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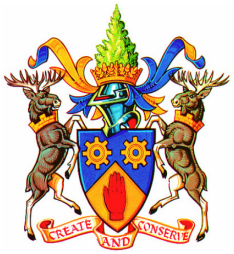
Report

NPL Report AS 35

2009 Air Quality Updating and Screening Assessment for *Castlereagh Borough Council*

In fulfillment of Part IV of the Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III: Local Air Quality Management

April 2009



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2009 Air Quality Updating and Screening Assessment for Castlereagh Borough Council

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Approved on behalf of Managing Director, NPL
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Executive Summary

The Air Quality Strategy has established the framework for air quality management in the UK. Local authorities have a duty under the Environment Act 1995 and subsequent regulations to review and assess air quality in their areas on a periodic basis so as to identify all areas where the air quality objectives are being or are likely to be exceeded.

A phased approach has been adopted for the review and assessment process so that the level of assessment undertaken is commensurate with the risk of an exceedence of an air quality objective. An updating and screening assessment (USA) is required to be prepared every three years by all local authorities in the UK. The last updating and screening assessment of air quality was undertaken in 2006 and the next is due by the end of April of this year. Castlereagh Borough Council has commissioned the National Physical Laboratory to assist and prepare its updating and screening assessment.

This report contains the 2009 updating and screening assessment for Castlereagh Borough Council and has been completed using the recommended template. The assessment is fully compliant with the applicable policy and technical guidances.

Castlereagh Borough lies to the southeast of Belfast in Northern Ireland. The Borough is of mixed urban and rural character. It is mainly residential with no significant industrial activity. Many residents work in Belfast and this, combined with the major arterial routes passing through the Borough, makes road transport the major air pollution concern. There are currently no Air Quality Management Areas within the Borough.

The main conclusions from the 2009 updating and screening assessment are:

- **Air Pollution Monitoring**

  The diffusion tube measurements at Normandy Court on the A20 Upper Newtownards Road in Dundonald have indicated exceedence of the annual mean objective for nitrogen dioxide in both 2007 and 2008. There is relevant exposure at this location. The measurements of nitrogen dioxide and particulate matter have shown no exceedences of air quality objectives at other monitoring sites in the Borough.

  The Council initiated a detailed monitoring assessment in the vicinity of Normandy Court in 2007, involving automatic measurements of nitrogen dioxide (and particulate matter). The annual mean concentrations derived were close to (in 2007) and below (in 2008) the annual mean objective. Castlereagh Borough Council has recently commissioned a detailed assessment involving dispersion modelling.

- **Developments/Changes within the Borough to Pollution Sources**

  There have been no new developments or significant changes to existing installations and activities within Castlereagh Borough, which require further assessment.

The 2009 assessment has revealed no new requirements to proceed to a detailed assessment for any pollutant. The main action is to complete and report the detailed assessment that has been initiated to assess exposure to nitrogen dioxide on the Upper Newtownards Road in Dundonald.

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Appendices

1 Introduction

The Air Quality Strategy has established the framework for air quality management in the UK. Local authorities have a duty under the Environment Act 1995 and subsequent regulations to review and assess air quality in their areas on a periodic basis so as to identify all areas where the air quality objectives are being or are likely to be exceeded.

A phased approach has been adopted for the review and assessment process so that the level of assessment undertaken is commensurate with the risk of an exceedence of an air quality objective. An updating and screening assessment (USA) is required to be prepared every three years by all local authorities in the UK. The last updating and screening assessment of air quality was undertaken in 2006 and the next is due by the end of April of this year. Castlereagh Borough Council has commissioned the National Physical Laboratory to assist and prepare its updating and screening assessment.

There have been a number of significant changes to the format of the USA report to ease the burden on local authorities. These changes have been made following the lessons learned during the previous rounds of review and assessment, and in particular to the recommendations of the Evaluation Report that was commissioned in 2007 by the UK Government and the Devolved Administrations (Defra, 2007). The most significant changes affect the way in which the Updating and Screening Assessment should be undertaken:

1. *Assessment by emission source rather than pollutant by pollutant*: The approach has been revised so that the assessment is carried out on a source-by-source basis, rather than by considering each pollutant in turn. This avoids unnecessary repetition where significant sources emit a number of pollutants (e.g., NO_x and PM from road transport)
2. *Web-based submission*: The USA report will be submitted via a web-based system, predominantly based on a series of checklists and proformae.

This report contains the 2009 updating and screening assessment for Castlereagh Borough Council and has been completed using the recommended template. The assessment is fully compliant with the applicable policy and technical guidances. Appendix A contains a shortened version of the web-based questionnaire or checklist designed to assist local authorities with the assessment.

1.1 Description of Local Authority Area

Castlereagh Borough Council covers an administrative area of 84 km² to the southeast of Belfast in Northern Ireland. Castlereagh Borough is divided into four administrative areas (see Figure 1-1). The Northern Ireland Statistics and Research Agency gives the population for the borough as 65,633 (Mid 2006 Population Estimate). As part of a local government re-organisation planned for next year, Castlereagh Borough Council will be split and amalgamated into Belfast City and Lisburn City Councils.

The Borough of Castlereagh is surrounded by the neighbouring local authorities of Ards Borough Council, Belfast City Council, Down District Council, Lisburn Borough Council and North Down Borough Council and its position in relation to Belfast, has made it a very popular area in which to live. Commuting time to the city centre from any part of the Borough is relatively short. This, combined with the major arterial routes passing through the Borough into Belfast, has made road transport the major air pollution concern.

The Borough is of a mixed urban and rural character, with the urban portion currently expanding into the more rural areas, since the easing of planning restrictions. The area has quite high-density private and public sector housing with the housing stock itself relatively modern and in good condition. The Borough has undergone a period of expansion with increased housing, commerce, and leisure facilities.

There are a number of large private and public sector employers in the area and numerous smaller businesses. The main centres are Newtownbreda, Carryduff, Dundonald and the villages of Moneyreagh and Crossnacreevy.

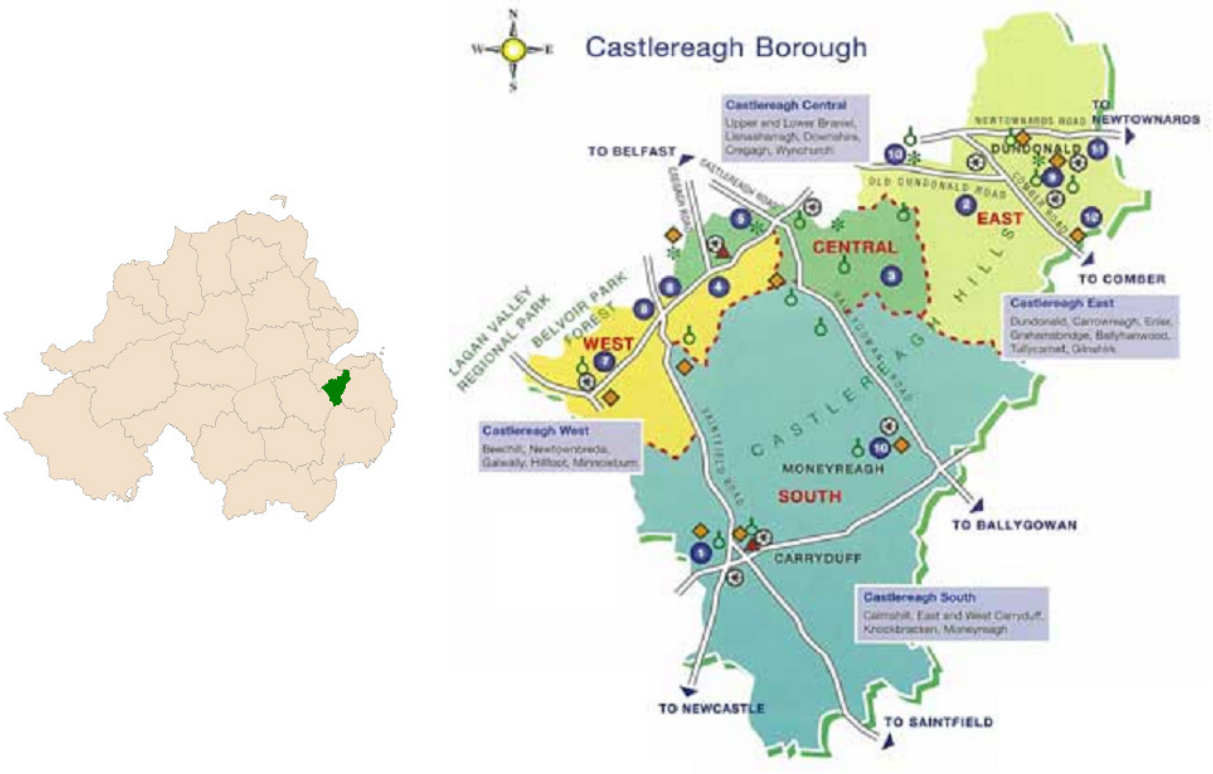

Figure 1-1: Location of Castlereagh Borough in Northern Ireland (left-hand map) and a detailed map of the Borough showing the major towns and administrative divisions (right-hand map).

Castlereagh Borough contains a significant amount of agricultural land towards its eastern and southern boundaries. A feature of the entire area is the green hills of Castlereagh, which has in recent years been protected against further development by strict planning controls.

The predominant wind direction is from the southwest.

1.2 Purpose of Report

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

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in Northern Ireland are set out in the Air Quality Regulations (Northern Ireland) 2003, Statutory Rules of Northern Ireland 2003, no. 342, and are shown in Table 1-1. This table shows the objectives in units of microgrammes per cubic metre μg m^{-3} (milligrammes per cubic metre, mg m^{-3} for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1-1: Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in Northern Ireland.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	3.25 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Castlereagh Borough Council has completed the following reviews and assessments of air quality in earlier rounds of the assessment process:

▪ Stage 1 Report (CBC, 2000)	2000	The first stage review and assessment found that the air quality objectives for 4 of the 7 specified parameters namely carbon monoxide, nitrogen dioxide, PM_{10} and sulphur dioxide were all unlikely to be achieved by 2003-2005.
▪ Stage 2/3 Air Quality Review (CBC, 2003, 2004)	2003	The stage 2/3 review for road emissions and domestic fuel combustion concluded that an Air Quality Management Area (AMQA) should not be declared for NO_2, PM_{10} and SO_2, as there were not predicted to be exceedences of the air quality objectives.
▪ Progress report	2005	The progress report concluded that PM_{10}, NO_2 and SO_2 were not predicted to cause exceedences of the air quality objectives at relevant receptors.
▪ Updating and Screening Assessment (USA, 2006)	2006	This indicated that current objectives in relation to SO_2, NO_2 and PM_{10} would be achieved at the location of the automatic monitoring stations. The diffusion tube measurements at the A20 Upper

		Newtownards road in Dundonald indicated the possibility of exceedences in relation to NO_2. A detailed assessment involving automatic measurements of NO_2 and PM_{10} was commenced in 2007.
▪ Progress report (EG, 2008)	2008	This reported the 2007 measurements. Although based on 76% data capture, the annual mean NO_2 concentration at the Dundonald automatic monitoring site was below the objective.

There are currently no Air Quality Management Areas (AQMAs) within the Borough. However, diffusion tube measurements made on the A20 Upper Newtownards Road in Dundonald have indicated exceedences in relation to NO_2. A detailed assessment involving automatic measurements of NO_2 and PM_{10} on the Upper Newtownards Road was commenced in 2007. These measurements did not indicate an exceedence of the annual or hourly mean NO_2 objectives in 2007 (and again in 2008). To address these issues, a detailed modelling assessment has been initiated, which will be reported separately.

2 New Monitoring Data

Castlereagh Borough Council and adjoining local authorities (Ards Borough Council, Down District Council, Lisburn City Council and North Down Borough Council, see Figure 1-1) form the Eastern Group of Councils for the purposes of air quality management and reporting. This group reporting gives an overall view of the state of air quality in this part of Northern Ireland and facilitates comparison.

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

In 2008, Castlereagh Borough Council carried out ambient air monitoring of oxides of nitrogen (NO_x)[1] and particulate matter (as PM_{10}) using automatic instrumentation at two roadside locations in the Borough:

- Castlereagh Lough View Drive (A1)
- Castlereagh Dundonald (A2)

At both sites, the measurements of NO_x and PM_{10} were made using chemiluminescence analysers and the TEOM technique, respectively. The TEOM data were reported as gravimetric equivalent using a factor of 1.3[2]. Information on these two sites is given in Table 2-1 and further details on the QA/QC arrangements are provided in Appendix B.

The locations of the automatic monitoring sites (A1 and A2) are shown in Figure 2-1.

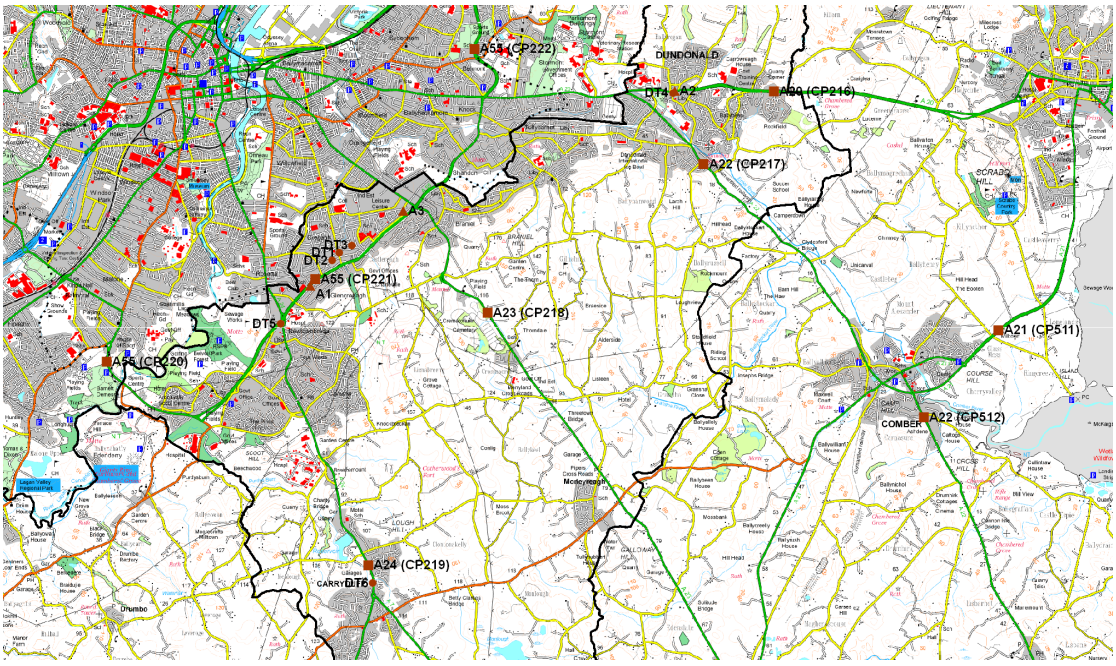

Figure 2-1: Overview map showing location of air pollution monitoring sites (circles and triangles) and traffic census points (squares) in and around Castlereagh Borough. The automatic sites are denoted by triangles [A1 = Lough View Drive, A2 = Dundonald and A3 = Espie Way] and the diffusion tube sites by circles [DT1 = Cregagh Road, DT2 = Everton Drive, DT3 = Downshire Park East, DT4 = Upper Newtownards Road, DT5 = Newtownbreda Road, DT6 = Saintfield Road]..

[1] Oxides of nitrogen (NO_x) is a collective term used to denote nitric oxide (NO) and nitrogen dioxide (NO_2). The chemiluminescence analyser determines the concentrations of NO and NO_x ($NO+NO_2$) and derives the concentration of NO_2 by difference. All references to the measurement of NO_x are taken to include the measurements of NO and NO_2.

[2] The volatile correction model has also been applied to the uncorrected data, as discussed in Appendix B.

Table 2-1: Details of Automatic Monitoring Sites

Site Name	Site Type	OS (NI) Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
Castlereagh Lough View Drive	Roadside	E 335749 N 370711	NO-NO_2-NO_x, PM_{10}	N	Y (22 m)	3 m	-
Castlereagh Dundonald	Roadside	E 342016 N 374041	NO-NO_2-NO_x, PM_{10}	N	Y (22 m)	3 m	N

Table 2-2: Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
Cregagh Road	Roadside	E 336257 N 371278	NO_2	N	Y (28m)	3 m	-
Everton Drive	Background	E 336132 N 371141	NO_2	N	Y (8 m)	1 m	-
Downshire Park East	Background	E 336474 N 371400	NO_2	N	Y (12 m)	1 m	-
Upper Newtownards Road	Roadside	E 341991 N 374013	NO_2	N	Y (2.5 m)	0.5 m	Y
Newtownbreda Road	Roadside	E 335246 N 370061	NO_2	N	Y (12 m)	2 m	-
Saintfield Road	Roadside	E 336832 N 365625	NO_2	N	Y (70 m)	3 m	-
Castlereagh Lough View Drive	Roadside	E 335749 N 370711	NO_2	N	Y (22 m)	3 m	-
Castlereagh Dundonald	Roadside	E 342016 N 374041	NO_2	N	Y (22 m)	3 m	N

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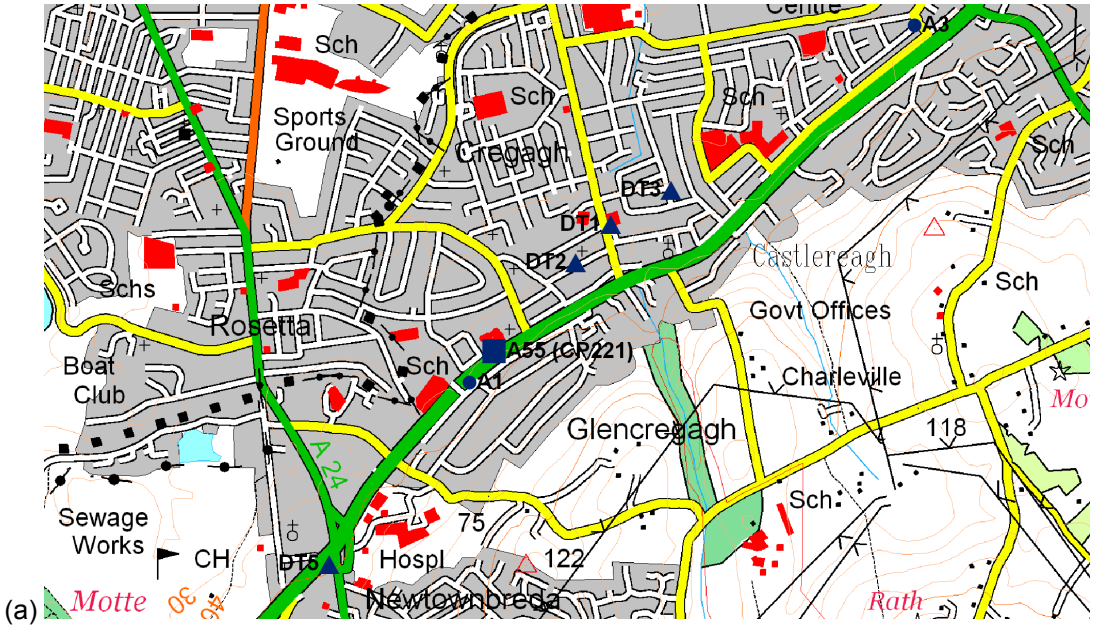
The Castlereagh Dundonald site was established in 2007 for a Detailed Assessment. Previously, there was an automatic station at Castlereagh Espie Way for SO_2 and PM_{10} (site A3 in Figure 2-1). This site was decommissioned in February 2007 and the PM_{10} instrument was installed at the roadside site in Dundonald, together with a new NO_x analyser.

2.1.2 Non-Automatic Monitoring

Diffusion tube measurements of NO_2 are made at a number of locations in the Borough, as indicated in Table 2-2. Figure 2-1 provided an overview of the diffusion tube sites in Castlereagh Borough. More detailed maps of the locations of the diffusion tubes sites are given in Figure 2-2a and b.



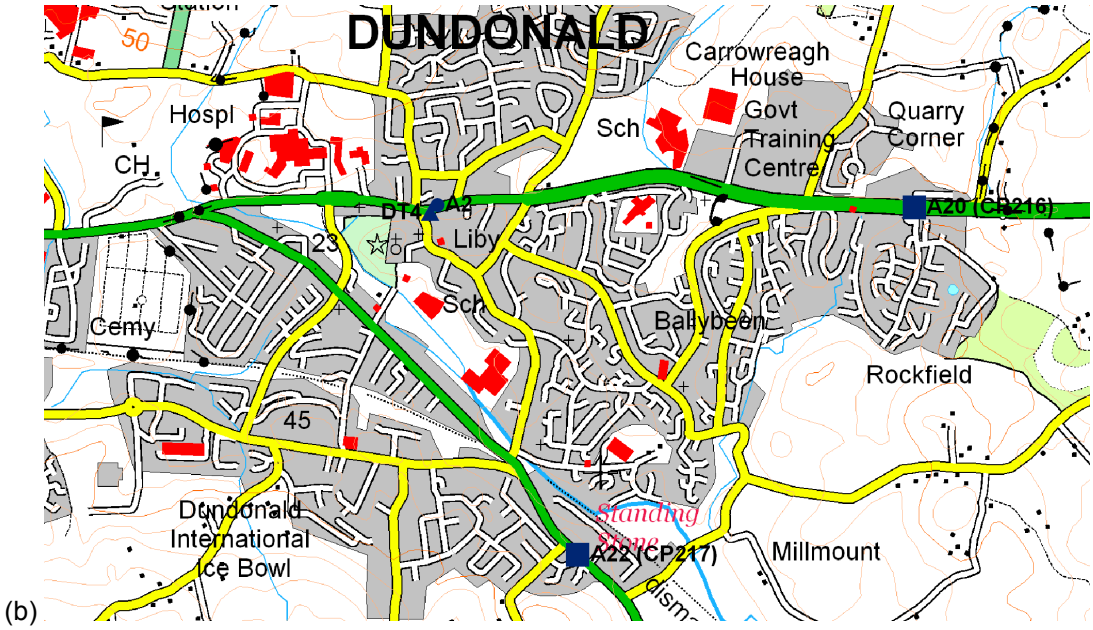


Figure 2-2: Detailed maps showing air pollution monitoring sites (circles and triangles) and traffic census points (square) in and around (a) the Upper Knockbreda Road (upper panel) and (b) Dundonald (lower panel) in Castlereagh Borough [Automatic Monitoring: A1 = Lough View Drive, A2 = Dundonald, A3 = Espie Way; Diffusion Tubes: DT1 = Cregagh Road, DT2 = Everton Drive, DT3 = Downshire Park East, DT4 = Upper Newtownards Road, DT5 = Newtownbreda Road, DT6 = Saintfield Road].

Triplicate diffusion tubes are now co-located at both automatic monitoring sites, thereby allowing adjustments to be made to the diffusion tube measurements. The triplicate measurements at the Castlereagh Dundonald automatic monitoring site commenced from March 2008.

The measurements at the Downshire Park East and the Upper Newtownards Road sites (DT3 and DT4 respectively in Figure 2-2) were stopped in March 2008 to allow triplicate diffusion tube measurements at the Castlereagh Dundonald automatic monitoring site. This closure of the Downshire Park East site was considered to be justified as there was another background site nearby (Everton Drive, DT2). The diffusion tube at the original site on the Upper Newtownards Road site was moved a short distance to be co-located with the Dundonald automatic monitoring site in March 2008. Following comment received on the 2008 progress report, monitoring was re-instated at the original site in October 2008 using triplicate diffusion tubes.

Further information on the diffusion tube measurements and the QA/QC arrangements are given in Appendix B.

2.2 Comparison of Monitoring Results with AQ Objectives

In the following sections, statistics are presented for nitrogen dioxide (NO_2) and PM_{10}, derived from the automatic and diffusion tube measurements. These statistics are compared with the objectives for the different pollutant (see Table 1-1) to identify exceedences.

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Plots of the measured hourly mean NO_2 concentrations at the two automatic monitoring sites for 2008 are provided in Appendix B1. Table 2-3a presents the annual mean concentrations of NO_2 determined at the two sites in 2008 from the hourly measurements. The annual means for 2006 and 2007 have also been included in this table. The Castlereagh Dundonald site was established in early 2007.

Table 2-3b presents the number of hours when the hourly mean concentration exceeded the hourly mean objective of 200 μg m^{-3} at the two sites for 2006-2008. Currently, a maximum of 18 exceedences are permitted.

Table 2-3a: Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective of 40 μg m^{-3}.

Site ID	ocation	Within AQMA?	Data Capture 2008 (%)	Annual mean concentrations (μg/m^3)		
				2006 *	2007 *	2008
A1	Castereagh Lough View Drive	N	95.3%	22.7	22.5	21.8
A2	Castereagh Dundonald	N	99.6%	-	38.8 (a)	32.3

(a) New site in 2007, measurements commenced in April. Data capture = 78.7%.

Table 2-3b: Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective of 200 μg m^{-3}.

Site ID	ocation	Within AQMA?	Data Capture 2008 (%)	Number of Exceedences of hourly mean (200 μg/m^3) *If the period of valid data is less than 90% o a full year, include the 99.8th %ile of hourly means in brackets.*		
				2006 *	2007 *	2008
A1	Castereagh Lough View Drive	N	95.3%	0	0	0
A2	Castereagh Dundonald	N	99.6%	-	2 (a)	3

(a) New site in 2007, measurements commenced in April. Data capture = 78.7%.

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As indicated in Table 2-3a and Table 2-3b, there were no exceedences of either the annual mean or the hourly NO_2 air quality objectives in 2008, although the measurements at Castlereagh Dundonald in 2007 were close to the annual mean objective of 40 μg m^{-3}.

Diffusion Tube Monitoring Data

Diffusion tube measurements of NO_2 were made at a number of locations in the Borough in 2008. The actual and adjusted monthly measurements can be found in Appendix B.2. A bias adjustment factor of 0.82 was applied to correct the 2008 diffusion tube data. The data capture and adjusted annual mean concentrations derived for the different sites in 2008 are presented in Table 2-4a. The results for the site at Upper Newtownards Road in 2008 (and for 2007) indicate an exceedence of the annual mean NO_2 air quality objective of 40 μg m^{-3}.

Table 2-4a: Results of Nitrogen Dioxide diffusion tubes for 2008.

Site ID	Location	Within AQMA?	Data Capture 2008 (%) [note a]	Annual mean concentration 2008 (μg/m^3) Adjusted for bias
Castlereagh DT1	Cregagh Road	N	100.0% (12)	26
Castlereagh DT2	Everton Drive	N	91.7% (11)	16
Castlereagh DT3	Downshire Park	N	16.7% (2)	*- (note b)*
Castlereagh DT4	**Upper Newtonards Road**	**N**	**41.7% (5)**	***55 (65) (note c)***
Castlereagh DT5	Newtownbreda Road	N	100.0% (12)	35
Castlereagh DT6	Saintfield Road	N	100.0% (12)	17

Table 2-4b: Results of Nitrogen Dioxide diffusion tubes for 2006-2008.

Site ID	Location	Within AQMA?	Annual mean concentrations (μg/m^3) Adjusted for bias		
			2006 *	2007 *	2008
Castlereagh DT1	Cregagh Road	N	23	27	26
Castlereagh DT2	Everton Drive	N	16	18	16
Castlereagh DT3	Downshire Park	N	13	16	*- (note b)*
Castlereagh DT4	**Upper Newtonards Road**	**N**	**40**	**48**	***55 (note c)***
Castlereagh DT5	Newtownbreda Road	N	32	34	35
Castlereagh DT6	Saintfield Road	N	15	17	17

Notes to Table 2.4: (a) The number in bracket indicates the number of valid monthly measurements; (b) Diffusion tube measurements were only made in January and February as the diffusion tubes for this site were used to make triplicate measurements at the Castlereagh Dundonald automatic site; (c) Diffusion tube measurements were only made for January-February and October-December 2008 as the tube was moved to the nearby Castlereagh Dundonald automatic site. The ratio of the period mean concentration to annual mean concentration was found to be 1.17 from automatic measurements made in Belfast and the Eastern group (see Appendix B2, section B.2.3.4). The entry shows the estimated annual mean concentration (period mean concentration).

Table 2-4b compares the annual mean concentrations in 2008 with those determined in 2006 and 2007. Figure 2-3 provides a graphical indication of the trend in the annual mean concentration over the longer period from 2001 to 2008. Only the measurements at the site on the Upper Newtownards Road are indicative of an exceedence of the annual mean objective.

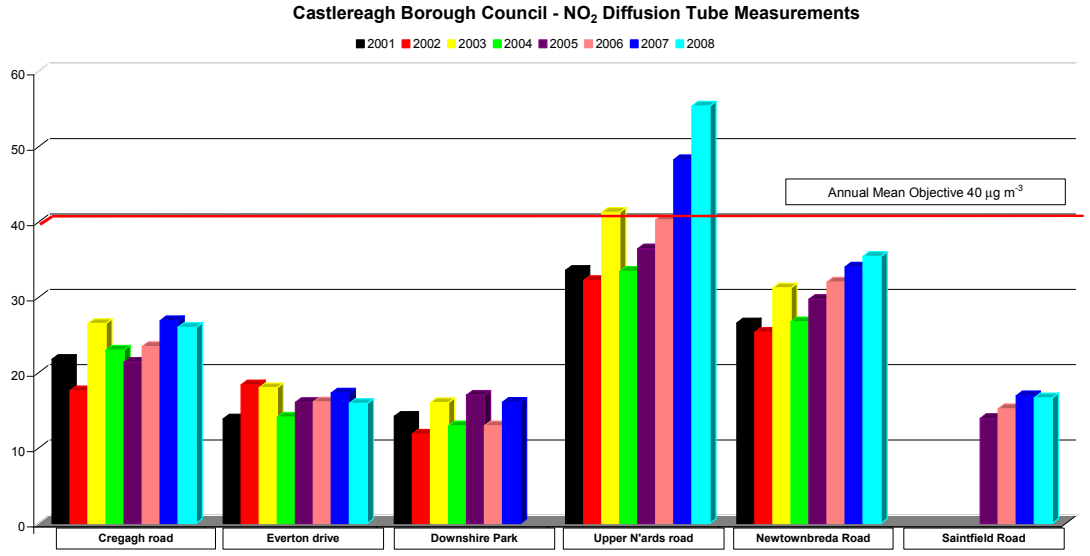

Figure 2-3: Trends in the measured annual mean NO_2 concentrations (in µg m^{-3}) at diffusion tube sites in Castlereagh.

2.2.2 PM_{10}

Plots of the hourly mean PM_{10} concentrations measured at the two automatic monitoring sites in 2008 can be found in Appendix B1. The Castlereagh Dundonald site was established in early 2007 and prior to that date, PM_{10} measurements were made at the Castlereagh Espie Way site.

The latest technical guidance [TG, 2009] recommends the use of the volatile correction model (VCM) developed by King's College London to correct TEOM measurements. The VCM uses measurements of the volatile PM_{10} component made using FDMS TEOM instruments, either co-located with the TEOM measurements or within 130 km of the site. A number of FDMS TEOM instruments were installed at sites in Northern Ireland during 2008 (see Table B2.1 in Appendix B). As described in Appendix B, the FDMS TEOM measurements made at the Lisburn Dunmurry site were used to correct the Castlereagh TEOM data.

Because the FDMS measurements only commenced in late February and to ensure consistency with the 2006 and 2007 measurements, the PM_{10} statistics for 2008 have been derived as gravimetric equivalents using the factor of 1.3, as shown in Table 2-5a and Table 2-5b [Table B2.2 in Appendix B compares the statistics using both methods]. There were no exceedences of the annual mean objective of 40 µg m^{-3} at the monitoring sites in 2008 (see Table 2-5a).

Table 2-5a: Results of PM_{10} Automatic Monitoring - Comparison with Annual Mean Objective of 40 µg m^{-3}.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m^3)		
				2006 *	2007 *	2008
A1	Castereagh Lough View Drive (gravimetric - note a)	N	91.6%	22.4	22.1	21.2
A2	Castereagh Dundonald (gravimetric - note a)	N	98.1%	-	22.1 (b)	22.8
A3	Castlereagh Epsie Way (gravimetric - note a)	N	-	22.7	- (c)	-

(a) TEOM PM_{10} measurements converted to gravimetric equivalent using a factor of 1.3; (b) New site in 2007, measurements commenced in April. Data capture = 69.5%; (b) Site closed in 2007.

Table 2.5b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective of 35 or fewer exceedences of a daily mean concentration of 50 μg m^{-3}.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of daily mean (50 μg/m^3) *If data capture < 90%, include the 90th %ile of hourly means in brackets.*		
				2006 *	2007 *	2008
A1	Castereagh Lough View Drive (gravimetric – note a)	N	91.6%	4	3	0
A2	Castereagh Dundonald (gravimetric)	N	98.1%	-	1 (b)	4
A3	Castlereagh Epsie Way (gravimetric)	N	-	5	- (c)	-

(a) TEOM PM_{10} measurements converted to gravimetric equivalent using a factor of 1.3; (b) New site in 2007, measurements commenced in April. Data capture = 69.5%; (b) Site closed in 2007.

Table 2-5b presents the number of days at the automatic sites for 2006-2008 when the daily mean PM_{10} concentration exceeded 50 μg m^{-3}. Currently, a maximum of 35 exceedences are permitted per year. There were therefore no exceedences of the daily mean PM_{10} objective.

2.2.3 Sulphur Dioxide

As part of the re-organisation of the automatic measurements in Castlereagh in 2007, the SO_2 measurements made at the Castlereagh Epsie Way site were terminated. There were no exceedences of air quality objectives for SO_2 at this site in 2005 or 2006.

2.2.4 Benzene

There were no measurements of benzene within Castlereagh Borough in 2008 (nor within the Eastern Group).

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

This was reviewed in the 2006 USA and there have been no change since then. No further assessment is required.

Castlereagh Borough Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

No such streets were identified the 2006 USA and there have been no change since then. No further assessment is required.

Castlereagh Borough Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

Castlereagh Borough Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

In previous assessments, the junction of the Saintfield Road (A24) and Upper Knockbreda Road (A55) had been identified as busy and with relevant exposure in the Castlereagh Borough Council area. This was assessed in the Stage 2/3 report using the DMRB model [CBC, 2003, 2004]. The assessment indicated values well within the objectives for NO_2, so it was considered unnecessary to reassess these roads.

Castlereagh Borough Council confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Castlereagh Borough Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

The previous updating and screening assessment (USA, 2006) considered a number of road links with traffic census points:

- A20 East Upper Newtownards Road, Belfast (at Quarry Inn)
- A22 East Comber Road, Belfast (south east of New Line)
- A23 East Ballygowan Road, Belfast (at Roselawn)
- A24 East Belfast, Carryduff (at Baronscourt)
- A55 East Upper Knockbreda Road Belfast

Figure 3-1 shows a time series of the actual and forecast traffic counts (AADT) at these and other traffic census points in and around Castlereagh Borough. The actual traffic counts (1998-2007) were provided by Roads Services of the Northern Ireland Department for Regional Development (DRD, 2008). The traffic counts for 2008-2010 were derived using the automated traffic growth calculator available on the LAQM webpage. The figure shows that there has been no substantial growth in traffic in the Borough.

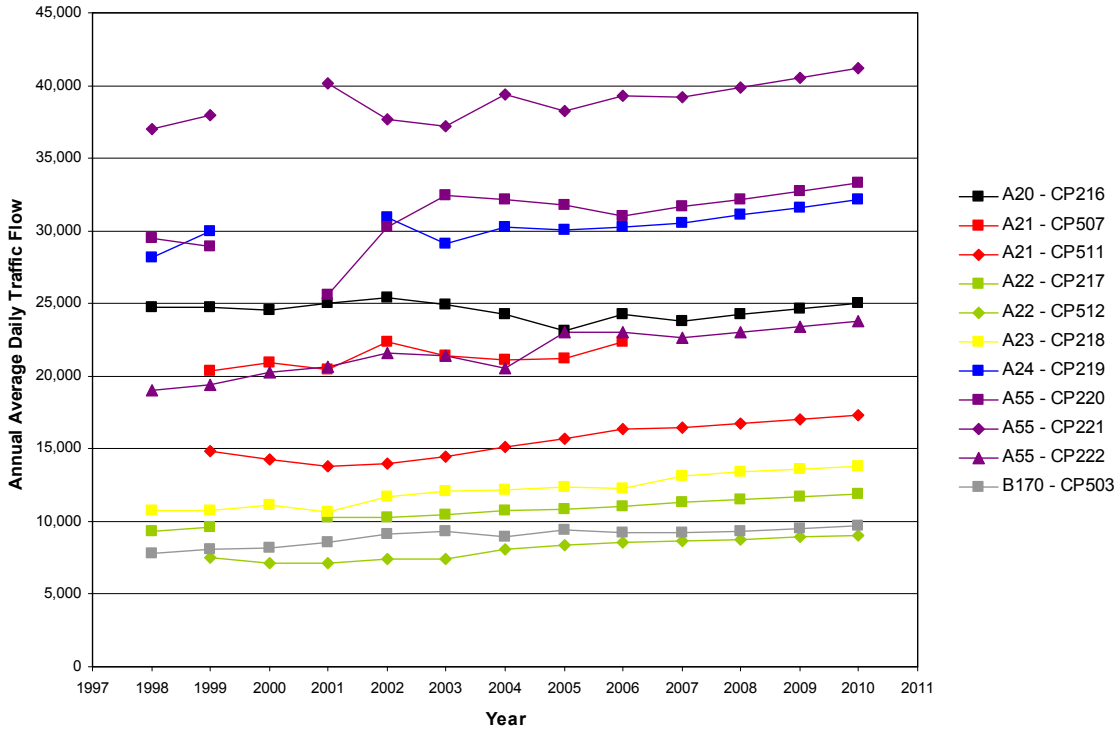

Figure 3-1: Time series of actual and forecast traffic counts (AADT) at traffic census points in and around Castlereagh Borough.

Although not strictly required, an assessment of pollutant concentrations in the vicinity of major roads has been made using the DMRB screening tool (version 1.03c). The tool was used to calculate pollutant concentrations in 2007, 2008 and 2010 on the roads highlighted in bold in Table 3-1, most of which were considered previously.

Appendix C provides the input data and results from the DMRB assessment. Calculations were undertaken for two average speeds, 30 and 60 km per hour. Only the results for the worse case are presented here (see Table 3-3). The results for both cases can be found in Appendix C.

Table 3-1: Recorded annual average daily traffic (AADT) counts for 2007 in and around Castlereagh Borough. Only the links in bold were modelled.

CP #	Route	Location	Easting	Northing	AADT
216	**A20**	**East Upper Newtownards Road Belfast (at Quarry Inn)**	**343728**	**374032**	**23,820**
507	A21	South Bangor Road Newtownards	349852	376100	-
511	**A21**	**South Newtownards Road Comber**	**347594**	**369952**	**16,500**
217	A22	East Comber Road Belfast (south east of New Line)	342520	372789	11,300
512	A22	South Comber Killyleagh (at Comber)	346309	368460	8,630
218	**A23**	**East Ballygowan Road Belfast (at Roselawn)**	**338808**	**370247**	**13,150**
219	**A24**	**East Belfast Carryduff (at Baronscourt)**	**336752**	**365930**	**30,570**
220	**A55**	**East Shaws Bridge Belfast**	**332258**	**369408**	**31,650**
221	**A55**	**East Upper Knockbreda Road Belfast**	**335838**	**370822**	**39,210**
222	A55	East Parkway Belfast	338583	374764	22,620

Source: DRDNI, 2008.

The traffic census point (CP221) on the A55 (335838, 370822) is within a few hundred metres of the Castlereagh Lough View Drive automatic monitoring site (335749, 370711). Table 3-2 compares the DRMB estimates for NO_2 and PM_{10} for 2007 and 2008 with the measured annual mean concentrations. No adjustment was made to the modelled concentrations, i.e., the verification factor was 1.0.

Table 3-2: Comparison of the estimated annual mean concentrations with those measured.

Location	Annual Mean NO_2 Concentration (in $\mu g\ m^{-3}$)		Annual Mean PM_{10} Concentration (in $\mu g\ m^{-3}$)	
	2007	2008	2007	2008
A55 - CP221 (30)	25.3	23.9	22.9	22.3
A55 - CP221 (60)	23.4	22.2	21.6	21.1
Castlereagh Lough View Drive	22.5	21.8	22.1	21.2

Table 3-3: Summary of the adjusted results of the DMRB conversion tool (5m receptor distance and speed of 30 km per hour).

Road Link Census Point	Year	Modelled Annual mean NO_x Concentration (in μg m^{-3})		Adjusted Annual mean NO_x Concentration (in μg m^{-3})		Adjusted Annual mean NO_2 Concentration (in μg m^{-3})		PM_{10}	
		Total [1]	Road Increment [2]	Road Increment [3]	Total [4]	Road Increment [5]	Total [6]	Annual Mean (in μg m^{-3})	Days > 50 μg m^{-3}
A20 - CP216	2007	35.1	23.7	23.7	35.1	10.6	18.8	19.2	2.5
A21 - CP511	2007	35.4	27.7	27.7	35.4	12.4	18.7	17.5	1.1
A23 - CP218	2007	30.9	19.2	19.2	30.9	8.8	17.0	18.4	1.7
A24 - CP219	2007	45.4	36.3	36.3	45.4	15.7	22.7	19.6	3.0
A55 - CP220	2007	41.3	27.3	27.3	41.3	12.0	21.4	20.9	4.6
A55 - CP221	2007	51.5	36.6	36.6	51.5	15.4	25.3	22.9	7.9
A20 - CP216	2008	32.9	22.0	22.0	32.9	10.0	17.8	18.8	2.1
A21 - CP511	2008	33.0	25.7	25.7	33.0	11.7	17.7	17.0	0.8
A23 - CP218	2008	29.1	18.1	18.1	29.1	8.3	16.2	18.0	1.4
A24 - CP219	2008	42.4	33.7	33.7	42.4	14.8	21.5	19.0	2.3
A55 - CP220	2008	38.6	25.4	25.4	38.6	11.3	20.2	20.4	3.9
A55 - CP221	2008	48.0	34.0	34.0	48.0	14.6	23.9	22.3	6.8
A20 - CP216	2010	28.7	18.9	18.9	28.7	8.7	15.8	18.0	1.4
A21 - CP511	2010	28.2	21.5	21.5	28.2	10.0	15.5	16.2	0.4
A23 - CP218	2010	25.6	15.6	15.6	25.6	7.3	14.5	17.3	0.9
A24 - CP219	2010	36.1	28.4	28.4	36.1	12.8	18.9	18.0	1.4
A55 - CP220	2010	33.4	21.7	21.7	33.4	9.9	17.9	19.6	2.9
A55 - CP221	2010	41.0	28.5	28.5	41.0	12.6	21.0	21.2	5.0

[1] Total NOx = direct from DMRB local output sheet
[2] Rd NOx = Total NOx – Background NOx
[3] Adj Rd NOx = Rd NOx x verification factor (state verification factor used)
[4] Adj Total NOx = Adj Rd NOx + Background NOx
[5] Adj Rd NO_2 = from NOx to NO_2 calculator (available LAQM Tools)
[6] Adj Total NO_2 = Adj Rd NO_2 + Background NO_2

This confirms that there are no major routes in Castlereagh Borough with exceedences of either the annual or hourly mean objectives for NO_2 or the annual or hourly mean objectives for PM_{10}.

The higher NO_2 concentrations measured close to Normandy Court on the A20 Upper Newtownards Road in Dundonald appear to result from a combination of a street canyon and junction. There are no other such junctions or street canyons within the Borough. A detailed assessment of the A20 Upper Newtownards Road in Dundonald close to Normandy Court is now in progress .

Castlereagh Borough Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

The number of bus movements at bus stations was previously estimated to be well below the 1,000 movements threshold, stated in the technical guidance. There have been no significant changes since the last updating and screening assessment in 2006.

Castlereagh Borough Council confirms that there are no relevant bus stations in the District.

4 Other Transport Sources

4.1 Airports

The nearest airport is Belfast City Airport, in neighbouring County Antrim. Since this is further than 1 km from the county border, it does not need to be considered further.

Castlereagh Borough Council confirms that there are no airports in the District.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

In the previous updating and screening assessment, no locations were identified within the district where locomotives were stationary for prolonged periods. This has not changed.

Castlereagh Borough Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

Castlereagh Borough Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

There are neither ports nor shipping movements in the district.

Castlereagh Borough Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

The IPC processes authorised and regulated by Castlereagh Borough Council are listed in Table D.1 (Appendix D). Apart from the Tesco Filling Station on the Newtownbreda Road, all the processes have previously been assessed. The dry cleaning facilities are not considered relevant for the purposes of local air quality and no further action is required.

The Part A and B processes within the district covered by Castlereagh Borough Council are available from the Northern Ireland Environment Agency website (see Table D.2 in Appendix D):

- Diageo Global Supply IBC Group (P0098/05A) — Treatment of Animal and Vegetable Matter
- ENVA (NI) Ltd (P0108/05A) — Recovery of waste
- Biofuels Carryduff (P0109/06A) — Organic chemicals
- Cashel Quarry (PPC0020/08B) — Production of Cement and Lime
- Cashel Quarry (PPC0099/08B) — Production of Other Mineral Fibres
- Northstone (NI) Ltd - Concrete Division (PPC0030/08B) — Production of Cement and Lime
- Land raise near Carryduff (P0305/09A) — Landfill site on farm land

Apart from the land raise near Carryduff, the processes listed above were covered in the 2006 updating and screening assessment. No new industrial processes have been identified since then. The land raise application is covered in Section 7 on Fugitive or Uncontrolled Sources.

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

Castlereagh Borough Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Castlereagh Borough Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Castlereagh Borough Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel storage depots within the Castlereagh Borough.

There are no major fuel storage depots within the local authority area.

5.3 Petrol Stations

A new petrol station has opened as part of the Knockbreda shopping development. The technical guidance (TG.09) indicates that a further assessment for benzene is only required if the petrol station has an annual throughput of more than 2,000 m^3 of petrol (2 million litres per annum) and has a busy road nearby (> 30,000 vehicles per day). Further, petrol stations fitted with Stage 2 recovery systems can be ignored. This petrol station falls below both the throughput and busy road criteria and thus no further assessment is required.

Castlereagh Borough Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

Exceedences of the PM_{10} objectives can potentially occur in the vicinity of poultry farms [defined as those containing chickens (laying hens and broilers), turkeys, ducks and guinea fowl]. The technical guidance has been updated since the last round of Review and Assessment and should be considered by all authorities. The guidance set thresholds for further assessment as:

- farms housing 400,000 birds if mechanically ventilated;
- farms housing 200,000 birds if naturally ventilated;
- farms housing 100,000 birds for any turkey unit.

According to the public register for Integrated Pollution and Prevention Control (IPPC), there are no such premises within Castlereagh Borough.

Castlereagh Borough Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

In the 2006 updating and screening assessment, four developments were under construction or planned for the area. Table 6-1 shows the current status of these and other developments in Castlereagh Borough.

Table 6-1: Housing and Retail Developments in Castlereagh Borough

Development	Location	Status
Housing	Carryduff	Not progressed
Housing	Castlereagh	Not progressed
Housing	Dundonald	Completed
New Shopping Centre	Newtownbreda	Completed
Housing	Millreagh	Started (not completed)

The 2006 USA recommended that these sources should be assessed in the next round of Review and Assessment as the number of vehicles might increase with the increasing number of houses. However, the traffic survey information presented in Section 3.6 did not indicate substantial growth.

The Millreagh redevelopment forms part of the Belfast Metropolitan plan. It is understood that there was no air quality assessment of this development.

6.1 Biomass Combustion – Individual Installations

Castlereagh Borough Council confirms that there are no such biomass combustion plants in the District.

6.2 Biomass Combustion – Combined Impacts

Castlereagh Borough Council confirms that there are no such biomass combustion plants in the District.

6.3 Domestic Solid-Fuel Burning

Domestic coal burning was modelled in detail in the earlier Stage 3 Air Quality Review in 2004. This showed that exceedences of the objectives for sulphur dioxide resulting from this source were unlikely. Domestic coal burning is not expected to have increased since that assessment was completed in 2004. Indeed, there has been a continued shift to oil and gas in existing and new domestic housing.

Castlereagh Borough Council confirms that there are no areas of significant domestic solid fuel use in the District.

7 Fugitive or Uncontrolled Sources

According to the 2006 updating and screening assessment, there were 6 operating quarries in the Castlereagh Borough Council area. The information on the PPC permits for these quarries can be found in Appendix D. Following the then applicable Technical Guidance (TG [2003]), these did not need further assessment as there was no relevant exposure within 200 m of the source and background concentration was less than 26 µg m^{-3}. There have been no changes since then.

The list of Part A and B processes within Castlereagh Borough, available from the Northern Ireland Environment Agency website (see Table D.2 in Appendix D), contains a pending application (P0305/09A) for land raise near Carryduff[3]. This application is for a small landfill site for hard core, builders' rubble, *etc* on farm land, near to the existing quarries at Lisdoonan. It could potentially be a source of PM_{10}.

As the concentrations of PM_{10}, derived from background concentration maps for this area, are less than 26 µg m^{-3}, the criterion used for the screening assessment (TG [2009]) is that there should be no relevant exposure within 200 m of the source (this is unchanged from that given in TG [2003]). Local council officials have visited the site and confirm that this is the case. No further assessment of this source is therefore required.

Castlereagh Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the District that require further assessment.

[3] The address is given on the Northern Ireland Environment Agency website as 177 Belfast Road, Saintfield, Down, BT24 8UR.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

There are currently no Air Quality Management Areas within Castlereagh Borough. The diffusion tube measurements at Normandy Court on the A20 Upper Newtownards Road in Dundonald have however indicated exceedence of the annual mean objective for nitrogen dioxide in both 2007 and 2008. There is relevant exposure at this location. The measurements of nitrogen dioxide and particulate matter at other sites showed no exceedences of air quality objectives.

Castlereagh Borough Council initiated a detailed assessment in the vicinity of Normandy Court in 2007, involving automatic measurements of nitrogen dioxide (and particulate matter). The annual mean concentrations derived were close to (in 2007) and below (in 2008) the annual mean objective. Castlereagh Borough Council has now initiated a detailed assessment involving dispersion modelling.

8.2 Conclusions from Assessment of Sources

There have been no new developments or significant changes to existing installations and activities within Castlereagh Borough which require further assessment.

8.3 Proposed Actions

The 2009 updating and screening assessment has revealed no new requirements to undertake a detailed assessment for any pollutant. The main action is to complete and report the detailed modelling assessment that has recently been initiated in the vicinity of Normandy Court on the A20 Upper Newtownards Road in Dundonald.

9 References

CBC (2000) **Air quality report**. Report prepared by the Environmental Health Department, Castlereagh Borough Council (June 2000).

CBC (2003) **Second/third stage review and assessment of local air quality**. Interim Report prepared by the Environmental Health Department, Castlereagh Borough Council (December 2003).

CBC (2004) **Third stage air quality review and assessment**. Report prepared by the Environmental Health Department, Castlereagh Borough Council (July 2004).

Defra (2007) **Evaluation of support provided by Defra and the Devolved Administrations to Local Authorities for air quality reviews and assessments (2004-2007)**. Report prepared for Defra and the Devolved Administrations by the Air Quality Management Resource Centre (University of the West of England) and Air Quality Consultants Ltd, May 2007.

DRDNI (2008) **Traffic and travel information 2007 incorporating annual traffic census and vehicle kilometres of travel**. Report prepared by the Roads Service, Northern Ireland Department for Regional Development.

EG (2008) **Eastern Group Air Quality Progress Report**. Annual report on air quality in the Eastern group of local authorities in Northern Ireland, April 2008.

TG (2003) **Part IV of the Environment Act 1995. Local Air Quality Management: Technical Guidance LAQM.TG(03)**. Guidance prepared by the Department for Environment, Food and Rural Affairs and the Devolved Administrations, January 2003.

TG (2009) **Part IV of the Environment Act 1995. Local Air Quality Management: Technical Guidance LAQM.TG(09)**. Guidance prepared by the Department for Environment, Food and Rural Affairs and the Devolved Administrations, February 2009.

USA (2006) **Air Quality Update and Screening and Assessment**. A report (ED 42019001 Issue 1) prepared for Castlereagh Borough Council by AEA Technology, May 2006.

10 Acknowledgements

We are grateful to (a) John Hewitt (ESRI) for his help in providing OSNI maps and (b) the Department of Regional Development in Northern Ireland for the provision of road traffic data.

Appendices

Appendix A: 2009 Updating and Screening Questionnaire for Castlereagh Borough Council

Section	Topic	Update
2	**New Monitoring Data**	
2.1.1	Automatic Monitoring Sites	Yes
2.1.2	Non-Automatic Monitoring	Yes
2.2.1	Nitrogen Dioxide	Yes
2.2.2	PM_{10}	Yes
2.2.3	Sulphur Dioxide	No
2.2.4	Benzene	No
2.2.5	Other pollutants if monitored (add as many sections as required)	No
3	**Road Traffic Sources**	
	New, or newly-identified (i.e. not previously assessed) roads	
3.1	Narrow congested streets with residential properties close to the kerb	No
3.2	Busy streets where people may spend 1 hour or more close to traffic	No
3.3	Roads with high flow of buses and/or HGVs.close to the kerb	No
3.4	Junctions	No
3.5	New roads constructed or proposed since the last round of review and assessment	No
3.6	All roads with significantly changed traffic flows.	No
3.7	Bus stations (flow of buses is greater than 2,500 vehicles per day)	No
4	**Other Transport Sources**	
	Please tick if you have the following in your District, which have not previously been assessed:	
4.1	Airports	No
4.2	Railways (diesel and steam trains)	No
4.2.1	Stationary Trains	No
4.2.2	Moving Trains	No
4.3	Ports (shipping)	No
5	**Industrial Sources**	
	Please tick if you have the following in your District, which have not previously been assessed:	
5.1	New or Proposed Industrial Installations	No
5.1.1	New or Proposed Processes for which an Air Quality Assessment has been carried out	No
5.1.2	Existing Installations where emissions have increased substantially or new relevant exposure has been introduced	No
5.1.3	New or significantly changed installations with no previous Air Quality Assessment	No
5.2	Major fuel (petrol) storage depots	No
5.3	Petrol Stations	No
5.4	Poultry Farms (housing in excess of 400,000 birds, and with relevant exposure within 100m of the poultry units)	No

Castlereagh Borough Council - Northern Ireland

Section	Topic	Update
6	**Commercial and Domestic Sources** Please tick if you have the following in your District, which have not previously been assessed:	
6.1	Biomass combustion - Individual Installations	No
6.2	Biomass combustion - Combined Impacts	No
6.3	Domestic Solid-Fuel Burning	No
6.4	Small Boilers	No
6.5	New or Proposed Installations for which an Air Quality Assessment has been carried out	No
7	**Fugitive or Uncontrolled Sources** New or newly identified (not included in the last updating and screening or progress reports) fugitive dust sources such as: quarries and opencast mines; landfills; handling of dusty cargo e.g. at ports; industrial sites with unpaved haul roads, processing plant and materials handling.	No
8	**New Developments - Residential, Commercial and Public** Please tick if you have the following in your District, which have not previously been assessed:	
8.1	New Housing Developments	No
8.2	New Commercial Developments	No
8.3	New Public Developments	No
9	**Implementation of Action Plans** Please tick above if you have an existing Air Quality Action Plan in place.	No
10	**Local Transport Plans and Strategies** Please tick above if you have a Local Transport Plan in place.	Yes

Appendix B: 2008 Air Pollution Measurements

The 2008 air pollution measurements in Castlereagh Borough comprised:

- Automatic measurements of NO, NO_2, NO_x and PM_{10} at Castlereagh Lough View Drive (see Appendix B1.1)
- Automatic measurements of NO, NO_2, NO_x and PM_{10} at Castlereagh Dundonald Drive (see Appendix B1.2)
- Diffusion tube measurements of NO_2 (see Appendix B1.3) from
    - Cregagh Road (single tube)
    - Everton Drive (single tube)
    - Downshire Park (January-February 2008)
    - Upper Newtownards Road (single tube for January-February, three tubes for October-December 2008)
    - Newtownbreda Road (single tube)
    - Saintfield Road (single tube)

In addition, three sets of diffusion tubes were exposed at both automatic monitoring sites to derive local bias adjustment factors.

Appendix B2 provides information on the measurements and the QA/QC procedures applied.

B1.1 2008 Automatic Measurements from Castlereagh Lough View Drive

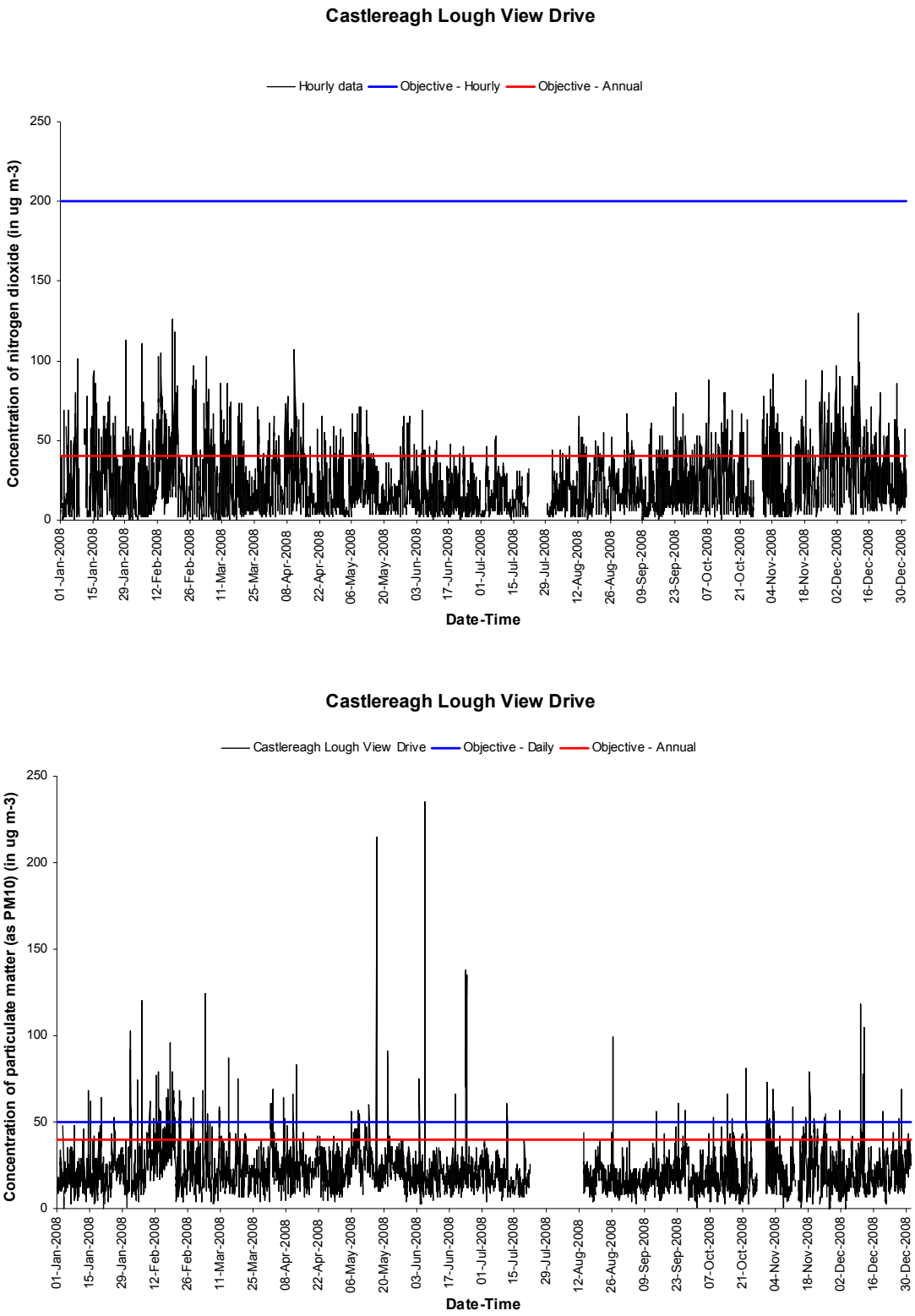

Figure B1.1: 2008 hourly measurements of nitrogen dioxide (in µg NO_2 m^{-3}, upper panel) and of particulate matter (as PM_{10} in µg m^{-3}, lower panel) for the Castlereagh Lough View Drive site.

Statistics: Castlereagh Lough View Drive
1st January to 31st December 2008

These data have been fully ratified by AEA Technology

POLLUTANT	PM_{10}*+	NO	NO_2	NO_X
Number Very High	0	-	0	-
Number High	0	-	0	-
Number Moderate	0	-	0	-
Number Low	8045	-	8369	-
Maximum 15-minute mean	859 μgm^{-3}	461 μgm^{-3}	147 μgm^{-3}	838 μgm^{-3}
Maximum hourly mean	235 μgm^{-3}	390 μgm^{-3}	130 μgm^{-3}	722 μgm^{-3}
Maximum running 8-hour mean	72 μgm^{-3}	186 μgm^{-3}	86 μgm^{-3}	370 μgm^{-3}
Maximum running 24-hour mean	51 μgm^{-3}	99 μgm^{-3}	66 μgm^{-3}	216 μgm^{-3}
Maximum daily mean	47 μgm^{-3}	97 μgm^{-3}	65 μgm^{-3}	210 μgm^{-3}
Average	21 μgm^{-3}	11 μgm^{-3}	22 $\mu g\ m^{-3}$	39 μgm^{-3}
Data capture	91.6 %	95.3 %	95.3 %	95.3 %

* PM_{10} Indicative Gravimetric Equivalent μgm^{-3}
+ PM_{10} as measured by a TEOM using a factor of 1.3 for Indicative Gravimetric Equivalence
All mass units are at 20°C and 1013mb
NO_X mass units are NO_X as NO_2 $\mu g\ m^{-3}$

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 μgm^{-3}	0	0
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 μgm^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 μgm^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 μgm^{-3}	0	0

Note – The PM_{10} measurements were reported as gravimetric equivalent using a factor of 1.3. As discussed in Section B2.2, the volatile correction model of King's College London has been used to correct the raw PM_{10} measurements.

B1.2 2008 Automatic Measurements from Castlereagh Dundonald

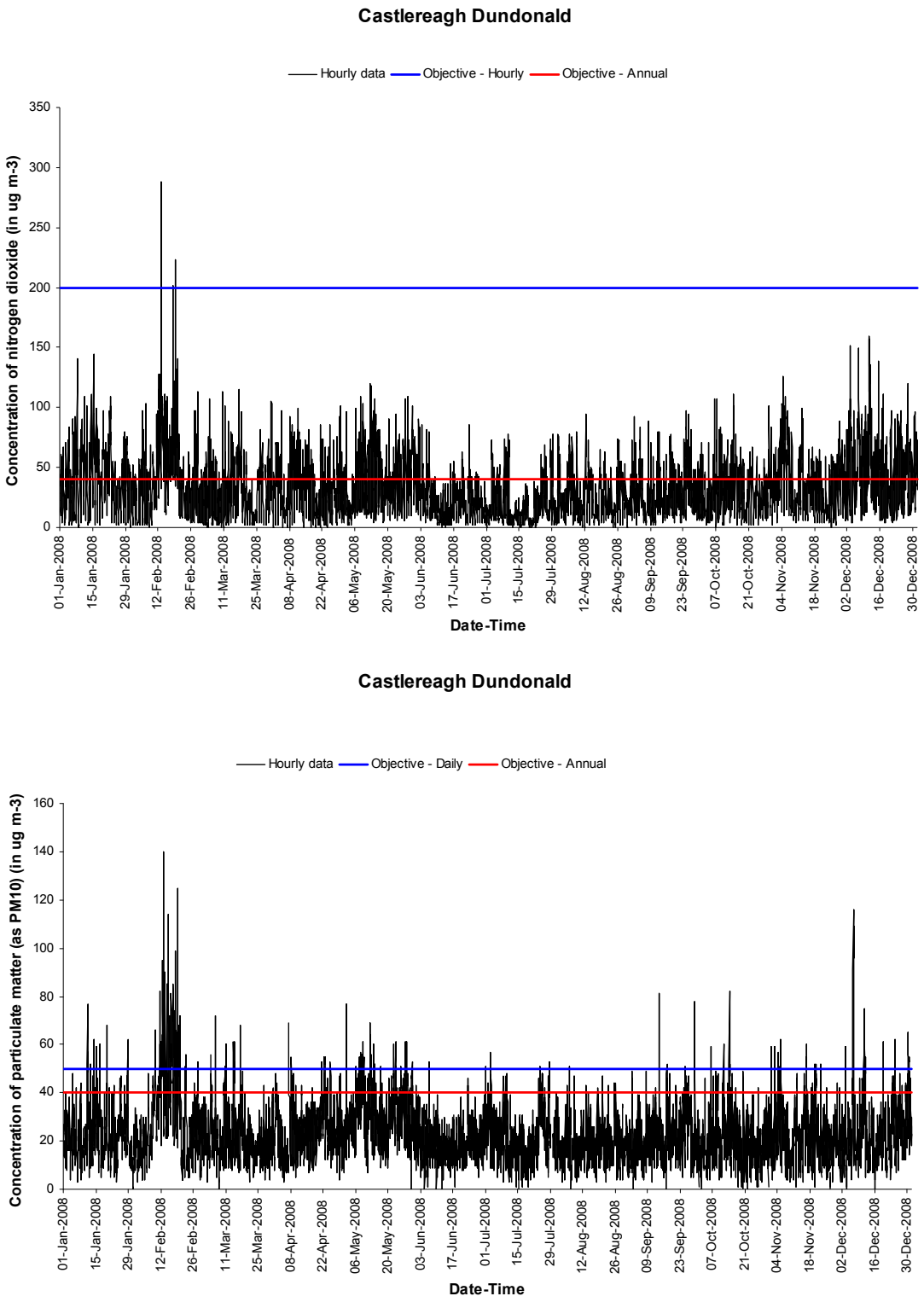

Figure B1.2: 2008 hourly measurements of nitrogen dioxide (in µg NO_2 m^{-3}, upper panel) and of particulate matter (as PM_{10} in µg m^{-3}, lower panel) for the Castlereagh Dundonald site.

Statistics: Castlereagh Dundonald
1st January to 31st December 2008

These data have been fully ratified by AEA Technology

POLLUTANT	PM_{10}*+	NO	NO_2	NO_X
Number Very High	0	-	0	-
Number High	0	-	0	-
Number Moderate	0	-	1	-
Number Low	8684	-	8746	-
Maximum 15-minute mean	299 μgm^{-3}	1119 μgm^{-3}	323 μgm^{-3}	2032 μgm^{-3}
Maximum hourly mean	140 μgm^{-3}	985 μgm^{-3}	288 μgm^{-3}	1793 μgm^{-3}
Maximum running 8-hour mean	95 μgm^{-3}	408 μgm^{-3}	136 μgm^{-3}	757 μgm^{-3}
Maximum running 24-hour mean	62 μgm^{-3}	264 μgm^{-3}	99 μgm^{-3}	502 μgm^{-3}
Maximum daily mean	56 μgm^{-3}	210 μgm^{-3}	94 μgm^{-3}	413 μgm^{-3}
Average	23 μgm^{-3}	33 μgm^{-3}	32 μgm^{-3}	83 μgm^{-3}
Data capture	98.1 %	99.6 %	99.6 %	99.6 %

* PM_{10} Indicative Gravimetric Equivalent μgm^{-3}
+ PM_{10} as measured by a TEOM using a factor of 1.3 for Indicative Gravimetric Equivalence
All mass units are at 20°C and 1013mb
NO_X mass units are NO_X as NO_2 $\mu g\ m^{-3}$

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 μgm^{-3}	4	4
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 μgm^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 μgm^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 μgm^{-3}	3	3

Note – The PM_{10} measurements were reported as gravimetric equivalent using a factor of 1.3. As discussed in Section B2.2, the volatile correction model of King's College London has been used to correct the raw PM_{10} measurements.

B1.3 2008 diffusion tube measurements

The unadjusted measurements are shown in Table B1.1a and the bias-adjusted measurements are shown in Table B1.1b. A bias-adjustment factor of 0.82 was used (see Table B2.5 in Section B2.3).

Table B1.1a: Unadjusted 2008 diffusion tube measurements

Site ID	Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Castlereagh 1	Cregagh Road	31	39	30	32	26	25	19	28	21	32	44	54
Castlereagh 2	Everton Drive	25	29	20	13	16	11	9	13		19	24	35
Castlereagh 3	Downshire Park (Note a)	24	21										
Castlereagh 4	Upper Newtownards Rd * Single tube (Note b)	69	74										
	Upper Newtownards Rd * Triplicate tubes (Note b)										73	73	110
											82	69	102
											81	74	93
Castlereagh 5	Newtownbreda Road	43	37	43	50	58	37	33	37	43	33	53	52
Castlereagh 6	Saintfield Road	17	23	13	21	25	14	14	16	41	12	22	26
Castlereagh 7	Castlereagh Lough View	29	38	29	34	27	26	19	23	21	31	44	45
		39	31	30	22	28	21	20	23		35	45	47
		98	39	40	28	27	22	19	24		32	49	47
Castlereagh 8	Castlereagh Dundonald			46	47	42	27	33	30	41	42	52	65
				45	50	51	31	33	34	43	37	53	66
				34	45	57	32	35		40	34	50	67

Table B1.1b: Bias-adjusted 2008 diffusion tube measurements

Site ID	Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Castlereagh 1	Cregagh Road	25.4	32.0	24.6	26.2	21.3	20.5	15.6	23.0	17.2	26.2	36.1	44.3
Castlereagh 2	Everton Drive	20.5	23.8	16.4	10.7	13.1	9.0	7.4	10.7		15.6	19.7	28.7
Castlereagh 3	Downshire Park	19.7	17.2	-	-	-	-	-	-	-	-	-	-
Castlereagh 4	Upper Newtownards Rd	56.6	60.7	-	-	-	-	-	-	-	64.5	59.0	83.4
Castlereagh 5	Newtownbreda Road	35.3	30.3	35.3	41.0	47.6	30.3	27.1	30.3	35.3	27.1	43.5	42.6
Castlereagh 6	Saintfield Road	13.9	18.9	10.7	17.2	20.5	11.5	11.5	13.1	33.6	9.8	18.0	21.3

Notes to Table B1.1: (a) Diffusion tube measurements at Downshire Park East were only made in January and February as the diffusion tubes for this site were used to make triplicate measurements at the Castlereagh Dundonald automatic site; (b) Diffusion tube measurements were only made for January-February and October-December 2008 as the tube was moved to the nearby Castlereagh Dundonald automatic site in March 2008. The measurements were re-instated at this site, as triplicate measurements, in October 2008.

Appendix B2: QA/QC Information

B2.1 QA/QC of the automatic monitoring instruments

Castlereagh Borough Council commissioned AEA Technology to provide the QA/QC of the automatic measurements of NO_2-NO_x and PM_{10} from the two sites. AEA Technology is the current QA/QC contractor for the national automatic urban and rural network (AURN) operated by the Department for Environment, Food and Rural Affairs and the Devolved Administrations. Local authority staff act as the local site operator and visit the sites on a fortnightly basis by the local site operator with six monthly audits of the site by AEA Technology.

AEA Technology provided the following specific comments on the automatic measurements in 2008:

- **Castlereagh Dundonald**: Both the NO_2-NO_x and PM_{10} instruments achieved a data capture of 98% and above during 2008.
- **Castlereagh Lough View Drive**: The NO_2-NO_x and PM_{10} instruments achieved data captures of 95.3% and 91.6%, respectively, during 2008. The low data captures were due to:
    i) the site experiencing an air conditioning unit failure from 21 to 29 July 2008 plus various modem problems resulting in further data loss 27th-30th October, 12th-13th November and 22nd November 2008.
    ii) a fuse had blown in the TEOM unit during the period of the air conditioning fault. The instrument was not repaired until 13th August 2008. The period of data loss for PM_{10} was from 21st July to 13th August 2008.

Scaled and fully ratified datasets from the Castlereagh Dundonald and Castlereagh Lough View Drive sites have been provided for 2008, together with the associated calendar year statistical summaries (see Appendix B1).

B2.2 PM monitoring adjustment

TEOM measurements of PM_{10} are known to under-read with respect to the reference gravimetric method. Until recently, a default correction of 1.3 was applied to TEOM data in order to generate a nominal "gravimetric-equivalent result" [paragraph 3.34 in TG (2009)]. This factor has been used by AEA Technology to convert the Castlereagh TEOM data into gravimetric equivalents.

The latest technical guidance [TG, 2009] recommends the use of the Volatile Correction Model (VCM) developed by King's College London. A VCM web portal is available through the national air quality archive at www.volatile-correction-model.info/Default.aspx. This allows local authorities to download a spreadsheet tool to correct their TEOM PM_{10} results. The volatile correction model uses measurements of the volatile PM_{10} component made using FDMS TEOM instruments, located within 130 km of the site.

Table B.2.1: PM_{10} FDMS TEOM Sites in Northern Ireland

FDMS TEOM Site	Measurements Commenced	Site within 130 km of Castlereagh monitoring sites?
Ballymena Ballykeel Estate	24th August 2008	Y (~40 km)
Belfast Stockman's Lane	*8th March 2009*	Y (~4, 12 km)
Belfast Centre	1st October 2008	Y (~4, 8 km)
Derry Brooke Park	10th March 2008	Y (~100 km)
Lisburn Dunmurry High School	20th February 2008	Y (~8, 15 km)
Newry Trevor Hill	30th August 2008	Y (~51-58 km)
Newry Monaghan Row	23rd June 2008	Y (~52-58 km)

A number of FDMS TEOM instruments were installed at sites in Northern Ireland during 2008, as shown in Table B.2.1. The FDMS TEOM measurements made at the Lisburn Dunmurry site were used to correct the Castlereagh TEOM data as the site is relatively close and these were the most complete set of measurements available for 2008. Even so, the Lisburn measurements started in late

February and a period of elevated PM_{10} concentrations in mid-February was missed. Figures B2.1 and B2.2 show the hourly PM_{10} concentrations derived from the automatic measurements at the Castlereagh Lough View drive and Dundonald sites, respectively, after applying (i) a factor of 1.3 and (ii) the volatile correction model.

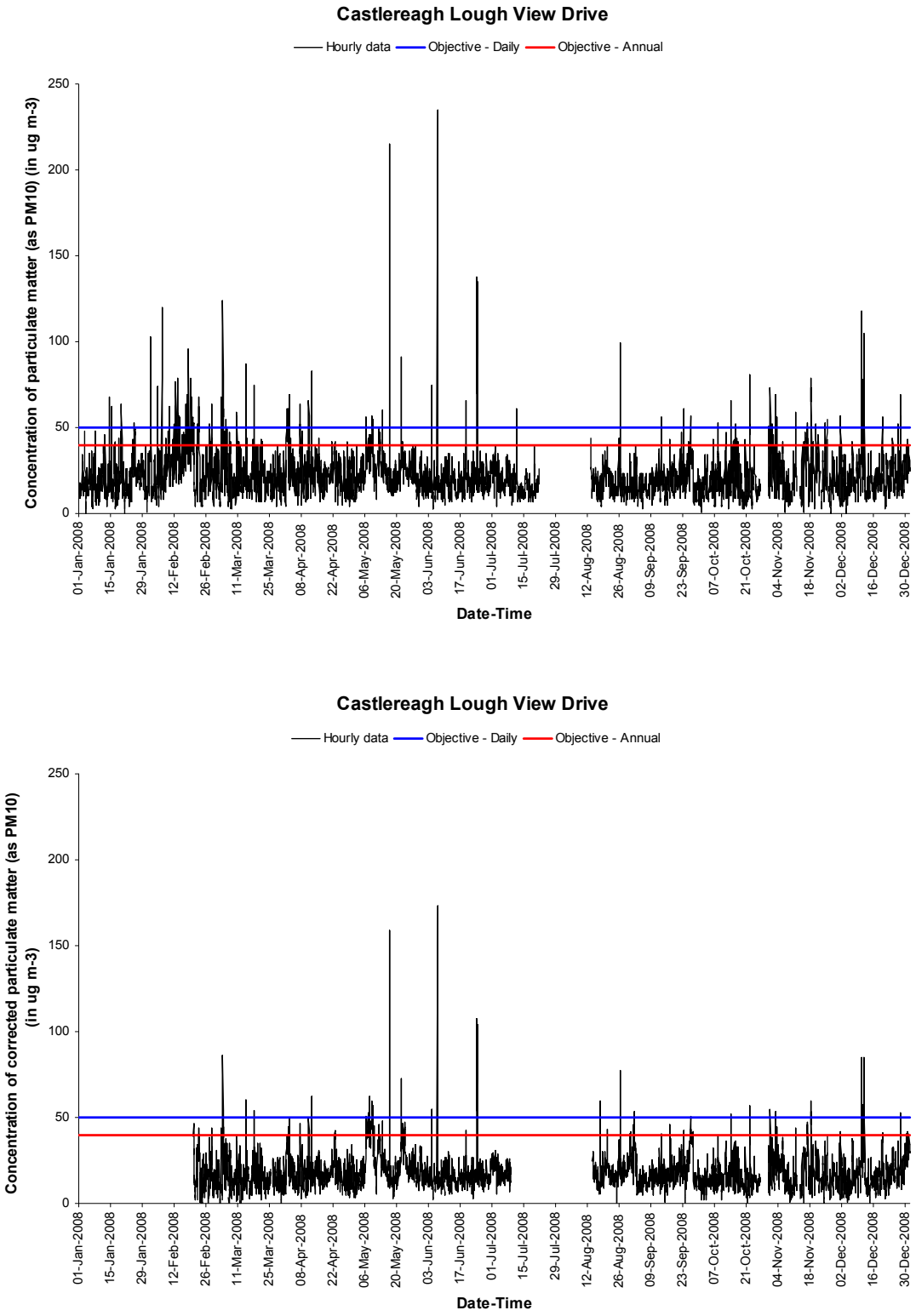

Figure B2.1: Corrected 2008 hourly measurements of PM_{10} (in µg m^{-3} gravimetric equivalent) at Castlereagh Lough View Drive using (i) a factor of 1.3 (upper panel) and (ii) the volatile correction model (lower panel)

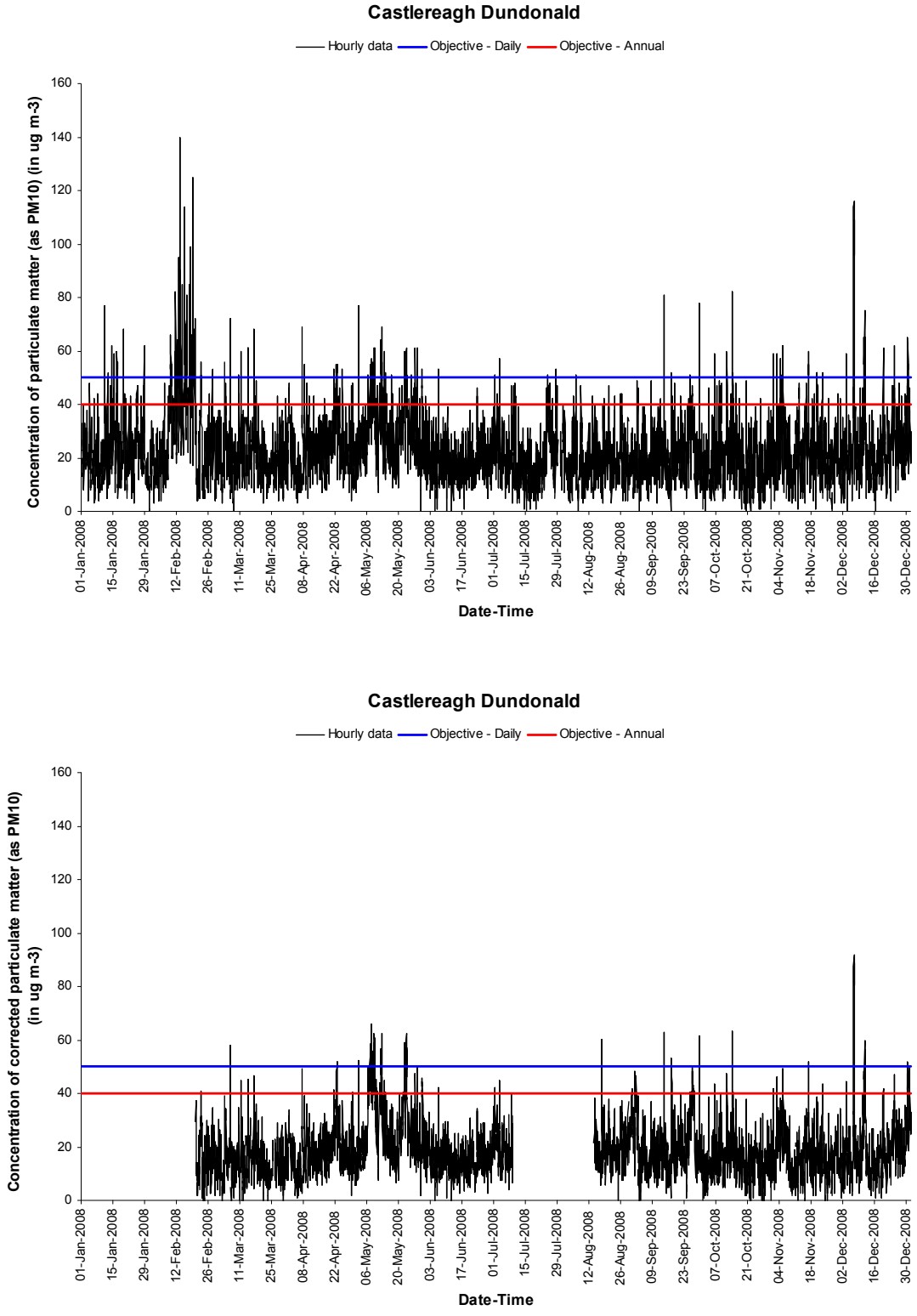

Figure B2.1: Corrected 2008 hourly measurements of PM_{10} (in µg m^{-3} gravimetric equivalent) at Castlereagh Dundonald using (i) a factor of 1.3 (upper panel) and (ii) the volatile correction model (lower panel)

Tables B2.2a and b compare the results of the PM_{10} monitoring with the annual and daily mean objectives. Results are presented using both the simple scaling factor of 1.3 and the volatile correction model. Although based on a lower data capture, the PM_{10} concentrations corrected using

the volatile correction model result in lower annual mean concentrations. Both approaches however indicate no exceedences of the current annual or daily mean PM_{10} objectives.

Table B2.2a: Results of PM_{10} Automatic Monitoring - Comparison with Annual Mean Objective of 40 µg m^{-3}.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m^3)		
				2006 *	2007 *	2008
A1	Castereagh Lough View Drive (gravimetric)	N	91.6%	22.4	22.1	21.2
	Castereagh Lough View Drive (VCM)		73.7%	-	-	17.6
A2	Castereagh Dundonald (gravimetric)	N	98.1%	-	22.1 (a)	22.8
	Castereagh Dundonald (VCM)		74.5%	-	-	18.7
A3	Castlereagh Epsie Way	N	-	22.7	- (b)	- (b)

(a) New site in 2007, measurements commenced in April. Data capture = 69.5%; (b) Site closed in 2007.

Table B2.2b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective of 35 or fewer exceedences of a daily mean concentration of 50 µg m^{-3}.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of daily mean (50 µg/m^3) *If data capture < 90%, include the 90th %il of hourly means in brackets.*		
				2006 *	2007 *	2008
A1	Castereagh Lough View Drive (gravimetric)	N	91.6%	4	3	0
	Castereagh Lough View Drive (VCM)		73.7%	-	-	0
A2	Castereagh Dundonald (gravimetric)	N	98.1%	-	1 (a)	4
	Castereagh Dundonald (VCM)		74.5%	-	-	0
A3	Castlereagh Epsie Way	N	-	5	- (b)	- (b)

(a) New site in 2007, measurements commenced in April. Data capture = 69.5%; (b) Site closed in 2007.

With the lower data capture and to ensure consistency with the previous years, the exceedence statistics presented in Section 2.2.2 are based on the scaling factor of 1.3.

B2.3 QA/QC of the diffusion tubes

Up to November 2004, the NO_2 diffusion tubes were supplied and analysed by Ruddock and Sheratt. Since then, Casella has supplied and analysed the tubes. The tubes are currently prepared using 10% TEA in water.

B2.3.1 Factor from local co-location studies

As indicated above, sets of three diffusion tubes were exposed at the 2 automatic monitoring sites in 2008 (from March 2008 for the Castlereagh Dundonald site). The data presented in tables B2.3a and B2.3b have been taken from the bias adjustment spreadsheet tool available on the Local Air Quality Management page of the National Air Quality website[4]. The tool reports the annual mean concentrations as integers and Table B2.4 summarises the bias adjustment factors derived from the 2008 Castlereagh measurements presented in Tables B.2.3a and B2.3b.

[4] see http://www.airquality.co.uk/archive/laqm/tools.php

Table B2.3a: Bias adjustment calculation from the Castlereagh Lough View Drive measurements.

Period	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	Diffusion Tube Measurements							Automatic Measurements		Data Quality Check	
			Tube 1 $\mu g\ m^{-3}$	Tube 2 $\mu g\ m^{-3}$	Tube 3 $\mu g\ m^{-3}$	Mean $\mu g\ m^{-3}$	Standard Deviation $\mu g\ m^{-3}$	Coefficient of Variation (CV)	95% CI of mean	Period Mean $\mu g\ m^{-3}$	Data Capture (%)	Tubes Precision Check	Automatic Monitor Data Capture Check
1	03/01/2008	31/01/2008	29	39	98	55	37.3	67	92.6	25	91.4	Poor	Good
2	31/01/2008	28/02/2008	38	31	39	36	4.4	12	10.8	28	99.1	Good	Good
3	28/02/2008	03/04/2008	29	30	40	33	6.1	18	15.1	22	99.8	Good	Good
4	03/04/2008	01/05/2008	34	22	28	28	6.0	21	14.9	21	99.7	Poor	Good
5	01/05/2008	29/05/2008	27	28	27	27	0.6	2	1.4	18	99	Good	Good
6	29/05/2008	03/07/2008	26	21	22	23	2.6	12	6.6	16	99.8	Good	Good
7	03/07/2008	30/07/2008	19	20	19	19	0.6	3	1.4	13	69.6	Good	Poor
8	30/07/2008	03/09/2008	23	23	24	23	0.6	2	1.4	18	99.3	Good	Good
9	03/09/2008	30/09/2008	-	-	-	-	-	-	-	20	99.8	-	Good
10	30/09/2008	29/10/2008	31	35	32	33	2.1	6	5.2	22	91.4	Good	Good
11	29/10/2008	04/12/2008	44	45	49	46	2.6	6	6.6	28	90.3	Good	Good
12	04/12/2008	07/01/2009	45.0	47.0	47.0	46	1.2	2	2.9	30	99.8	Good	Good

Table B2.3b: Bias adjustment calculation from the Castlereagh Dundonald measurements.

Period	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	Diffusion Tube Measurements							Automatic Measurements		Data Quality Check	
			Tube 1 $\mu g\ m^{-3}$	Tube 2 $\mu g\ m^{-3}$	Tube 3 $\mu g\ m^{-3}$	Mean $\mu g\ m^{-3}$	Standard Deviation $\mu g\ m^{-3}$	Coefficient of Variation (CV)	95% CI of mean	Period Mean $\mu g\ m^{-3}$	Data Capture (%)	Tubes Precision Check	Automatic Monitor Data Capture Check
1	03/01/2008	31/01/2008	-	-	-	-	-	-	-	39	91.4	-	Good
2	31/01/2008	28/02/2008	-	-	-	-	-	-	-	45	99.1	-	Good
3	28/02/2008	03/04/2008	46	45	34	42	6.7	16	16.5	30	99.8	Good	Good
4	03/04/2008	01/05/2008	47	50	45	47	2.5	5	6.3	32	99.7	Good	Good
5	01/05/2008	29/05/2008	42	51	57	50	7.5	15	18.8	39	99	Good	Good
6	29/05/2008	03/07/2008	27	31	32	30	2.6	9	6.6	23	99.8	Good	Good
7	03/07/2008	30/07/2008	33	33	35	34	1.2	3	2.9	19	69.6	Good	Poor
8	30/07/2008	03/09/2008	30	34		32	2.8	9	25.4	24	99.3	Good	Good
9	03/09/2008	30/09/2008	41	43	40	41	1.5	4	3.8	30		Good	-
10	30/09/2008	29/10/2008	42	37	34	38	4.0	11	10.0	29	91.4	Good	Good
11	29/10/2008	04/12/2008	52	53	50	52	1.5	3	3.8	34	90.3	Good	Good
12	04/12/2008	07/01/2009	65	66	67	66	1.0	2	2.5	50	99.8	Good	Good

Table B2.4: Bias adjustment factors derived from the 2008 measurements.

Site	Annual Mean Diffusion Tube	Annual Mean Automatic	Bias Adjustment Factor
Castlereagh Lough View Drive			
▪ all data	33	23	0.68 (0.64-0.73)
▪ excluding periods with CV> 20%	35	23	0.65 (0.58-0.75)
Castlereagh Dundonald			
▪ all data	45	33	0.73 (0.70-0.77)
▪ excluding periods with CV> 20%	45	33	0.73 (0.70-0.77)

B2.3.2 Discussion of choice of diffusion tube bias adjustment factors

Table B.2.5 summarises the bias factors used to adjust the diffusion tube measurements. As noted above, there was a change in the supplier and the analysis of the diffusion tube in November 2004.

Table B.2.5: Bias adjustment factors used to correct the Castlereagh NO_2 diffusion tube measurements.

Year	Bias Adjustment Factor	Comment
2001	1.374	From co-located measurements made by North Down Borough Council in 2003/2004
2002	1.374	As above
2003	1.374	As above
2004	1.374 0.83 (a)	As above. Following the change of supplier, the factor was taken as the weighted average of the 7 studies listed in the bias-adjustment spreadsheet available from the LAQM page of the National Air Quality website[5].
2005	0.80	The factor was taken as the weighted average of the 13 studies listed in the bias-adjustment spreadsheet. The 2006 USA used 0.81 as an average across the Eastern group.
2006	0.87	The factor was taken as the weighted average of the 10 studies listed in the bias-adjustment spreadsheet. The Lisburn and North Down measurements were included in the weighted average.
2007	0.90	The factor was taken as the weighted average of the 17 studies listed in the the bias-adjustment spreadsheet. The Castlereagh site-specific value was 1.07 and this was included in the weighted average.
2008	0.82	The factor was taken as the weighted average of the 9 studies included in bias-adjustment spreadsheet. The Castlereagh site-specific values were 0.65 and 0.73 and these were included in the weighted average.

Note (a) There was a change in the supplier and the analysis of the diffusion tube in November 2004.

The factor of 1.374 was derived from a co location study at the North Down Borough Council automatic site in 2003/2004. In the absence of any other appropriate figure, this factor was applied to the diffusion tube results between January 2001 and October 2004.

[5] See http://www.airquality.co.uk/archive/laqm/tools.php

Since November 2004, the bias adjustment factors have been taken from the bias-adjustment spreadsheet available on the LAQM page of the National Air Quality website for the method used to prepare the diffusion tube and the analytical laboratory used. These include the Castlereagh measurements for 2007 and 2008. The derivation of the local bias adjustment factors was given in the previous section (B2.3.1).

B2.3.3 Short-term to long-term data adjustment

The diffusion tube measurements at Downshire Park and on the Upper Newtownards Road were only made for part of the year [Downshire Park – January and February; Upper Newtownards Road January, February, October, November and December]. As stated previously, the measurements at the Downshire Park East were stopped in March 2008 to allow triplicate diffusion tube measurements at the Castlereagh Dundonald automatic monitoring site. The diffusion tube at the original site on the Upper Newtownards Road site was moved a short distance to be co-located with the Dundonald automatic monitoring site in March 2008. Following comment received on the 2008 progress report, monitoring was re-instated at the original site in October 2008 using triplicate diffusion tubes.

Using the NO_2 measurements from the automatic monitoring sites in Belfast and the Eastern Group, mean concentrations have been derived for the period January, February, October, November and December 2008. The period mean concentration has been compared to the corresponding annual mean concentration at the site to derive a factor (see Tables B.2.6), which can be used to give an estimate of the annual mean concentrations at the Upper Newtownards Road site.

Table B.2.6: Comparison of the 2008 annual mean NO_2 concentration to the period mean concentration for January-February, October-December 2008.

Site	Site Type	Annual Mean	Period Mean	Ratio
Belfast Ormeau Road	Roadside	33.64	36.39	1.08
Belfast Stockman's Lane	Roadside	62.34	72.58	1.16
Belfast Centre	Urban Background	31.93	38.59	1.21
Belfast Newtownards Road	Roadside	44.15	50.06	1.13
Castlereagh Lough View Drive	Roadside	21.78	26.25	1.21
Castlereagh Dundonald	Roadside	32.27	38.55	1.19
Lisburn Lagan Valley Hospital	Roadside	25.73	31.56	1.23
North Down Holywood A2	Roadside	31.92	36.78	1.15
			Average	1.17

Appendix C: DMRB Calculations

The assessment of pollutant concentrations in the vicinity of major roads made use of the DMRB screening tool (version 1.03c). The tool was used to calculate pollutant concentrations in 2008 and 2010 from input data on

- 'background' concentrations of NO_x and PM_{10} for the grid squares containing the traffic census points. The 'background' concentration were taken from the maps available on the LAQM page of the National Air Quality archive. The maps provided information on the contribution of different sources (motorways, trunk roads, primary A roads and minor roads, industrial, domestic, etc). The contribution from the in-square primary A roads was excluded to avoid double counting. The background concentrations used can be found in Table C.1.
- traffic flows (AADTs) and vehicle composition recorded by Northern Ireland Department for Regional Development for 2007 (see Table C.2)
- growth factors (central forecast) for the different vehicle types generated by the Automated Traffic Growth calculator for Scotland, Wales and Northern Ireland (Table C.3)
- time series of actual and projected traffic flows for 1998-2010 (Table C.4)

Table C.5 gives the input data used in the DMRB screening tool. The tool then provides estimates of the annual mean concentrations of carbon monoxide, benzene, 1,3-butadiene, oxides of nitrogen, nitrogen dioxide and particulate matter as PM_{10} and the contributions from the roads and background. This approach was adopted for carbon monoxide, benzene, 1,3-butadiene, and PM_{10}. Following the technical guidance, the spreadsheet tool incorporating the oxidant partitioning model was used to estimate the annual mean concentrations of oxides of nitrogen and nitrogen dioxide (Table C.6). The results from the DMRB assessment are given in Table C.7.

Table C.1: Background concentrations used in the DMRB assessment

Location/ Receptor	Grid Ref	Background Concentrations (in µg m^{-3})			
		Year	NO_x	NO_2	PM_{10}
A20-CP216	343728 374032	2008	10.88	(a)	16.32
A21-CP511	347594 369952	2008	7.33	(a)	14.25
A23-CP218	338808 370247	2008	11.09	(a)	16.00
A24-CP219	336752 365930	2008	8.63	(a)	15.27
A55-CP220	332258 369408	2008	13.23	(a)	17.65
A55-CP221	335838 370822	2008	14.05	(a)	18.71

Notes (a) As per the Technical Guidance [TG.09, 2009], the spreadsheet tool was used to calculate the roadside and background NO2 concentrations using an oxidant partitioning approach.

Table C.2: Recorded annual average daily traffic (AADT) counts for 2007 and composition (as percentage) of the traffic by vehicle type [taken from DRDNI, 2008].

CP #	Route	Location	Easting	Northing	AADT	Car	LGV	HGV-Rigid	HGV-Artic	Bus/Coach
216	**A20**	**East Upper Newtownards Road Belfast (at Quarry Inn)**	**343728**	**374032**	**23,820**	**92.3**	**4.4**	**2.0**	**0.8**	**0.5**
507	A21	South Bangor Road Newtownards	349852	376100	-	-	-	-	-	-
511	**A21**	**South Newtownards Road Comber**	**347594**	**369952**	**16,500**	**90.1**	**5.0**	**4.1**	**0.6**	**0.2**
217	A22	East Comber Road Belfast (south east of New Line)	342520	372789	11,300	96.4	1.3	1.6	0.7	0.0
512	A22	South Comber Killyleagh (at Comber)	346309	368460	8,630	94.2	3.0	1.3	1.5	0.1
218	**A23**	**East Ballygowan Road Belfast (at Roselawn)**	**338808**	**370247**	**13,150**	**91.9**	**4.4**	**2.8**	**0.7**	**0.2**
219	**A24**	**East Belfast Carryduff (at Baronscourt)**	**336752**	**365930**	**30,570**	**86.8**	**7.3**	**3.3**	**1.2**	**1.4**
220	**A55**	**East Shaws Bridge Belfast**	**332258**	**369408**	**31,650**	**93.5**	**3.3**	**2.4**	**0.8**	**0.1**
221	**A55**	**East Upper Knockbreda Road Belfast**	**335838**	**370822**	**39,210**	**93.0**	**2.5**	**3.9**	**0.5**	**0.0**
222	A55	East Parkway Belfast	338583	374764	22,620	91.0	4.4	3.0	1.3	0.3

Table C.3: Central forecast growth factors for different vehicles for a 2007 base year as generated by the Automated Traffic Growth calculator for Scotland, Wales and Northern Ireland.

Year	Cars	LGV	HGV-Rigid	HGV-Artic	PSV	All Traffic
2007	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2008	1.0168	1.0268	1.0078	1.0252	1.0059	1.0168
2009	1.0336	1.0518	1.0155	1.0522	1.0137	1.0354
2010	1.0504	1.0768	1.0233	1.0791	1.0215	1.0541

Table C.4: Recorded annual average daily traffic (AADT) counts for the years 1998-2007 and projected counts for 2008-2010 for traffic census points in the Castlereagh Borough and surrounding area. The roads in bold were modelled.

CP #	Route	Location	Easting	Northing	AADT (vehicles per day)												
					1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
216	**A20**	**East Upper Newtownards Road Belfast (at Quarry Inn)**	**343728**	**374032**	**24,780**	**24,710**	**24,510**	**25,010**	**25,390**	**24,890**	**24,270**	**23,080**	**24,220**	**23,820**	**24,226**	**24,632**	**25,037**
507	A21	South Bangor Road Newtownards	349852	376100	-	20,350	20,930	20,440	22,380	21,430	21,080	21,260	22,370	-	-	-	-
511	**A21**	**South Newtownards Road Comber**	**347594**	**369952**	**-**	**14,860**	**14,310**	**13,780**	**13,960**	**14,420**	**15,160**	**15,720**	**16,400**	**16,500**	**16,780**	**17,058**	**17,336**
217	A22	East Comber Road Belfast (south east of New Line)	342520	372789	9,360	9,600	-	10,285	10,320	10,440	10,770	10,860	11,050	11,300	11,490	11,680	11,870
512	A22	South Comber Killyleagh (at Comber)	346309	368460	-	7,520	7,110	7,100	7,440	7,410	8,070	8,330	8,540	8,630	8,777	8,925	9,072
218	**A23**	**East Ballygowan Road Belfast (at Roselawn)**	**338808**	**370247**	**10,710**	**10,720**	**11,130**	**10,620**	**11,680**	**12,080**	**12,180**	**12,370**	**12,240**	**13,150**	**13,374**	**13,597**	**13,820**
219	**A24**	**East Belfast Carryduff (at Baronscourt)**	**336752**	**365930**	**28,190**	**30,000**	**-**	**-**	**30,890**	**29,140**	**30,260**	**30,080**	**30,220**	**30,570**	**31,095**	**31,617**	**32,140**
220	**A55**	**East Shaws Bridge Belfast**	**332258**	**369408**	**29,460**	**28,960**	**-**	**25,560**	**30,210**	**32,470**	**32,110**	**31,750**	**31,040**	**31,650**	**32,187**	**32,722**	**33,258**
221	**A55**	**East Upper Knockbreda Road Belfast**	**335838**	**370822**	**37,020**	**37,940**	**-**	**40,130**	**37,660**	**37,240**	**39,390**	**38,250**	**39,270**	**39,210**	**39,866**	**40,521**	**41,175**
222	A55	East Parkway Belfast	338583	374764	18,980	19,410	20,240	20,650	21,610	21,430	20,570	23,020	23,030	22,620	23,005	23,390	23,774

Notes (a) Recorded AADTs taken from Traffic and travel information 2007 incorporating annual traffic census and vehicle kilometres of travel (DRDNI, 2008); (b) AADTs for 2008-2010 were calculated from the 2007 AADTs and traffic composition using the growth factors for the different vehicle types provided in Table x.

Table C.5: Input Data for the DMRB screening tool.

#	Road	Year	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
				AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
							% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	A20 - CP216	2007	5	23820	30 or 60	D	92.300	4.400	96.700	0.500	2.000	0.800	3.300
2	A21 - CP511	2007	5	16500	30 or 60	D	90.100	5.000	95.100	0.200	4.100	0.600	4.900
3	A23 - CP218	2007	5	13150	30 or 60	D	91.900	4.400	96.300	0.200	2.800	0.700	3.700
4	A24 - CP219	2007	5	30570	30 or 60	D	86.800	7.300	94.100	1.400	3.300	1.200	5.900
5	A55 - CP220	2007	5	31650	30 or 60	D	93.407	3.297	96.703	0.100	2.398	0.799	3.297
6	A55 - CP221	2007	5	39210	30 or 60	D	93.093	2.503	95.596	0.000	3.904	0.501	4.404
1	A20 - CP216	2008	5	24226	30 or 60	D	92.275	4.442	96.717	0.494	1.982	0.806	3.283
2	A21 - CP511	2008	5	16780	30 or 60	D	90.086	5.048	95.134	0.198	4.063	0.605	4.866
3	A23 - CP218	2008	5	13374	30 or 60	D	91.880	4.442	96.322	0.198	2.774	0.706	3.678
4	A24 - CP219	2008	5	31095	30 or 60	D	86.768	7.369	94.137	1.384	3.269	1.209	5.863
5	A55 - CP220	2008	5	32187	30 or 60	D	93.391	3.329	96.720	0.099	2.376	0.806	3.280
6	A55 - CP221	2008	5	39866	30 or 60	D	93.099	2.527	95.626	0.000	3.869	0.505	4.374
1	A20 - CP216	2010	5	25037	30 or 60	D	92.238	4.508	96.746	0.486	1.947	0.821	3.254
2	A21 - CP511	2010	5	17336	30 or 60	D	90.072	5.124	95.196	0.194	3.993	0.616	4.804
3	A23 - CP218	2010	5	13820	30 or 60	D	91.852	4.508	96.361	0.194	2.726	0.719	3.639
4	A24 - CP219	2010	5	32140	30 or 60	D	86.720	7.477	94.196	1.360	3.212	1.232	5.804
5	A55 - CP220	2010	5	33258	30 or 60	D	93.369	3.378	96.747	0.097	2.335	0.821	3.253
6	A55 - CP221	2010	5	41175	30 or 60	D	93.116	2.566	95.682	0.000	3.804	0.514	4.318

Table C.6a: Results from the DMRB screening tool (5m receptor distance and speed of 30 km per hour).

Receptor number	Name	Year	CO	Benzene	1,3-butadiene	NO_x *	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$
1	A20 - CP216	2007	0.34	0.79	0.25	23.7	-	19.2	2.5
2	A21 - CP511	2007	0.28	0.58	0.20	27.7	-	17.5	1.1
3	A23 - CP218	2007	0.32	0.79	0.19	19.2	-	18.4	1.7
4	A24 - CP219	2007	0.33	0.75	0.34	36.3	-	19.6	3.0
5	A55 - CP220	2007	0.41	1.02	0.34	27.3	-	20.9	4.6
6	A55 - CP221	2007	0.45	1.19	0.45	36.6	-	22.9	7.9
1	A20 - CP216	2008	0.32	0.76	0.24	22.0	-	18.8	2.1
2	A21 - CP511	2008	0.26	0.57	0.19	25.7	-	17.0	0.8
3	A23 - CP218	2008	0.30	0.76	0.18	18.1	-	18.0	1.4
4	A24 - CP219	2008	0.31	0.73	0.32	33.7	-	19.0	2.3
5	A55 - CP220	2008	0.39	0.98	0.31	25.4	-	20.4	3.9
6	A55 - CP221	2008	0.42	1.15	0.42	34.0	-	22.3	6.8
1	A20 - CP216	2010	0.29	0.72	0.22	18.9	-	18.0	1.4
2	A21 - CP511	2010	0.25	0.54	0.18	21.5	-	16.2	0.4
3	A23 - CP218	2010	0.28	0.73	0.17	15.6	-	17.3	0.9
4	A24 - CP219	2010	0.28	0.69	0.30	28.4	-	18.0	1.4
5	A55 - CP220	2010	0.35	0.93	0.29	21.7	-	19.6	2.9
6	A55 - CP221	2010	0.38	1.10	0.39	28.5	-	21.2	5.0

Notes – Following the technical guidance, the background concentrations of NO_x and NO_2 were set to zero so that the concentrations shown are those from the road link. The NO_2 results are not shown as the methodology used in DMRB to derive the annual mean NO_2 concentration has been superseded by the oxidant partitioning approach (see Table C.7a).

Table C.6b: Results from the DMRB screening tool (5m receptor distance and speed of 60 km per hour).

Receptor number	Name	Year	CO	Benzene	1,3-butadiene	NO_x *	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$
1	A20 - CP216	2007	0.28	0.70	0.18	21.0	-	18.3	1.7
2	A21 - CP511	2007	0.23	0.52	0.15	23.8	-	16.5	0.5
3	A23 - CP218	2007	0.28	0.75	0.15	16.8	-	17.7	1.1
4	A24 - CP219	2007	0.27	0.64	0.24	31.0	-	18.3	1.6
5	A55 - CP220	2007	0.34	0.90	0.25	24.1	-	19.9	3.3
6	A55 - CP221	2007	0.37	1.05	0.33	31.7	-	21.6	5.6
1	A20 - CP216	2008	0.26	0.68	0.18	19.5	-	18.0	1.4
2	A21 - CP511	2008	0.21	0.51	0.14	22.0	-	16.1	0.4
3	A23 - CP218	2008	0.26	0.72	0.15	15.8	-	17.4	0.9
4	A24 - CP219	2008	0.25	0.63	0.22	28.8	-	17.8	1.3
5	A55 - CP220	2008	0.33	0.87	0.23	22.4	-	19.5	2.8
6	A55 - CP221	2008	0.35	1.02	0.31	29.4	-	21.1	4.9
1	A20 - CP216	2010	0.24	0.65	0.16	16.8	-	17.4	1.0
2	A21 - CP511	2010	0.20	0.49	0.13	18.6	-	15.5	0.2
3	A23 - CP218	2010	0.24	0.68	0.13	13.7	-	16.8	0.6
4	A24 - CP219	2010	0.23	0.60	0.21	24.3	-	17.0	0.8
5	A55 - CP220	2010	0.29	0.83	0.21	19.2	-	18.8	2.1
6	A55 - CP221	2010	0.31	0.97	0.28	24.8	-	20.2	3.7

Notes – Following the technical guidance, the background concentrations of NO_x and NO_2 were set to zero so that the concentrations shown are those from the road link. The NO_2 results are not shown as the methodology used in DMRB to derive the annual mean NO_2 concentration has been superseded by the oxidant partitioning approach (see Table C.7b).

Table C.7a: Results from the NO_x/NO_2 conversion tool (5m receptor distance and speed of 30 km per hour).

Road Link Census Point	Easting	Northing	Year	Distance to receptor (m)	Speed	Annual mean NO_x Concentration (in µg m^{-3})		Annual mean NO_2 Concentration (in µg m^{-3})	
						Total	Road Increment	Total	Road Increment
A20 - CP216	343728	374032	2007	5	30	35.1	23.7	18.8	10.6
A21 - CP511	347594	369952	2007	5	30	35.4	27.7	18.7	12.4
A23 - CP218	338808	370247	2007	5	30	30.9	19.2	17.0	8.8
A24 - CP219	336752	365930	2007	5	30	45.4	36.3	22.7	15.7
A55 - CP220	332258	369408	2007	5	30	41.3	27.3	21.4	12.0
A55 - CP221	335838	370822	2007	5	30	51.5	36.6	25.3	15.4
A20 - CP216	343728	374032	2008	5	30	32.9	22.0	17.8	10.0
A21 - CP511	347594	369952	2008	5	30	33.0	25.7	17.7	11.7
A23 - CP218	338808	370247	2008	5	30	29.1	18.1	16.2	8.3
A24 - CP219	336752	365930	2008	5	30	42.4	33.7	21.5	14.8
A55 - CP220	332258	369408	2008	5	30	38.6	25.4	20.2	11.3
A55 - CP221	335838	370822	2008	5	30	48.0	34.0	23.9	14.6
A20 - CP216	343728	374032	2010	5	30	28.7	18.9	15.8	8.7
A21 - CP511	347594	369952	2010	5	30	28.2	21.5	15.5	10.0
A23 - CP218	338808	370247	2010	5	30	25.6	15.6	14.5	7.3
A24 - CP219	336752	365930	2010	5	30	36.1	28.4	18.9	12.8
A55 - CP220	332258	369408	2010	5	30	33.4	21.7	17.9	9.9
A55 - CP221	335838	370822	2010	5	30	41.0	28.5	21.0	12.6

Table C.7b: Results from the NO_x/NO_2 conversion tool (5m receptor distance and speed of 60 km per hour).

Road Link Census Point	Easting	Northing	Year	Distance to receptor (m)	Speed	Annual mean NO_x Concentration (in $\mu g\ m^{-3}$)		Annual mean NO_2 Concentration (in $\mu g\ m^{-3}$)	
						Total	Road Increment	Total	Road Increment
A20 - CP216	343728	374032	2007	5	60	32.4	21.0	17.7	9.5
A21 - CP511	347594	369952	2007	5	60	31.5	23.8	17.1	10.8
A23 - CP218	338808	370247	2007	5	60	28.5	16.8	16.0	7.7
A24 - CP219	336752	365930	2007	5	60	40.1	31.0	20.7	13.7
A55 - CP220	332258	369408	2007	5	60	38.1	24.1	20.1	10.7
A55 - CP221	335838	370822	2007	5	60	46.5	31.7	23.4	13.6
A20 - CP216	343728	374032	2008	5	60	30.3	19.5	16.7	8.9
A21 - CP511	347594	369952	2008	5	60	29.4	22.0	16.2	10.1
A23 - CP218	338808	370247	2008	5	60	26.9	15.8	15.2	7.3
A24 - CP219	336752	365930	2008	5	60	37.4	28.8	19.5	12.8
A55 - CP220	332258	369408	2008	5	60	35.6	22.4	19.0	10.1
A55 - CP221	335838	370822	2008	5	60	43.4	29.4	22.2	12.8
A20 - CP216	343728	374032	2010	5	60	26.6	16.8	14.9	7.8
A21 - CP511	347594	369952	2010	5	60	25.3	18.6	14.2	8.7
A23 - CP218	338808	370247	2010	5	60	23.7	13.7	13.6	6.5
A24 - CP219	336752	365930	2010	5	60	32.1	24.3	17.2	11.2
A55 - CP220	332258	369408	2010	5	60	30.9	19.2	16.8	8.8
A55 - CP221	335838	370822	2010	5	60	37.3	24.8	19.5	11.2

Verification

The traffic census point (CP221) on the A55 (335838, 370822) is within a few hundred metres of the Castlereagh Lough View Drive automatic monitoring site (335749, 370711). Table C.8 compares the DRMB estimates for NO_2 and PM_{10} for 2007 and 2008 with the measured annual mean concentrations.

Table C.8: Comparison of the estimated annual mean concentrations with those measured.

Location	Annual Mean NO_2 Concentration (in $\mu g\ m^{-3}$)		Annual Mean PM_{10} Concentration (in $\mu g\ m^{-3}$)	
	2007	2008	2007	2008
A55 - CP221 (30)	25.3	23.9	22.9	22.3
A55 - CP221 (60)	23.4	22.2	21.6	21.1
Castlereagh Lough View Drive	22.5	21.8	22.1	21.2

No adjustment has therefore been made.

Results

Tables C.9a and C.9b provide the final summary. There are no exceedences of the annual mean objectives for NO_2 and PM_{10}.

Table C.9a: Summary of the adjusted results of the DMRB conversion tool (5m receptor distance and speed of 30 km per hour).

Road Link Census Point	Year	Annual mean NO_x Concentration (in μg m^{-3})		Adjusted Annual mean NO_x Concentration (in μg m^{-3})		Adjusted Annual mean NO_2 Concentration (in μg m^{-3})		PM_{10}	
		Total [1]	Road Increment [2]	Road Increment [3]	Total [4]	Road Increment [5]	Total [6]	Annual Mean (in μg m^{-3})	Days > 50 μg m^{-3}
A20 - CP216	2007	35.1	23.7	23.7	35.1	10.6	18.8	19.2	2.5
A21 - CP511	2007	35.4	27.7	27.7	35.4	12.4	18.7	17.5	1.1
A23 - CP218	2007	30.9	19.2	19.2	30.9	8.8	17.0	18.4	1.7
A24 - CP219	2007	45.4	36.3	36.3	45.4	15.7	22.7	19.6	3.0
A55 - CP220	2007	41.3	27.3	27.3	41.3	12.0	21.4	20.9	4.6
A55 - CP221	2007	51.5	36.6	36.6	51.5	15.4	25.3	22.9	7.9
A20 - CP216	2008	32.9	22.0	22.0	32.9	10.0	17.8	18.8	2.1
A21 - CP511	2008	33.0	25.7	25.7	33.0	11.7	17.7	17.0	0.8
A23 - CP218	2008	29.1	18.1	18.1	29.1	8.3	16.2	18.0	1.4
A24 - CP219	2008	42.4	33.7	33.7	42.4	14.8	21.5	19.0	2.3
A55 - CP220	2008	38.6	25.4	25.4	38.6	11.3	20.2	20.4	3.9
A55 - CP221	2008	48.0	34.0	34.0	48.0	14.6	23.9	22.3	6.8
A20 - CP216	2010	28.7	18.9	18.9	28.7	8.7	15.8	18.0	1.4
A21 - CP511	2010	28.2	21.5	21.5	28.2	10.0	15.5	16.2	0.4
A23 - CP218	2010	25.6	15.6	15.6	25.6	7.3	14.5	17.3	0.9
A24 - CP219	2010	36.1	28.4	28.4	36.1	12.8	18.9	18.0	1.4
A55 - CP220	2010	33.4	21.7	21.7	33.4	9.9	17.9	19.6	2.9
A55 - CP221	2010	41.0	28.5	28.5	41.0	12.6	21.0	21.2	5.0

[1] Total NOx = direct from DMRB local output sheet
[2] Rd NOx = Total NOx – Background NOx
[3] Adj Rd NOx = Rd NOx x verification factor (state verification factor used)
[4] Adj Total NOx = Adj Rd NOx + Background NOx
[5] Adj Rd NO_2 = from NOx to NO_2 calculator (available LAQM Tools)
[6] Adj Total NO_2 = Adj Rd NO_2 + Background NO_2

Table C.9b: Summary of the adjusted results of the DMRB conversion tool (5m receptor distance and speed of 60 km per hour).

Road Link Census Point	Year	Annual mean NO_x Concentration (in μg m^{-3})		Adjusted Annual mean NO_2 Concentration (in μg m^{-3})		Adjusted Annual mean NO_2 Concentration (in μg m^{-3})		PM_{10}	
		Total [1]	Road Increment [2]	Road Increment [3]	Total [4]	Road Increment [5]	Total [6]	Annual Mean (in μg m^{-3})	Days > 50 μg m^{-3}
A20 - CP216	2007	32.4	21.0	21.0	32.4	9.5	17.7	18.3	1.7
A21 - CP511	2007	31.5	23.8	23.8	31.5	10.8	17.1	16.5	0.5
A23 - CP218	2007	28.5	16.8	16.8	28.5	7.7	16.0	17.7	1.1
A24 - CP219	2007	40.1	31.0	31.0	40.1	13.7	20.7	18.3	1.6
A55 - CP220	2007	38.1	24.1	24.1	38.1	10.7	20.1	19.9	3.3
A55 - CP221	2007	46.5	31.7	31.7	46.5	13.6	23.4	21.6	5.6
A20 - CP216	2008	30.3	19.5	19.5	30.3	8.9	16.7	18.0	1.4
A21 - CP511	2008	29.4	22.0	22.0	29.4	10.1	16.2	16.1	0.4
A23 - CP218	2008	26.9	15.8	15.8	26.9	7.3	15.2	17.4	0.9
A24 - CP219	2008	37.4	28.8	28.8	37.4	12.8	19.5	17.8	1.3
A55 - CP220	2008	35.6	22.4	22.4	35.6	10.1	19.0	19.5	2.8
A55 - CP221	2008	43.4	29.4	29.4	43.4	12.8	22.2	21.1	4.9
A20 - CP216	2010	26.6	16.8	16.8	26.6	7.8	14.9	17.4	1.0
A21 - CP511	2010	25.3	18.6	18.6	25.3	8.7	14.2	15.5	0.2
A23 - CP218	2010	23.7	13.7	13.7	23.7	6.5	13.6	16.8	0.6
A24 - CP219	2010	32.1	24.3	24.3	32.1	11.2	17.2	17.0	0.8
A55 - CP220	2010	30.9	19.2	19.2	30.9	8.8	16.8	18.8	2.1
A55 - CP221	2010	37.3	24.8	24.8	37.3	11.2	19.5	20.2	3.7

[1] Total NOx = direct from DMRB local output sheet
[2] Rd NOx = Total NOx – Background NOx
[3] Adj Rd NOx = Rd NOx x verification factor (state verification factor used)
[4] Adj Total NOx = Adj Rd NOx + Background NOx
[5] Adj Rd NO_2 = from NOx to NO_2 calculator (available LAQM Tools)
[6] Adj Total NO_2 = Adj Rd NO_2 + Background NO_2

Appendix D Regulated Processes within Castlereagh Borough

Processes with IPC authorisations within Castlereagh Borough are shown in Table D.1.

Table D.1: IPC authorisations within Castlereagh Borough in 2007/2008.

Premises	NIPG	Previously Assessed
Belvoir Filling Station 60 Milltown Road, Belvoir, BT8 4XP	1.14	Yes
Brackenvale Service Station 520 Saintfield Road, Belfast	1.14	Yes
Carryduff Service Station 629 Saintfield Road, Carryduff, BT8 8BS	1.14	Yes
Cherryvalley Service Station 46 Gilnahirk Road, Belfast, BT5 7DG	1.14	Yes
Gilnahirk Filling Station 109A Gilnahirk Road, Belfast, BT5 7QL	1.14	Yes
Jamison of Carryduff Ltd 636 Saintfield Road, Carryduff	1.14	Yes
Moat Lodge Service Station 58 Comber Road, Dundonald, BT16 2AB	1.14	Yes
Sainsbury's Filling Station Upper Galwally, Castlereagh, BT8	1.14	Yes
Spar/Texaco Filling Station 758 Upper Newtownards Road, Dundonald	1.14	Yes
Tesco Filling Station 170 Newtownbreda Road, Belfast BT8 4PZ	1.14	Section 5.3
Carryduff Building Supplies 116 Hillsborough Road, Moneyreagh	3.1	Yes
Stoneyford Concrete Ltd Charity Bridge, Carryduff, BT8 8HJ	3.1	Yes
Cemex (NI) Ltd Davidsons Quarry, 74 Ballygowan Road, Castlereagh, BT5 7TP	3.1	Yes
City of Belfast Crematorium Ballygowan Road, Castlereagh	5.2	Yes
Lindsay Ford Unit 16 Maryland Industrial Estate, Moneyreagh, BT23 6BL	6.34	Yes
Wright Accident Repairs 533 Saintfield Road, Belfast, BT8 8ES	6.34	Yes
Wright Accident Repairs Ballyoran Lane	6.34	Yes
McGladery Commercials Limited 22 Prince Regent Road Belfast BT5 6QR	6.34	Yes
Swift Clean 742 Upper Newtownards Road, BT16 ORJ	6.46	Section 5
Chevron Cleaners 42 Gilnahirk Road, Cherryvalley, BT5 7DG	6.46	Section 5
Marlowe Unit 34, Forestside Shopping Centre, Belfast, BT8 4FY	6.46	Section 5
Smart Wash-in 39 Glen Road, Braniel BT5 7LT	6.46	Section 5

NIPG codes:
- 1.14 Unloading of petrol into storage at service stations
- 3.1 Blending, packing, loading and use of bulk cement
- 5.2 Crematoria
- 6.34 Re-spraying of road vehicles
- 6.46 Dry cleaning

Castlereagh Borough Council - Northern Ireland

Table D.2 lists Part A and B processes within the district covered by Castlereagh Borough Council, as listed on the Northern Ireland Environment Agency website[6]

Table D.2 - Part A and B Processes within Castlereagh Borough Council

#	Permit Number	Site Operator Address	Section Number	Process Type	Status
1	P0098/05A	Diageo Global Supply IBC Group 3 Marshalls Road, Castlereagh, BELFAST, Co. Antrim, BT5 6SL	6.8	Treatment of Animal and Vegetable Matter	Determined
2	P0108/05A	ENVA (NI) Ltd 11 Comber Road, Carryduff, BELFAST, Co. Down, BT8 8AN	5.4	Recovery of waste	Determined
3	P0109/06A	Biofuels Carryduff Unit 2, 11 Comber Road, CARRYDUFF, Co. Down, BT8 8AN	4.1	Organic chemicals	Determined
4	P0305/09A	Land raise Land adjacent to 177 Belfast Road, CARRYDUFF, Co. Down (see Note a)	-	Landfill	Pending
5	PPC0020/08B	Cashel Quarry Lisdoonan, Belfast Road, SAINTFIELD, Co. Down, BT24 7HF	3.1	Production of Cement and Lime	Determined
6	PPC0030/08B	Northstone (NI) Ltd - Concrete Division Cashel Quarry, Lisdoonan, Belfast Road, SAINTFIELD, Co. Down, BT24 7HF	3.1	Production of Cement and Lime	Determined
7	PPC0099/08B	Cashel Quarry Cashel Quarry, Lisdoonan, CARRYDUFF, Co. Down, BT24 7EP	3.4	Production of Other Mineral Fibres	Determined

Note (a) Although correctly assigned to Castlereagh Borough Council, the address for the land raise is given on the Northern Ireland Environment Agency website as 177 Belfast Road, Saintfield, Down, BT24 8UR.

[6] http://www.ni-environment.gov.uk/pollution/ipc/ipc-public-registers/listofpartabprocesses.htm