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

In fulfillment of Part IV of the Environment Act 1995
Local Air Quality Management

August 2009

Newtownabbey
BOROUGH COUNCIL

Local Authority Officer	Vanessa Hodgen

Department	Environmental Health
Address	Mossley Mill Newtownabbey
Telephone	02890340154
e-mail	vhodgen@newtownabbey.gov.uk

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Executive Summary

This report follows Guidance LAQM.TG(09) issued by DEFRA and intends to identify any significant changes that have occurred since the previous stage of Review and Assessment which may have the potential to affect the localised air quality.

Newtownabbey Borough Council carried out a Progress Report in 2007. This report concluded that there are three areas, namely Sandyholme Way/Sandyknowes Avenue, Antrim Road Elmfield and Main Street Ballyclare where the nitrogen dioxide objective would not be met. The Progress Report also concluded that these three areas should be declared as AQMAs and a Detailed Assessment carried out for each area. These three areas were declared as AQMAs in January 2008 and a Detailed Assessment carried out by AEA in 2007/2008 and reported in February 2009. The main findings of the Detailed Assessment were as follows:

Main Street, Ballyclare (AQMA 2)
The modelled nitrogen dioxide concentrations in Main Street, Ballyclare marginally exceeded the objective of 40 µg/m^3 in 2007. The measured nitrogen dioxide concentrations in Main Street, Ballyclare were above the objective. AQMA 2 should be retained for present.

Antrim Road, Elmfield (AQMA 3)
The modelled nitrogen dioxide concentrations in the AQMA 3 area were above the objective of 40 µg/m^3 in 2007. The measured nitrogen dioxide concentrations in AQMA 3 were above the objective. AQMA 3 should be retained and extended to include the residential properties on the north east side of Antrim Road, Elmfield where the modelling showed exceedances. In addition both the annual mean and hourly mean nitrogen dioxide objectives were exceeded in Antrim Road and it is necessary to amend the AQMA to include the nitrogen dioxide hourly mean objective.

Sandyknowes (AQMA 4)
The modelled nitrogen dioxide concentrations in the Sandyknowes area were below the objective of 40 µg/m^3 in 2007. The measured nitrogen dioxide concentrations in Sandyknowes AQMA were above the objective. AQMA 4 should be retained for present.

Following approval of the Detailed Assessment Report Newtownabbey Borough Council amended the AQMA 3, Antrim Road, Elmfield in June 2009.

In addition Automatic Nitrogen Dioxide Analysers were located within 5m of relevant location in AQMA 2, Ballyclare and within 2m of a relevant location of AQMA 3, Antrim Road, Elmfield in January 2008.

Locations of nitrogen dioxide diffusion tubes in the 3 AQMAs were reviewed to ensure they were on or as close to the façade of the relevant location.

This report has identified exceedances of the nitrogen dioxide annual mean and 1 hour objective at the Antrim Road, Elmfield Automatic Analyser site and diffusion tubes located at relevant locations on the Antrim Road. As this site is located in AQMA 3 the next course of action is to provide an Action Plan for this AQMA.

There have been no exceedances of the nitrogen dioxide annual mean objective at the Ballyclare or Sandyknowes Automatic Analyser sites or at any of the diffusion tubes located in AQMA 2, Ballyclare or AQMA 4, Sandyknowes. We will continue to monitor at these locations in 2009 but may consider revoking these AQMAs in 2010 if a second year of monitoring results indicates that the Nitrogen Dioxide objective will be met.

The Updating and Screening Assessment has not identified any need for additional monitoring, or changes to the existing monitoring programme.

This report has not identified any new sources with relevant exposure therefore it is not considered necessary to proceed to a Detailed Assessment based on potential sources.

Newtownabbey Borough Council will be submitting its next Progress Report in April 2010.

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Appendices

1 Introduction

1.1 Description of Local Authority Area

Newtownabbey is situated on the shore of Belfast Lough reaching north from the City of Belfast and stretching up towards the Glens of Antrim. The Council area is 54 square miles and is bound to the west by Antrim Borough Council, to the north by Larne Borough Council, to the east by Carrickfergus Borough Council and to the south by Belfast City Council.

Newtownabbey Borough Council has a population of approximately 80,000 and is the fifth highest Borough population within Northern Ireland.

The majority of the population of the Borough is in the developed urban area stretching out from Glengormley to include Whiteabbey, Mossley, Monkstown and Mallusk and Ballyclare. There are a number of rural villages including Ballynure, Ballyrobert, Ballyeaston, Doagh and Straid, all of which lie within the commuter belt of Belfast.

The Borough is a prime business location with large industrial centres at Mallusk, Hydepark and Monkstown. Newtownabbey's proximity to Northern Ireland's ports and airports makes these industrial parks an ideal place to locate. The port of Larne, Belfast International Airport and Belfast City Airport are within 30 minutes drive and the area is also well served by major roads linking it to the rest of the province. The Borough is well provided for in terms of major retail outlets and shopping centres at Abbeycentre and Northcott.

1.2 Purpose of Report

This report fulfills the requirements of the Local Air Quality Management 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 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.

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 $\mu g/m^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances 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

Newtownabbey Borough Council has completed the following review and assessments of air quality to date:

- Stage 1 (2001);
- Stage 2 and 3 update (2004);
- Stage 3 –Domestic Fuel Combustion (2004);
- Stage 4 –(2005);
- Progress report (2005);
- Updating and Screening Assessment (2006)
- Progress Report (2007)
- Progress Report (2008)
- Detailed Assessment Nitrogen Dioxide (2009)

Newtownabbey Borough Council carried out the first round of review and assessment in three Stages, and concluded that an Air Quality Management Area (AQMA) should be declared in Ballyclare for Particulate Matter (PM10) from domestic sources. The AQMA in Ballyclare was declared in October 2004. A further Stage 4 review and assessment was completed in 2005, and concluded that on the basis of modelling results Newtownabbey Borough Council could consider revoking the AQMA for PM10.

Local authorities are required to proceed to the second round of review and assessment in which sources of emissions to air are reassessed to identify whether the situation has changed since the first round of review and assessment, and if so, what impact this may have on predicted exceedances of the air quality objectives. Such changes might include significant traffic growth on a major road, which had not been foreseen, construction of a new industrial plant with emissions to air, or significant changes in the emissions of an existing plant.

The assessment is carried out in two steps. The first step is an Updating and Screening Assessment (USA), which updates the Stage 1 and 2 review and assessments previously undertaken for all pollutants identified in the Air Quality Regulations.

Newtownabbey Borough Council carried out an Updating and Screening Assessment in 2006, and concluded that it is unlikely that the objective for the seven pollutants listed in Air Quality Strategy would be exceeded. Taking into account the USA conclusion and the PM10 modelling results completed in Ballyclare area, the Council revoked the AQMA in Ballyclare in November 2006.

Newtownabbey Borough Council carried out a Progress Report in 2007. This report concluded that there are three areas:

- Sandyholme Way/Sandyknowes Avenue,
- Antrim Road, Elmfield and
- Main Street, Ballyclare

where the nitrogen dioxide objective would not be met. The Council declared these three areas as AQMAs in January 2008. (Appendix B Figure 1-1, Figure 1-2, Figure 1-3)

Therefore, the Council was required to undertake a Detailed Assessment of these areas to ascertain the concentrations at relevant exposure locations and the geographical extent of the exceedance area. A Detailed Assessment was carried out by AEA in 2007/2008 and the report submitted February 2009 and the main findings were:

Main Street, Ballyclare (AQMA 2)

The modelled nitrogen dioxide concentrations in Main Street, Ballyclare marginally exceeded the objective of 40 $\mu g/m^3$ in 2007. The measured nitrogen dioxide concentrations in Main Street, Ballyclare were above the objective. AQMA 2 should be retained for present.

Antrim Road, Elmfield (AQMA 3)

The modelled nitrogen dioxide concentrations in the AQMA 3 area were above the objective of 40 µg/m^3 in 2007. The measured nitrogen dioxide concentrations in AQMA 3 were above the objective. AQMA 3 should be retained and extended to include the residential properties on the north east side of Antrim Road, Elmfield where the modelling showed exceedances. In addition both the annual mean and hourly mean nitrogen dioxide objectives were exceeded in Antrim Road and it is necessary to amend the AQMA to include the nitrogen dioxide hourly mean objective.

Sandyknowes (AQMA 4)

The modelled nitrogen dioxide concentrations in the Sandyknowes area were below the objective of 40 µg/m^3 in 2007. The measured nitrogen dioxide concentrations in Sandyknowes AQMA were above the objective. AQMA 4 should be retained for present.

Following the detailed assessment report AQMA 3 Antrim Road, Elmfield was amended on 29 June 2009 (Appendix B Fig 1-4).

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Newtownabbey Borough Council has three automatic monitoring stations located at:

- Sandyknowes since 2003
- Main Street Ballyclare since January 2008
- Antrim Road, Elmfield since January 2008.

The Automatic Monitoring Sites at Main Street, Ballyclare and Antrim Road, Elmfield are located in AQMA 2 and AQMA 3 respectively. The analyser at Main Street, Ballyclare is located within 5m of the relevant location and the analyser at Antrim Road, Elmfield is located within 2m of the relevant location

The locations of the automatic continuous monitoring stations are included in Table 2.1 and Appendix C

Table 2.1 Details of 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?
Sandyknowes	Roadside	330542 383012	NO_2	N	N	4m	N
Ballyclare, Main St	Roadside	328851 391134	NO_2	Y	Y (5m)	0.5m	Y
Antrim Road	Roadside	332305 381697	NO_2	Y	Y (2m)	1m	Y

These continuous monitoring stations are part of the Calibration Club managed by AEA. Data from these sites is quality assured to the AURN standards as part of the Calibration Club. Nitrogen dioxide concentrations are measured by ozone chemiluminescence. Ozone chemiluminescence is the reference method specified by the EU NO_2 Directives.

Routine calibration of the NO_x analyser is undertaken by NBC fortnightly, using on-site certified calibration gas cylinders provided by Messer UK and traceable to National Calibration Standards. In addition a QA/QC audit which includes calibration of the analyser using zero and span gas standards, and other tests, including for linearity and NO_x converter efficiency is undertaken by AEA twice in the year. Data is fully ratified by AEA staff using procedures as applied to data from the AURN UK national monitoring network sites.

2.1.2 Non-Automatic Monitoring

Newtownabbey Borough Council operates a network of 22 nitrogen dioxide diffusion tubes across the Borough. The diffusion tubes are exposed for a four/five week period and further site specific details on these tube locations are provided in Table 2.2 and Appendix C, while the tube data is presented in Table 2.4a. Exceedances of the 40 µg/m^3 annual mean NO_2 are highlighted in bold.

In 2008 the diffusion tubes were analysed by Gradko Services using 20% triethylamine in water.

QA/QC details which include the bias adjustment factor for 2008 is reported in Appendix A.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref X Y	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?
Site 1 Main Street, Ballyclare	Roadside	328854 391134	NO_2	Y	Y (located on property)	2m	Y
Site 59 Main Street, Ballyclare	Roadside	328854 391134	NO_2	Y	Y (located on property)	2m	Y
Site 57 7 Sandyholme Way	Roadside	330514 382939	NO_2	Y	Y (located on property)	9m	Y
Site 12 7 Sandyholme Way	Roadside	330514 382939	NO_2	Y	Y (located on property)	9m	Y
Site 5 Ulster Bank, Hightown Road	Roadside	331697 382250	NO_2	N	Y (20m)	2m	Y
Site 8 Braden Heights, Rathcoole	Urban Background	333898 381926	NO_2	N	Y (5m	n/a	Y
Site 11 44 Sandyknowes Avenue	Roadside	330675 382586	NO_2	N	Y (7m)	7m	Y
Site 16 Doagh Village	Roadside	326136 383539	NO_2	N	Y (8m)	1m	Y
Site 20 A8/Motorway at Sandyknowes	Roadside	330499 383141	NO_2	N	Y (located on property)	20m	Y
Site 36 NOx Analyser Antrim Road, Sandyknowes	Roadside	330545 383011	NO_2	N	N	n/a	N
Site 37 NOx Analyser Antrim Road, Sandyknowes	Roadside	330545 383011	NO_2	N	N	n/a	N
Site 38 NOx Analyser Antrim Road, Sandyknowes	Roadside	330545 383011	NO_2	N	N	n/a	N
Site 43 Antrim Road,Elmfield	Roadside	332305 381697	NO_2	Y	Y (2m)	1m	Y
Site 58 Antrim Road ,Elmfield	Roadside	332305 381697	NO_2	Y	Y (2m)	1m	Y
Site 46 12 Collinbridge Road	Roadside	332193 381666	NO_2	N	Y (located on property)	9m	Y
Site 47 13 Sandyholme Park	Roadside	330554 382848	NO_2	Y	Y (7m)	7m	Y
Site 48 24 Sandyknowes Avenue	Roadside	330631 382729	NO_2	N	Y (located on property)	17m	Y
Site 49 6 Sandyknowes Gardens	Urban Background	330641 382771	NO_2	N	Y (located on property)	55m	Y
Site 50 45 Burney's Lane	Roadside	331025 382224	NO_2	N	Y (located on property)	17m	Y
Site 51 196 Shore Road	Roadside	334758 380501	NO_2	N	Y (located on property)	6m	Y
Site 52 10 Mill Road	Roadside	334354 380226	NO_2	N	Y (located on property)	5m	Y
Site 56 5 Sandyholme Park	Roadside	330589 382908	NO_2	N	Y (7m)	68m	Y

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Table 2.3a provides all nitrogen dioxide continuous monitoring data collected since 2007 and Table 2.3b compares the results with the 1 hour Mean Objective.

Exceedances of the 40 µg/m^3 annual mean nitrogen dioxide objective and cases where there are more than the permitted 18 exceedances of the 200 µg/m^3 1-hour mean nitrogen dioxide objective are highlighted in bold.

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Proportion of year with valid data 2008 %	Annual mean concentrations (µg/m^3)	
				2007	2008
Sandyknowes	Antrim Road, Mallusk	N	98.5	34.0	35.0
Ballyclare, Main St	Ballyclare Main Street	Y	94.3	N/A	37.0
Antrim Road, Elmfield	**Antrim Road, Elmfield**	**Y**	**80.2**	**N/A**	**56.0**

Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedances of hourly mean (200 µg/m^3) *If the period of valid data is less than 90% of a full year, include the 99.8th %ile of hourly means in brackets.*	
				2007	2008
Sandyknowes	Antrim Road, Mallusk	N	98.5	6	15
Ballyclare, Main St	Ballyclare Main Street	Y	94.3	N/A	0
Antrim Road, Elmfield	**Antrim Road, Elmfield**	**Y**	**80.2**	**N/A**	**55**

Results of Automatic Monitoring for Nitrogen Dioxide for 2008 showed an exceedance of the annual mean at the Antrim Road, Elmfield site. This site also showed 55 exceedances of the 1 hour mean objective.

There were no exceedances of the annual mean objective for nitrogen dioxide at either of the other two sites.

Diffusion Tube Monitoring Data

All diffusion tube monitoring data has been bias-adjusted using the National Bias Adjustment Factor for Gradko. Further details on calculations used to generate adjusted results and information on QA/QC procedures in place are provided in Appendix A.

Table 2.4a shows results for 2008 and Table 2.4b for 2007 and 2008.

There were only two sites, namely Site 43 and Site 58 which showed an exceedance of the NO_2 annual mean objective in 2008. These are located within AQMA 3 Antrim Road, Elmfield.

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations	Annual mean concentrations
				2008 (µg/m^3)	2008 (µg/m^3) Adjusted for bias 0.90 (Gradko)
Site 1	Main Street, Ballyclare	Y	100	32.88	30
Site 59	Main Street, Ballyclare	Y	100	31.27	28
Site 57	7 Sandyholme Way	Y	100	40.84	37
Site 12	7 Sandyholme Way	Y	100	40.26	36
Site 5	Ulster Bank, Hightown Road	N	92	27.86	25
Site 8	Braden Heights, Rathcoole	N	100	18.17	16
Site 11	44 Sandyknowes Avenue	N	100	35.84	32
Site 16	Doagh Village	N	100	29.46	27
Site 20	A8/Motorway at Sandyknowes	N	100	27.88	25
Site 36	NOx Analyser Antrim Road	N	100	37.27	34
Site 37	NOx Analyser Antrim Road	N	100	37.91	34
Site 38	NOx Analyser Antrim Road	N	100	37.31	34
Site 43	**Antrim Road at Elmfield Lights**	**Y**	**100**	**49.95**	**45**
Site 58	**Antrim Road at Elmfield Lights**	**Y**	**100**	**49.94**	**45**
Site 46	12 Collinbridge Road	N	100	38.31	34
Site 47	13 Sandyholme Park	Y	100	41.58	37
Site 48	24 Sandyknowes Avenue	N	100	30.73	28
Site 49	6 Sandyknowes Gardens	N	100	26.87	24
Site 50	45 Burney's Lane	N	100	31.96	29

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations	Annual mean concentrations
				2008 (µg/m^3)	2008 (µg/m^3) Adjusted for bias 0.90 (Gradko)
Site 51	196 Shore Road	N	100	33.40	30
Site 52	10 Mill Road	N	100	29.92	26
Site 56	5 Sandyholme Park	N	100	30.50	27

Table 2.4b Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Annual mean concentrations ($\mu g/m^3$) Adjusted for bias	
			2007 National Gradko (0.89)	2008 National Gradko (0.9)
Site 1	Main Street, Ballyclare	Y	32.2	30
Site 59	Main Street, Ballyclare	Y	29.1	28
Site 57	7 Sandyholme Way	Y	38.5	37
Site 12	7 Sandyholme Way	Y	36.5	36
Site 5	Ulster Bank, Hightown Road	N	25.9	25
Site 8	Braden Heights, Rathcoole	N	21.4	16
Site 11	44 Sandyknowes Avenue	N	36.8	32
Site 16	Doagh Village	N	25.5	27
Site 20	A8/Motorway at Sandyknowes	N	31.1	25
Site 36	NOx Analyser Antrim Road	N	37.3	34
Site 37	NOx Analyser Antrim Road	N	39.3	34
Site 38	NOx Analyser Antrim Road	N	35.9	34
Site 43	**Antrim Road at Elmfield Lights**	**Y**	**45.4**	**45**
Site 58	**Antrim Road at Elmfield Lights**	**Y**	**45.1**	**45**
Site 46	12 Collinbridge Road	N	34.9	34
Site 47	13 Sandyholme Park	Y	**44.7**	37
Site 48	24 Sandyknowes Avenue	N	30.5	28
Site 49	6 Sandyknowes Gardens	N	27.3	24
Site 50	45 Burney's Lane	N	31.3	29
Site 51	196 Shore Road	N	31.9	30
Site 52	10 Mill Road	N	29.4	26
Site 56	5 Sandyholme Park	N	32.0	27

2.2.2 PM10

Newtownabbey Borough Council does not carry out PM10 Monitoring.

2.2.3 Sulphur Dioxide

Newtownabbey Borough Council does not carry out Sulphur Dioxide Monitoring.

2.2.4 Benzene

Newtownabbey Borough Council does not carry out Benzene Monitoring.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Newtownabbey 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

Newtownabbey 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

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

3.4 Junctions

Newtownabbey 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

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

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

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

4 Other Transport Sources

4.1 Airports

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

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Newtownabbey 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

Newtownabbey 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)

Newtownabbey 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

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

Newtownabbey 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

Newtownabbey 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

Newtownabbey 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 (petrol) storage depots within the Newtownabbey Borough Council area.

5.3 Petrol Stations

ASDA, Ballyclare is a new petrol station which has an annual throughput of more than 2000 m^3 of petrol however there is no busy road nearby and no relevant exposure within 10m of the pumps.

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

5.4 Poultry Farms

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Newtownabbey Borough Council confirms that there are no biomass combustion plant in the District.

6.2 Biomass Combustion – Combined Impacts

Newtownabbey Borough Council confirms that there are no biomass combustion plant in the District.

6.3 Domestic Solid-Fuel Burning

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

7 Fugitive or Uncontrolled Sources

Newtownabbey Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the District.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

AQMA 2 Ballyclare

The Nitrogen Dioxide Analyser is sited 5m from the relevant location in the AQMA 2 Ballyclare.

Results of Automatic Monitoring Data for Nitrogen Dioxide in 2008 showed annual mean concentrations of 37 µg/m^3. Provisional data from January to June 2009 shows a mean of 36 µg/m^3.

Nitrogen dioxide diffusion tubes 1 and 59 are located on the façade of the relevant location in Ballyclare AQMA. Results from these diffusion tubes showed annual means of 32.2 µg/m^3 and 29.1 µg/m^3 in 2007 and 30 µg/m^3 and 28 µg/m^3 in 2008.

As all of these new monitoring data results show levels of nitrogen dioxide well below the annual mean objective of 40 µg/m^3 Newtownabbey Borough Council will recommend to continue monitoring until end of 2009 with a view to revoking the AQMA in 2010 if these monitoring trends continue for a second year.

AQMA 4 Sandyknowes

The Nitrogen Dioxide Analyser is located outside the AQMA in Sandyknowes. Attempts were made to locate the analyser to the garden of the relevant location but due to legal complications this was not able to proceed.

Results of Automatic Monitoring Data for nitrogen dioxide showed an annual mean concentration of 34 µg/m^3 in 2007 and 35 µg/m^3 in 2008. Provisional data from January to June 2009 shows a mean of 36 µg/m^3.

Nitrogen dioxide diffusion tubes 57 and 12 are located on the façade of the relevant location in the AQMA in Sandyknowes. Results from these diffusion tubes were 38.5 µg/m^3 and 36.5 µg/m^3 in 2007 and 37 µg/m^3 and 36 µg/m^3 in 2008.

Diffusion tube 47 is located within 7m of a relevant location in AQMA Sandyknowes and the result for 2008 was 37 µg/m^3.

As all of these new monitoring data results show levels of nitrogen dioxide well below the annual mean objective of 40 µg/m^3. Newtownabbey Borough Council will recommend to continue monitoring until end of 2009 with a view to revoking AQMA in 2010 if these monitoring trends continue for a second year.

AQMA 3 Antrim Road, Elmfield

The Nitrogen Dioxide Analyser is located 2m from the relevant location in AQMA 3 Antrim Road, Elmfield.

Results of Automatic Monitoring for nitrogen dioxide in 2008 showed an annual mean concentration of 56 µg/m^3. There were also 55 exceedances of the 1 hour objective.

Diffusion tubes 43 and 58 are located within 2m from the relevant location and they both showed exceedances of the annual mean concentration both showing results of 45 µg/m^3.

Newtownabbey Borough Council recommends to proceed to Action Planning for this AQMA.

8.2 Conclusions from Assessment of Sources

No new sources with relevant exposure have been identified through this Update and Screening Assessment. It is therefore not considered necessary to proceed to a 'Detailed Assessment' based on potential sources.

8.3 Summary

8.3 Proposed Actions

This report has identified exceedances of the nitrogen dioxide annual mean and 1 hour objective at the Antrim Road, Elmfield automatic analyser site and diffusion tubes located at relevant locations at the Antrim Road. As this site is located in AQMA 3 the next course of action is to provide an Action Plan for this AQMA.

There have been no exceedances of the nitrogen dioxide annual mean objective at the Ballyclare or Sandyknowes automatic analyser sites or at any of the diffusion tubes located in AQMA 2, Ballyclare or AQMA 4, Sandyknowes. We will continue to monitor at these locations in 2009 but may consider revoking these AQMAs in 2010 if a second year of monitoring results indicates that the Nitrogen Dioxide objective will be met.

The Updating and Screening Assessment has not identified any need for additional monitoring, or changes to the existing monitoring programme.

The Updating and Screening Assessment has not identified any new sources with relevant exposure therefore it is not necessary to proceed to a Detailed Assessment based on potential sources.

9 References

Newtownabbey Borough Council Detailed Assessment Report April 2009, 2007
Available at: www.airqualityni.co.uk/laqm
.
Local Air Quality Management – Technical Guidance (09). 2009

Appendices

Appendix A: QA/QC Data

Appendix B: Locations of AQMAs

Appendix C: Locations of Monitoring Sites

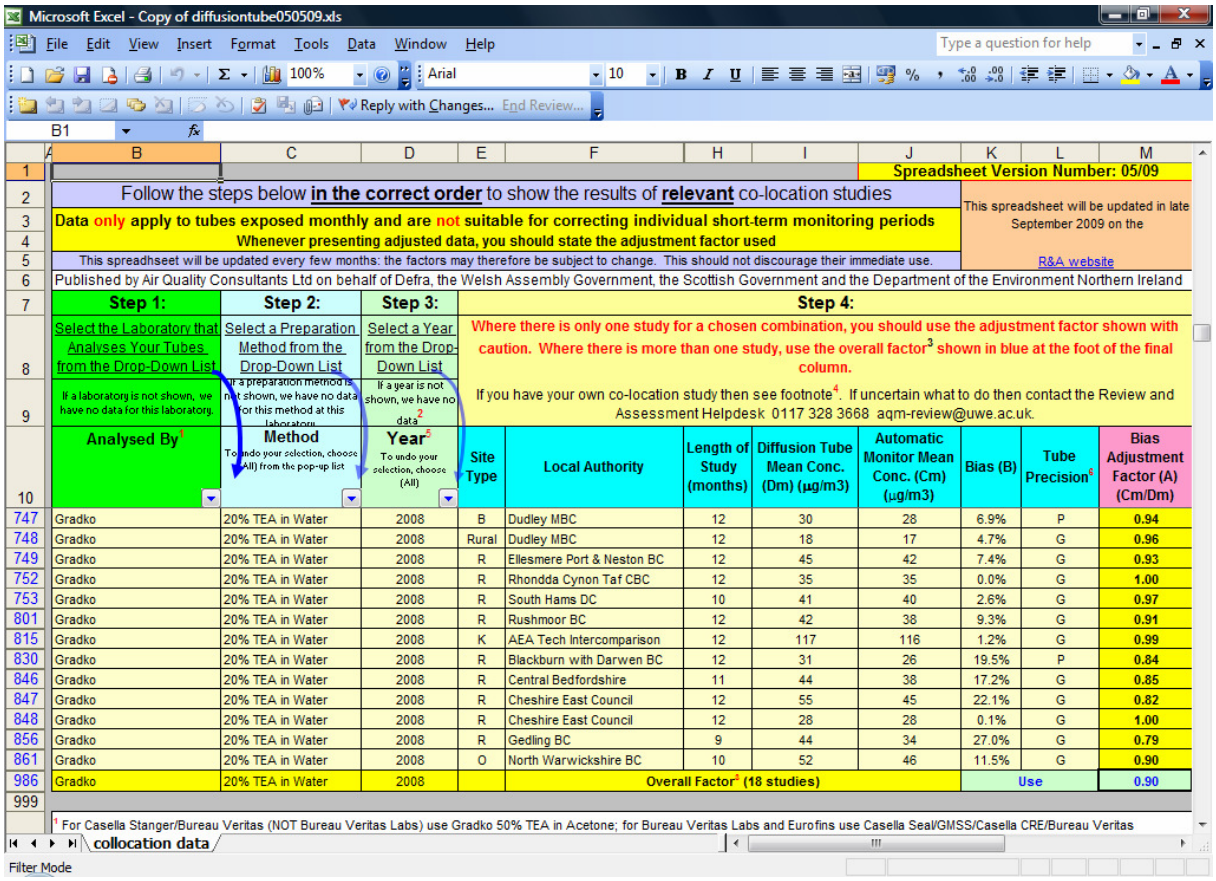
Appendix A: QA:QC Data

Diffusion Tube Monitoring

In 2008 the diffusion tubes were analysed by Gradko Services using 20% TEA in water.

The laboratory bias correction factor was calculated using the diffusion tube spreadsheet tool. This diffusion tube spreadsheet tool is published by Air Quality Consultants Ltd on behalf of DEFRA, the Welsh Assembly Government, the Scottish Executive and the Department of the Environment Northern Ireland and it is available on the UWE website (2008).

The bias adjustment factor of 0.90 was calculated from 18 studies from Gradko Services for 2008 using the diffusion tube spreadsheet tool, for the diffusion tubes study.



Microsoft Excel - Copy of diffusiontube050509.xls

Spreadsheet Version Number: 05/09

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used

This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated in late September 2009 on the R&A website

Published by Air Quality Consultants Ltd on behalf of Defra, the Welsh Assembly Government, the Scottish Government and the Department of the Environment Northern Ireland

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4:

Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Review and Assessment Helpdesk 0117 328 3668 aqm-review@uwe.ac.uk.

	Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m3)	Automatic Monitor Mean Conc. (Cm) (µg/m3)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
747	Gradko	20% TEA in Water	2008	B	Dudley MBC	12	30	28	6.9%	P	0.94
748	Gradko	20% TEA in Water	2008	Rural	Dudley MBC	12	18	17	4.7%	G	0.96
749	Gradko	20% TEA in Water	2008	R	Ellesmere Port & Neston BC	12	45	42	7.4%	G	0.93
752	Gradko	20% TEA in Water	2008	R	Rhondda Cynon Taf CBC	12	35	35	0.0%	G	1.00
753	Gradko	20% TEA in Water	2008	R	South Hams DC	10	41	40	2.6%	G	0.97
801	Gradko	20% TEA in Water	2008	R	Rushmoor BC	12	42	38	9.3%	G	0.91
815	Gradko	20% TEA in Water	2008	K	AEA Tech Intercomparison	12	117	116	1.2%	G	0.99
830	Gradko	20% TEA in Water	2008	R	Blackburn with Darwen BC	12	31	26	19.5%	P	0.84
846	Gradko	20% TEA in Water	2008	R	Central Bedfordshire	11	44	38	17.2%	G	0.85
847	Gradko	20% TEA in Water	2008	R	Cheshire East Council	12	55	45	22.1%	G	0.82
848	Gradko	20% TEA in Water	2008	R	Cheshire East Council	12	28	28	0.1%	G	1.00
856	Gradko	20% TEA in Water	2008	R	Gedling BC	9	44	34	27.0%	G	0.79
861	Gradko	20% TEA in Water	2008	O	North Warwickshire BC	10	52	46	11.5%	G	0.90
986	Gradko	20% TEA in Water	2008		Overall Factor[3] (18 studies)				Use		0.90

[1] For Casella Stanger/Bureau Veritas (NOT Bureau Veritas Labs) use Gradko 50% TEA in Acetone; for Bureau Veritas Labs and Eurofins use Casella Seal/GMSS/Casella CRE/Bureau Veritas

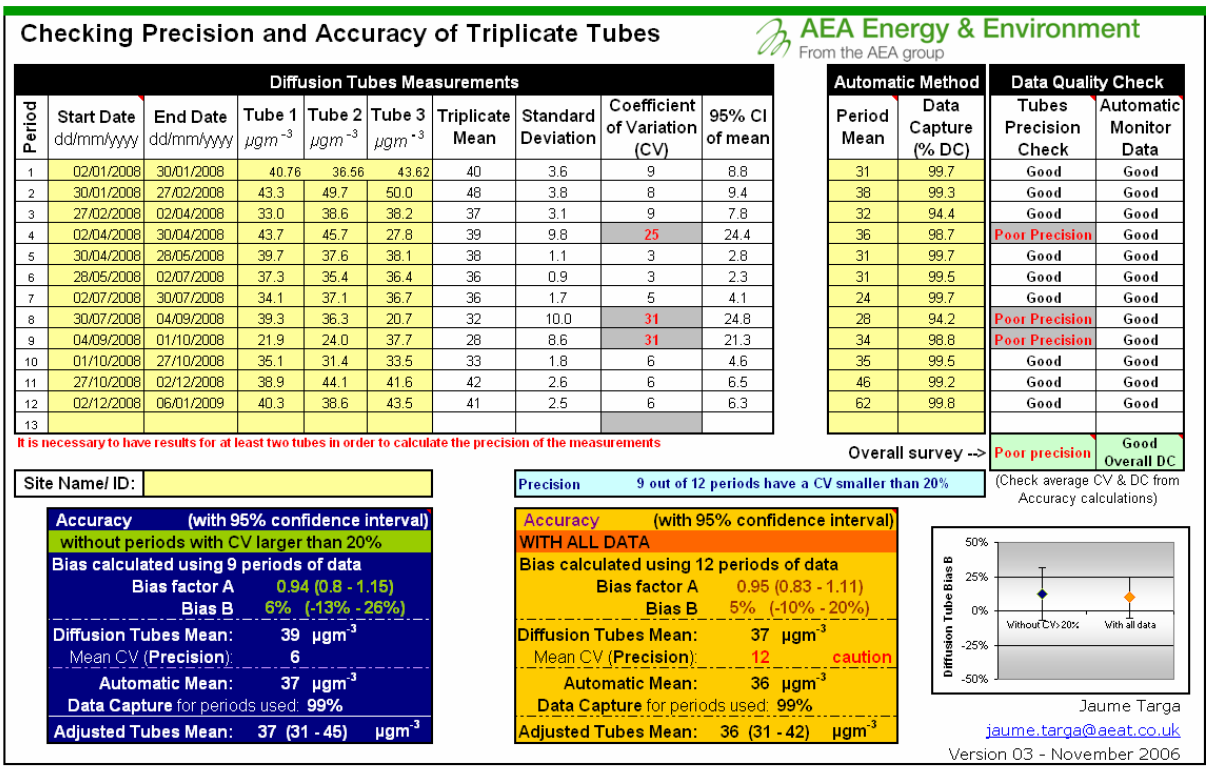
collocation data

Filter Mode

Newtownabbey Borough Council

Factor from Local Co-location Studies (if available)

A local co-location study was carried out at Sandyknowes. A bias adjustment factor of 0.95 was calculated from the diffusion tubes co-located within the Sandyknowes site using the AEA Energy and Environments "Spreadsheet for calculating Precision, Accuracy and Bias Adjustment factors of Diffusion Tubes".



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	02/01/2008	30/01/2008	40.76	36.56	43.62	40	3.6	9	8.8
2	30/01/2008	27/02/2008	43.3	49.7	50.0	48	3.8	8	9.4
3	27/02/2008	02/04/2008	33.0	38.6	38.2	37	3.1	9	7.8
4	02/04/2008	30/04/2008	43.7	45.7	27.8	39	9.8	25	24.4
5	30/04/2008	28/05/2008	39.7	37.6	38.1	38	1.1	3	2.8
6	28/05/2008	02/07/2008	37.3	35.4	36.4	36	0.9	3	2.3
7	02/07/2008	30/07/2008	34.1	37.1	36.7	36	1.7	5	4.1
8	30/07/2008	04/09/2008	39.3	36.3	20.7	32	10.0	31	24.8
9	04/09/2008	01/10/2008	21.9	24.0	37.7	28	8.6	31	21.3
10	01/10/2008	27/10/2008	35.1	31.4	33.5	33	1.8	6	4.6
11	27/10/2008	02/12/2008	38.9	44.1	41.6	42	2.6	6	6.5
12	02/12/2008	06/01/2009	40.3	38.6	43.5	41	2.5	6	6.3
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
31	99.7	Good	Good
38	99.3	Good	Good
32	94.4	Good	Good
36	98.7	Poor Precision	Good
31	99.7	Good	Good
31	99.5	Good	Good
24	99.7	Good	Good
28	94.2	Poor Precision	Good
34	98.8	Poor Precision	Good
35	99.5	Good	Good
46	99.2	Good	Good
62	99.8	Good	Good
Overall survey -->		Poor precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 9 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 9 periods of data	
Bias factor A	0.94 (0.8 - 1.15)
Bias B	6% (-13% - 26%)
Diffusion Tubes Mean:	39 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	37 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	37 (31 - 45) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.95 (0.83 - 1.11)
Bias B	5% (-10% - 20%)
Diffusion Tubes Mean:	37 μgm^{-3}
Mean CV (Precision):	12 caution
Automatic Mean:	36 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	36 (31 - 42) μgm^{-3}

Jaume Targa
jaume.targa@aeat.co.uk
Version 03 - November 2006

Discussion of Choice of Factor to Use

The National Bias Adjustment Factor has been applied to the diffusion tube data because there were three poor precision results in the local co-location study and there is a caution on the Mean CV (precision) as it is above 10% (see spreadsheet above).

PM Monitoring Adjustment

Newtownabbey Borough Council does not monitor for Particulate Matter.

Short-term to Long-term Data adjustment

No short-term to long-term monitoring adjustments are required.

QA/QC of Automatic Monitoring

Sandyknowes, Main Street, Ballyclare and Antrim Road, Elmfield continuous monitoring stations are part of the Calibration Club managed by AEA. Data from these sites are quality assured to the AURN standards as part of the Calibration Club.

Routine calibration of the NO_x analysers is undertaken by NBC fortnightly, using on-site certified calibration gas cylinders provided by Messer UK and traceable to National Calibration Standards. In addition a QA/QC audit which includes calibration of the analyser using zero and span gas standards, and other tests, including for linearity and NO_x converter efficiency is undertaken by AEA twice in the year. Data is fully ratified by AEA staff using procedures as applied to data from the AURN UK national monitoring network sites.

The 2008 summaries and hourly data sets for the three Newtownabbey monitoring locations are provided at the end of Appendix A.

QA/QC of Diffusion Tube Monitoring

Diffusion tubes were analysed by Gradko Services using 20% triethylamine in water.

Gradko have confirmed that their laboratory complies with the procedures detailed in the DEFRA Harmonistaion Practical Guidance and their WASP results for 2008 were satisfactory.

WASP results for January 2008 to January 2009

Jan 08 Round 100	Ref Value : 1.36 ugNO2 Measured Value : 1.34 ugNO2 Z score -0.1 Satisfactory Ref Value : 1.47 ugNO2 Measured Value : 1.50 ugNO2 Z score 0.2 Satisfactory
March 08 Round 101	Ref Value : 0.92 ug NO2 Measured Value : 0.95 ugNO2 Z Score 0.2 Satisfactory Ref Value : 1.86 ugNO2 Measured Value : 1.85 ugNO2 Z Score 0 Satisfactory
July 08 Round 102	Ref Value : 1.37 ugNO2 Measured Value : 1.42 ugNO2 Z Score 0.3 Satisfactory Ref value : 2.28 ugNO2 Measured Value : 2.21 ugNO2 Z score -0.2 Satisfactory
Jan 09 Round 104	Ref Value : 2.02 ugNO2 Measured Value : 1.85 ugNO2 Z Score -0.7 Satisfactory Ref Value : 1.22 ug NO2 Measured Value : 1.21 ugNO2 Z Score - 0.1 Satisfactory

Produced by AEA on behalf of Newtownabbey BC

NEWTOWNABBEY BALLYCLARE MAIN ST
01 January to 31 December 2008

These data have been fully ratified by AEA

POLLUTANT	NO_X	NO	NO_2
Number Very High	-	-	0
Number High	-	-	0
Number Moderate	-	-	0
Number Low	-	-	8287
Maximum 15-minute mean	1236 µg m^{-3}	671 µg m^{-3}	411 µg m^{-3}
Maximum hourly mean	940 µg m^{-3}	508 µg m^{-3}	183 µg m^{-3}
Maximum running 8-hour mean	640 µg m^{-3}	326 µg m^{-3}	146 µg m^{-3}
Maximum running 24-hour mean	393 µg m^{-3}	196 µg m^{-3}	103 µg m^{-3}
Maximum daily mean	375 µg m^{-3}	194 µg m^{-3}	96 µg m^{-3}
Average	94 µg m^{-3}	37 µg m^{-3}	37 µg m^{-3}
Data capture	94.3 %	94.5 %	94.3 %

All mass units are at 20'C and 1013mb
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 µg m^{-3}	0	0

Produced by AEA on behalf of Newtownabbey

NEWTOWNABBEY ANTRIM ROAD
01 January to 31 December 2008

These data have been fully ratified by AEA

POLLUTANT	NO_X	NO	NO_2
Number Very High	-	-	0
Number High	-	-	0
Number Moderate	-	-	2
Number Low	-	-	7039
Maximum 15-minute mean	1870 µg m^{-3}	1001 µg m^{-3}	426 µg m^{-3}
Maximum hourly mean	1664 µg m^{-3}	891 µg m^{-3}	302 µg m^{-3}
Maximum running 8-hour mean	1146 µg m^{-3}	594 µg m^{-3}	242 µg m^{-3}
Maximum running 24-hour mean	693 µg m^{-3}	347 µg m^{-3}	163 µg m^{-3}
Maximum daily mean	692 µg m^{-3}	347 µg m^{-3}	162 µg m^{-3}
Average	128 µg m^{-3}	47 µg m^{-3}	56 µg m^{-3}
Data capture	80.2 %	80.2 %	80.2 %

All mass units are at 20'C and 1013mb
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}	1	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	55	26

Newtownabbey Borough Council

Produced by AEA on behalf of Newtownabbey BC

NEWTOWNABBEY SANDYKNOWES
01 January to 31 December 2008

These data have been fully ratified by AEA

POLLUTANT	NO_X	NO	NO_2
Number Very High	-	-	0
Number High	-	-	0
Number Moderate	-	-	3
Number Low	-	-	8652
Maximum 15-minute mean	2812 µg m^{-3}	1564 µg m^{-3}	422 µg m^{-3}
Maximum hourly mean	2601 µg m^{-3}	1441 µg m^{-3}	399 µg m^{-3}
Maximum running 8-hour mean	1460 µg m^{-3}	804 µg m^{-3}	237 µg m^{-3}
Maximum running 24-hour mean	845 µg m^{-3}	450 µg m^{-3}	158 µg m^{-3}
Maximum daily mean	796 µg m^{-3}	420 µg m^{-3}	154 µg m^{-3}
Average	78 µg m^{-3}	28 µg m^{-3}	35 µg m^{-3}
Data capture	98.5 %	98.5 %	98.5 %

All mass units are at 20'C and 1013mb
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 µg m^{-3}	15	6

Produced by AEA on behalf of Newtownabbey BC

NEWTOWNABBEY BALLYCLARE MAIN ST
01 January to 30 June 2009

These data are provisional and may be subject to further quality control

POLLUTANT	NO_X	NO	NO_2
Number Very High	-	-	0
Number High	-	-	0
Number Moderate	-	-	0
Number Low	-	-	4178
Maximum 15-minute mean	1220 µg m^{-3}	538 µg m^{-3}	407 µg m^{-3}
Maximum hourly mean	670 µg m^{-3}	325 µg m^{-3}	183 µg m^{-3}
Maximum running 8-hour mean	418 µg m^{-3}	199 µg m^{-3}	121 µg m^{-3}
Maximum running 24-hour mean	274 µg m^{-3}	125 µg m^{-3}	84 µg m^{-3}
Maximum daily mean	271 µg m^{-3}	124 µg m^{-3}	82 µg m^{-3}
Average	86 µg m^{-3}	33 µg m^{-3}	36 µg m^{-3}
Data capture	96.2 %	96.2 %	96.2 %

All mass units are at 20'C and 1013mb
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}	-	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Produced by AEA on behalf of Newtownabbey

NEWTOWNABBEY ANTRIM ROAD
01 January to 30 June 2009

These data are provisional and may be subject to further quality control

POLLUTANT	NO_X	NO	NO_2
Number Very High	-	-	0
Number High	-	-	0
Number Moderate	-	-	0
Number Low	-	-	4309
Maximum 15-minute mean	1194 µg m^{-3}	558 µg m^{-3}	353 µg m^{-3}
Maximum hourly mean	951 µg m^{-3}	451 µg m^{-3}	277 µg m^{-3}
Maximum running 8-hour mean	581 µg m^{-3}	258 µg m^{-3}	187 µg m^{-3}
Maximum running 24-hour mean	364 µg m^{-3}	154 µg m^{-3}	129 µg m^{-3}
Maximum daily mean	325 µg m^{-3}	136 µg m^{-3}	117 µg m^{-3}
Average	126 µg m^{-3}	44 µg m^{-3}	59 µg m^{-3}
Data capture	99.2 %	99.2 %	99.2 %

All mass units are at 20'C and 1013mb
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}	-	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	26	17

Produced by AEA on behalf of Newtownabbey BC

NEWTOWNABBEY SANDYKNOWES
01 January to 30 June 2009

These data are provisional from 01/04/2009 and may be subject to further quality control

POLLUTANT	NO_X	NO	NO_2
Number Very High	-	-	0
Number High	-	-	0
Number Moderate	-	-	1
Number Low	-	-	4303
Maximum 15-minute mean	1820 µg m^{-3}	945 µg m^{-3}	376 µg m^{-3}
Maximum hourly mean	1476 µg m^{-3}	758 µg m^{-3}	319 µg m^{-3}
Maximum running 8-hour mean	804 µg m^{-3}	399 µg m^{-3}	196 µg m^{-3}
Maximum running 24-hour mean	577 µg m^{-3}	272 µg m^{-3}	162 µg m^{-3}
Maximum daily mean	422 µg m^{-3}	191 µg m^{-3}	131 µg m^{-3}
Average	69 µg m^{-3}	22 µg m^{-3}	36 µg m^{-3}
Data capture	99.1 %	99.1 %	99.1 %

All mass units are at 20'C and 1013mb
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}	-	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	6	2

Appendix B: Locations of AQMAs

Figure 1-1 AQMA 2, Main Street Ballyclare

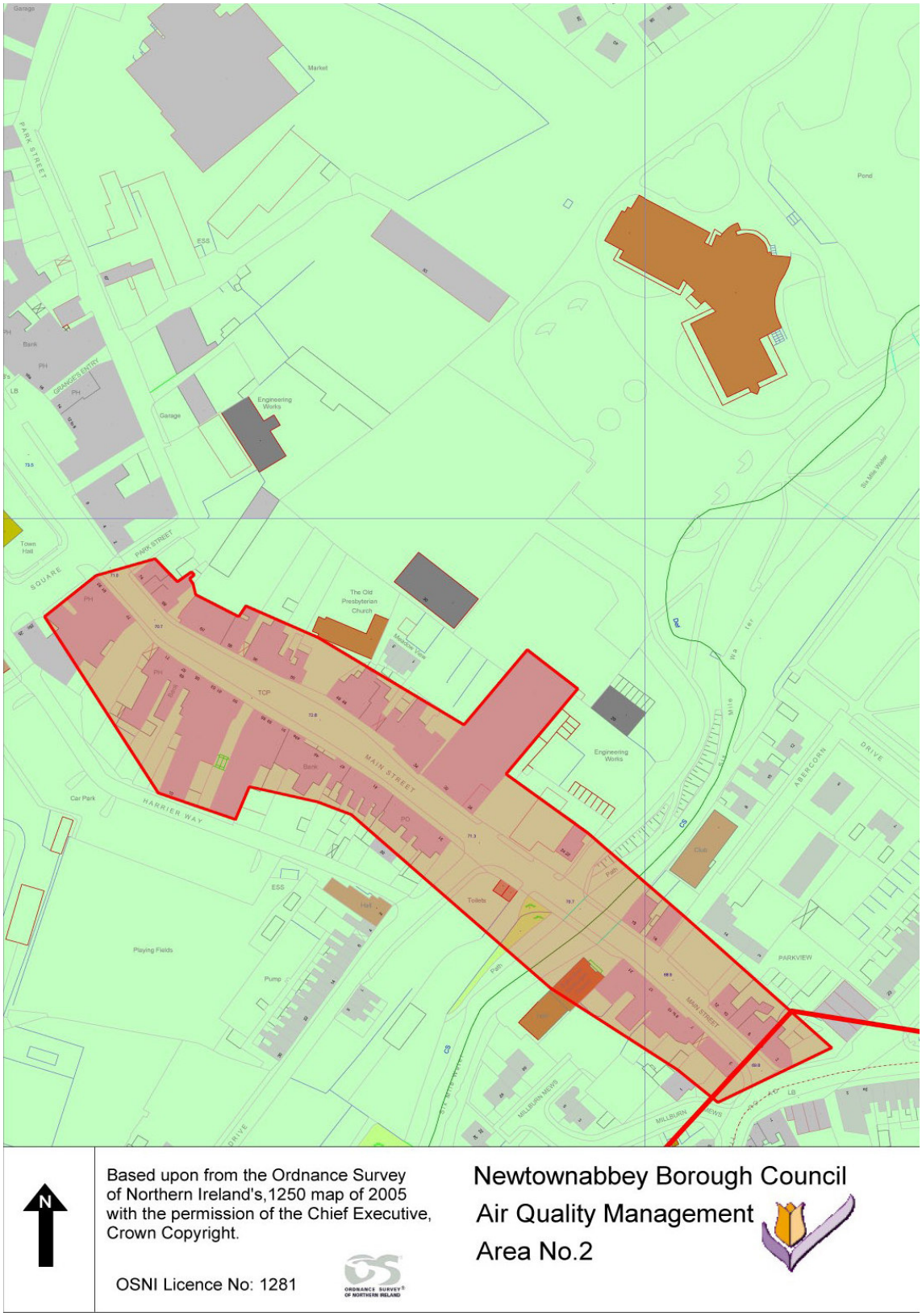


Figure 1-2 AQMA 3 Antrim Road, Elmfield

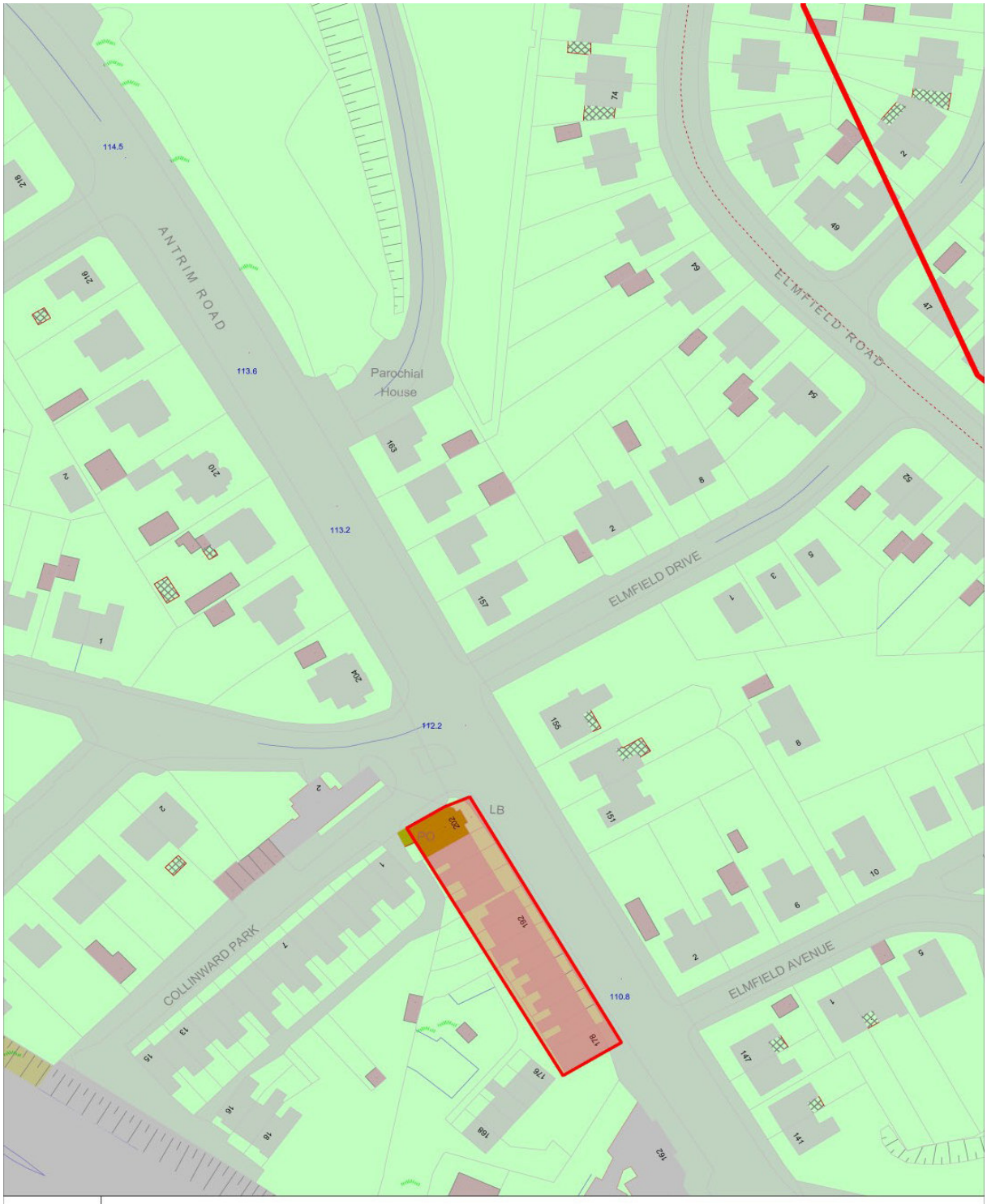


Figure 1-3 AQMA 4 Sandyknowes

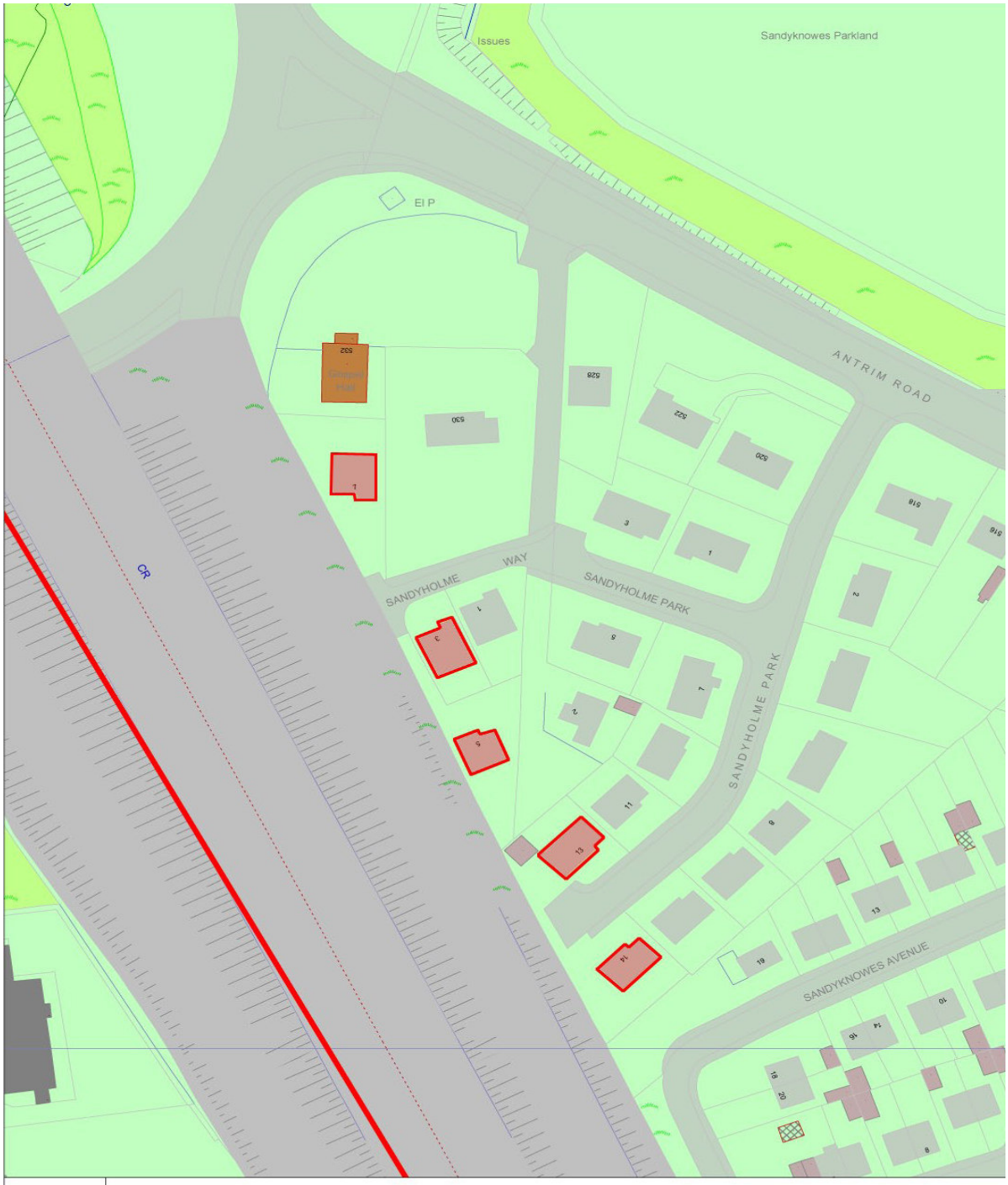
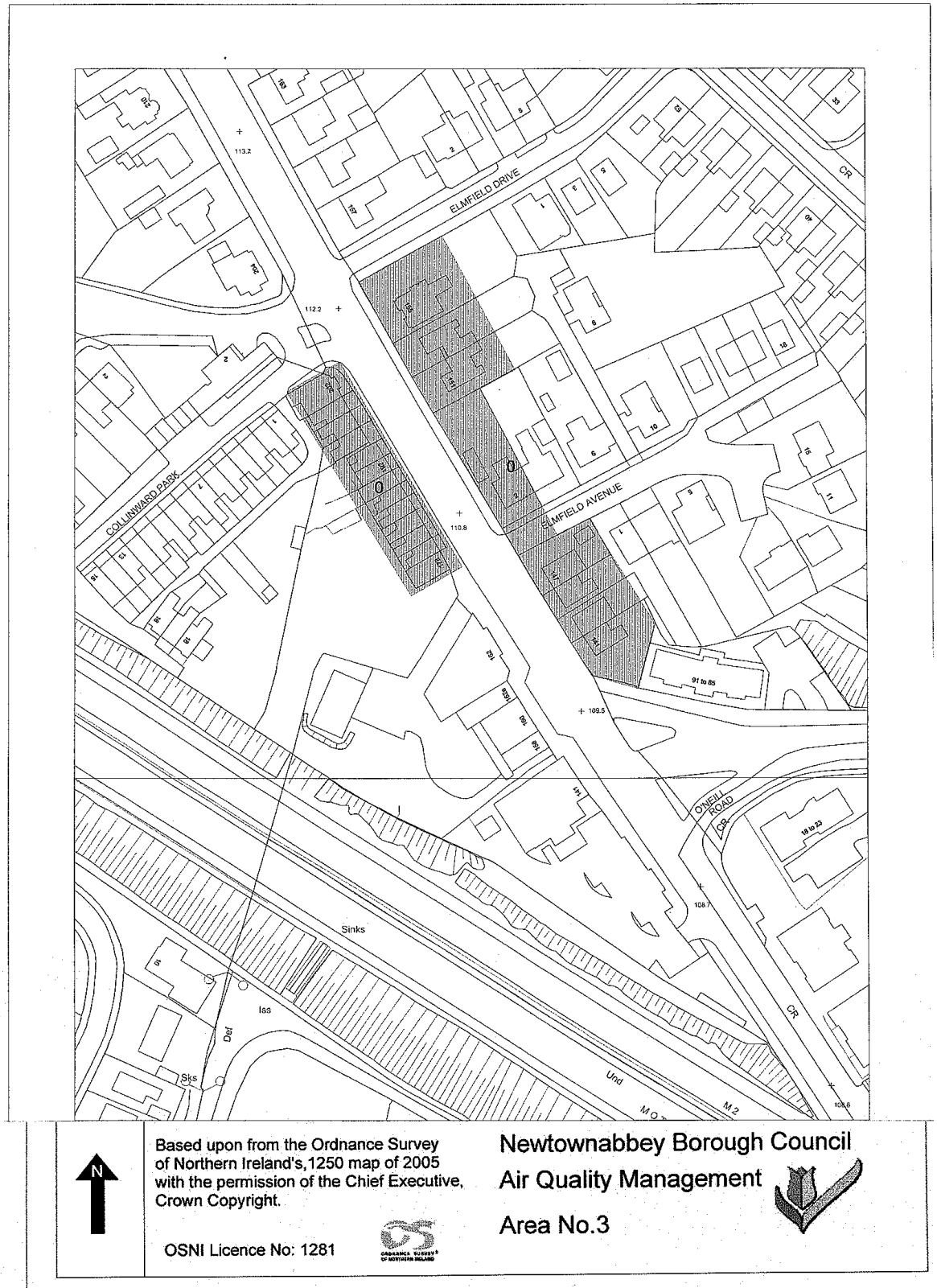
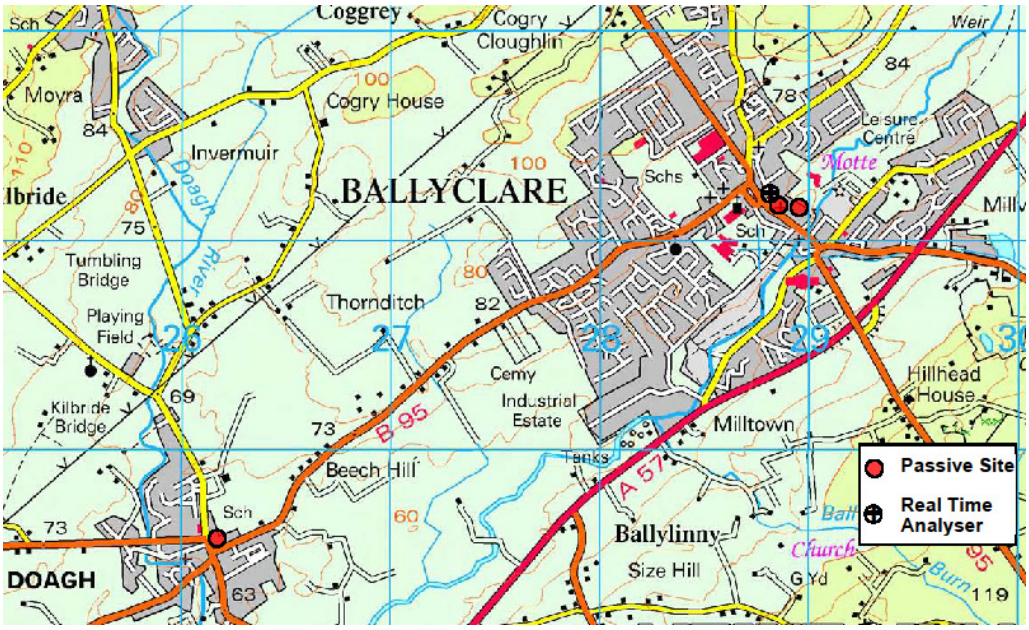


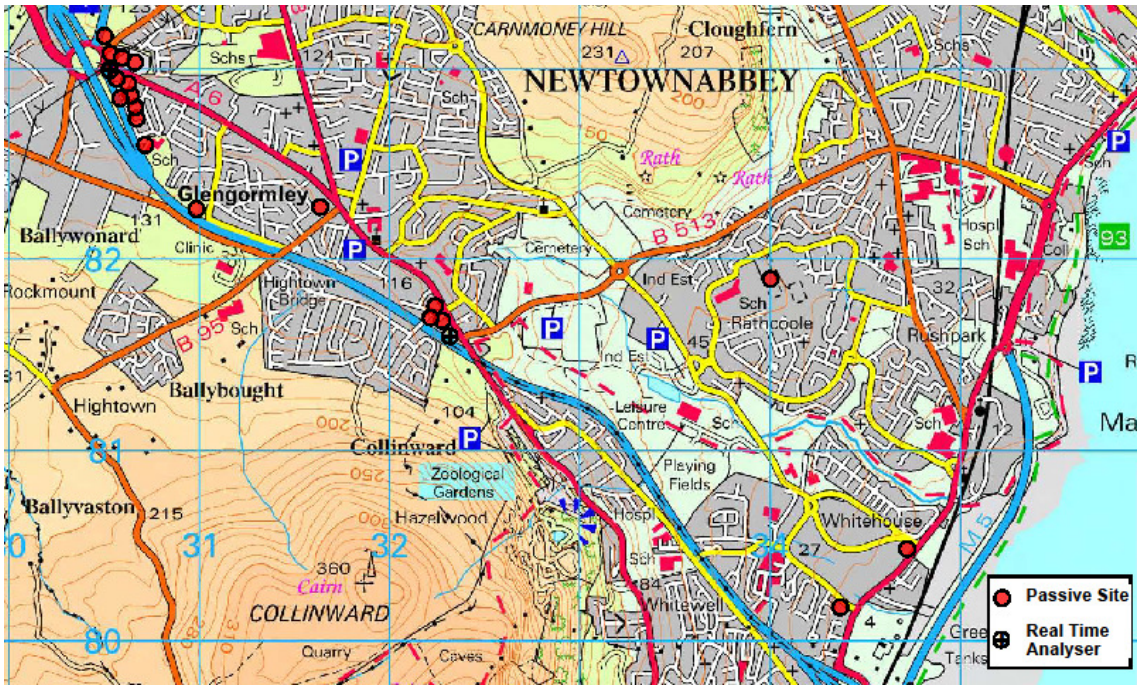
Figure 1-4 AQMA 3 (amended) Antrim Road, Elmfield



Appendix C: Location of Monitoring Sites



Main Street, Ballyclare



Antrim Road, Elmfield

Newtownabbey Borough Council

Sandyholme Way, Sandyknowes