LOCAL AIR QUALITY MANAGEMENT

REPORT OF THE SECOND AND THIRD STAGE REVIEW AND ASSESSMENT OF LOCAL AIR QUALITY

AUGUST 2004

Executive Summary

This report details the findings of the Second and Third Stage review and assessment of Local Air Quality within Dungannon and South Tyrone Borough Council area. It has been compiled under the provisions of the Local Air Quality Management (LAQM) regime established in Northern Ireland by the Environment (NI) Order 2003 and takes into account air quality objectives specified in the Northern Ireland Air Quality Regulations as well as guidance set out in Technical Guidance LAQM.TG(03).

The aim of the Second Stage Review and Assessment is to provide further screening of pollutants identified during the First Stage review and assessment as requiring further investigation. Where necessary the Third Stage review and assessment involves a more detailed and robust analysis of the potential pollutant impacts.

Following from the First Stage review and assessment report (including feedback received from consultants engaged by the Department of Environment to review the report) it was concluded that the following pollutants required further assessment:

- Nitrogen dioxide from road traffic
- PM_{10} from road traffic, domestic coal burning and uncontrolled and fugitive emissions.
- Sulphur dioxide from domestic coal burning and small combustion plant.

This second/third stage report makes the following conclusions and recommendations with respect to each of the above pollutants/sources:

NITROGEN DIOXIDE (NO_2)

One location has been identified where the annual average NO_2 objective may not be met. This is Church Street in Dungannon, where relevant exposure exists and the NO_2 concentrations measured by diffusion tube exceed the prescribed annual mean objective, despite the fact that Design Manual for Roads and Bridges (DMRB) modelling projects compliance with the objective. Further to advice from the Help Desk concerning this disparity, additional monitoring has already begun with extra diffusion tubes placed in Church Street to form part of a more detailed assessment prior to deciding on further action in the LAQM process. A supplementary third stage report will be submitted in due course, when additional diffusion tube monitoring data is available.

PARTICULATE MATTER (PM_{10})

Road Traffic

Further screening using the DMRB model indicates that PM_{10} emissions from traffic sources are not predicted to lead to an exceedence of the 2004 PM_{10} objectives. Therefore it is concluded that there is no need to proceed further to Detailed Assessment of PM_{10} from this pollutant source.

Domestic Coal Burning

Monitoring of PM_{10} using a TEOM sampler in a housing area considered to represent the 'worst case scenario' in terms of domestic coal burning, indicates comfortable compliance with the 2004 PM_{10} objectives. Further action is therefore not proposed in respect of this PM_{10} pollutant source.

Uncontrolled and Fugitive Emissions

Further screening of the potential impact of PM_{10} emissions from a quarry and a landfill site in the Borough has led to the conclusion that a Detailed Assessment is not required, and no further action is therefore proposed.

SULPHUR DIOXIDE (SO_2)

Domestic Coal Burning

Monitoring using an automatic real-time analyser located in a housing area considered to represent the 'worst case scenario' in terms of domestic coal burning, indicates comfortable compliance with the 2004 and 2005 SO_2 objectives. Further action is therefore not proposed in respect of this SO_2 pollutant source.

Combustion Plant greater than 5 MW

Further consideration of the SO_2 emissions from the one combustion plant over 5 MW located in the Borough has led to the conclusion that a Detailed Assessment is not required for this SO_2 pollutant source.

Contents

1.0 INTRODUCTION

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 in Great Britain. The National Air Quality strategy provides a framework for air quality control standards. New National Air Quality Standards have been proposed by the expert panel on Air Quality Standards (EPAQs) for the UK. These and other air quality standards and their objectives have been enacted through the Air Quality Regulations in Northern Ireland. The Environment (NI) Order 2003 establishes the Local Air Quality Management regime in the province, and charges local authorities with reviewing and assessing local air quality in the context of the objectives set by regulations for a range of pollutants considered to have public health significance. In areas where it is not anticipated that air quality objectives are likely to be met by the specified dates, local authorities are required to establish air quality management areas to improve air quality.

1.1 First Stage review and assessment

From the review of pollutant sources and monitoring data available to Dungannon & South Tyrone Borough Council area at the preparation of its first stage report it was concluded that additional assessment was required in the following areas: -

1. Nitrogen dioxide (NO_2) and particulates (PM_{10}) from road traffic.
2. Sulphur dioxide (SO_2) and particulates (PM_{10}) from domestic coal burning.
3. Sulphur dioxide (SO_2) from combustion plant greater than 5MW.
4. Particulates (PM_{10}) from uncontrolled and fugitive sources.

1.2 Second and Third Stage review and assessment

Further to the identified need for further scrutiny of the above pollutants/sources, work has been undertaken in accordance with Technical Guidance LAQM.TG(03) to complete further Second Stage screening and in some cases more detailed Third Stage assessment. This process is designed to result in conclusions on the need for declaration of statutory Air Quality Management Areas and to assist with the development of a local air quality management strategy

2.0 NITROGEN DIOXIDE (NO_2)

2.1 Air Quality Objectives

The air quality objectives for NO_2 set out in the Air Quality regulations (Northern Ireland) 2003, to be achieved by 31 December 2005, are: -

- An annual mean concentration of 40 μgm^{-3}
- A I hour mean of 200 μgm^{-3} not to be exceeded more than 18 times per year

2.2 Background concentrations of Nitrogen Dioxide

Background concentrations were obtained for the Dungannon & South Tyrone area using the maps on the UK National Air Quality Information Archive web site
http://airquality.co.uk/archive/laqm/tools.php?tool-background

An estimated NO_x background concentration has been taken from the highest value in the mapped dataset to provide a conservative estimate. A background NO_x estimate of 14.1 $\mu g\ m^{-3}$ has been estimated for 2005 in the Dungannon & South Tyrone Borough Council region.

2.3 Modelling of NO_2 from Road Traffic

Modelling of NO_2 impact from road traffic was carried out by Netcen on behalf of the Council, and copies of its reports (both initial, dated March 2002 and reappraisal, dated January 2004) are provided in Appendix A. The findings of these exercises were used to assist in drawing conclusions as to any need for further Detailed Assessment of this pollutant source.

The First Stage review and assessment identified some road links as needing further study in a Second Stage assessment. The concentrations at these kerbside locations were estimated using the earlier version of the Design Manual for Roads and Bridges (DMRB), and this showed one slight exceedance of NO_2 at Church Street (40.2$\mu g/m^3$), as shown in table 2.3 below. The detail and methodology used in this modelling exercise is set out in the appended March 2002 Netcen report.

Table 2.3 Nitrogen dioxide concentrations at roadside locations in the Dungannon and South Tyrone District, with 7.3% HGV, the Roads Service average

Description of Link	NO_2 Annual Mean (µg m^{-3})	NO_2 99.8th percentile of hourly averages (µg m^{-3})
Mullaghmore Rd	20.4	71
Moy Rd	29.6	104
Quarry Lane	20.6	72
Thomas St	29.7	104
Northland Rd	24.1	84
Circular Rd	26.9	94
Church St	40.2	141
Newell Rd	37.7	132
William St	31.2	109

The data used in the earlier March 2002 Netcen report was entered into the updated version of DMRB and the new predicted annual average concentration for 2005 was 22.8µg/m^3 in Church Street, well below the objective level of 40µg/m^3. This means that according to the new version of the DMRB model, the emissions from traffic are not predicted to lead to an exceedance of the 2005 NO_2 objectives in Church St. Again the detail and methodology of the re-modelling exercise is set out in the appended January 2004 reappraisal report drawn up by Netcen.

2.4 Monitoring of Nitrogen Dioxide

Monthly average concentrations of NO_2 have been measured with diffusion tubes at five sites in Dungannon & South Tyrone, including roadside locations considered to represent the 'worst case scenarios' with respect to impact of NO_2 emissions from road traffic and relevant personal exposure. The results for 2000 to 2003 are summarised in Table 2.4.1. The monitoring periods are representative of a full year and therefore the period average concentrations can be compared with the annual mean objective except where indicated. Analysis of the diffusion tube samples was carried out by Lambeth Scientific Services whose biases relative to an automatic analyser are set out in table 2.4.2.

Table 2.4.1 Diffusion tube concentrations of NO_2 measured at locations in the Dungannon & South Tyrone area ($\mu g\ m^{-3}$)

			Annual Average	Corrected for lab bias	2005 project
2000	Site 1	Market Square	17.8	17.3	15.1
	Site 2	4 Ardgannon, Quarry Lane	18.2	17.7	15.3
	Site 3	Howard Primary School	10.9	10.6	9.2
	Site 4	Bushvale	10.8	10.5	9.3
2001	Site 1	Market Square	20.7	22.6	20.2
	Site 2	4 Ardgannon, Quarry Lane	19.4	21.1	18.8
	Site 3	Howard Primary School	13.3	14.5	12.9
	Site 4	Bushvale	14.2	15.5	14.1
2002	Site 1	Market Square	22.1	25.4	23.4
	Site 2	4 Ardgannon, Quarry Lane	17.3	19.9	18.3
	Site 3	Howard Primary School	12.8	15.3	14.1
	Site 4	Bushvale	12.3	14.7	13.7
	Site 5	Church Street*	45.8	52.7	48.5
2003	Site 1	Market Square	15.4	16.2	15.4
	Site 2	4 Ardgannon, Quarry Lane	21.6	22.7	21.5
	Site 3	Howard Primary School	13.3	14	13.3
	Site 4	Bushvale	8.5	8.9	8.5
	Site 5	Church Street	41.9	44	41.7

*5 month average (August – December)

Table 2.4.2 Laboratory Bias Figures Used

Year	Bias
2000	0.97
2001	1.09
2002	1.15
2003	1.05

From AQ Consultants spreadsheet of nationwide lab biases (2004)

The diffusion tubes placed at the kerbside and intermediate locations at sites 1-4 have not exceeded the annual mean standard for nitrogen dioxide of 40 $\mu g\ m^{-3}$. Therefore, it is unlikely that the NO_2 annual mean objective will be exceeded in these locations in 2005.

Church Street does however register an exceedence of the NO_2 objective. The 2002 figure is only based on five months data, and therefore can only be regarded as indicative. The 2003 data however can be directly compared to the objective and shows a predicted annual mean concentration of 41.7 $\mu g\ m^{-3}$ in 2005, which exceeds the 40 $\mu g\ m^{-3}$ objective. As this diffusion tube is in close proximity to residential property it indicates that relevant exposure does exist and further assessment of this area is required.

2.5 Quality Assurance/Quality Control

The NO_2 diffusion tube monitoring undertaken by the Council is carried out in accordance with the QA/QC standards set out in the NO_2 Diffusion Tube Network Instruction Manual, and the results of such monitoring are supplied to netcen for inclusion in the annual report of NO_2 monitoring data. The tubes are analysed by a laboratory that participates in the UK NO_2 diffusion tube network inter-comparison, and for which a bias 'correction factor' is published. As already specified, the bias factor was applied to results obtained.

2.6 Conclusions for NO_2

Church Street becomes congested during peak times resulting in idling vehicles causing an increase in emissions of NO_x, which then converts to NO_2 in the air. While low annual average speeds can be used in the DMRB model, it is not possible to take account, in any detailed way, the likely idling emissions in the area. It is considered that the high idling emissions during peak times are the most likely cause of the large variation between the modelled concentrations and those measured by diffusion tube.

As the measured NO_2 concentrations in Church Street are greater than the objective, the Council will need to undertake a more Detailed Assessment. Further to advice from the Help Desk about the disparity between modelled predictions using the revised DMRB and the measured concentrations using a single diffusion tube, it was concluded that additional diffusion tube samplers should be placed in the area, particularly adjacent to the location of relevant exposure. It is proposed that the additional NO_2 monitoring data obtained will facilitate a more informed and accurate decision on further action with respect to local air quality management at this location. A supplementary report will be submitted to DoE in due course, when this data is available.

3.0 Particles (PM_{10})

3.1 Air Quality Objectives

The air quality objectives for PM_{10} set out in the Air Quality regulations (Northern Ireland) 2003, to be achieved by 31 December 2004, are: -

- An annual mean concentration of 40 $\mu g\ m^{-3}$
- A 24-hour mean concentration of 50 $\mu g\ m^{-3}$ not to be exceeded more than 35 times a year.

3.2 Background concentrations of PM_{10}

Background concentrations were obtained for the Dungannon and South Tyrone area using the maps on the UK National Air Quality Information Archive web site http://www.airquality.co.uk/archive/laqm/tools.php?tool=background. The estimated annual average background concentration for 2004 in Dungannon and South Tyrone was 16.9 $\mu g/m^3$ or lower.

3.3 Road Traffic

As recommended in LAQM.TG(03), DMRB was used as a screening mechanism to predict PM_{10} concentrations for 2004 from road traffic. The assessment was undertaken on behalf of the Council by netcen, and copies of its reports (both an initial report using the earlier DMRB model and reappraisal using the newer version) are given in Appendix A. The detail and methodology used in these modelling exercises is set out in the initial March 2002 Netcen report.

An estimated maximum background concentration for 2004 of 16.9$\mu g\ m^{-3}$ was used, taken from the highest value in the dataset. Estimated traffic flows for 2005 were used in the modelling, but as traffic counts are likely to be higher in 2005 than in 2004 it can be assumed that if the objective is met with 2005 traffic data it would certainly have been met with 2004 data.

Using the newer version of the model, the method predicts 2004 annual average concentrations of PM_{10} in the Church Street area will be 22.0$\mu g\ m^{-3}$ at 1.25 metres from the kerb. Guidance

LAQM.TG(03) states that the 24-hour objective is highly unlikely to be exceeded if the annual mean concentration is below 28 μg m^{-3}, gravimetric.

3.3.1 Conclusions for Road Traffic PM_{10}

By running the new version of the DMRB model it is predicted that emissions from traffic are unlikely to lead to an exceedence of the PM_{10} objectives in 2004, and it is concluded that there is no need to proceed to a Detailed Assessment for PM_{10}.

3.4 Domestic Coal Burning

Dungannon town is the largest within the Borough and would be classed as a small town (approximately 16 km^2 area) as classified within Technical Guidance LAQM.TG(03).

At the time of the First Stage review and assessment in 2000 there was insufficient information in relation to coal burning activates to draw conclusions in relation to PM_{10} impact from this source.

A TEOM analyser was purchased and installed within Lambfields, one of two housing areas identified in the First Stage review with the potential to have over 300 coal burning properties. This location is considered to represent 'worst case scenario' in regard to domestic coal burning and potential for exceedance of the PM_{10} objectives.

Monitoring has been carried out since 10 October 2002, and the results are given in Table 2.4. The figures given represent the TEOM results multiplied by a factor of 1.3 to estimate the gravimetric equivalent concentration, as recommended in LAQM.TG(03).

Table 2.4 PM_{10} Monitoring Data 2002 – 2004

Year	Maximun 24 Hour mean	No 24 Hour mean > 50 μg	Annual Mean
2002 (Oct-Dec)	**47**	**0**	**19.37**
2003	**62.79**	**25**	**27.82**
2004 (Jan-Mar)	**44.46**	**0**	**21.97**

Data for the entire 2003 year is available and can be used for direct comparison with the 2004 objectives. The annual mean concentration was significantly less than the 40μg m^{-3} objective and there were 25 exceedences of the 50μg m^{-3} 24-hour mean objective (significantly less than the 35 exceedance limit set in the objective).

3.4.1 Quality Assurance/Quality Control

The figures specified in table 2.4 are based upon data that has been ratified in accordance with the guidance set out in LAQM.TG(03). The ratified data capture rate for 2003 was 88.3%, which complies with the 75% recommended in LAQM.TG(03) for screening purposes.

The TEOM equipment is calibrated, maintained and serviced in accordance with the guidance set out in LAQM.TG(03), and complies with the manufacturers recommendations. There is a service contract in place with the supplier of the equipment.

3.4.2 Conclusions for Domestic Coal Burning PM_{10}

Monitoring results indicate that with the current levels of domestic coal burning there is unlikely to be an exceedance of the 2004 PM_{10} objectives. Since evidence indicates that domestic coal burning is on a dramatic decline (for example the NIHE has recently indicated that the number of its properties capable of burning coal in the whole Council area has now dropped to just 175 properties), it is concluded that there is no requirement to take further action in respect of this pollutant source.

3.5 Fugitive and Uncontrolled Sources

There are two sources within Dungannon & South Tyrone Borough Council that was not screened at the first stage review and assessment process.

1. Barrack Hill Quarry
2. Tullyvar Landfill Site.

Barrack Hill Quarry is a Part B process authorised by the Industrial Pollution Radiological inspectorate of the Environment & Heritage Service. All potential emission sources are strictly controlled by conditions within the authorisation. Relevant information in terms of the screening method set out

in LAQM.TG(03) is as follows. There are 4 properties within 200 metres of the boundary of the quarry but only one of these properties is within 200m of the potential emissions source.

Prior to the process being authorised a number of visits to the site indicated that the process is well managed and controlled with no visual evidence of dust emissions or drag out from the quarry. The Environmental Health Department has not received any complaint regarding dust nuisance.

From this information, and the guidance set out in LAQM.TG(03), it is considered unlikely that the objective for PM_{10} will be exceeded at any place of relevant exposure.

Tullyvar Landfill Site

The landfill site has been operational for approximately 8 years. Again, relevant information in terms of the screening method set out in LAQM.TG(03) is as follows. There are 3 properties within 400 metres of the boundary. 2 properties are within 200 metres of potential sources of emission. The landfill site is jointly run between Dungannon and South Tyrone Borough Council and Omagh District Council. The site is well managed and potential emission sources well controlled.

The projected background concentration for PM_{10} is 16 $\mu g\ m^{-3}$ obtained from using the maps on the UK National Air Quality Information Archive web site http://www.airquality.co.uk/archive/laqm/tools.php?tool=background.
The Environmental Health department has not received any complaints relating to dust emission since the site was operational.

Again, from this information and the guidance set out in LAQM.TG(03), it is considered unlikely that the objective for PM_{10} will be exceeded at any place of relevant exposure.

3.5.1 Conclusions for Fugitive and Uncontrolled PM_{10} Sources

Using the projected background concentration of PM_{10} for the Dungannon area in 2004 of 16 $\mu g\ m^{-3}$ and the screening method set out in LAQM.TG(03), it is considered unlikely that fugitive and uncontrolled sources will lead to exceedance of 2004 PM_{10} objectives at places of relevant exposure and it is not proposed to proceed further to a Detailed Assessment

4.0 Sulphur Dioxide (SO_2)

4.1 Air Quality Objectives

The air quality objectives for PM_{10} set out in the Air Quality regulations (Northern Ireland) 2003, to be achieved by 31 December 2004, are: -

- 15-minute mean of 266 μg m^{-3} not to be exceeded more than 35 times per year, to be achieved by December 2005
- 1 hour mean of 350 μg m^{-3} not to be exceeded more than 24 times a year, to be achieved by December 2004
- 24 hour mean of 125 μg m^{-3} not to be exceeded more than 3 times a year, to be achieved by December 2004

4.2 Domestic Coal Burning

Two areas were identified at the fist stage review and assessment as having the potential to have in excess of 300 coal burning properties per square kilometre. The council decided to implement a monitoring programme and an automatic sulphur dioxide analyser was located within Lambfields in Dungannon, which lies in one of these km^2 grids and is considered to represent the 'worst case scenario' with respect to SO_2 impact from domestic coal burning.

Table 4.2 shows the results of SO_2 Monitoring Data from 22 October 2002 – 30 April 2004.

Table 4.2 SO_2 Monitoring Data 2002, 2003, 2004

Lambfields, Dungannon

Year	No. of 15 minutes means > 266 μg m^{-3}	Maximun 1 hour mean μg m^{-3}	No. of 1 hour means > 350 μg m^{-3}	Maximum 24 hour mean μg m^{-3}	No. 24 hour means > 125 μg m^{-3}
2002 (22 Oct 2002-31 Dec 2002)	0	38	0	22.3	0
2003	0	77.5	0	35.4	0
2004 (01 Jan 2004 –30 Apr 2004)	0	63.42	0	27.4	0

Data for the entire 2003 year is available and can be used for direct comparison with the 2004 and 2005 objectives. There were no exceedances of either the 15 minute, 1 hour or 24 hour means, indicating compliance with all the objectives for SO_2.

4.2.1 Quality Assurance/Quality Control

The figures specified in table 4.2 are based upon data that has been ratified in accordance with the guidance set out in LAQM.TG(03). The ratified data capture rate for 2003 was 95.9%, which complies with both the 75% recommended in LAQM.TG(03) for screening studies and the 90% for monitoring.

The analyser is calibrated, maintained and serviced in accordance with the guidance set out in LAQM.TG(03), and in compliance with the manufacturers recommendations. There is a service contract in place with the supplier of the equipment.

4.2.2 Conclusions for Domestic Coal Burning SO_2

Monitoring results indicate that with the current levels of domestic coal burning there is unlikely to be an exceedance of the 2004 or 2005 SO_2 objectives. Since evidence indicates that domestic coal burning is on a dramatic decline (for example the NIHE has recently indicated that the number of its properties capable of burning coal in the whole Council area has now dropped to just 175 properties), it is concluded that there is no requirement to take further action in respect of this pollutant source.

4.3 Small Combustion Plant

A review of small combustion plant within Dungannon & South Tyrone Borough Council indicates that there is one process operating a boiler greater than 5mw thermal input. For the purposes of this exercise it was assumed that the boiler operated continuously. An SO_2 emission rate of 6 tonnes per annum and an effective stack height of 18.7 m was calculated, details in Appendix B.

4.3.1 Conclusions for SO_2 for Small Combustion Plant

Using guidance in LAQM.TG(03) and nomogram 7.1, it is estimated that the emissions of sulphur dioxide from the single combustion plant over 5 MW in the borough are well below levels which may give rise to an excedance of the objectives for sulphur dioxide. It is therefore concluded that there is no requirement to proceed to a Detailed Assessment for this pollutant source.

APPENDIX A

DMRB road traffic NO_2 and PM_{10} modelling reports – Netcen March 2002 (earlier DMRB model version) and January 2004 (new DMRB model version)

Air Quality Review and Assessment - Stage 2:

Reappraisal of traffic pollution modelling

A report produced for:

Dungannon and South Tyrone Borough Council

January 2004

Air Quality Review and Assessment - Stage 2:

Reappraisal of traffic pollution modelling

January 2004

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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 in Great Britain. The National Air Quality Strategy provides a framework for air quality control through air quality management and air quality standards. New national air quality standards have been proposed by the Expert Panel on Air Quality Standards (EPAQS) for the UK. These and other air quality standards and their objectives have been enacted through the Air Quality Regulations in England, Wales and Scotland (2000). The GB Environment Act 1995 requires Local Authorities to undertake an air quality review. In areas where air quality objectives are not anticipated to be met by the specified date, Local Authorities are required to establish Air Quality Management Areas to improve air quality.

The first step in this process is to undertake a review of current and potential future air quality in a three staged approach. Dungannon and South Tyrone Borough Council has completed a Stage 1 review and assessment which concluded that a Stage 2 review and assessment was required for the pollutants nitrogen dioxide and particulate matter from traffic sources. This was carried out and recommended that diffusion tube monitoring should be carried out on Church Street, which has been done since August 2002, and that a Stage 3 review and assessment should be considered.

However, since then a new version of the DMRB model used in the assessment has been released which may produce more realistic predictions of concentrations. With this in mind this report re-models the area in question, Church Street, to assess the new predicted concentrations, rather than proceeding directly to a Stage 3 review.

This report, resulting from the updated predictions of the original Stage 2 assessment, makes the following conclusions:

Nitrogen Dioxide (NO_2)

Diffusion tube readings from Church Street predict an exceedence of the 2005 objective. Therefore, it is recommended that a Detailed Review and Assessment be carried out. For the Detailed Assessment, the Council should place further diffusion tube samplers at a number of locations in Church Street, particularly close to the point of personal exposure, for at least a six month period. This data should be used to verify, or otherwise, the existing concentrations measured.

Particulate matter (PM_{10})

It is recommended that there is no need for a Stage 3 Review and Assessment, based on the results of roadside PM_{10} concentrations predicted using the DMRB model.

Contents

Acronyms and definitions

AADT	Annual Average Daily Traffic (vehicles per day)
ADMS	Atmospheric Dispersion Modeling System
AQMA	Air Quality Management Area
ATC	Automatic Traffic Counts
AURN	Automatic Urban and Rural (air quality monitoring) Network
BAM	Beta Attenuation Monitor
BAT	Best Available Techniques
CCTV	Closed Circuit Television
CO	carbon monoxide
CO_2	carbon dioxide
COMEAP	Committee on the Medical Effects of Air Pollutants
Defra	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges Screening Model (v1.00)
	EA Environment Agency
EFD (or EFDB)	Emissions Factor Database
EfW	Energy from Waste
EIA	Environmental Impact Assessment
GSS	Guidance for estimating the air quality impact of Stationary Sources
HECA	Home Energy Conservation Act 1995
HDV	Heavy Duty Vehicles (includes Rigid and articulated Heavy Goods Vehicles and Buses and Coaches)
Minor roads	Non A roads or motorways
NAEI	National Atmospheric Emissions Inventory
NAMAS	National Accreditation of Measurement and Sampling
NO	Nitric oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRTF	National Road Traffic Forecasts
NWS	National Waste Strategy (Scotland)
OS	Ordnance Survey
O_2	oxygen
O_3	ozone
PM_{10}	particulate matter with an (equivalent aerodynamic) diameter of ten microns (10 µm) or less
$PM_{2.5}$	particulate matter with an (equivalent aerodynamic) diameter of 2.5 microns (2.5 µm) or less
SO_2	sulphur dioxide
UKAS	United Kingdom Accreditation Service
USA	Updating and Screening Assessment

1 Introduction to the air quality review

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 in Great Britain. The National Air Quality Strategy provides a framework for air quality control through air quality management and air quality standards. New national air quality standards have been proposed by the Expert Panel on Air Quality Standards (EPAQS) for the UK. These and other air quality standards and their objectives have been enacted through the Air Quality Regulations in England, Wales and Scotland (2000). The GB Environment Act 1995 requires Local Authorities to undertake an air quality review. In areas where air quality objectives are not anticipated to be met by the specified date, Local Authorities are required to establish Air Quality Management Areas to improve air quality.

PURPOSE OF THIS STUDY

Dungannon and South Tyrone Borough Council completed a Stage 2 assessment and identified locations where, potentially, the air quality objectives could be exceeded. However, since this assessment, a new version of DMRB has been released that may produce more realistic predictions of concentrations.

Rather than proceeding directly to a Stage 3 review and assessment, Dungannon and South Tyrone Borough Council wished to first remodel the area predicted to exceed the air quality objectives for PM_{10} and NO_2, using the latest version of DMRB. More recent diffusion tube monitoring data has also been reviewed in parallel with the DMRB modelling.

CONCLUSIONS OF PREVIOUS AIR QUALITY REVIEW FOR DUNGANNON AND SOUTH TYRONE BOROUGH COUNCIL

This section summarises the conclusions from Dungannon and South Tyrone Borough Council's previous air quality review and assessments completed for the Department of the Environment (NI). It highlights the air quality problems identified at that time.

1. **NO_2**
   Predictions indicated that concentrations would be approximately at the objective level for 2005 in Church Street in Dungannon. It was therefore recommended that monitoring be carried out at this location to ascertain the current concentration levels. Following this, consideration would be given to the need for a Stage 3 Review and Assessment.

2. **PM_{10}**
   Emissions from traffic sources were not predicted to lead to an exceedence of the PM_{10} objectives in 2004. Therefore it was concluded that there was no need to proceed to a Stage 3 Review and Assessment.

However, since the modelling was completed, it was recognised that DMRB may have been overestimating some concentrations. A newer version of DMRB has now become available, and this has been used in this report to decide whether or not to proceed to a further assessment for this source. More recent diffusion tube monitoring data has also been used, in conjunction with the DMRB modelling, to inform this decision.

APPROACH TAKEN

The approach taken in this study is:

- Modelling of air quality effects of traffic using the latest version of the Design Manual for Roads and Bridges (DMRB) screening model in the area identified as possibly exceeding the air quality objectives for PM_{10} and NO_2 (Church Street).
- A review of new relevant monitoring data.
- An indication of whether Air Quality Strategy (2002) NO_2 and PM_{10} objectives will be exceeded in the Dungannon and South Tyrone Borough region.
- Advice on whether additional monitoring is required and, if so, further recommendations on the appropriate action to take.

In preparing this report the latest version of the UK Government's Technical Guidance has been used, LAQM.TG(03).

STRUCTURE OF THIS REPORT

This report is structured in the following way:

Chapter 1: Introduces the UK Air Quality Strategy (AQS) and the local data used in this review and assessment.

Chapter 2: Provides more details on the Local Air Quality Management process.

Chapters 3 to 4: Provides detailed information and results concerning the review and assessment process for NO_2 and PM_{10}.

Chapter 5: Summary of the findings and recommendations of the work.

INFORMATION PROVIDED BY THE COUNCILS TO SUPPORT THIS ASSESSMENT

The following information from Dungannon and South Tyrone Borough Council was used to complete this review and assessment:

- Local air quality monitoring data
- Information on proposed developments
- Traffic flow and speed data (including % HDVs)
- Transport strategy

Dungannon and South Tyrone Borough Council and its environs

Dungannon and South Tyrone has a population of 46,900 in an area of 315 sq. miles. It is an area rich in history that stretches from the westward shores of Lough Neagh up through the Clogher Valley and northwards to the foothills of the Sperrins. There is a wide range of industrial, educational, health, cultural and leisure facilities on offer. The area whilst predominantly rural in nature has some significant urban areas.

Extent of data available

Dungannon and South Tyrone Borough Council carries out monitoring of nitrogen dioxide using passive diffusion tube samplers. Data is available from 1998 to 2003, however only data since 2000 is considered in this report owning to the availability of lab biasing information. Section 3.2 details the results of the diffusion tube sampling.

Quality Assurance/Quality control of data

The diffusion tubes were analysed by laboratories which participate in the laboratory intercomparison exercises for the UK National NO_2 Diffusion Tube Network. The results in this report have therefore been corrected for analytical bias as advised in the UK Government Technical Guidance.

Traffic data

Traffic flow measurements and 2004/2005 predictions have been provided by the Council, as have average traffic speeds. Traffic growth forecasts were provided by the Northern Ireland Roads Service Division. The model requires estimates of HGVs on the roads to predict the pollutant concentrations, this data was also provided by the Council. Appendix 1 summarises the traffic information used in the assessment.

Assumed distance from the centre of the road to kerbside

The model used to predict the roadside concentrations requires estimates of the distance of the receptor and the kerbside from the centre of the road. This information was provided by the Council for the previous report and has been used again here.

The updated Air Quality Strategy

THE NEED FOR AN AIR QUALITY STRATEGY

After agreement of a Common Position on the Air Quality Daughter Directives (AQDD), in June 1998 at the European Union Environment Council, the government published its proposals for review of the National Air Quality Strategy (in 1999). Subsequently the Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in January 2000.

The NI Environment Order came into operation in January 2003 and implements both the European Air Framework Directive 96/62EC and the UK Air Quality Strategy. The Expert Panel on Air Quality Standards (EPAQS) has proposed new national air quality standards for the UK.

The NI Environment Order 2002 provides the framework for LAs to review air quality and for implementation of an AQMA. It is issued by the Department of the Environment in Northern Ireland under Article 16 of the Environment (NI) Order 2002. Under article 16 of the order, District Councils and other relevant authorities are required to have regard to this guidance when carrying out any of their duties under, or by virtue of Part III of the order. The guidance the document sets out is outlined in Table 2.1 below.

Table 2.1: NI Environment Order 2002 key guidance

- The statutory background and the legislative framework within which relevant authorities have to work
- The new principles behind reviews and assessments of air quality up to 2010 and the recommended steps that relevant authorities should take
- The timetable for reviews and assessments up to 2010
- How district councils should handle the designation of AQMAs
- How relevant authorities should handle the drawing up and implementation of action plans
- Recommendations and suggestions on taking forward the development of local and regional air quality strategies
- Suggestions of how relevant authorities should consult and liase with others
- Local transport measures which Roads Service might wish to consider
- The general principles behind air quality and land use planning; and
- How enforcing authorities should use powers of entry under Article 19 of the Order

OVERVIEW OF PRINCIPLES AND MAIN ELEMENTS OF THE NATIONAL AIR QUALITY STRATEGY

The main elements of the AQS can be summarised as follows:

- The use of a health effects based approach using national air quality standards and objectives.
- The use of policies by which the objectives can be achieved and which include the input of important actors such as industry, transportation bodies and local authorities.
- The predetermination of timescales with target dates of 2003, 2004, 2005, 2008 and 2010 for the achievement of objectives and a commitment to review the Strategy every three years.

It is intended that the AQS will provide a framework for the improvement of air quality that is both clear and workable. In order to achieve this, the Strategy is based on several principles which include:

- the provision of a statement of the Government's general aims regarding air quality;
- clear and measurable targets;
- a balance between local and national action and
- a transparent and flexible framework.

Co-operation and participation by different economic and governmental sectors is also encouraged within the context of existing and potential future international policy commitments.

National Air Quality Strategy

At the centre of the AQS is the use of national air quality standards to enable air quality to be measured and assessed. These also provide the means by which objectives and timescales for the achievement of objectives can be set. Most of the proposed standards have been based on the available information concerning the health effects resulting from different ambient concentrations of selected pollutants and are the consensus view of medical experts on the Expert Panel on Air Quality Standards (EPAQS). These standards and associated specific objectives to be achieved between 2003 and 2010 are shown in Table 2.2. The table shows the standards in $\mu g/m^3$ with the number of exceedences that are permitted (where applicable).

Specific objectives relate either to achieving the full standard or, where use has been made of a short averaging period, objectives are sometimes expressed in terms of percentile compliance. The use of percentiles means that a limited number of exceedences of the air quality standard over a particular timescale, usually a year, are permitted. This is to account for unusual meteorological conditions or particular events such as November 5th. For example, if an objective is to be complied with at the 99.9th percentile, then 99.9% of measurements at each location must be at or below the level specified.