

Environmental Health Department

2012 Air Quality Progress Report for Ballymena Borough Council

In fulfillment of Environment (Northern Ireland) Order 2002 Local Air Quality Management

August 2013

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Executive Summary

A review of new monitoring data for the period 1 January $2012 - 31^{st}$ December 2012 has identified the following:

Nitrogen Dioxide

- The North Road automatic analyser for Nitrogen Dioxide had an Annual mean nitrogen dioxide concentration of 27 µgm⁻³ therefore below the Annual Mean Air Quality Objective of 40 µgm⁻³.
- Throughout the year there were 9 exceedances of the hourly mean concentration (>200 µgm⁻³)

Sulphur Dioxide

• During the 2012 monitoring period there were no exceedances of the 15- minute, hourly, daily or the annual means for sulphur dioxide,

\mathbf{PM}_{10}

 During the 2012 monitoring period there were 6 exceedances of the daily mean for PM₁₀.

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• There were no exceedances of the annual mean objectives.

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1 Introduction

1.1 Description of Local Authority Area

Ballymena Borough has a population of approximately 64,000. The borough is approximately 200 square miles, and has a mixed urban and rural character. The Borough has a central location within Northern Ireland with good roads and rail communication network. It is served by the M2 motorway and with a Train station on the Belfast to Londonderry rail-line.

Belfast International Airport is located 18 miles and Belfast City Airport is 30 miles from Ballymena. It is also accessible to the seaports of Larne and Belfast, 20 and 27 miles respectively.

The Antrim Coast and Giants Causeway bound it to the north, to the east by Slemish Mountain, to the west the river Bann, and to the south by Lough Neagh. The figure below illustrates the positioning of both Ballymena Town and the surrounding villages.



Figure 1-1 Map of Ballymena Town and surrounding villages.

Local conditions that have a bearing on air quality include:

- Good transport infrastructure
- High levels of owner occupied housing/good quality housing
- Strong manufacturing base
- Above average reliance on agriculture, retail/distribution and public sectors in comparison to Northern Ireland overall.

1.2 Purpose of Progress Report

This report fulfills the requirements of the Local Air Quality Management process as set out in the Environment (Northern Ireland) Order 2002, 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 exceedances 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedance of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

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 μ g/m³ (milligrammes per cubic metre, mg/m³ for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Pollutant	Air Quality Objective	Date to be			
	Concentration	Measured as	achieved by		
Benzene	16.25 μg/m³	Running annual mean	31.12.2003		
Delizene	3.25 µg/m ³	Running annual mean	31.12.2010		
1,3-Butadiene	2.25 µg/m³	Running annual mean	31.12.2003		
Carbon monoxide	10 mg/m ³	Running 8-hour mean	31.12.2003		
Lead	0.50 µg/m ³	Annual mean	31.12.2004		
Leau	0.25 μg/m ³	Annual mean	31.12.2008		
	200 µg/m ³ not to be				
Nitrogen dioxide	exceeded more than 18	1-hour mean	31.12.2005		
	times a year				
	40 µg/m ³	Annual mean	31.12.2005		
	50 µg/m ³ , not to be				
Particulate Matter	exceeded more than 35	24-hour mean	31.12.2004		
(PM ₁₀) (gravimetric)	times a year				
	40 μg/m ³	Annual mean	31.12.2004		
	350 µg/m ³ , not to be				
	exceeded more than 24	1-hour mean	31.12.2004		
	times a year				
	125 µg/m ³ , not to be				
Sulphur dioxide	exceeded more than 3	24-hour mean	31.12.2004		
	times a year				
	266 µg/m ³ , not to be				
	exceeded more than 35	15-minute mean	31.12.2005		
	times a year				

Table 1-1 Air Quality Objectives included in Regulations for the purpose ofLAQM in Northern Ireland

1.4 Summary of Previous Review and Assessments

1.4.1 First stage review and assessment (2000/01)

A First Stage Review and assessment of local air quality in Ballymena had highlighted the need to progress to second stage for:

- SO₂ and PM₁₀ for domestic fuel burning
- PM_{10} and NO_2 for traffic data
- SO2 from Two Industrial point sources, i.e. plant burning over 5 MW

1.4.2 Second stage review and assessment (2003/04)

A Second Stage Review and assessment concluded the following:

NO₂ and PM₁₀ from Road Traffic

Further DMRB modelling in February 2004 using 2002-04 monitoring data and 2003 road traffic counts confirmed that there was no need to declare an AQMA due to Road Traffic sources for either NO_2 or PM_{10} as these would not exceed objectives in 2004/05.

SO₂ and PM₁₀ from Domestic Fuel Burning

Commenced monitoring of SO_2 by means of Real Time Analyser in August 2002 within the worse case square, Ballykeel in relation to domestic fuel combustion.

Relocation of two existing smoke and sulphur dioxide bubblers in 2002 to more appropriate locations within residential coal burning areas, namely Ballykeel and Dunclug.

Commenced monitoring of SO_2 by Diffusion Tubes in residential areas (10).

Modelling undertook in 2003/04 in respect of domestic fuel combustion for 6 areas of concern. This modelling has concluded that an AQMA be declared in respect of PM_{10}

for two areas of concern, broadly named Ballykeel and Dunclug. However further investigative work was required.

SO₂ and PM₁₀ from Industrial Point Sources

GSS Modelling for two industrial plants confirmed that SO_2 and PM_{10} objectives would not be exceeded in 2004.

1.4.3 Third stage review and assessment (2004)

The outcome of domestic fuel combustion modelling resulted in declaration of two AQMAs broadly named Dunclug and Ballykeel in respect of predicted exceedence on PM¹⁰. Ballymena Borough Council proceeded to declare two AQMA's in respect of PM10 on 25th October 2004. A copy of the AQMA Order together with maps is shown in Appendix One.

The department's technical guidance stresses the importance of verifying the dispersion modelling by conducting local monitoring. Therefore a decision to colocate a PM_{10} Real Time analyser with our existing SO₂ Real Time analyser within the Ballykeel AQMA was implemented in December 2004.

1.4.4 Stage Four Review and Assessment (2004/05).

With updated fuel use data obtained in late 2004 NETCEN were commissioned to conduct a Stage 4 Air Quality Review for domestic emissions sources within both AQMA'S. Importantly at this stage NIHE had embarked on a fuel conversion scheme with the Dunclug AQMA. Fresh data in respect of both areas was incorporated into the study. The report dated September 2005 assessed current and potential future PM₁₀ and SO₂ concentrations as a result of domestic fuel combustion emissions in two grids Ballykeel and Dunclug.

It should be noted that the modelling methodology used in the Stage 4 assessment differed from that used in the Stage 3 assessment. Until model verification with local

monitoring data can be undertaken these model results are not finalised. This Stage 4 study represents a more accurate modelling exercise using more up to date information than the previous stage 3 modelling.

The conclusions of this report were:

Particulate Matter (PM₁₀ gravimetric)

Detailed modelling has shown that PM_{10} emissions arising from domestic fuel combustion in Ballymena Borough Council was predicted to cause an exceedence of the daily PM_{10} objective at relevant receptors within the assessed areas, specifically Ballykeel.

Sulphur dioxide (SO₂)

Detailed modelling has shown that SO₂ emissions arising from domestic fuel combustion in Ballymena Borough Council were not predicted to cause an exceedence of the air quality objectives at relevant receptors within the assessed areas.

The modelling had predicted an exceedance of the regulated objectives. The designation of an AQMA remained valid subject to verification of the modelling using local monitoring data. Continuous monitoring of SO_2 was already in place to capture data for the purpose of verification and PM_{10} monitoring was introduced in December 2005.

The modelling has also predicted an exceedance of the provisional PM₁₀ annual objective in 2010 in Ballykeel.

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1.4.5 Update and Screening Assessment (April 2006)

The purpose of the update and screening assessment (USA) report was to reconsider all seven pollutants screened at first stage accounting for new or changed circumstances which may influence air quality. There are two key findings within the report:

Firstly, detailed assessment to particulate matter in relation to domestic coal burning within the two AQMA's should continue, with a verification study required as sufficient data was now available.

Secondly, in respect of nitrogen dioxide from traffic, a co-location study which was being undertaken using diffusion tubes and our real time analyser, indicated further investigative work is required regarding bias adjustment to diffusion tube data. The conclusions of this report in respect of all pollutants were as follows;

Pollutant	Detailed Assessment
	Required
Carbon Monoxide	Yes/No
Benzene	Yes/No
1,3 Butadiene	Yes/No
Lead	Yes/No
Nitrogen Dioxide	Yes/No.
	However the diffusion tube co-location study
	remains under review.
Sulphur Dioxide	Yes/No
Particulate Matter	Detailed assessment continues, with the
	preparation of an action plan.

1.4.6 Progress Report (2007)

The main sources of pollutants in the Ballymena Borough continue to be nitrogen dioxide from road traffic and sulphur dioxide / particulate matter from domestic sources. Nitrogen dioxide, sulphur dioxide and particulate matter will continue to be monitored in key locations, with update to the department provided with reference to the objectives of relevance.

• Nitrogen Dioxide

The 2006 annual average concentrations for the passive nitrogen dioxide monitoring sites at Galgorm Road and Queen Street are above the Annual Mean Air Quality Objective of 40 μ gm⁻³ with the application of a **local** (2.07) bias adjustment factor. In using the **national** (1.33) bias adjustment factor all sites remain below the 40 μ gm⁻³ objective. In 2005 using a local bias adjustment (1.51) Galgorm Road was under the objective at 36.7 μ gm⁻³, however Queen Street was in exceedence of the objective at 45.7 μ gm⁻³. Importantly in 2005 using a national bias adjustment no site was in exceedence of this objective.

There has been some doubt as to diffusion tube precision used during 2006. Efforts have been made to address this issue, this includes renewing our diffusion tube contract with an alternative service provider. The contract commenced 1st October 2007. It is proposed to review the matter at the earliest opportunity when sufficient diffusion tube data becomes available and provide an update within the next progress report due April 2008.

• Sulphur Dioxide and Particulate Matter (PM₁₀)

The mean 2006 concentrations for both SO_2 and PM_{10} are below the annual air quality objectives for both these pollutants.

The Council has relocated the Ballykeel AQMS to a best-fit location within the Ballykeel AQMA. Once sufficient monitoring data becomes available consideration will be given to the revocation of the Dunclug AQMA and either revocation / amendment of the Ballykeel AQMA.

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1.4.7 Progress Report (2008).

The main sources of pollutants in the Ballymena Borough continue to be nitrogen dioxide from road traffic and sulphur dioxide / particulate matter from domestic sources. Nitrogen dioxide, sulphur dioxide and particulate matter will continue to be monitored in key locations, with update to the department provided with reference to the objectives of relevance.

• Nitrogen Dioxide

In using the **national** (1.06 Lambeth) bias adjustment factor all sites remain below the 40 μ gm⁻³ objective, however the Gradko bias adjusted (0.89) levels show Linenhall Street and George Street are in exceedence. Four other sites are close to the 40 μ gm⁻³ objective. Of these six sites two are not considered relevant as there are no residential properties in these locations, i.e.

- George Street
- Ballymoney Street

For the other four sites it is this departments intention to undertaken further detailed assessment to determine whether declaration of an AQMA(s) is necessary

• Sulphur Dioxide and Particulate Matter (PM₁₀)

The mean 2007 concentrations for both SO_2 and PM_{10} are below the annual air quality objectives for both these pollutants.

The Council had relocated the Ballykeel AQMS to a best-fit location within the Ballykeel AQMA and will continue to monitor SO_2 and PM_{10} in this area. FDMS upgrade to the Ballykeel analyser is currently operating and once sufficient monitoring data comparable with that produced within the DEFRA National Network becomes available consideration will be given to either revocation / amendment of the Ballykeel AQMA as required.

It is likely that in light of the re-verification modelling in relation to the 2006 Updating and Screening Assessment that the AQMA for Dunclug will be revoked in 2008.

1.4.8 Update and Screening Report (2009)

The update screening and assessment findings are summarised as follows;

• Conclusions from New Monitoring Data

There are two significant conclusions from new monitoring data which support ongoing work since the last round of update and screening, these are;

1. Revocation of the Ballykeel and Dunclug AQMAs.

In October 2004 Ballymena Borough Council declared two Air Quality Management Areas broadly termed Ballykeel and Dunclug. Both AQMAs were designated in relation to likely exceedences of PM10 (annual and daily mean) objectives as specified by the air quality regulations. Source apportionment showed these exceedences were due to domestic coal burning.

The Air Quality Regulations state that PM10 gravimetric concentration as a daily average of 50ug/m³ should not be exceeded more than 35 times per annum, in addition a target annual mean of 40ug/m³ should be achieved. Local monitoring in 2008 has shown these objectives are being achieved even within the worst case contour for which the conversion to gas will not be completed until 2011. The major contributor to this improvement in air quality being that over 50% of NIHE housing stock has been converted to natural gas there has been a positive impact even on this worst case contour. In addition it is hoped that fuel efficiency work undertaken by this department has also had a beneficiary impact, including owner occupiers available of various grant aided schemes through sign posting by this department.

2. Declaration of an AQMA in the Linenhall / George Street Area.

A detailed assessment has just been completed by AEA technology on behalf of Ballymena Borough Council (April 2009). This concluded an air quality management

area be designated in the Linenhall / George Street area due to modelled nitrogen concentrations along Linenhall and George Street above the objective of 40 ug/m3. This is reflected in the nitrogen dioxide diffusion tube monitoring results.

• Conclusions from Assessment of Sources

The assessment of sources has not highlighted any new areas of concern.

• Proposed Actions

The Updating and Screening Assessment has not identified the need to proceed to a Detailed Assessment for any new pollutant. As discussed above a detailed assessment has just been completed by AEA technology on behalf of Ballymena Borough Council (April 2009). This concluded an air quality management area be designated in the Linenhall / George Street area due to modelled nitrogen concentrations along Linenhall and George Street above the objective of 40 ug/m3. This report is currently with assessors for validation and approval to proceed with a declaration for an AQMA, as described above.

The Updating and Screening Assessment has not identified any need for additional monitoring, or changes to the existing monitoring programme mainly because there as been a continual review of same since 2006, in particular regarding domestic fuel burning and road traffic sources.

There are changes required to existing Ballykeel and Dunclug AQMAs by way of revocation. The air quality objectives within both areas are now being achieved due to substantial fuel conversion work undertaken by the NIHE since the declaration of these areas. This matter is with the devolved administration for approval. It is not proposed to proceed to a Detailed Assessment due to the number of fuel burning sources that have been removed and local monitoring data.

Next course of action;

• To declare an AQMA along the Linenhall Street / George Street area (subject to approval) due to modelled nitrogen concentrations above the objective of 40 ug/m3. Then to proceed with Action Planning as required.

- To revoke both Ballykeel and Dunclug AQMAs (subject to approval) as local monitoring has shown PM₁₀ objectives are being achieved
- Submit 2010 Progress Report.

1.4.9 Progress Report 2010

The 2010 progress Report highlighted the following actions were necessary.

A further assessment for nitrogen dioxide should be undertaken to review the recently declared AQMA, including scenarios with a view to action planning.

A detailed assessment with a view to revocation of the AQMAs in Dunclug and Ballykeel should be undertaken.

Planning application consultations should continue to be assessed with regard to potential impact on local air quality.

1.4.10 Progress Report 2011

The 2011 progress Report highlighted the following actions were necessary

Following a detailed assessment of AQMA's in Dunclug and Ballykeel, decision reached to revoke Dunclug AQMA.

Ballykeel AQMA to remain due to continuing increased levels in PM₁₀

1.4.11 Update and Screening Assessment Report 2012

The updating and screening assessment showed that no significant actions are required in relation to air quality management for identified pollutants.

Nitrogen Dioxide

Ballymena North Road Automatic monitor showed that mean nitrogen dioxide concentrations for the period 1 January 2011 to 31 December 2011 (27 µgm-3)did not exceed the Annual Mean Air Quality Objective of 40 µgm-3. There were no exceedences of the hourly mean or of the Daily mean objective.

Diffusion Tube Monitoring did show exceedance for nitrogen dioxide within the Linenhall Street Air Quality Management Area.

Nitrogen dioxide remains under focus as a action point to address within the action plan for the Linenhall Street AQMA.

PM10 and Sulphur Dioxide

During the 2011 monitoring period there were no exceedences of the 15- minute, hourly, daily or the annual means for sulphur dioxide, however there were 10 exceedences of the daily mean for PM10. A detailed assessment was undertaken with a view to revocation of the Ballykeel and Dunclug AQMAs. This study was completed in early 2011 with a conclusion to revoke Dunclug AQMA, but to retain the Ballykeel AQMA.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

There are three continuous analysers currently in operation, at two locations. All sites were in operation at the last round of update and screening in 2012. Details of monitoring are as follows:-

- (1) Sulphur dioxide continuous analyser at Ballykeel
- (2) Particulate matter (with FDMS) continuous analyser at Ballykeel
- (3) Nitrogen dioxide continuous analyser at North Road

All continuous monitoring stations are part of the Calibration Club managed by Ricardo AEA. Data from these sites are quality assured to the AURN standards as part of the Calibration Club. In addition a QA/QC audit which includes calibration of the analysers using zero and span gas standards, and other tests for efficiency is undertaken by Ricardo AEA. Data are fully ratified by Ricardo AEA staff using procedures as applied to data from the AURN UK national monitoring network sites.

Further information regarding Quality Assurance/Quality Control for Automatic Continuous Analysers is detailed in Appendix A.

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst- Case Exposure?
Ballykeel CMS	Ballykeel	AQMA	311900	402600	2.0	PM ₁₀ S0 ₂	Y	TEOM FDMS	Y	N/A	Y
North Road CMS	North Road	Roadside	310636	403072	1.5	NO NO _x NO ₂	Y	Thermo I Series	Y	2m	N*

Table 2-1 Air Quality Objectives included in Regulations for the purpose of LAQM in Northern Ireland

*As preferred worst-case location not an option due to a narrow footpath, the second preferred worst-case location was chosen.



Figure 2-1 Photo - Ballykeel Automatic Analysers

Figure 2-2 Photo - North Road Automatic Analyser



Figure 2-3 Showing location map of Ballykeel and North Road Automatic Analysers and declared AQMA's



2.1.2 Non-Automatic Monitoring Sites

Ballymena Borough Council operates a network of nitrogen dioxide diffusion tubes across the borough. The diffusion tubes are exposed for a four-week period.

The bias adjustment factor of 0.97 reported as the national average of co-location studies conducted using diffusion tubes prepared and analysed by Gradko Environmental during 2012 has been used to adjust the diffusion tube results. Full details of the diffusion tube QA/QC are presented in Appendix A.

The locations of the diffusion tubes in the assessed areas are listed in Table 2.2. Individual tube locations are details in also shown in Figure 2.5.

diffusion tubes 13, 14 and 14B were collocated with the North Road monitoring site in 2012.

Table 2-2 Details of Non- Automatic Monitoring Sites- NOx Diffusion Tubes

									Relevant		
Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst- Case Exposure?
DT1	Leighinmohr Ave	Urban Background	310228	402546	2.5	NO _x	N	N	Y	N/A	Y
DT2	Galgorm Road	Kerbside	310336	403196	2.5	NO _x	N	N	Y	3m	Y
DT3	Main St, Cullybackey	Kerbside	305841	405690	2.5	NO _x	N	N	Y	2m	Y
DT4	Cullybackey Road	Kerbside	310350	403443	2.5	NO _x	N	N	Y	3m	Y
DT5	Larne St	Kerbside	310602	402920	2.5	NO _x	Ν	Ν	Y	3m	Y

									Relevant		
Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst- Case Exposure?
DT6	Ballyloughan Ave	Urban Background	309532	404425	2.5	NO _x	N	Ν	Y	N/A	Y
DT7	George St	Kerbside	310584	403239	2.5	NO _x	N	N	Y	1m	Y
DT8	Wellington St	Kerbside	310795	403386	2.5	NO _x	N	N	Y	2m	Y
DT9	Ballymoney St	Kerbside	310796	403582	2.5	NO _x	N	N	Y	2m	Y
DT10	Parkway	Kerbside	311000	403905	2.5	NO _x	N	N	Y	2m	Y
DT11	Lisnevenagh Rd	Road Side	311884	397037	2.5	NO _x	N	N	Y	6m	Y
DT12	Queen St	Kerbside	310743	402219	2.5	NO _x	Ν	Ν	Y	3m	Y
DT13	North Road	Roadside	310638	403079	1.5	NO _x	N	Y	Y	2m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst- Case Exposure?
DT14	North Road	Roadside	310638	403079	1.5	NO _x	Ν	Y	Y	2m	Y
DT14B	North Road	Roadside	310638	403079	1.5	NO _x	Ν	Y	Y	2m	Y
DT15	Linenhall St	Kerbside	310687	403122	2.5	NOx	Y	N	Υ	<1m	Y



Figure 2-4 Maps of Non-Automatic Monitoring Sites

DT1 – Leighmohr Avenue, Ballymena



DT2 – Galgorm Road



DT3 – Main Street, Cullybackey



DT4 – Cullybackey Road



DT5 – Larne Street, Ballymena



DT6 – Ballyloughan Avenue



DT7 – George Street, Ballymena



DT8 – Wellington Street, Ballymena LAQM Progress Report 2013



DT9 - Ballymoney Street, Ballymena



DT10 – Parkway, Ballymena LAQM Progress Report 2013



DT11 – Lisnevenagh Road, Ballymena



DT12 – Queen Street, Ballymena



DT13,14,14B, North Road, Bridge Street, Ballymena DT15 – Linenhall Street, Ballymena

Gradko laboratory overall precision in accordance Para 3.23 in TG (09) has been assessed as 'Good' (in 38 of 41 studies). The following web link verifies this. http://laqm.defra.gov.uk/documents/Tube_Precision_2013_version_09_13-Final.pdf . A summary of Gradko performance is in Appendix A.

A database of bias adjustment factors determined from Local Authority co-location studies throughout the UK has been collated by the Local Air Quality Management Helpdesk. Using orthogonal regression combined bias adjustment factors have been calculated for each laboratory, year and preparation method combination for which data are available.

Bias adjustment for Gradko with 20% TEA in water has been calculated using the spreadsheet tool and is shown in Appendix 4. A bias adjustment factor of 0.96 was calculated from this diffusion tube spreadsheet tool http://laqm.defra.gov.uk/bias-LAQM Progress Report 2013

<u>adjustment-factors/national-bias.html</u> which used 35 studies from Gradko Services using 20% TEA in water for 2012.

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO₂)

An air quality management was declared in March 2010 in the Linenhall / George Street area due to modelled nitrogen dioxide exceedances of the objective of 40ug/m3.

Automatic Monitoring Data

During the 2012 monitoring period there was 9 exceedances of the hourly or annual mean. However there were no exceedance of the daily or annual mean.

Table 2-3Results of Automatic Monitoring for Nitrogen Dioxide: Comparisonwith Annual Mean Objective

These data have been fully ratified by Ricardo-AEA											
POLLUTANT	NO _X	NO	NO ₂								
Number Very High	-	-	0								
Number High	-	-	0								
Number Moderate	-	-	3								
Number Low	-	-	7948								
Maximum 15-minute mean	1484 µg m ⁻³	751 µg m ⁻³	632 µg m ⁻³								
Maximum hourly mean	1253 µg m ⁻³	650 µg m ⁻³	346 µg m ⁻³								
Maximum running 8-hour mean	712 µg m ⁻³	359 µg m ⁻³	164 µg m ⁻³								
Maximum running 24-hour mean	504 µg m ⁻³	255 µg m ⁻³	115 µg m ⁻³								
Maximum daily mean	465 µg m ⁻³	233 µg m ⁻³	109 µg m ⁻³								
Average	56 µg m ⁻³	19 µg m ⁻³	27 µg m ⁻³								
Data capture	90.5 %	90.5 %	90.5 %								

BALLYMENA NORTH ROAD 01 January to 31 December 2012

All gaseous pollutant mass units are at 20'C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 μ g m ⁻³	9	6

The mean nitrogen dioxide concentrations for the period 1 January 2012 to 31 December 2012 at the North Road site was 27 μ gm⁻³ therefore below the Annual Mean Air Quality Objective of 40 μ gm⁻³. There was no exceedance of the hourly mean objective with the maximum daily mean of 115 μ gm⁻³ or the Daily mean objective, with the maximum daily mean of 109 μ gm⁻³. (Air Quality Regulations (Northern Ireland) 2003)

Table 2-4 Results of	Automatic I	Monitoring f	for NO2:	Comparison	with	Annual
Mean Objec	tive					

		Valid		Annual Mean Concentration (µgm ⁻³)				
Site Name	Site Type	Data Capture 2012	Within AQMA	2008	2009	2010	2011	2012
North Road		90.5%	Y	29	29	32	27	27

A bar chart showing the trend in annual mean NO₂ concentrations over the last five years at the North Road monitoring site is presented in Figure 2-5. The Chart shows the measured annual mean NO2 concentrations have remained generally static, although increased level was detected in 2010 (as was the case in most of the UK).





Table 2-5 Results of Automatic Monitoring for NO2: Comparison with 1-hourMean Objective

			Valid	Number of Hourly Means > 200µg/m ³					
Site ID	Site Type	Within AQMA?	Data Capture 2012 % ^b	2008* ^c	2009* ^c	2010* ^c	2011* ^c	2012 ^c	
North Road	Roadside	Y	90.5	0	1	2	0	9	

Diffusion Tube Monitoring Data

Details of the annual mean NO_2 concentrations measured using diffusion tube sites during 2012 are presented in Table 2-6 and the series of results measured from 2008 to 2012 are presented in Table 2-7.

Data capture was generally good across the network of diffusion tubes and no short or long term adjustment calculations were required.

There was 1 site (DT15 – Linenhall Street) at which the Annual mean NO2 concentration of 40 μ g/m³. This location is located within a declared AQMA for NO₂ and current action plan is in place to address the issue.

A bar chart showing the trends in annual mean NO2 concentrations measured across the Ballymena Borough Council diffusion tube network during period 2008 – 2012 are presented in Figure 2-6

Table 2-6 Results of NO2 Diffusion Tubes 2012

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months or %) ^a	2012 Annual Mean Concentration (μ g/m ³) - Bias Adjustment factor = 0.96
DT1	Leighinmohr Ave	Urban Background	Ν	Ν	100%	9.53
DT2	Galgorm Road	Kerbside	N	Ν	100%	27.16
DT3	Main St, Cullybackey	Kerbside	N	Ν	83.33%	20.90
DT4	Cullybackey Road	Kerbside	N	Ν	100%	25.17
DT5	Larne St	Kerbside	N	Ν	100%	24.11
DT6	Ballyloughan Ave	Urban Background	N	Ν	91.66%	9.32
DT7	George St	Kerbside	N	N	100%	33.67
DT8	Wellington St	Kerbside	N	Ν	100%	21.57
DT9	Ballymoney St	Kerbside	N	Ν	100%	24.58
DT10	Parkway	Kerbside	N	N	100%	25.74
DT11	Lisnevenagh Rd	Road Side	N	Ν	100%	20.15
DT12	Queen St	Kerbside	N	N	100%	28.47
DT13	North Road	Roadside	N	Y	100%	24.26
DT14	North Road	Roadside	N	Y	100%	24.18
DT14B	North Road	Roadside	N	Y	100%	21.74
DT15	Linenhall St	Kerbside	Y	Ν	100%	45.42

Table 2-7 Results of NO2 Diffusion Tubes (2008 to 2012)

				Annual Mean Concentration (µg/m ³) - Adjusted for Bias ^a							
Site ID		Site Type	Within	2008 (Bias	2009 (Bias	2010 (Bias	2011 (Bias	2012 (Bias			
Olice ID	Location	One Type	AQMA?	Adjustment Factor	Adjustment Factor	Adjustment Factor	Adjustment Factor	Adjustment Factor			
				= 0.9)	= 0.9)	= 0.92)	= 0.91)	= 0.96)			
DT1	Leighinmohr Ave	Urban	N	10.4	11 4	13	12.63	9.53			
	Leighninon	Background		10.4	11.4	10	12.00	0.00			
DT2	Galgorm Road	Kerbside	N	32.5	33.53	34.04	30.56	27.16			
DT3	Main St,	Kerbside	N	22.5	21.67	24 56	24.04	20.90			
210	Cullybackey			22.0	21.07	21.00	21.01	20.00			
DT4	Cullybackey	Kerbside	N	27.8	30.22	31 74	30.58	25.17			
	Road			21.0	00.22		00.00	20.17			
DT5	Larne St	Kerbside	N	25.8	25.8	28.89	26.28	24.11			
DT6	Ballyloughan	Urban	N	9.0	11 1	14 44	15.26	0.32			
010	Ave	Background		0.0		17.77	10.20	0.02			
DT7	George St	Kerbside	N	44.1	39.0	39.84	35.24	33.67			
DT8	Wellington St	Kerbside	N	26.7	24.9	27.5	28.33	21.57			
DT9	Ballymoney St	Kerbside	N	27.6	28.73	31	29.92	24.58			
DT10	Parkway	Kerbside	N	27.0	23.25	30.18	30.8	25.74			
DT11	Lisnevenagh Rd	Road Side	Ν	23.2	24.68	27.6	27.28	20.15			
DT12	Queen St	Kerbside	N	34.7	32.78	36.98	35.54	28.47			
DT13	North Road	Roadside	N	25.5	21.81	27.69	28.78	24.26			
DT14	North Road	Roadside	N	25.5	21.81	27.69	28.78	24.18			
DT14B	North Road	Roadside	N	25.5	21.81	27.69	28.78	21.74			
DT15	Linenhall St	Kerbside	Y	43.0	49.12	58.14	57	45.42			





2.2.2 Particulate Matter (PM₁₀)

The annual mean PM_{10} concentrations for both 2012 monitoring period is presented in Table 2-8

The 2012 monitoring period there was no exceedances of the PM_{10} annual mean AQS objective of $40\mu g/m^3$.

Table 2-8 Results of Automatic Monitoring for PM₁₀ 2012

BALLYMENA BALLYKEEL 01 January to 31 December 2012

These data have been fully ratified by Ricardo-AEA

POLLUTANT	PM ₁₀ +
Number Very High	0
Number High	0
Number Moderate	34
Number Low	7927
Maximum 15-minute mean	183 µg m ⁻³
Maximum hourly mean	183 µg m ⁻³
Maximum running 8-hour mean	116 µg m ⁻³
Maximum running 24-hour mean	72 µg m ⁻³
Maximum daily mean	64 µg m⁻³
Average	21 µg m ⁻³
Data capture	91.0 %

+ PM₁₀ as measured by a FDMS (No Correction)

All gaseous pollutant mass units are at 20'C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure.

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedances	Days
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 μ g m ⁻³	6	6
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 40 μ g m ⁻³	0	-

Table 2-9 Results of Automatic Monitoring for PM10: Comparison with AnnualMean Objective

				Valid	Data Confir	Confirm	PM ₁₀ Annual Mean Concentration (µg/m ³)				
Site	Site	Site Type	Within	Capture	2012	Gravimetric			0040	0044	0040
U	Name		AQMA?	。 % ^b			2008	2009	2010	2011	2012
						(Y OF N/A)					
	Ballykeel	AQMA	Y	91		Y	25	25	24	22	21





Since 2008 there has been a downward trend in the annual mean concentration. Works by housing associations to replace smoky solid fuel fire with natural gas fired heating appliances has been ongoing and has helped this downward trend.

Table 2-10 Results of Automatic Monitoring for PM10: Comparison with 24-hour Mean Objective

				Valid	Confirm	Number of Daily Means > 50µg/m ³				
Site	Site Name	Site	Within	Data	Gravimetric					
ID	Olici Name	Туре	AQMA?	Capture	Equivalent	2008	2009	2010	2011	2012
				2012 %	Lyuwalent					
	Ballykeel	AQMA	Y	91	Y	7	6	11	10	6

There remains a quite consistent number of exceedances of daily mean objectives, and it is advised that the AQMA remain and the situation monitored

2.2.3 Sulphur Dioxide (SO₂)

Sulphur dioxide concentrations monitoring at this site is a continuous real time monitor and is affiliated to Defra's Automatic Urban and Rural Network (AURN).

The annual mean SO_2 concentrations for 2012 monitoring period is presented in Table 2-11.

There were no exceedances of any of the SO₂ AQS objectives objective during the 2012 monitoring period.

Table 2-11 Results of Automatic Monitoring for SO₂ 2012

BALLYMENA BALLYKEEL 01 January to 31 December 2012

This data have been fully ratified by Ricardo-AEA

POLLUTANT	SO ₂
Number Very High	0
Number High	0
Number Moderate	0
Number Low	28821
Maximum 15-minute mean	101 µg m ⁻³
Maximum hourly mean	64 µg m ⁻³
Maximum running 8-hour mean	32 µg m ⁻³
Maximum running 24-hour mean	23 µg m ⁻³
Maximum daily mean	19 µg m ⁻³
Average	4 µg m ⁻³
Data capture	83.8 %

All gaseous pollutant mass units are at 20'C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure.

Pollutant	Air Quality Regulations	Exceedances	Days
	(Northern Ireland) 2003		-
Sulphur Dioxide	15-minute mean > 266 μ g m ⁻³	0	0
Sulphur Dioxide	Hourly mean > 350 µg m ⁻³	0	0
Sulphur Dioxide	Daily mean > 125 μ g m ⁻³	0	0

Table 2-12	Results	of	Automatic	Monitoring	for	SO ₂ :	Comparison	with
0	bjectives							

Site ID	Site Name	Site Type	Within AQMA?	Valid Data Ca 2012 % ^b	Number of: ^c 15-minute Mea 266µg/m ³	1-hour Means 350µg/m ³	24-hour Mear 125µg/m ³
	Ballykeel	AQMA	Y	83.8	0	0	0

2.2.4 Summary of Compliance with AQS Objectives

Ballymena Borough Council has examined the results from monitoring in the borough

Linenhall Street AQMA – NO₂

Concentrations within the Linenhall St AQMA still exceed the Annual and hourly objectives for NO₂ and the AQMA should remain.

An action plan has been finalised and the measured will be implemented and monitored on an ongoing basis.

Ballykeel AQMA – PM₁₀, SO₂

Concentrations of PM₁₀ within the Ballykeel AQMA are within the AQS annual mean concentration levels.

However, the Ballykeel AQMA still experiences concentrations that are quite close to the objective. Given the unavoidable uncertainty in assessments of this nature, it is therefore considered prudent to retain the Ballykeel AQMA. Ongoing action plan objectives namely fuel switching and energy efficiency measures will be monitored.

Concentrations of pollutants outside of AQMAs are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

Ballymena Borough Council confirms that there are no significant new or newly identified local developments which may have an impact on air quality within the Local Authority Area.

Ballymena Borough Council confirms that the following have been considered:

- Road Traffic Sources
- Other Transport Sources
- Industrial Sources
- Commercial and domestic sources
- New developments with fugitive or uncontrolled sources.

No significant development applications have received planning permission during the period of this report.

4 **Planning Applications**

A summary of significant planning applications and current/proposed developments across Ballymena Borough Council is described below;

Ballymena Gateway Project – G/2013/0007/PREAPP

Planning Status - Proposed Development

Development of site to include, 4500 seat church, major leisure and education facilities and associated car parking; 3000 sq m factory for Nutrack including regional training centre; 6000 sq m business park; an EMI home, special needs home and supported housing units; 6 acres of social, affordable and market housing; a commercial development to include hotel, petrol filling station and supermarket; access from adjacent A26.

Environmental Statement to be submitted.

Tully Quarry Centralised Anaerobic Digestion Plant - G/2013/0282/F

Planning Status - Proposed Development

Development of a 2MW Centralised Anaerobic Digestion (CAD), Combined Heat and Power (CHP) Plant, Process Building, Storage Building, Staff Facilities, Weighbridge, Wheelwash, Substation, Access Lane, Ancillary Site Works.

Environmental Statement to be submitted.

Quarry Extension - Craigs Quarry, Glenhead Road, Glenwherry – G/2012/0296/DETEIA

Planning Status - Proposed

5 Hectare westerly extension to existing quarry

5 Local Transport Plans and Strategies

The Sub-Regional Transport Plan 2015, was produced in 2007 following the Regional Strategic Transport Network Transport Plan. The Plan represented a significant proposed investment of £2.3 billion up to 2015, subject to the availability of funds and contained practical blueprints for the development of sustainable transport networks in towns.

With specific relevance to Ballymena, the Plan stated that "Local Transport Studies have made an allowance for bus based Park and Ride schemes totalling £5 million in Londonderry and possibly Ballymena in the longer term." The Larne Link Road / Linenhall Street Junction was highlighted as a junction under consideration for improvement in the Highway Blueprint and the proposed south-west distributor road between Ballee Road West and Parkway at the Greenmount Roundabout was also identified.

6 Implementation of Action Plans

Ballykeel AQAP – SO₂ and PM₁₀

The action plan outlines the measures to be taken in pursuit of achieving the air quality objectives and air quality standards for sulphur dioxide (SO_2) and particulate matter (PM_{10}) within the air quality management area and proposes the timescale for implementing such measures. Ballymena Borough Council submitted its Air Quality Action Plan in April 2008.

Since the inception of the action plan, works have been implemented and remain ongoing in regard to the action plan measures. A full report of Action Plan Progress Report is available, but is summarized below:

• Conversion of Solid fuel heating systems to LPG within NIHE housing stock

This has been ongoing in conjunction with NIHE according to financial and project constraints.

• Promotion of Warm Home, and Energy Efficiency Schemes.

There has been ongoing promotion of various energy efficiency schemes, and Ballymena Borough Council have an energy efficiency officer employed to progress uptake of these schemes.

• Bonfire Guidance & Controls

Ongoing guidance given in relation to community bonfires.

Also Environmental Health Officers investigate and enforce legislation to unlicensed or nuisance burning of wastes complaints within the AQMA.

Linenhall Street - AQAP – NO₂

Ballymena Borough Council has prepared this Air Quality Action Plan (AQAP) following the declaration of an Air Quality Management Area (AQMA) for nitrogen dioxide (NO₂) along the Linenhall Street/George Street area in Ballymena town centre in 2009.

This action plan was finalised in October 2012, and the progress to date is summarised in Table 6-1.

Table 6-1 Linenhall Street AQMA Action Plan Progress

No.	Measure	Focus	Lead Authority	Planning Phase	Implemen- tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
1	Reduction of Queuing Traffic on Linenhall Street	Reductions in queuing time and therefore reduction of emission from idling cars is therefore likely to reduce pollution levels.	DRDNI			Alterations to Linenhall Street / Bridge Street Junction					
2	Improvements in Bus Fleet Emissions	Translink to replace Ulsterbus buses with latest Euro class buses on an ongoing basis	Translink		Ongoing Replacement	Improvement of bus fleet					
3	Encouraging Modal Shift	Public Realm Strategy	BBC		2014 -	Implementation of Ballymena Public Realm Strategy		Project currently being prepared for Planning Application			
4	Ballymena South West Distributor Road	DRDNI to develop road as and when required by new development	DRDNI		On Hold						

No.	Measure	Focus	Lead Authority	Planning Phase	Implemen- tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
5	Bus Park and Ride	DRDNI to consider in accordance with SRTP	DRDNI		The Sub- Regional Transport Plan (SRTP) 2015						
6	Comment upon planning applications to ensure that all relevant air quality issues are highlighted and mitigation measures are considered wherever possible.	Use Planning Process to ensure potential air quality issues are assessed. Comment upon planning applications to ensure that all relevant air quality issues are highlighted and mitigation measures are considered wherever possible	BBC	Ongoing	Ongoing	Visibility of and comment upon all relevant planning applications					
7	Contribute to influence forthcoming development policies for Ballymena to ensure that air quality considerations are included.	Incorporate policies into future development policies to ensure that sustainable development and air quality considerations are included.	BBC	Ongoing	Ongoing	Air quality added to BBC planning policy					

No.	Measure	Focus	Lead Authority	Planning Phase	Implemen- tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
8	Authorise and regularly inspect industrial premises under the Industrial Pollution Control (NI) Order 1997 and the Pollution Prevention and Control (NI) Regulations 2003.	Permitting and inspection of industrial processes and installations under Part C of the Industrial Pollution Control (NI) Order 1997 and the Pollution, Prevention and Control (NI) Regulations 2003	BBC	Ongoing	Ongoing	Continued permitting and inspection					
9	Enforce relevant legislation to reduce the burning of commercial and domestic waste.	Take enforcement action under Public Health (Ireland) Act 1878 and Pollution Control local Government (NI) Order 1978 in accordance with Council enforcement policy	BBC	Ongoing	Ongoing	Continued enforcement action					

7 Conclusions and Proposed Actions

7.1 Conclusions from New Monitoring Data

• Nitrogen Dioxide

Automatic Monitoring Data

The mean nitrogen dioxide concentrations for the period 1 January 2012 to 31 December 2012 at the North Road site was 27 μ gm⁻³ therefore below the Annual Mean Air Quality Objective of 40 μ gm⁻³. There was no exceedence of the hourly mean objective with the maximum daily mean of 115 μ gm⁻³ or the Daily mean objective, with the maximum daily mean of 109 μ gm⁻³. (Air Quality Regulations (Northern Ireland) 2003)

Diffusion Tube Monitoring

On consideration of Box 3.3 of the technical guidance, in making a choice of bias adjustment factor (locally derived versus national database) for use the nationally derived factor is chosen. Reasons for choice include;

- 1. Tube exposure is monthly
- 2. Data capture for the automatic site was 82.4% and is not an AURN site.

3. Tubes on monitoring station are in an 'open' environment; those tubes in the AQMA are in a 'canyon', thus better to use the results from a variety of studies.

- 4. Diffusion tube study was over one year.
- 5. Study was based on 41 sites using Gradko tubes.

National Bias adjustment figure:

An exceedance of the nitrogen dioxide annual mean remains at Linenhall Street, This location is within the AQMA for nitrogen dioxide.

• Particulate matter – PM₁₀

The annual mean concentrations for the period 1 January 2012 to 31 December 2012 at the Ballykeel site was $21\mu gm^{-3}$, which is well below the annual objective of $40\mu gm^{-3}$.

There were 6 exceedances of the daily mean objective of 50 μ gm⁻³ with a maximum recorded daily mean of 64 μ gm⁻³. These number of exceedances remain below the 35 exceedances per year for this objective.

• Sulphur Dioxide – SO₂

During the monitoring period 1 January 2012 to 31 December 2012 2012 there was no exceedances of the 15- minute, hourly, daily or the annual means.

7.2 Conclusions relating to New Local Developments

There are no new local developments that will require more detailed consideration in the next Updating and Screening Assessment.

7.3 Other Conclusions

Planning application consultations will continue to be assessed with regard to potential impact on local air quality.

7.4 Proposed Actions

Proposed actions are detailed in the following table;

Action	Date
Consultation and action planning in respect of the declared	Continuing
AQMA for nitrogen dioxide.	
Review Ballykeel AQMA after benefit of Winter 2011/12 data and	April 2014
completion on on-going fuel switching.	
Submit 2014 Air Quality Progress Report	April 2014

8 References

- 1. Local Air Quality Management Technical Guidance LAQM.TG (09), February 2009, DEFRA.
- 2. Air Quality Review and Assessment Detailed Assessment, March 2009, AEA Technology.

9 Appendices

Appendix A: Quality Assurance / Quality Control (QA/QC)

Diffusion Tube Bias Adjustment Factors

Nitrogen Dioxide diffusion tubes were supplied and analysed by Gradko Environmental Ltd., St Martins, 77 Wales Street, Winchester, Hampshire, S023 ORH. The preparation method is 20% TEA in water. Gradko Environmental Ltd is a UKAS accredited laboratory and follows Laboratory Quality Procedures. Analysis is carried out in accordance with documented in-house laboratory method GLM7.

Ballymena Borough Council obtained the appropriate national bias factor from the DEFRA Website. <u>http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html</u>

A bias factor of 0.96 was taken from the drop down menus available on the excel spreadsheet matrix for Gradko diffusion tubes.

Factor from Local Co-location Studies

Ballymena Borough Council did not use a Bias Factor from its local Co-location site at North Road. Although a co-location factor was available, it was felt that the national bias factor was drawn from a greater range of sites and could therefore be considered overall more representative of the sites monitored in the borough.

PM₁₀ Monitoring Adjustment

All data sets for PM₁₀ monitoring during 2012 were provided by AEAT. All monitoring data contained within this report has been adjusted and ratified by AEAT.

Short-term to Long-term Data adjustment

NIA

QA/QC of automatic monitoring

QA/QC of data management is carried out by AEA who complete audits of the Ballykeel and North Road automatic analysers on a six monthly basis.

Maintenance of the automatic monitoring equipment was carried out by EMS Environmental Monitoring Systems Ltd) and are available for any urgent call outs with 24 hours notice.

Calibrations and minor maintenance is completed on a fortnightly basis by the air quality management officer of Ballymena Borough Council acting as a Local Site Operator (LSO).

QA/QC of NO₂ Diffusion Tubes

Gradko Environmental analytical laboratory is assessed annually by UKAS to establish conformance of the Laboratory Quality Procedures to the requirements of ISO/IEC 17025 Standard.

Gradko Environmental have demonstrated "good precision" results for 2012 as detailed in the summary of precision results for the individual laboratories performance on the Defra website; <u>http://laqm.defra.gov.uk/diffusion-tubes/precision.html</u>

Gradko Environmental also demonstrated good performance in the WASP scheme for analysis of nitrogen dioxide diffusion tubes for rounds 116 – 119 (January – December 2012); <u>http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html</u>

Appendix B: NO2 Diffusion Tube Monthly Data 2012

													Mean Annual	Di adducto d
										. .		-	Concentration	Bias Adjusted
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	µg/m3	(0.96)
DT1	16.01	15.1	13.04	10.08	6.66	8.13	5.68	9.54	7.13	12.71	14.99	15.72	9.92	9.53
DT2	40.64	43.04	36.01	31.21	14.45	26.08	16.73	24.39	26.79	42.08	38.04	34.5	28.29	27.16
DT3	19.86	28.07	25.82	22.81	14.75	24.24		19.16		32.2	30.81	27021	21.77	20.90
DT4	37.08	29.36	32.78	23.02	23.5	28.03	18.67	27.07	21.99	34.85	38.24	32.84	26.22	25.17
DT5	37.43	37.6	34.76	17.82	16.55	19	19	26.43	21.79	30.63	40.36	27.57	25.11	24.11
DT6	16.18	15.24	12.55	8.46	6.33		5.48	8.01	6.31	13.06	15.17	18.63	9.71	9.32
DT7	46.58	54.88	43.17	32.19	26.79	32.6	27.1	33.66	35.85	45.31	42.73	45.47	35.07	33.67
DT8	32.94	32.93	25.27	22.9	17.1	21.33	13.3	20.02	22.39	31.25	30.14	31.12	22.46	21.57
DT9	34.54	36.53	35.06	21.52	20.28	26.64	18.75	26.72	19.13	35.25	32.79	20.89	25.60	24.58
DT10	38.14	32.88	32.83	29.09	18.96	24.69	21.19	23.83	23.49	40.68	35.92	37.15	26.81	25.74
DT11	30.96	28.35	29.58	19.32	17.55	16.03	17.01	24.94	16.15	28.61	23.42	27.7	20.99	20.15
DT12	34.52	41.89	37.46	33.69	23.49	26.97	24.08	27.56	27.48	36.18	42.54	31.03	29.66	28.47
DT13	34.19	35.07	32.15	24.5	22.48	24.39	19.56	26.58	18.01	30.84	35.51	31.97	25.27	24.26
DT14	34.54	37.38	31.57	26.22	21.03	24.61	18.62	25.9	16.42	27.3	38.71	33.11	25.19	24.18
DT14 B	33.6	28.37	29.24	26.57	20.66	26.8	17.5	25.7	18.12	29.38	15.76	32.16	22.64	21.74
DT15	61.9	76.27	33.23	44.51	35.5	45.99	38.66	47.56	44.65	66.61	72.82	74.87	47.31	45.42