



2011 Air Quality Progress Report for *Carlisle City Council*

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

April, 2011

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Executive Summary

The Government prepared the Air Quality Strategy for England, Scotland, Wales and Northern Ireland for consultation in August 1999. It was originally published in January 2000. The Strategy has been revised since originally published. The latest Air Quality Strategy was published on 17 July 2007.

At the centre of the Air Quality Strategy is the use of air quality standards to enable air quality to be measured and assessed. These also provide the means by which objectives and timescales for the objectives to be achieved can be set. These standards and associated specific objectives had to be achieved between 2003 and 2010.

To aid local authorities in the completion of the assessment, revised Technical Guidance (TG (09)) was published by Defra in February 09. This guidance provides a checklist approach to assessing where specific sources of pollutant may, on a local level, lead to a risk of an air quality objective being exceeded and therefore require a more detailed assessment.

Local Authorities are required to review and assess the air quality in their areas to determine whether the air quality objectives are likely to be met. Where the likelihood of exceedences of the air quality objectives has been identified, in areas of significant public exposure, a detailed assessment of that area will be required. Depending upon the findings an Air Quality Management Area (AQMA) may need to be declared, followed by a further assessment and the formulation of an action plan to help reduce these exceedences.

This report represents the third stage of the fourth round of review and assessment of local air quality for the Carlisle City Council area.

Carlisle City Council has previously undertaken 3 rounds of review and assessment. This review and assessment work has concluded that overall air quality within our local authority is good. There are, however, small pockets within the city where the annual mean objective level for nitrogen dioxide is being exceeded due to road traffic sources. As a consequence 6 Air Quality Management Areas have been declared between 2005 and 2008.

A 'Further Assessment' undertaken by our specialist consultant's AEA Technology on behalf of Carlisle City Council as part of our air quality management duties, in 2009, concluded that AQMA no.3 should be extended to cover residential properties along Wigton Rd, to include odd nos. 1-11 and even nos. 2-24 and also properties on Caldcoates. The need to extend was due to exceedences of the annual mean objective level for nitrogen dioxide in this area. The order to extend the AQMA came into force on 1st July 2010 following no objections from consultees.

The purpose of this Progress Report is to identify any significant changes that may have occurred since the previous rounds of review and assessment were completed. This includes new monitoring data, new or changed emissions sources, or any other local changes that might affect air quality. In each case, these sources need only be considered if they are new, if they have not been considered previously, or if there have

been significant changes since the last round of review and assessment. If significant new sources or changes are identified then the city council would need to proceed to a Detailed Assessment for that pollutant.

This report will identify any proposed new developments which may be introduced into our district since the last round of review and assessment which may have air quality implications. It will also detail any large developments currently being considered by the planning department. In most cases the prospective developers have been asked to demonstrate the likely impacts and mitigation measures by submitting an Air Quality Impact Assessment (AQIA). Depending on the conclusions of these and in the event of a granted application, it may be necessary to proceed to a detailed assessment should the predicted impacts be sufficient to warrant further detailed investigation.

The three principal pollutants that are currently monitored by Carlisle City Council include; nitrogen dioxide, particulates (PM10 & PM 2.5) and benzene. Both the historical and the most recent results for 2010 are presented in this report for comparison purposes. Data from 2010 indicates that the annual mean nitrogen dioxide concentrations have risen in many monitoring locations around the district from the previous year. Results of PM10 PM2.5 and Benzene show that levels remain considerably below the objective.

New monitoring data indicates that locations within AQMA numbers 1, 2, 3, 4, 5 & 6 remain above the annual mean objective level for nitrogen dioxide. The data shows an increase in NO2 annual mean concentrations across the district, this is believed to be linked to adverse meteorological conditions. In 2010 the region experienced unusually long periods of exceptionally cold weather in the winter months with freezing conditions and limited air movement. The poor driving conditions may also have led to increased congestion and slower traffic movement in busy areas. As a result the data from the winter months contains some of our highest recorded results both from our diffusion tubes and automatic monitoring stations. This has had a bearing on annual mean concentrations in the majority of monitoring locations.

It is intended that monitoring will continue unchanged, at least until after the opening of the Carlisle Northern Development Route (CNDR). This will enable 'before and after' comparisons to be drawn at all monitoring locations.

Work has continued on the CNDR throughout 2010. Previous 'Further Assessment' work in 2007 indicates that the opening of the CNDR will have a major impact on nitrogen dioxide levels along A7 (AQMA No. 1) bringing levels to below the objective level. 'Further Assessment' work undertaken in 2009, to aid the City Council in developing its Air Quality Action Plan and to take account of the recently declared AQMA's also indicates that the CNDR will have a significant positive impact on air quality along the A595 (this includes AQMA No's 3 and 4).

This report summarises the current policies adopted by the council which relate to air quality including its local transport plans and strategies, air quality planning policies and climate change strategies. It includes a summary of the measures detailed in the action plan which are expected to have a positive effect on air quality in the city. It provides an update on the progress made in implementing these measures and the timescales in which they are likely to run. A revised Air Quality Action Plan will be available in 2011.

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1 Introduction

1.1 Description of Local Authority Area

Carlisle City Council is the most northerly of the 6 Cumbrian authorities and covers more than 400² miles.

The City of Carlisle supports the highest population concentration in Cumbria with over 70,000 people living within the urban area. The rural towns of Brampton and Longtown support the next two highest population concentrations, around 4000 and 2000 respectively.

Carlisle is remote from other centres of population being 300 miles from London, more than 120 miles from Manchester, more than 90 miles from Glasgow and Edinburgh, and 60 miles from Newcastle Upon Tyne. Consequently Carlisle is the regional, commercial, administrative and retail centre serving a catchment population of around 450,000 who live within an hours travelling time of the city.

Today's economy is characterised by food processing, agricultural support, automotive component manufactures and engineering. The dominant sectors are branch operation in warehousing, retailing, manufacturing, public administration and health services.

Carlisle is also a significant transport hub for rail services and the national road transport network.

The Government Regional Planning Guidance for the North West identifies Carlisle as one of the North West's key towns and cities where development should be concentrated.

1.2 Purpose of Progress Report

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. However, if the Progress Report identifies the risk of exceedence 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 Local Air Quality Management (LAQM) in **England** are set out in the Air Quality (England) Regulations 2000 (SI 928), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (for carbon monoxide the units used are milligrammes per cubic metre, mg/m^3). Table 1.1. includes the number of permitted exceedences in any given year (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Maximum daily running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Since 1996 Carlisle City Council has been monitoring pollution levels in Carlisle and comparing them with the national air quality objectives a process known as review and assessment.

Our review and assessment work has concluded that air quality within our local authority is generally very good. For the majority of pollutants the concentrations found in Carlisle are well below the governments health based objectives and are not of any concern. However there are small pockets within the city where the annual mean objective for nitrogen dioxide is not being met due to road traffic emissions. The local authority has subsequently declared six Air Quality Management Areas within the city.

All of our Air Quality Assessment Reports are listed below and are available on the city councils website (www.carlisle.gov.uk)

Stage 1 Report 1996 - concluded that a stage 2 assessment would be required for nitrogen dioxide and particulates

Stage 2 Report 1998 - concluded that a detailed stage 3 assessment would be required in respect to nitrogen dioxide and particulates.

Stage 3 Report 2000 - concluded that it was unlikely that an air quality objective would be exceeded.

Updating and Screening Assessment Report 2003 – concluded that a detailed assessment would be required for nitrogen dioxide and particulates.

Detailed Assessment 2004 – concluded that it was likely that the annual mean objective for nitrogen dioxide would be exceeded at location alongside the A7. As a consequence Air Quality Management Area No.1 was declared in 2005

Progress Report 2005 – concluded that it was likely that the annual mean objective for nitrogen dioxide would be exceeded at locations alongside Currock Street. As a consequence Air Quality Management Area No.2 was declared in Dec 2006

Updating and Screening Assessment Report 2006 - concluded that a detailed assessment would be required in respect to the annual mean nitrogen dioxide at 4 locations within the City i.e. Wigton Rd, Bridge St, London Rd and Dalston Rd.

Progress Report 2007 – update on air quality issues.

Detailed Assessment 2007 – concluded that it was likely that the annual mean objective for nitrogen dioxide would be exceeded at locations alongside Wigton Rd, Bridge St, London Rd and Dalston Rd. As a consequence Air Quality Management Areas Nos. 3, 4, 5 and 6 were declared in 2008.

Further Assessment Report 2007 – confirmed that AQMA boundaries for AQMA no1 and 2 were correct.

Progress Report 2008 – update on air quality issues

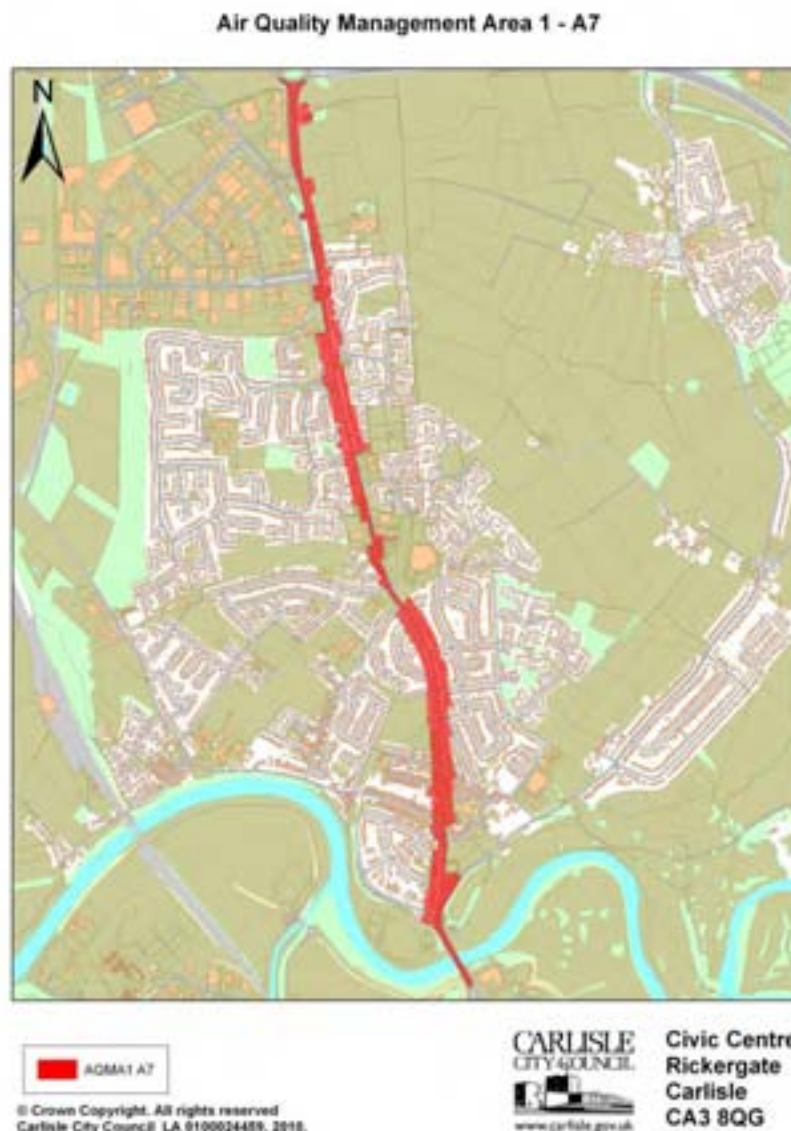
Further Assessment Report 2009 – confirmed that the boundaries AQMA's Nos. 4- 6 are correct. It recommends that the boundary of AQMA No.3 be extended to the bottom of Caldewgate roundabout.

Updating and Screening Assessment 2009 - concludes that that the existing boundary of AQMA no.3 on Wigton Rd will need to be extended to the Caldewgate roundabout and include properties on Caldcotes.

Progress Report 2010 – Update on Air Quality issues. Confirmed that the recent extension of AQMA No.3 had taken place and gave an update on progress with action plan measures.

The following maps show all six of the AQMA's that have been declared in the district, all have been declared due to exceedences of NO2 objectives only. Appendix E shows all AQMA's on one large map.

Figure 1.1 Map of AQMA Boundaries (if applicable)



Air Quality Management Area 2 - Currock Street.



 AQMA2 Currock Street

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CARLISLE Civic Centre
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AQMA3 Wigton Road (Extended)



 AQMA3 Wigton Road (Extended)

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Air Quality Management Area 4 - Bridge Street.



 AQMA4 Bridge St

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Air Quality Management Area 5 - Dalston Road.



 AQMA5 Dalston Rd

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Air Quality Management Area 6 - London Road.



 AQMA6 London Road

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2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

Air quality monitoring in Carlisle City Council is driven by the local air quality management process and in particular the review and assessment of air quality. Carlisle City Council currently monitors for 3 pollutants; **nitrogen dioxide**, **particulates** and **benzene** and employs two principle methods of monitoring; diffusion tubes and continuous monitoring.

Nitrogen dioxide (NO₂) and nitric oxide (NO) are both oxides of nitrogen and are collectively referred to as nitrogen oxides (NO_x). All combustion processes produce NO_x emissions, largely in the form of NO, which is then converted to NO₂, mainly as a result of reaction with ozone in the atmosphere.

The principle source of nitrogen dioxide within the district is road transport.

Particulates are the fraction of suspended airborne particles, these small particles can be breathed into the lungs carrying with them a range of both natural and manmade substances.

Particulate Matter 10 or PM₁₀ is the fraction of particulate matter less than 10µm (Ten micrometres) in aerodynamic diameter. This comes from a wide range of sources known as primary i.e. combustion processes such as vehicle exhaust emissions, secondary i.e. formed in the atmosphere and coarse i.e. from suspended soils, dust and construction etc). In Carlisle the dominating sources are likely to be:-

Local traffic

Resuspension of road dust

Agriculture

Background PM₁₀ carried from other parts of the UK and continental Europe.

The PM_{2.5} fraction of particulate matter differs from PM₁₀ only in respect of the size of the particles, these particles are much smaller, less than 2.5µm (2.5 micrometres) in aerodynamic diameter. Carlisle City council began measuring PM 2.5 at the Paddy's Market site on 19th March 2009. This is the first part of our review and assessment work that has reported upon a full year of results of these measurements.

Benzene is a recognised genotoxic human carcinogen.

The main sources of benzene in the UK are petrol engine vehicles, petrol refining and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems.

Whilst the local authority does not have any sources within the area which are likely to exceed the objective levels Carlisle has been monitoring benzene since April 2008. As part of the Non Automatic Hydrocarbon Network Benzene monitoring is

undertaken at the Paddy's Market station using a pumped tube sampler with sorbent tubes containing Carbopack X.

2.1.1 Automatic Monitoring Sites

There are two continuous monitoring stations in Carlisle. These are located at Paddy's Market and Stanwix Bank.

Pollutant concentrations have been monitored at a roadside site at Paddy's Market in Caldewgate since 2005. The pollutants measured include oxides of nitrogen and particulate matter using a Chemiluminescent Analyser and a Tapered Element Oscillating Microbalance (TEOM) respectively. In April 2009 an additional TEOM to measure even smaller sized particles (PM_{2.5}) was installed in Paddy's Market monitoring station by Defra and both TEOM's were upgraded to include a Filter Dynamics Measurement System (FDMS) to allow better equivalence to the objective level. The site is now partly funded by Defra.

Parts of the site equipment not funded by Defra including the chemiluminescent analyser belong to the council and are maintained by Casella Monitor. Since February 2008 the site has been affiliated to the Automatic Urban and Rural Network (AURN) and the network quality assurance and control procedures are implemented.

The Stanwix Bank site has been in operation since the beginning of 2007 and measures nitrogen dioxide with a chemiluminescent analyser. The site is maintained and the data is managed by Casella Monitor. Casella has a defined quality system, which forms part of the UKAS accreditation that the laboratory holds.

Daily data from both monitoring stations is available to the public on the city councils website.

Appendix A contains further details on our automatic monitoring including information on co-location study, quality control and quality assurance measures.

The following are maps of our automatic monitoring locations and details of the sites themselves.

Figure 2.1 Map(s) of Automatic Monitoring Sites

Paddys Market Automatic Monitoring Station



Scale: 1:2,500

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Date: 02/03/2010



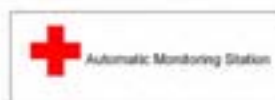
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Stanwix Bank Automatic Monitoring Station



Scale: 1:2,500

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Date: 02/03/2010



Civic Centre
Rickergate
Carlisle
CA3 8QG

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
		X	Y						
Paddy's Market	Roadside	X 339467	Y 555974	NO2, PM 10, PM2.5	Chemilumin escent analyser, TEOM FDMS	N	N with 42m to relevant exposure	4m	N
Stanwix Bank	Roadside	X 340018	Y 557044	NO2	Chemilumi nescent analyser.	Y	N within 15m to relevant exposure	3m	N

2.1.2 Non-Automatic Monitoring Sites

Benzene

The council operates a pumped tube benzene sampler as part of the UK Non-Automatic Hydrocarbon Network. The benzene station is located within the Paddy's Market Unit and has been in operation since April 2008. It is entirely funded by Defra.

Nitrogen Dioxide

Carlisle City Council operates an extensive network of Nitrogen Dioxide diffusion tubes across the district. Up to the end of January 2009 the council utilised tubes prepared and analysed by Bureau Veritas Labs using 10% triethanolamine (TEA) in water. In February 2009 the council changed suppliers and now utilises tubes prepared with 20% TEA in water prepared and analysed by Gradko Environmental Ltd.

Throughout 2010 the council has obtained a full twelve months of monitoring data from most of the diffusion tube monitoring locations. Some locations have slightly fewer monthly results due to problems with individual tubes such as laboratory issues and dislodging or unauthorised removal of a diffusion tube from its mounting. There are also four results that have been removed from the study which appear to be anomalous.

Raw monthly diffusion tube results can be found in appendix B.

Appendix A contains further details on our NO₂ diffusion tube analysis including bias adjustment and Quality control measures.

The locations of all the diffusion tubes are shown on the map in Appendix D and are listed in the table below:

(Tube B12 Denton St has been moved by 8 metres along the Kerbside but remains at the same distance to the same road. This has resulted in the coordinates and distance to nearest residential property being slightly different to previous review and assessment reports.)

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
A1	Roadside	339995	557188	NO ₂	Y	N (4.5)	1.5	Y
A10	Roadside	340008	556842	NO ₂	Y	N (1.5)	1.5	Y
A12	Roadside	339935	557125	NO ₂	N	Y	3	Y
A5	Roadside	339758	558059	NO ₂	Y	Y	4	Y
A7	Roadside	339526	559285	NO ₂	Y	N (7.5)	4	Y
A9	Roadside	340028	556833	NO ₂	Y	Y	1.5	Y
B12	Kerbside	339921	555406	NO ₂	N	N (10)	0.5	Y
B3	Roadside	339537	555613	NO ₂	N	Y	9	Y
B4	Roadside	339434	555638	NO ₂	Y	Y	3.5	Y
B5	Roadside	339613	555587	NO ₂	N	Y	2.5	Y
B6	Roadside	339731	555526	NO ₂	N	Y	2.5	Y
B7	Roadside	340205	555198	NO ₂	Y	Y	3	Y
C1	Roadside	340216	556131	NO ₂	N	Y	3	Y
C2	Urban Centre	340069	555955	NO ₂	N	N	N/A	N
C3	Roadside	340218	555768	NO ₂	N	Y	3	Y
C4	Roadside	340286	555622	NO ₂	N	Y	9	Y
C5	Roadside	340298	555589	NO ₂	N	Y	3	Y
D1	Roadside	341106	555954	NO ₂	N	N (8.5)	3.7	Y
D10	Roadside	342044	555907	NO ₂	N	Y	5	Y
D11	Roadside	340426	556040	NO ₂	N	Y	4.5	Y
D12	Kerbside	340307	555718	NO ₂	N	N	5	Y
D3	Roadside	341167	555892	NO ₂	N	Y	10	Y
D5	Roadside	341310	555914	NO ₂	N	Y	9	Y
D7	Roadside	341593	555893	NO ₂	N	Y	7	Y
D9	Roadside	341426	555910	NO ₂	N	Y	8.5	Y

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?
E22	Roadside	339834	556137	NO ₂	N	Y	12	Y
E12	Roadside	339225	555821	NO ₂	Y	N (2)	2.5	Y
E15	Roadside	339091	555736	NO ₂	Y	Y	4.5	Y
E16	Roadside	339141	555900	NO ₂	Y	Y	2.5	Y
E19	Roadside	338953	555610	NO ₂	Y	Y	2.5	Y
E20	Roadside	339023	555692	NO ₂	Y	Y	5.5	Y
E4	Roadside	339396	555947	NO ₂	N	N(3)	3	Y
E6	Roadside	339467	555974	NO ₂	N	N(42)	9	Y
E6	Roadside	339467	555974	NO ₂	N	N(42)	9	Y
E6	Roadside	339467	555974	NO ₂	N	N(42)	9	Y
E8	Roadside	339516	556024	NO ₂	Y	Y	4	Y
E9	Roadside	339405	555996	NO ₂	N	Y	9	Y
E21	Roadside	337730	556118	NO ₂	N	N (8)	3	Y
F1	Roadside	340482	555489	NO ₂	N	Y	3.5	Y
F10	Roadside	349597	555351	NO ₂	N	Y	3	Y
F5	Roadside	340534	555409	NO ₂	N	Y	3	Y
F7	Roadside	340708	555240	NO ₂	Y	Y	4.5	Y
F9	Kerbside	341099	554931	NO ₂	N	Y	0.5	Y
H1	Roadside	352824	561039	NO ₂	N	N (0.5)	2.5	Y
H3	Roadside	338052	568478	NO ₂	N	N (0.5)	2.5	Y
H4	Roadside	347411	556881	NO ₂	N	N (0.5)	2.5	Y
H5	Roadside	337643	554100	NO ₂	N	Y	1.5	Y
H6	Roadside	337962	553220	NO ₂	N	Y	4	Y
H7	Roadside	338282	553396	NO ₂	N	Y	6.5	Y
H8	Other	347874	561254	NO ₂	N	Y	2	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

Nitrogen Dioxide

Automatic Monitoring Data

All nitrogen dioxide monitoring data shown has been ratified by the AEA group and Casella Monitor.

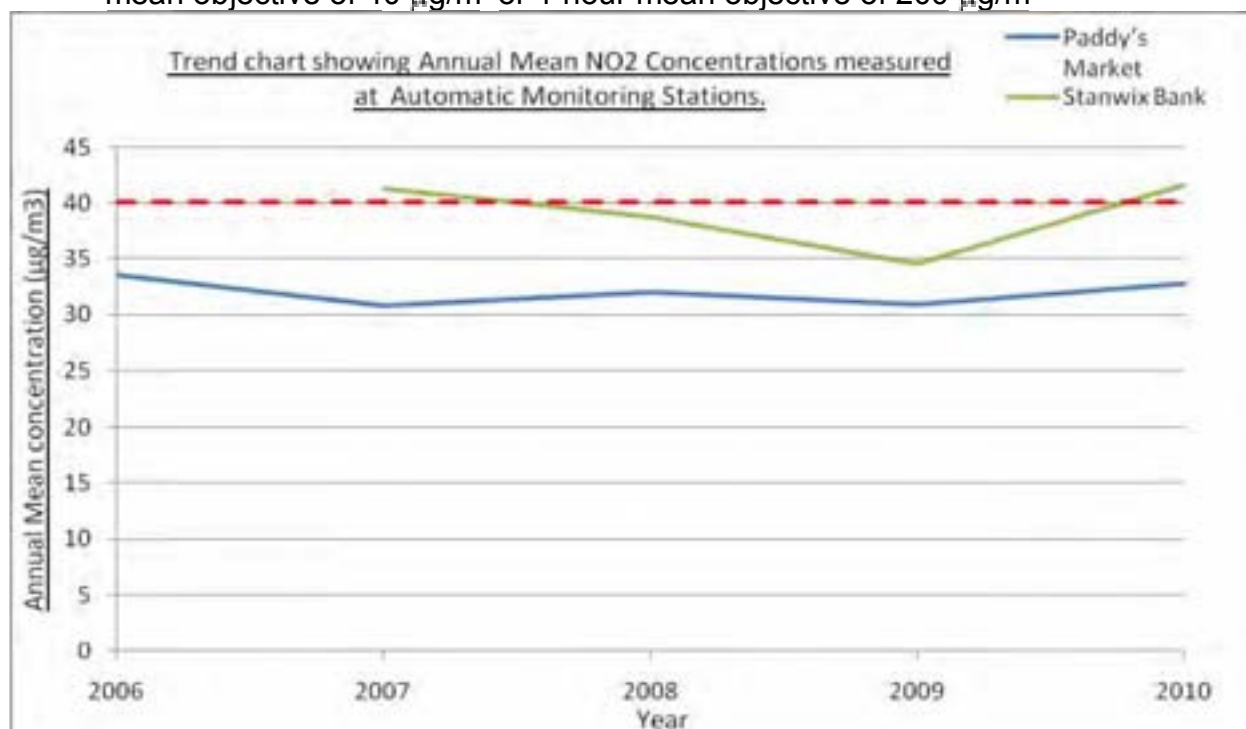
Data in red indicates results that exceed the annual mean objective of 40 $\mu\text{g}/\text{m}^3$

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

Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)				
					2006	2007	2008	2009	2010
Paddy's Market	N	N	Full year of monitoring	96.4	33.5	30.8	32	30.85	32.79
Stanwix Bank	Y	N	Full year of monitoring	99.0	-	41.3	38.8	34.6	41.6

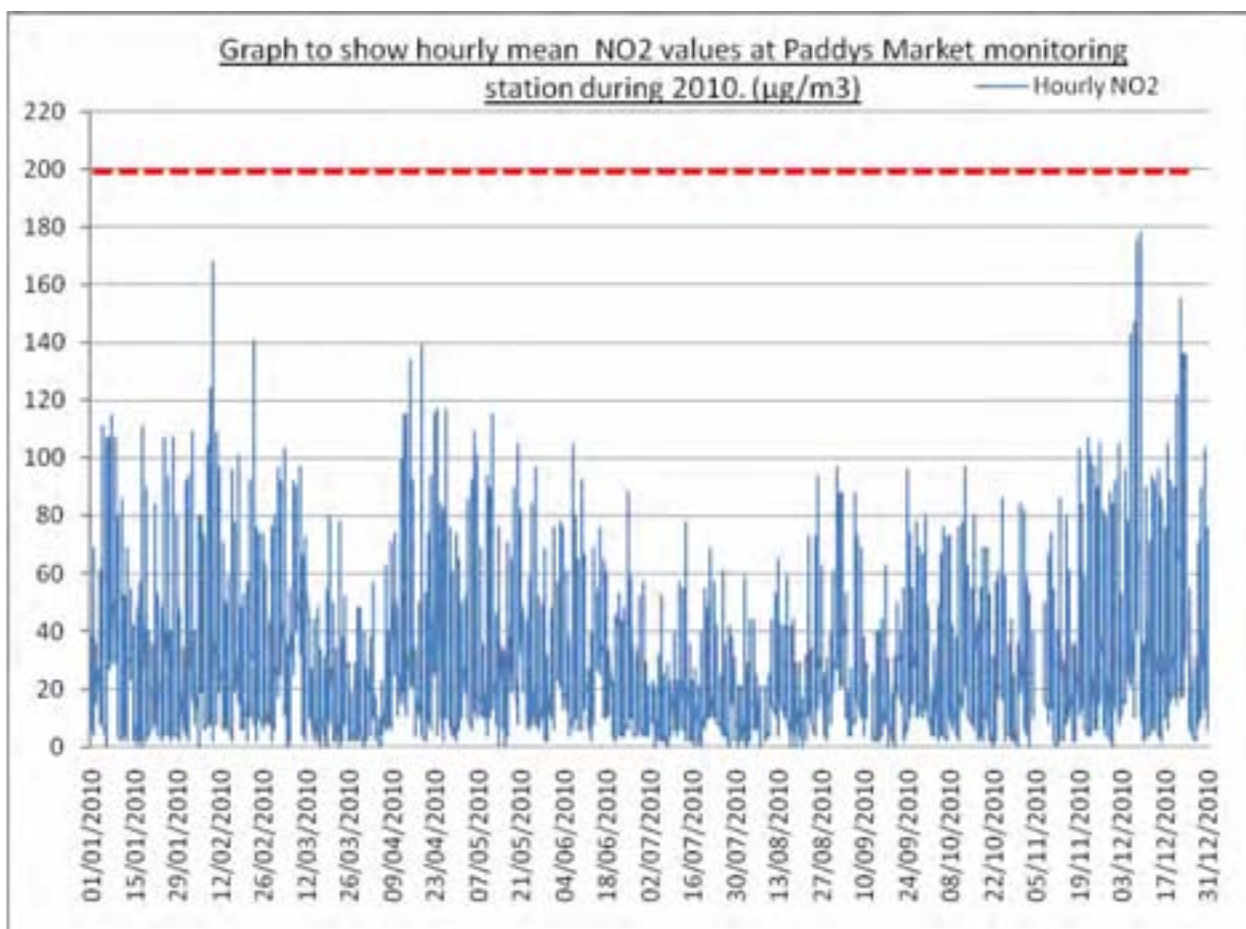
Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Automatic Monitoring Sites.

..... The dashed red line on the following flow charts is used to indicate the annual mean objective of 40 $\mu\text{g}/\text{m}^3$ or 1 hour mean objective of 200 $\mu\text{g}/\text{m}^3$



The above trend chart indicates that the Paddys Market roadside unit has remained relatively constant since 2006. During 2010 there has been a slight increase in the annual mean for nitrogen dioxide however the level is still very similar to that of previous years and remains below the objective. The Stanwix Bank unit has seen a gradual reduction in NO2 levels since it was installed in 2007, however in 2010 there was a sharp increase which has taken the overall annual mean back above the objective level. This site is within AQMA 1 and does not represent direct public exposure in that it is 15 metres away from the nearest residential property.

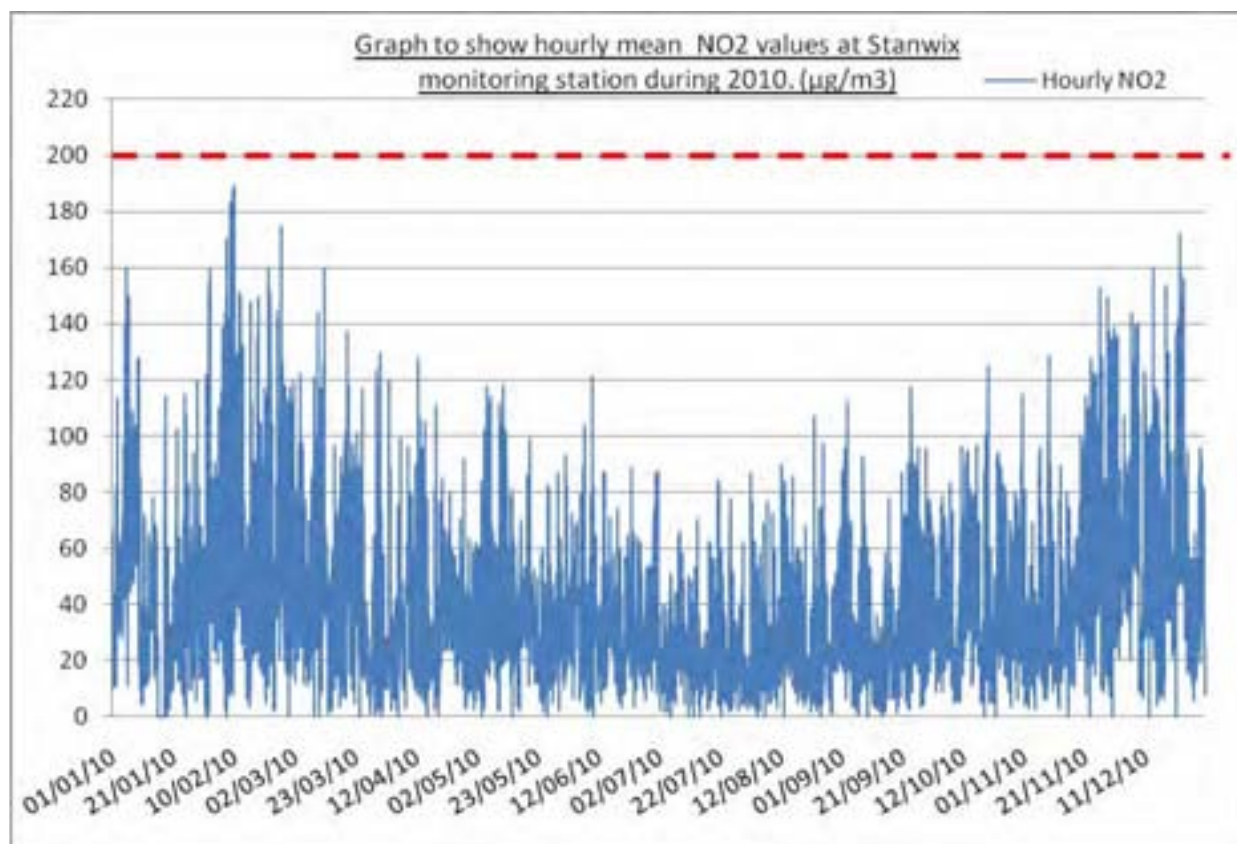
Figure 2.4 Results of Hourly Automatic Monitoring for Nitrogen Dioxide during 2010: Comparison with 1-hour Mean Objective at Paddys Market:



Max	178
Min	0
Annual mean	32.79

The graph above shows that there were no recorded exceedences of the 1 hour mean objective for Nitrogen Dioxide during 2010. The highest reading at the Paddys Market site was 178µg/m3. This occurred on a day when the unit recorded unusually high concentrations in relation to the previous and next days.

Figure 2.5 Results of Hourly Automatic Monitoring for Nitrogen Dioxide during 2010: Comparison with 1-hour Mean Objective at Stanwix Bank:



Max 188.8
 Min 0.8
 Annual Mean 41.6

The data above shows that there were no recorded exceedences of the 1 hour mean objective for Nitrogen Dioxide during 2010. The highest reading at the Stanwix Bank site was 188.8 µg/m³.

The 200 µg/m³ 1 hour mean objective for Nitrogen Dioxide should not be exceeded more than 18 times per year, neither of our monitoring sites showed any exceedence throughout the year.

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

Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period %	Data Capture for full calendar year 2010 ^b %	Number of Exceedences of hourly mean (200 µg/m ³)				
					2006	2007	2008	2009	2010
Paddy's Market	N	N	Full year	96.4	0	0	0	0	0
Stanwix Bank	Y	N	Full year	99.0	0	0	0	0	0

Diffusion Tube Monitoring Data

For 2009 the annual mean for each diffusion tube location has been adjusted using the national bias adjustment factor of 0.92. (See appendix A for details)

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes

Data shown in **red** indicates a result which has exceeded the annual mean objective of $40\mu\text{g}/\text{m}^3$

Site ID	Location	Within AQMA ?	Relevant public exposure? Y/N	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2010 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
						2008	2009	2010
A1	45 SCOTLAND RD	✓	N	100	100	46.1	46.25	45.74
A10	STANWIX BANK	✓	N	100	100	56.4	49.92	59.18
A12	14 ETTERBY ST	x	Y	100	100	21.6	21.00	25.54
A5	37 KINGSTOWN RD	✓	Y	100	100	42.4	41.42	43.59
A7	282 KINGSTOWN RD	✓	N	100	100	30.7	31.43	34.06
A9	BRAMPTON RD	✓	Y	100	100	42.6	41.93	48.49
B12	DENTON ST	x	N	100	100	40.9	38.33	43.16
B3	SHADDONMILL	x	Y	100	100	29.8	28.36	29.15
B4	DALSTON RD	✓	Y	83	83	51	42.76	52.62
B5	8 JUNCTION ST	x	Y	92	92	29.4	29.10	35.41
B6	41 CHARLOTTE ST	x	Y	83	83	33.2	32.25	38.57
B7	12 CURROCK ST	✓	Y	100	100	41.6	39.79	43.28
C1	LOWTHER ST	x	Y	100	100	37.3	32.14	38.11
C2	TOURIST INFO	x	N	100	100	16.2	17.60	19.94
C3	DEVONSHIRE ST	x	Y	100	100	37.6	35.24	39.40
C4	BAR SOLO	x	Y	92	92	39.1	33.83	36.97
C5	GRIFFEN	x	Y	92	92	40.5	46.23	43.27
D1	VICTORIA PLACE	x	N	92	92	31.2	27.11	33.59
D10	368 WARWICK RD	x	Y	100	100	31.6	28.91	35.50
D11	CARTREF	x	Y	100	100	35.6	29.45	37.43
D12	POST OFFICE	x	N	100	100	42.6	40.10	42.78
D3	166 WARWICK RD	x	Y	100	100	22.8	21.99	25.99
D5	215 WARWICK RD	x	Y	100	100	24.1	22.48	27.98
D7	282 WARWICK RD	x	Y	92	92	37.9	33.10	37.06
D9	251 WARWICK RD	x	Y	89	89	27.7	27.10	34.35
E22	FINKLE ST	x	Y	100	100	37.6	37.10	40.39
E12	3 WIGTON RD	✓	N	100	100	46.9	44.38	47.40

E15	22 WIGTON RD	✓	Y	100	100	42.5	39.09	45.49
E16	JOVIAL SAILOR	✓	Y	100	100	44.7	36.02	39.25
E19	49 WIGTON RD	✓	Y	100	100	46.9	46.66	51.19
E20	44 WIGTON RD	✓	Y	100	100	41.6	37.12	43.41
E4	JOHN ST	x	N	100	100	42.9	35.69	43.68
E6	PADDYS MARKET 1	x	N	92	92	31.6	31.46	36.80
E6	PADDYS MARKET 2	x	N	100	100	32.8	33.33	39.20
E6	PADDYS MARKET 3	x	N	100	100	34.5	31.64	36.86
E8	BRIDGE ST	✓	Y	100	100	55.8	50.60	56.58
E9	CHURCH ST	x	Y	92	92	35.3	31.36	37.16
E21	BURGH RD	x	N	100	100	16.2	18.71	21.82
F1	3 TAIT ST	x	Y	75	75	32.6	31.20	35.12
F10	155 BOTCHERGATE	x	Y	100	100	35.2	33.02	39.10
F5	STANLEY HALL	x	Y	100	100	38.1	33.03	39.68
F7	24 LONDON RD	✓	Y	75	75	39.4	36.33	45.47
F9	129 LONDON RD	x	Y	100	100	32.7	31.46	37.66
H1	BRAMPTON	x	N	92	92	20.9	18.68	23.17
H3	LONGTOWN	x	N	100	100	23.1	21.48	25.97
H4	WARWICK BRIDGE	x	N	100	100	35.7	31.83	37.22
H5	WIGTON RD	x	Y	100	100	27.3	19.96	26.83
H6	PETER LANE	x	Y	100	100	11.3	10.21	14.18
H7	DALSTON RD	x	Y	100	100	15.8	15.68	20.03
H8	AIRPORT	x	Y	100	100	9.84	9.05	11.02

None of the diffusion tube annual means for 2010 exceed $60\mu\text{g}/\text{m}^3$. An annual mean level of $60\mu\text{g}/\text{m}^3$ is the equivalent indicator level for the likelihood of exceedence of the hourly mean objective of $200\mu\text{g}/\text{m}^3$. All of the results are below $60\mu\text{g}/\text{m}^3$ and it can therefore be concluded that there has been no indication of any exceedence of the hourly mean objective. This supports the readings taken by both automatic monitoring stations.

Some of the annual means have shown exceedences of the $40\mu\text{g}/\text{m}^3$ objective level however the vast majority of these are located within areas which have already been declared as air quality management areas or are not residential areas.

Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.

The diffusion tube locations across the district are divided into relevant areas of the city, the areas include A, B, C, D, E, F and H. The following looks at each area individually it includes a map indicating the location of each tube in that area, a table showing the last 6 years of annual mean NO₂ concentrations and a trend chart displaying this data.

Results in (brackets) indicate calculated annual mean for locations that are not relevant to public exposure. It represents a prediction of the Annual mean NO₂ concentration at the nearest relevant receptor to the monitoring location.

Area A – A7 Stanwix Bank, Scotland Rd and Kingstown Rd (AQMA No1)

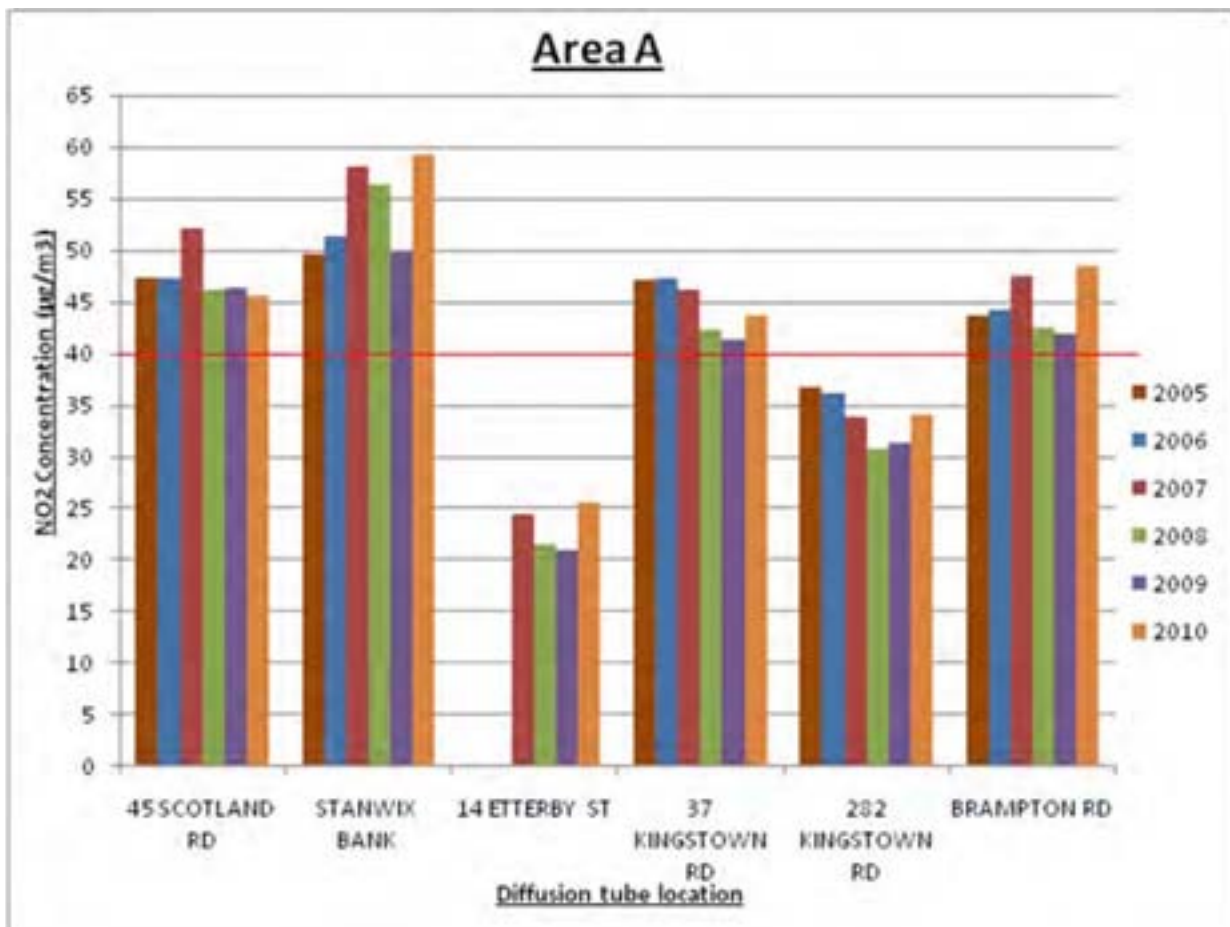
Figure 2.6 Map of diffusion tube locations in area A.



Table 2.5a NO² diffusion tube results at monitoring locations in area A.

SITE ID	LOCATION	WITHIN AQMA?	ANNUAL MEAN CONCENTRATIONS ADJUSTED FOR BIAS					
			2005	2006	2007	2008	2009	2010
A1	45 SCOTLAND RD	✓	47.4	47.3	52.1	46.1 (43.4)	46.3 (35.8)	45.7 (35.6)
A10	STANWIX BANK	✓	49.7	51.4	58.1	56.4	49.9 (44.8)	59.2 (52.5)
A12	14 ETTERBY ST	x	-	-	24.5	21.6	21.0	25.5
A5	37 KINGSTOWN RD	✓	47.2	47.3	46.1	42.4	41.4	43.6
A7	282 KINGSTOWN RD	✓	36.7	36.2	33.8	30.7 (28.3)	31.4 (26.4)	34.1 (27.1)
A9	BRAMPTON RD	✓	43.7	44.2	47.5	42.6	41.9	48.5

Figure 2.7 Chart showing NO₂ diffusion tube trends at monitoring locations in area A.



Results indicate that there are still sites within AQMA (No1) that remain above the NO₂ annual mean objective level. There is therefore no proposal to amend this AQMA at this stage.

Results from the diffusion tubes indicate that the majority of NO₂ annual mean concentrations have shown a sharp increase in this area from last year. This is most likely to be due to the adverse effects of unusually long periods of exceptionally cold weather.

Results from the continuous analyser on Stanwix bank support the increase in NO₂ annual mean from last year

The introduction of the CNDR (now scheduled for 2012) will bring about a substantial reduction in traffic flows along this route, as a result of the expected reduction in traffic, nitrogen dioxide results may fall below the objective level.

Results indicate that there are no locations within this area that are likely to have exceeded the 1 hour mean objective level for nitrogen dioxide. This is also supported by results from the automatic monitoring site in this area.

Area B – Currock St, Victoria Viaduct, Charlotte St, Junction St and Dalston Rd (Includes AQMA No2 and No5)

Figure 2.8 Map of diffusion tube locations in area B

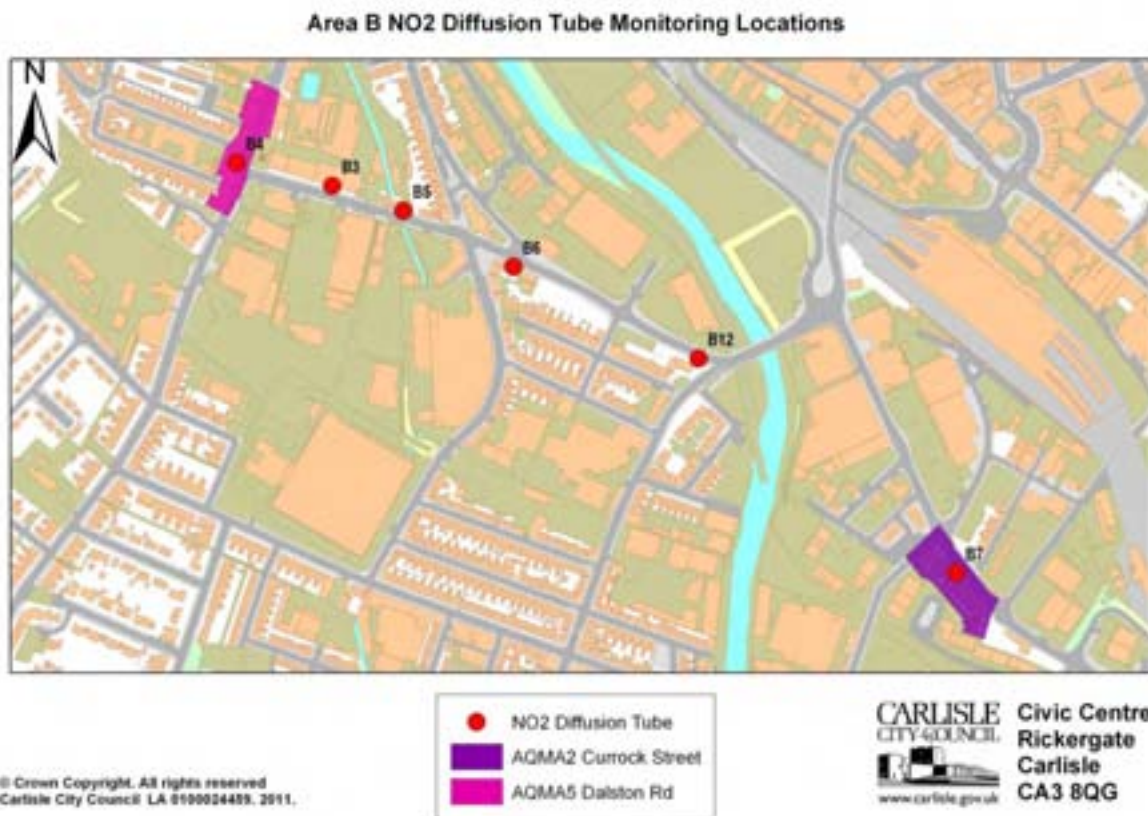
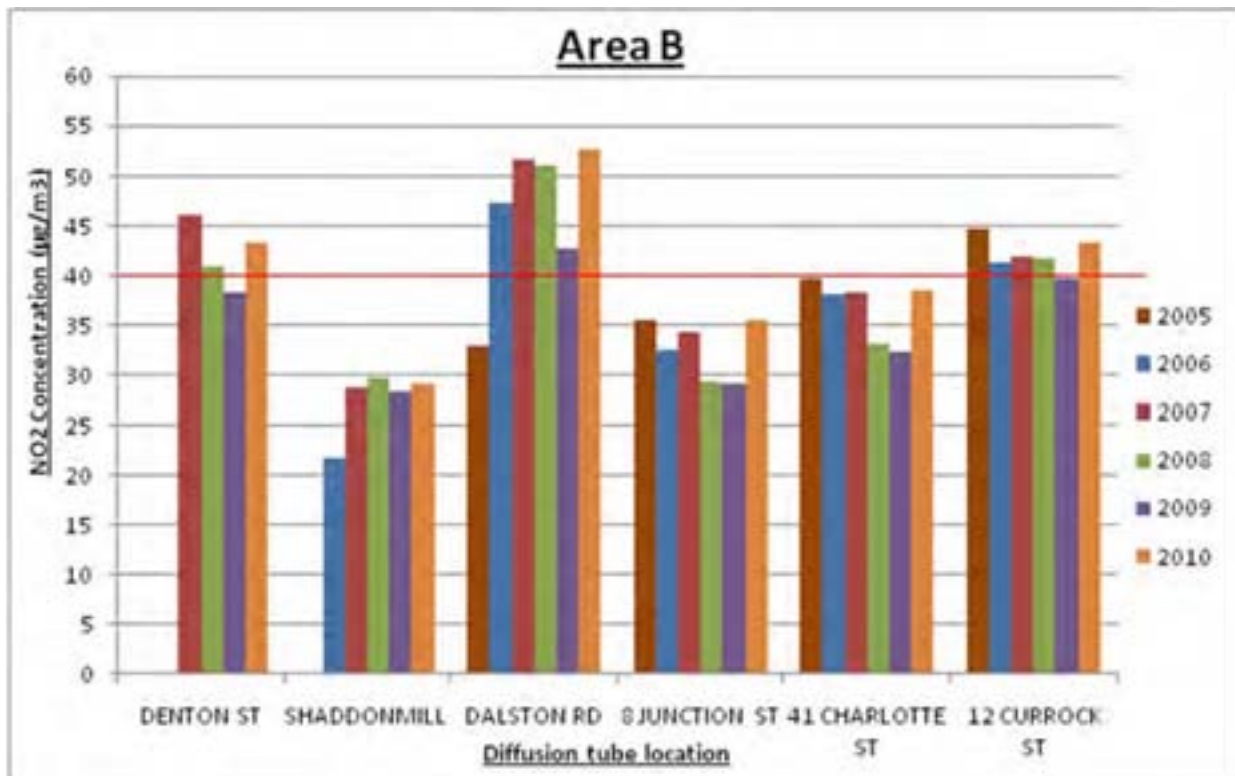


Table 2.5b NO² diffusion tube results at monitoring locations in area B.

SITE ID	LOCATION	WITHIN AQMA?	ANNUAL MEAN CONCENTRATIONS ADJUSTED FOR BIAS					
			2005	2006	2007	2008	2009	2010
B12	DENTON ST	x	-	-	46.1	40.9 (25.9)	38.3 (35)	43.2 (33.6)
B3	SHADDONMILL	x	-	21.7	28.8	29.8	28.4	29.1
B4	DALSTON RD	✓	33.0	47.2	51.7	51	42.8	52.6
B5	8 JUNCTION ST	x	35.6	32.5	34.3	29.4	29.1	35.4
B6	41 CHARLOTTE ST	x	39.8	38.1	38.3	33.2	32.3	38.6
B7	12 CURROCK ST	✓	44.6	41.2	41.9	41.6	39.8	43.3

Figure 2.9 Chart showing NO2 diffusion tube trends at monitoring locations in area B.



Diffusion tube results indicate that NO2 concentrations at all locations along this main traffic thoroughfare have increased from the previous year.

'Further Assessment' work undertaken in 2007 by AEA consultants predicted that nitrogen dioxide levels along Currock St (AQMA No2) would fall below the annual mean objective level by 2010. The report is available on the council's website. The result for 2009 showed that site B7 (AQMA 2) had fallen to just below the objective level, however, the unexpected increase of this year has again taken the annual mean to slightly above the objective.

The annual mean concentration for location B12 (Denton Street) has also increased to above the objective, however this does not represent relevant public exposure. When the predicted concentration at the nearest receptor was calculated the result shows $33.6\mu\text{g}/\text{m}^3$, which is comfortably below the objective of $40\mu\text{g}/\text{m}^3$.

Location B4 (Dalston Road) remains consistently above the objective and is located within AQMA 5. The City Council and County Council are working together to introduce new revised action measures that will reduce nitrogen dioxide levels along Dalston Rd (AQMA No5) and Currock Street (AQMA No2). The revised Action Plan will be available in 2011.

Results indicate that there are no locations within this area that are likely to have exceeded the 1 hour mean objective level for nitrogen dioxide.

Area C – City Centre Locations

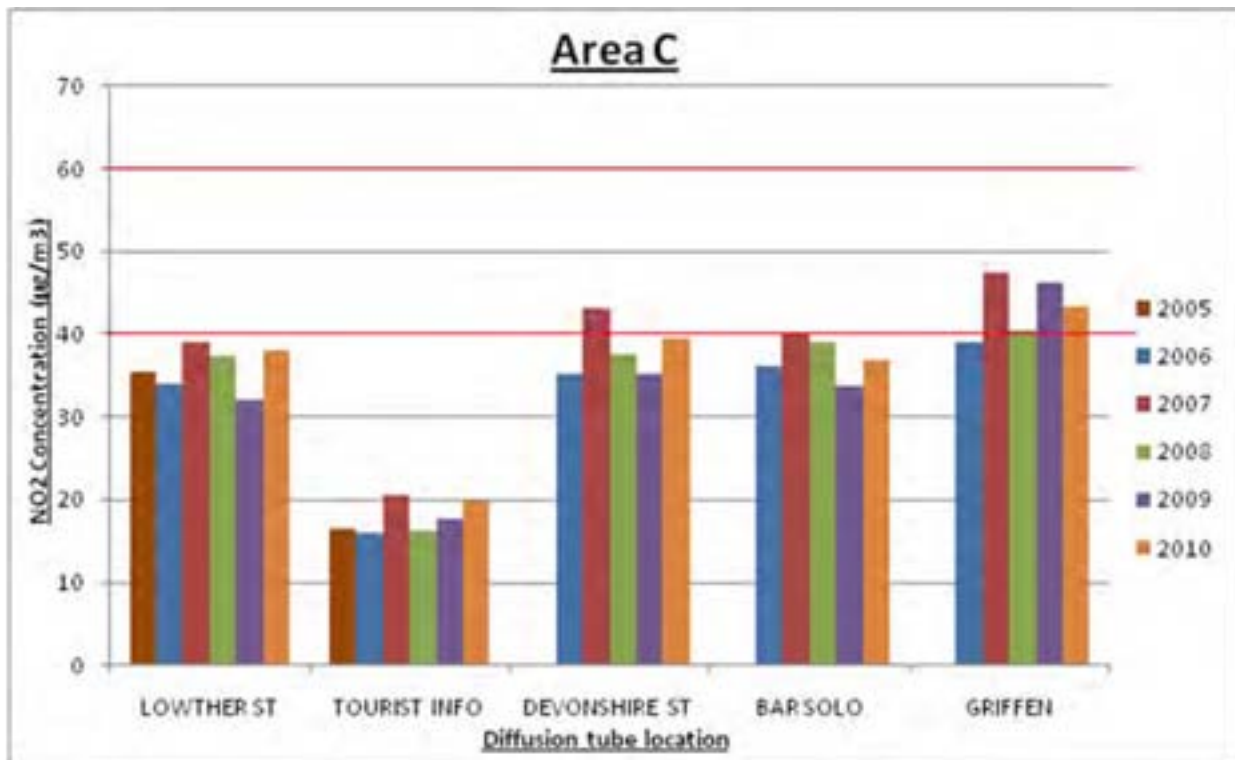
Figure 2.10 Map of diffusion tube locations in area C



Table 2.5c NO² diffusion tube results at monitoring locations in area C.

SITE ID	LOCATION	WITHIN AQMA?	ANNUAL MEAN CONCENTRATIONS ADJUSTED FOR BIAS					
			2005	2006	2007	2008	2009	2010
C1	LOWTHER ST	x	35.3	33.9	39.1	37.3	32.1	38.1
C2	TOURIST INFO	x	16.5	15.9	20.5	16.2	17.6	19.9
C3	DEVONSHIRE ST	x	-	35.1	43.2	37.6	35.2	39.4
C4	BAR SOLO	x	-	36.2	40.2	39.1	33.8	37.0
C5	GRIFFEN	x	-	39	47.3	40.5	46.2	43.3

Figure 2.11 Chart showing NO₂ diffusion tube trends at monitoring locations in area C.



Tube C1 is the only location in this area that is in a residential area, for this reason it is the only location that should be compared to the annual mean objective of $40\mu\text{g}/\text{m}^3$. The data shows that this has not been exceeded.

Tubes C3 – C5 cover the main shopping/outdoor cafe areas within the centre of Carlisle. Results from these tubes should only be compared to the 1 hour mean objective level for nitrogen dioxide which is equivalent to an annual mean of $60\mu\text{g}/\text{m}^3$. This is due to likelihood of people spending longer periods of time in these areas, for example drinking and dining outdoors. All are considerably below this objective level therefore there is no need to proceed to a 'Detailed Assessment'.

Tube C2 is located in a pedestrian precinct in the heart of the city centre. The area is primarily used for shopping, this represents an urban centre reading for NO₂ concentration.

Area D A69 – Warwick Rd

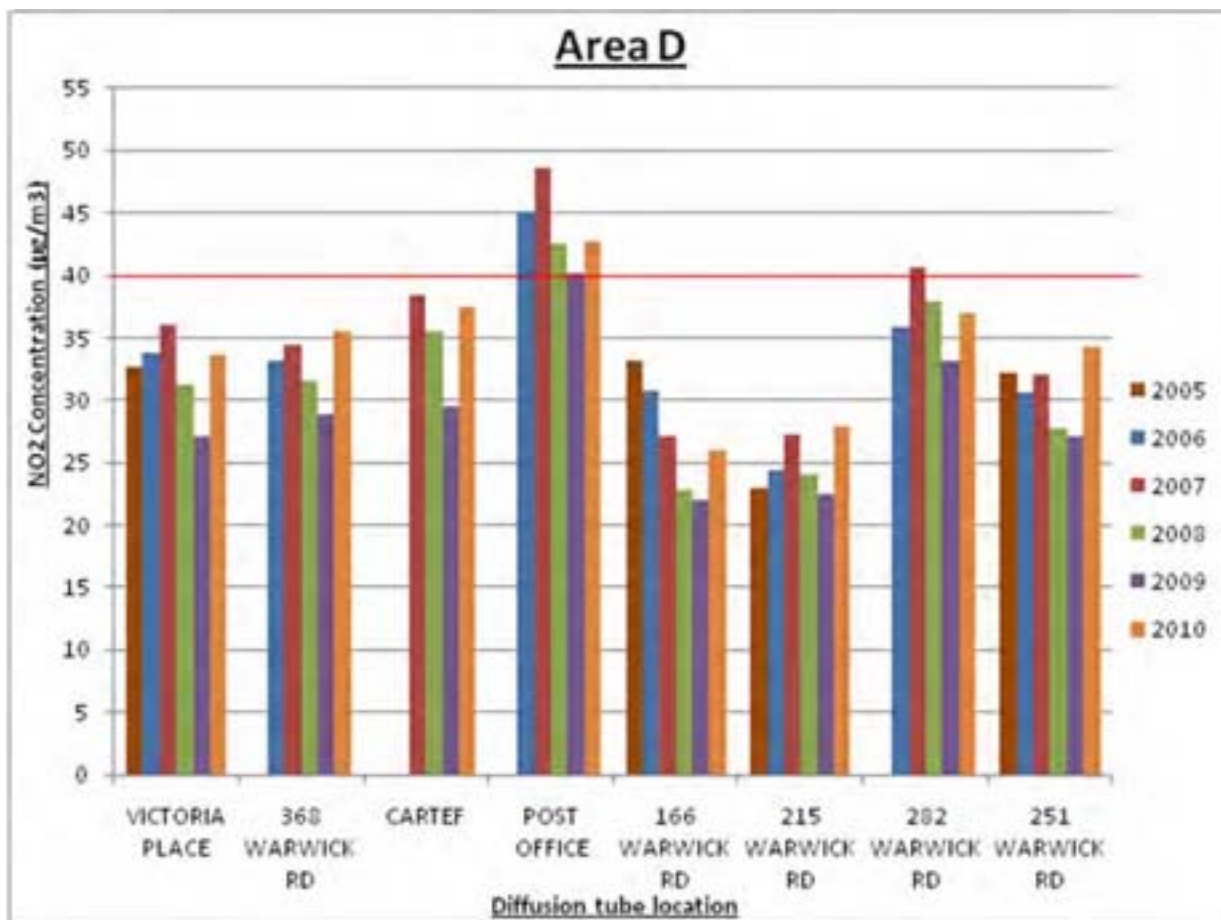
Figure 2.12 Map of diffusion tube locations in area D.



Table 2.5d NO² diffusion tube results at monitoring locations in area D.

SITE ID	LOCATION	WITHIN AQMA?	ANNUAL MEAN CONCENTRATIONS ADJUSTED FOR BIAS					
			2005	2006	2007	2008	2009	2010
D1	VICTORIA PLACE	x	32.7	33.8	36.1	31.2 (29.5)	27.1 (23.6)	33.6 (27.7)
D10	368 WARWICK RD	x	-	33.2	34.5	31.6	28.9	35.5
D11	CARTEF	x	-	-	38.4	35.6	29.4	37.4
D12	POST OFFICE	x	-	45.1	48.7	42.6	40.1	42.8
D3	166 WARWICK RD	x	33.2	30.8	27.1	22.8	22.0	26.0
D5	215 WARWICK RD	x	23.0	24.4	27.2	24.1	22.5	28.0
D7	282 WARWICK RD	x	-	35.8	40.7	37.9	33.1	37.1
D9	251 WARWICK RD	x	32.2	30.6	32.1	27.7	27.1	34.4

Figure 2.13 Chart showing NO2 diffusion tube trends at monitoring locations in area D.



Nitrogen dioxide levels in 2010 have again increased at all locations compared to 2009. This goes against the downward trend that we have previously seen at all locations in this area since 2007.

Despite the rise in NO2 results most locations in this area still have annual mean concentrations that are considerably below the objective level. The only tube location that shows an annual mean which is above the objective is D12 (Post Office). This however this is not a 'relevant location' i.e. it is not adjacent to residential property and there is therefore no need to proceed to a 'Detailed Assessment'.

Results indicate that there are no locations within this area that are at risk of exceeding the 1 hour mean objective level for nitrogen dioxide.

Area E - A595 Caldewgate, Wigton Rd and Newtown Rd (includes AQMA No3 and AQMA No4)

Figure 2.14 Map of diffusion tube locations in area E.

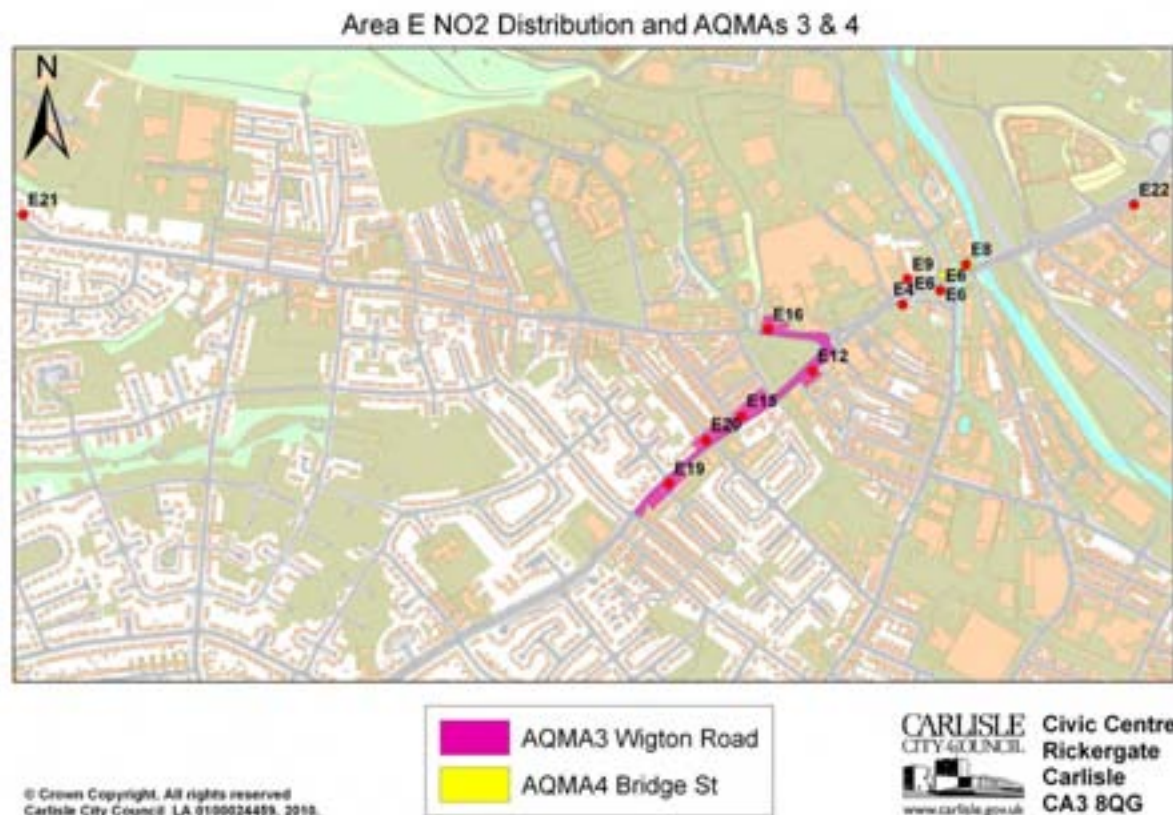
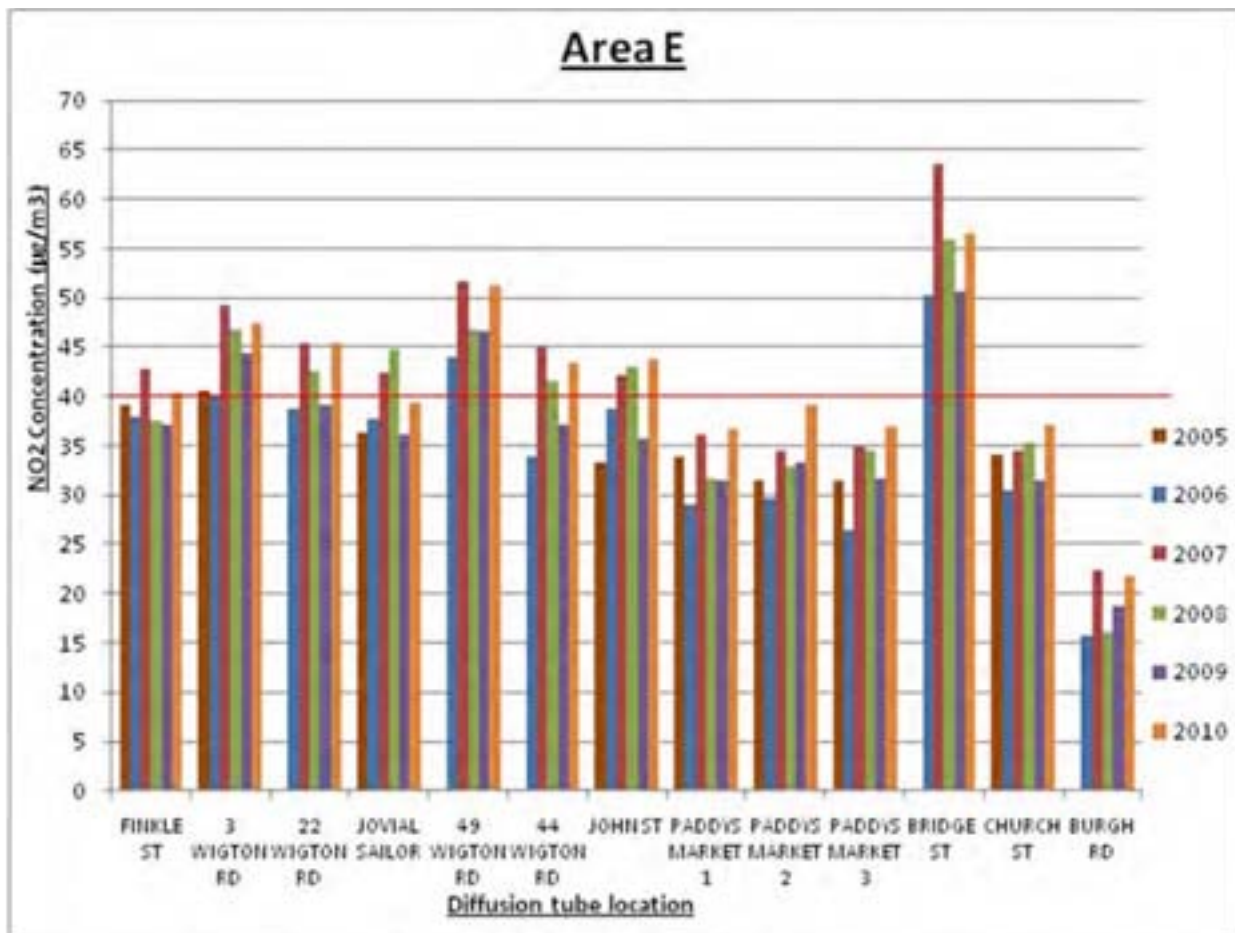


Table 2.5e NO² diffusion tube results at monitoring locations in area E.

SITE ID	LOCATION	WITHIN AQMA?	ANNUAL MEAN CONCENTRATIONS ADJUSTED FOR BIAS					
			2005	2006	2007	2008	2009	2010
E22	FINKLE ST	x	39.1	37.9	42.7	37.6	37.1	40.4
E12	3 WIGTON RD	✓	40.5	40.1	49.3	46.9 (41.5)	44.4 (41.8)	47.4 (44.2)
E15	22 WIGTON RD	✓	-	38.8	45.3	42.5	39.1	45.5
E16	JOVIAL SAILOR	✓	36.3	37.8	42.3	44.7	36.0	39.3
E19	49 WIGTON RD	✓	-	43.9	51.7	46.9	46.7	51.2
E20	44 WIGTON RD	✓	-	33.8	44.9	41.6	37.1	43.4
E4	JOHN ST	x	33.3	38.8	42.2	42.9 (37.8)	35.7 (34.1)	43.7 (40.4)
E6	PADDYS MARKET 1	x	33.9	29	36.1	31.6	31.5	36.8
E6	PADDYS MARKET 2	x	31.4	29.6	34.4	32.8	33.3	39.2
E6	PADDYS MARKET 3	x	31.4	26.5	34.8	34.5	31.6	36.9
E8	BRIDGE ST	✓	-	50.3	63.6	55.8	50.6	56.6
E9	CHURCH ST	x	34.0	30.5	34.4	35.3	31.4	37.2
E21	BURGH RD	x	-	15.7	22.4	16.2 (15.5)	18.7 (16.1)	21.8 (17.9)

Figure 2.15 Chart showing NO₂ diffusion tube trends at monitoring locations in area E.



NO₂ concentrations in 2010 along this main traffic route are higher than the previous year at all locations

Some locations within the AQMAs nos.3 and 4 remain above the objective level. The Updating and Screening Assessment 2009 identified several 'relevant' locations immediately outside the original AQMA No3 on Wigton Rd and Caldcoates which were above the objective level in 07/08. These are essentially along the traffic routes leading up to the Caldewgate roundabout. 'Further Assessment' work has been undertaken which confirmed that it was necessary to extend AQMA No3 to cover these locations. DEFRA were consulted and supported the decision to extend the AQMA, the map above shows the new boundaries since July 2010.

The results show that seven locations have an annual mean above the objective level, four of these locations are within AQMA 3 and one is within AQMA 1. The remaining two locations are E22 (Finkle St) and E4 (John St), both have a borderline result of 40.4µg/m³. This increase is likely to be the result of meteorological variation. For these reasons the same locations will continue to be monitored closely and reviewed in the Updating and Screening assessment in 2012. There are currently no plans to further amend the AQMA.

Results indicate that there are no locations within area E that are at risk of exceeding the 1 hour mean objective level for nitrogen dioxide, this is also supported by results from the nearby automatic monitoring site.

Area F – A6 London Road / Botchergate (AQMA No6)

Figure 2.16 Map of diffusion tube locations in area F.

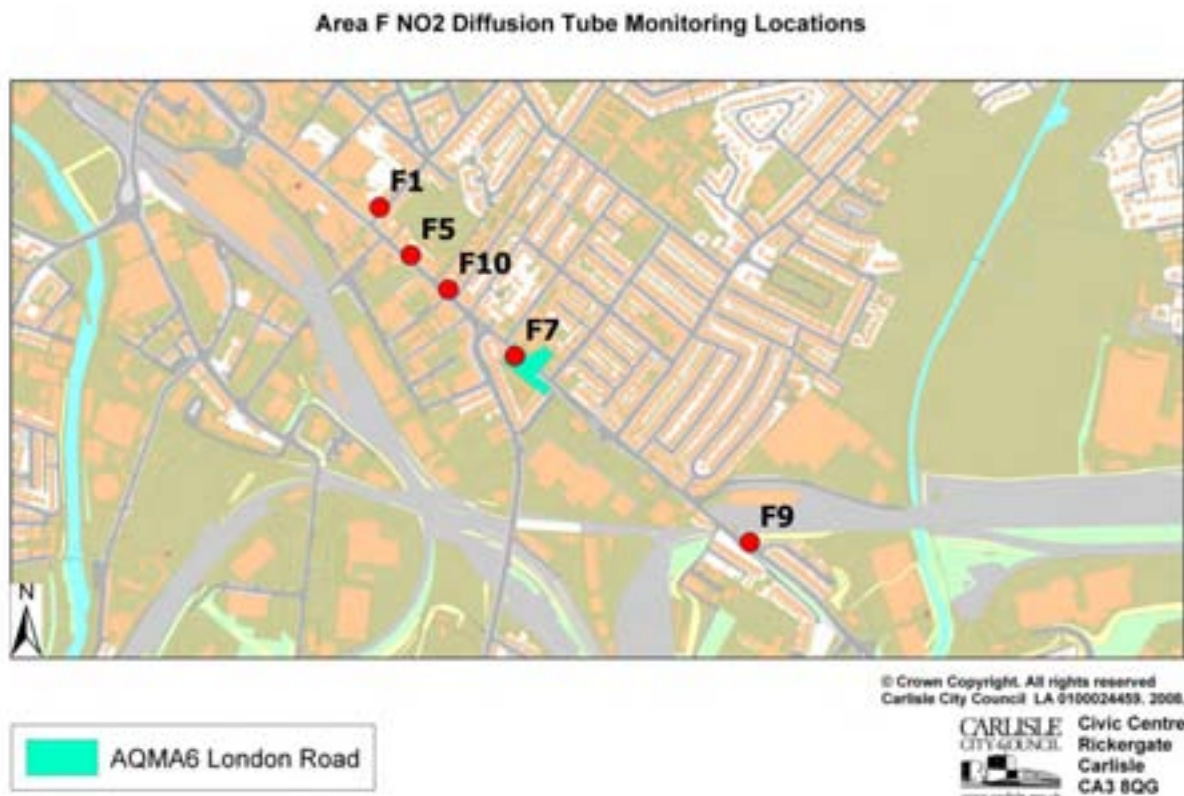
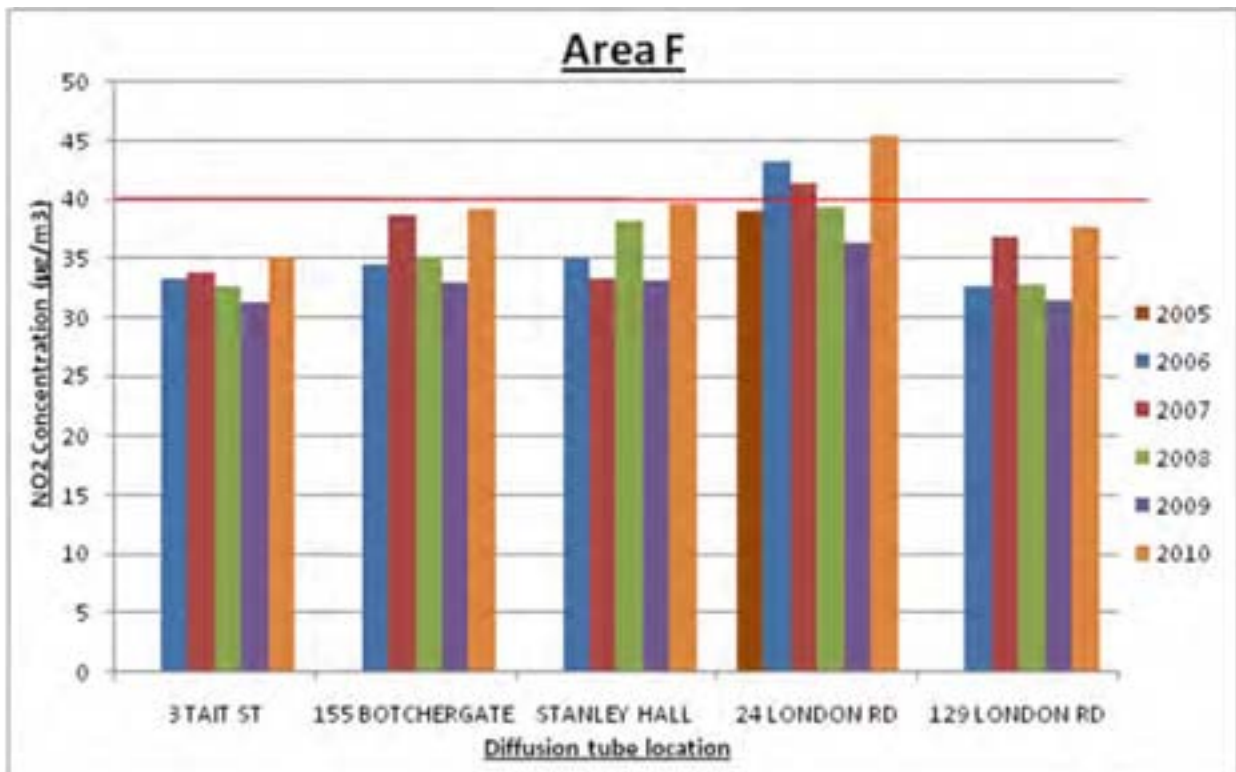


Table 2.5f NO₂ diffusion tube results at monitoring locations in area F.

SITE ID	LOCATION	WITHIN AQMA?	ANNUAL MEAN CONCENTRATIONS ADJUSTED FOR BIAS					
			2005	2006	2007	2008	2009	2010
F1	3 TAIT ST	x	-	33.2	33.8	32.6	31.2	35.1
F10	155 BOTCHERGATE	x	-	34.4	38.7	35.2	33.0	39.1
F5	STANLEY HALL	x	-	34.9	33.2	38.1	33.0	39.7
F7	24 LONDON RD	✓	39.0	43.3	41.4	39.4	36.3	45.5
F9	129 LONDON RD	x	-	32.6	36.8	32.7	31.5	37.7

Figure 2.17 Chart showing NO2 diffusion tube trends at monitoring locations in area F.



Results show that nitrogen dioxide annual mean concentrations have increased from the previous year at every location in 2010. This is again the opposite of the reduction trend which has continued at most locations since 2007.

All locations shown in this area have remained below the objective level apart from F7 (London Road) which is located within AQMA No 6. It is hoped that the completion of the Carlisle Northern Development Route in 2012 should reduce traffic volume in this area to the point where consideration could be given to revoking the AQMA at this location. This would only be the case should there be consistent reduction in NO2 results, which previously took place from 2006 – 2009, resume.

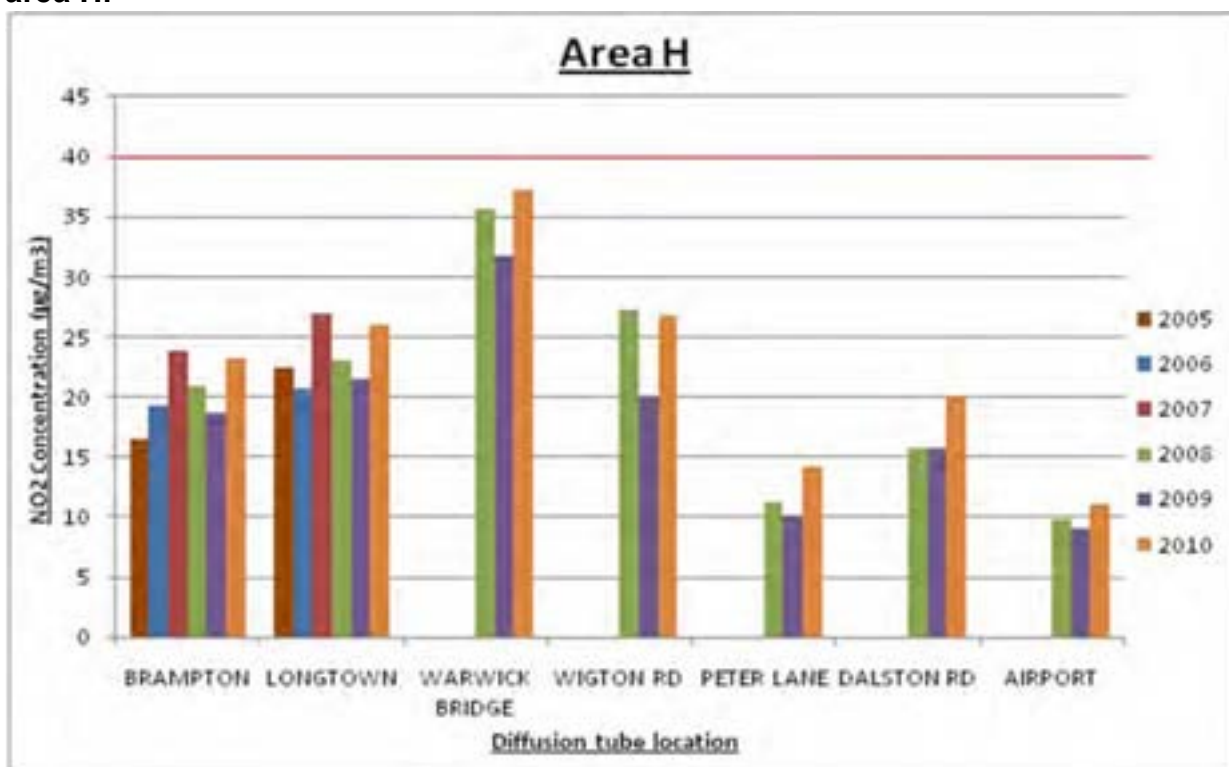
Results indicate that there are no locations within this area that are at risk of exceeding the 1 hour mean objective level for nitrogen dioxide.

Area H – Outskirts of City, Townships and Airport

Table 2.5h NO² diffusion tube results at monitoring locations in area H.

SITE ID	LOCATION	WITHIN AQMA?	ANNUAL MEAN CONCENTRATIONS ADJUSTED FOR BIAS					
			2005	2006	2007	2008	2009	2010
H1	BRAMPTON	x	16.5	19.3	23.9	20.9 (20.3)	18.7 (18.2)	23.2 (22.4)
H3	LONGTOWN	x	22.5	20.7	26.9	23.1 (22.4)	21.5 (20.8)	26.0 (24.9)
H4	WARWICK BRIDGE	x	-	-	-	35.7 (34.5)	31.8 (30.8)	37.2 (35.9)
H5	WIGTON RD	x	-	-	-	27.3	20.0	26.8
H6	PETER LANE	x	-	-	-	11.3	10.2	14.2
H7	DALSTON RD	x	-	-	-	15.8	15.7	20.0
H8	AIRPORT	x	-	-	-	9.84	9.1	11.0

Figure 2.18 Chart showing NO₂ diffusion tube trends at monitoring locations in area H.



Tubes H1 & H3 are located in the next two largest centres of population outside Carlisle. Both are still showing NO₂ concentrations well below the objective level. Tubes H4 – H8 are located on the outskirts of the city. Location H4 (Warwick bridge) showed the highest level, this has been calculated at 35.9µg/m³ when predicting the concentration at the nearest relevant receptor. We will continue to monitor this area in future rounds of review and assessment.

Results from all of these sites indicate that the nitrogen dioxide levels are significantly below the objective levels for nitrogen dioxide and there is no risk of exceeding the 1 hour mean objective level for nitrogen dioxide.

2.2.1 PM₁₀

The TEOM analyser at Paddys Market was upgraded using a Filter Dynamics Measurement System (FDMS) on 18th March 2009. More information on this change can be found in Appendix A. The unit location is not representative of relevant public exposure.

All PM10 data up to 31st December 2010 has been ratified by AEA Group.

The PM10 objective for England is an annual mean of 40 $\mu\text{g}/\text{m}^3$. There is also a 50 $\mu\text{g}/\text{m}^3$ 24 hour mean not to be exceeded more than 35 times per year.

Table 2.6a Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)				
				2006	2007	2008	2009	2010
Paddy's Market	N	Full year of monitoring	94.5	27.3	27.2	20.8	16.8	22.5

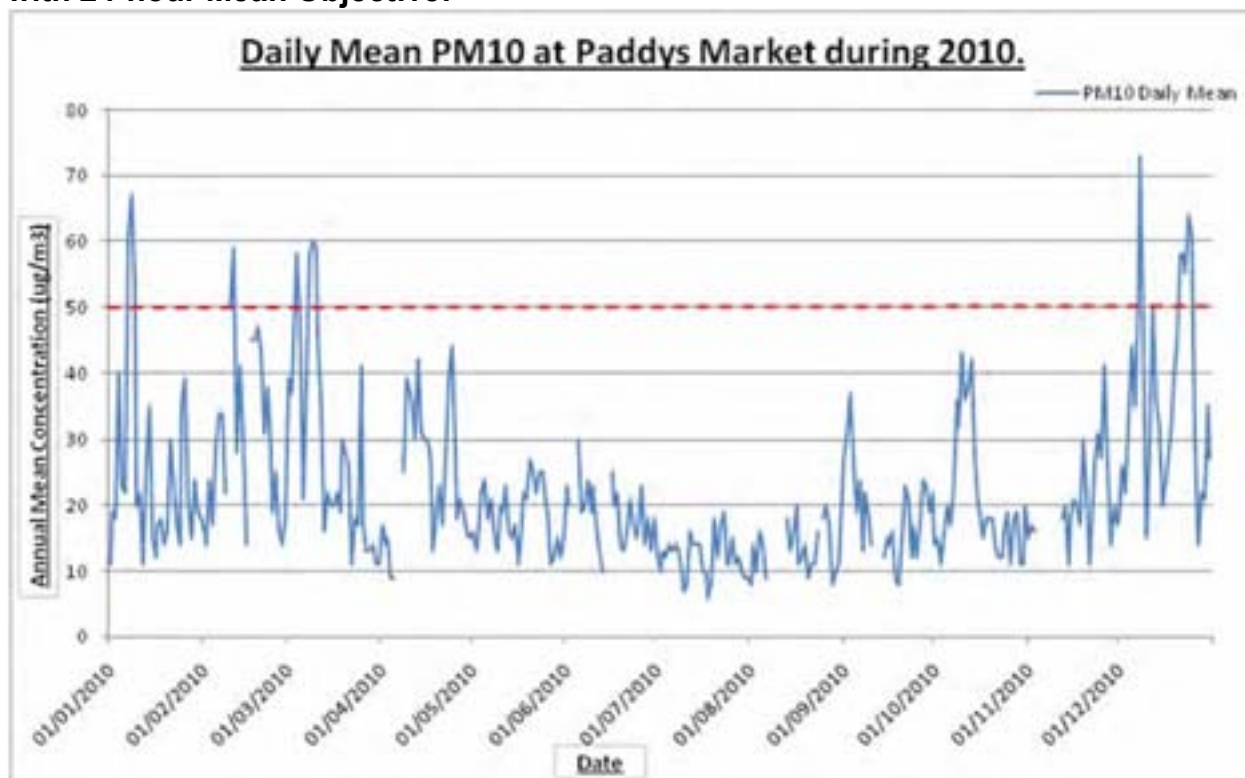
The current annual mean for the study period at Paddys Market is clearly well below the objective level, it is above that of 2009 and it appears to run against a downward trend since 2006. This is the first full 12 months of data that has been collected using the FDMS equipment, which should have a higher level of accuracy.

Table 2.6b Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2010 %	Number of Exceedences of daily mean objective (50 $\mu\text{g}/\text{m}^3$)				
				2006	2007	2008	2009	2010
Paddy's Market	N	Full year of monitoring	94.5	16	11	0	7	18

It is clear from this data that the number of exceedences of the 24 hour mean during 2010 is considerably lower than the objective level of 35 times per year.

Figure 2.19 Chart to Show Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective:



The data above shows that although the daily mean level of 50µg/m³ has been exceeded 18 times during the year, there is no exceedence of the overall 24 hour mean objective for PM10.

2.2.2 Benzene

Carlisle has been monitoring benzene since April 2008 as part of the Non Automatic Hydrocarbon Network. The Objective level for benzene is 5µg/m³ measured as a running annual mean, to be achieved by December 2010.

All Benzene data shown has been ratified by the National Physical Laboratory & AEA who have since taken over management of the Non Automatic Hydrocarbons Network.

Table 2.7 Results of Benzene Monitoring: Comparison with Running Annual Mean Objective

Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Running Annual mean concentrations (µg/m ³)		
				2008	2009	2010
Paddy’s Market	N	Full Year	88.5	0.81	0.92	1.1

This data shows that the annual mean is still considerably below the objective level. The site is also 42 metres away from the nearest relevant public exposure.

2.2.3 PM 2.5

Carlisle City council began measuring PM 2.5 at the Paddy's Market site on 19th March 2009. This is the second stage of our review and assessment work that has reported upon the results of these measurements. This is the first full year of data that has been reported on as part of the review and assessment process.

All PM2.5 data up to 31st December 2010 has been ratified by AEA Group.

Table 2.8 Results of PM_{2.5} Automatic Monitoring: Comparison with Annual Mean Objective

Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)	
				2010	2010
Paddy's Market	N	Full year of monitoring	95.1	11.8	15.54

The PM2.5 objective for England is an annual mean of $25\mu\text{g}/\text{m}^3$, to be achieved by 2020. There is also an exposure reduction target of 15% (measured as a 3-year mean) between 2010 and 2020, applicable at urban background locations.

The 2010 annual mean at Paddys Market is clearly well below the objective level. We will continue to monitor PM 2.5 at this location and report the findings, as more data is collected any trends should become apparent.

2.2.4 Summary of Compliance with AQS Objectives

Carlisle City Council has examined the results from monitoring in the district. Concentrations outside of the AQMA are all below the objectives or borderline at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

Defra guidance requires that details of new local developments, that might affect local air quality, are included in the Progress Report. The new developments which were previously covered in the progress report 2010 have also been included below and, where appropriate, updates are given. These are considered under the following categories:

3.1 Road Traffic Sources

There have been a number of minor changes to roads in the district, in particular changes to junctions to allow increased traffic flows associated with new developments or to reduce the volume of standing traffic. The following summarises the changes and gives an update on any developments that have been previously covered since the last Updating and Screening Assessment in 2009:

- There are no new narrow congested streets with residential properties close to the kerb.
- There are no new busy streets where people may spend one hour or more close to traffic.
- There are no new roads with a high flow of buses and/or HGVs.
- There are no new bus or coach stations.
- Recent improvement works have been carried out on two roads in an attempt to improve traffic flows, these include:
 - Lowther Street - Alterations to the bus lane and lane markings. The scheme aims to improve bus movements, reduce queuing to the Lanes and Lowther Street car parks and to reduce the amount of through traffic on Lowther Street by encouraging vehicles to go via Lonsdale Street and Warwick Road and reduce congestion on Victoria Place. In conjunction with the is the bus lane on Warwick Road has been converted to allow two way traffic on Warwick Road, providing a more direct route from Lowther Street to the East (A69). This was completed and implemented in June 2010 with some controversy and the County Council are currently compiling traffic data to give an indication of its success.
 - Castle Street scheme - Work started on site in early June 2010 and the project has now been implemented and completed. The scheme aimed to improve the area for pedestrians. It has also reduced the on street car parking provision and so far the scheme appears to have substantially reduced the amount of traffic that had previously circulated on Castle Street / Fisher Street and St Mary's Gate. This was carried out as part of the Roman Gateway scheme that aims to improve the link between Tullie House and Bitts Park.

- There have been new developments to two road junctions within the city these include:
 - London Road - alterations to junctions to accommodate a new Aldi Supermarket development. This has widened the Petheril Bank Road / London Road junction to include an extra lane for traffic turning into Petheril bank Road where the entrance to the supermarket is located. This has served to reduce the amount of queuing traffic at this junction. The now completed scheme also includes bus stop lay-bys, which is intended to reduce the amount of traffic queuing behind buses while passengers board / alight.
 - Lowry Hill / Kingstown Road junction - improvements to the signals to provide a right turn lane on Kingstown Road for vehicles turning into Lowry Hill and a left turn lane from Lowry Hill to Kingstown Road. These alterations to the lane markings associated with the implementation of part time signals should reduce the amount of queuing traffic. This work is now completed and the County Council traffic data will be able to give an indication of its success
 - There are new planned improvements to signalise the Asda & Parkhouse Road junction this is associated with the implementation of the CNDR and will improve the traffic link between the city bypass and industrial estates at the North of the city near junction 44 of the M6.
- As discussed in previous rounds of review and assessment there has been one major new road development; the CNDR. Construction has commenced since the Updating and Screening Assessment 2009 and is still ongoing. Due to unexpected delays the completion date for this city bypass was put back, it is now on target for completion in Spring 2012. It is expected that this will improve overall air quality within the city in particular our two largest AQMA's No.1 (A7) and No.3 (Wigton Road).
- There are no other new roads constructed or proposed since updating and screening assessment in 2009 except minor roads associated with new residential developments.

3.2 Other Transport Sources

As well as road vehicles, public exposure to emissions from planes, buses, trains, ships etc must also be considered. The following summarises the changes since the last Updating and Screening Assessment in 2009:

- There are no new locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.
- There are no new locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.
- Carlisle City Council has no ports for shipping.
- Carlisle City Council does have an airport in the district. As discussed in previous rounds of review and assessment there have been various applications made to develop the airport and negotiations are ongoing. Essentially the airport itself has

remained unchanged since April 2009 and it still operates as a small runway for light passenger/pleasure aircraft. Any changes to the airport will be re-examined in the next round of review and assessment.

3.3 Industrial Sources

For the purpose of this section of the report it is necessary to look at new or changed industrial sources of air pollution. The following summarises the changes since the last updating and screening assessment in 2009:

- There are no new or proposed installations for which an air quality assessment has been carried out.
- There are no existing installations where emissions have increased substantially or new relevant exposure has been introduced.
- There are no new or significantly changed installations without a previous air quality assessment.
- There are no new major fuel storage depots storing petrol.
- There are no new Petrol stations.
- There is one newly permitted poultry farm since April 2009 this has been established in a rural area on Bow farm near Moorhouse village. The two broiler sheds were built in 2004 and have the capacity to house 110'000 broiler chickens for meat production. As part of the permit application comprehensive management plans were submitted including fugitive release, noise and odour. The permit, granted by the Environment Agency, was effective from 21/12/09.

Two other free range poultry facilities have been granted permission by the planning department; one at Broomhills on Orton Road (12000 birds) and another at Thorneyland, Easton (8000 birds) both are for free range egg production. Neither facility required an Environmental Permit under the Environmental Permitting Regulations 2007 as the proposal does not meet the 40,000 poultry places threshold.

3.4 Commercial and Domestic Sources

For the purpose of this section of the report it is necessary to look at new or changed commercial & domestic sources of air pollution. The following summarises the changes since the last updating and screening assessment in 2009:

- There are no new individual biomass combustion plants.
- There are no new areas where the combined impact of several biomass combustion sources may be relevant.
- There are no new areas where domestic solid fuel burning may be relevant, however the council is in receipt of an increased number of enquiries regarding the installation of wood burning stoves. This also includes the installation of

exempt appliances in smoke control areas and the use of exempt smokeless fuel. This is a trend that appears to cover the whole of the city and will be addressed in more detail in the Updating and Screening Assessment 2012. It is, however, difficult to quantify the combined effects on air quality from these sources.

3.5 New Developments with Fugitive or Uncontrolled Sources

For the purpose of this section of the report it is necessary to look at new developments with uncontrolled or fugitive sources of air pollution. The following summarises the changes since the last updating and screening assessment in 2009:

- There are no new landfill sites.
- There are no new quarries.
- There are no new unmade haulage roads on industrial sites.
- There has been a new waste transfer station established in the district since April 2009. Brampton Skips is a skip hire and waste sorting facility at Kingmoor Park. It is situated on an industrial estate near Rockcliffe, 4-5 miles outside of the city, this site is now operational.

Works have begun on an extension to the main landfill site for the district which is located at Hespian wood. The decision was made to build a mechanical biological treatment plant which is designed to sort household waste and reduce the amount currently going to landfill. The process is expected to begin in August 2011 and following a 6-9 month implementation period it is expected to be fully operational.

The process involves the residual (black bag) waste from doorstep collections. Essentially the waste will be shredded then biologically treated and dried for 7 days before plastic, steel, aluminium and other recyclables are removed. A fraction of the remaining waste will be composted and some sent to landfill but the majority be compressed and sent South to be used in industrial biomass incinerators.

The new plant is expected to reduce landfill waste by 75-80%. It will be an indoor process and the plant will operate under a negative pressure system with emissions being directed through a bio filter. Another very similar site in Dumfries and Galloway has been operational for around 4 years, this is reported to have had no issues with particulate and dust emissions.

- There are no other new potential sources of fugitive particulate emissions.

Carlisle City Council confirms that there are no new or newly identified local developments which are likely to have an impact on air quality within the Local Authority area.

Carlisle City Council confirms that all the following have been considered –

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Planning Applications

Since 1st April 2010 Carlisle City Council has received a number of applications for a whole range of new developments, most of which are small and insignificant in terms of air quality impacts however there are also a number of major new developments that have been granted permission or are currently being considered by the planning department. Some of the developments below were included in the progress report 2010 and in these cases details of any application decisions or amended proposals are given:

Morton Development

The original application made in May 2009 was for the proposed development of land for a Maximum of 852 residential dwellings, 40000 m² of floor space used for employment, such as offices and warehousing, as well as public open spaces.

The proposed location is open agricultural land at Morton bounded by Peter Lane, Wigton Road and Dalston Road, the North-Eastern boundary backs onto existing suburban residential properties. It would be located right on the edge of the city, to the West, in an area which is predominantly residential. See appendix F for map. This application has now been granted, at committee, subject to legal agreement.

Since the original application subsequent applications have been submitted for adjacent locations in this area of the city:

- In October 2010 an application was received for further development, on adjoining land to the North of the original proposal, adjacent to Wigton Road and South of Ellesmere Way. See appendix F for map. This comprises a retail food store, petrol filling station, crèche, restaurant/cafe and take-away, with associated car parking and landscaping. A decision has now been made by committee to grant this application.
- A further outline application was received in April 2011 for a residential development. It is expected to consist of approximately 160 new homes and is currently in consultation period. The proposal is located toward the South East corner of the original site, on land adjacent to Peter Lane and bounded by Dalston Road, Peter Lane and Newby West. See appendix F for map.
- A final application has been received in November 2010 and relates to the Garden Village area of Morton. The application comprises the erection of 253 dwellings, associated access, parking, engineering works and landscaping. It is currently in consultation period. This is located to the West of the original site on the opposite side of Wigton Road. See appendix F for map.

An Air Quality Impact Assessment (EIA) has been submitted as part of each of the first two applications detailed above (original 852 residential properties & the Ellesmere Way supermarket project). Consideration is being taken as to the combined impact of the above proposals as they are all in close proximity to one another and together they combine to make the Morton Master plan. For this reason the latter two smaller residential proposals were called in by the Secretary of State

who determined that neither was sufficient to warrant an EIA as part of the planning process.

Tube H5 was placed on the roadside at the proposed entrance to the original site in 2008 when the application was first rumoured. Since then the annual mean for NO₂ at this location has been considerably below the objective. Other tubes that have been positioned adjacent to the site include H6 and H7 both of which are also consistently well below the objective level.

The air quality impacts are uncertain in that traffic flow along Wigton Road (AQMA 3) could increase due to the increased density of the population in the area but at the same time the supermarket would have a large catchment in the west and rural areas reducing the need for journeys into the city centre for shopping purposes. The site entrance is planned to be right next to a junction onto the CNDR which is likely to direct much of the traffic flow around the city bypass.

Carlisle Lake District Airport

A recent planning application to expand and develop the existing airport was refused, on appeal, in court in 2010. Since then, however, a new modified application has subsequently been submitted. This includes plans for a distribution centre inclusive of air freight and road haulage, permission is sought for integrated chillers, workshops, offices, a gatehouse, new access, auxiliary fire station and a raised re-profiled runway. A new expanded environmental Impact assessment containing an Air Quality Impact Assessment has been submitted as part of the proposal, which is currently in consultation period. See appendix F for map of location.

Tube H8 was placed on the roadside near to the existing site entrance in 2008 when it became clear that expansion was a possibility. Since then the annual mean for NO₂ at this location has been consistently below the objective and this year showed an 11.0µg/m³ annual mean.

Westwood (Dobbies) Garden Centre

This application was submitted in May 2010 and has since been granted subject to legal agreement. The proposal incorporates a restaurant/café and farm food hall, with ancillary works including car parking, a new vehicular access road with a roundabout off the A595, outdoor display/demonstration areas, a farm yard display area and associated landscaping.

The application site extends to 7.47 hectares, it is situated approximately 3.5 kilometres to the southwest of Carlisle, on the eastern side of a minor road that links Orton Grange with the village of Dalston. See appendix F for map of location.

There is no air quality monitoring data for this particular locality, however, the development would be positioned outside of Carlisle, in a rural area, apart from any centres of population. There are no current traffic issues in this area and it is not anticipated that the garden centre will generate such volumes of vehicles that are likely to give rise to any air quality concerns.

Kingmoor Hotel

This outline application was first submitted in Jan 2007 however development has been delayed and, as a result, a further application to renew the unexpired permission for a further 5 years was received by the council in September 2010. This has since been granted. The proposal incorporates the Development of a 130 bedroom hotel up to 5 storeys in height, with ancillary conference centre, health and fitness centre, restaurants and bar together with associated car parking.

The site consists of 2.95 hectares of land situated adjacent to the north side of the intended leg of the Carlisle Northern Development Route (CNDR) from Junction 44 (Greymoorhill) of the M6 into Kingmoor Park. A roundabout to be built as part of the CNDR works would be adjacent to the proposed site's southern frontage. See appendix F for map of location.

This development is proposed for the northern fringe of the city and any increased traffic associated with the development is likely to be based around the CNDR and M6 junction. Guests staying in the hotel may enter the city centre via the A7 (AQMA 1), which may cause a slight increase in traffic volume. It is expected that any increase would be easily offset by the relief from the CNDR, the completion of which is depended upon by the hotel proposal.

Crindledyke Development

This application was submitted in July 2009 for the proposed development of a maximum of 950 residential properties, ancillary local community facilities; including a school, a community building and open public space. The total area of the site is 29.08 hectares.

This development is proposed for open land at Crindledyke bounded by the North West mainline, the M6 and Kingmoor industrial estate. It would be located in an area which is semi rural farmland to the North West of the city. See appendix F for map.

An Air Quality Impact Assessment as been submitted as part of an Environmental Impact assessment. The EIA was considered unsatisfactory as it did not take into consideration the combined impacts of other new local developments. An amended assessment was submitted and the application is still in a consultation period.

Caldewgate Development

This application was submitted in June 2009 the application has since been approved at committee in February 2011. This consists of the proposed erection of a class A1 food store comprising 8886 M² gross external area and a 5514 M² Net Sales floor space. It also includes a petrol filling station of 132 M² gross external floor space and 70M² net sales, ancillary development and some car parking.

This development is proposed for a brown field site at the junction of Bridge Street and Bridge Lane in Calewgate. See appendix F for map.

An Air Quality Impact Assessment as been submitted and considered by Environmental Health and independently by our private consultants AEA Technologies. It was deemed that the air quality impact of the development would be negligible despite the fact that it is to be located just outside AQMA 4 (Bridge St) and near to AQMA 3 (Wigton Rd) and AQMA 5 (Dalston Rd).

Richard Rose Morton Academy development

Planning permission has been granted and works are ongoing on an extension to the Richard Rose Morton Academy. This includes demolition of parts of the academy, improved sports facilities and the erection of a new academy for 1150 students. The vehicular entrance is also to be relocated.

The academy is located close to the edge of the city to the South West, in a location bounded by Wigton Road, Queensway and Haycock Lane. See appendix F for map.

An Air Quality Impact Assessment was not requested however it would appear that the changes are mainly intended to improve facilities. The overall increase in the number of students is likely to be minor however there is expected to be more vehicle movements to and from the site on evenings and weekends.

Denton Business Park development.

This application was received in September 2009 and has since been granted, subject to legal agreement, in April 2011. It includes the demolition of former storage and workshop buildings and the erection of new buildings to house 40 craft/art workshop units, retail facilities, admin support and performance areas. Plans include 196 student bedrooms which may also be used by the occupants of craft/workshop units. It also proposes the creation of 2 additional flats, alterations to two other flats and facade alterations to 36-40 Denton Street.

The proposed site is in the Denton Holme area, just outside the city centre to the south, on a Brownfield site bounded by Denton Street, Lorne Street and Milbourne Street. See appendix F for map.

The proposal is to have good cycle connections with the city's improved cycle path network and, due to the location, there are very few parking spaces. It is not anticipated that the student dwellings will have an impact on traffic flow in the area and the road layout in the area means that the effects of the development on any of our AQMA's is likely to be negligible.

5 Air Quality Planning Policies

The Environmental Health department and Planning department continue to work closely to discuss the potential air quality impacts of new developments.

In 2006 we produced a local guidance document, Air Quality and Land use planning 2006, this is aimed primarily at applicants where proposed developments may affect air quality through attracting significant numbers of road vehicles. It is also relevant where there is likely to be significant emissions from a particular industrial or commercial source. It outlines the key trigger values that have been developed to assist in deciding whether an Air Quality Impact Assessment (AQIA) is required as part of a planning application. This supplements the Environmental Protection UK guidance 'Development Control: Planning for Air Quality' this is updated guidance from 2010 and deals with air quality concerns within the development control process. Both documents are closely followed to ensure that there is a clear understanding of best practice in both Environmental Health and Planning.

In the event that an AQIA is required we endeavour to work closely with any private consultants involved, from an early stage, to help specify the extent of investigation that is required. This usually involves detailed consideration into the potential impacts on our declared AQMA's. Once the AQIA is submitted to us we can evaluate its findings and suitability then, if necessary, we can present it to our own independent consultants AEA Technologies for their views. This allows us to make informed comments to the planning department as necessary; these can then be considered when planning conditions are drawn up.

6 Local Transport Plans and Strategies

The County Council has developed Local Transport Plan 2 (2005/6-2010/11) this is the most up to date plan however a draft 2011 - 2026 has been submitted and is awaiting approval; this is expected to be implemented by June 2011. The following are some of the measures detailed within the LTP that relate to bringing about air Quality improvements:

The key priorities in Carlisle are addressing transport and movement issues that limit economic vitality and growth in the City of Carlisle and improving accessibility in the rural parts of the district. The city is identified as a regional centre for economic growth. The approach in Carlisle is to work effectively with the initiative to support the new development opportunities and to implement the Carlisle Northern Development Route. Measures will be implemented to assist public transport, cycling and walking in the city. Ways of improving access to essential services from the rural areas will be based on developing demand responsive transport measures and opportunities presented by the Tyne Valley Line.

Congestion issues:

Journey times on the radial routes in and out of the city can be long and unpredictable due to traffic congestion at key locations at peak times. Bus services within and through the city suffer from unreliability and extended journey times in the morning and afternoon peaks because of this. Travel to work and school by car are seen as the major causes of congestion in Carlisle.

The Carlisle Northern Development Route (CNDR) will provide an opportunity to reduce some traffic congestion in the city centre and 'lock in' these benefits by giving greater priority to access by bus, walking and cycling. In addition, implementing a 'smarter choices' programme would combine physical infrastructure measures with softer publicity and awareness measures to influence travel behaviour and reduce congestion through transfer of trips from car to bus, cycling and walking.

In April 2011 Cumbria County Council put forward a bid to secure £5 million to the Department for Transport's Local Sustainable Transport Fund. This would involve a 4 year programme of initiatives and improvement schemes and will allow the implementation of many of the Local Transport Plan measures to be implemented effectively. The outcome of the bid should be heard in June 2011. The City Council will work closely with the County Council and some of the measures that will be developed for the updated action plan will be closely linked to the new transport plan and the recent bid, should it be successful.

Public transport connections for rural communities into Carlisle, Brampton and Longtown will be enhanced through further development of the already successful Carlisle Rural Wheels project. City bus routes with highest potential for passenger growth identified in partnership with Stagecoach North West will receive priority for raised kerbs and bus boarders at bus stops to create Quality Bus Routes. Plans for these improvements are also included in the recent bid. Partnership with Stagecoach will ensure that low floor vehicles are directed to these routes alongside better signing and road marking, and timetable information. Similar improvements will be

made at important individual bus stops, for instance where demand responsive services such as Carlisle Rural Wheels converge on the scheduled network.

The council will continue to support the Community Minibus scheme in Carlisle Area. It will develop Carlisle Ring and Ride to provide transport opportunities for people in the city who cannot use conventional public transport because of disability.

The urban cycle networks for Carlisle has been defined and Longtown and Brampton will follow. Measures to fill gaps will be prioritised to encourage cycling to work and school. The council will seek to facilitate improvements to longer distance national and regional recreational cycling routes where these coincide with the urban network. These plans are also included in the Local Sustainable Transport Bid.

Reallocation of highway space on some of the radial routes and within the city centre to cycles and pedestrians will be part of the measures implemented to maximise the benefits to the city of the CNDR.

Work will be carried out to develop priority bus routes on the radial routes into and out of the city on the A6 London Road, A7 Scotland Road and A595 Wigton Road. Combined with a “smarter choices” programme, this would maximise the impact upon modal choice and congestion. The council will help and promote developing Work Travel Plans with the major employers and clusters of employers including Kingmoor Park and the councils, hospitals and colleges. Improved access to the Kingmoor Park employment from residential areas and the city centre site by all modes will be a priority.

Mobility Plans will be prepared for Carlisle, Longtown and Brampton within this Plan period in order to progressively remove barriers for all transport users, taking particular account of the needs of people with impaired mobility. The focus will be on pedestrian links between the rail stations and main bus stops, car parks and town centre facilities. As part of the annual programme of works many upgrades across the district have been made to lower kerbs and improve bus stop facilities. The Cumbria Disability Network will be a key partner in helping to provide user perspective and advice on accessibility and mobility, workshops and discussions in relation to this are ongoing.

In Carlisle Area the aim is to provide for the transport needs of economic growth and regeneration where appropriate. This involves improving access generally to West Cumbria while reducing the impact of traffic and enhancing the environment of town centres and sensitive rural areas on the routes, where greater priority will be given to vulnerable road users. Measures to improve access to Carlisle Airport and to help the development of employment opportunities there will be considered as required. A South-Eastern Environmental Route has long been sought to complete a ring road around the city once the CNDR is in place. This proposal will be considered in the context of access to North West Cumbria from the M6 and the problems of lorry movements.

Key measures for implementation within Plan period

Nelson bridge junction

The Nelson Bridge scheme undertaken in 2005/6 is now complete; this relieves city centre traffic congestion at peak times at a key pinch point on the through traffic

network. The scheme incorporates improved pedestrian and cycle facilities as well as more efficient traffic flow.

Bus route and real time information

This scheme has been developed in partnership with Stagecoach North West to provide real-time bus information at stops in the city centre and on route to the infirmary. The scheme develops a pilot system trialled in 2005/6 and is linked with the Urban Bus Challenge project in the city. Works on this measure are ongoing and there has been little expansion of the scheme during 2010 due to lack of funding. However trial scheme is currently operating well on key routes. If funding becomes available through the Local Sustainable Transport Fund, this will be extended to other routes in the City.

Quality bus routes in Carlisle

Investment to provide better bus route infrastructure will be prioritised on those city routes identified jointly with operators that will give the best patronage growth. Passenger boarding and waiting facilities and bus service information has been enhanced this year on some key routes in the city. Works are planned to further improve waiting facilities on Lowther Street. Raised kerbs and bus boarders will be provided on identified routes to improve bus accessibility, particularly for mobility impaired users. These measures will assist in reducing road congestion by making buses more attractive, convenient and accessible, and through this will continue to underpin commercial bus operation in the city. This measure has been implemented and the extent of which will be detailed in LTP3.

Cycling and Walking measures in Carlisle

School and Work Travel Plans are identifying small scale improvements that improve permeability of the city centre on foot and bicycle. These will contribute to modal shift and consequent public health and environmental benefits as well as assisting in developing a public realm that supports an economy reflecting the City's regional status. Measures have been implemented and improvements have been reported by County Council. The Caldew Cycleway is programmed for completion in 2011/12. This will provide a continuous link from Denton Holme to the City Centre. Developer contributions will be used to improve the cycle network in the City and to ensure that new developments are accessible on foot and bicycle.

Additional measures identified for investigation by LTP 2:

1 The traffic issues identified as a priority in Carlisle City require a strategic assessment of parking provision and management. The City Council and the chamber of commerce will be key stakeholders and partners in this assessment.

2 Improvements to the public transport network in Carlisle to achieve LTP targets and tackle congestion require identification and evaluation of options for central interchange arrangements.

3 The strategic transport requirements identified in the Spatial Strategy for access to North West Cumbria, together with the traffic congestion and environmental quality priorities in the City require an assessment of options for rerouting local through traffic to avoid the city centre. Options would need to include alternative routes for the South West sector.

7 Climate Change Strategies

The council has in place three key documents relating to climate change these are summarised as follows:

- In the Nottingham Declaration the council acknowledges the occurrence of climate change and it outlines the council's commitment from the 15th January 2007 to, amongst other things, achieve a significant reduction of greenhouse gas emissions from our own authority's operations. It identifies key areas where this can be achieved including energy sourcing and use, travel and transport, waste production and disposal and the purchasing of goods and services.

The declaration shows commitment to working with central government to contribute, at a local level, to the delivery of the UK Climate Change Programme, the Kyoto Protocol and the target for carbon dioxide reduction by 2010. The document is signed by the council's Chief Executive, Leader of the Council, the Minister of State for Climate Change and the Environment (DEFRA) as well as the Parliamentary Under Secretary of State (DCLG)

- As part of Carlisle City Council's Carbon Management Programme the Carbon Management Plan (CMP) was introduced in 2008 and is due to be reviewed in April 2013. The plan was developed with the Carbon Management Trust in order to meet the following objectives:
 - Lead by example in reducing carbon emissions in the Carlisle area
 - Reduce energy and fuel consumption and expenditure on bills
 - Meeting legislative and government requirements through the performance framework
 - Embed fuel and energy efficiency into the Council's corporate culture and working practices
 - Allocate roles and responsibilities for reducing carbon emissions
 - Support our partners – Carlisle Leisure Limited and Community Centres in delivering carbon reductions
 - Establish an effective monitoring system of consumption and savings achieved
 - Set informed carbon reduction targets to guide progress.

The key messages from the Carbon Management Plan are:

- *If we do nothing, annual utility and fuel costs to the City Council and our partners are likely to increase from £1,127,000 to £1,748,000 by 2013 and carbon emissions will rise unchecked.*
 - *If we apply the carbon management programme, we could reduce the total cumulative cost by £1,344,000 during the same period of 5 years and save 5,580 tonnes of carbon dioxide.*
- The Climate Change Strategy was developed in 2008 to be reviewed in 2012 the purpose of this was to draw together these achievements along with aims, objectives and milestones to measure success. These objectives are as follows:

Ensure that our operations and services address the issue of climate change

How we will measure success:

- Completion of a climate ‘proofing’ assessment of key Council policies, strategies, action plans and procedures to ensure that they are systematically lowering carbon emissions and ensuring that decisions are resilient to climate change.
- A corporate Climate Change group is established to oversee the implementation of the Climate Change Strategy.
- Staff and Members are aware of the implications of climate change, how it affects our operations and services and receiving training and support where needed.
- Carlisle is achieving targets against our performance indicators on climate change.
- The City Council’s partners, businesses and the wider community have developed a Carlisle Climate Change Action Plan

Reduce the City Council’s carbon emissions associated with our operations

How we will measure success:

- By April 2013 Carlisle City Council will have reduced CO2 emissions from its operations*. An aspirational target of 25% on 2007-08 levels will be aimed for.
- Procurement decisions take a whole life cycle approach that includes associated carbon emissions.

Ensure that the City Council’s operations and services are adapted to climate change

How we will measure success

- All directorates have undertaken a climate change impacts assessment of their operations and services
- By 2012 Carlisle City Council and our key partners will be implementing an adaptation action plan and monitoring progress.

Establish climate change as a priority issue for the Carlisle Partnership

How we will measure success

- The target of achieving a 3% reduction per annum on CO2 emissions per capita for Carlisle is being achieved.
- Carlisle Partnership members have put in place carbon reduction plans and report their action.
- Carlisle Partnership will have undertaken a local climate change impacts profile for Carlisle.
- Carlisle Partnership is playing an active role in helping local communities, businesses and partners to work towards a climate proofed Carlisle through the development and delivery of a Carlisle Climate Change Action Plan.

Develop more environmentally friendly transport choices

How we will measure success

- The City Council and Carlisle Partnership are engaging with local employers on the potential for partnership working through the development of Green Travel Plans.

Make planning an effective tool in the pursuit of a climate proofed Carlisle

How we will measure success

- Planning policies include targets and standards for addressing climate change.

Support improvement in the energy efficiency of Carlisle's housing stock

How we will measure success

- Targets are being met for the Decent Home standard and fuel poverty indicator.

8 Implementation of Action Plans

The following table gives an update on the implementation of the measures outlined in Carlisle City Councils most recent Air Quality Action Plan. The plan was originally produced in 2007 and it will be reviewed and updated in 2011. The new version will be submitted to DEFRA and will detail the current initiatives that are being implemented across the district as a new improved collection of Action Plan measures.

Table 8.1 Action Plan Progress

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1	A new major road, the CNDR, will be constructed to the west of the City, which will remove approximately 25% of through traffic from the A7 (AQNA no1) and the A595	Reduction of traffic volume and HGV's through the city	Cumbria County Council	<2007	2007-2012	Reduced NO2 levels at monitoring locations and within AQMA's.	Anticipate approx 25% reduction in NO2 in city centre.	Contract signed and construction now underway. Traffic count data being collected for comparison.	Contract signed and construction now underway.	2012	Predicted major reduction in vehicle emissions within the city.
2	Inner Orbital Relief Route. Plans in place to provide a stronger route to ease congestion between the A6 & A7 through to the A595 by a series of junction improvements and widening of the road where possible.	Improve traffic flow and reduce standing traffic at key inner city junctions.	Cumbria County Council	2007 - 2010	Unable to specify	Reduced NO2 levels at monitoring locations and within AQMA's.	Not Calculated	Study complete. Proposal is now part of the 'Strategic Overview of Transport in Carlisle'	Consideration of plans, undertaking study and organisation of proposal.	Proposal to be presented to full County Council by 2011. Decision to be made by County Council.	Road improvements will run directly through 3 AQMA's. This should result in reduced vehicle emissions in these areas.
3	Investigations to improve traffic flows in the city particularly at signals along the A7 & the A595.	To improve traffic flows along two main arterial roads.	Cumbria County Council	2007 - 2010	Ongoing from 2010	Reduced NO2 levels at monitoring locations along both roads and within AQMA's.	Not Calculated	Signal improvements undertaken in 2007 along A7. Real time air quality information is being shared with County Council to identify effects of traffic signalling on NO2 Concentrations. Traffic count data being compiled by County Council.	Work is ongoing and Changes to Lowry Hill Junction are complete.	Work is ongoing and traffic count data being compiled by County Council	Key measure in improving traffic flow and reducing standing traffic.
4	Within the local plan, the City Council has set policies, which target a number of areas such as Green Travel Plans & accessibility by different modes of sustainable transport.	To set out statement of intent for council and details of initiatives	Cumbria County Council Carlisle City Council	<2008	Ongoing	Increased adoption of travel plans and more widespread use of alternative transport.	Not Calculated	Local plan has been through public enquiry and the inspectors report received by the council. All policies are underpinned by the concept of sustainable development and seeks to reduce reliance on private car.	Ongoing promotion & implementation of plan.	Ongoing	These policies contribute to improving air quality.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
5	The Environmental Quality Section continues to work with the Planning Department with regard to new developments.	To ensure that air quality is taken into account in the planning process.	Carlisle City Council	Ongoing	Ongoing	Improved correspondence between EQ and planning. A Q Impact Assessments submitted where necessary.	Not Calculated	Environmental Quality Section is now consulted on proposed developments which may impact on air quality at an early pre planning stage. Consultations now take place with applicant prior to applications being submitted.	Air Quality Impact Assessments have been submitted as part of application for several large new developments.	Ongoing	AQIA's are now submitted as part of applications for large developments. Potential emissions can be addressed at early stage.
6	A guidance document "Air Quality & Land Use" has been produced for the developers submitting planning applications on where & in what form an air quality impact assessment will be required. This has now been incorporated into the council's planning validation process.	To ensure that air quality is taken into account in the planning process & raise awareness of AQ issues.	Carlisle City Council	<2006	2006	Air Quality Impact Assessments submitted by developers where necessary.	Not Calculated	Completed. The Air Quality & Land Use Guidance Document is now on the City Council's web site & can therefore be viewed by developers & the public. Large developments are required to carry out an air quality assessment if they meet criteria set out in the air quality planning guidance. Criteria are essentially based on criteria used to trigger a transport assessment.	Air Quality Impact Assessments have been submitted as part of application for several large new developments.	Ongoing	Enquiries can now be directed to this document. Air quality issues are clearly expressed.
7	Supplementary Planning Guidance will be produced on planning obligations to financial contributions from developers to movement & public realm projects set out in the Development Strategic Transport Overview for Carlisle	To require financial contributions from developers to offset air quality impacts.	Cumbria County Council Carlisle City Council	< July 08	Sept 2008	Financial contributions assisting to fund air quality improvement initiatives.	Not Calculated	Draft SPG has been completed and has been through full consultation. It has not yet been adopted and is still in draft form. The SPG clarifies and sets out the City Council's exact approach to the use of planning obligations under section 106 of the Town & Country Planning Act 1990. It includes new developments which are likely to result in a significant increase in traffic volumes/demand for public transport &/or a deterioration in air quality. Financial contributions are	Work has now begun on the 'core strategy' which will replace the 'Local Plan' and be the overarching document, covering elements of the SPG which is currently	Ongoing	Very useful to mitigate negative air quality impacts of large new developments. The SPG will set out the council's position and clarify exactly how these powers can be implemented.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								required to mitigate/offset such negative effects such as alternative transport infra structure improvements. Carlisle District Local Plan 2001-2016 (Policy CP16) has already been used to secure monies for junction improvements; bus shelters raised kerbs and cycle routes.	'on hold' until further notice.		
8	The County Council has entered a Quality Bus Partnership with Stagecoach to improve bus route infrastructure	To improve bus service and increase patronage	Cumbria County Council Stagecoach	2006 to date	2012/13	Increased bus patronage	Not Calculated	Real Time information screens ('PIP' screens) were introduced on the 67/68 services during 2007 covering The Courts, West Tower Street and the Cumberland Infirmary. This measure was favoured by the public to enhance information and service reliability. There has been no increase in the number of information screens since 2007 due to funding issues. New busses are fitted with transmitters to allow expansion of the system. 9 new single deck busses bought this year are to Euro 4 standard, all busses on the city centre network are at least to Euro 3 standard and 66% of the entire fleet is Euro 3 or above. Development Framework & Movement Strategy provides detailed recommendations to enable public transport provision can develop to satisfy future demand.	Bid made to secure funding to expand the system. Lowther street has had improvements to bus lane and raised kerbs.	ongoing	Reduced emissions from new Euro 4 busses. Pip Screens encourage the introduction of an improved, modern fleet.
9	Bus priority measures will take place on Scotland Rd (AQMA NO1). Wigton Rd & London Rd including traffic signal priority	To reduce the effect of traffic on bus times.	Cumbria County Council Stagecoach	2007-2010	Originally 2010-2011	Improved bus flow on key routes	Not Calculated	Proposals have been rejected by County Councillors on the grounds that they are not Feasible.	None	Rejected	Potential for reduced emissions to improved traffic flow.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
10	Smart Card Ticketing solution will be developed on public transport services	Improve convenience of bus service speed of boarding and efficiency.	Cumbria County Council Stagecoach	2006 to date	2014/15	Increased bus patronage when new technology in place	Not Calculated	Smart card ticketing was introduced for concessionary passengers in 2006 (NOW Card). Technical trials have taken place on the expansion of smart card ticketing to include commercial bus ticketing, including pre pay tickets for travel in a fixed period and top up cards that can be 'charged' with credit.	Applied for funding through the Local Sustainable Transport Fund.	2013	Minor reduction in traffic volume if patronage improves.
11	Roadside publicity & telemarketing will be used to encourage bus patronage	Increased awareness of service provided.	Cumbria County Council Stagecoach	ongoing	ongoing	Increased bus patronage	Not Calculated	Annual bus patronage data obtained from Stagecoach highlights that patronage across the majority of key City Centre routes increased during 2004-2007. From 2004/05-2005/06 there was a 0.5% increase in bus patronage, however the largest increase was observed from 2005/06-2006/07 when an increase of 7% was observed. This has reversed the declining trend that was observed from 2001-2004 & is believed to be due to the renewal of the bus fleet after the 2005 floods, marketing, fares initiatives & the introduction of the NoW Card. Patronage growth has now levelled off, with small declines in 2008/9 and 2009/10. Stagecoach telemarketing has contributed to preventing further decline.	Environmental Health in partnership with other Cumbrian authorities has developed adverts for the back of busses to promote alternative transport. These will be in circulation by early summer 2011.	ongoing	Minor reduction in traffic volume if patronage improves.
12	Development of Park & Ride will take place during the LTP(2) Plan	Fewer cars entering the city.	Cumbria County Council	<2010	Scheme rejected.	Reduced vehicle volume within the city.	Not Calculated	Scheme was rejected by County Councillors due to lack of feasibility.	None	Scheme rejected.	Potential emission reductions unclear.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
13	A concessionary bus fare scheme has been introduced by Carlisle City Council to encourage use of public transport	Reduce the number of pensioners using private cars to enter the city centre	Carlisle City Council /Cumbria County Council	2006	2006	Scheme in place	Not Calculated	The NoW Card is the free bus travel scheme in Carlisle for senior citizens. Bus Pass uptake:- 2004/05 – 11,800 2007/08 – 16,500 Concessionary patronage has grown each year since 2006 but in 2009/10 by less than 1%. The Scheme will pass to County Council control in 2011 when it will become a Cumbria wide initiative.	Scheme Complete There are 19,019 elderly NoW cards in circulation An increase of 3% over 20010/11.	Scheme Complete	Large uptake and popularity indicates positive impact however restrictions may be introduced by County Council.
14	A Cycle Development Action Plan will be implemented through LTP(2) which will provide safer & better maintained cycle routes, more secure cycle parking, promotional programmes & improved signage	Improve safety & convenience of cycle ways & encourage alternative transport.	Cumbria County Council	2006 - date	2009-2011	Completion of proposed works and opening of connect 2 scheme.	Not Calculated	Improvements to existing cycle routes are in progress. Recent improvements include the Brampton Rd to Eden Bridge cycle route & sections along the River Petteril. Much of the major construction work is complete however some sections are still ongoing.	Further improvements and construction work has been completed in the last 12 months.	2011	Minor impact on emissions however could improve with good promotion and increased use.
15	A proposed Cycling Network has been developed for the City	Encourage cycling by providing fast, safe, efficient routes.	Cumbria County Council	2006 - date	2009-2011	Completion of proposed works and opening of connect 2 scheme.	Not Calculated	Progress is being made on the development of the cycle/ pedestrian network in Carlisle. Several sections of the connect2 Kingmoor- Currock cycle route (which goes through two AQMA's) are completed. Work is also taking place along the green corridors along the Petteril & Eden as part of the flood defence work. A cycle movement strategy has been developed as part of the Strategic Transport Overview– delivery will follow successful fund application.	Denton Holme Missing Link currently under construction	2011	Minor impact on emissions however could improve with good promotion of completed cycle network.
16	Cycling & Walking will be encouraged through promotional campaigns e.g. Bike week, and	Improve awareness of events. Encourage	Cumbria County Council Carlisle	Ongoing promotion of the current	Ongoing promotion of the current	Regular articles and campaign	Not Calculated	Both the City Council's Sport's & Recreation Team & Cumbria CC Cycling Officer are working with communities & businesses to	Up to 15 cycle leaders in Carlisle &	Ongoing	Minor impact on emissions however essential in

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	through regular features in Carlisle Focus Magazine & on the Council's Website	participation.	City Council	events	events	info in local media.		encourage walking & cycling. This includes setting up refresher courses, learn to ride courses & organising events. Cycling & walking is regularly promoted in Staff Focus, Carlisle Focus & Your Cumbria Magazines. The Sports & Physical Alliance project delivers walking & cycling initiatives in the community. The Sport & recreation Sections Walking Your Way to Health programme continues to thrive & new routes have been included. Both the City Council & County Council still take part in National Bike Week and provide pool bikes to encourage as many employees as possible to bike to work.	over 150 people in the City have been involved in course/ events. Baseline in 2007/08 is 3,230 trips per day. LTP & Action Plan have set a target of 2% increase per annum or 3% if funding is secured.		order to raise public awareness.
17	A cycling & walking guide for the City will be published by the end of 2008	To increase awareness of cycling and walking routes	Cumbria County Council Carlisle City Council	2008	2008	Release of guide to the general public.	Not Calculated	Guide now complete. Walk pack has been produced including maps of city walks to encourage active transport and engagement.	Ongoing promotion of the Cycling Guide & walk pack.	Complete	Informative guide with minimal air quality impacts.
18	Existing businesses will be provided, on request, with information and guidance on implementing, monitoring and reviewing Travel Plans and promoting more sustainable travel to their staff	Encourage existing businesses to adopt alternative transport. Offer advice where requested	Cumbria County Council	2006	2006 - date	Increased number of participating businesses and more widespread use of alternative transport.	Not Calculated	The Travel Plan Officer appointed by the County Council continues to work with existing businesses where appropriate. Focus has shifted from actively contacting existing businesses to providing information and guidance on an ad hoc basis, as requested. This is so that more attention can be focussed on obtaining and developing travel plans through the development control process.	No existing businesses have taken up a travel plan in the last 12 months.	Ongoing	Minor impact however commitment from a number of large businesses may lead to reduction in business traffic.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
19	Travel Plans will be required to be implemented & monitored through s106 agreements through the Development Control Process for all new developments that meet the criteria for travel plan preparation	All new developments meeting criteria for travel plan preparation	Cumbria County Council Carlisle City Council	Ongoing	Ongoing	Increased number of participant businesses and more widespread use of alternative transport.	Not Calculated	Large new businesses likely to result in increased highway usage must submit a travel plan for approval when making a planning application. Council's Highways Development Control Officer comments on all planning applications affecting the highway. Monitoring system now in place to ensure adherence to all parts of S106 Agreements. Travel Plans were provided for 6 new proposed developments in 2009.	Travel plans have been secured and implemented for 2 new developments They are a condition of planning for a further 7 proposals.	Ongoing	Minor impact however commitment from large organisations may lead to reduction in business traffic.
20	Local schools will be encouraged & supported in taking up the School Travel Plans through the 'Better Ways To School Programme'	To increase awareness of issues among school children. Reduce number of vehicles at peak times.	Cumbria County Council	2008	2008-2010	Increased number of schools developing travel plans.	Not Calculated	All schools within the city have now prepared school travel plans. This has since been extended to include cycle training; this is now being offered to all year 6 students in Carlisle City. Level 3 training being offered to selected secondary school students, ACTS team now working in schools to encourage active travel to school. There is new mapping of routes and barriers to these schools.	Modal shift data for a five years shows a 7% increase in walking and 1% increase in cycling in the schools in the Carlisle area(04/05 baseline)	Completed all schools now have plan in place. Cycle training to run until 2013.	Emission reductions are minimal however positive step and increased awareness.
21	A car share scheme will be set up for the use by the public	To reduce the number of single occupancy vehicles.	Carlisle City Council	2007	2007	Members signing up to scheme via website.	Not Calculated	Cumbria Liftshare has been implemented 3 years ago for council staff in Cumbria, managed nationally. Public car share scheme still limited to link on website. Car sharing promoted on councils website, Carlisle Focus magazine as part of Green Travel Plan.	Promotion work. However unable to monitor uptake.	Ongoing promotion	Minor impact on emissions however could improve with good promotion and increased uptake.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
22	The City Council will develop & implement a Green Travel Plan for the organisation & promote the initiative to major employers	To set out statement of intent for council and details of initiatives.	Carlisle City Council	<April 2008	April 2008	Final plan approved and implemented	Not Calculated	Completed, the Green Travel Plan was approved by council in April 2008, this statement of intent is to be reviewed every 3 years. It is available on the website and intranet.	Business mileage is now closely monitored and has seen a steady reduction. As are fleets, fuel consumption and hire cars.	Ongoing to be reviewed in 2011	Directs awareness to key areas of the council to promote green issues.
23	The Council will seek to improve the availability of cleaner fuels by encouraging new service stations to stock alternative cleaner fuels	General public given affordable and convenient alternative to petrol	Carlisle City Council	2006	Not feasible for council to implement.	Increased availability and use of alternative fuels.	Not Calculated	An increasing number of petrol/service stations are offering greener fuel alternatives such as LPG and Diesel with a percentage of Biodiesel content. However the council doesn't actively encourage this and the process is entirely demand driven.	No progress	Ongoing	The natural move toward greener fuel alternatives is reliant on demand and vehicle technology improvements.
24	The Council will develop partnerships with business & major fleet operators to encourage the accelerated use of cleaner vehicle technologies & cleaner fuels & promote improved maintenance & considerate & economical driving	Reduce emissions from privately owned vehicles in the district	Carlisle City Council	2006/07	No progress	Improved links and cooperation from private businesses	Not Calculated	Not feasible for council to implement at this stage, priority given to improving councils own fleet.	Bid made to secure funding to provide training on economical driving	No further progress expected with scheme.	No improvement expected as a result of scheme
25	The Council will introduce a policy of replacing it's vehicle fleet with greener types of vehicle	Improvement to refuse collection vehicle fleet.	Carlisle City Council	Ongoing	Ongoing	Improved efficiency of council owned vehicles.	Not Calculated	The council has gradually replaced its fleet of refuse collection vehicles and 100% of these now meet euro 5 standard. 75% of the 136 council owned	Vehicles over 3.5 tonne and seasonal equipment	Ongoing. Vehicles renewed in line with 10 year	Emission reductions in council fleet contribute to improved air

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								vehicles are registered in 2005 or later. Almost all vehicles meet euro 4 standard. Electric alternatives found not to be viable. Most vehicles run on diesel with 5% biodiesel content as standard.	e.g. grass cutters are serviced every 4-6 wks, others serviced at least every 6 months	replacement programme. Majority replaced within 5 years.	quality.
26	The Council will carry out campaigns to raise awareness of vehicle pollution, including discouraging drivers from allowing their engine to idle & possible voluntary vehicle emission testing	Increase awareness among the general public.	Carlisle City Council	2006/7	Not feasible for council to implement	-	Not Calculated	Considered not to be feasible for council to implement.	No progress to date.	No plans to implement measure	Potential air quality impacts would be very minimal.
27	The City Council will consider authorising it's officers under the Road Vehicle (Construction & Use) Regulations for the purposes of issuing fixed penalty notices where motorists refuse to turn off idling engines	Increase awareness among the general public.	Carlisle City Council	2006/7	Not feasible for council to implement	Fixed penalties issued to non compliant drivers.	Not Calculated	Considered not to be feasible for council to implement.	No progress to date.	No plans to implement measure	Potential air quality impacts are likely to be very minimal.
28	The City Council & The County Council will develop & implement a comprehensive Car Parking Strategy	To reduce unnecessary congestion in city. Particularly at peak times	Cumbria County Council Carlisle City Council	2008-2010	2011 onwards	Reduced traffic volume within city centre.	Not Calculated	Based on a Parking Strategy for Carlisle, joint City and County Council parking policies have been developed. These are in the process of being approved by Members. Following approval, steps can be taken towards implementation.	Completed Parking Strategy and development of the parking policies are on track	Policies implemented in 2011.	Improved parking arrangement should reduce congestion from slow moving traffic looking for parking.
29	The movement of goods by rail, wherever possible, will be encouraged.	To increase rail freight by major train operators.	Cumbria County Council	<2006	2007	Increased rail freight to and from the district.	Not Calculated	County Council appointed rail officer to promote and encourage movement of freight by rail. Direct rail services based at Carlisle are helping to improve infrastructure.	Ongoing improvements on Settle to Carlisle	Ongoing	Intended to reduce the number of HGV's passing through the

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								Train operators make decision on economics & feasibility.	line and Cumbria Coast Line to allow heavy freight movement.		city.
30	The City Council will promote the reporting of smoky vehicles through information leaflets, information in Carlisle Focus Magazine & through the City Council's website.	Increase awareness & provide convenient way of reporting Smokey vehicles.	Carlisle City Council	2007	2007 / 2008	Visible information in key locations including website.	Not Calculated	Information leaflets have been distributed in public buildings e.g. civic centre, libraries & community centres. A form to report smoky vehicles is now available on the web site.	Ongoing	Ongoing	Minimal AQ and emissions impacts. Reported vehicles dealt with by Vehicle and Operator Services Agency. (VOSA)
31	The Council will continue to provide comprehensive control over all Part A2 & B. Processes located within the local authority	Control emissions to air in line with nationally agreed levels and encourage year on year improvement	Carlisle City Council	Ongoing	Ongoing	Inspections show that emission limits are being met and efforts are being made to improve on national levels. Inspections are risk based.	Not Calculated	Part A processes are permitted & inspected by Environment Agency. There are currently 70 part B and 2 A2 processes which are permitted & inspected at least annually by Carlisle City Council.	Processes have improved and many have shown a steady reduction in emissions, year on year. All now medium or low risk category.	Ongoing	Moderate AQ impacts. Increased awareness through inspection leads to gradual improvement in process management and emissions.
32	The Council will improve information & advise give to residents & companies about problems caused by bonfires, and continue enforcement action where appropriate.	To control emissions from burning and prevent statutory nuisance caused by smoke.	Carlisle City Council	Ongoing	Ongoing	Reduction in the number of public complaints	Not Calculated	Information on website and advice leaflets available. 67 Smoke related complaints received in 2007. 48 during 2008. 47 in 2009.	45 smoke related complaints received in 2010.	Ongoing	Bonfires not producing black smoke can only be prevented if causing a nuisance or trade waste. AQ impacts are minimal.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
33	An extensive publicity campaign has recently taken place on green waste collection schemes provided by the Council	To reduce organic waste going to landfill and burning of garden waste	Carlisle City Council	<2005	2004-2005	Increasing quantities of garden waste being collected in 2 weekly collection	Not Calculated	When implemented in 2004/05 5619 tonnes of garden waste was collected in the district. This rose to 6917 in 2006/07, 8627 in 08/09 & 8881 tonnes In 10/11. There are 4 specialised green waste collection vehicles all to euro 5 standard.	Publicity and improvements to collection system show year on year increase.	Ongoing	Emission reductions from landfill and garden bonfires.
34	The Council will continue to investigate complaints of dark smoke from industrial and trade premises and cable burning.	To control emissions to air from the burning of unsuitable material.	Carlisle City Council	Ongoing	Ongoing	Reduction in the number of public complaints	Not Calculated	There are 5 Smoke Control Areas located within the City. A map showing the areas & information acceptable types of fuel / appliances on the website. 3 prosecutions in 2009 in relation to the burning of cables.	No prosecutions in relation to commercial premises or cable burning.	Ongoing	Enforcement and warnings ensure that smoke control is widely observed.
35	The Council will continue to ensure that only authorised fuels and appliances are used in smoke control areas.	To control emissions to air from the burning of unsuitable material in smoke control areas.	Carlisle City Council	Ongoing	Ongoing	Reduction in the number of public complaints	Not Calculated	There are currently 5 smoke control areas. EQS receives approximately 12 queries per year from householders who are unsure as to whether they are in a SCA & what restrictions are in place. All key information is on website.	Advice given and complaints responded to as required.	Ongoing	Warnings issued and advice ensures that smoke control is widely observed.
36	An Energy Efficiency advice survey will be targeted at residential properties within/adjacent to the AQMA's . Energy savings advice & grants to be provided	Measures to improve energy efficiency and assist residents in fuel poverty.	Carlisle City Council now in conjunction with Tadea.	Ongoing; schemes and target areas always change.	1996	Reduction in the amount of fuel required to heat residential properties.	Not Calculated	£4 million spent by the council to date on improvement subsidies and grants. Subsidised works include cavity wall insulation virgin lofts and loft top up's.	£56000 spent last financial year on subsidised work including 357 Cavity Wall. 189 Top Up and 432 virgin Loft.	Ongoing	Previously funding and improvements were targeted at vulnerable households. This is no longer the case, resulting in increased uptake.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
37	We will establish a method to introduce more regular publicity events & promotion of air quality & sustainable transport issues	Improve accessibility to A Q. Information Increased public awareness	Carlisle City Council / Cumbria County Council	2007	2008	Visible promotion of sustainable travel in media.	Not Calculated	The walking & cycling guidance has been produced. Cumbria public transport maps and extensive info is available on website. This will be extended if funding bid is successful.	Regular publishing in Staff & Carlisle Focus Magazines & on web.	Ongoing	Awareness of alternative transport options may lead to reduction in emissions.
38	The City Council will improve access to information regarding transport options by publishing up to date bus & rail times on the Council's website	Improve accessibility to timetables.	Carlisle City Council / Cumbria County Council	2007	2007	Increased bus & train patronage. Improved public service.	Not Calculated	Completed. Bus & rail information is now available on the City Councils web site. County council manage travel line and information is available on their web site.	Links to bus and rail sites updated due to changes in service providers.	Complete	Minimal short term impact on air quality in the district.
39	The City Council will publish more local air quality monitoring data on it's website	Raise public awareness and publish real time data.	Carlisle City Council	<2007	2007	Regularly updated NO2 readings on web page.	Not Calculated	Real time monitoring data from monitoring stations, review and assessment work and monitoring results are available on the council's web site.	Reports and results are uploaded as necessary.	Complete / ongoing	Official resource for current air quality information.
40	The City Council will produce a teaching pack on air quality & reducing air pollution. These will be circulated to schools in the District	Raise children's awareness of air quality issues.	Carlisle City Council	2007	2008	Packs produced and distributed to schools	Not Calculated	Information packs completed. Officers have given talks to 2 schools on air pollution issues.	No further progress	Scheme no longer in operation due to time constraints	Minimal short term impact on air quality in the district.
41	We have expanded our monitoring network to incorporate a new continuous monitoring site for nitrogen dioxide installed within AQMA (No1)	Increase the level of continuous monitoring to be used in review & assessment work. Provide detailed monitoring of AQMA 1	Carlisle City Council	<2007	2007	Monitoring data is managed by Casella Monitor. Hourly readings are reported to Environmental Quality	Not Calculated	Air monitoring unit has been installed at Stanwix Bank (within AQMA No1). Paddy's Market Monitoring Unit has been incorporated into the National Automatic & Rural Network (AURN) and non-automatic hydrocarbon network.	Ongoing monitoring, collection and reporting of real-time data from unit.	Now Complete	From 2007 to 2009 the annual mean results from the station has shown a steady reduction in annual mean at this location. 2010 results show an exception,

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

Nitrogen Dioxide

The monitoring undertaken for the purpose of this report has identified potential exceedences of the nitrogen dioxide annual mean at relevant locations outside our current AQMA's. These locations, namely; C3(39.4 $\mu\text{g}/\text{m}^3$), E22(40.4 $\mu\text{g}/\text{m}^3$), E6(39.2 $\mu\text{g}/\text{m}^3$), F10(39.1 $\mu\text{g}/\text{m}^3$) & F5(39.7 $\mu\text{g}/\text{m}^3$) are borderline of exceeding the annual mean objective for NO₂, each of these have an annual mean of between +/- 1 $\mu\text{g}/\text{m}^3$ of the 40 $\mu\text{g}/\text{m}^3$ objective concentration. It would appear that this unexpected increase in NO₂ concentrations is linked to adverse meteorological conditions. In 2010 the region experienced unusually long periods of exceptionally cold weather in the winter months with freezing conditions and limited air movement. The poor driving conditions also led to increased congestion and slower traffic movement in busy areas. As a result, some of the data from these months is exceptionally high both from our diffusion tubes and automatic monitoring stations. This has had a bearing on annual mean concentrations in the majority of our monitoring locations. It is predicted that future levels will return to normal and should continue to follow the downward trend that was seen in previous years.

New monitoring data has revealed that there are locations where the annual mean for nitrogen dioxide still remains above the objective level within all of our AQMA's, therefore there are no plans to revoke or amend any of them at this present time.

It is likely that our monitoring network will continue unchanged, at least until after the opening of the Carlisle Northern Development Route (CNDR), this will allow accurate 'before and after' comparisons to be drawn. This action plan measure is likely to have the most dramatic effect on inner city traffic congestion and should have a knock on improvement in NO₂ concentrations in key areas.

Monitoring from our continuous analyser unit at Paddys Market showed no exceedence of the 1 hour mean objective, or the annual mean objective, for nitrogen dioxide during 2010.

Monitoring from our continuous analyser unit at Stanwix Bank showed no exceedence of the 1 hour mean objective. The unit recorded an annual mean of 41.6 $\mu\text{g}/\text{m}^3$ which is just above the objective level. It should be noted that the unit location is not representative of public exposure and is within AQMA 1.

Particulate Matter (PM 10)

Monitoring from our unit at Paddys Market showed 18 exceedences of the 40 $\mu\text{g}/\text{m}^3$ 24 hour mean, this is below the permitted 35 exceedences given in the objective. The annual mean was also below the objective level, during 2010.

Particulate Matter (PM 2.5)

Monitoring from our unit at Paddys Market showed no exceedence of the annual mean objective, for PM 2.5, during 2010.

Benzene.

Monitoring from our pumped diffusion tube unit at Paddys Market showed no exceedence of the annual mean objective for Benzene, during 2010.

No other pollutants are of concern in the district.

9.2 Conclusions relating to New Local Developments

The new local developments within the district are detailed in section 4 of this report, the air quality impacts of these have been assessed either as part of the planning process or under the Environmental Permitting Regulations 2010. There are no new major developments of any particular concern since the last round of review and assessment.

There are some large proposed developments including two major residential developments and an application to develop the airport which will be closely monitored. If necessary these will be given more detailed consideration in the Updating and Screening Assessment in 2012.

No new developments currently give rise to the need for a detailed assessment.

9.3 Other Conclusions

As detailed in the report there has been some progress with a wide range of initiatives set out in the previous action plan, this is summarised in table 8.1 in section 8 of this report. The council is committed to reviewing and improving the 2007 action plan and this will become available before the next round of review and assessment is submitted in April 2012 .

The additional monitoring of PM2.5 started in March 2009 and the first full year of results have now been reported. The results have shown an annual mean of 15.54µg/m³. This is well below the target objective of 25 µg/m³ to be achieved by 2020. There is therefore no concern of any exceedences of this pollutant at this stage.

There are a number of major planning applications not yet approved which have been summarised in section 4 of this report. The only developments which are likely to have any real effect on air quality are the combined Morton developments, the Cryndledyke development and the Carlisle Airport distribution centre. In all cases an Air Quality Impact Assessment has been requested and Environmental Health has been working with the planning department and any the consultants concerned as to the scope the assessments and the potential impacts. Any outcomes or changes to these applications will be monitored and documented in the Updating and Screening Assessment 2012.

The County Council has developed Local Transport Plan 2 (2005/6-2010/11) which has been assessed in detail in section 6 of this report. This is the most up to date plan however LTP 3 should be available this year and will form part of future rounds of Review and Assessment.

9.4 Proposed Actions

The new monitoring data for 2010 has not identified the need to proceed to a Detailed Assessment for any pollutant. There are a small number of locations that are outside the existing AQMA's which are borderline of exceeding the annual mean objective for NO₂. As previously discussed we believe that this unexpected increase in NO₂ concentrations is the result of meteorological variation and it is expected that future levels will stabilise. If these locations continue to show an increase or significantly exceed the objective then it will be necessary to carry out a detailed assessment, however this may be unlikely especially when the annual mean trends from previous years are considered.

The new monitoring data has not identified any need for additional monitoring, or changes to the existing monitoring programme. This will remain largely the same so that comparisons can be drawn when the CNDR is complete. It is hoped that the bypass will further improve air quality in several AQMA's and at this point it may be possible that one or more may be revoked.

The current AQMA 3 (Wigton Road) has been successfully extended and the AQMA order came into force on 1st July 2010. Monitoring will continue here in the same way during 2011, as the data collected from the AQMA during 2010 is currently around borderline or above the NO₂ annual mean objective.

There is currently no reason to make any further changes to the boundaries of any of the existing AQMA's.

The next report to be submitted to DEFRA will be our updated action plan, this will be produced during 2011 and subsequently become available for public access on the City Councils web site. The next report will be the Updating and Screening Assessment which will be submitted in Spring 2012, this will present all of the monitoring data for 2011 as well as detail any further progress with proposed or existing developments.

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Appendices

Appendix A: QA/QC Data

Appendix B: Monthly NO² diffusion tube results 2009 (Raw Data)

Appendix C: NO² diffusion tube results 2009 (Calculated Data)

Appendix D: Map of Non-Automatic Monitoring Sites

Appendix E: Map Showing All Declared AQMA's.

Appendix F: Maps Showing location and extent of new local developments.

Appendix A: QA:QC Data

Diffusion tube precision can be described as the ability of a measurement to be consistently reproduced, i.e. how similar the results of duplicate or triplicate tubes are to each other. Accuracy represents the ability of the measurement to represent the 'true' value, which, in this case, is defined as the result from the automatic analyser. When averaged over a number of sets of results bias can be evident. This represents the overall tendency of the diffusion tubes to depart from the 'true' value, i.e. to systematically over or under-read when compared against the reference method. Once identified, bias can be adjusted for to improve the accuracy of diffusion tube results. This is done using bias adjustment factors, which have been found to be specific to a laboratory and tube preparation method.

As a result of the considerable difference in the performance of tubes prepared by different labs, government guidance recommends that a bias adjustment factor is determined and applied to the data. Technical guidance gives a method for this, which involves the co-location of these tubes with a chemiluminescent NO_x analyser.

Authorities are asked to report the adjustment factor from their own collocation study, where available. The national bias adjustment factor is then determined by National Physical Laboratory who on behalf of Defra, they collate and assess data from NO₂ collocation studies across the UK. Full details of both the national and local bias adjustment factors used to adjust data and a comment on overall precision are provided below.

Diffusion Tube Bias Adjustment Factors

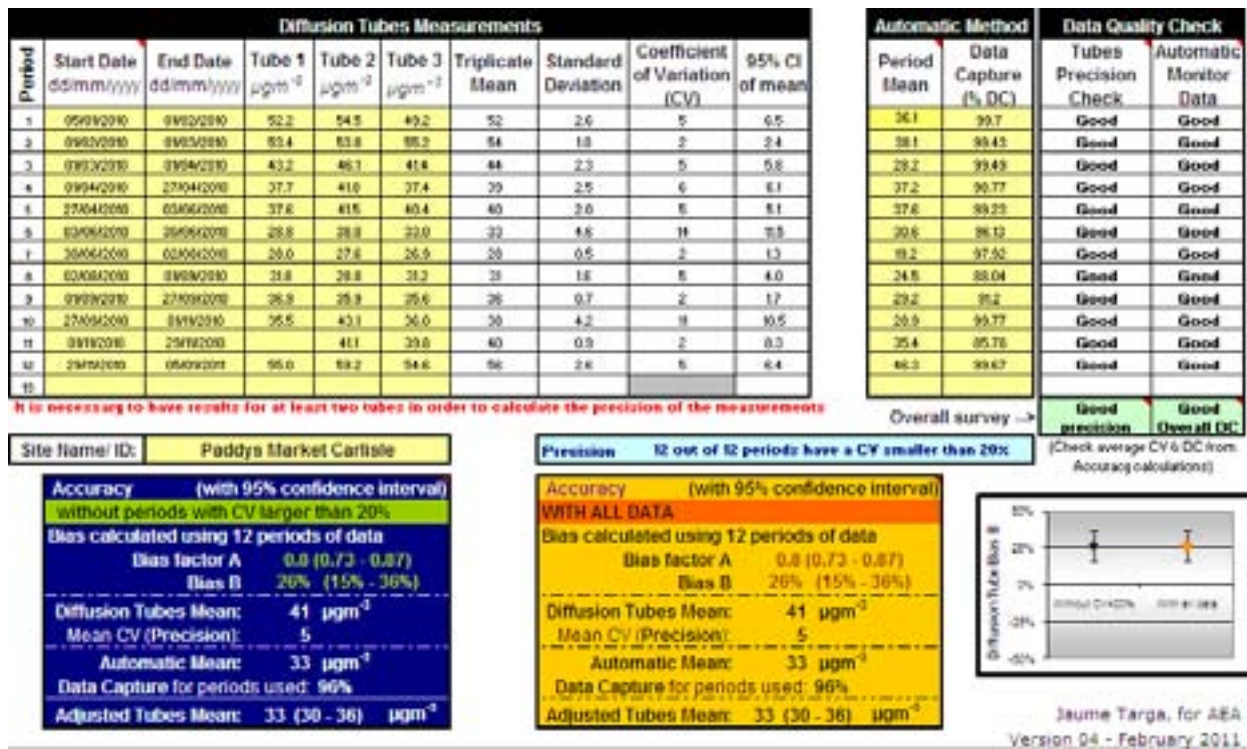
In February 2009 the council changed suppliers and now utilises NO₂ diffusion tubes prepared with 20% TEA in water prepared and analysed by Gradko Environmental Ltd.

A national bias adjustment factor of **0.92** was calculated using the bias adjustment spreadsheet tool on the Local Authority Air Quality Support Website. This calculation is based on 39 individual co-location studies nationally, including our own. All of these studies were analysed by Gradko for the method 20% TEA in water during 2010.

Factor from Local Co-location Study

A local bias adjustment factor of **0.8** was derived from the diffusion tubes co-located at the Paddy's Market monitoring station. This was calculated using the AEA Spreadsheet for checking the precision and accuracy of triplicate tubes, found on the UK Air Quality Archive website.

The following screen print shows the results of the data that was input into the spreadsheet.



Our local bias adjustment factor shown on the spreadsheet was then submitted so that it could be contributed to the overall accuracy of the national bias adjustment factor.

Tube precision is separated into two categories Good or Poor as follows: tubes are considered to have Good precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%, and the average CV of all monitoring periods is less than 10%. Tubes are considered to have Poor precision where the CV of four or more periods is greater than 20% and/or the average CV is greater than 10%.

All of our 12 study periods shown above had a CV of below 20% for this reason the bias adjustment factor and annual means are all based on the whole year of collected data. This is summarised as follows:

Diffusion tubes annual mean: **41 µg/m³**
 Automatic monitoring station mean: **33 µg/m³**
 Local bias adjustment factor: **0.8**

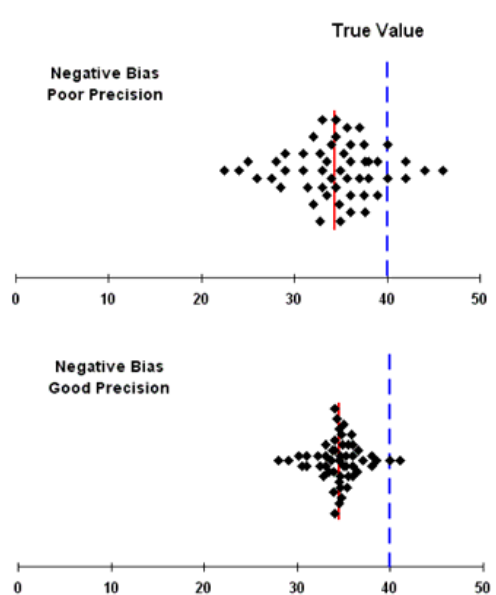
Discussion of Choice of Factor to Use

The two separately calculated bias adjustment factors (Local: 0.8, National: 0.92) are evidently rather closely matched. It was decided that the overall correction factor derived from as many co-location studies as possible will provide the best estimate of the level of bias between the diffusion tubes results and the ‘true value’. The 51 diffusion tubes that we use are exposed over a wide range of locations across the district, some of which differ considerably from our own co-location site. Therefore annual mean for each diffusion tube location has been adjusted using the national

bias adjustment factor, calculated from 39 individual collocation studies, which will incorporate many different types of monitoring site.

Unlike bias, poor precision cannot be adjusted for. It can only be improved by careful handling of the tubes in both the laboratory and the field. The two Figures below illustrate the difference between bias and precision. Both sets of results have the same calculated negative bias, shown by the vertical red line, compared with the true value. However, those in the top part of the Figure have poor precision, whereas those in the lower part have good precision (the vertical spread is just a way of displaying the large number of individual results).

Good vs Poor Precision



The distinction between Good and Poor precision is an indicator of how well the same measurement can be reproduced. This precision will reflect the laboratories performance/consistency in preparing and analysing the tubes, as well as the subsequent handling of the tubes in the field. Any laboratory can show Poor precision for a particular period/collocation study, if this is due to poor handling of the tubes in the field. Therefore, when assessing the performance of a laboratory, account should be taken of the proportion of Poor precision collocation results, not just the presence or absence of Poor precision co-location results.

PM Monitoring Adjustment

Defra published the results of a study investigating the equivalence of various samplers and instruments for measuring PM10 in comparison with the European reference method (a gravimetric technique).

The study found that the TEOM did not meet the equivalence criteria of the European reference method within the UK, even with the 1.3 correction factor (as advised in previous guidance). The outcome of the equivalence study means that TEOM analysers cannot strictly be used to measure PM10 concentrations for comparison with the air quality objectives.

TEOM's are however widely used in LAQM work. Defra & the Devolved Administrations advice to local authorities using TEOM's is that it is generally not necessary to replace the instrument immediately, but when the time does come to replace it, the selected sampler should be a reference sampler, or one that meets the equivalence criteria.

During some previous review and assessment work the data has been corrected wherever possible using the King's College London Volatile Correction Model (VCM) for PM10 (rather than by the application of a 1.3 correction factor). This adjustment is not necessary for the purpose of this progress report because the TEOM was upgraded to FDMS on 18th March 2009. For this reason the PM10 data presented here can be used to compare with the air quality objectives.

QA/QC of automatic monitoring

Both of our automatic stations are subject to stringent QA/QC procedures.

Paddy's Market, which monitors PM10, NO2 and more recently PM2.5, is part of the AURN and the network quality assurance and control procedures are implemented.

To ensure optimum data quality and capture, a three-tier system of calibration and analyser test procedures is employed in the AURN. The major components of this system are briefly described below.

- a) Daily automatic IZS checks - these allow instrumental drifts to be examined, and act as a daily check on instrument performance.
- b) Fortnightly manual calibrations - these are performed by the local site operators and are used by management unit to scale raw pollution data.
- c) 6 – monthly network inter calibrations – These exercises are performed by the QA/Qc Unit every 6 months to ensure that all measurements from all network stations are completely representative and intercomparable. The inter calibrations will also act as an independent audit of the system at the site.

Data ratification is undertaken every 3 month intervals. This involves a critical review of all information relating to the data set to verify, amend or reject the data. When the data is ratified, they represent the final data set in the review & assessment process

Stanwix Bank, which monitors NO2 is data managed by Casella Monitor. Casella Monitor has a defined quality system that forms part of their UKAS accreditation that the laboratory holds.

Re-scaling relies on the LSO providing fortnightly calibration reports as a result of using calibration sources such as gas cylinders and zero air scrubbers. This data is used to calculate the true analyser zero and response factor and is used to scale data for the following two weeks leading up to the next scheduled calibration.

QA/QC of diffusion tube monitoring**Carlisle City Council QA/QC of diffusion tube monitoring**

Carlisle City Council follows the guidance set out in the 'Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and User' which includes advice on selection of site, the location of the samplers, instructions for exposure, and collocation with automatic analysers.

Laboratory QA/QC of diffusion tube monitoring

Gradko International has a defined quality system which forms part of the UKAS accreditation that the laboratory holds. All accredited methods are fully documented. The analytical laboratory is assessed by UKAS to establish conformance of Laboratory Quality Procedures to the requirements of ISO/IEC 17025 Standard.

UKAS assessors visit on an annual basis and review all aspects of the analysis from the sample handling to analysis and reporting. As a condition of the accreditation the laboratory is required to participate in external proficiency schemes. Gradko participates in the Workplace Analysis Scheme for Proficiency (WASP) organised by the Health and Safety Laboratory. This scheme provides a regular assessment of the lab's performance in that, every quarter, the laboratory receives four diffusion tubes doped with an amount of nitrite known to HSL, but not the laboratory. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. Any result from such a scheme that falls outside the relevant limits is immediately investigated and steps taken to rectify the situation.

Calibration

The instrument is calibrated twice daily, using a series of calibration standards to ensure a satisfactory linear response is obtained. A standard check is analysed after every fifty samples to ensure that the calibration is still valid.

Quality Control

A quality control check is run after ten samples and is assessed against warning and action limits defined in the method. Quality control solutions are prepared from standards supplied by a different vendor to that of the calibration standards. Any AQC exceeding the action limit or two consecutive warning limits is internally assessed and is reported to the client as an AQC failure.

Travel Blank

The travelling blank is analysed at the same time as the samples, any blank exceeding the currently prescribed maximum is investigated and reported to the client.

Appendix B MONTHLY NO2 DIFUSION TUBE RESULTS 2010 - Raw Data

AREA A - A7 STANWIX BANK, SCOTLAND ROAD AND KINGSTOWN ROAD

Site ID	OS Grid Reference		Site Name	Old Site ID	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	No of months
A1	3E+05	6E+05	45 SCOTLAND RD	2	60.19	60.38	53.58	56.06	40.49	44.24	37.27	42.74	46.95	46.02	47.77	60.98	12
A10	3E+05	6E+05	STANWIX BANK	37	83.86	101.3	68.53	54.89	40.18	45.85	46.71	46.49	61.08	64.82	75.75	82.54	12
A12	3E+05	6E+05	14 ETTERBY ST	14	42.27	40.03	29.85	27.58	12.03	21.16	15.79	17.25	27.55	24.08	31.07	44.53	12
A5	3E+05	6E+05	37 KINGSTOWN RD	34	54.1	49.69	44.77	53.2	39.48	42.24	37.2	41.58	42.04	45.22	48.56	70.52	12
A7	3E+05	6E+05	282 KINGSTOWN RD	29	42.9	45.1	37.37	35.63	31.95	33.86	26.77	32.4	35.44	30.03	43.07	49.75	12
A9	3E+05	6E+05	BRAMPTON RD	31	60.6	65.4	56.74	55.7	36	50	39.09	43.83	47.88	58.89	49.91	68.4	12

AREA B - CURROCK ST-DENTON ST

B12	3E+05	6E+05	DENTON ST	17	54.28	56.03	48.68	50.89	35.15	38.04	36.57	36.97	46.54	41.87	55.26	62.65	12
B3	3E+05	6E+05	SHADDONMILL	12	48.82	44.13	27.59	32.96	24.54	24.37	17.73	24.42	26.83	25.28	36.91	46.61	12
B4	3E+05	6E+05	DALSTON RD	24	57.64	68.15	52.34	57.01	45.73	a	a	48.02	54.23	45.69	53.34	89.84	10
B5	3E+05	6E+05	8 JUNCTION ST	18	50.63	55.59	a	38.28	33.91	29.87	23.95	29.95	31.75	32.92	40.89	55.62	11
B6	3E+05	6E+05	41 CHARLOTTE ST	33	44.76	48.51	40.67	45.38	35.99	26.99	30.85	r	41.47	43	r	61.57	10
B7	3E+05	6E+05	12 CURROCK ST	25	61.07	52.29	47.7	48.21	38.02	34.12	35.91	39.06	44.53	47.43	52.5	63.63	12

AREA C - CITY CENTRE

C1	3E+05	6E+05	LOWTHER ST	19	54.75	53.94	36.74	44.9	35.35	31.68	29.13	31.39	41.45	38.25	44.04	55.44	12
C2	3E+05	6E+05	TOURIST INFO	11	29.78	30.22	34.63	19.96	12.55	10	12.69	12.66	18.1	18.94	26.42	34.16	12
C3	3E+05	6E+05	DEVONSHIRE ST	13	52.74	51.07	44.14	53.36	35.89	30.85	30.34	37.95	37.85	40.46	49.17	50.05	12
C4	3E+05	6E+05	BAR SOLO	38	a	51.48	40.96	39.58	31.58	31.75	32.24	27.94	39.5	44.1	47.59	55.28	11
C5	3E+05	6E+05	GRIFFEN	48	47.82	47.17	50.23	47.22	37.76	41.46	43.83	40.59	45.62	a	52.2	63.42	11

AREA D - A69 WARWICK ROAD

D1	3E+05	6E+05	VICTORIA PLACE	1	48.27	44.77	a	31.07	30.34	25.33	30.83	30.55	37.8	38.77	36.27	47.59	11
D10	3E+05	6E+05	368 WARWICK RD	3	53.02	38.55	41.26	34.5	30.25	28.73	28.01	29.42	35.68	43.23	40	60.38	12
D11	3E+05	6E+05	CARTEF	49	46.37	50.19	41.93	40.35	42.5	32.09	31.39	35.31	38.47	35.01	44.96	49.59	12
D12	3E+05	6E+05	POST OFFICE	10	61.2	46.11	47.33	50.93	38.34	37.77	39.69	34.5	51.6	46.35	40.34	63.89	12
D3	3E+05	6E+05	166 WARWICK RD	5	39.39	35.78	29.16	29.13	23.77	20.19	20.5	20.62	27.93	19.29	33.01	40.21	12
D5	3E+05	6E+05	215 WARWICK RD	6	40.25	38.64	34.4	32.99	25.03	23.3	21.66	24.91	29.25	22.42	31.27	40.78	12
D7	3E+05	6E+05	282 WARWICK RD	8	53.73	44.79	43.66	39.97	31.89	a	24.16	33.87	39.92	35.45	41.37	54.29	11
D9	3E+05	6E+05	251 WARWICK RD	7	50.04	45.93	37.03	32.46	28.16	a	24.16	30.07	a	32.08	45.15	48.3	10

AREA E - CALDEWEGATE-WIGTON ROAD-NEWTOWN ROAD

E22	3E+05	6E+05	FINKLE ST	30	55.08	52.22	41.96	44.84	34.35	32.66	39.15	37.04	41.79	45.63	44.03	58.05	12
E12	3E+05	6E+05	3 WIGTON RD	32	56.45	71.17	51.4	45.93	47.77	48.13	41.56	44.91	44.98	45.47	50.64	69.86	12
E15	3E+05	6E+05	22 WIGTON RD	26	59.11	61.58	56.48	50.65	48.83	40.18	34.93	40.02	50.71	41.08	50.41	59.32	12
E16	3E+05	6E+05	JOVIAL SAILOR	35	49.87	59.65	42.45	44	38.07	31.97	30.09	33.07	37.6	39.39	45.37	60.44	12
E19	3E+05	6E+05	49 WIGTON RD	44	73.66	83.71	56.41	50.48	42.14	39.75	39.74	34.13	51.06	52.93	65.19	78.49	12
E20	3E+05	6E+05	44 WIGTON RD	45	59.86	54.99	49.27	40.55	45	45.38	29.63	29.31	44.14	40.5	56.03	71.52	12
E4	3E+05	6E+05	JOHN ST	36	57.66	59	47.5	40.57	42.29	36.57	38.81	35.93	47.06	49.96	51.05	63.33	12
E6	3E+05	6E+05	PADDYS MARKET 1	9	52.19	53.4	43.17	37.72	37.55	28.75	27.96	31.84	36.91	35.54	r	55.01	11
E6	3E+05	6E+05	PADDYS MARKET 2	15	54.48	53.77	46.05	41.82	41.49	38.03	27.62	28.82	35.9	43.08	41.09	59.21	12
E6	3E+05	6E+05	PADDYS MARKET 3	16	49.23	55.21	41.42	37.41	40.41	32.99	26.92	31.23	35.59	35.98	39.78	54.57	12
E8	3E+05	6E+05	BRIDGE ST	23	65.9	89.83	63.77	55.32	56.56	54.7	57.43	46.51	53.58	56.97	64.6	72.8	12
E9	3E+05	6E+05	CHURCH ST	20	45.27	53.26	47.32	38.82	32.53	25.08	29.9	a	38.9	42.87	41.6	48.71	11
E21	3E+05	6E+05	BURGH RD	42	34.29	36.71	25.33	20.8	16.84	15.01	9.34	14.98	20.75	19.62	32.72	38.19	12

AREA F - BOTCHERGATE / LONDON ROAD

F1	3E+05	6E+05	3 TAIT ST	39	51.13	43.63	38.36	a	33.28	32.05	28.19	32.28	a	34.82	a	49.8	9
F10	3E+05	6E+05	155 BOTCHERGATE	43	57.5	58.68	39.89	43.82	41.18	33.56	25.26	33.5	36.56	36.58	43.02	60.48	12
F5	3E+05	6E+05	STANLEY HALL	40	50.66	63.18	43.56	40.25	49.28	34.88	26.95	36.28	36.88	32.43	47.17	56.01	12
F7	3E+05	6E+05	24 LONDON RD	41	54.68	61.86	50.84	a	r	41.72	38.71	a	44.45	43.51	51.73	57.35	9
F9	3E+05	6E+05	129 LONDON RD	27	55.98	53.41	39.71	39.22	33.4	34.64	27.29	33.59	37.85	26.43	53.58	56.08	12

AREA H - TOWNS

H1	4E+05	6E+05	BRAMPTON	21	33.1	37.71	a	22.27	17.43	18.04	16.01	18.1	22.55	22.55	31.59	37.63	11
H3	3E+05	6E+05	LONGTOWN	22	38.71	34.06	26.69	24.53	28.47	19.31	19.81	21.23	29.07	29.72	29.93	37.18	12
H4	3E+05	6E+05	WARWICK BRIDGE	50	52.09	53.13	38.61	40.65	38.72	28.46	30.99	32.64	38.94	38.73	45.77	46.73	12
H5	3E+05	6E+05	WIGTON RD	4	39.28	38.3	32.39	26.12	21.38	20.9	18.88	21.71	22.62	28.04	35.33	44.97	12
H6	3E+05	6E+05	PETER LANE	47	26.55	25.48	16.13	14.05	10.8	9.04	6.7	7.82	12.13	12.76	19.47	23.98	12
H7	3E+05	6E+05	DALSTON RD	46	32.64	33.39	22.43	17.8	15.44	16.76	12.37	11.62	18.25	20.28	29.11	31.2	12
H8	3E+05	6E+05	AIRPORT	28	18.2	17.96	11.71	9.35	6.63	6.23	6.87	6.83	10.47	12.25	15.93	21.37	12

r = Anomalous data removed from the study. See table below.

a - Absent data.

Site ID	Month	Value Removed
F7	May	7.18
E6	Nov	19.9
B6	Aug	10.05
B6	Nov	81.68

Appendix C NO2 DIFUSION TUBE RESULTS 2010 - Calculated Data

AREA A - A7 STANWIX BANK, SCOTLAND ROAD AND KINGSTOWN ROAD

Site ID	Site Name	Annual Mean (µg/m ³)	Local Bias Adjustment (0.8)	National Bias Adjustment (0.92)	In relevant location? (Distance of residence from tube) (m)	Distance of tube from kerb of nearest Road. (m)	NO2 Background Concentration (µg/m ³)	Predicted NO2 Concentration at receptor (µg/m ³)
A1	45 SCOTLAND RD	49.7225	39.78	45.74	N (4.5)	1.5	12.27372	35.6
A10	STANWIX BANK	64.3292	51.46	59.18	N (1.5)	1.5	15.38254	52.5
A12	14 ETTERBY ST	27.7658	22.21	25.54	Y	3	-	-
A5	37 KINGSTOWN RD	47.3833	37.91	43.59	Y	4	-	-
A7	282 KINGSTOWN RD	37.0225	29.62	34.06	N (7.5)	4	13.33568	27.09
A9	BRAMPTON RD	52.7033	42.16	48.49	Y	1.5	-	-

AREA B - CURROCK ST-DENTON ST

B12	DENTON ST	46.9108	37.53	43.16	N (10)	0.5	25.486	33.6
B3	SHADDONMILL	31.6825	25.35	29.15	Y	9	-	-
B4	DALSTON RD	57.199	45.76	52.62	Y	3.5	-	-
B5	8 JUNCTION ST	38.4873	30.79	35.41	Y	2.5	-	-
B6	41 CHARLOTTE ST	41.919	33.54	38.57	Y	2.5	-	-
B7	12 CURROCK ST	47.0392	37.63	43.28	Y	3	-	-

AREA C - CITY CENTRE

C1	LOWTHER ST	41.4217	33.14	38.11	Y	3	-	-
C2	TOURIST INFO	21.6758	17.34	19.94	N		-	Not residential
C3	DEVONSHIRE ST	42.8225	34.26	39.40	N	3	-	Not residential
C4	BAR SOLO	40.1818	32.15	36.97	N	9	-	Not residential
C5	GRIFFEN	47.0291	37.62	43.27	N	3	-	Not residential

AREA D - A69 WARWICK ROAD

D1	VICTORIA PLACE	36.5082	29.21	33.59	N (8.5)	3.7	15.47297	27.7
D10	368 WARWICK RD	38.5858	30.87	35.50	Y	5	-	-
D11	CARTEF	40.68	32.54	37.43	Y	4.5	-	-
D12	POST OFFICE	46.5042	37.20	42.78	N	5	-	Not residential
D3	166 WARWICK RD	28.2483	22.60	25.99	Y	10	-	-
D5	215 WARWICK RD	30.4083	24.33	27.98	Y	9	-	-
D7	282 WARWICK RD	40.2818	32.23	37.06	Y	7	-	-
D9	251 WARWICK RD	37.338	29.87	34.35	Y	8.5	-	-

AREA E - CALDEWEGATE-WIGTON ROAD-NEWTOWN ROAD

E22	FINKLE ST	43.9	35.12	40.39	Y	12	-	-
E12	3 WIGTON RD	51.5225	41.22	47.40	N (2)	2.5	25.486	44.2
E15	22 WIGTON RD	49.4417	39.55	45.49	Y	4.5	-	-
E16	JOVIAL SAILOR	42.6642	34.13	39.25	Y	2.5	-	-
E19	49 WIGTON RD	55.6408	44.51	51.19	Y	2.5	-	-
E20	44 WIGTON RD	47.1817	37.75	43.41	Y	5.5	-	-
E4	JOHN ST	47.4771	37.98	43.68	N (3)	3	25.486	40.4
E6	PADDYS MARKET 1	40.0036	32.00	36.80	N (42)	9	-	Not residential
E6	PADDYS MARKET 2	42.6133	34.09	39.20	N (42)	9	-	Not residential
E6	PADDYS MARKET 3	40.0617	32.05	36.86	N (42)	9	-	Not residential
E8	BRIDGE ST	61.4975	49.20	56.58	Y	4	-	-
E9	CHURCH ST	40.3873	32.31	37.16	Y	9	-	-
E21	BURGH RD	23.715	18.97	21.82	N (8)	3	10.13949	17.9

AREA F - BOTCHERGATE / LONDON ROAD

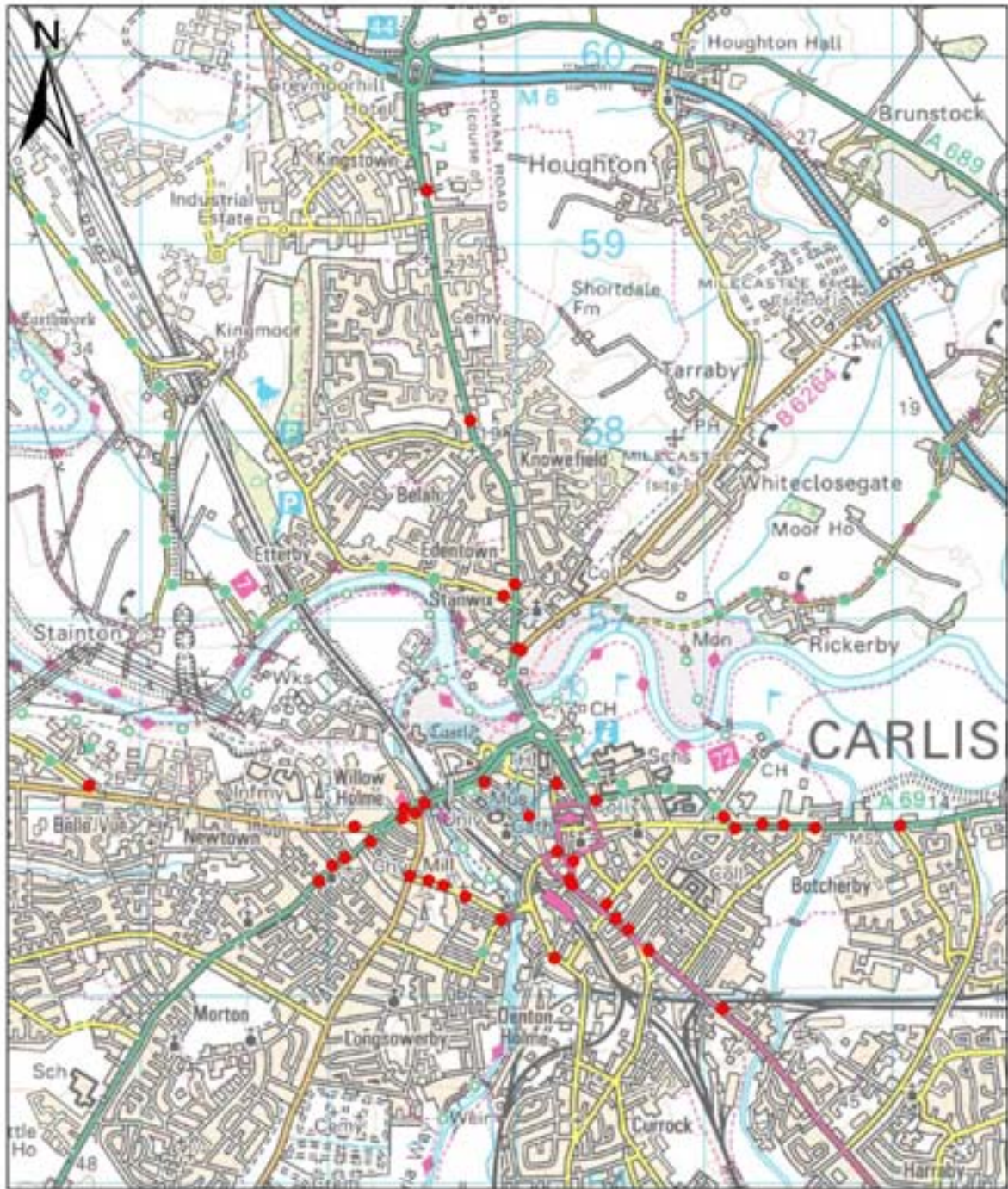
F1	3 TAIT ST	38.1711	30.54	35.12	Y	3.5	-	-
F10	155 BOTCHERGATE	42.5025	34.00	39.10	Y	3	-	-
F5	STANLEY HALL	43.1275	34.50	39.68	Y	3	-	-
F7	24 LONDON RD	49.4278	39.54	45.47	Y	4.5	-	-
F9	129 LONDON RD	40.9317	32.75	37.66	Y	0.5	-	-

AREA H - TOWNS

H1	BRAMPTON	25.18	20.14	23.17	N (0.5)	2.5	6.73579	22.4
H3	LONGTOWN	28.2258	22.58	25.97	N (0.5)	2.5	6.323553	24.9
H4	WARWICK BRIDGE	40.455	32.36	37.22	N (0.5)	2.5	7.860951	35.9
H5	WIGTON RD	29.16	23.33	26.83	Y	1.5	-	-
H6	PETER LANE	15.4092	12.33	14.18	Y	4	-	-
H7	DALSTON RD	21.7742	17.42	20.03	Y	6.5	-	-
H8	AIRPORT	11.9833	9.59	11.02	Y	2	-	-

Results in red indicate an exceedence of the annual mean objective of 40 µg/m3.

Appendix D: Map of Non-Automatic Monitoring Sites



NO2 Diffusion Tube Location Map

● NO2 Tube

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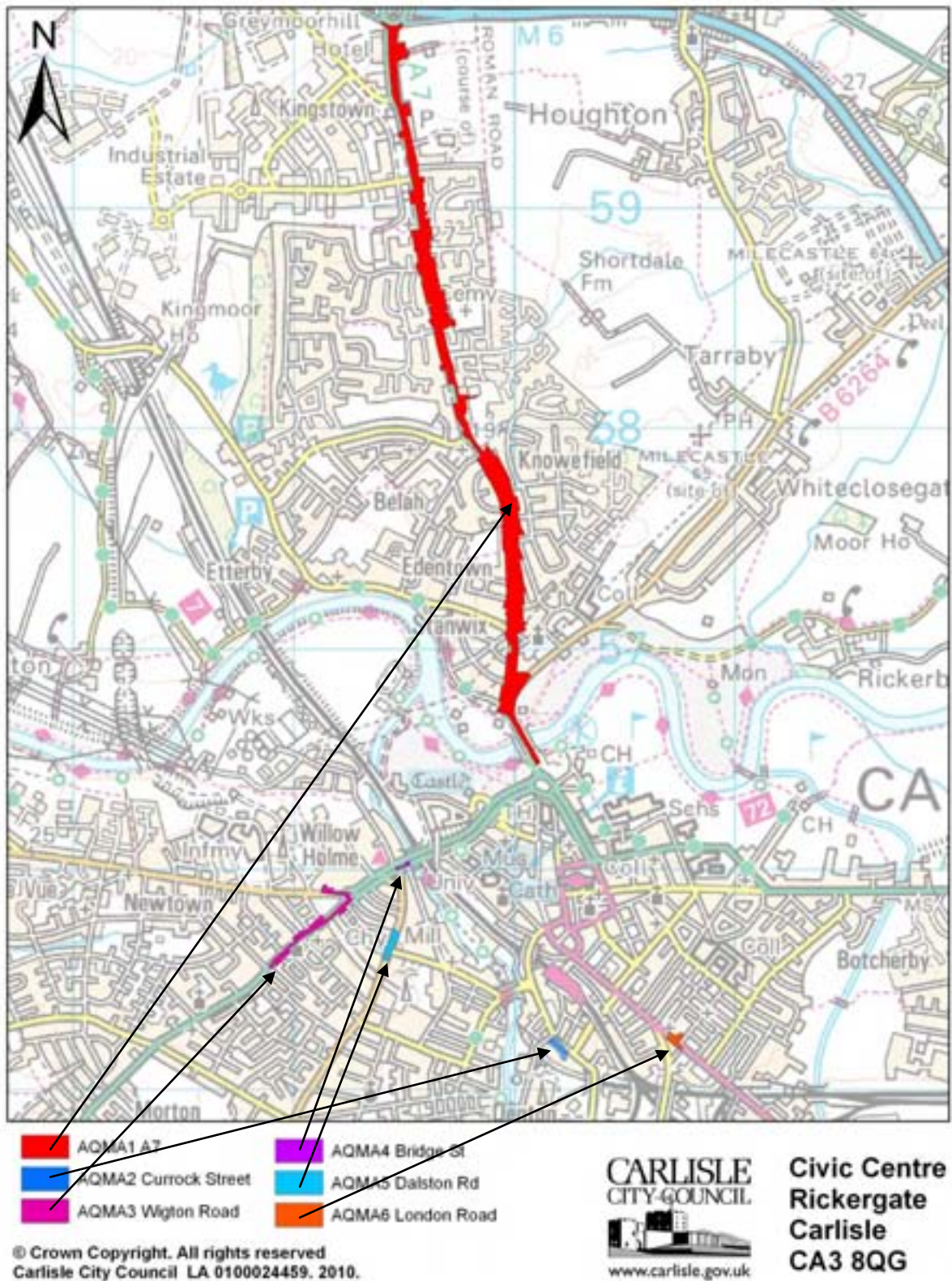
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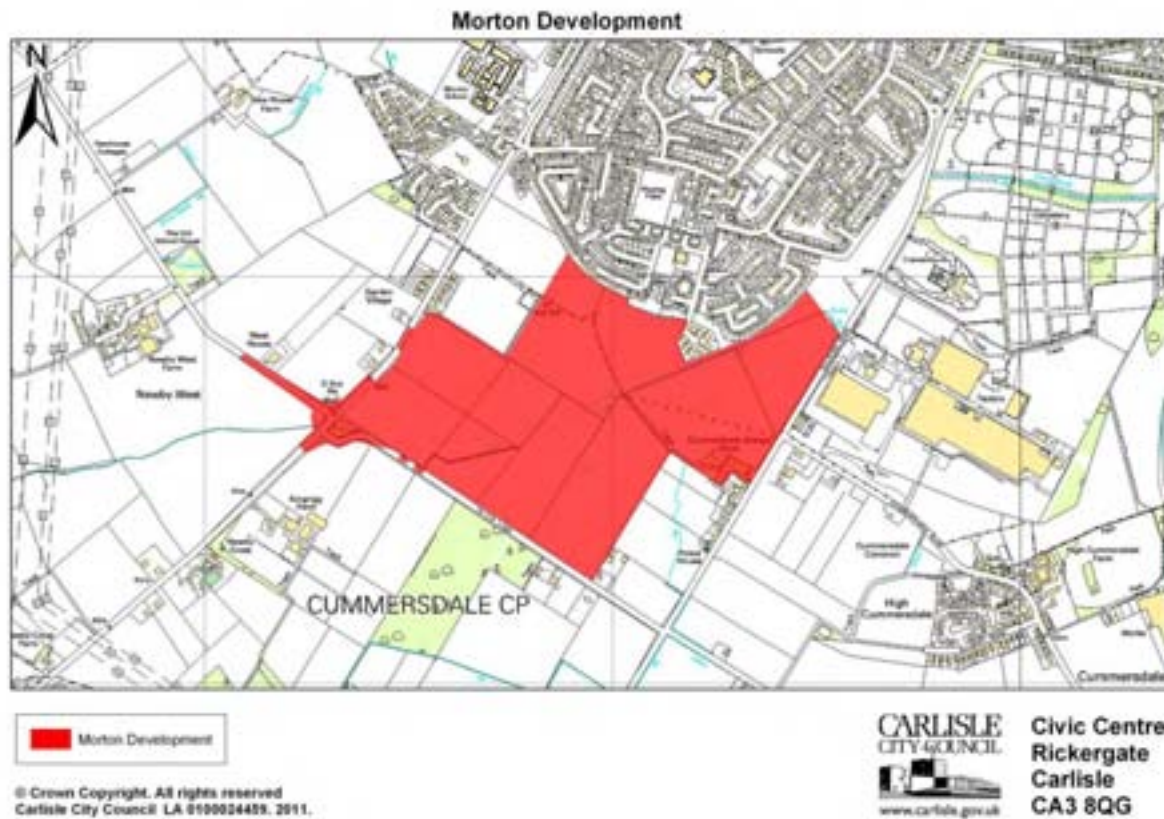
Appendix E: Map Showing All Declared AQMA's.

Location of Carlisle AQMAs.



Appendix F: Map Showing Locations of new Major developments

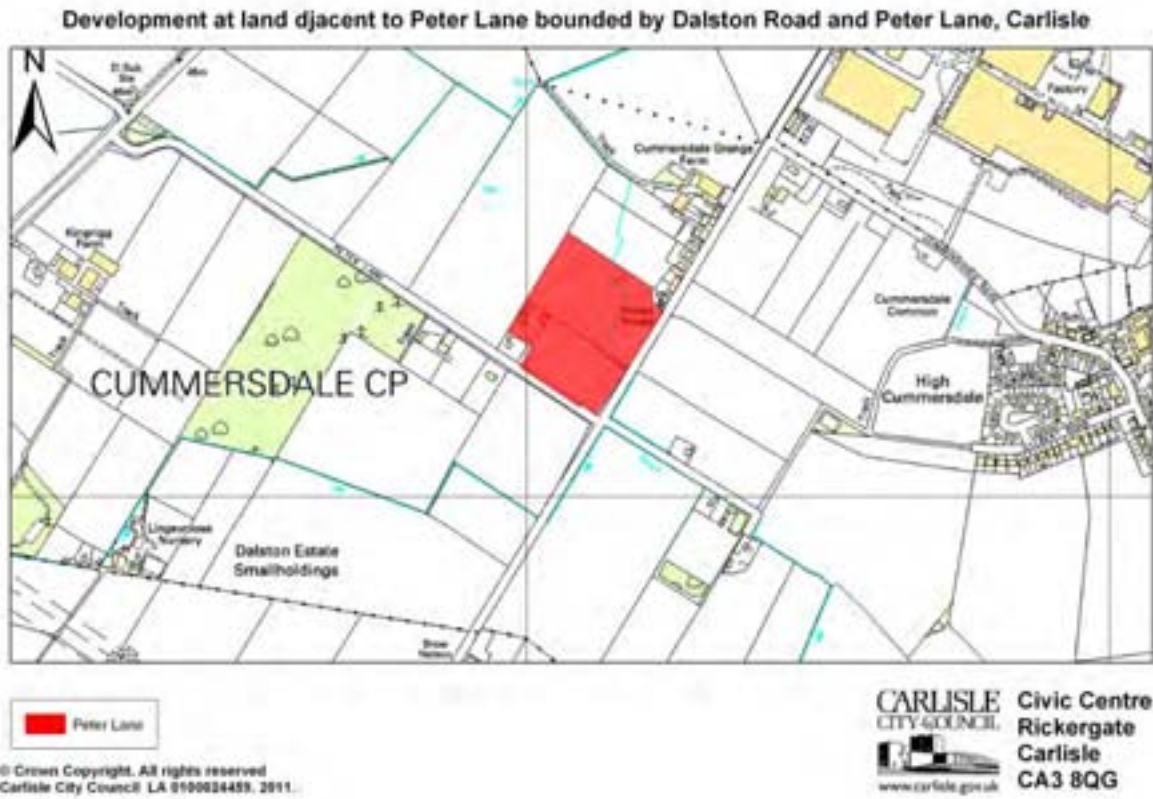
Morton Development - Original application



Morton Development - Ellesmere Way application



Morton Development - Peter Lane application



Morton Development - Garden Village application



Carlisle & Lake District Airport



Westwood Garden Centre



Kingmoor Hotel

Development of Hotel at Kingmoor Park East, Kingmoor Park, Carlisle



Kingmoor Hotel

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Crindledyke Development

Crindledyke Development Area

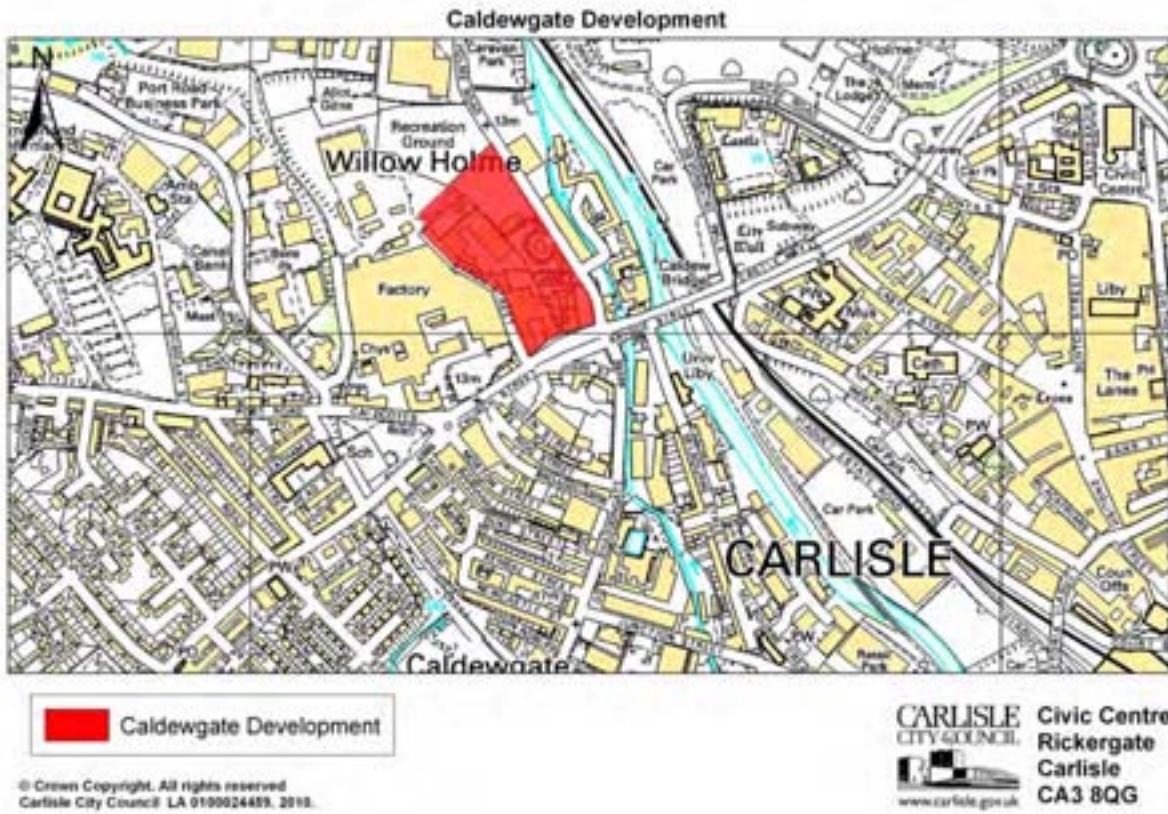


Crindledyke development area

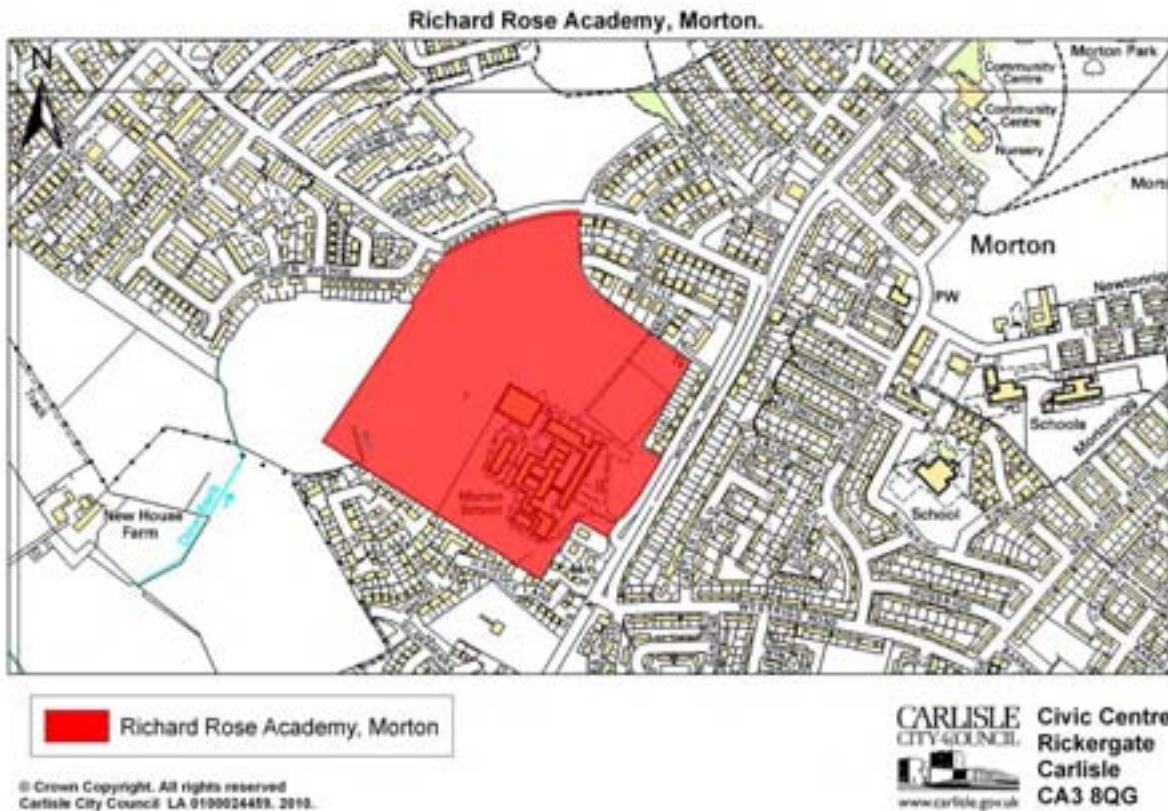
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Caldewgate Development



Richard Rose Morton Academy Development



Denton Business Park Development

