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

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

October, 2009

Local Authority Officer	Brian Page

Department	Environmental Protection
Address	Luton Borough Council, Town Hall, George Street, Luton, Bedfordshire, LU1 2BQ
Telephone	01582 546 000
e-mail	Brian.Page@luton.gov.uk

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Executive Summary

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 USA identified that concentrations of nitrogen dioxide (NO_2) at the following monitoring locations exceeded the annual mean objective:

- M1 Belper, Belper Road, East of junction 11 of M1.
- M9 Wyndham, Wyndham Road, West of junction 11 M1.
- LA01 Terminal Patio
- LA05 Runway Apron

The USA identifies that the first two locations are already within an AQMA and the second two locations are not near a relevant receptor for the annual mean objective. As a result it has been determined that a Detailed Assessment for NO_2 will not be required for these locations. No exceedences were identified outside the AQMA for 2008.

There is also no requirement to proceed to a Detailed Assessment for any other sources assessed as part of this USA.

The USA also identifies that further monitoring data is required to establish whether the boundary of the existing AQMA needs to be reassessed in reference to Copperfield as monitoring results for this location indicated that NO_2 concentrations do not exceed air quality objectives.

It is recommended that the new initiative monitoring that has begun in 2009 is continued to establish the impact of London Luton Airport on the relevant receptors found on its northern boundary.

A Progress Report will need to be completed by the end of April 2010.

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Appendix A QA/QC Data

1 Introduction

1.1 Description of Local Authority Area

Luton is a unitary authority in Bedfordshire in the South East of England. It has an estimated population of over 185,000 in 4336 ha (c. 10,657 acres). The borough is dominated by the population centre of Luton and also contains London Luton Airport.

The main sources of air pollution are the M1 Motorway that runs North – South towards the Western side of the Borough, and London Luton Airport (LLA) that is situated in the Southeast corner of the Borough. There is only the one Part A IPPC process (regulated by the Environment Agency) in the area, being the IBC vehicle-plant Boiler house. There are no large Part B IPPC processes (regulated by Luton BC) in the area.

The borough contains an Air Quality Management Area (AQMA) that covers 431 dwellings situated near the M1 motorway.

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.

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- $\mu g/m^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene			
	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Luton Borough Council has completed the following rounds of Review and Assessment to date:

- Stages 1 and 2 (1999);
- Stage 3 (2001);
- Stage 4 (2003);
- Updating and Screening Assessment (2003);
- Further and Detailed Assessment (2004);
- Progress Report (2005);
- Updating and Screening Assessment (2006);
- Progress Report (2007); and
- Progress Report (2008).

Stages 1 to 4 (1999 to 2002)
Luton Borough Council published its Stage 1 Review and Assessment in March 1999. It concluded that further investigation was required for CO, NO_2, particulate matter (PM_{10}) and Sulphur Dioxide (SO_2). The Stage 2 Review and Assessment published in October 1999 considered these pollutants in more detail and concluded that further investigation needed to be made regarding
NO_2 and PM_{10}. Stage 3 Review and Assessment (2001) looked in greater detail at NO_2 and PM_{10} and found that the AQS objectives predicted to be exceeded were the annual mean NO_2 objective (21ppb/40µg/m^3 by end of 2005) and the 24 hourly mean PM_{10} objective (50µg/m^3 by end of 2004).

However, after considering whether there was any relevant exposure, and following consultation, it was decided not to declare an AQMA.

In 2003, the Stage 4 Review & Assessment report (AEAT, 2003) was used to inform an Action Plan and to provide more up to date information on air quality in Luton. The assessment looked in detail at NO_2 and PM_{10} and concluded that a) the PM_{10} annual average objective would not be exceeded anywhere in Luton, b) that the 24-hour mean objective for PM_{10} would only be exceeded on the M1 Motorway itself (where relevant exposure does not occur) and c) that the provisional annual average objective for PM_{10} of 20 $\mu g/m^3$ by 2010 would not be exceeded, except perhaps within approximately 5m of the boundary of the M1. The assessment also concluded that there was likely to be exceedences of the NO_2 annual mean objective at locations of relevant exposure. These locations were at 24 specified dwellings that are within a 50 m band along the M1.

Updating & Screening Assessment (2003)
The Updating and Screening Assessment (Luton Borough Council, 2003) concluded that the following pollutants would meet relevant AQS objectives Benzene, 1-3 Butadiene, CO, Lead, PM_{10} and SO_2. However, it was concluded that there was likely to be exceedence of the NO_2 annual mean objective at locations inside and outside of the AQMA declared in November 2003(which contained the 24 dwellings determined to have relevant exposure in the Stage 4 Review and Assessment). Therefore a Detailed Assessment and Further Assessment were required to quantify and spatially redefine the exceedence area.

Further and Detailed Assessment (2004)
The Further Assessment and Detailed Assessment (AEAT, 2004) concluded that the NO_2 annual mean objective of 40 $\mu g/m^3$ for 2005 was likely to be exceeded over a much greater area than had been concluded by the Stage 3 and 4 Review and Assessments. The area of likely exceedence comprised 431 dwellings. An Air Quality Management Area (AQMA) was subsequently declared in March 2005, which contained these 431 dwellings (see Appendix 1 The Luton Air Quality Management Areas (NO_2) Order 2005).

Progress Report (2005)
The 2005 Progress Report indicated a downward trend in NO2 concentrations in Luton at the monitoring locations. During 2004 the measured average annual concentration of NO_2 in Luton reduced at all locations compared to 2003. There was only one site exceeding the annual mean objective for NO_2; by Junction 11 of the M1. All other AQS pollutant concentrations fell consistently below the objective concentrations.

Updating and Screening Assessment (2006)
The Updating and Screening Assessment (2006) concluded that Further Assessments or Detailed Assessments were not required for any of the AQS pollutants.

Progress Report (2007)
The 2007 Progress Report indicated that the measured annual average NO_2 concentration in Luton reduced at virtually all locations compared with the 2003 concentrations. As in previous assessments, a downward trend in NO_2 concentrations at the measurement sites was indicated. All other AQS pollutant concentrations fell consistently below the objective concentrations.

Progress Report (2008)
The 2008 Progress Report showed that there has been no exceedence of the annual or short-term objectives for NO_2, PM_{10}, CO and SO_2. It was reported that diffusion tubes had been re-deployed with the AQMA in 2008 but there was no data available to assess if there were likely to be an exceedence in NO_2 objectives in the borough. Two exceedences were identified at London Luton Airport, although no monitoring at locations of relevant exposure is currently undertaken.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Two automatic monitors are currently in operational in the Borough; the first is situated 179m from the central reservation of the M1 Motorway, just to the north of junction 11 (505571,222755). The site monitors Carbon Monoxide (CO), NO_2, Nitrogen Oxides (NO_x), Sulphur Dioxide (SO_2), PM_{10} using the Tapered Element Oscillating Microbalance (TEOM) and Ozone. Data from this Station is collected hourly and ratified by ERG (formerly SEIPH). ERG places the data on the http://www.hertsbedsair.org.uk web site, on which daily and longer term data can be viewed. Figure 1 (Appendix 2) displays the monitoring location of this automatic monitor.

The second is situated at London Luton Airport (LLA). LLA currently operates a PM_{10} automatic monitor, which is situated by the airport terminal (511871, 221142). PM_{10} concentrations are measured using a Beta Attenuation Monitor (BAM). Data from the station is collected hourly and ratified by ERG (formerly SEIPH). ERG places the data on the http://www.hertsbedsair.org.uk web site on which daily and longer term data can be viewed. Figure 4 in Appendix 2 displays the location of this automatic monitor.

Table 2.1 provides summary information on both automatic monitoring locations.

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location ?
Luton	Urban Background	X 505571 Y 222755	CO, NO_2, NO_x, SO_2, PM_{10}	N	Y (38m)	14m	N
Luton Airport	Urban Background	X 511866 Y 221145	PM_{10}	N	N	N/A	N

2.1.2 Non-Automatic Monitoring

NO_2 concentrations were measured at 27 locations around the Borough using diffusion tubes, between 2002 and 2005. However, diffusion tubes were not deployed in 2006 or 2007. Diffusion tubes were deployed again in April 2008.

In 2008, Luton Borough Council and LLA carried out diffusion tube NO_2 monitoring at 19 locations throughout their area; 7 within and around the AQMA and 12 within London Luton Airport. Details of the diffusion tube monitoring locations are provided in Table 2.2 and displayed on the figure 1 and 2. The locations include residential locations close to main roads, urban background and kerbside locations across the district. In 2009, diffusion tube monitoring has been extended to cover a new initiative near Luton Airport. The results of this monitoring will be covered in the next round of Review and Assessment.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
M1	Belper	Roadside	X 505492 Y 222607	NO_2	Y	Y (5m)	3m	
M9	Wyndham	Roadside	X 505325 Y 222812	NO_2	Y	Y (5m)	1m	
M14	Copperfield	Roadside	X 505015 Y 223538	NO_2	Y	Y (3m)	2m	
CR1	CRAQM 1	Urban Background	X 505571 Y 222755	NO_2	N	Y (38m)	13m	N
CR2	CRAQM 2	Urban Background	X 505571 Y 222755	NO_2	N	Y (38m)	13m	N
CR3	CRAQM 3	Urban Background	X 505571 Y 222755	NO_2	N	Y (38m)	13m	N
LA01	Terminal Patio	Background	X 511847 Y 221336	NO_2	N	N	N/A	N
LA02	Airport Approach Road	Kerbside	X 511586 Y 220978	NO_2	N	N	N/A	N
LA03	Runway Threshold Western	Background	X 511156 Y 220437	NO_2	N	N	N/A	N
LA04	Runway Threshold Eastern	Background	X 513634 Y 221198	NO_2	N	N	N/A	N
LA05	Runway Apron	Background	X 511703 Y 221320	NO_2	N	N	N/A	N
LA06	President Way Jct	Kerbside	X 511645 Y 221679	NO_2	N	N	N/A	N
LA07	Terminal Car Park	Intermediate	X 512181 Y 221352	NO_2	N	N	N/A	N
LA08	BAM CoLocator	Background	X 511871 Y 221142	NO_2	N	N	N/A	N
LA09	Stagenhoe Bottom Farm	Background	X 517637 Y 222554	NO_2	N	N	N/A	N
LA10	Grove Farm Slip End	Background	X 507623 Y 217724	NO_2	N	N	N/A	N
LA13	Delmerend Lane Flamstead	Rural	X 508426 Y 214366	NO_2	N	N	N/A	N
LA14	Stand 60 Luton Airport	Kerbside	X 511861 Y 221579	NO_2	N	N	N/A	N

NO_2 is measured using diffusion tubes at 19 sites within the Borough; 7 sites in and around the AQMA (figure 1) and 12 sites within the boundary of London Luton Airport (figure 2).

For the 7 sites in and around the AQMA Luton Borough Council uses 'Grey Cap' diffusion tubes supplied and analysed by Gradko using a preparation mixture of 20% triethanolamine (TEA) in deionised water. Gradko comply with the WASP scheme and achieved 'good' performance based on old and new criteria for the January 2008 – January 2009 period.

A bias adjustment factor of 0.82 was calculated based on the co-location triplicate site at the Luton Background automatic monitor. These diffusion tubes are labelled CRAQM 1,2,3 in the table above.

As diffusion tube monitoring was not undertaken for the fully year an adjustment factor was required to estimate the annual mean concentrations. This was calculated using the methodology laid out in Box 3.2 in the Technical Guidance LAQM.TG(09). A factor of 1.116 was calculated (table 2.3) using three

nearby, long-term, continuous monitoring sites. The period mean was calculated from April 21st 2008 to 3rd December 2008.

Table 2.3 Calculation of Annual Adjustment Factor

Site Name	X	Y	Annual Average Mean	2008 DC	Period Mean 2008	Period DC	Ratio
South Beds Dumstable	501906	221822	30.4	80	28.2	94	1.078
St Albans Fleetville	516548	207358	22.6	97	19.2	97	1.177
Hertsmere Borehamwood 2	520248	197246	24.6	84	22.5	75	1.093
						Average	**1.116**

The 12 NO_2 diffusion tube sites within the London Luton Airport are prepared and analysed by Bureau Veritas (Gradko International Ltd). The laboratory takes part in the NO_2 Network QA/QC Field Intercomparison using the preparation method of 50% Triethanolamine (TEA) in Acetone.

Diffusion tubes frequently exhibit bias (over- or under-read) relative to the chemiluminescence analyser (the reference technique for NO_2), and it is necessary to correct for such bias when using diffusion tube results for Review and Assessment purposes. Data are available from a summary spreadsheet (spreadsheet version number: 04/08) of Local Authority co-location studies prepared by Air Quality Consultants (2008) and available via the Air Quality Review and Assessment website http://www.uwe.ac.uk/aqm/review/.

Six nationwide co-location studies were carried out in 2008 using 50% TEA in Acetone diffusion tubes from Bureau Veritas (Gradko International Ltd). The overall bias factor calculated from these studies was 0.94. Table 2.5b shows both the bias corrected and uncorrected diffusion tube monitoring results for London Luton Airport for 2008. These are then compared to results form 2006 and 2007 in table 2.5c.

Figure 1. Monitoring Locations in and around the AQMA

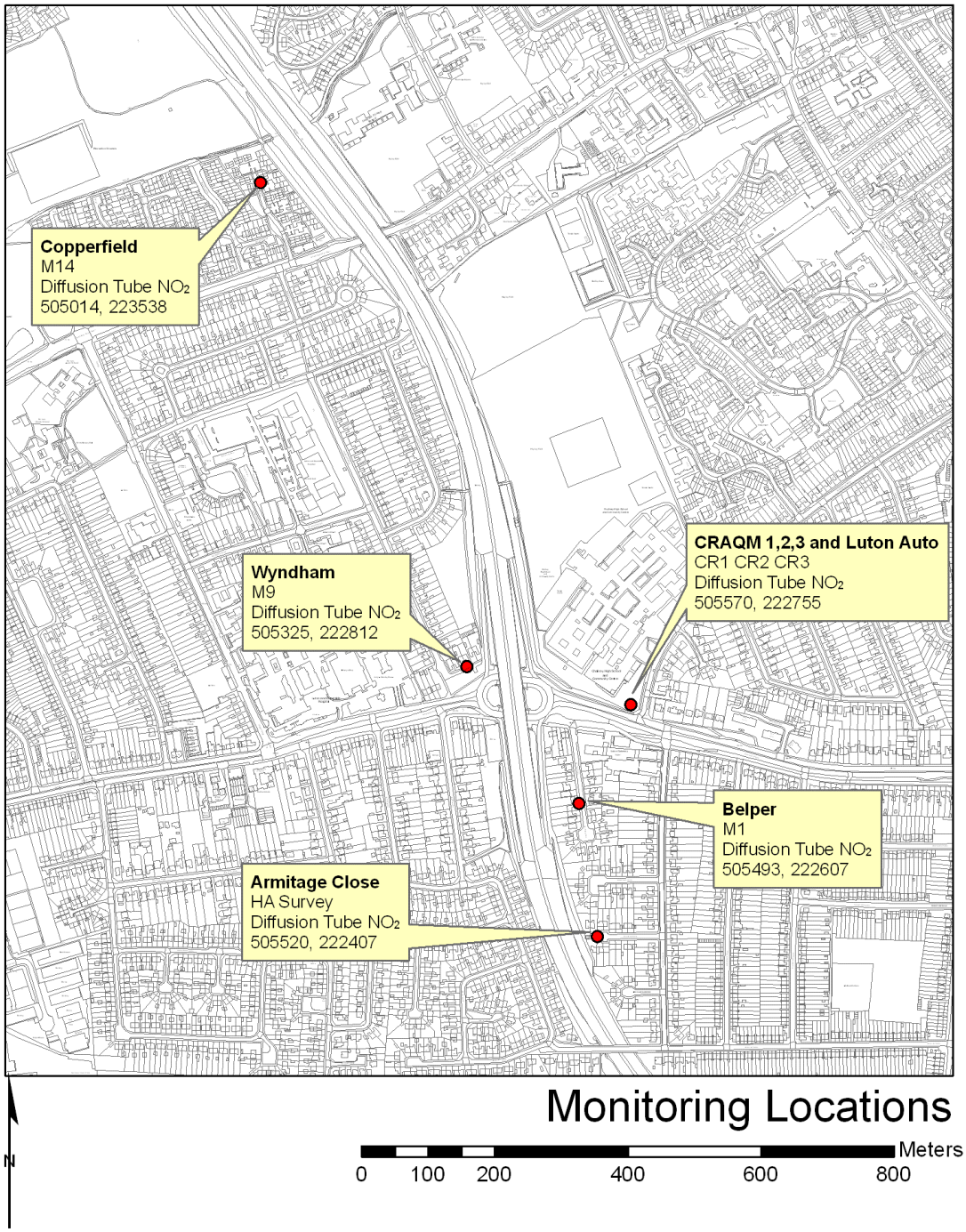
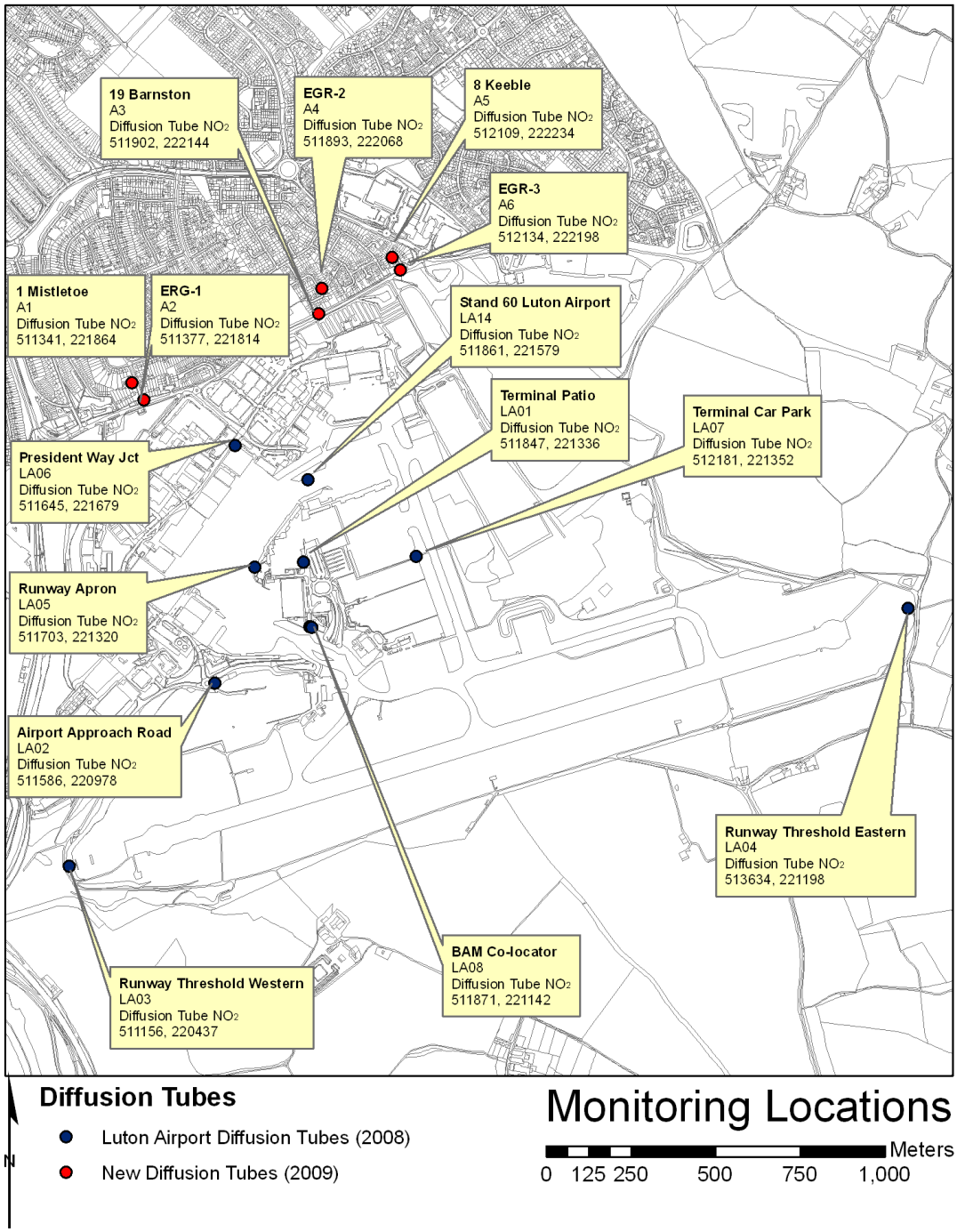


Figure 2. Monitoring Locations in and around the London Luton Airport



2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Table 2.4a displays the annual mean NO_2 monitoring results from the automatic monitoring sites in the borough for 2006, 2007 and 2008.

Table 2.4a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Proportion of year with valid data 2008 %	Annual mean concentrations (µg/m^3)		
				2006	2007	2008
LN1	Luton Background	N	81%	34.0	35.0	35.0

There were no exceedences of the annual mean NO_2 objective (40µg/m^3) at the Luton Background automatic monitoring site in 2006, 2007 or 2008.

Table 2.4b shows the number of exceedences of the hourly mean NO_2AQS objective, measured at the Luton Background automatic monitoring site in the borough, for 2006, 2007 and 2008.

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

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of hourly mean (200 µg/m^3)		
				2006	2007	2008
LN1	Luton Background	N	81%	8	14	5

The hourly mean objective for NO_2 (200 µg/m^3 not to be exceeded more than 18 times per year) was not exceeded at the automatic monitoring site in 2006, 2007 or 2008.

Diffusion Tube Monitoring Data

Table 2.5a shows the adjusted and unadjusted for bias diffusion tube monitoring results for the period of monitoring undertaken in Luton from April 21st 2008 to December 3rd 2008. The table also shows the estimated Annual mean concentrations following application of adjustment ratio (see section 2.1.2). Diffusion tube monitoring was resumed in April 2008 following no deployment in 2006 and 2007.

Table 2.5a Results of Nitrogen Dioxide Diffusion Tubes in Luton

Site ID	Location	Within AQMA?	Period Data Capture %	Period Mean	Bias Adjusted* Period Mean	Annual mean concentrations (µg/m^3) Adjusted for bias	
						2008 **	2010***
M1	Belper	Y	71%	**45**	37	**41.2**	37.9
M9	Wyndham	Y	100%	**47.5**	39	**43.4**	**40.0**
M14	Copperfield	Y	85%	28.6	23	26.1	24.0
CR1	CRAQM 1	N	100%	36.5	30	33.4	30.8
CR2	CRAQM 2	N	100%	38.8	32	35.5	32.7
CR3	CRAGM 3	N	87%	**41.2**	34	37.7	34.7

** a bias adjustment factor of 0.82 was applied*
*** a factor 1.116 was applied to calculate the annual mean*
****2010 Projected concentrations based on TG(09)*
Exceedences of the 40 µg/m^3 Air Quality Objective are shown in **Bold.**

When applying the bias correction to the mean 2008 results, 2 of the NO_2 diffusion tube sites in and around the AQMA exceed the NO_2 annual mean objective of 40μg/m^3. These diffusion tube locations are as follows:

1. M1 Belper, Belper Road, East of junction 11 of M1.
2. M9 Wyndham, Wyndham Road, West of junction 11 M1.

The Belper diffusion tube is located roadside on Belper Road, which is a residential road leading to a cul-de-sac running parallel to the M1 motorway and the on slip road for south bound traffic. The diffusion tube and the nearest receptor are both within the current AQMA. The diffusion tube is 2.4 metre from the road and 5 metres from the nearest receptor. Following the procedure set out in Box 2.3 of LAQM TG(09) it is predicted that the concentration at the receptor would be 41.2 μg/m^3, therefore a continued exceedence is estimated within this area of the AQMA. As the diffusion tube is positioned within the AQMA there is no need to proceed to a Detailed Assessment for this location.

The Wyndham Road diffusion tube is located roadside on Wyndham Road, a residential cul-de-sac near the roundabout and on slip road for north bound traffic at Junction 11 of the M1 motorway. The diffusion tube and the nearest receptor are both within the current AQMA. The diffusion tube is roadside, 1.2 metre from the road and 5.1 metres from the nearest receptor. Following the procedure set out in Box 2.3 of LAQM TG(09) it is predicted that the concentration at the receptor would be 40.6 μg/m^3, therefore a continued exceedence is estimated within this area of the AQMA. As the diffusion tube is positioned within the AQMA there is no need to proceed to a Detailed Assessment for this location.

The Copperfield site diffusion tube is located roadside on a Copperfield, a residential street that runs parallel to the M1 motorway. The diffusion tube is located within the AQMA, although the predicted annual mean concentration for 2008 is below the NO_2 annual mean objective of 40μg/m^3 at 26.1μg/m^3. This indicates that the AQMA might not need to cover this area. However, due to a full years monitoring not being available for this location it is recommended that monitoring should continue to gather a greater evidence base before the boundary is reconsidered.

For each of the monitoring sites NO_2 concentrations were projected forward to 2010 using future year adjustment factors laid out in TG(09) Box 2.1. The application of these factors predicts a reduction in NO_2 levels at each of the sites, although the Wyndham diffusion tube remains above the NO_2 annual mean objective of 40μg/m^3. As mentioned earlier this site is already within an AQMA.

Table 2.5b Results of Nitrogen Dioxide Diffusion Tubes in London Luton Airport

Site ID	Location	Within AQMA?	Annual Data Capture %	Annual Mean	Annual mean concentrations (μg/m^3) Adjusted for bias 2008
LA01	Terminal Patio	N	100%	**43**	**40.4**
LA02	Airport Approach Road	N	100%	35.2	33.1
LA03	Runway Threshold Western	N	100%	25.3	23.8
LA04	Runway Threshold Eastern	N	100%	21.2	19.9
LA05	Runway Apron	N	100%	**47.7**	**44.8**
LA06	President Way Jct	N	100%	37.8	35.6
LA07	Terminal Car Park	N	100%	29.5	27.7
LA08	BAM CoLocator	N	100%	32.8	30.8
LA09	Stagenhoe Bottom Farm	N	100%	12.5	11.8
LA10	Grove Farm Slip End	N	100%	13.9	13.1
LA13	Delmerend Lane Flamstead	N	100%	14.2	13.3
LA14	Stand 60 Luton Airport	N	100%	**40.8**	38.4

** a bias adjustment factor of 0.82 was applied*
Exceedences of the 40 μg/m^3 Air Quality Objective are shown in **Bold.**

Table 2.5c: Bias Adjusted Annual Mean NO_2 concentrations µg/m^3 for London Luton airport, Measured Using Diffusion Tubes 2006-2008 and Estimated Annual Mean NO_2 Concentrations µg/m^3, for 2010

Site ID	Location	Annual mean concentrations (µg/m^3) Adjusted for bias			
		2006	2007	2008	2010
LA01	Terminal Patio	39.5	35.6	**40.4**	37.2
LA02	Airport Approach Road	**45.1**	31.2	33.1	30.4
LA03	Runway Threshold Western	23.4	26.4	23.8	21.9
LA04	Runway Threshold Eastern	19.5	18.6	19.9	18.3
LA05	Runway Apron	**42.2**	**42.9**	**44.8**	**41.3**
LA06	President Way Jct	37.5	34.3	35.6	32.7
LA07	Terminal Car Park	28.2	27.4	27.7	25.5
LA08	BAM CoLocator	33.0	32.1	30.8	28.3
LA09	Stagenhoe Bottom Farm	11.8	11.0	11.8	10.8
LA10	Grove Farm Slip End	12.0	12.6	13.1	12.0
LA13	Delmerend Lane Flamstead	14.6	13.9	13.3	12.3
LA14	Stand 60 Luton Airport	**45.3**	**40.8**	38.4	35.3

****2010 Projected concentrations based on TG(09)*
Exceedences of the 40 µg/m^3 Air Quality Objective are shown in **Bold.**

When applying the bias correction to the mean 2008 results, 2 of the NO_2 diffusion tube sites within the London Luton Airport boundary exceed the NO_2 annual mean objective of 40µg/m^3. These diffusion tube locations are as follows:

1. LA01 Terminal Patio
2. LA05 Runway Apron

The Runway Apron diffusion tube is situated on the façade of the terminal building. There has been a slight increase in concentrations from 2006 and 2007, although future concentrations are projected to be reduced by 2010. The Terminal Patio diffusion tube is also positioned on the façade of the terminal building. Both of these monitoring locations are not in areas of relevant exposure for annual mean therefore no Detailed Assessment of the exceedences are required.

2.2.2 PM_{10}

Table 2.6a displays the annual mean PM_{10} monitoring results from the automatic monitoring sites in the borough across the time series 2006 - 2008. All statistics have been ratified according to QA/QC procedures outlined in appendix A.

Table 2.6a Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m^3)		
				2006 *	2007 *	2008
LN1	Luton (Background)	N	92	22	21	18
LA1	Luton Airport	N	95	28	23	21

When assessing the 2006, 2007 and 2008 annual mean PM_{10} concentrations against the AQS Objective of 40 µg/m^3, no exceedences are evident at any of the automatic monitoring sites.

Table 2.6b shows the number of exceedences of the 24-hour mean PM_{10} AQS objective, measured at each of the automatic monitoring sites in the borough across the time series 2006 – 2008.

Table 2.6b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA'	Data Capture 2008 %	Number of Exceedences of daily mean objective (50 µg/m^3) *If data capture < 90%, include the 90th %ile of daily means in brackets.*		
				2006 *	2007 *	2008
LN1	Luton (Background)	N	92	8	12	3
LA1	Luton Airport	N	95	15	10	4

When assessing the 2006, 2007 and 2008 24-hour mean PM_{10} concentrations against the AQS Objective of 50 µg/m^3, not to be exceeded more than 35 times per year, no exceedences are evident at any of the automatic monitoring sites.

2.2.3 Sulphur Dioxide

The continuous monitoring station located at Junction 11 of the M1 has also measured SO_2 concentrations since 1997. Table 2.7 displays the number of times that the 24-hour mean, 1-hour mean and the 15-minute mean was exceeded for each year from 2005. Since 2005 the AQS objectives for SO_2 have never been exceeded.

Table 2.7: Number of Occurrences of the Exceedances of the 24-Hour Mean, 1-Hour Mean and the 15-Minute Mean

Year	24-Hour Mean 125 µg/m^3 Not to be Exceeded More Than 3 Times a Year	1-Hour Mean 350 µg/m^3 Not to be Exceeded More Than 24 Times a Year	15-Minute Mean 266 µg/m^3 Not to be Exceeded More Than 35 Times a Year
2005	0	0	0
2006	0*	0*	0*
2007	0	0	0
2008	0**	0**	0**

* Data capture rate was less than 75% for the year (73%). ** Data capture rate was less than 90% for the year (88%).

2.2.4 Automatic CO Results

Monitoring of the CO maximum daily running 8-hour mean has been undertaken at the Junction 11 M1 continuous monitor site since 1997. Table 2.8 displays the number of times that the rolling 8-hour mean of 10 mg/m^3 has been exceeded for each year from 2005. During this period the AQS objective of 10 mg/m^3 has never been exceeded.

Table 2.8: Number of Occurrences of the Rolling 8-hour Mean Exceeding 10 mg/m^3

Year	No occurrences of Rolling 8hr Mean >10mg/m^3
2005	0
2006	0
2007	0
2008	0

Luton 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

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

This item has changed since the last round of Review and Assessment, and therefore all locations need to be assessed. Locations that have traffic flows around or greater than 5,000 vehicles per day where assed to establish if the also represented a narrow congested street; where the average speed is less than 25kph and where residential are within 2m of the kerb. No sites that fulfil these criteria where found in the Luton area.

Luton 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

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

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

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

3.4 Junctions

Luton 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

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

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

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

4 Other Transport Sources

4.1 Airports

London Luton Airport occupies a 235 hectare site to the south east of the Luton, Dunstable and Houghton Regis urban area. The airport lies predominantly within the unitary authority of Luton Borough Council.

Diffusion tube monitoring is currently undertaken at 14 locations within the airport boundary. Analysis of these results for 2008 (see section 2.2.1) shows that there are exceedences of the AQS objective of **40μg/m^3** measured as an annual mean at two locations. Both of these monitoring locations are not in areas of relevant exposure for annual mean therefore no Detailed Assessment of the exceedences is required.

There is relevant exposure within 1000 m of the airport boundary, along Eaton Green Road, which consists of residential housing. Although the receptors are over 400 m from the terminal buildings and over 1000 m from the runway.

Luton Borough Council have deployed 6 diffusion tubes to conduct monitoring at relevant receptors, 3 of which are worse-case locations on Eaton Green Road which boarders the airport boundary and 3 are within the residential area near Eaton Green Road.

The proximity of the airport to relevant receptors (<1000m) indicates that there is a requirement for a detailed assessment of this location. As the airport has been assessed in previous rounds of review and assessment, as well as the current monitoring showing no exceedences at relevant locations, there is no requirement to progress to a detailed assessment at this stage. The area should be considered during the progress report to be completed in 2010 during the next round of review and assessment when the results of diffusion tube monitoring at relevant receptors to the north of the airport on Eaton Green Road are available.

Luton Borough Council confirms that there are no significant changes at identified airports; therefore a detailed assessment is not required.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Luton 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

New evidence has come to light that nitrogen dioxide concentrations can be elevated alongside railway lines with a large number of diesel locomotive movements. LAQM TG (09) outlines a new requirement that applies to a number of local authorities to assess railway lines with a high usage of diesel locomotives to establish whether there is relevant public exposure nearby. These lines need to be considered where the background annual mean nitrogen dioxide concentration is above 25 μg/m^3. LAQM TG (09) does not identify Luton Borough Council as one of the local authorities at risk.

Luton 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)

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

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been carried out

Since the last assessment there has been an application for the installation of a Combined Heat and Power (CHP) plant fuelled by Liquefied Bio-Methane, at the Cargo 10 building, Airport Way, Luton. The Air Quality Impact Assessment indicates that adequate dispersion will be achieved which would result in minimum impact to ground level concentrations.

Luton 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

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

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

Luton 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

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

5.4 Poultry Farms

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Luton Borough Council confirms that there are no biomass combustion plants in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

Luton Borough Council confirms that there are no biomass combustion plants in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

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

7 Fugitive or Uncontrolled Sources

Luton 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

Luton Borough Council and London Luton Airport (LLA) undertake both continuous and diffusion tube nitrogen dioxide monitoring throughout their area. Two automatic monitors are currently in operational in the Borough; the first is situated 179m from the central reservation of the M1 Motorway, just to the north of junction 11. The second is situated at London Luton Airport currently operates a PM_{10} automatic monitor, which is situated by the airport terminal. There were no measured exceedences of the NO_2 or PM_{10} AQS objectives at either of the sites in 2008.

The Luton Background automatic monitoring station also measures CO and SO_2; there were no measured exceedences for 2008.

Luton Borough Council and LLA carry out diffusion tube NO_2 monitoring at 27 locations throughout the borough. The 2008 bias adjusted results indicate that concentrations of NO_2 exceeded the annual mean objective at 4 locations. These locations were;

1. M1 Belper, Belper Road, East of junction 11 of M1.
2. M9 Wyndham, Wyndham Road, West of junction 11 M1.
3. LA01 Terminal Patio
4. LA05 Runway Apron

The first two locations are already within an AQMA and the second two locations do not have relevant receptor for the annual mean objective. As a result it has been determined that a Detailed Assessment for NO_2 will not be required for these locations. No exceedences were identified outside the AQMA for 2008.

The Copperfield diffusion tube, which is within the current AQMA, measured annual mean NO_2 concentrations below the annual mean objective of 40μg m^{-3}indicating that an AQMA is not required for this location. As a full years monitoring results where not available it is recommended that further monitoring should be undertaken to provide better evidence of NO2 concentrations at this location, rather than immediately proceeding to a Detailed Assessment to spatially reassess the AQMA at this location.

8.2 Conclusions from Assessment of Sources

8.2.1 Road Traffic Sources

There is no requirement to proceed to a Detailed Assessment for the following sources:

- Narrow Congested Streets with Residential Properties Close to the Kerb
- Busy Streets Where People May Spend 1-hour or More Close to Traffic;
- Roads with a High Flow of Buses and/or HGVs;
- Junctions;
- New Roads Constructed or Proposed Since the Last Round of Review and Assessment;
- Roads with Significantly Changed Traffic Flows and;
- Bus and Coach Stations.

8.2.2 Other Transport Sources

There is no requirement to proceed to a Detailed Assessment for the following sources:

- Airports;
- Railways (Diesel and Steam Trains); and
- Ports (Shipping).

8.2.3 Industrial Sources

There is no requirement to proceed to a Detailed Assessment for the following sources:

- Industrial Installations;
- New or Significantly Changed Installations with No Previous Air Quality Assessment;
- Major Fuel (Petrol) Storage Depots;
- Petrol Stations; and
- Poultry Farms.

8.2.4 Commercial and Domestic Sources

There is no requirement to proceed to a Detailed Assessment for the following sources:

- Biomass Combustion – Individual Installations
- Biomass Combustion – Combined Impacts; and
- Domestic Solid-Fuel Burning.

8.2.5 Fugitive or Uncontrolled Sources

There is no new or newly identified sources or potential sources of fugitive particulate matter therefore there is no requirement to proceed to a Detailed Assessment.

8.3 Proposed Actions

This Updating and Screening Assessment has identified there is no need to proceed to any Detailed Assessments. The exceedances of the NO_2 AQS objectives measured in 2008 are within the current AQMA or not at locations of relevant exposure.

As a result of the proximity of London Luton Airport to relevant receptors along its northern boundary there is the possibility of exceedence in this location. In 2009 Luton Borough Council has deployed diffusion tube monitoring at 6 sites in this location. It is recommended that monitoring continues in these locations, with the results considered in next stage of Review & Assessment.

Diffusion tube data from the Copperfield site, which is with in the current AQMA, indicates that there may no longer be an exceedence of the annual NO_2 objective. As the monitoring at this location does not extend to a full year and no trend data is available it is recommended that more measurements are collected before a Detailed Assessment is carried out. This area should be considered in the next round of Review & Assessment.

Luton Borough Council will now proceed to a Progress Report, which will need to be completed by the end of April 2010.

9 References

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The Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043),

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UK National Air Quality Information Archive, accessed at www.airquality.co.uk,

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Appendices

Appendix A: QA/QC Data

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors

For the 7 sites in and around the AQMA Luton Borough Council uses the 'Grey Cap' diffusion tubes supplied and analysed by Gradko: a preparation mixture of 20% triethanolamine (TEA) in deionised water is used. Gradko comply with WASP scheme and achieved 'good' performance based on old and new criteria for the January 2008 – January 2009 period.

The 12 NO_2 diffusion tube sites within the London Luton Airport are prepared and analysed by Bureau Veritas (Gradko International Ltd). The laboratory takes part in the NO_2 Network QA/QC Field Intercomparison using the preparation method of 50% Triethanolamine (TEA) in Acetone.

Factor from Local Co-location Studies (if available)

A bias adjustment factor of 0.82 was calculated for the 7 Gradko diffusion tubes located in and around the AQMA. The factor was based on the co-location triplicate site at the Luton Background automatic monitor.

As co-located sites were not available for the 12 diffusion tubes located within London Luton Airport the bias adjustment factor was derived from the national database of co-located studies. This database compares bias adjustment factors from a number of surveys, categorising results on the basis of the laboratory preparing and analysing the diffusion tubes and the preparation method. Six nationwide co-location studies were carried out in 2007 using 50% TEA in Acetone diffusion tubes from Bureau Veritas (Gradko International Ltd). The overall bias factor calculated from these studies was 0.94 for 2008.

Figure A1: Diffusion Tube Bias Adjustment Calculations (Bureau Veritas (Gradko International Ltd))

Spreadsheet Version Number: 09/09

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

This spreadsheet will be updated in late February 2010 on the R&A website

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

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

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

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Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data[2].

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

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

Analysed By[1] (To undo your selection, choose (All) from the pop-up list)	Method (To undo your selection, choose (All))	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m3)	Automatic Monitor Mean Conc. (Cm) (µg/m3)	Bias (B)	Tube Precision[3]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in Acetone	2008	R	Boston BC	12	45	36	27.3%	G	**0.79**
Gradko	50% TEA in Acetone	2008	R	LB Hammersmith and Fulham	10	90	68	32.4%	S	**0.76**
Gradko	50% TEA in Acetone	2008	UB	Reading BC	12	26	23	13.4%	G	**0.88**
Gradko	50% TEA in Acetone	2008	UC	Uttlesford DC	11	26	28	-7.0%	G	**1.08**
Gradko	50% TEA in Acetone	2008	R	Stevenage BC	12	37	29	26.5%	G	**0.79**
Gradko	50% TEA in Acetone	2008	R	LB Hounslow	12	58	59	-0.2%	G	**1.00**
Gradko	50% TEA in Acetone	2008	R	LB Hounslow	12	69	72	-4.6%	G	**1.05**
Gradko	50% TEA in Acetone	2008	UB	LB Hounslow	10	38	30	24.9%	G	**0.80**
Gradko	50% TEA in Acetone	2008	R	LB Redbridge	12	46	46	-0.2%	G	**1.00**
Gradko	50% TEA in Acetone	2008	R	LB Redbridge	11	50	55	-10.1%	G	**1.11**
Gradko	50% TEA in Acetone	2008	UB	LB Redbridge	12	37	32	13.9%	G	**0.88**
Gradko	50% TEA in Acetone	2008	K	LB Redbridge	10	52	53	-2.4%	G	**1.03**
Gradko	50% TEA in Acetone	2008	K	AEA Tech Intercomparison	12	103	116	-10.7%	G	**1.12**
Gradko	50% TEA in Acetone	2008	R	Horsham DC	11	34	30	12.7%	G	**0.89**
Gradko	50% TEA in Acetone	2008	R	LB Lewisham	10	69	63	8.1%	G	**0.93**
Gradko	50% TEA in Acetone	2008	UC	Sheffield CC	12	33	30	10.8%	G	**0.90**
Gradko	50% TEA in Acetone	2008	R	LB Richmond	11	27	45	-38.7%	P	**1.63**
Gradko	50% TEA in Acetone	2008	B	LB Richmond	11	45	29	52.6%	G	**0.66**
Gradko	50% TEA in Acetone	2008		**Overall Factor[3] (18 studies)**				**Use**		**0.94**

[1] For Casella Stanger/Bureau Veritas (NOT Bureau Veritas Labs) use Gradko 50% TEA in Acetone.
For Casella Seal/GMSS/Casella CRE/Bureau Veritas Labs/Eurofins use Bureau Veritas Labs
For Staffordshire CC SS use Staffordshire County Analyst.

Short-term to Long-term Data adjustment

As diffusion tube monitoring was not undertaken for the fully year an adjustment factor was required to estimate the annual mean concentrations. This was calculated using the methodology laid out in Box 3.2 in the Technical Guidance LAQM.TG(09). The factor was calculated using three nearby (within 50 miles radius), long-term, continuous monitoring sites. The period mean was calculated from April 21st

2008 to 3rd December 2008. All three sites used had data capture greater than 80% for the 12 month period 1 Jan to 31st Dec.

Site Name	X	Y	Annual Average Mean	2008 DC	Period Mean 2008	Period DC	Ratio
South Beds Dumstable	501906	221822	30.4	80	28.2	94	1.078
St Albans Fleetville	516548	207358	22.6	97	19.2	97	1.177
Hertsmere Borehamwood 2	520248	197246	24.6	84	22.5	75	1.093
						Average	**1.116**

QA/QC of automatic monitoring

In order to satisfy the requirement outlined in the Technical Guidance (09), the following QA/QC procedures were implemented:

- 3-weekly calibrations of the NO_x analyser;
- 6-monthly audits and servicing of the monitoring site; and
- Data ratification.

Calibrations of the NO_x analyser were carried out using certified compressed gas standards (ISO17025). This ensured that the calibration gas was traceable to national and international standards. In addition to the calibration sample filters were changed for both NO_x and TEOM analysers and any faults were identified thus minimising data loss.

Audits of the monitoring site consisted of a number of performance checks to identify any faults with the equipment. The calibration cylinder was also checked against another gas standard in order to confirm the gas concentration. Any identified faults were forwarded on to the service unit for repair.

The final stage of the QA/QC process was to ratify the data. During ratification, all calibration, audit and service data are collated and the data is appropriately scaled. Any suspect data identified are deleted therefore ensuring that the data are of a high quality.

QA/QC of diffusion tube monitoring

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance-testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO_2 Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). The laboratory participants analyse four spiked tubes, and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte.

The outcomes of these QA/QC schemes are evaluated on a regular basis against a set of pre-defined performance criteria. The Performance criteria are based upon the Rolling Performance Index (RPI) statistic.

Gradko Laboratories takes part in the independent Workplace Analysis Scheme for Proficiency and demonstrated good performance in the WASP scheme for analysis of NO_2 diffusion tubes, January 2008 – January 2009.

Bureau Veritas (Gradko International Ltd) also take part in the independent Workplace Analysis Scheme for Proficiency and demonstrated good performance in the WASP scheme for analysis of NO_2 diffusion tubes, January 2008 – January 2009.