




2012 Air Quality Updating and
Screening Assessment for
Rugby Borough Council

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

May 2012 (Revised November 2012)

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Executive Summary

The Updating and Screening Assessment 2012 has shown that no Detailed Assessments will be required for any of the key air pollutants at this time.

Rugby Borough Council declared an AQMA in 2004 for exceedences of the annual mean NO₂ objective.

The latest monitoring results for NO₂ showed that three monitoring locations within the existing AQMA exceeded the annual mean NO₂ objective in 2011, two of which are locations of relevant exposure. The latest NO₂ monitoring results suggest that the annual mean NO₂ objective is not likely to be exceeded outside the current AQMA. However, the potential for exceedences within the AQMA persist and consequently the AQMA declaration should remain.

The most recent PM₁₀ monitoring results showed that the annual mean PM₁₀ and 24-hour PM₁₀ objectives are currently being achieved at monitoring locations in the Borough and exceedences are considered unlikely at locations of relevant exposure. The 2011 PM₁₀ monitoring results at T8 Townsend Lane give some cause for concern. The annual mean PM₁₀ concentration increased from 19.2 µg/m³ in 2010 to 25.5 µg/m³ in 2011. There were also 28 days of PM₁₀ greater than 50 µg/m³, which is approaching the 35 days permitted under the 24-hour PM₁₀ objective. There is sizeable construction activity on a number of large housing developments in the Long Lawford area, which may be attributable to the increase in PM₁₀ concentration and number of days of PM₁₀ greater than 50 µg/m³. It is expected that there will be a reduction in PM₁₀ at Townsend Lane upon completion of the developments.

No new significant sources have been noted that could give rise to air quality issues in the Borough. Increases in the emissions of NO_x and PM₁₀ from the Cemex Rugby Cement facility have been assessed. The magnitude of the increase in emissions is not likely to result in exceedences of the relevant air quality objectives at any location and the Council does not need to consider this source further at this stage. A planning application for the redevelopment of the leisure centre at Bruce Williams Way in Rugby incorporating a biomass burning energy centre has been approved

subject to the completion of an air quality assessment to assess the likely impact of the proposed redevelopment and biomass burner.

Rugby Borough Council proposes to continue to monitor NO₂ within the Borough through the long-term diffusion tube survey. A new site at the Dun Cow, Dunchurch Square will be considered to establish, with greater certainty, NO₂ concentrations in this area. The Council will also compile and submit a combined Air Quality Progress Report and Action Plan Progress Report in 2013.

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1 Introduction

1.1 Description of Local Authority Area

Rugby Borough Council is situated in north east Warwickshire to the west of the M1 and east of Coventry and is bound to the north by the M6. The Borough covers an area of 138 square miles surrounding the town of Rugby. The main pollutants of concern in Rugby Borough, as in most urban areas of the UK, are associated with road traffic, in particular NO₂ and particulate matter (PM₁₀) at locations close to busy, congested roads where people may live, work or shop. Previous Review and Assessment reports and local knowledge have identified areas where UK objectives may be exceeded.

Rugby Borough Council has six Part A1 installations that are regulated and inspected by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2010, including the cement works, which are located close to the town centre and are a source of NO_x, SO₂ and PM₁₀.

The Borough has a number of other industrial installations of significance in terms of air quality. There is one Part A2 process for the manufacturing of drinks cans which involves solvent based coating processes. In addition, there are 34 minor (Part B) installations. Each process / installation is regulated under the Environmental Permitting (England and Wales) Regulations 2010. The processes / installations are regularly inspected by the Rugby Borough Council Regulatory Services unit to ensure they are controlling their emissions to atmosphere.

The majority of the urban area of Rugby town is classed as a smoke control area making it an offence under the Clean Air Act 1993 to emit smoke from a chimney caused by the burning of unauthorised fuel or the use of an unauthorised appliance

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local

authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in **England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running 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	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 (PM ₁₀) (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

Rugby Borough Council completed the required three rounds of Review and Assessment of air quality in its administrative area between 1998 and 2008, comprising:

- Round One:
 - Stage 1 (Review and Assessment) identifying the main sources of air pollution within and around the Borough, reviewing the levels of air pollutants for which prescribed standards and objectives have been set, and estimating the likely future levels.
 - Stage 2/3 provided further screening of pollutant concentrations within the area to assess whether the air quality objectives would be achieved by the target date. A more complex assessment of monitoring and modelling in the Borough identified no exceedences of national air quality objectives.
- Round Two:
 - Updating and Screening Assessment (USA) 2003ⁱ. The USA identified a number of sources that may lead to exceedences of the air quality objectives, thus requiring Rugby Borough Council to proceed to a Detailed Assessment.
 - Detailed Assessment of Air Quality 2004ⁱⁱ involved an accurate and detailed study of current and future air quality. The assessment identified that annual average levels of NO₂ were at risk of being exceeded on a number of major roads in the centre of Rugby town and in Dunchurch.
 - Detailed Assessment of Particulate Matter 2005ⁱⁱⁱ to investigate the risk of exceedence of the PM₁₀ air quality objectives related to emissions (stack, low-level point source and fugitive) from the Cemex cement plant in Rugby. The report concluded that air quality objectives for PM₁₀ would be achieved.

The outcome of the 2004 Detailed Assessment led to the declaration of Rugby's AQMA in 2004. A map depicting the extent of the AQMA is shown in Figure 1.1 below.

The Further Assessment^{iv} required the local authority to undertake further detailed monitoring of the air quality within the AQMA in order to confirm that the decision to declare the AQMA was justified. The Further Assessment involved calculations to predict the scale of improvement that was needed for each pollutant exceeding the air quality objectives to satisfy those objectives and included source apportionment of pollutant emissions.

The Further Assessment was amended following comments received by Defra, in February 2006. It identified that only one property in the Borough was likely to be exposed to levels above the national air quality objective. Projected future reductions in NO_x emissions and the planned Rugby by-pass (the Rugby Western Relief Road) were anticipated to result in compliance within 2 years.

Between 2006 and 2011 Rugby Borough Council completed the third and fourth rounds of the Review and Assessment process. The following reports were published in fulfilment of LAQM duties:

- Round Three:
 - USA 2006^v, which concluded that the air quality objectives were unlikely to be exceeded at any location within the Borough for six of the seven pollutants assessed. It was concluded that exceedences of the NO₂ objective persisted at several locations within the present AQMA in respect of diffusion tube monitoring results. The declaration of the AQMA was upheld and there was no need to proceed to a Detailed Assessment.
- Round Four:
 - USA 2009^{vi}, which identified the requirement for a Detailed Assessment due to the development of a new superstore in the town centre and the proposed expansion of the pedestrianised area of the town centre. Updated monitoring results indicated continued exceedences of the annual mean NO₂ objective at a number of locations of relevant

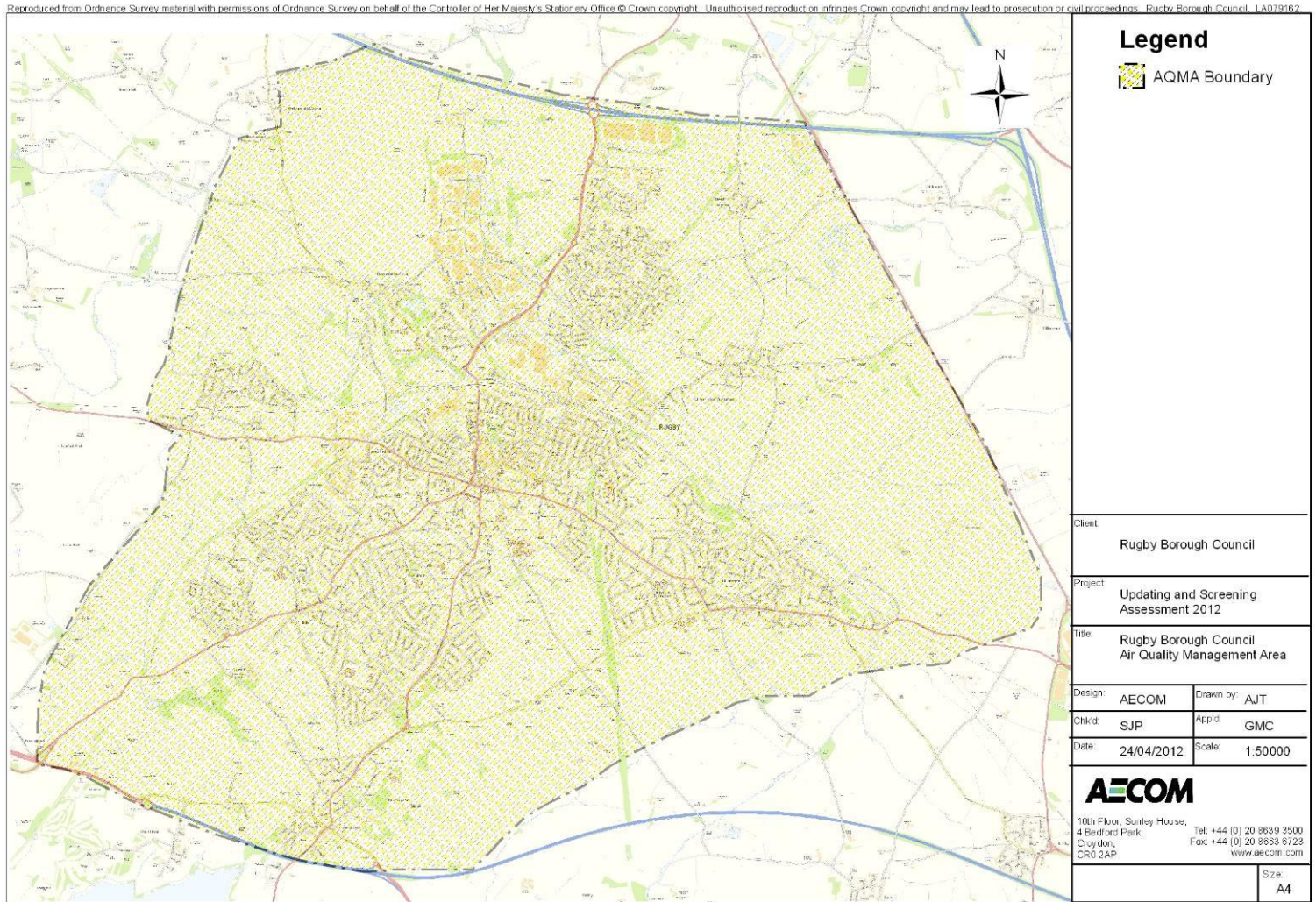
exposure. It was concluded that exceedences of the air quality objectives for any of the other key pollutants were very unlikely.

- Detailed Assessment of Nitrogen Dioxide 2011^{vii} concluded from the results of a short-term monitoring programme, implemented as part of the Rugby Pedestrianisation Scheme study, that potential exceedences could occur along a number of streets in Rugby Town Centre as a consequence of poor dispersion, i.e. street canyon effects. Dispersion modelling undertaken during the Detailed Assessment predicted that the highest NO₂ concentrations would be along the B5414 Church Street/North Street/Clifton Road.

Based on the findings of the Detailed Assessment it was recommended that the existing AQMA order remained in place and that the long-term monitoring survey of NO₂ should be continued. Additional recommendations were made to supplement the existing monitoring network with a number of new monitoring locations across the Borough, focusing on pollution hotspots and narrow streets, to provide better information on the spatial variation of pollution concentrations and to assess changes in pollution levels following the completion of the Rugby Western Relief Road (RWRR).

In April 2011 Rugby Borough Council produced a Progress Report^{viii} documenting updated monitoring data within the Borough, and new local developments and planning applications with the potential to impact upon local air quality.

Figure 1.1 Map of AQMA Boundaries



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

In August 2011 Rugby Borough Council's Air Quality Monitoring Task Group completed a review of the Council's Air Quality Monitoring Network^{ix} to define a cost-effective strategy for air quality monitoring within the Borough beyond the end date of the current Air Quality Monitoring Network contract in June 2012. The review concluded with a recommendation that all continuous monitoring of NO₂ and PM₁₀ within the Borough should cease in June 2012. In support of this recommendation the following statements were given:

- There have been no exceedences of the annual mean PM₁₀ objective at any site since monitoring began in 1999 and exceedences of the daily mean PM₁₀ objective have been extremely rare, therefore there is no necessity to continue to monitor PM₁₀ concentrations in the Borough;
- Ongoing monitoring using the automatic air quality monitoring station (AQMS 5 Newbold Road) beyond the life of the existing contract (expiry June 2012) would be costly. The continuous monitoring data is not needed to fulfil the Council's statutory obligations. The size of the unit means that it is difficult to move and not suitable for some locations where additional monitoring would be of value. The AQMS should therefore be taken out of use.
- The NO₂ diffusion tube network should be expanded to allow greater flexibility to respond to new concerns and to enable robust monitoring of the areas of high or potentially high traffic volumes identified by the County Council. Around 40 to 50 diffusion tubes should be adequate for this purpose.

In October 2011 a Cabinet Meeting approved the recommendations detailed within the Review of the Rugby Borough Council Air Quality Monitoring Network that Rugby Borough Council would cease to operate continuous air quality monitoring equipment. All continuous monitoring stations within the Borough were decommissioned in June 2012.

2.1.1 Automatic Monitoring Sites

Since the 2011 Progress Report there have been no major changes to the continuous monitoring network in Rugby. AQMS 5, located at the junction of Newbold Road and Essex Street is the only operational continuous monitoring station in the Borough. This station monitors concentrations of oxides of nitrogen (NO_x) and particulate matter (PM_{10}). AQMS 5 is equipped with a Thermo Electron Chemiluminescence Analyser for monitoring NO_x and NO_2 . Measurements of PM_{10} are made using a TEOM-FDMS and as such require no correction to ensure gravimetric equivalence.

Airborne particulate matter concentrations are monitored at a further five locations using Turnkey Osiris dust monitors. The positions of these monitors remain unchanged from those reported in the 2011 Progress Report. Measurements of airborne particulate matter by the Turnkey Osiris monitors are presented uncorrected as previous co-location studies in Rugby indicated a good agreement between TEOM measurements and Turnkey Osiris measurements.^x

Further details of the monitoring methods are presented below. Maps indicating the positions of the monitoring locations are shown in Figures 2.1a to 2.1e. Tabulated details of the automatic monitoring sites can be found in Table 2.1. Details on the continuous monitoring equipment used in Rugby and QA/QC procedures can be found in Appendix B.

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	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?
AQMS 5 Newbold Road	Roadside	450130	275849	NO ₂ , PM ₁₀	Y	Chemiluminescence (NO ₂); TEOM-FDMS (PM ₁₀)	Y (1m)	6 m	Y
T2 Lawford Farm	Rural	444853	274080	TSP, PM ₁₀ , PM _{2.5} , PM ₁	Y	Turnkey Osiris	N	N/A	N
T8 Townsend Lane	Industrial	448125	275865	TSP, PM ₁₀ , PM _{2.5} , PM ₁	Y	Turnkey Osiris	Y	2 m	N
T10 Avenue Road	Industrial	449289	275607	TSP, PM ₁₀ , PM _{2.5} , PM ₁	Y	Turnkey Osiris	Y	<1 m	Y
T14 Russelsheim Way	Roadside	450016	274966	TSP, PM ₁₀ , PM _{2.5} , PM ₁	Y	Turnkey Osiris	Y	2 m	Y
T16 Murray Road	Roadside	451132	275887	TSP, PM ₁₀ , PM _{2.5} , PM ₁	Y	Turnkey Osiris	Y	2 m	Y

Figure 2.1a Continuous and Diffusion Tube Monitoring Locations in Rugby Town Centre

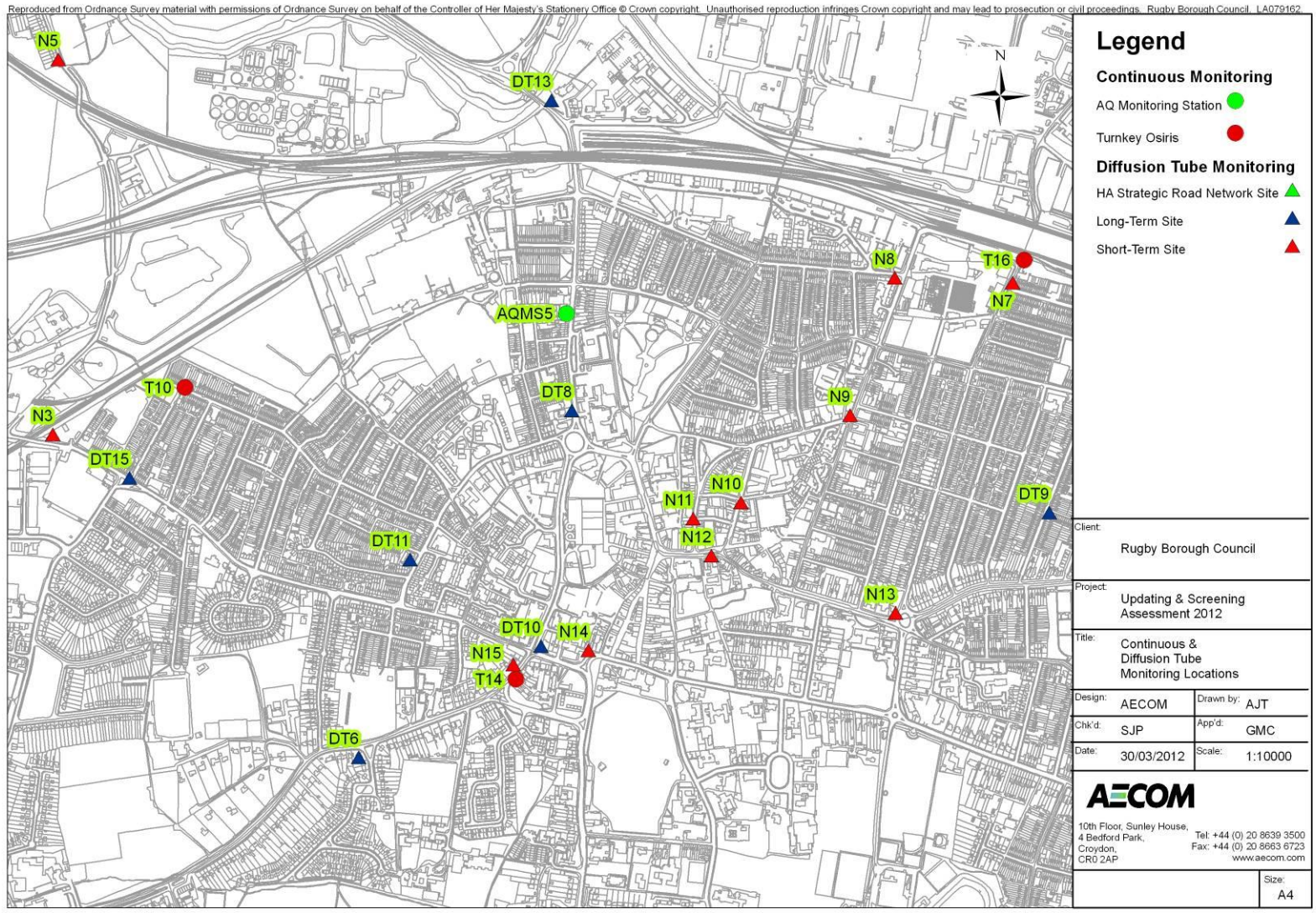


Figure 2.1b Continuous and Diffusion Tube Monitoring Locations in the West of Rugby Borough

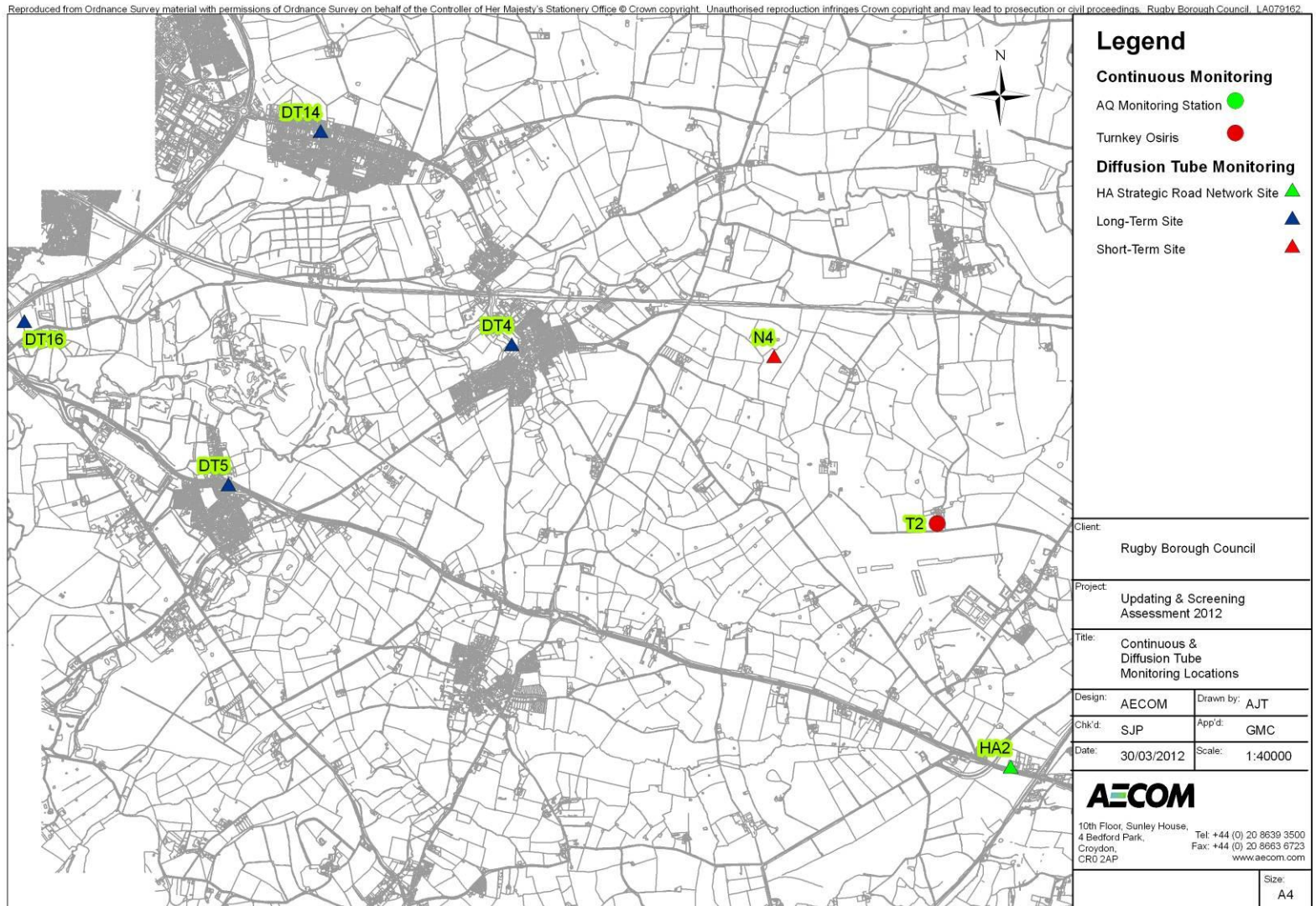


Figure 2.1c Continuous and Diffusion Tube Monitoring Locations South and West of Rugby Town Centre

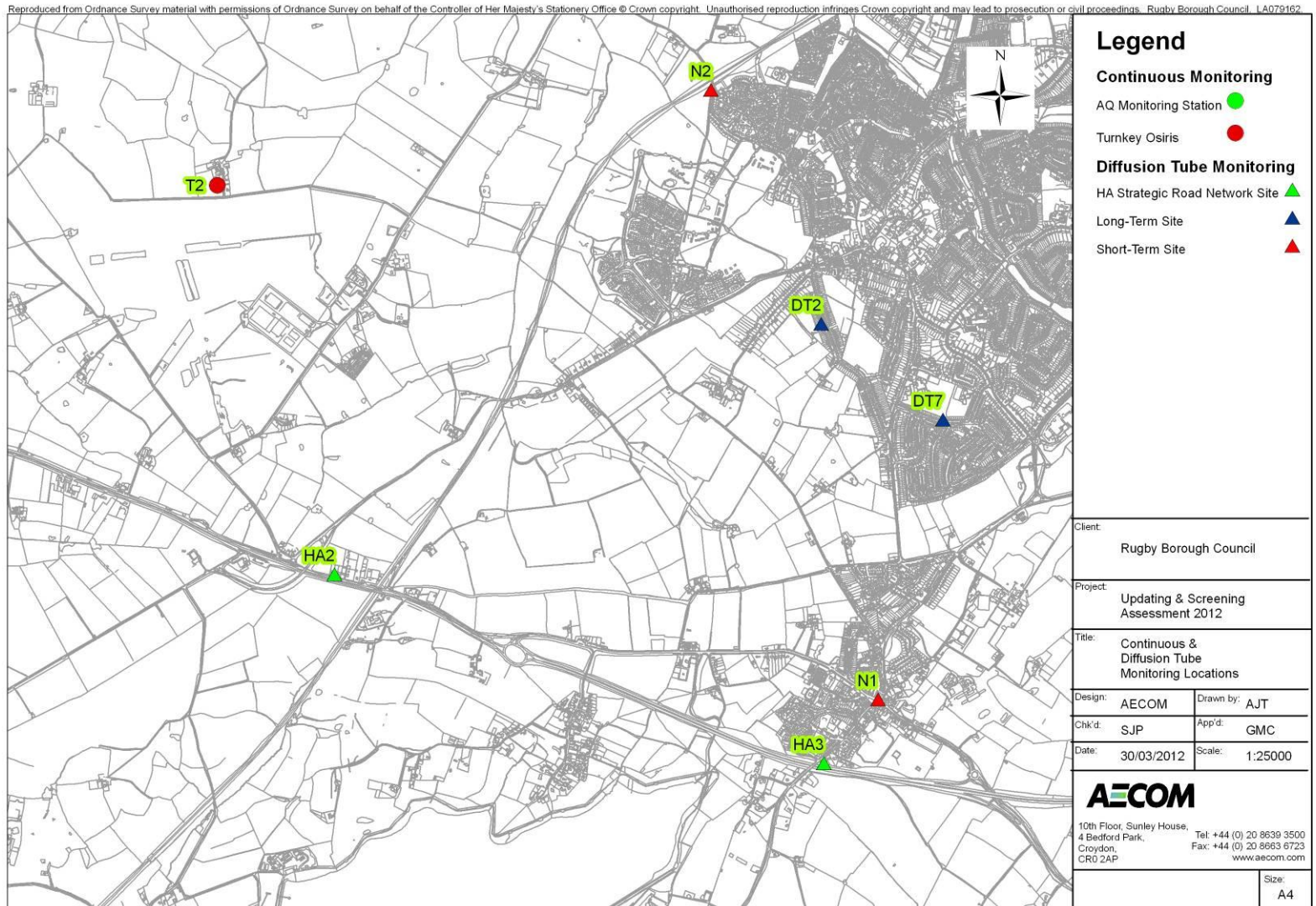


Figure 2.1d Continuous and Diffusion Tube Monitoring Locations North of Rugby Town Centre

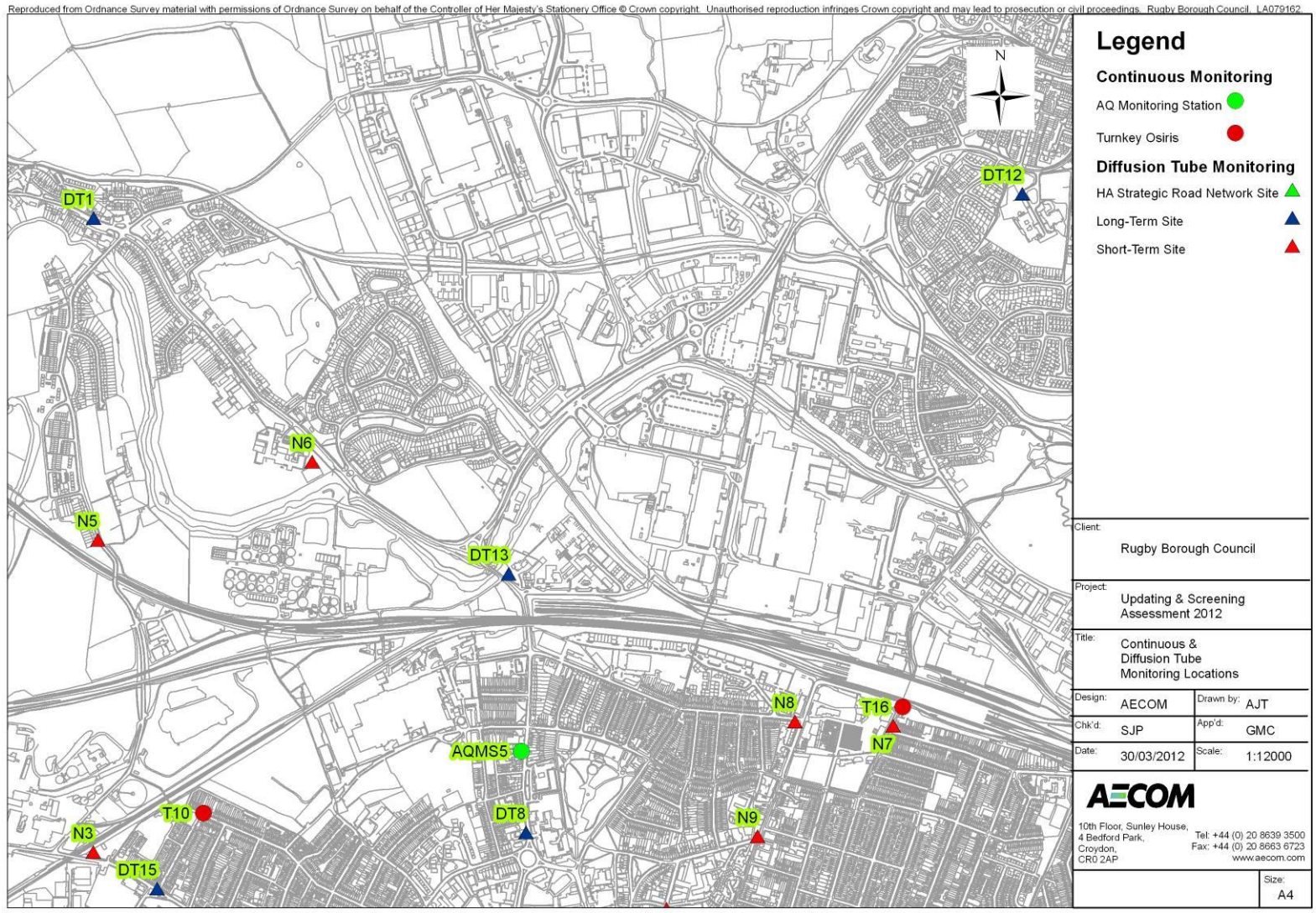


Figure 2.1e Diffusion Tube Monitoring Locations North of Rugby Town Centre



2.1.2 Non-Automatic Monitoring Sites

Rugby Borough Council has operated a network of NO₂ diffusion tubes since 2000. Until April 2012 there were seventeen long-term diffusion tube locations across the Borough, including one co-location study alongside the continuous monitoring station at Newbold Road. Further details are provided in Table 2.2 and Figures 2.1a to 2.1e.

In October 2011 the Cabinet approved the recommendations of Rugby Borough Council's review of the air quality monitoring network. The recommendations included to cease all continuous monitoring in the Borough and expand the NO₂ diffusion tube monitoring network. The diffusion tube network was expanded to 47 sites and triplicate tubes for the purpose of bias correction are now located alongside an automatic monitoring station in Leamington Spa. Monitoring at the new locations commenced in April 2012. Consequently no results are reported in this Updating and Screening Assessment, but will be reported in future review and assessment reports. The list of monitoring sites in the expanded diffusion tube monitoring network is presented in Appendix A.

To inform baseline conditions an air quality assessment of a proposed extension to the town centre pedestrianised zone and Detailed Assessment of Nitrogen Dioxide 2011 Rugby Borough Council implemented a short-term diffusion tube monitoring survey in the town centre area. The survey revealed potential exceedences of the annual mean air quality objective for NO₂. In light of this monitoring Rugby Borough Council extended and expanded the short-term monitoring survey.

Monitoring was carried out at 10 locations around Rugby town centre and at a further 5 locations in the surrounding areas of Dunchurch, Lawford Road and alongside the RWRR to improve the spatial coverage of the NO₂ monitoring. The survey ran from November 2010 to April 2011. The results of the short-term monitoring survey were annualised according to the methodology outlined in Box 3.2 of LAQM.TG(09) to estimate the 2011 annual mean NO₂ concentrations at these locations. Details of these monitoring sites are presented in Table 2.2 and Figures 2.1a to 2.1e.

Rugby Borough Council participated in the Highways Agency air quality monitoring survey of the strategic road network (SRN). In Rugby Borough, this monitoring survey included four diffusion tube monitoring sites located at sensitive residential receptor locations in proximity to the M6, A5, A45 and M45. Details of the SRN and short-term monitoring sites are shown in Table 2.2.

Diffusion tubes used in the long-term and short-term monitoring surveys were supplied and analysed by Environmental Services Group using a 50% TEA / Acetone preparation. Based upon the new Z-Score Performance criteria Environmental Services Group achieved 100% Z-Scores of $< \pm 2$, (which is interpreted as a satisfactory result and indicative of acceptable laboratory performance) in all WASP NO₂ Laboratory Performance Proficiency Testing Rounds 108 to 115. Further details of diffusion tube QA / QC and the derivation of bias adjustment factors are presented in Appendices A and B.

Table 2.2 Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	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?
LONG-TERM DIFFUSION TUBE SITES										
DT 1	10 Newbold Rd	Kerbside	449000	277178	NO ₂	Y	N	Y	<1 m	N
DT 2	Marton A423	Roadside	440815	269039	NO ₂	Y	N	Y (5m)	<1 m	N
DT 3	69 School St, Long Lawford	Urban Background	447314	276168	NO ₂	Y	N	Y	15 m	N
DT 4	St Margaret's School, Wolston	Urban Background	441131	275648	NO ₂	N	N	N	90 m	N
DT 5	Ryton Village Hall, High St	Near-Road	438642	274418	NO ₂	N	N	Y	5 m	Y
DT 6	2 Westfield Rd, Bilton	Urban Background	449671	274795	NO ₂	Y	N	Y	10 m	N
DT 7	68 Cymbeline Way, Bilton	Urban Background	448853	272782	NO ₂	Y	N	Y	20 m	N
DT 8	EHO Dept, Newbold Rd	Roadside	450139	275557	NO ₂	Y	N	Y	<1 m	Y
DT 9	Cambridge St. / Argyle St.	Near-Road	451187	275333	NO ₂	Y	N	Y	5 m	N
DT 10	Webb Ellis Pub, Corporation St.	Roadside	450071	275039	NO ₂	Y	N	Y	5 m	Y
DT 11	15 Oliver St., New Bilton	Roadside	449783	275230	NO ₂	Y	N	Y	5 m	N
DT 12	Boughton Leigh School, Brownsover	Urban Background	451447	277242	NO ₂	Y	N	N	56 m (school parking area <1 m)	N
DT 13	Avon Mill Pub, Newbold Rd	Roadside	450088	276229	NO ₂	Y	N	Y (15 m)	4.5 m	N
DT 14	Binley Woods Village Hall	Urban Background	439450	277523	NO ₂	N	N	Y	20 m	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	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?
DT 15	Lawford / Jubilee St, Arnie's Batch	Kerbside	449167	275409	NO ₂	Y	N	Y	<1 m	Y
DT 16	Marriot / Courtyard Hotel, A45, Ryton	Near-Road	436848	275852	NO ₂	N	N	Y	19 m	Y
DT 17	AQMS 5 Newbold Road	Roadside	450130	275849	NO ₂	Y	Y	Y	6 m	N
SHORT-TERM DIFFUSION TUBE SITES (NOV-10 to APR-11)										
N 1	Dun Cow, Dunchurch Square	Roadside	448496	271244	NO ₂	Y	N	Y	5 m	Y
N 2	Bilton Lane near RWRR	Near-Road	447579	274594	NO ₂	Y	N	Y	15 m	Y
N 3	Lawford Road, former Simms Scrap Yard	Near-Road	448999	275505	NO ₂	Y	N	Y	22 m	Y
N 4	Avenue Rd / Campbell St	Roadside	449435	275543	NO ₂	Y	N	Y	5 m	Y
N 5	256 Parkfield Rd	Roadside	449011	276329	NO ₂	Y	N	Y	5 m	Y
N 6	Avon Valley School	Urban Background	449576	276535	NO ₂	Y	N	Y	35 m	Y
N 7	Murray Rd	Roadside	451107	275838	NO ₂	Y	N	Y	3 m	Y
N 8	Wood St / Park Rd	Roadside	450848	275849	NO ₂	Y	N	Y	5 m	Y
N 9	Railway Terrace, Station Bar	Roadside	450750	275547	NO ₂	Y	N	Y	5 m	Y
N 10	Albert St, Alma Lodge Hotel	Roadside	450510	275355	NO ₂	Y	N	Y	5 m	Y
N 11	Regent St, near Oxfam	Roadside	450405	275329	NO ₂	Y	N	Y	5 m	Y
N 12	Church St, Town Fryer	Roadside	450445	275238	NO ₂	Y	N	Y	5 m	Y
N 13	Clifton Road Roundabout	Roadside	450850	275112	NO ₂	Y	N	Y	5 m	Y
N 14	Lawrence Sheriff St	Near-Road	450175	275030	NO ₂	Y	N	Y	13 m	Y
N 15	6A Bilton Rd	Near-Road	450010	274999	NO ₂	Y	N	Y	15 m	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	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?
HIGHWAYS AGENCY SRN DIFFUSION TUBE SITES										
HA 1	M6 Nettle Hill Farm Cottages	Near-Road	441998	282678	NO ₂	Y	N	Y	55 m	Y
HA 2	A45 Ricky	Near-Road	445512	271931	NO ₂	Y	N	Y	20 m	Y
HA 3	M45 Toft Monks	Near-Road	448199	270892	NO ₂	Y	N	Y	20 m	Y
HA 4	A5 Farndale	Near-Road	452748	280718	NO ₂	Y	N	Y	14 m	Y

2.2 Comparison of Monitoring Results with AQ Objectives

Data from each of the Rugby automatic monitoring locations are presented in Sections 2.2.1 and 2.2.2 below along with a discussion of the results of diffusion tube monitoring in Rugby. Summary tables comparing the measured concentrations with the air quality objectives and providing data capture statistics are included.

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Continuous monitoring of NO₂ in Rugby has been carried out at the current Newbold Road site since 2007. The site was relocated in 2007 from a previous site further along Newbold Road that was operational from 2003 to 2007. The latest results, for 2011, indicate that the annual mean NO₂ objective of 40 µg/m³ was achieved.

The monitored mean NO₂ concentration at Newbold Road in 2011 was 34.4 µg/m³. Due to data capture being less than 90% an annualisation factor of 0.950 was calculated (see Table 2.3 and Appendix A) and applied to the monitored mean NO₂ concentration. The annualised NO₂ concentration at Newbold Road data was 32.7 µg/m³. Both the monitored mean and annualised mean NO₂ concentrations were below the annual mean NO₂ objective.

The recent trend in annual mean NO₂ concentrations at Newbold Road is depicted in Figure 2.3. From 2007 to 2009 the annual mean NO₂ concentrations at Newbold Road were below the annual mean NO₂ objective and appeared to be decreasing slightly over time. The result for 2010 displayed a deviation from this trend with the annual mean concentration for 2010 exceeding the annual mean objective for the first time since monitoring began in 2003. A contributing factor to the monitored exceedence in 2010 was the diversion of traffic via Oliver Street and Newbold Road during the construction of the Rugby Western Relief Road and it was anticipated that NO₂ concentrations would decrease following the opening of the relief road. The

relief road opened in 2011 and the latest monitoring data suggests that there has been a reduction in NO₂ concentrations since this time.

There were no hours of NO₂ concentration in 2011 exceeding the hourly mean NO₂ standard of 200 µg/m³, the maximum recorded hourly concentration being 124.2 µg/m³ on 22/04/2011 at 00:00. Since the data capture rate was less than 90% the 99.8th percentile of hourly mean NO₂ concentrations, calculated for 2011, was 111.1 µg/m³. On the basis of these results it is concluded that the hourly mean NO₂ objective was achieved at Newbold Road in 2011. This is consistent with historical monitoring data at the site – there have been no recorded exceedences of the hourly standard of 200 µg/m³ since monitoring began at the site (Table 2.4).

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

Site ID	Site Type	Within AQMA?	Valid Data Capture 2011 %	Annual Mean Concentration $\mu\text{g}/\text{m}^3$				
				2007	2008	2009	2010	2011
AQMS 5	Roadside	Y	88.0	32.4	33.6	34.0	40.9	34.4 ^a 32.7 ^b

^a Monitored NO_2 concentration at Newbold Road in 2011

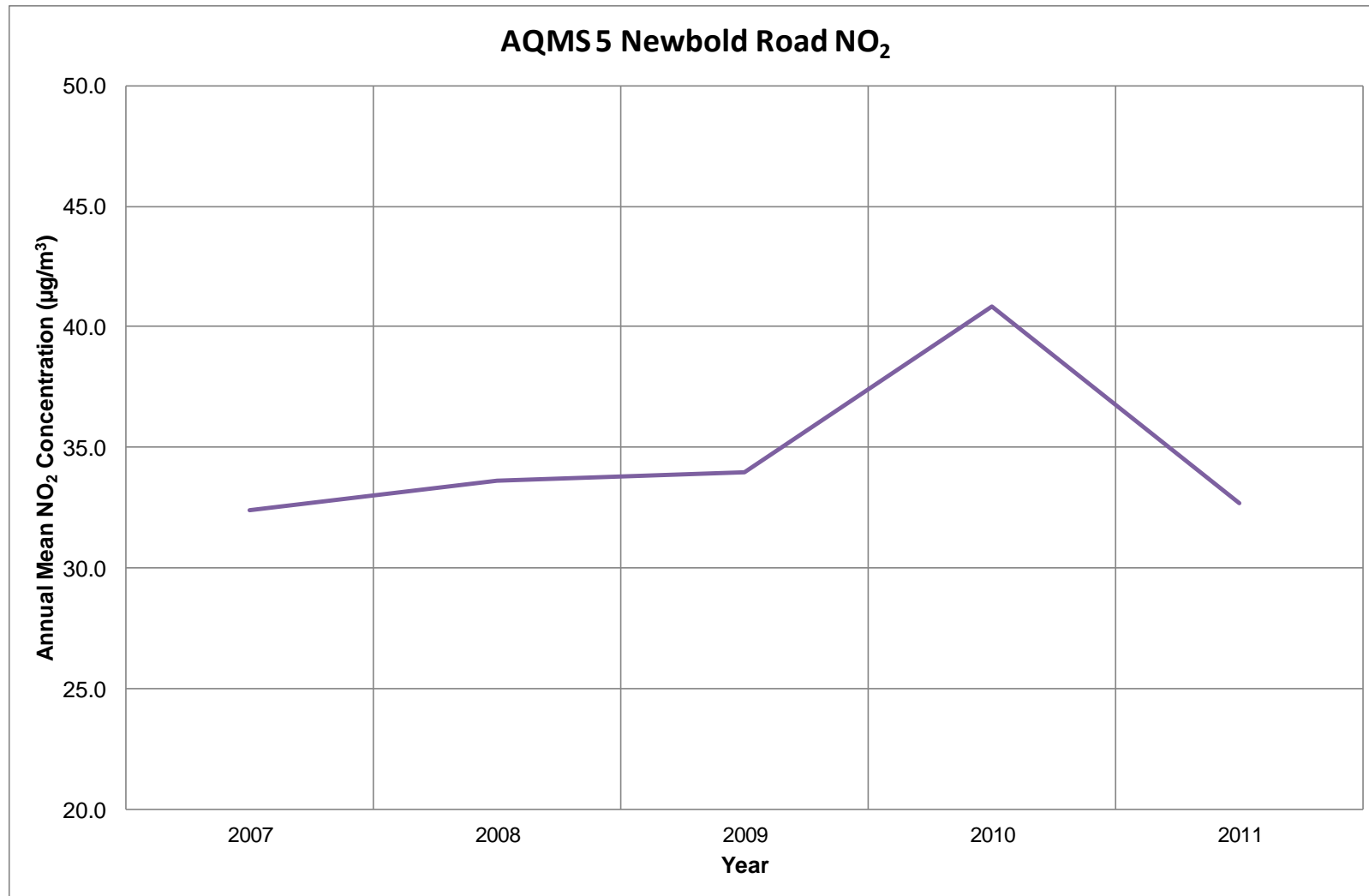
^b Annualised mean concentration, according to methodology in Box 3.2 of LAQM.TG(09), due to low data capture. See Appendix A for details.

Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2011 % ^b	Number of Exceedences of Hourly Mean ($200 \mu\text{g}/\text{m}^3$) ^a				
				2007	2008	2009	2010	2011
AQMS 5	Roadside	Y	88.0	0 (115)	0	0	0	0 (111.1)

^a Figures in brackets 99.8th percentile of hourly means due to period of valid data less than 90%

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at AQMS 5 Newbold Road



Diffusion Tube Monitoring Data

Long-Term Diffusion Tube Sites

Rugby Borough Council's long-term diffusion tube monitoring covers 16 single tube locations and one triplicate co-location study. 13 sites lie within the AQMA and 15 sites are at locations of relevant exposure. The raw diffusion tube results were bias-adjusted using a locally-derived factor from the co-location study at the Newbold Road AQMS 5 site. Details of the derivation of the local factor and discussion of the choice of factor to use (i.e. local or national) can be found in Appendix A.

16 of the 17 sites achieved at least 90% data capture. DT 16 was the only site to achieve lower than 90% (83.3%). As all sites recorded nine months or more of valid data no annualisation calculations have been carried out.

The 2011 bias-adjusted results indicate that the annual mean NO₂ objective continues to be exceeded at two locations (Table 2.5). The highest annual mean concentration was monitored at DT 10 (46.1 µg/m³, Webb Ellis Pub, Corporation Street). This is consistent with the long-term monitoring trend: NO₂ concentrations at this site have been amongst the highest in Rugby since 2007 (Table 2.6).

The annual mean NO₂ objective was also exceeded at DT 13 (Avon Mill Pub, Newbold Road) in 2010. The objective was exceeded at DT 13 in 2008 and 2010 and the 2011 result is within the range of concentrations historically monitored at this location. DT 13 is not situated at a location of relevant exposure. The nearest relevant receptors are approximately 15 metres from the kerb of Newbold Road, slightly to the south and east of the monitoring location. After applying the distance correction calculation the estimated annual mean NO₂ concentration at the nearest relevant exposure is 33.8 µg/m³, which is below the annual mean NO₂ objective (see Table 2.5 and Appendix A for details).

Annual mean NO₂ concentrations at all long-term diffusion tube monitoring sites were much lower in 2011 than in 2010. DT 5, DT 8, DT 11 and DT 15 all achieved the annual mean NO₂ objective in 2011 following recorded exceedences in 2010. DT 8, DT 11 and DT 15 are located at Newbold Road, Oliver Street and Lawford Road,

respectively and the monitoring results for 2011 at these locations may reflect the anticipated beneficial impact of the opening of the Rugby Western Relief Road on local air quality along these routes as traffic is diverted away from these areas.

The long-term trend in NO₂ concentrations in Rugby appears to be one of a slight increase between 2006 and 2011.

Short-Term Diffusion Tube Sites and Highways Agency Monitoring

Rugby Borough Council carried out a short-term monitoring survey at 15 locations between November 2010 and April 2011, inclusive, to better understand NO₂ concentrations in these areas following modelling work done as part of the air quality assessment of the proposed town centre Pedestrianisation Scheme and the Detailed Assessment of Nitrogen Dioxide. Due to the short-term nature of the survey the results were annualised, according to the procedure described in LAQM.TG(09), to provide estimated annual mean NO₂ concentrations for 2011. Continuous monitoring data, from AURN urban background monitoring stations at Coventry Memorial Park, Leamington Spa and Sandwell West Bromwich, were used to calculate an annualisation factor of 0.672. Full details of the annualisation calculation are presented in Appendix A.

The annualised results were then bias adjusted by applying the locally derived bias adjustment factor (See Appendix A for details). Both the unadjusted monitored mean NO₂ concentrations and the estimated annual mean NO₂ concentrations for 2011 (annualised and bias-adjusted) are presented in Table 2.7.

After annualisation and bias adjustment of the short-term diffusion tube survey results the annual mean NO₂ objective was found to be exceeded at one location, N 1 Dun Cow, Dunchurch Square. The estimated annual mean NO₂ concentration at N 1 was 46.7 µg/m³. The site is within the boundaries of the current AQMA but there is no previous monitoring in the area to establish whether NO₂ concentrations have been historically above the objective at this location.

The Highways Agency SRN monitoring survey in Rugby ran from November 2010 to April 2011, inclusive. An annualisation factor of 0.654 was calculated for the Highways Agency SRN monitoring sites using the methodology outlined in LAQM.TG(09). Details of the annualisation calculation can be found in Appendix A. After annualisation and bias adjustment of the SRN survey results (using the local bias adjustment factor of 1.00) the estimated 2011 annual mean NO₂ concentrations at all four of the SRN sites were well below the annual mean NO₂ objective of 40 µg/m³. The maximum NO₂ concentration was 23.6 µg/m³ at HA 1 and HA 4 (See Table 2.7).

Table 2.5 Results of Long-Term Nitrogen Dioxide Diffusion Tubes in 2011

Site ID	Location	Site Type	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 1.00)
						2011 ($\mu\text{g}/\text{m}^3$)
DT 1	10 Newbold Road opposite shops	Kerbside	100	-	N	23.0
DT 2	Marton A423	Roadside	100	-	N	21.1
DT 3	69 School Street	Urban Background	100	-	N	19.8
DT 4	St Margaret's School, Wolston	Urban Background	100	-	N	17.0
DT 5	Ryton Village Hall, High Street	Near-Road	100	-	N	33.9
DT 6	2 West Field Road	Urban Background	100	-	N	19.6
DT 7	68 Cymbeline Way	Urban Background	100	-	N	17.7
DT 8	EHO Treatment, Newbold Rd	Roadside	100	-	N	36.4
DT 9	(Argyle Street) Cambridge St	Near-Road	100	-	N	22.8
DT 10	Webb Ellis Pub, Corporation St	Roadside	91.7	-	N	46.1
DT 11	15 Oliver Street	Roadside	100	-	N	30.3
DT 12	Boughton Leigh School, Hollowell Way	Urban Background	91.7	-	N	28.2
DT 13	Avon Mill Pub, Newbold Road	Roadside	83.3	-	Y	41.1 / 36.5^A
DT 14	Binley Woods, Village Hall	Urban Background	100	-	N	21.2
DT 15	Lawford/Jubilee St, Arnie's Batch	Kerbside	91.7	-	N	35.5
DT 16	Marriot/Courtyard Hotel, A45	Near-Road	83.3	-	N	24.4
DT 17	Newbold Road AQMS 5	Roadside	100	-	N	32.0

Notes: Figures in *ITALICS* indicate annual mean NO₂ concentrations after distance correction.

^A distance correction for DT 13: distance from kerb to tube = 4.5 m, distance from kerb to nearest receptor = 14.6 m, background NO₂ concentration taken from 2011 result for Westfield Road urban background site (19.6 $\mu\text{g}/\text{m}^3$) as a worst-case indication as mapped background NO₂ concentration for 2011 for nearest grid square (450500, 276500) was 16.4 $\mu\text{g}/\text{m}^3$. Further details in Appendix A.

Table 2.6 Results of Long-Term Nitrogen Dioxide Diffusion Tube Survey (2007 to 2011)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2007 (Bias Adjustment Factor = 0.78)	2008 (Bias Adjustment Factor = 0.99)	2009 (Bias Adjustment Factor = 0.81)	2010 (Bias Adjustment Factor = 1.14)	2011 (Bias Adjustment Factor = 1.00)
DT 1	Kerbside	Y	22.2	26.0	21.5	30.7	23.0
DT 2	Roadside	Y	-	-	15.5	31.2	21.1
DT 3	Urban Background	Y	15.2	21.7	17.4	28.6	19.8
DT 4	Urban Background	N	14.9	19.2	13.3	21.9	17.0
DT 5	Near-Road	N	27.2	37.4	25.5	40.7	33.9
DT 6	Urban Background	Y	20.7	24.4	19.8	28.5	19.6
DT 7	Urban Background	Y	17.5	21.8	13.6	24.8	17.7
DT 8	Roadside	Y	37.2	47.0	38.6	56.0	36.4
DT 9	Near-Road	Y	22.5	26.7	21.2	31.0	22.8
DT 10	Roadside	Y	42.2	58.6	43.0	61.4	46.1
DT 11	Roadside	Y	40.0	59.3	44.7	50.3	30.3
DT 12	Urban Background	Y	26.9	29.5	26.3	34.3	28.2
DT 13	Roadside	Y	28.9	40.6	34.9	55.3	45.2
DT 14	Urban Background	N	18.9	22.5	20.4	29.4	21.2
DT 15	Kerbside	Y	29.5	40.5	36.9	45.4	35.5
DT 16	Near-Road	N	22.7	27.7	21.1	31.5	24.4

Note: Co-located tubes used to derive local bias adjustment factor in 2008 may have been incorrectly positioned leading to higher than expected bias adjusted NO₂ concentrations.

Figure 2.4a Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites DT1-DT8

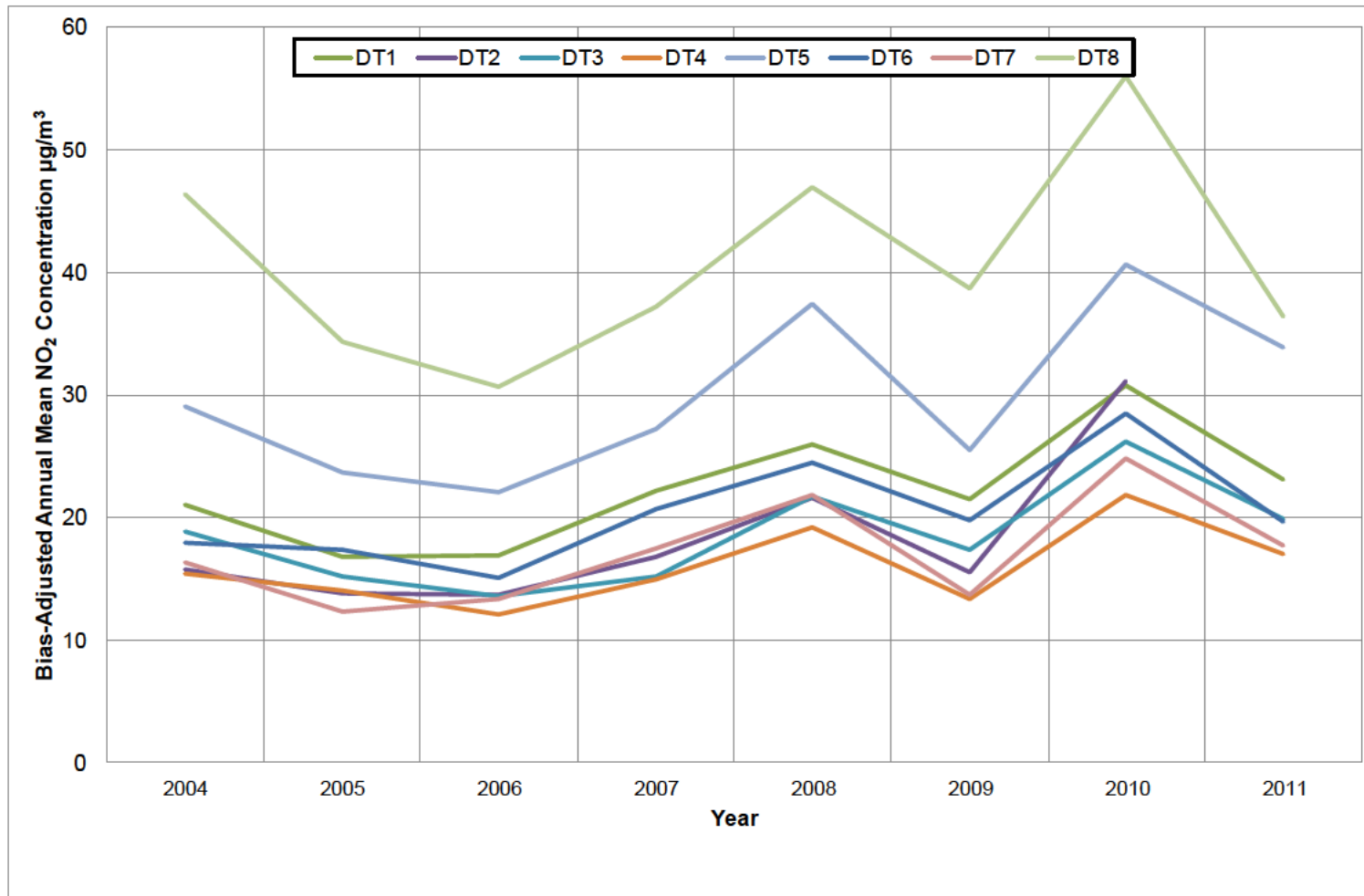


Figure 2.4b Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites DT9-DT16

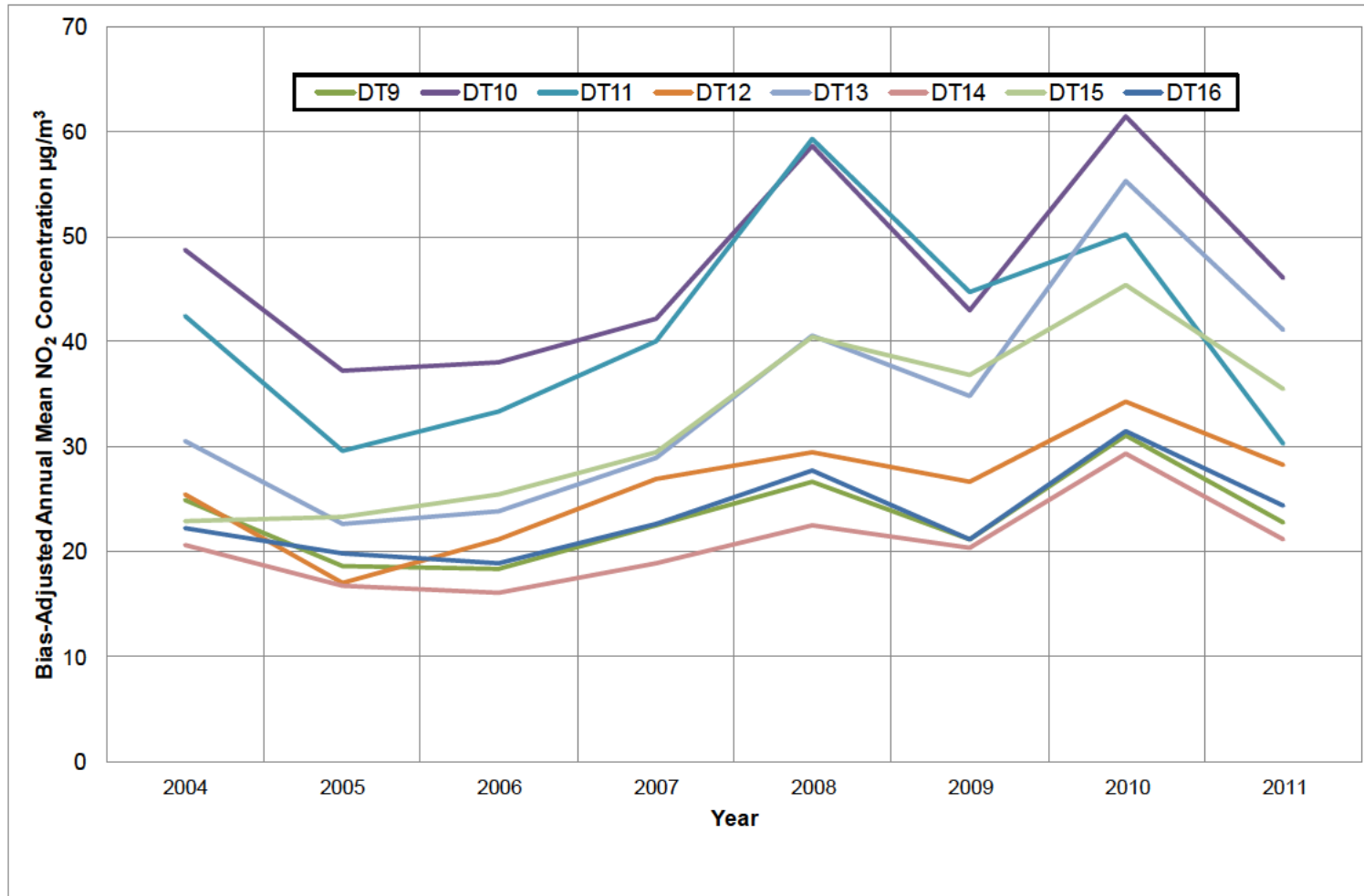


Table 2.7 Results of Short-Term Nitrogen Dioxide Diffusion Tubes (November 2010 to April 2011)

Site ID	Location	Site Type	Data Capture (Period; %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Monitored Mean Concentration (Nov 2010 – Apr 2011)	Annual mean concentration (Bias Adjustment factor = 1.00)
						($\mu\text{g}/\text{m}^3$) ^A	2011 ($\mu\text{g}/\text{m}^3$) ^B
SHORT-TERM DIFFUSION TUBE SITES (NOV-10 to APR-11)							
N 1	Dun Cow, Dunchurch Square	Roadside	100	Y	N	69.6	46.7
N 2	Bilton Lane near RWRR	Near-Road	100	Y	N	30.7	20.6
N 3	Lawford Road Flats former Simms Scrap Yard	Near-Road	100	Y	N	34.1	22.9
N 4	Avenue Road/Campbell Street	Roadside	100	Y	N	36.5	24.5
N 5	Parkfield Road No. 256	Roadside	83.3	Y	N	32.8	22.0
N 6	Avon Valley School	Urban Background	83.3	Y	N	38.3	25.7
N 7	Murray Road- bus stop near train station	Roadside	100	Y	N	54.2	36.4
N 8	Wood Street/Park Road	Roadside	100	Y	N	50.0	33.6
N 9	Railway Terrace Station Bar	Roadside	100	Y	N	47.9	32.2
N 10	Albert Street Alma Lodge Hotel	Roadside	100	Y	N	42.6	28.6
N 11	Regent Street lamppost near Oxfam	Roadside	100	Y	N	44.0	29.5
N 12	Church Street Town Fryer	Roadside	100	Y	N	48.9	32.8
N 13	Clifton Road Roundabout	Roadside	100	Y	Y	46.6	31.3
N 14	Lawrence Sheriff Street lamppost opposite flats	Near-Road	100	Y	N	48.1	32.3
N 15	6A Bilton Road. Big Yellow House	Near-Road	83.3	Y	N	43.3	29.1
HIGHWAYS AGENCY SRN DIFFUSION TUBE SITES (NOV-10 to APR-11)							
HA 1	M6 Nettle Hill Farm Cottages	Near-Road	100	Y	N	36.1	23.6
HA 2	A45 Ricky	Near-Road	100	Y	Y	28.7	18.7
HA 3	M45 Toft Monks	Near-Road	83.3	Y	N	26.9	17.6
HA 4	A5 Farndale	Near-Road	100	Y	N	36.1	23.6

Notes: ^A Monitored mean concentrations before annualisation or bias adjustment. ^B Estimated annual mean concentrations for 2011 after applying annualisation factor and local bias adjustment factor; annualisation factor for sites N 1 to N 15 = 0.672; annualisation factor for sites HA 1 to HA 4 = 0.654.

2.2.2 PM₁₀

Continuous monitoring of PM₁₀ has been carried out at Newbold Road, Rugby since 2003. The monitoring station has been situated at its present location since 2007 (AQMS 5). The monitoring site uses a TEOM-FDMS system and so the data require no correction to ensure gravimetric equivalence.

Turnkey Osiris units operate at an additional five sites around Rugby town centre and the surrounding areas. Previous co-location studies with TEOM instruments in Rugby demonstrated a good agreement between the Turnkey Osiris measurements and those of gravimetric equivalent TEOM measurements. Consequently, all Turnkey results are presented without adjustment.

The latest monitoring data for 2011 indicate that the annual mean PM₁₀ objective of 40 µg/m³ and the daily PM₁₀ objective of 35 days of greater than 50 µg/m³ were achieved at AQMS 5 and all of the Turnkey monitoring sites. The highest annual mean PM₁₀ concentration was monitored at T8 Townsend Lane (25.5 µg/m³). There have been no recorded exceedences of the annual mean PM₁₀ objective at any of the monitoring sites since 2007 and the latest results indicate that any exceedence of the annual mean objective is unlikely.

There has been a general downward trend in annual mean PM₁₀ concentrations in Rugby between 2007 and 2011 although the 2011 result at Townsend Lane runs contrary to this. The elevated annual mean PM₁₀ concentration may be attributed to large housing developments to the west and southwest of the monitoring site. The locations of these developments in relation to T8 Townsend Lane monitoring site are shown in Figure 2.5. At the time of preparing this report the housing development nearest to the monitoring site (William Davis Development) is completed, although work at the Bloor Homes and Persimmon Homes developments are ongoing. Rugby Borough Council has been investigating the latter development site following concern surrounding dust generated by construction activities. Environmental Services are monitoring the developments and may enforce dust suppression measures to minimise nuisance dust emissions. It is anticipated that the increase in PM₁₀

concentration at Townsend Lane is temporary and will decrease again upon completion of the developments.

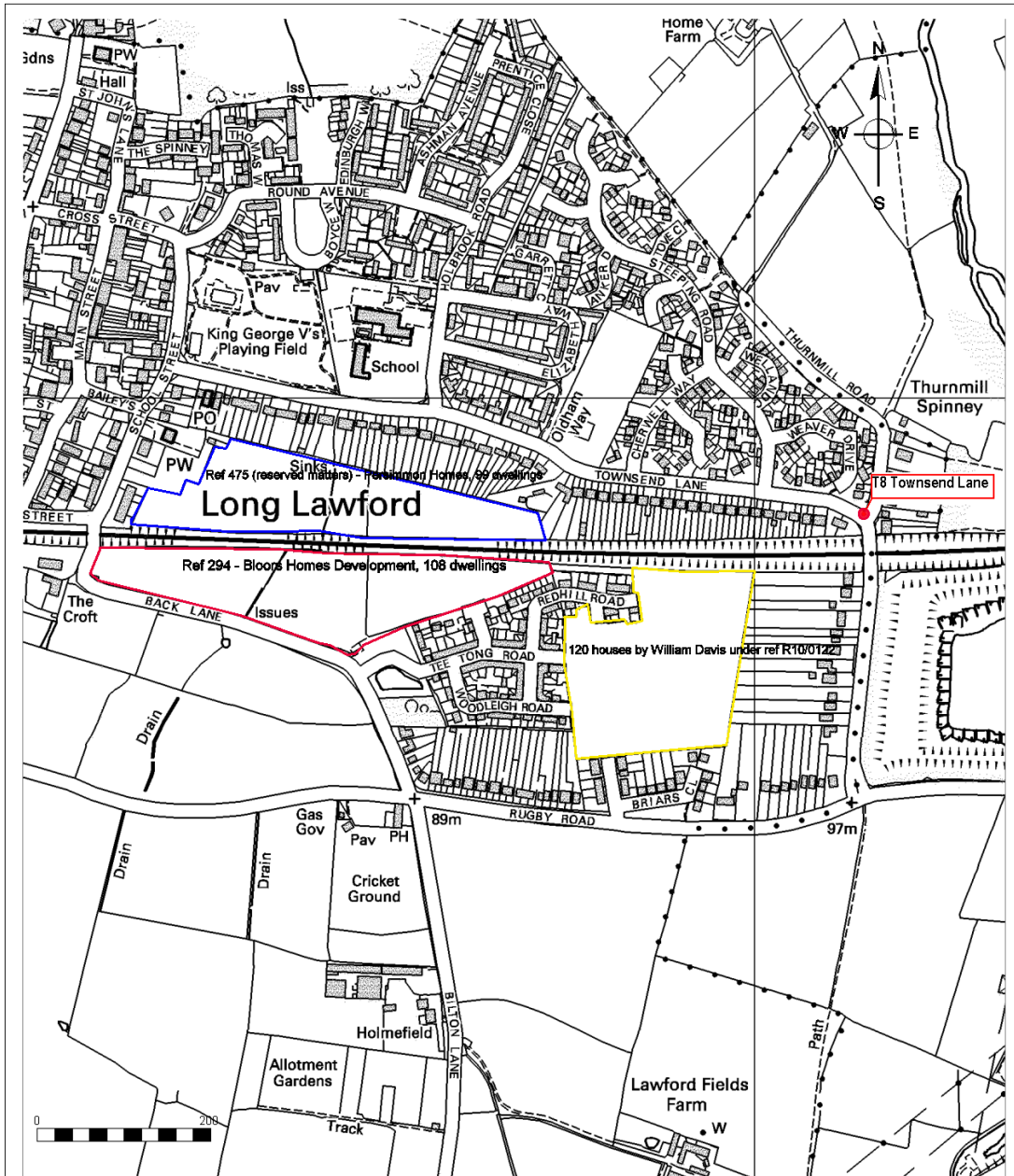
AQMS 5 Newbold Road, T10 Avenue Road, T14 Russelsheim Way and T16 Murray Road all display evidence of a downward trend in PM₁₀.

All PM₁₀ monitoring sites continue to record occurrences of daily mean PM₁₀ concentrations exceeding the standard of 50 µg/m³. However, no site exceeded the 35 permitted days of PM₁₀ greater than 50 µg/m³ in any year between 2008 and 2011. Murray Road recorded 43 days of PM₁₀ greater than 50 µg/m³ in 2007 and this remains the only exceedence of the 24-hour PM₁₀ objective since 2007.

The maximum number of days of PM₁₀ greater than 50 µg/m³ monitored in 2011 was 28 days at T8 Townsend Lane, which is higher than previous years at this location. Data capture was lower than 90% and so the 90th percentile of daily mean PM₁₀ concentrations has been calculated as 46.1 µg/m³, which indicates that the 24-hour PM₁₀ objective was achieved in 2011 at Townsend Lane. As stated previously it is likely that PM₁₀ concentrations in 2011 at Townsend Lane were strongly influenced by local housing developments in the Long Lawford area giving rise to an increase in the number of days of exceedence of the 24-mean PM₁₀ standard.

T2 Lawford Farm, T10 Avenue Road and T14 Russelsheim Way had data capture rates lower than 90%. The results of the 90th percentile of daily mean PM₁₀ calculations for these sites show that the 24-hour PM₁₀ objective was achieved.

Figure 2.3 Housing Developments in Long Lawford






ENVIRONMENTAL SERVICES				THE RETREAT NEWBOLD ROAD, RUGBY, CV21 2LG Tel. No. (01788) 533533 Fax. No. (01788) 533866	
Title				ORIGINAL CREATED	
				A4	
Drawn	Date	Scale	Checked	 The Home of Rugby Football	
	23/11/2011				
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Table 2.8 Results of Automatic Monitoring of PM₁₀: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration µg/m ³				
					2007	2008	2009	2010	2011
AQMS 5	Roadside	Y	92.5	NA	26.0	20.9	21.5	20.9	19.8
T2	Rural	N	75.5	Y	21.4	20.7	22.2	22.2	19.3
T8	Industrial	Y	87.6	Y	18.3	16.1	17.3	19.2	25.5
T10	Industrial	Y	88.4	Y	21.0	19.2	19.6	15.4	16.3
T14	Roadside	Y	83.5	Y	24.0	20.7	15.9	16.4	19.6
T16	Roadside	Y	98.2	Y	30.6	24.3	20.0	18.2	17.7

^a Means “annualised” according to methodology in Box 3.2 of LAQM.TG(09) due to low data capture.

Table 2.9 Results of Automatic Monitoring for PM₁₀: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2011 % ^b	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 µg/m ³)				
					2007	2008	2009	2010	2011
AQMS 5	Roadside	Y	92.5	NA	14 (40.8)	13	10	4	14
T2	Rural	N	75.5	Y	11	5 (31.4)	11	11 (36.3)	7 (33.3)
T8	Industrial	Y	87.6	Y	9	2 (25.3)	4 (26.1)	6	28 (46.1)
T10	Industrial	Y	88.4	Y	9 (33.0)	5	7 (30.9)	1	6 (26.4)
T14	Roadside	Y	83.5	Y	8	5	6	1	9 (35.6)
T16	Roadside	Y	98.2	Y	43	11 (40.6)	7	1 (29.5)	11

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

^c if data capture is less than 90%, include the 90th percentile of 24-hour means in brackets

2.2.3 Sulphur Dioxide

No continuous monitoring of SO₂ is carried out in Rugby. Continuous monitoring of SO₂ ceased in 2007 following the decommissioning of the Webb Ellis Rugby Club monitoring site. During the period that the site was operational there were no exceedences of any of the objectives relating to SO₂ nor was it considered likely that future exceedences would occur.

Diffusion tube monitoring continues to be carried out at three locations for the purpose of historical comparison and trend analysis of SO₂ concentrations in the Borough (Table 2.10). Owing to the short timescales over which the SO₂ objectives apply the diffusion tube results cannot be compared against the objectives. However, the results of the SO₂ diffusion tube monitoring may help inform decisions on the need for any future continuous monitoring programme.

The most recent results for 2011 suggest that SO₂ levels remain low at the monitoring sites. In comparison with previous years 2011 concentrations were lower than 2008 to 2010, inclusive. The long-term trend is that mean SO₂ concentrations in Rugby are constant over an annual period.

Table 2.10 Trend Analysis of Sulphur Dioxide Diffusion Tube Monitoring in Rugby Borough, 2004 – 2011

Site Reference	Location	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)							
		2004	2005	2006	2007	2008	2009	2010	2011
DT C	69 School Street	4.3	5.3	6.7	6.0	7.1	8.2	7.9	6.0
DT F	Wolvey Village Hall	5.4	6.0	6.6	5.7	9.5	9.7	9.0	3.5
DT M	Avenue Road	ND	ND	ND	ND	10.3	6.0	8.2	6.5

2.2.4 Benzene

No monitoring of benzene is undertaken within the Borough. On the basis of historical monitoring it is considered that there are no significant sources that might give rise to exceedences of the air quality objective for benzene at any receptor location within the Borough.

2.2.5 Other pollutants monitored

Rugby Borough Council does not perform monitoring activities for any other pollutants.

2.2.6 Summary of Compliance with AQS Objectives

Updated continuous monitoring data for 2011 in Rugby shows that the annual mean NO₂ and PM₁₀ objectives were achieved at all continuous monitoring sites. The short-term objectives for NO₂ and PM₁₀ at the continuous monitoring sites were also achieved. T8 Townsend Lane showed an elevated number of days of PM₁₀ greater than 50 µg/m³ (28 days), but was within the 35 days permitted to comply with the 24-hour objective.

The results of the 2011 long-term diffusion tube monitoring survey showed exceedences of the annual mean objective at two locations, sites DT 10 and DT 13. Site DT 10 (Web Ellis Pub, Corporation Street) has historically shown some of the highest NO₂ concentrations in Rugby and 2011 indicates this site remains an air quality problem. Site DT 10 also has relevant exposure nearby. Site DT 13 (Avon Mill Pub, Newbold Road) exceeded the annual mean NO₂ objective in 2011 and has shown exceedences in recent years (2008 and 2010). After correction for distance from the kerb, the estimated annual mean NO₂ concentration at the nearest relevant exposure is below the annual mean objective. The monitored exceedences are within the boundary of the current AQMA and do not represent new locations within the AQMA of exceedence. Consequently, no additional assessment of these locations is considered necessary.

Annualised results from a short-term diffusion tube survey, from November 2010 to April 2011, highlighted one exceedence of the annual mean NO₂ objective at site N 1 (Dun Cow, Dunchurch Square). The site is within the current AQMA boundary although because no monitoring has historically been undertaken at this location it cannot be concluded whether this is a new area of exceedence. Furthermore, it should be kept in mind the uncertainty associated with this result since it is based on an annualised figure derived from a six-month monitoring survey. Rugby Borough Council will establish a permanent diffusion tube monitoring site at the location to establish whether concentrations at this location are in fact likely to exceed the annual mean NO₂ objective.

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

3 Road Traffic Sources

Since the last round of Review and Assessment the Rugby Western Relief Road has been completed and is fully operational. During the construction of the RWRR road closures and temporary diversions led to increased traffic flows along key road links around Rugby town centre, notably Oliver Street, Warwick Street Gyratory, Corporation Street and Newbold Road. The increase in traffic along these routes was suggested as a likely cause of monitored exceedences at diffusion tube sites in these areas.

With the opening of the RWRR it was anticipated that traffic flows along Oliver Street, Warwick Street Gyratory and the Newbold Road - Corporation Street corridor would decrease and that air quality would improve as a result. At present there is limited traffic data available to confirm that traffic flows have reduced. The latest traffic data for the principal routes around Rugby town centre cover short time periods, which may not be representative of annual flows along these roads. However, the monitoring data along these routes displayed reductions in NO₂ concentrations in 2011, which may be the result of road traffic improvements.

There have been no other changes to the local road network since the previous Review and Assessment report was compiled

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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

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

There are a number of benches alongside Newbold Road outside the bar and restaurant at the junction of Essex Street and Newbold Road where people may spend an hour or more close to traffic. The automatic monitoring station at Newbold Road is around 10 metres to the south. The monitoring station is 6 metres from the kerbside, whereas the benches outside the bar and restaurant are around 2 metres from the kerbside. Applying the distance correction calculation methodology to the monitored annual mean NO₂ concentration at AQMS 5 Newbold Road gives an estimated concentration of 37.2 µg/m³ at a distance of 2 metres from the kerbside. It is therefore very unlikely that people spending one hour or more at this location would be exposed to NO₂ concentrations in excess of 60 µg/m³. Consequently, an exceedence of the hourly NO₂ objective is also very unlikely.

Rugby Borough Council has assessed new/newly identified busy streets where people may spend 1 hour or more close to traffic, that were not assessed in previous rounds of Review and Assessment, and concluded that it will not be necessary to proceed to a Detailed Assessment.

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

Based on local knowledge Church Street and North Street were identified as having a high proportion of buses and / or HGVs. However, traffic data supplied by Warwickshire County Council indicates that the flow of buses / HGVs along these streets is less than the 2500 vehicles per day threshold for roads requiring further investigation.

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

3.4 Junctions

The opening of the Rugby Western Relief Road in 2011 created six new junctions:

- Newbold Road / Rugby Western Relief Road near Avon Valley School;
- Parkfield Road / Rugby Western Relief Road;
- Lawford Road / Rugby Western Relief Road;
- Bilton Lane / Rugby Western Relief Road;
- Whitefriars Drive / Cawston Grange Drive / Rugby Western Relief Road; and
- Coventry Road / Rugby Western Relief Road.

The junctions all lie within the current Rugby AQMA and as such do not require any further assessment at this stage. The potential impacts of the Rugby Western Relief Road and the associated junctions were assessed as part of the Further Assessment in 2006 prior to the construction of the relief road. The assessment concluded that the air quality objective for NO₂ and PM₁₀ would not be exceeded at any sensitive receptor locations alongside the Rugby Western Relief Road route corridor, although it was accepted that increases in pollutant concentrations were likely at these locations. It was predicted that the scheme would result in an improvement in air quality at receptor locations alongside other routes through Rugby town centre due to a reduction in traffic and congestion along these routes.

Three short-term NO₂ diffusion tube monitoring sites (N 3, N 5 and N 6; see Table 2.2) were established at locations of relevant exposure alongside the RWRR to investigate NO₂ concentrations following the completion of the RWRR. Annualised monitoring data from these sites suggests that the annual mean NO₂ objective was achieved in 2011 and that concentrations are likely to be well below the objective at receptor locations alongside the RWRR. The maximum annualised NO₂ concentration was 25.7 µg/m³ at N 6 (Avon Valley School)

As part of the expanded NO₂ diffusion tube network monitoring recommenced at sites N 3, N 5 and N 6 in April 2012. This will permit Rugby Borough Council to establish with greater certainty the NO₂ concentrations at locations of relevant exposure alongside the RWRR and the associated junctions.

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

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

The Rugby Western Relief Road was completed and became operational in 2011. As detailed in Section 3.4, the Relief Road was assessed as part of the 2006 Further Assessment and it was concluded that the air quality objectives for NO₂ and PM₁₀ would be achieved at sensitive receptor locations alongside the route corridor and that the diversion of traffic away from the town centre of Rugby would alleviate existing air quality problems in this area.

Rugby Borough Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with Significantly Changed Traffic Flows

Based on the available traffic data there are no roads within the Borough that meet the criteria for assessment of roads with significantly changed traffic flows. There are no roads of greater than 10,000 vehicles AADT that have undergone an increase of 25% or more.

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

3.7 Bus and Coach Stations

Rugby Borough Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

There are no airports within the administrative area of Rugby Borough Council. The nearest airport is Coventry Airport in neighbouring Warwick District Council, which handles fewer than the 10 million passengers per annum threshold to qualify for consideration under LAQM. Previous assessment has shown that the site does not cause significant impact on air quality in Rugby. However, if circumstances change, Coventry Airport may need to be reassessed in the future.

Rugby Borough Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Rugby Rail Station and the Network Rail Service Depot have been identified as locations where diesel trains may be stationary, whilst passengers embark and disembark and freight is loaded and unloaded. However, stationary times are shorter than the 15 minute threshold detailed in Section B.2 Box 5.4 of TG(09). Rugby Borough Council will continue to monitor these sources in the future.

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

4.2.2 Moving Trains

Table 5.1 of LAQM.TG(09) identifies the section of rail line between Rugby and Birmingham New Street as one with a high usage of diesel locomotives. However, LAQM.TG(09) requires that rail lines need only be considered by local authorities

where the annual mean background NO₂ concentration exceeds 25 µg/m³. A list of local authorities likely to be affected is available on the LAQM Support Defra webpage^{xi} and does not feature Rugby Borough Council.

NO₂ diffusion tube monitoring at urban background locations around Rugby indicate that the annual mean NO₂ background concentration is less than 25 µg/m³ and mapped background NO₂ concentrations support this. Moving train emission sources therefore do not need to be considered further.

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

4.3 Ports (Shipping)

The Borough is landlocked and there are no major waterways in the area.

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

5 Industrial Sources

5.1 Industrial Installations

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

Cemex submitted a planning application to construct a Climafuel Manufacturing Facility at Malpass Farm, Rugby, to supply Rugby Cement Works with solid recovered fuel from waste. Permission for the facility was granted in November 2010.

An Environmental Impact Assessment of the proposed development has been carried out. In relation to air quality, a worst-case assessment of the potential impacts of the proposed facility on sensitive receptors within 1 km of the site indicated that the air quality objectives for NO₂, PM₁₀ and SO₂ would be achieved at all locations within the modelled study area. Road traffic impacts associated with the proposed facility were also demonstrated to be negligible. The overall impact on NO₂, PM₁₀ and SO₂ was concluded to be Minor Adverse.

Rugby Borough Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

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

Following public consultation with interested parties questions were raised regarding the original assessment of the reported increase in emissions from Cemex. It was identified that an incorrect effective stack height of 109.6 m was used in the original assessment. This error was due to the nearest adjacent building to the main stack of the Cemex facility being incorrectly identified as the raw meal silo. This error resulted in an overestimate of the threshold pollutant emission rates above which local air quality impacts might be likely.

The results presented in the following paragraphs supersede results that were presented in the draft 2012 Updating and Screening Assessment, which was circulated for public consultation and comment. It should also be noted that incorrect figures were also published in the 2009 Updating and Screening Assessment and that the results and conclusions presented here supersede the findings of the 2009 Updating and Screening Assessment.

In accordance with assessment approach presented in Box 5.5 of TG(09) Rugby Borough Council have identified one industrial installation within the Borough where emissions have increased substantially (greater than 30%) – Cemex Rugby Cement Works.

Emissions statistics available from the Environment Agency^{xii} indicate that the emissions of NO_x and PM₁₀ increased significantly between 2008 and 2010 (the latest year for which figures are currently available). The emissions statistics include NO_x and PM₁₀ emissions from all point sources and fugitive sources.

Between 2008 and 2010 NO_x emissions from Cemex increased from 1226 tonnes to 2020 tonnes (64.7%) whilst PM₁₀ emissions increased from 6.5 tonnes to 13.9 tonnes over the same time period. For NO_x most of the increase occurred between 2009 and 2010.

From Table 5.1 it can be seen that the 2010 NO_x emissions are similar to the levels recorded in all years since 2005. 2010 PM₁₀ emissions are significantly lower than annual emissions in 2005 to 2007, inclusive. As a consequence it is unlikely that the increase in NO_x and PM₁₀ emissions between 2008 and 2010 would have an adverse impact on local air quality. The statistics are summarised in the table below.

Table 5.1 Pollutant Emissions (tonnes) from Cemex Rugby Cement Works, 2005 – 2010

Year	Pollutant Emissions (tonnes)	
	NO _x	PM ₁₀
2005	1750	134.0
2006	1761	133.3
2007	2380	59.9
2008	1226	6.5
2009	1406	12.8
2010	2020	13.9
2011	1952	13.3
Percentage Change 2008 – 2010	+64.7%	+113.8%

Table 5.2 Physical Characteristics of Main Stack at the Cemex Plant

Physical Stack Height (U _{act} ; m)	Height of Tallest Adjacent Building (H; m)	Effective Stack Height (m) (U _{eff} = 1.66 × (U _{act} – H))	Stack Diameter (m)
115	106	15	4.2

Notes: H = height of tallest adjacent building within 5 actual stack heights distance of the stack (m) = 106 m (pre-heater tower).

NO_x

NO_x emissions from the main stack at Cemex were assessed in accordance with the procedure in LAQM.TG(09) using the data presented in Tables 5.1 and 5.2 for comparison with the nomograms. The calculation steps are summarised in Tables 5.3 and 5.4.

Table 5.3 Assessment of NO_x Emissions from Cemex Against the 1-Hour Nomogram

Year	99.8 th Percentile of Total Oxidant Conc. (NO ₂ +O ₃ ; µg/m ³) ^A	Locally Available Headroom (µg/m ³) ^B	Final Target Conc. ^C	NO _x emission from stack (tonnes/year)	Scaled Emission (tonnes/year) ^D	Threshold Emission Rate (tonnes/year) ^E
2010	147	53	267	2020	303	250

Notes: ^A Total oxidant concentration derived from 2010 continuous monitoring data from Leamington Spa AURN site.

^B Locally Available "headroom" calculated as the objective value (200 µg/m³) minus 99.8th %ile total oxidant concentration.

^C Final target concentration is calculated by dividing the headroom by 0.05 (i.e. assumes that 5% of the NO_x emission is released as NO₂ and the remaining NO_x is converted to NO₂ up to the limit of available O₃. The result is divided by 4 (to allow for uncertainty in the nomogram) to obtain the Final Target Concentration.

^D NO_x Emissions scaled for comparison with nomogram by dividing the stack NO_x emission (tonnes/year) by the Final Target Concentration and multiplying by 40. Units are tonnes/year.

^E Threshold Emission Rate taken from Figure 5.1 of TG(09) for effective stack height of 15 m and diameter of 4 m to provide a lowest-case estimate of the Threshold Emission Rate.

Table 5.4 Assessment of NO_x Emissions from Cemex Against the Annual Mean Nomogram

Year	Background NO ₂ (µg/m ³) ^A	Locally Available Headroom (µg/m ³) ^B	Final Target Conc. ^C	NO _x emission from stack (tonnes/year)	Scaled Emission (tonnes/year) ^D	Threshold Emission Rate (tonnes/year) ^E
2010	20.25	19.75	4.9	2020	409	40

Notes: ^A Mapped background NO₂ concentration for 2010 for grid square 448500,275500.

^B Headroom calculated as annual mean objective value (40 µg/m³) minus maximum background NO₂ concentration.

^C Final Target Concentration calculated by dividing available headroom by 4.

^D NO_x emissions scaled for comparison with nomogram by dividing the annual emission from the stack by the Final Target Concentration. Units are tonnes/year.

^E Threshold Emission Rate taken from Figure 5.2 of TG(09) for effective stack height of 15 m and diameter of 4 m to provide a lowest-case estimate of the Threshold Emission Rate.

From the calculations presented in Tables 5.3 and 5.4 it can be seen that the scaled emissions of NO_x from the Cemex facility exceed the threshold emission rates derived from the nomograms for the short-term or annual mean objectives.

The scaled NO_x emission for assessment against the 1-hour nomogram was 303 tonnes/year compared to the threshold emission rate of 250 tonnes/year. In relation to the assessment of NO_x emissions against the annual mean nomogram the scaled emission was 409 tonnes/year compared to the threshold emission rate of 40 tonnes/year.

Screening Assessment Using AERMOD

Since the scaled short-term and annual mean emission rates were found to exceed the threshold emission rates determined from the nomograms a basic screening assessment was carried out using AERMOD. Further justification for this approach is presented in Appendix E.

The key input data used in the screening assessment are summarised in Table 5.5. As a worst-case it was assumed that NO_x emissions were equal to the maximum permitted emission concentration for NO_x of 800 mg/m³ for both short-term and long-term emissions. This corresponds to a NO_x emission rate of 88.6 g/s.

Table 5.5 Summary of Main Stack Emissions and Parameters Used in the AERMOD Screening Assessment

Parameter	Value	
Temperature of Emission (°C)	170	
Actual Flow Rate (m ³ /hr)	988,200	
Emission Velocity at Stack Exit (m/s)	19.8	
Normalised Flow Rate (Nm ³ /hr)	398,800	
	Short-Term Emission	Long-Term Emission
NO _x Emission Concentration (mg/Nm ³)	800	800
NO _x Emission Rate (g/s)	88.6	88.6

NO₂ concentrations were predicted at 11 sensitive receptor locations using AERMOD and the approach presented in Box 6.3a of LAQM.TG(09). The receptor locations were chosen to be representative of human exposure and selected as representing

worst-case locations on the basis of preliminary modelling results. A map of the receptor locations is presented in Appendix E.

Background pollutant concentrations for 2010 were sourced from the Leamington Spa AURN monitoring site. Leamington Spa was chosen for the background pollutant data as this was the nearest site monitoring both NO₂ and O₃ and also having sufficient data capture. The data from Leamington Spa are summarised in Table 5.6. As a worst case it was assumed that 100% of NO_x was emitted as NO₂.

Table 5.6 Background Pollutant Monitoring Data from Leamington Spa AURN Site, 2010

Site Name	Site Type	OS Grid Ref (X, Y)	Annual Mean NO ₂ Concentration, 2010 (µg/m ³)	99.8 th Percentile Hourly NO ₂ Concentrations (µg/m ³)	99.8 th Percentile Total Oxidant		Data Capture (%)	
					NO ₂ + O ₃	NO ₂	O ₃	
Leamington Spa AURN	Urban Background	431943, 265733	28.3	107	147	99	99	

Meteorological data from Birmingham Elmdon for 2010 was used in the screening exercise. All nearby buildings were included in the model to account for the effects of building downwash.

The 99.8th percentile of total NO₂ concentrations at receptor locations were determined in accordance with the approach set out in Box 6.3a of LAQM.TG(09), with equation B2 being used for the short-term calculations. The 99.8th percentile NO₂ concentrations at all of the modelled receptors were well below the threshold concentration of 75% of the hourly NO₂ standard of 200 µg/m³ (i.e. 150 µg/m³) above which a more detailed approach would be required. The highest predicted 99.8th percentile of NO₂ concentrations is predicted at Avon Valley School (110.5 µg/m³; Table 5.7).

The background NO₂ concentration for 2010 (as monitored at Leamington Spa AURN) was added to modelled annual mean process contributions of NO₂ for comparison against the annual mean NO₂ objective. Predicted annual mean NO₂ concentrations are well below the annual mean NO₂ objective at all modelled receptors, the maximum concentration being 30.0 µg/m³ at Avon Valley School.

The results of the screening assessment indicate that the NO_x emissions from the Cemex facility, based on the above worst-case assumptions will not impact upon sensitive receptors in the local area. Actual annual mean NO₂ concentrations and 99.8th percentile concentrations under normal operational conditions at nearby receptor locations will be lower than the results shown in Table 5.7.

Table 5.7 Predicted 99.8th Percentile of Total NO₂ and Annual Mean NO₂ Concentrations at Receptor Locations

Receptor Name	OS Grid Ref (X, Y)	99.8 th Percentile of Hourly NO ₂ Concentrations		Annual Mean NO ₂ Concentration (µg/m ³)	
		µg/m ³	As % of Objective	µg/m ³	As % of Objective
Parkfield Road	449002, 276314	109.0	54.5	29.3	73.3
Avon Valley School	449455, 276523	110.5	55.2	30.0	75.1
Avenue Road	449251, 275627	108.7	54.4	29.2	72.9
Lawford Road	449467, 275178	109.3	54.6	29.4	73.6
Freemantle Road	448252, 274894	109.8	54.9	29.7	74.2
Lawford Fields Farm	447948, 275136	109.0	54.5	29.3	73.3
Townsend Lane 1	447842, 275890	108.0	54.0	28.8	72.1
Peninsular Farm	448292, 276588	108.5	54.3	29.1	72.7
Bridle Road	449086, 275523	107.9	53.9	28.7	71.9
Townsend Lane 2	448147, 275858	107.8	53.9	28.7	71.8
St Oswald's School	448880, 275138	108.5	54.3	29.1	72.7

PM₁₀

PM₁₀ emissions from Cemex were assessed in accordance with LAQM.TG(09) procedures against permitted PM₁₀ emission rates derived from the nomogram for high temperature (>100°C exit temperature) sources greater than 10 metres tall.

The calculations are summarised in Table 5.8. The maximum permitted PM₁₀ emissions rate from the facility is 4 tonnes/year. Adjusting for the background PM₁₀ concentration, in accordance with LAQM.TG(09) methodology, the background adjusted permitted PM₁₀ emission rate is 56 tonnes/year.

Table 5.8 Assessment of PM₁₀ Emissions from Cemex Against the 24-Hour Nomogram

Year	Maximum Permitted Emission Rate (tonnes/year) ^A	Mapped Background PM ₁₀ ^B	Background Adjusted Permitted Emission Rate (tonnes/year) ^C	PM ₁₀ Emission from Stack (tonnes/year)
2010	4	18.06	56	13.9

Notes: Typical exit temperature from the main stack is 170°C.

^A Maximum permitted emission rate determined from Figure 5.4 of LAQM.TG(09) for effective stack height 15 m and diameter 4 m;

^B mapped background PM₁₀ for 2010 for grid square 448500, 275500;

^C background adjusted permitted emission rate calculated as Maximum Permitted Emission Rate × (32 – mapped background PM₁₀).

From the calculation presented in Table 5.8 it is apparent that the 2010 PM₁₀ emissions from the Cemex facility did not exceed the background adjusted permitted emission rate and it is unlikely that the permitted emission rate from the facility will be exceeded in the future unless there are further significant increases in PM₁₀ emissions from Cemex.

The assessment above considers PM₁₀ emissions from the main stack of the Cemex facility. A number of low-level, fugitive sources exist within the site, such as the cement mills, various silos, separators and bypass vents. These sources have been scrutinised extensively in earlier Review and Assessment. A Detailed Assessment of Particulate Matterⁱⁱⁱ carried out in 2005 concluded that on the basis of monitoring data from a large network of continuous monitoring sites in the Borough exceedences of the air quality objectives for PM₁₀ were unlikely.

Correspondence with the Environment Agency has confirmed that production at the Cemex facility has not increased significantly since Cemex completed their last air quality report^{xiii}. The release of PM₁₀ from fugitive sources is anticipated to have remained similar since detailed dispersion modelling was previously carried out. In percentage terms PM₁₀ emissions from Cemex increased significantly (as defined in Box 5.5 of LAQM.TG(09)) between 2008 and 2010. However, in absolute terms emissions of PM₁₀ in 2010 were approximately 10% of PM₁₀ emissions in 2005 and 2006. Continuous monitoring of PM₁₀ at six sites in the Borough continued until June 2012. During this period there were no monitored exceedences of the air quality objectives at Avenue Road or Townsend Lane (the nearest monitoring sites to the Cemex facility boundary) or any other PM₁₀ monitoring site attributable to PM₁₀

emissions from Cemex. PM₁₀ concentrations at monitoring sites in Rugby displayed a general long-term reduction over time and were well below the relevant air quality objectives such that the Council deemed the expenditure on PM₁₀ monitoring was no longer justifiable.

On the basis of the above evidence it will not be necessary to proceed to a Detailed Assessment of PM₁₀.

Rugby Borough Council has assessed industrial installations with substantially increased emissions and concluded that it will not be necessary to proceed to a Detailed Assessment for any pollutant.

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

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

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

There are no petrol stations within the Borough meeting the criteria outlined in Box 5.5 of LAQM.TG(09).

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

5.4 Poultry Farms

W Potter and Sons Poultry Limited located at Willy Fields Farm within the Borough is listed on the Rugby Borough Council Pollution Prevention and Control Act 1999 / Environmental Permitting Regulations 2010 Index Register as EA permit pending. The number of birds is stated as 84,000 and so the facility does not meet the criterion for assessment.

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

In April 2012 Rugby Borough Council granted permission to a planning application for the demolition of the existing leisure centre and erection of new leisure centre at Bruce Williams Way, Rugby (Application Reference R12/0396)^{xiv}. The planning application includes conditional approval for a biomass boiler heat generation plant. The planning condition requires that an air quality assessment of the proposed development is to be submitted to and approved in writing by Rugby Borough Council before any construction work can commence. The Air Quality Assessment must include an assessment of the emissions from road traffic and biomass plant sources.

The Air Quality Assessment has not yet been submitted to the Council but is expected in June 2012.

Rugby Borough Council confirms that there are no biomass combustion plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

Rugby Borough Council confirms that there are no biomass combustion plant in the Local Authority area.

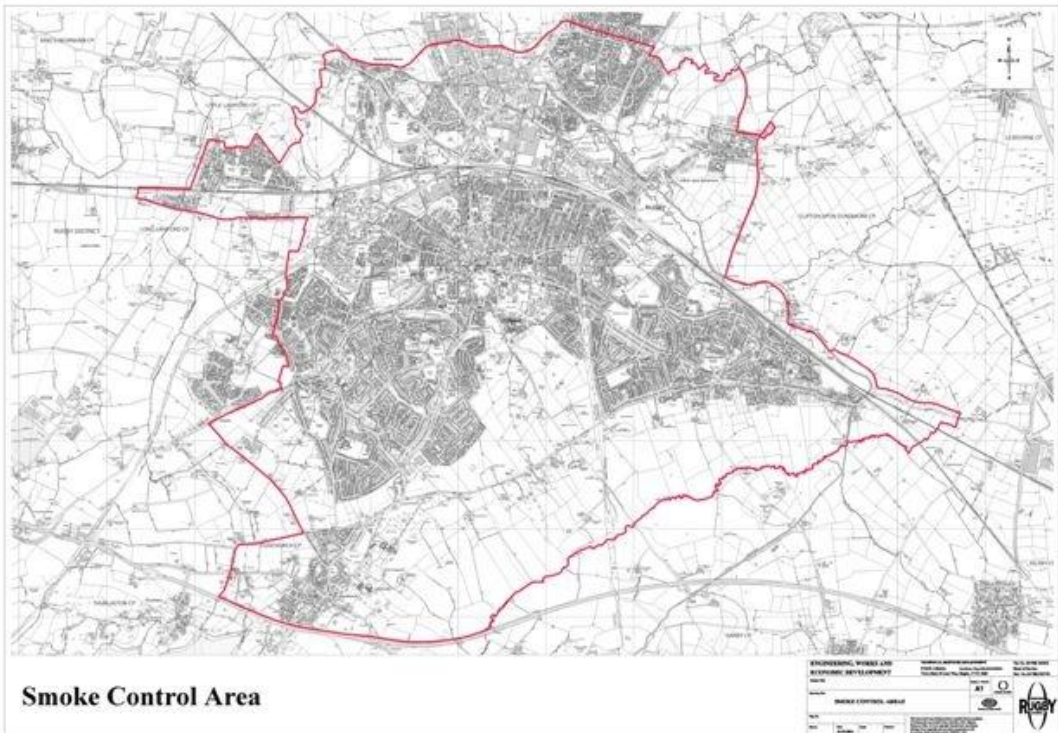
6.3 Domestic Solid-Fuel Burning

Domestic use of smokeless fuels or coal in Rugby is not widespread. Knowledge of the local area suggests there are no areas that may exceed the assessment criteria as described in Section D.2 of LAQM.TG(09). Domestic solid fuel combustion is

largely confined to individual dwellings in rural areas surrounding the town. A smoke control area is enforced in the town centre area (see Figure 6.1). At present no assessment is required but Rugby Borough Council will revisit this issue if circumstances change.

Rugby Borough Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

Figure 6.1 Area Covered by Rugby Smoke Control Area



7 Fugitive or Uncontrolled Sources

There are no new potential sources of fugitive particulate matter emissions that have not been assessed previously or undergone substantial changes in their operation since being assessed. There are no cases of new exposure to existing sources of fugitive emissions.

Rugby Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The latest NO₂ monitoring data for Rugby has indicated exceedences of the annual mean NO₂ objective at three diffusion tube locations, DT 10 (Webb Ellis Pub, 46.1 µg/m³), DT 13 (Avon Mill Pub, 45.2 µg/m³) and N 1 (Dun Cow, Dunchurch Square).

DT 10 and DT 13 are within the AQMA and exceedences of the annual mean NO₂ objective have previously been reported at these locations. N 1 is also within the AQMA, but since the site formed part of the short-term diffusion tube survey there are no previous data against which to compare the present result. It should also be noted that the monitored exceedence at N 1 is an annualised figure derived from six months of monitoring.

DT 13 is not a location of relevant exposure and after the application of the distance correction calculation for NO₂ the predicted annual mean NO₂ concentration at the nearest relevant exposure is 33.8 µg/m³, which is below the annual mean NO₂ objective.

Continuous monitoring of PM₁₀ in Rugby continues to show that the annual mean PM₁₀ objective is currently being achieved at all monitoring sites in the Borough and it is unlikely that the annual mean PM₁₀ objective will be exceeded in the future. The annual mean PM₁₀ concentration at AQMS 5 Newbold Road in 2011 was 19.8 µg/m³, which is the lowest annual mean concentration since monitoring began at the site in 2007. The highest annual mean PM₁₀ concentration was monitored at T8 Townsend Lane. This runs contrary to the long-term trend of decreasing PM₁₀ concentrations in Rugby. However, the increase is likely to be the result of housing developments to the west and southwest of the monitoring site in the Long Lawford area. It is anticipated that the increase is temporary in nature and PM₁₀ concentrations should decrease upon completion of the construction activities. The remaining four Turnkey

sites reported annual mean PM₁₀ concentrations in keeping with the long-term trend of decreasing concentrations.

The 24-hour PM₁₀ objective was achieved at all monitoring sites in Rugby in 2011. Since 2008 there have been no exceedences of the 24-hour objective. The maximum number of days greater than 50 µg/m³ was 28 at T8 Townsend Lane, which is close to but within the 35 exceedences permitted to comply with the 24-hour objective. The number of exceedences at Townsend Lane in 2011 is significantly higher than the number of exceedences in any year since 2007. It is likely that PM₁₀ concentrations at Townsend Lane are being influenced by ongoing construction of housing developments in the Long Lawford area and it would be expected that PM₁₀ concentrations decrease once construction is completed.

8.2 Conclusions from Assessment of Sources

The assessment of road transport and other transport sources has not identified any significant changes in existing sources likely to impact adversely upon local air quality in the Borough. There are no new sources of transport-related pollution that have not been assessed in previous rounds of Review and Assessment.

Emissions of NO_x and PM₁₀ from the main stack of the Cemex Rugby Cement industrial facility increased substantially since the last round of Review and Assessment. Assessment of the pollutant emissions against the permitted threshold emission rates concluded that NO_x emissions were above the threshold rate at which there might be impacts on local air quality. Further investigation using worst-case assumptions regarding NO_x emissions indicated the impact on local air quality at receptor locations in the area to be acceptable. PM₁₀ emissions were well below the threshold rates above which there might be impacts on local air quality. Data from PM₁₀ monitoring stations did not show any exceedences of the relevant air quality objectives relating to emissions from the Cemex facility at any time between 2007 and 2012 and the data displayed a general long-term reduction over time.

Communication with the Environment Agency indicated that production at the Cemex facility has not increased significantly over time and that PM₁₀ and dust emissions from fugitive and low-level sources have not increased significantly since the previous detailed dispersion modelling exercise was carried out. Rugby Borough Council does not consider emissions from the Cemex facility to warrant further investigation at this stage.

A planning application for the redevelopment of Rugby Leisure Centre has been approved subject to an Air Quality Assessment being carried out. The granted application includes the provision of a biomass-fuelled energy centre. As part of the planning conditions imposed by Rugby Borough Council, the biomass facility emissions must be assessed prior to the commencement of any construction work. An air quality assessment of the leisure centre redevelopment is expected in June 2012. The findings of the assessment will be detailed in the 2013 Air Quality Progress Report.

Rugby Borough Council is not aware of any other new local developments that might have implications for local air quality that have not been identified previously. Assessment of all other potential air pollution sources in the Borough has not identified any new or significantly changed sources that could give rise to exceedences of the relevant air quality objectives at locations outside the existing AQMA.

8.3 Proposed Actions

The conclusions of the 2012 Updating and Screening Assessment are as follows:

- Exceedences of the annual mean NO₂ objective continue to be monitored at two long-term diffusion tube monitoring locations in Rugby of which one is representative of relevant exposure. These are DT 10 (Webb Ellis Pub, Corporation Street) and DT 13 (Avon Mill Pub, Newbold Road);
- The results of a short-term diffusion tube survey (November 2010 to April 2011) highlighted one exceedence of the annual mean NO₂ objective, at site N 1 (Dun Cow, Dunchurch Square). It should be noted that this exceedence is

based on annualised data due to the short-term nature of the monitoring survey;

- All of the monitored NO₂ exceedences are within the boundary of the AQMA;
- There are no locations where the annual mean PM₁₀ objective is currently being exceeded or is likely to be exceeded in the future;
- There were no exceedences of the 24-hour PM₁₀ objective at any monitoring location since the previous round of Review and Assessment;
- Assessment of sources has not identified any new or significantly changed sources likely to result in adverse effects on local air quality;
- There is no need to proceed to a Detailed Assessment for any pollutant at this stage.

On the basis of these conclusions Rugby Borough Council proposes the following actions:

- Submit an Air Quality Progress Report in 2013, in accordance with the LAQM Review and Assessment procedure.
- Ensure that an appropriate air quality assessment of the proposed leisure centre redevelopment is carried out.
- Continue to operate a network of diffusion tubes throughout the Borough to inform of NO₂ concentrations in the Borough. In July 2012 all continuous monitoring sites will be decommissioned. However, Rugby Borough Council has expanded the existing NO₂ diffusion tube monitoring network to 50 sites and will report upon the findings of the expanded survey in the 2013 Progress Report.
- Maintain the extent of the existing AQMA for NO₂.

Appendices

Appendix A: Monitoring Data

Annualisation Calculations

NO₂ data capture at AQMS 5 Newbold Road was less than 90% in 2011. Therefore, an annualisation factor was calculated according to the methodology in Box 3.2 of LAQM.TG(09). Continuous monitoring data from nearby AURN monitoring sites with at least 90% data capture for 2011 and the period covered by AQMS 5 Newbold Road. The selected sites used for the annualisation were:

- Coventry Memorial Park;
- Leamington Spa; and
- Sandwell West Bromwich.

Significant periods of data loss occurred at Newbold Road during May, July and August. Consequently, the period mean was calculated using the following dates:

- 01/01/2011 to 30/04/2011;
- 17/05/2011 to 14/07/2011; and
- 09/08/2011 to 31/12/2011.

The key statistics from the monitoring sites and the derivation of the annualisation factor are summarised in Table A.1. It should be kept in mind that the AURN data contains ratified and provisional data and may therefore be subject to change.

Table A.1 Annualisation Calculation for AQMS 5 Newbold Road, 2011

	Coventry Memorial Park	Leamington Spa	Sandwell West Bromwich	
Annual Mean 2011 ($\mu\text{g}/\text{m}^3$)	17.18	21.06	27.68	Annualisation Factor (Average Ratio)
Data Capture 2011 (%)	97.72	98.44	98.74	
Period Mean ($\mu\text{g}/\text{m}^3$)	18.28	22.03	28.96	
Period Mean Data Capture (%)	97.96	98.37	98.62	
Ratio Annual Mean : Period Mean	0.940	0.956	0.956	

The same nearby AURN sites were used to annualise the results of the short-term diffusion tube survey and the Highways Agency Strategic Road Network Survey.

The period mean values were calculated using the following dates:

- Rugby Borough Council short-term diffusion tube survey: 03/11/2010 to 06/05/2011; and
- Highways Agency Strategic Road Network survey: 03/11/2010 to 28/04/2011.

The annualisation factor calculations for the short-term diffusion tube survey and the Highways Agency survey are shown in Table A.2 and A.3, respectively.

Table A.2 Annualisation Calculation for Short-Term Diffusion Tube Survey, 2010 – 2011

	Coventry Memorial Park	Leamington Spa	Sandwell West Bromwich	
Annual Mean 2011 ($\mu\text{g}/\text{m}^3$)	17.18	21.06	27.68	Annualisation Factor (Average Ratio)
Data Capture 2011 (%)	97.72	98.44	98.74	
Period Mean ($\mu\text{g}/\text{m}^3$)	27.34	31.44	38.63	
Period Mean Data Capture (%)	99.05	98.64	99.03	
Ratio Annual Mean : Period Mean	0.628	0.670	0.717	

Table A.3 Annualisation Calculation for Highways Agency Strategic Road Network Survey, 2010 – 2011

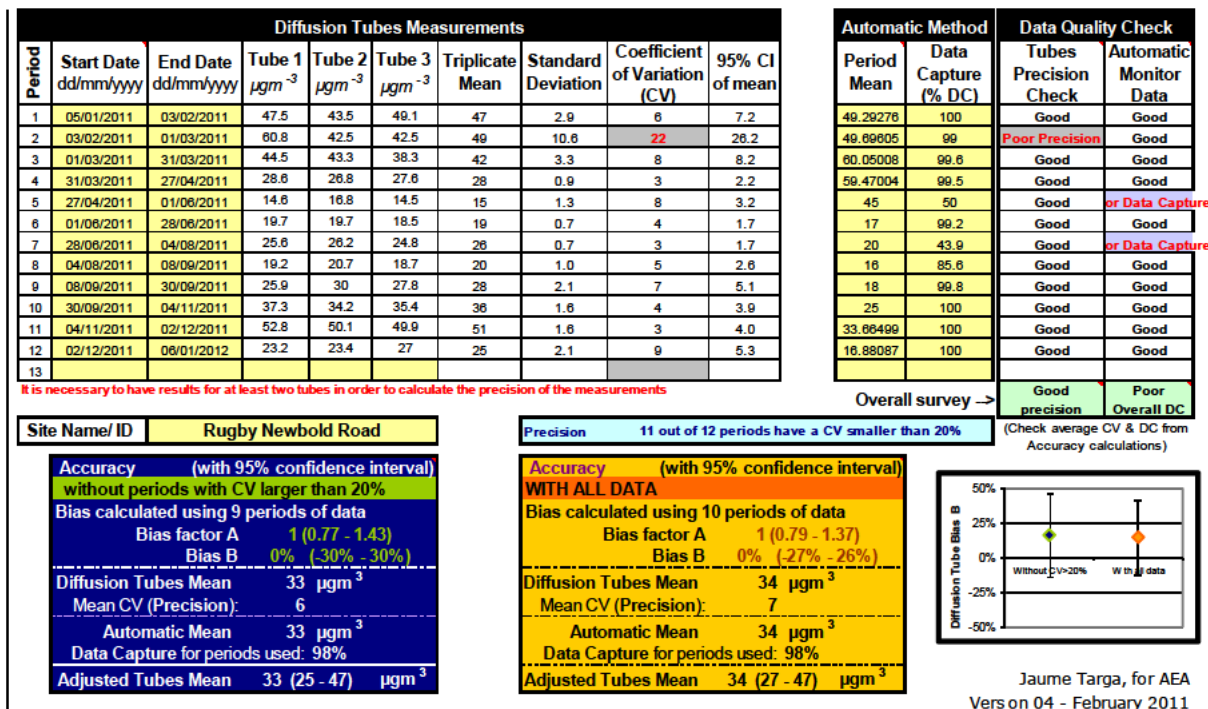
	Coventry Memorial Park	Leamington Spa	Sandwell West Bromwich	
Annual Mean 2011 ($\mu\text{g}/\text{m}^3$)	17.18	21.06	27.68	Annualisation Factor (Average Ratio)
Data Capture 2011 (%)	97.72	98.44	98.74	
Period Mean ($\mu\text{g}/\text{m}^3$)	28.14	32.40	39.54	
Period Mean Data Capture (%)	99.00	98.62	99.00	
Ratio Annual Mean : Period Mean	0.611	0.650	0.700	

Bias Adjustment of Diffusion Tubes

Factor from Local Co-location Studies

A local bias adjustment factor for NO₂ Diffusion Tube monitoring was derived from a co-location study. Triplicate tubes were placed alongside the NO_x Analyser at AQMS 5 Newbold Road and the co-location used to calculate a local bias adjustment factor. Details of the local bias adjustment calculation are shown in Figure A.1. The local bias adjustment calculation resulted in a local bias adjustment factor of 1.00.

Figure A.1 NO₂ Diffusion Tube Bias Adjustment Calculation, Rugby 2011



National Diffusion Tube Bias Adjustment Factors

A national bias adjustment factor of 0.84 was obtained from the national Spreadsheet of Bias Adjustment Factors Version 03/12 using the following inputs:

- Analysed By: Environmental Services Group;
- Method: 50% TEA / Acetone/;
- Year: 2011.

The output is shown in Figure A.2.

Figure A.2 NO₂ Diffusion Tube National Bias Adjustment Factors, Rugby 2011

Analysed By ¹	Method <small>To undo your selection, choose (All) from the pop-up list.</small>	Year ² <small>To undo your selection, choose (All)</small>	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ³	Bias Adjustment Factor (A) (Cm/Dm)
Environmental Scientific Groups	50% TEA in acetone	2011	R	Dover District Council	12	42	37	14.0%	G	0.88
Environmental Scientific Groups	50% TEA in acetone	2011	UB	Medway Council	12	22	26	-15.6%	G	1.19
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	10	52	48	8.9%	G	0.92
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	9	38	35	7.5%	G	0.93
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	12	41	31	32.8%	G	0.75
Environmental Scientific Groups	50% TEA in acetone	2011	UB	North East Lincolnshire Council	12	22	21	7.5%	P	0.93
Environmental Scientific Groups	50% TEA in acetone	2011	B	Medway Council	9	32	20	55.3%	G	0.64
Environmental Scientific Groups	50% TEA in acetone	2011	R	Wrexham County Borough Council	12	22	19	11.8%	G	0.89
Environmental Scientific Groups	50% TEA in acetone	2011	R	Medway Council	9	36	30	19.0%	G	0.84
Environmental Scientific Groups	50% TEA in acetone	2011	K	Marylebone Road Intercomparison	11	121	99	21.5%	G	0.82
Environmental Scientific Groups	50% TEA in acetone	2011	R	Castlereagh Borough Council	11	49	40	20.9%	G	0.83
Environmental Scientific Groups	50% TEA in acetone	2011	R	Down District Council	12	51	36	39.0%	G	0.72
Environmental Scientific Groups	50% TEA in acetone	2011	R	Lisburn City Council	12	30	20	49.6%	G	0.67
Environmental Scientific Groups	50% TEA in acetone	2011	R	North Down Borough Council	11	45	27	66.7%	G	0.60
Environmental Scientific Groups	50% TEA in Acetone	2011	K	Suffolk Coastal District Council	12	51	43	18.7%	G	0.84
Environmental Scientific Groups	50% TEA in acetone	2011	R	Dumfries and Galway Council	12	38	32	20.0%	G	0.83
Environmental Scientific Groups	50% TEA in acetone	2011	R	Rugby Borough Council	10	34	34	-0.3%	G	1.00
Environmental Scientific Groups	50% TEA in acetone	2011	R	Wycombe District Council	10	43	39	11.5%	G	0.90
Environmental Scientific Groups	50% TEA in acetone	2011	R	Tunbridge Wells Borough Council	12	59	43	38.5%	P	0.72
Environmental Scientific Groups	50% TEA in acetone	2011	R	LB Newham	12	40	47	-14.3%	G	1.17
Environmental Scientific Groups	50% TEA in acetone	2011	UB	Canterbury City Council	11	17	15	17.8%	G	0.85
Environmental Scientific Groups	50% TEA in acetone	2011	R	Canterbury City Council	12	39	34	15.5%	G	0.87
Environmental Scientific Groups	50% TEA in acetone	2011		Overall Factor* (22 studies)					Use	0.84

Discussion of Choice of Factor to Use

Both local and national bias adjustment factors were derived for the purpose of bias adjusting Rugby Borough Council's NO₂ diffusion tube results. It was decided to use the local factor for bias adjustment for the following reasons:

- Local bias adjustment factor is considered to be the most representative of local conditions in Rugby.
- Analysis of the long-term trends in bias-adjusted diffusion tube results indicated that the use of a local factor would produce bias-adjusted NO₂ concentrations consistent with the long-term trends.
- The local bias adjustment factor was higher than the national figure (1.00 compared to 0.84) and therefore represents a more conservative estimate of NO₂ concentrations.

Distance Adjustment of NO₂ Diffusion Tubes

Continuous Monitoring Sites

In Section 3.2 one location where people may spend one hour or more close to traffic was identified for assessment. Nearby monitoring data from AQMS 5 Newbold Road was distance corrected to estimate the annual mean NO₂ concentration at the assessed location.

The monitoring site is 6 metres from the kerbside at Newbold Road. The assessed location is 2 metres from Newbold Road. The background NO₂ concentration for the location was taken from the diffusion tube result for 2011 at DT 6 (Westfield Road). This was considered to be more representative of the background NO₂ concentration in Rugby than the mapped background for the grid square 450500, 276500.

After correction for distance from the kerb the estimated annual mean NO₂ concentration at the location of exposure is 37.2 µg/m³, which is well below the 60 µg/m³ threshold that may indicate exceedence of the hourly mean NO₂ objective. Details of the distance adjustment calculation are shown in Figure A.3.

Figure A.3 NO₂ Falloff With Distance Correction Calculation for AQMS Newbold Road, 2011^{xv}

This calculator allows you to predict the annual mean NO₂ concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	6	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	2	metres
Step 3	What is the local annual mean background NO ₂ concentration (in µg/m ³)?	(Note 2)	19.6	µg/m ³
Step 4	What is your measured annual mean NO ₂ concentration (in µg/m ³)?	(Note 2)	32.7	µg/m ³
Result	The predicted annual mean NO ₂ concentration (in µg/m ³) at your receptor	(Note 3)	37.2	µg/m ³

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at <http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm> for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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Diffusion Tube Monitoring Sites

Distance correction of monitored NO₂ concentrations was necessary for one site in Rugby in 2011 (DT 13).

The DT 13 monitoring site, located at 450088, 276229, is approximately 4.5 m from the kerb. The nearest relevant exposure is approximately 14.6 m from the kerb at this location. The background NO₂ concentration for the site was taken from the diffusion tube result for 2011 at DT 6 (Westfield Road). This was considered to be more representative of the background NO₂ concentration than the mapped background for the grid square 450500, 276500.

After correction for distance, the estimated annual mean NO₂ concentration at the nearest relevant exposure to DT 13 is 33.8 µg/m³. Details of the distance adjustment calculation are shown in Figure A.4.

Figure A.4 NO₂ Falloff With Distance Correction Calculation for DT 13 (Avon Mill Pub), 2011^{xvi}

This calculator allows you to predict the annual mean NO₂ concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	4.5	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	14.6	metres
Step 3	What is the local annual mean background NO ₂ concentration (in µg/m ³)?	(Note 2)	19.6	µg/m ³
Step 4	What is your measured annual mean NO ₂ concentration (in µg/m ³)?	(Note 2)	45.2	µg/m ³
Result	The predicted annual mean NO ₂ concentration (in µg/m ³) at your receptor	(Note 3)	36.5	µg/m ³

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at <http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm> for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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New Diffusion Tube Monitoring Network Sites (Commencing April 2012)

Table A.4 contains a list of sites included in the Rugby Borough Council diffusion tube network from April 2012 following the expansion of the existing diffusion tube network. Grid references and other details such as distance to kerbsides and relevant exposure are not currently available. This information will be reported in future LAQM reports.

Table A.4 NO₂ Diffusion Tube Survey Locations from April 2012

Site Number	Site Name	Site Number	Site Name
1	10 Newbold Road Opposite Shops	26	Lawford Road Flats- former Simms Scrapyard
2	Marion A423	27	Avenue Road / Campbell Street
3	69 School Street	28	Parkfield Road No.256
4	St. Margaret's School Wolston	29	Avon Valley School
5	Ryton Village Hall High Street	30	Murray Road - bus stop near train station
6	2 West Field Road	31	Wood Street / Railway Terrace corner
7	68 Cymbeline Way	32	Railway Terrace Station Bar
8	EHO Treatment Newbold Road	33	Albert Street, Alma Lodge Hotel
9	Cambridge Street (Argyle Street)	34	Regent Street lamp post near Oxfam
10	Webb Ellis Pub Corporation Street	35	Church Street, Town Fryer
11	15 Oliver Street	36	Whitehall Road junction with Clifton Roundabout
12	Boughton Leigh School Hollowell Way	37	Lower Hillmorton Road junction with Clifton Roundabout
13	Avon Mill Pub, Newbold Road	38	Clifton Road before Railway Line
14	Binley Woods Village Hall	39	Murray Road junction with Clifton Roundabout
15	Lawford Road- Jubilee Street, Arnie's Batch	40	Lawrence Sheriff St, lamp post opp flat 5
16	Holiday Inn Hotel A45	41	Bilton Road, Big Yellow House
17	Corner of Newbold Road and Essex Street	42	215 Bilton Road near Crow Pie pub
18		43	Dunchurch Gyratory Residential- lamp post opposite 26a Maffey Court
19		44	6 The Croft, High Street Hillmorton
20	Newbold Road-opposite AQMS	45	Electricity Pole near 3 Avon Cottages, Bretford
21	Corner of Percival Road and Ashlawn Road	46	Oxford Road, Ryton-on-Dunsmore
22	Corner of Fisher Avenue and Ashlawn Road	47	Regent Place
23	Paddox Pub Corner	48	North Street opposite Natwest Bank
24	Dun Cow, Dunchurch Square	49	Lesley Suiter House Whitehall Road/Hillmorton Road
25	Opposite 'Crystal' Chinese Takeaway, Southam Road, Dunchurch	50	Bilton Church

PM Monitoring Adjustment

PM₁₀ concentrations at AQMS 5 Newbold Road are measured by TEOM-FDMS and so do not require any correction for gravimetric equivalence. Particulate matter concentrations measured by the Turnkey Osiris Dust Monitors are presented without any correction because the optical measurement method used by the Osiris analysers is not accepted as an Equivalence measurement method either with or without correction. Previous studies in Rugby indicated a good agreement between co-located Turnkey and TEOM instruments and thus it is considered acceptable to present the Turnkey concentrations without adjustment.

Appendix B: QA / QC

QA/QC of automatic monitoring

Monitoring in Rugby was performed in accordance with the guidelines outlined in Technical Guidance Notes LAQM.TG(09), LAQM.TG(03) and LAQM.TG1(00). All the analysers were set up and calibrated in strict accordance with the manufacturers' recommended procedures prior to and during use. An overview of QA/QC procedures are provided below.

Automatic remote calibrations of the NO_x analyser are conducted daily. These automatic calibrations are supplemented by manual calibrations every two to three weeks to quantitatively determine instrumental drift. Air Liquide specialist calibration gases are used to obtain span values and instrumental drift is accounted for during the processing of the data. Analyser filters are also changed during these routine calibrations, with span and zero determinations being made before and after. Any instrument span or zero drift was assumed to be linear between discrete checks, and the data corrected linearly in accordance with any drift.

All fittings in contact with the sample gas stream are either polytetrafluoroethylene (PTFE) or stainless steel, so that surface losses are kept to a minimum. Qualified engineers service the analysers at six monthly intervals.

The TEOM-FDMS analyser filters are changed every four weeks during routine site visits. The sampling head is cleaned regularly. Visual inspection of the analyser along with remote access to diagnostic information ensures problems can be identified quickly and dealt with effectively, thus ensuring good data capture rates. Qualified engineers service the TEOM-FDMS every six months.

The continuous monitoring equipment is subject to biannual independent audits. The audits serve to identify problems with the analysers and infrastructure that may not be identified during routine servicing, such as:

- Erroneous analyser response factors;
- Converter inefficiency within NO_x / NO₂ gas analysers;

- Drifts in calibration cylinder concentrations;
- Instrument faults and configuration errors;
- Analyser flow rates; and
- Erroneous analyser calibration constants.

Certificates of calibration and summary reports of the audit findings are retained and used for use in the data ratification process.

The five Turnkey Osiris Dust Monitors are inspected every four to six weeks during routine site visits. The filters are changed and sample flow rates are checked and adjusted as necessary. The monitors are returned to the manufacturer annually for recalibration and servicing.

All site visits are documented to describe any adjustments made and to record any problems encountered. Results of all analyser tests and calibrations are recorded. Following scheduled service visits service reports are issued by the service engineers to provide documentation of maintenance performed.

QA/QC of diffusion tube monitoring

All NO₂ diffusion tubes used by Rugby Borough Council are supplied and analysed by Environmental Services Group using a 50% TEA in Acetone preparation method. Analysis is performed in accordance with standard operating procedure HS/WI/1015 Issue 14. This method conforms to the guidelines set out in Defra's 'Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance'.

Environmental Services Group scored achieved 100% satisfactory laboratory performance in WASP Rounds 108 – 115, inclusive, based on the z-score assessment criterion.

Appendix C: Pollution Prevention and Control Index

	Register Only – Other LA Enforced
	Register Only – EA Enforced
	Part A Processes
	Part B Processes

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
5/PPC/3.1(a)	18.2.93 25.11.98 11.03.04 20.12.05	The Company Secretary, Cemex Ltd Camden House Clearwater Park Thornaby Stockton on Tees TS17 6QY	Cemex UK Materials, Leicester Road, RUGBY. Permit surrendered on 27.07.2011	SP 503765	28805/001	Concrete Batching
6/PPC/3.1(a)	16.3.92 30.11.98 00.03.04 19.10.05	FAO Purchase Ledger Lafarge Aggregates Ltd PO Box 7390 Grinite House Grinite way Syston Leicester, LE7 1WQ.	Lafarge Aggregates Limited Concrete Batching Plant Brandon Lane, Willenhall, COVENTRY, CV3 3GW.	SP 386757	3495/001	Concrete Batching
8/PPC/3.1(a)	5.1.93 15.1.99 13.03.03 09.06.06	Tarmac Limited Millfields Road Ettingshall Wolverhampton West Midlands WV 4 6JP Tel 01902 353522	Tarmac Central Ltd, Unit 11, Dunchurch Trading Estate, A45 London Road, Dunchurch, Nr. RUGBY. CV23 9LN.	SP 458719	6028/001	Concrete Batching
9/PPC/3.1(a)	11.2.93 29.4.99 26.05.04	Marshalls Mono Ltd. Landscape House, Premier Way, Lowfields Business park, Eland, West Yorkshire. HX5 9HT	Stonemarket Limited, Old Gravel Quarry Oxford Road Ryton-on-Dunsmore Nr. COVENTRY, CV8 3EJ.	SP 379741	38181/001	Concrete Batching

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
11/PPC/3.1(a)	19.1.93 11.03.04	Tailby Brack Limited Butlers Leap, RUGBY. CV21 3RQ.	Cwikskip, Butlers Leap, RUGBY. CV21 3RQ	SP 515760	2202/001	Concrete Batching
				Dismantled but permit still in force 28.09.04 26.07.10		
13/PPC/6.5(a)	14.6.93 2.11.00 Part A Issued 31.01.07	Ball Packaging Europe UK Limited, Lakeside Chester Business Park Wrexham Road Chester CH4 9QT	Ball Packaging Pretorian Way, Glebe Farm Industrial Estate, RUGBY. CV21 2RN.	SP 502772	548/001	Metal Coating
16/EPA/E.A EA Ref:	22.2.93	National Grid Gas plc (Company Registered Address) 1-3 strand London WC2N 5EH	British Gas plc., Churchover Compressor Station, Churchover Lane, Harborough Magna, RUGBY. CV23 0HH.	Withheld	N/a	Natural gas
23/PPC/1.3(e)	21.11.92 9.11.99 12.03.04	Wolston Garage and Engineering Wolston, Nr. Coventry. CV8 3HB.	Wolston Garage & Engineering Wolston Nr Coventry CV8 3HB	SP 413753	1523/001	Waste Oil Burning
24/EPA/3.1 EA	16.6.93	The Company Secretary, Cemex UK Materials Limited, Cemex House, Coldharbour Lane, Thorpe. Egham SURREY.	Cemex Lawford Road, RUGBY.	SP 488757		Cement Manufacturing

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
		TW20 8TD				
29/PPC/6.5(b)	28.2.96 18.1.00 01.04.04 04.01.07	The Rugby Bodyshoppe, 2 Avon Industrial Estate, Butlers Leap, RUGBY. CV21 3UY.	(As applicant)	SP 515762	5580/001	Vehicle Car Spraying
32/PPC/1.4(b)	24.9.98 31.03.03 12.03.04	Sainsbury's Supermarkets Ltd 33 Holborn London EC1N 2HT Tel. 02076956000 Fax 020 7695 7610 www.sainsbury.co.uk	Sainsbury's Supermarkets Limited Petrol Station 385 Dunchurch Road, RUGBY. CV22 6HU. <div style="border: 1px solid red; padding: 5px; color: red; text-align: center;">Temporary Service Station Permit issued for Temporary Service Station at Sainsbury's on 1 February 2012 (6 months)</div>	SP 495726	9446/001	Unloading of petrol into stationary storage tanks at a service station
33/PPC/1.4(b)	25.9.98 12.03.04 15.06.06	(Texaco Franchise) Mr Munaf Lakha LW Fuels Limited 50 Woodgate Leicester LE3 5GF	LW Fuels Limited Stretton Service Station A45 London Road Southbound Stretton On Dunsmore Coventry CV23 9HX	SP 416733	31530/001	Unloading of petrol into stationary storage tanks at a service station

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
34/PPC/1.4(b)	25.9.98 30.06.04	Total UK Limited 40 Clarendon Road, Watford, Hertfordshire, WD17 1QT.	Great Central Service Station 89 Hillmorton Road, RUGBY. CV22 5AG.	SP 513749	10558/001	Unloading of petrol into stationary storage tanks at a service station
35/PPC/1.4(b)	25.9.98 16.03.04 3.03.04	Tesco Stores Limited, P.O. Box 400, Cirrus Building, Shire Park, Welwyn Garden City, Herts, AL7 1AB. Contact: Lynda Vick 01707 634088	Tesco Stores Limited, 1 Leicester Road, RUGBY. CV21 1RG.	SP 506769	8486/001	Unloading of petrol into stationary storage tanks at a service station
37/PPC/1.4(b)	23.11.98 26.02.02 20.09.02 12.03.04	(Texaco Franchise) Mr I Patel 30 Shipley Road Leicester LE5 5BW 0116 2731351	Pure Fuels (UK) Ltd (A45 – Northbound), London Road, Dunstore Heath Rugby, Coventry CV23 9LG	SP 453719	37857/001	Unloading of petrol into stationary storage tanks at a service station
38/PPC/1.4(b)	19.1.99 23.02.04 24.03.04	Mr S. Nathawani Gibbets Cross Station Ltd Watling Street Shawell, Lutterworth, LE17 6AR	Gibbets Cross Station Ltd Watling Street Shawell, Lutterworth, LE17 6AR	SP 529808	40527/001	Unloading of petrol into stationary storage tanks at a service station

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
39/PPC/1.4(b)	25.3.99 31.03.03 12.03.04	Murco Petroleum Limited, 4 Beaconsfield Road, St. Albans, Hertfordshire, AL1 3RH.	Lawford Road Service Station, Lawford Road, RUGBY, CV21 3HAQ.	SP 493754	9449/001	Unloading of petrol into stationary storage tanks at a service station
40/PPC/1.4(b)	20.1.99 10.02.06	Murco Petroleum Limited 4 Beaconsfield Road St. Albans Hertfordshire AL1 3RH	Rugby Leicester Road Service Station, Leicester Road, RUGBY. CV22 5EZ.	SP 501763	9449/001	Unloading of petrol into stationary storage tanks at a service station
41/PPC/1.4(b)	22.1.99 10.02.06	Murco Petroleum Limited 4 Beaconsfield Road St. Albans Hertfordshire AL1 3RH	Binley Woods Service Station, Coventry Eastern By-pass, COVENTRY, CV3 2ZZ.	SP 382769	9449/001	Unloading of petrol into stationary storage tanks at a service station
42/PPC/1.4(b)	23.4.99 23.02.04	Total Fina Elf UK Limited, 40 Clarence Road, Watford, Hertfordshire, WD1 1TQ.	Total Convenience Store (Auto Stop), 54 Lawford Road, RUGBY. CV21 3EA.	SP 500751	9448/001	Unloading of petrol into stationary storage tanks at a service station
43/PPC/1.4(b)	25.3.99 02.02.06	Mr N. Navanathan 339 Hillmorton Road, RUGBY. CV22 5EZ.	Paddox Service Station, 339 Hillmorton Road, RUGBY. CV22 5EZ.	SP 527738	42697/001	Unloading of petrol into stationary storage tanks at a service station

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
46/PPC/6.5	22.2.00 21.11.05 08.12.06	XK Engineering Limited, Swallow House, Shilton Industrial Estate, Shilton, Coventry CV7 9JY	XK Engineering Limited, Swallow House, Shilton Industrial Estate, Shilton, Coventry CV7 9JY	SP 402855	7272/001	Vehicle Car Sprayer
47/PPC/1.4(b)	16.6.00 12.03.04	STK Services Limited Dunchurch Service Station Coventry Road Dunchurch Rugby CV22 6RA	Dunchurch Service Station, Coventry Road, Dunchurch, RUGBY, CV22 6RA.	SP 484714	37295/001	Unloading of petrol into stationary storage tanks at a service station
51/PPC/6.2(a)	19.09.02 27.09.05	The Millboard Company Ryton Lodge Farm, Oxford Road, Ryton-on-Dunsmore, CV8 3EJ.	The Millboard Company Ryton Lodge Oxford Road Ryton on Dunsmore Warwickshire CV8 3EJ	SP 405708	17911/001	Di-isocyanate
52/PPC/3.5(c)	26.02.03 24.03.04	B Reilly & Son Limited 19 North Road Clifton Rugby Warwickshire, CV23 0BW	Mobile plant		17910/001	Mobile screening and crushing process.
57/PPC A1 Installation (EA Reference BU2381)	30.3.2005	Onyx Landfill Ltd 54 Pentoville Road London N1 9PE	Ling Hall Landfill Site Coal Pit Lane Rugby Warwickshire CV23 9HH	SP 445 735	221 5767	Landfill Site

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
59/QP3434SH EA Enforced	20.10.05	Britvic House Broomfield House Chelmsford Essex CM1 1TU	Britvic Soft Drinks, Rugby Aventine Way Glebe Farm Industrial Estate RUGBY CV21 1HA			Soft Drinks Manufacture
60/PPC/3.1(a)	30.11.05	The Company Secretary Breedon Aggregates Limited Breedon Quarry Main Street Breedon-on-the-Hill Derby Derbyshire DE73 8AP	Breedon Aggregates Limited Ling Hall Quarry Coal Pit Lane Lawford Heath CV23 9HH		29927/001	Concrete Batching
64/PPC/ A1 Installation (EA Reference EA/PPC/BP3234 LK Permit number BU2381iE		Summerleaze RE-Generation Ltd 7 Summerleaze Road Maidenhead Berkshire SL6 8SP	Ling Hall Gas Plant Ling Hall Landfill Coalpit Lane Lawford Heath Rugby Warwickshire CV23 9HH	SP45007341	00151665	Gas Utilisation Plant
65/PPC SED Installation	04.01.07 11.04.07	Johnson's Cleaners UK Ltd Lydia House Puma Court Kings Business Park Kings Drive Prescot L34 1PJ	35 Clifton Road Rugby Warwickshire CV21 3QF		1312/002	Dry Cleaners

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
66/PPC SED Installation	18.01.07 10.04.07	Johnson's Cleaners UK Ltd Lydia House Puma Court Kings Business Park Kings Drive Prescot L34 1PJ	Johnsons Cleaners UK Ltd Central Processing Unit Unit 17, Gladiator Way Rugby Warwickshire, CV21 1DD		1312/002	Dry Cleaners
67/PPC SED Installation	04.01.07	Brightly Dry Cleaners & Shirt Laundry 45 Woodlands Avenue Binley Woods Coventry CV3 2JL	Brightly Dry Cleaners & Shirt Laundry 45 Woodlands Avenue Binley Woods Coventry CV3 2JL		34538/001	Dry Cleaners
69/PPC Plus SED	19/2/2007	Blanc Aero Industries Ltd Butlers Leap Rugby Warwickshire CV21 3RG	Blanc Aero Industries Ltd Butlers Leap RUGBY CV21 3RQ	SP 518 761	34535/001	Coating & Surface Treatment of Metals plus Degreasing Process
70/PPC	18.01.07	The Village Dry Cleaners, 63 High Street, Hillmorton, Rugby. CV21 4EG.	The Village Dry Cleaners, 63 High Street, Hillmorton, Rugby. CV21 4EG.		1445/001	Dry Cleaners
71/PPC	28.03.07	Breedon Aggregates Limited Breedon Quarry Main Street Breedon-on-the-Hill Derby Derbyshire DE73 8AP	Breedon Aggregates Limited Ling Hall Quarry Coalpit Lane Lawford Heath Nr Rugby Warwickshire CV23 9HH		29927/001	Road stone Coating Plant

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
72/PPC	18/4/2007	Brinklow Quarry, Coventry Road, Brinklow CV23 0NJ.	As Applicant	SP 421 786	35797/001	Mobile Crushing & Screening
73/PPC	EA - Pending	W Potter and Sons (Poultry Limited Willey Fields Farm CV23 OSQ	As Applicant			Poultry Rearing Plant 84000 Pullets
74/PPC	EA - Pending	Bio Depot Ltd, The Locks, Hillmorton, Rugby, CV21 4PP.	30 Butlers Leap, Rugby, Warwickshire.	SP 5197 61		Bio Diesel Production
75/PPC/1.3(e)	14/05/2009	Woodlands Service Station 37 Cymbeline Way Bilton Rugby Warwickshire Cv22 6JZ	As Applicant Contact Jackie Sewell	TBC	40378/001	Waste Oil Burning

Ref No.	Date Authorised	Applicant	Address to which relates	O S Grid Ref.	Customer Number	Process
76/EPA/EA	EA - Transfer	Charles Trent Ltd Trent House 8 St. George's Avenue Parkstone Poole Dorset BH12 4ND	Charles Trent Ltd Avon Lane Land off Newbold Road Rugby Warwickshire CV21 1HF EA Ref: EPR/AP3995SC			Vehicle Dismantlers
77/PPC/1.3(e)	23/03/09	T W Tyres 11 Paynes Lane New Bilton Rugby Warwickshire CV21 2UH	T W Tyres 11 Paynes Lane New Bilton Rugby Warwickshire CV21 2UH	TBC	574/001	Waste Oil Burning
78/PPC/1.4b	08/05/2009	BP Oil (UK) Limited Witan Gate House 500-600 Witan Gate Milton Keynes MK9 1ES	Kestrel Service Station (BP), Corporation Street Rugby Warwickshire CV21 2DN	TBC	8487/001	Petrol Station
80/PPC	02/12/2010	Regal Dry Cleaners (Warwickshire) Ltd 18a Hunters Lane Rugby Warwickshire CV21 1EA	Regal Dry Cleaners (Warwickshire) Ltd 18a Hunters Lane Rugby Warwickshire CV21 1EA	TBC		Dry Cleaners
82/EPR/1.3(e)	04/10/2011	Binley Woods Service Station 60-62 Rugby Road Coventry Warwickshire CV3 2AX	Binley Woods Service Station 60-62 Rugby Road Coventry Warwickshire CV3 2AX	TBC		Waste Oil Burner

Appendix D: Air Quality Action Plan Progress Report

Table D.1 Summary of Rugby Borough Council's Progress in Implementing Air Quality Action Plan Measures

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
A	Rugby Western Relief Road	Serve new development at Cawston, Swift Valley, Malpass Farm and Coton Park, and reduce the impact of traffic within the town centre.	WCC	1996-2007	2007-2011	Implementation of the scheme in full	12%	The road opened in December 2010.	N/A	Completed	
B	Improvements to the Warwick Street Gyratory	Manage the impact of housing and employment growth on the transport network of the town.	WCC	2007-2012	2012-2019	Implementation of the scheme in full	Not specified	A major improvement to the Gyratory is proposed to support the significant growth proposed in the RBC's Local Development Framework Core Strategy.	The County Council's S-Paramics traffic model of Rugby is being used to test the impact of the individual development sites which are proposed in the LDF Core Strategy. A financial contribution from the Gateway Rugby site towards an improvement scheme has been secured. A scheme design for the Gyratory is currently being prepared by the promoters of the Rugby Radio Station site as part of their transport	Subject to the Rugby Radio Station site securing planning permission and agreement of an appropriate phasing plan, an improvement to the Gyratory is likely to come forward in the next 5-7 years.	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
									mitigation package.		
C	Improvements to Church Street/North Street	<p>Reduce the impact of traffic on the town centre, and allow better access for pedestrians and cyclists.</p> <p>Support the regeneration of the town centre and the growth proposals within the Borough.</p>	WCC	2007-2012	2013-2014	Implementation of the scheme in full	Not specified	<p>Pedestrianisation of the area around the Clock Tower on Church Street/North Street has been considered as part of the Rugby Transport Study. This would extend the existing pedestrianised area and allow the delivery of a new civic space within the town centre.</p>	<p>A preferred scheme for full pedestrianisation has been identified and agreed by Members. Detailed design of this scheme was completed in 2011. There is currently no funding available to deliver full pedestrianisation. An alternative scheme for partial pedestrianisation is now under development.</p>	Subject to securing funding, an alternative scheme could be implemented in 2013/14.	
D	Decriminalisation of Parking Enforcement within Rugby Borough	<p>Improve the management of traffic within the town centre and the impact of illegal parking.</p>	WCC	2000-2005	2005-2006	Implementation of the scheme in full	Not specified	Scheme fully implemented in 2006	N/A	Completed	<p>Since the commencement of Decriminalisation of Parking (now referred to as Civil Parking Enforcement CPE) on 02/10/06 in Rugby, the introduction of parking charges on some town centre streets together with a high level of enforcement has resulted in less vehicles being parked on the streets and less</p>

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
											congestion due to inconsiderate parking.
E	Rugby Town Centre 20:20 Vision	Improve public transport. Improve access for pedestrians and cyclists.	RBC	N/A – ongoing initiative	N/A – ongoing initiative	N/A	Not specified	On Schedule and ongoing. Various target dates.	Rugby BID are starting to consult on updating the Town Centre Strategy.	N/A	No progression. WCC has no financial resources at the moment to support implementation.
F	Re-routing traffic – Lorry Route Maps and agreements	Reduce the impact of heavy goods vehicles on the transport network of the Borough.	WCC	N/A – ongoing initiative	N/A – ongoing initiative	Reduction in complaints regarding inappropriate lorry movements	Not specified	An initial Advisory Lorry Route Map for the County was produced in 2005. This was subsequently revised and reissued in 2009.	N/A	N/A	
G	Variable Message Signing	Reduce the impact of circulating traffic seeking access to the town centre car parks.	WCC	2006-2008	2009	Implementation of the scheme in full	Not specified	Scheme fully implemented in 2009.	N/A	Completed	
H	Enforcement of Idling Vehicle Legislation	Reduce number of idling vehicle improving local air quality by reducing emissions to air.	RBC/WCC	Under investigation, but unlikely to be implemented. Limitations in the Traffic Management Act means that Civil Enforcement Officers will be unable to enforce	Currently N/A	Currently N/A	Currently N/A	Feasibility of scheme investigated. Decision taken not to proceed with the scheme due to the restrictions in enforcement actions that can be carried out by Civil Enforcement Officers	Decision made not to proceed with scheme to restrictions on enforcement actions that can be carried out by Civil Enforcement Officers.		
I	Improve the Borough Council Fleet (interims of	As vehicles are replaced, they are	RBC	N/A – ongoing initiative	N/A – ongoing initiative	Not specified	Not specified	3 vehicles were replaced with Euro V vehicles	1 further vehicle has been replaced with a	Ongoing N/A	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	emissions)	replaced with lower emission vehicles.						in 2007/8 and 2008/9 and 2 further vehicles were replaced during 2009/10. No replacements have been made to date during 2010/2011.	Euro V vehicle		
J	Improve Bus Emissions	The County Council is working with the major bus operator within the town (Stagecoach) to reduce bus emissions through its fleet renewal process, and on individual routes when they are upgraded to QBC status.	RBC/WCC	Ongoing	Ongoing	Not specified.	Not specified	Urban Quality Bus Corridor improvements have been made on routes between the Town Centre and Lower Hillmorton/Long Lawford, between Woodlands and the Town Centre, and on the Inter-Urban route between Rugby and Coventry.	No further QBC improvements have been made in the last 12 months due to a lack of resources on the part of the bus operators.	Ongoing initiative	
K	Cycling	Reduce the impact of traffic on the transport network of the Borough (particularly within the urban area of Rugby) by encouraging a shift towards sustainable modes of transport.	WCC	N/A – ongoing initiative	N/A – ongoing initiative	Increase in cycling as a result of individual scheme implementation	Not specified	The basis of a cycle network has been delivered in Rugby over the last 12-15 years, using a combination of on and off-carriageway routes. Additional routes will come forward as part of the LTP process and in conjunction with new development.	Work is ongoing between Sustrans and RBC to deliver the Connect2 scheme to reopen the Leicester Road viaduct to cyclists. Cycle routes to complement future growth within the Borough are in the process of being identified.	2012/13 2012-2026	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								<p>The County Council and RBC provide cycle training for young people and adults who are keen to improve their cycle skills.</p> <p>Improvements to the Black Path bridge for pedestrians and cyclists over the West Coast Main Line have been implemented. Further improvements to this facility will be made as part of the Connex2 scheme.</p> <p>A number of cross-town cycle improvements have been identified as part of the Rugby Transport Study, including changes to the Warwick Street Gyratory and measures to complement the proposed pedestrianisation around the Clock Tower.</p> <p>Cycle facilities</p>			

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								have been provided as part of the Rugby Western Relief Road.			
L	Walking	Reduce the impact of traffic on the transport network of the Borough (particularly within the urban area of Rugby) by encouraging a shift towards sustainable modes of transport.	WCC	N/A – ongoing initiative	N/A – ongoing initiative	Increase in walking (footfall) as a result of individual scheme implementation	Not specified	The LTP Walking Strategy sets out a series of improvements for pedestrians, including new or upgraded pedestrian crossings, new/widened footways, improved street lighting, provision of new dropped kerbs, and footway resurfacing/reconstruction.	Along with the area-wide improvements described in the progress to date section, a scheme for the pedestrianised area of the town centre has been identified – see Measure C for details.	2013/14 (subject to the availability of funding) – see Measure C for details	
M	Workplace Travel Plans	Reduce the impact of traffic on the transport network of the Borough (particularly within the urban area of Rugby) by encouraging a shift towards sustainable modes of transport.	WCC	N/A – ongoing initiative	N/A – ongoing initiative	Number of Travel Plans agreed with existing employers and as part of new development	Not specified	Workplace Travel Plans are secured through a S106 agreement as part of new development.	Travel Plans covered by Planning Condition - NPIA Training Centre - Ryton - Rugby Cattle Market, Hotel Use Travel Plans covered by S106 - Herbert Grey College / Caldecott Square Residential Travel Plan - Coton Park East (awaiting outcome of appeal)	N/A	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
N	School Travel Plans and Safer Routes to School	Reduce the impact of traffic on the transport network of the Borough (particularly within the urban area of Rugby) by encouraging a shift towards sustainable modes of transport.	WCC	N/A – ongoing initiative	N/A – ongoing initiative	Reduction in the number of car-based journeys to school	Not specified	A School Travel Plan must be produced prior to any Safer Routes to School improvements being implemented. An ongoing programme of schemes is implemented across the County. The most recent scheme to be delivered within the Borough relates to Avon Valley School.	N/A	N/A	
O	Public Transport Strategy, including the Bus Strategy	Reduce the impact of traffic on the transport network of the Borough (particularly within the urban area of Rugby) by encouraging a shift towards sustainable modes of transport.	WCC	N/A – ongoing initiative	N/A – ongoing initiative	Increase in bus patronage	Not specified	Ongoing implementation of the various strategies which make up the Public Transport Strategy, including the Bus Strategy, Passenger Rail Strategy, Community Transport Strategy, Public Transport Information Strategy and Public Transport Interchange Strategy.	No further significant improvements have been made in the last 12 months due to a lack of resources on the part of the bus operators.	N/A	
P	Travel Awareness Campaigns	Reduce the impact of traffic on the transport network of the	WCC	N/A – ongoing initiative	N/A – ongoing initiative	Reduction in the number of car-based journeys being made within	Not specified	Ongoing implementation of the Changing Travel Behaviour Strategy and	Regular annual events include Bike Week, Walk to School week, and In Town	N/A	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		Borough (particularly within the urban area of Rugby) by encouraging a shift towards sustainable modes of transport.				the Borough		other relevant LTP strategies.	Without My Car Day. The County and Borough Councils both support the national Travel wise initiative.		
Q	Energy efficiency improvements to Rugby housing & the reduction of fuel poverty.	Reduction of carbon emissions from domestic dwellings, the reduction of residents' fuel bills & the alleviation of ill health due to cold, damp housing.	Rugby Borough Council	N/A – ongoing initiative	Ongoing	NI 187 (reduction of fuel poverty); NI 186 (per capita reduction in CO ₂ emissions in the LA area).	15% increase in households receiving energy efficiency improvements; 1.5% improvements in SAP Ratings.	Ongoing promotion of energy efficiency measures across the Borough.	Improvement in the energy efficiency performance of housing the encouraging the installation of cavity wall insulation, loft insulation & high energy efficiency condensing boilers through discounts & grants. Households receiving energy efficiency improvements : 173 heating upgrades and 268 loft insulation upgrades to 270mm = 441 measures in total <i>Warm Front</i> Grants funding to Rugby Borough residents for energy efficiency improvements: assisted 46 households with measures totalling £97,788	Ongoing	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	Corporate Property								<p>Act on Energy referrals totalled 77.</p> <p>NI187 is no longer applicable as the government have discontinued this indicator, and have not developed a replacement yet.</p> <p>Have installed LED lighting with movement sensors in the John Barford Car Park in February 2012 whereby we are looking to reduce energy consumption. The anticipated annual reduction in energy consumption is 70% with an annual carbon saving of 44 tonnes.</p>		
R	Control Of Industrial Emissions	Reduce the environmental impact of industrial processes through pollution control regulation	RBC	N/A – ongoing initiative	N/A – ongoing initiative	97.36% compliance improvements	Not specified	Annual inspection programme complete.	35 Industrial Pollution Processes (100% of inspections completed). All were inspected through 2011/2012 - 96.34% compliance improvements	N/A	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
									where required for pollution at these sites.		
S	Emissions from Domestic and Commercial Sources	Prevent and/or reduce environmental impacts from domestic and commercial emissions.	RBC	N/A – ongoing initiative	N/A – ongoing initiative	Reduction in complaints.	Not specified	Low priority. Low number of complaints.	Ongoing	N/A	
T	Control of Bonfires	Prevent and/or reduce environmental impacts from domestic and commercial emissions.	RBC	N/A – ongoing initiative	N/A – ongoing initiative	Reduction in complaints	Not specified	Low priority. Low number of complaints.	Ongoing		
U	Planning Development and Planning Applications	Air quality assessments have been requested for land use planning developments that meet AQMA thresholds in the Rugby Borough Local Plan (July 2006). The requirements for future assessments have now been embodied in a new Planning Obligations Supplementary Planning Document adopted in March 2012.	RBC	Ongoing	Ongoing	Not specified	Not specified	CEMEX Climafuel Facility Malpass Farm, Rugby. Rugby Radio Station Sustainable Urban Extension Gateway Rugby Sustainable Urban Extension Lime Tree Village Extension, Cawston Rugby. Long Lawford residential development Rugby Western Relief Road Priority Junction.	Ongoing Local Plan (July 2006) superseded with Core Strategy/ Planning Obligations Supplementary Planning Document adopted in March 2012. Section 7 covers Air Quality as well as providing an air quality guidance document for developers that is currently under a wide consultation process.		

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		<p>This is to ensure that new development does not result in a significant increase in the production of air pollutants and that opportunities are taken to improve air quality, where possible. In some instances where an AQMA threshold has not been met, officer discretionary measures have been utilised where it is felt that a proposed land use development has potential to impact on air quality and should be a material consideration.</p>						<p>Town Centre Pedestrianisation</p> <p>Rugby Western Relief Road including proposed changes to include priority Junction</p> <p>Priory Road, Wolston Residential Development</p> <p>Biomass Boiler for Queens Jubilee Leisure Centre</p> <p>Crematorium Facility, Ashlawn Road, Rugby</p>			

Appendix E: Screening Assessment of Emissions from Cemex

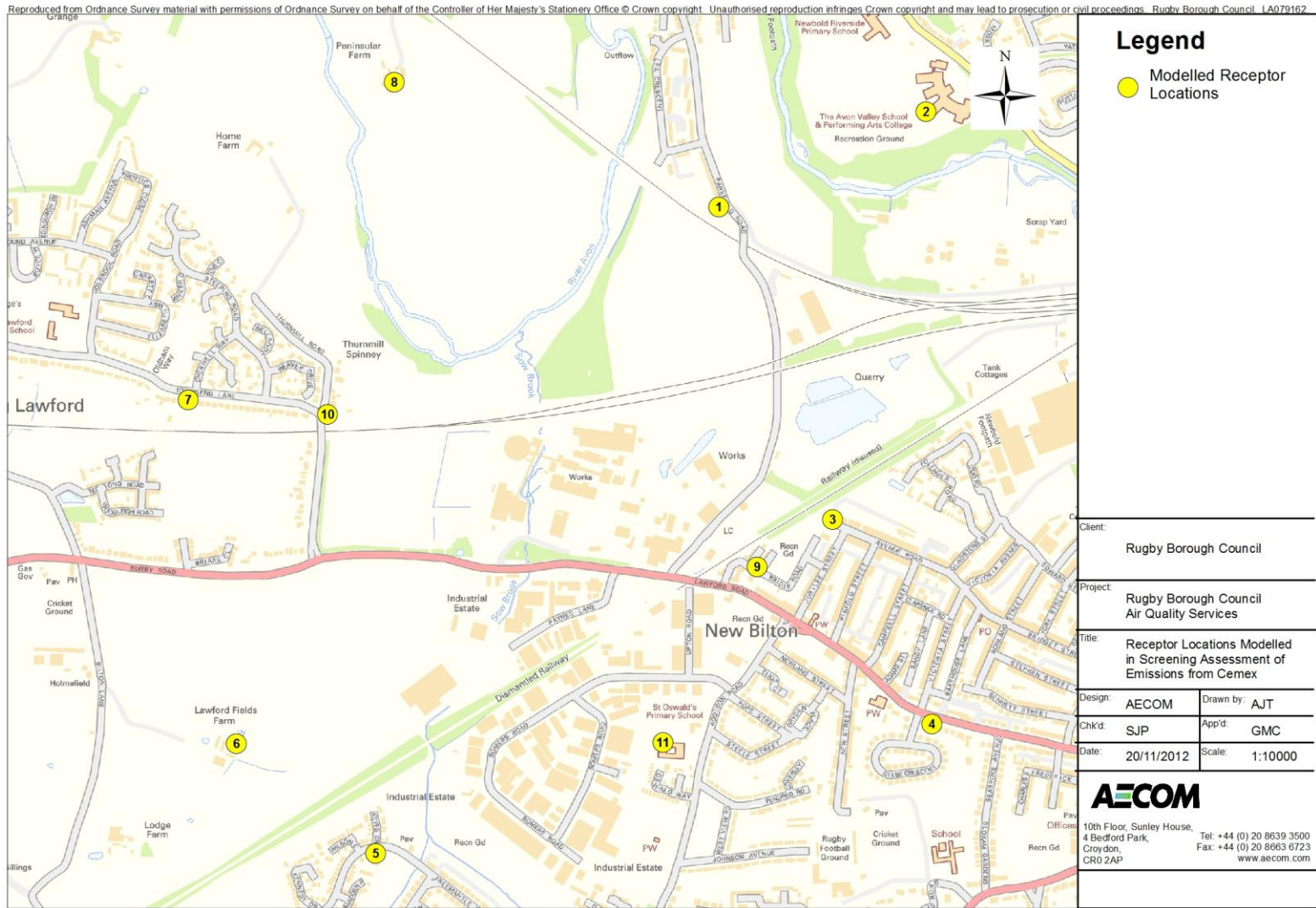
A screening assessment of emissions from Cemex was carried out in accordance with LAQM TG09 methodology, using the nomograms for industrial sources published in the technical guidance for use in Updating and Screening Assessments. This showed that NO_x emissions from Cemex exceeded short-term and long-term threshold emission rates above which a more detailed investigation would be required using a detailed dispersion model. This is the phased approach that should be taken when assessing emissions from industrial sources. In this report a more detailed investigation was carried out using the AERMOD dispersion model. Worst-case emissions input data were used to predict short-term and long-term concentrations at sensitive receptor locations. The locations of the modelled receptors are shown in Figure

The industrial nomograms and H1 Screening Assessment tools are for screening purposes to determine whether there is a requirement for more detailed dispersion modelling to be carried out. The screening assessment is a deliberately cautious approach and will overestimate emissions. The extract below, taken directly from Annex F of the H1 Guidance clearly states that the use of detailed dispersion modelling will result in "less precautionary and more accurate process contribution estimates"

"The simple calculation methods used to estimate process contributions (PC) have been developed primarily for screening purposes and for estimating process contributions where environmental consequences are relatively low. They do not take into account all the parameters that may influence dispersion of substances to air or deposition from air to land. These simple models are precautionary and assume worst case conditions to deliberately overestimate actual contributions.

"More accurate calculation of process contributions can be achieved by mathematical air dispersion models, which take into account relevant parameters of the release and surrounding conditions. Operators of sites with higher environmental risks may prefer to use these more complex methods to derive less precautionary and more accurate process contribution estimates."

Figure A.5 Receptor Locations Modelled in Cemex Screening Assessment



9 References

- ⁱ Faber Maunsell (2003). Rugby Borough Council Updating and Screening Assessment 2003.
- ⁱⁱ Faber Maunsell (2004). Rugby Borough Council Detailed Air Quality Assessment 2004.
- ⁱⁱⁱ Faber Maunsell (2005). Rugby Borough Council Detailed Assessment of Particulate Matter February 2005.
- ^{iv} Faber Maunsell (2005). Rugby Borough Council Further Assessment of Air Quality December 2005.
- ^v Faber Maunsell (2006). Rugby Borough Council Updating and Screening Assessment 2006.
- ^{vi} Faber Maunsell (2009). Rugby Borough Council Updating and Screening Assessment 2009.
- ^{vii} AECOM (2011). Rugby Borough Council Detailed Assessment of Nitrogen Dioxide.
- ^{viii} AECOM (2011). Rugby Borough Council Air Quality Progress Report 2011.
- ^{ix} Rugby Borough Council Air Quality Monitoring Task Group (2011). A Review of Rugby Borough Council's Air Quality Monitoring Network, August 2011.
- ^x Faber Maunsell and AECOM. Quarterly and Annual Air Quality Monitoring Reports 2004 – 2011. Available at http://www.rugby.gov.uk/site/scripts/documents_info.php?categoryID=413&documentID=1218 Accessed 01/05/2012.
- ^{xi} Defra LAQM Support. FAQs. "Guidance on Assessing Emissions from Railway Locomotives". Downloaded from <http://laqm.defra.gov.uk/laqm-faqs/> on 13/04/2012.
- ^{xii} Environment Agency (2011). "What's in Your Backyard?" <http://www.environment-agency.gov.uk/homeandleisure/124274.aspx> Accessed 23/04/2012.
- ^{xiii} Air Independent Air Quality and Odour Specialists (2006). Rugby Works: Detailed Air Quality Assessment Final Report (Version 2). November 2006. Report Reference: C18-P04-R02.
- ^{xiv} <http://www.planningportal.rugby.gov.uk/fulldetail.asp?AltRef=R12/0396&ApplicationNumber=R12%2F0396&AddressPrefix=&Postcode=&CaseOfficer=&ParishName=&AreaTeam=&WardMember=&Consultant=&DateReceivedStart=&DateReceivedEnd=&DateDecidedStart=&DateDecidedEnd=&Locality=&AgentName=&ApplicantName=&ShowDecided=&DecisionDescription=&DecisionLevel=&Sort1=FullAddressPrefix&Sort2=DateReceived+DESC>
- ^{xv} Air Quality Consultants (2011). "Nitrogen Dioxide Falloff With Distance Calculator Version 4". Downloaded from <http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html> on 23/04/2012.
- ^{xvi} Air Quality Consultants (2011). "Nitrogen Dioxide Falloff With Distance Calculator Version 4". Downloaded from <http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html> on 23/04/2012.