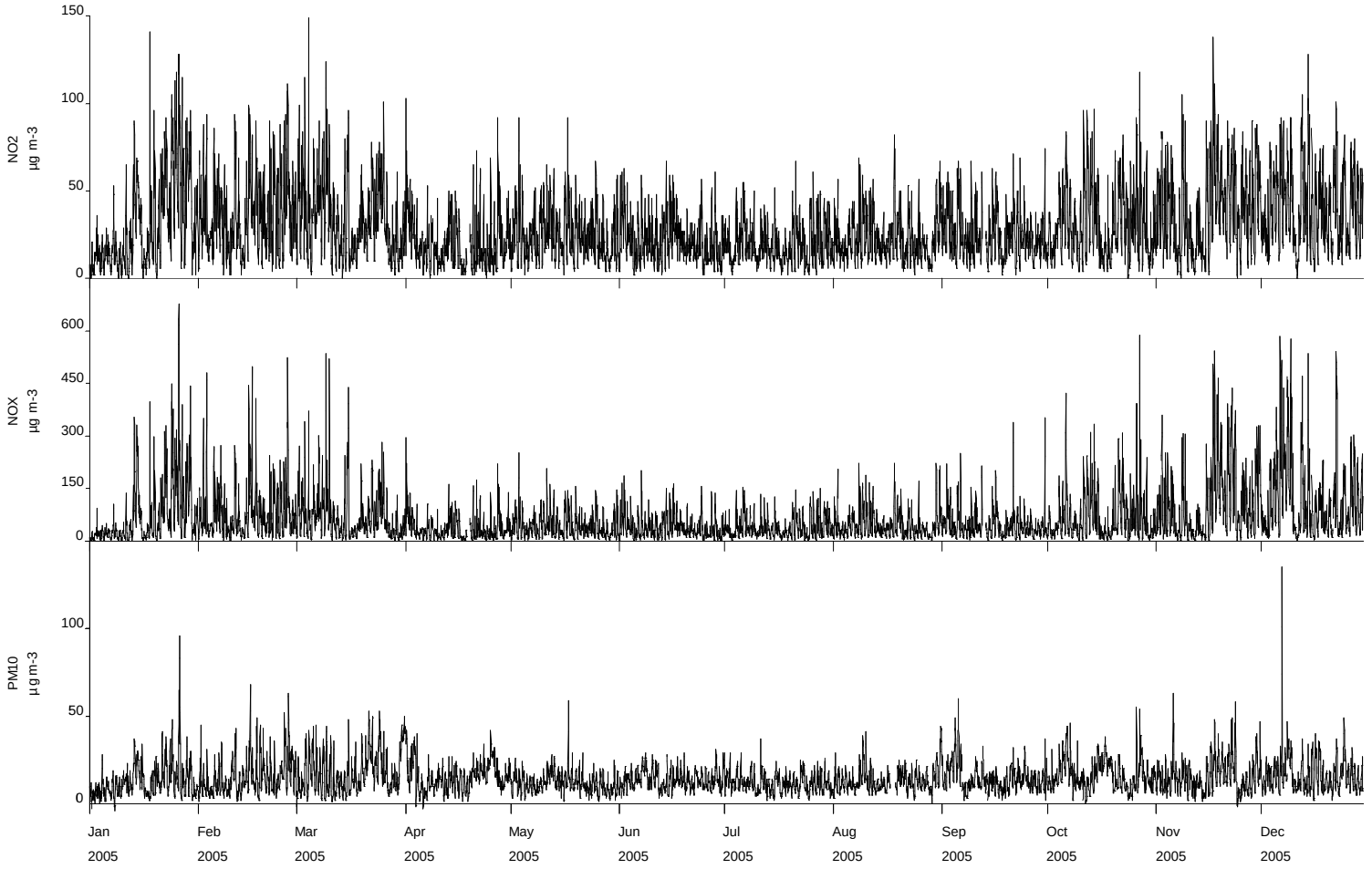
POLLUTANT	NO_2	NO_X	PM_{10}+
Number Very High	0	-	0
Number High	0	-	0
Number Moderate	0	-	0
Number Low	8689	-	8715
Maximum 15-minute mean	397 µg m^{-3}	1024 µg m^{-3}	225 µg m^{-3}
Maximum hourly mean	149 µg m^{-3}	678 µg m^{-3}	135 µg m^{-3}
Maximum running 8-hour mean	105 µg m^{-3}	444 µg m^{-3}	59 µg m^{-3}
Maximum running 24-hour mean	77 µg m^{-3}	282 µg m^{-3}	41 µg m^{-3}
Maximum daily mean	70 µg m^{-3}	263 µg m^{-3}	40 µg m^{-3}
Average	28 µg m^{-3}	63 µg m^{-3}	14 µg m^{-3}
Data capture	99.2 %	99.2 %	99.2 %

+ PM_{10} instrument is a TEOM
All mass units are at 20'C and 1013mb
NO_X mass units are NO_X as NO_2

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	1	1
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg m^{-3}	0	-
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	1	-

Produced by netcen on behalf of Perth and Kinross Council

Perth Air Monitoring
Hourly Mean Data for 01 January to 31 December 2005



A1.3 Perth 2 Automatic Monitoring Data (Atholl Street)

PERTH 2
01 January to 31 December 2005

These data are provisional from 01/07/2005 and may be subject to further quality control

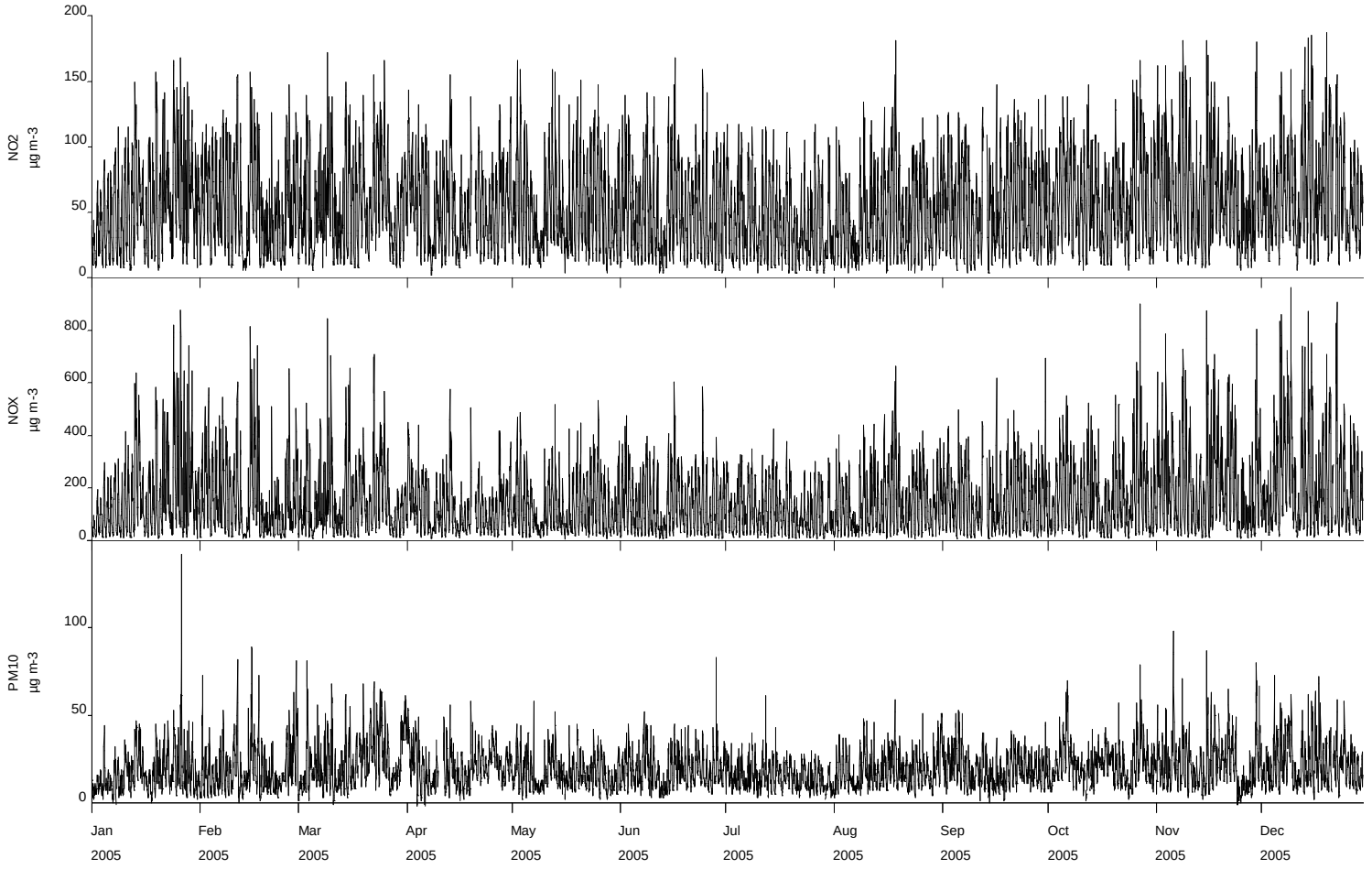
POLLUTANT	NO_2	NO_X	PM_{10}+
Number Very High	0	-	0
Number High	0	-	0
Number Moderate	0	-	0
Number Low	8681	-	8634
Maximum 15-minute mean	308 µg m^{-3}	1217 µg m^{-3}	205 µg m^{-3}
Maximum hourly mean	187 µg m^{-3}	963 µg m^{-3}	142 µg m^{-3}
Maximum running 8-hour mean	157 µg m^{-3}	677 µg m^{-3}	71 µg m^{-3}
Maximum running 24-hour mean	99 µg m^{-3}	427 µg m^{-3}	47 µg m^{-3}
Maximum daily mean	95 µg m^{-3}	394 µg m^{-3}	46 µg m^{-3}
Average	54 µg m^{-3}	153 µg m^{-3}	19 µg m^{-3}
Data capture	99.1 %	99.1 %	98.1 %

+ PM_{10} instrument is a TEOM
All mass units are at 20'C and 1013mb
NO_X mass units are NO_X as NO_2

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	1	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	4	4
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg m^{-3}	0	-
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	1	-

Produced by netcen on behalf of Perth and Kinross Council

Perth 2 Air Monitoring
Hourly Mean Data for 01 January to 31 December 2005



Appendix 2
Detailed Traffic Flow Data

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Table A2.1 Road classifications in LAQM.TG(03)

Very busy roads	Single carriageway roads with daily average traffic flows which exceed 80,000 vehicles per day. Dual carriageway (2 or 3-lane) roads with daily average traffic flows which exceed 120,000 vehicles per day. Motorways with daily average traffic flows which exceed 140,000 vehicles per day.
Busy Roads	Roads with more than 30,000 vehicles per day.

Table A2.2a Traffic Flow Data from the NAEI Data Warehouse

Explanation of the data fields:	
Rd_no	Number of the road
x	Grid reference Easting
y	Grid reference Northing
All_vehicles	AADTF Total
CAR	AADTF Cars
BUS	AADTF Buses
LGV	AADTF Light Goods Vehicles
HGVr	AADTF rigid HGVs
HGVa	AADTF articulated HGVs
Moto	AADTF Motorcycles
MB	Built-up motorway
MN	Non built-up motorway
PB	Built-up primary road

Table A2.2b Traffic Flow Data from the NAEI Data Warehouse (2004 data)

Road No.	X	Y	All Vehicles	Car	Bus	LDV	HGVr	HGVa	Moto
M90	312200	705300	30960	24574	163	3235	1395	1523	70
A9	296500	755430	13939	11411	113	1244	455	660	56
A9	281300	705300	25172	18550	112	2949	1362	2142	57
A85	280800	722700	3873	3109	38	500	170	26	30
A93	317670	745020	10054	8403	50	991	326	199	85
A93	312300	723400	12388	10303	163	785	884	161	92
A822	296700	739700	906	735	7	107	12	2	43
A823	301700	699450	1562	1315	20	139	29	3	56
A826	290600	742600	837	695	7	94	23	4	14
A923	302700	742300	4506	3889	79	363	115	37	23
M90	312400	699100	29246	23420	96	3044	1300	1207	179
A9	306600	738950	12995	10266	88	1212	613	733	83
A90	325000	726650	32033	24201	191	3642	1676	2219	104
A823	301920	698470	6058	4384	18	823	276	462	95
M90	309000	722380	29237	21792	191	3263	1778	2051	162
A85	304800	725200	6764	5645	53	670	235	62	99
A91	311600	704640	4287	3454	32	560	127	60	54
A93	312850	774300	976	812	20	45	5	30	64
A93	313260	730700	3618	3000	31	324	144	63	56
A94	324900	742420	5693	4798	51	620	107	51	66
A822	283700	709300	4097	3333	44	527	92	17	84
A827	282200	748300	1663	1367	15	225	36	17	3
A911	317800	702500	3695	3111	23	414	70	13	64
A912	314700	716900	9681	7707	66	1435	290	94	89
A923	325700	736600	3903	3266	24	403	111	56	43
A924	293100	758700	4117	3633	54	340	71	8	11
A926	322800	746460	3943	3297	41	400	152	16	37
A9	293000	757790	6932	5148	37	858	360	515	14
A9	290000	708800	22639	16642	114	2552	1296	1978	57
A977	310000	702800	4860	3684	29	482	216	407	42
M90	313700	710000	26561	21404	171	2632	972	1335	47
A924	295000	757500	5071	4287	85	448	151	17	83
A85	270000	724160	4132	3412	16	419	144	113	28
A85	312100	723900	16648	13700	222	2257	306	3	160
A93	316300	750000	1978	1562	15	271	64	8	58
A94	320000	737000	5580	4092	58	609	340	407	74
A822	290000	726800	1125	845	7	212	32	0	29
A912	311500	722000	11120	9107	118	1322	398	71	104
A923	320000	741950	5259	4292	73	537	202	131	24
M90	310950	703700	28126	21500	110	3558	1314	1506	138
A9	300000	748500	13738	11238	134	1179	468	673	46
A90	333000	730500	33588	25564	176	3731	1715	2307	95
A85	288000	722900	5650	4587	34	667	257	52	53

Road No.	X	Y	All Vehicles	Car	Bus	LDV	HGVr	HGVa	Moto
A93	317200	741500	5131	4255	32	486	191	37	130
A94	328600	744800	5977	4593	58	815	245	254	12
A989	312000	723100	7280	5164	57	1354	575	111	19
A911	319400	701500	2260	1851	27	245	102	15	20
A912	316660	711200	2144	1712	7	272	91	50	12
A924	300000	762990	685	580	3	61	12	5	24
A926	325500	747800	2055	1590	13	269	83	35	65
A984	307200	740500	978	741	10	156	51	5	15
A9	272000	770400	6980	5160	59	649	364	743	5
A90	316500	721940	33518	25128	146	3543	2088	2491	122
A977	300000	697440	4301	3288	3	275	379	353	3
M90	313270	719340	33692	25872	179	3909	2028	1615	89
A989	311800	723900	17605	14955	125	2125	318	22	60
A91	309700	704000	2970	2481	7	298	100	28	56
A93	313700	757200	920	728	5	113	28	22	24
A85	312340	723700	11611	9247	55	1599	458	219	33
A94	322350	740160	8038	6335	22	1095	300	263	23
A822	286200	718600	4881	4032	23	551	195	52	28
A823	294800	705300	1621	1338	4	198	57	17	7
A827	262900	736560	755	606	11	56	29	18	35
A911	315400	704100	3119	2624	14	351	60	9	61
A912	311900	720300	5046	4285	79	473	129	6	74
A913	320100	717000	3949	3128	25	451	250	51	44
A923	321000	740900	6215	4861	51	861	227	57	158
M90	312500	721000	32990	24775	97	3507	1969	2530	112
A977	302400	699600	6027	4390	26	947	291	362	11
A85	310000	724700	10077	8635	89	906	352	66	29
A85	312500	723000	11715	9117	102	1709	435	303	49
A984	318550	740160	892	759	0	73	33	9	18
A923	306460	745800	832	654	8	113	23	24	10
A922	311730	704000	6603	5280	115	986	140	51	31
A989	311700	723100	10848	8421	132	1573	636	52	34
A93	318200	745300	11031	9031	121	1461	238	80	100
A94	312250	724000	19653	15686	190	2754	742	173	108
A823	290200	713200	1616	1303	16	200	49	4	44
A823	302000	697800	1739	1450	7	212	39	6	25
A822	289400	734500	1000	782	9	120	46	5	38
A926	326400	748050	1683	1285	56	241	64	20	17
A94	330810	745500	3294	2470	18	412	202	167	25
M90	313360	696500	26323	22467	154	2059	706	869	68
M90	314400	706340	6715	5298	38	755	373	176	75
A85	308700	724870	15112	12980	174	1284	394	145	135
A93	317900	745330	5375	4696	56	467	97	27	32
A93	317960	745100	7701	6479	95	716	272	78	61
A923	317900	745100	5576	4817	37	474	134	48	66
A912	312000	721130	11788	9653	126	1402	422	75	110

Road No.	X	Y	All Vehicles	Car	Bus	LDV	HGVr	HGVa	Moto
A85	312500	722380	11833	9207	104	1726	439	308	49
A90	313050	721970	11833	9207	104	1726	439	308	49
A93	308500	722790	9826	8186	174	1140	193	109	24
A94	312370	724500	6194	4542	64	677	379	451	81
A9	292800	711000	22789	16859	77	2619	1090	2067	77
A9	295000	712400	21788	16482	123	2023	1330	1780	50
A9	300000	717100	24184	17665	110	2844	1427	2067	71
A824	293555	712000	2631	2206	50	290	55	5	25
A824	295000	713100	5825	4824	26	544	201	158	72
A824	297700	715300	3462	2824	28	466	92	23	29
A9	309000	725650	27780	22372	201	2841	1131	1064	171
A989	312050	723720	6024	5140	32	508	248	48	48
A93	310460	723000	10796	8995	191	1253	211	120	26
A85	311250	724200	21201	17667	533	2098	619	147	137
A912	310000	725750	19568	15370	241	2717	973	175	92
A989	311325	723790	15839	13453	186	1577	475	39	109
A924	294200	758665	2009	1723	28	216	42	0	0
A924	310000	755350	527	425	5	51	32	2	12
A827	295000	752650	3895	3244	38	320	116	145	32
A984	310000	740550	2444	2001	33	235	61	34	80
A823	292100	711000	4065	3470	30	449	100	10	6
A824	292700	712000	3036	2598	68	294	55	11	10
A9	300500	717550	24877	19081	153	2369	1298	1906	70
A827	290000	752300	3051	2382	37	392	169	32	39
A91	315000	706800	6715	5298	38	755	373	176	75
A9	308250	724000	23314	17989	123	2738	1141	1126	197

Table A2.3 Traffic flow data for major roads in Perth and Kinross supplied by Transport Scotland (2005)

Count Ref	Route Number	X	Y	AADTF	Location
ATC00001	A85	275269	722712	2,092	A85 West of Comrie
ATC03001	M90	311400	701800	27,557	M90 N of B9097
ATC03002	M90	312400	705300	30,329	M90 N of A91
ATC03005	M90	312500	721000	31,407	M90 Friarton Bridge - S of A85
ATC03014	A85	304500	725400	7,027	A85 Methven - at Myreside Cottages
ATC03015	A85	287715	722720	5,552	A85 E of Crieff
ATC03016	A85	279500	722600	3,247	A85 W of Crieff
ATC03019	A9	292095	759990	9,999	A9 N of A924/B8019
ATC03021	A9	298200	751800	10,785	A9 S of A827/Ballinluig
ATC03022	A9	300325	743120	13,308	A9 N of A822/Dunkeld
ATC03025	A9	309375	727470	23,424	A9 N of Inveralmond
ATC03028	A9	305130	721175	25,313	A9 Broxden - SW of M90
ATC03033	A9	291000	709400	25,345	A9 Blackford Bypass
ATC03034	A9	282500	706500	28,406	A9 SW of A822/Greenloaning
ATC03149	A9	283845	707115	25,292	A9 Greenloaning N of A822
ATCPT044	M90	312300	720650	8,088	M90 J10 Friarton Br off ramp to A9 junc
ATCPT045	M90	311000	703700	28,283	M90 J6 - J7
JTC00001	A90	334189	730543	36,791	A90 - West of Dundee near BP Garage
JTC00002	A90	314992	722278	35,181	A90 - East of Kinfauns Castle
JTC00003	M90	313223	719381	35,494	M90 Junction 9 to 10
JTC00004	A9	309000	725700	25,401	A9 - Perth Western By-pass (North)
JTC00005	A9	308300	724000	22,648	A9 - Perth Western By-pass (South)
JTC00006	M90	309950	721960	13,243	M90 - Southern Arm 1 Mile from Junction with A9
JTC00007	A9	301085	717825	25,999	A9 - North of Auchterarder - South of B934
JTC00008	A9	298175	715585	22,954	A9 - North End of Auchterarder By-pass
JTC00009	A9	292715	710738	24,657	A9 - Southwest of Auchterarder
JTC00065	A90	320038	721850	33,440	A90 Kinfauns - NE of B958/Glencarse
JTC00066	M90	314424	712752	26,162	M90 S of A912 - at Glenfarg (N of Junc 8)
JTC00067	A9	298488	716052	25,711	A9 North of Auchterarder bypass
JTC00139	A9	288400	764300	8,303	A9 S of B847 - at Shierglas
JTC00140	A9	294300	757100	8,883	A9 Pitlochry Bypass - S of A924
JTC00141	A827	297200	751900	3,000	A827 Ballinluig Bridge
JTC00152	A90	326150	727455	32,382	A90 INCHMARTINE - SW OF B953
JTC00304	A9	309200	730000	15,993	A9 Luncarty
JTC00305	A9	303200	741600	13,133	A9 Dunkeld
JTC00306	A9	296877	754947	13,162	A9 Moulinearn

Count Ref	Route Number	X	Y	AADTF	Location
JTC00307	A9	290938	763551	9,415	A9 Killiecrankie
JTC00308	A9	280999	765802	8,364	A9 Calvine
JTC00309	A9	273685	770143	8,283	A9 Glen Garry
JTC00310	A9	264135	773780	8,307	A9 Dalnaspidal
JTC08186	A90	330100	730000	34,809	A90 Longforgan
JTC08193	A85	290550	723180	4,347	A85 Gilmerton
JTC08194	A9	291850	709700	25,742	A9 Blackford
JTC08214	A91	305750	703250	2,809	A91 Carnbo
JTC08217	A9	303070	741700	13,174	A9 Birnam
NTC00810	M90	311361	703430	2,963	M90S J6 Off Slip
NTC00811	M90	311468	703196	11,042	M90S J6 Main Carriageway
NTC00812	M90	310203	703196	2,531	A977E West of Kinross
NTC00813	M90	310168	702341	2,441	A977W West of Kinross
NTC00814	M90	311468	702541	2,640	M90S J6 On Slip
NTCPT002	A9	304750	721000	25,772	A9 West of M90 J11
NTCPT007	M90	312450	719620	18,000	M90 J10 to J9

Table A2.4 AADT flows derived from SCOOT traffic counts in Perth (2005)

Street Name	AADTF
Atholl Street	27334
County Place	13237
Perth Bridge	9675
South Methven Street	4629
Kinnoull Street	6057
Caledonian Road	16114
Glasgow Road	10983
Charlotte Street	17863
Tay Street	13627
Barrack Street	18660

Appendix 3

Descriptions of selected models and tools

CONTENTS

Simple screening models[a]

A3.1. Design Manual for Roads and Bridges (DMRB) - This screening method was formulated by the former Department of Transport. The method gives a preliminary indication of air quality near roads. The DMRB method requires information on vehicle flow, HDV mix, vehicle speed and receptor-road distances. It contains a useful database of vehicular emission factors for future years.

The method adopts the annual mean concentration as the base statistic. Background pollutant levels are included explicitly in the calculations by adding an amount to the annual mean traffic contribution using the Air Quality Archive (paragraph 6.09) or default values The model also estimates, from the annual mean PM_{10} prediction, the number of days where the PM_{10} concentration exceeds the 50µg m^{-3} daily mean objective. The latest version of the DMRB nomogram (1.02, dated February 2003) has been used for this assessment. Details of the road layout cannot be specified.

A3.2. Guidance for Estimating the Air Quality Impact of Stationary Sources (GSS); this guide provides precalculated dispersion results for stack emissions expressed as nomograms, was published by the Environment Agency (EA) in 1998. The nomograms are based on a large number of computations using ADMS. They cover 10 stack heights, 4 categories of surface roughness, 3 averaging times and 3 climate types. The predicted pollutant concentrations are comparable with the prescribed air quality objectives. The model is limited to a range of stack heights and exit velocities, and cannot treat building wake effects or non-buoyant source releases.

Where such point sources needed to be assessed, the **netcen** point source spreadsheet, based on this methodology has been used. This is available from http://www.airquality.co.uk/archive/laqm/tools.php.

[a] The information on simple screening models has been taken from LAQM.TG(03) Review and Assessment: *Selection and use of dispersion models*.

Appendix 4
Industrial Processes

CONTENTS

Table A4.1 Part A and Part B Regulated Processes

Auth'n Ref	Process Site	Applicant	Description	SiteContact Name
PPC/E/30112	CPL Fishmeal The Harbour Perth PH2 8BB 01738 626675	CPL Calport The Harbour Perth PH2 8BB 01738 626675	Animal/ Vegetable	Alister Baynes
PPC/B/1000080	Grosvenor Grain & Feed Co Ltd Shore Rd Perth PH2 8BW 441220	Grosvenor Grain & Feed Co Ltd 5 Bassendale Rd Croft Business Park Bromborough CH62 3QL 0151 473 1267	Animal/ Vegetable	Perth - Ken Petrie
PPC/E/30048	CPL Coal The Harbour Perth PH2 8BB 01738 626675	CPL Calport The Harbour Perth PH2 8BB 01738 626675	Mineral	Alister Baynes
MP/3 APC/E/519	Barhaul (2003) Ltd Aberfeldy Ind Est Dunkeld St Aberfeldy	Barhaul Mathis House Dunkeld Rd Aberfeldy PH15 2AQ 01887 820022	Mineral	Patrick Bradley
MP/1 APC/E/517	Tarmac Northern Ltd Friarton Quarry Gleneagles Rd Perth PH2 0AW 01738 624131	Tarmac Northern Ltd PO Box 5 Fell Bank, Birtley Chester le Street DH3 2ST	Mineral	Bill Judge
MP/6 APC/E/521	Tayside Contracts Collace Quarry Kinrossie Perthshire PH2 6JB 01821 650222	Tayside Contracts Contracts House 1 Soutar St Dundee DD3 8SS	Mineral	Grant Milne Balfour Dunn

MP/4 APC/E/520	Ennstone Thistle Shierglas Quarry Pitlochry PH16 5II 01796 481325	Ennstone Thistle Roberts St Forfar DD8 3HD	Mineral	Duncan Morrison (07795 240791)
PPC/E/30179	I & H Brown PO Box 51 Dunkeld Rd Perth PH1 3YD 637171	I & H Brown	Mineral	Bob Leggeat George Young
PPC/E/30094	Holden Environmental Ltd Shore Rd Perth PH2 8BH 634747	Holden Environmental Ltd	Mineral	Bob Holden Tony Brown
PPC/E/30095	Alan Dougan The Station Auchterarder PH3 1PF 01764 662086	Alan Dougan	Coating (Vehicles)	Alan Dougan
PPC/E/30106	Camerons (Perth) Ltd 166 Dunkeld Rd Perth PH1 5AS 01738 636036	Camerons (Perth) Ltd	Coating (Vehicles)	Gordon Reid
PPC/B/1000170	Elder & Paton Arran Rd Perth PH1 3DZ 01738 441999	Elder & Paton	Coating (Vehicles) WOB	Mike Paton Tony Brown
PPC/E/30107	J R Weir 172 - 174 Dunkeld Rd Perth PH1 3XL 01738 630736	J R Weir	Coating (Vehicles)	Mark McCowan

PPC/E/30104	Crole's Coachworks Jessie St Blairgowrie PH10 6BT 01250 872750	Crole's Coachworks	Coating (Vehicles)	Walter Crole Gail Crole
PPC/E/30105	G Mutch Mechanical Services Shore Rd Perth PH2 8BH 01738 626688	G Mutch Mechanical Services	Coating (Vehicles)	Brian Mutch
CP/1 APC/E/530	Donald Kirk Ltd 288 Strathtay Road Perth PH1 2JU 01738 627800	Donald Kirk Ltd	Coating (Vehicles)	Michael Kirk
CP/2 APC/E/531	J.M.Accident Repair Centre Friarton Bridge Park Friarton Road Perth PH8 2LN 01738 626262	J.M.Accident Repair Centre	Coating (Vehicles)	Steve MacKay
IP/2 APC/E/525	Perth Crematorium Crieff Rd Perth PH1 2PE 01738 625068	Perth & Kinross Council Environment Services Pullar House 35 Kinnoull St Perth PH1 5GD	Incineration	Jackie MacRae Richard Smith (P & K C) 475251
CLP/1 (PPC/B/1003224)	RMC Readymix Ltd Shore Rd Perth PH2 8BH 01738 623388	RMC(Scotland)Ltd Hawbank Rd College Milton East Kilbride G74 5HB	Cement/Lime	tba Robert Wilson (RMC Edinburgh)
CLP/3 APC/E/516 (PPC/B/1004297)	Hanson Quarry Products Europe Ltd Friarton Rd Perth PH2 8DE 01738 580212 01786 430032	Hanson Quarry Products Europe Ltd Pioneer House 56 - 60 Northolt Rd South Harrow Middlesex HA2 0EY	Cement/Lime	David Sissons

PPC/B/1004313	J A Laird Ltd Marlee Quarry Blairgowrie	J A Laird Ltd Lunanhead Forfar DD8 3NQ (01307 466577)	Cement/Lime	Jim Laird Willie Gillies (01241 877604)
PPC/E/30086	Aggregate Industries (UK) Ltd Perth Readymix Plant Unit 9 Inveralmond Rd Perth PH1 3TW phone no. TBA	Aggregate Industries UK Ltd Bardon Hill Coalville Leics LE67 1TL	Cement/Lime	Neil Bingham
APC/E/20192	Glenalmond Timber Co Ltd Station Rd Methven Perth PH1 3QF 01738 840600	Glenalmond Timber Co Ltd	Timber	Fraser Steele Martin Clelland Fiona Denchfield (587988)
APC/E/20126	Kenneth Melville (Errol) Ltd Inchmichael Garage Dundee Rd Errol PH2 7RR 01821 670242	Kenneth Melville (Errol) Ltd	PVR	Murray Melville
APC/E/20140	Lamb & Gardiner Ltd Union St Coupar Angus PH13 9AF 01828 627271	Lamb & Gardiner Ltd	PVR	Margaret Mackie
APC/E/20145	Guildtown Garage Guildtown Perth PH2 6BS 01821 640368	Guildtown Garage	PVR	Sandy Reid
APC/E/20190 (PPC/B/1004467)	Ballinluig Services Ballinluig Perthshire PH9 0LG 01796 482212	Ballinluig Services	PVR	Clive Bridges

APC/E/20196	Asda Stores PFS 89 Dunkeld Rd Perth PH1 5AP 01738 638100	Commercial Development Asda Stores Ltd Asda House Southbank Great Wilson St Leeds LS11 5AD	PVR	Jacqui Allan Leeds Christine Pollard
APC/E/20164	St Johnstone Service Station 2 Dunkeld Rd Perth PH1 5RG 01738 443655	BP Express Shopping Ltd Witan Gate House 500 - 600 Witan Gate Milton Keynes Bucks MK9 1ES	PVR	Joyce Johnston Asst Manager - Yvonne MK Michelle Bailley
APC/E/20221	South Inch Filling Station 4 Edinburgh Rd Perth PH2 8AR 01738 446576	South Inch Filling Station	PVR	David Ballingall
APC/E/20219	Girvans of Aberfeldy Dunkeld St Aberfeldy PH15 2AF 01887 820254	Girvans of Aberfeldy	PVR	Blair Girvan
APC/E/20120	Auchterarder Motors Ltd 223 High St Auchterarder PH3 1AF 01764 662136	Auchterarder Motors Ltd	PVR	Robert Ferguson
APC/E/20240	Perth Services The Triangle, Inveralmond Perth PH1 3GA 01738 443880	Perth Services	PVR	Mr Arif Habib Pam Thomson
APC/E/20294	Perth Street Service Station 34 - 36, Perth Street Blairgowrie PH10 6DQ 01250 875960	Perth Street Service Station	PVR	Derek Ingram

APC/E/20242	Crieff Garage 75 East High Street Crieff PH7 3JA 01764 652273	Crieff Garage	PVR	Robert Simpson
APC/E/20243	Pitlochry Service Station Perth Rd Pitlochry PH16 5LY 01796 473969	Pitlochry Service Station	PVR	Mr S Cunningham
APC/E/20293	Morrisons Petrol Station Caledonian Rd Perth 442422	Wm Morisson Supermarkets Unit A, Gildersome Link Ind Park Nephshaw Lane South Gildersome, W Yorks	PVR	Cathy Dryburgh
APC/E/20426	Almondbank Filling Station Crieff Rd Perthshire 583231	Almondbank Filling Station	PVR	Mr or Mrs Lyle
APC/E/20319	Strathtay Service Station Edinburgh Rd Perth PH2 8DX 633620	Kevin Neary Asscs Phoenix House 215b -217b High Rd Benfleet, Essex S57 5HZ 01268 794388	PVR	Mr E.M Kennedy K N A Michael Wigmore
APC/E/20302	The Brig Motor Company Main St Bridge of Earn Perth PH2 9PJ 812256	The Brig Motor Company	PVR	Fiona Wilson
APC/E/20502 (PPC/B/1003259)	Blair Atholl Garage Blair Atholl PH18 5SX 01796 481221	Blair Atholl Garage	PVR	Roddy Crighton

APC/E/20503 (PPC/B/1003258)	Lix Toll Garage Ltd Lix Toll Killin Perthshire FK21 8RB 01567 820280	Lix Toll Garage Ltd	PVR	Jim Cushley
APC/E/20506 (PPC/B/1004274)	Birnam Autopoint Perth Rd Birnam Perthshire PH8 0AA 01350 727223	Dove Cottage Perth Rd Birnam Perthshire PH8 0AA	PVR	Jamie Dalgleish
APC/E/20520 (PPC/B/1004400)	Tay Racers Balbeggie Service Stn Main St Balbeggie Perthshire PH2 6EZ 01821 640789	Tay Racers	PVR	Mike Martin
APC/E/0120021	Tesco Stores Ltd Crieff Rd Perth PH1 2NR 412400	Tesco House Delamere Rd Cheshunt Herts EN8 9SL	PVR	Mr I C McDougall (manager) Lorraine Raith
PPC/E/30001	Esso Petroleum Co Ltd Broxden Perth phone no. TBA	Esso Petroleum Co Ltd Exxon Mobil House Ermyn Way Leatherhead KT22 8UX	PVR	
PPC/B/1004506	Tesco, Blairgowrie		PVR	
PPC/B/1005099	Somerfields, Scone		PVR	

PPC/E/30075	Scotland Gas Network nr Pitcairngreen	Inchcolm House 11 West Shore Rd Edinburgh EH5 1RH 0131 559 6218	Odourisation	Peter McQueen (07767 384285) Gordon McMillan - Glasgow Eddie Heaney (07979 706454)
PPC/E/20061	Errol Brick Co Ltd Errol Brickworks Inchcoonans Rd Errol Perthshire PH2 7RB 01821 642653	Errol Brick Co Ltd	Ceramic	Martin Deighton
PPC/E/20065	Marshall Food Group Ltd George St Coupar Angus PH13 9LU 01828 627295	20 Queens Rd Aberdeen AB14 4ZT	Slaughter	Ian Condie 7766517733 William Orr 7967677303
PPC/E/20067	ABP Ruthvenfield Rd Perth PH1 3XB 624242	6290 Bishops Court Solihull Park Way Birmingham B37 7YB	Slaughter	David Low H/O John Roberts 0121 717 2500
PPC/E/20066	DARA Almondbank		Metal Surface Coating	