2012 Air Quality Updating and Screening Assessment for *Luton Borough Council*

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

July, 2012

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Executive Summary

The results presented in this report, show that Luton Borough Council do not need to progress to a detailed assessment for air quality at this time.

Data obtained from both automatic monitoring sites was below the Air Quality Objectives.

Data obtained from nitrogen dioxide diffusion tubes deployed within the Air Quality Management Area shows there to have been no exceedances of the objective.

Given the works on the M1 J10/J13 Hard Shoulder Running Scheme are ongoing and not expected to be completed until some time in 2013, it would not be prudent to review the boundaries of the AQMA at this time, and probably not until at least a year after completion of those works.

A number of locations outside of the Air Quality Management Area measured levels in excess of the objective:

LN06 - Liverpool Road / Dunstable Road
LN07 - Guildford Street / Bute Street
LN28 - Caddington Road
LA01 - Terminal Patio at LLA
LA02 - Airport Approach Road
LA05 - Runway Apron at LLA
LA06 - President Way at LLA
LA14 - Stand 60 at LLA
LA15 - Eaton Green Road

Of these locations, only Liverpool Road / Dunstable Road (LN06) was found to have receptors that could be exposed to elevated levels of nitrogen dioxide. The Council will now monitor nitrogen dioxide levels at the façade of the nearest receptor to this road to determine if it is necessary to proceed to a detailed assessment.

The Updating and Screening Assessment has not identified any locations where there are new or increased sources that would indicate a need to proceed to a Detailed Assessment.

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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 205,000 in an area of 4336 hectares (10,657 acres). The Borough is dominated by the population centre of Luton and also contains London Luton Airport to the south east.

The main sources of air pollution are traffic using the M1 Motorway, that runs North – South at 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 A1 IPPC process (regulated by the Environment Agency) in the area, being the General Motors site situated near to London Luton Airport. There are no A2 processes and 49 Part B processes (regulated by Luton BC) in the area.

The borough has declared 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.

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 micrograms 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 LAQM 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);
- Progress Report (2008);
- Updating and Screening Assessment (2009);
- Progress Report (2010).
- Progress Report (2011)

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 carbon monoxide (CO), nitrogen dioxide ($NO_{2)}$, 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 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 µg.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 exceedances 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, PM10 and SO_2. However, it was concluded that there was likely to be exceedance 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 exceedance 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 exceedance comprised 431 dwellings. An Air Quality Management Area (AQMA) was subsequently declared in March 2005, which contained these 431 dwellings (see Figure 1.1: Map of AQMA Boundaries).

Progress Report (2005)
The 2005 Progress Report indicated a downward trend in NO_2 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 exceedance 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 within the AQMA in 2008 but there was no data available to assess if there were likely to be an exceedance in NO_2 objectives in the borough. Two exceedances were identified at London Luton Airport, although no monitoring at locations of relevant exposure is currently undertaken.

Updating & Screening Assessment (2009)
Monitoring of NO_2 began in areas of relevant exposure outside the northern boundary of London Luton Airport. There was not a calendar year of data at this time but

results to date suggested exceedances of the Annual Objective were unlikely. There is no requirement to proceed to a Detailed Assessment.

Progress Report (2010)

The 2010 Progress Report identified there was no need to proceed to any Detailed Assessments. Results from the automatic monitoring station LN01 showed no exceedances of the AQS Objectives in both the short and long term for any of the prescribed pollutants measured.

Progress Report (2011)

The 2011 Progress Report identified there was no need to proceed to any Detailed Assessments. Results from the automatic monitoring stations at LN01 and LLA showed no exceedances of the AQS Objectives in both the short and long term for any of the prescribed pollutants measured. Passive monitoring results did not show any exceedances of the annual average objective near relevant receptors for NO_2 in 2010.

Figure 1.1 Maps of AQMA Boundaries

(Taken from Air Quality Management Area (No.2) Order 2005)


WESTERDALE
GREEN CL
HOME CLOSE
128m
130m
HOCKWELL RING
SALTFIELD
BANK CLOSE
M1
Path
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Scale = 1:1750 @ A4


Leagrave
Prim Sch
Playing Field
Pol
Sta
COPPERFIELDS
LEAGRAVE HIGH ST
SEABROOK
LIME AVENUE
Path
Playing Fi
Hospital
ABINGDON ROAD
CALNWOOD ROAD
M1
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Scale = 1:2250 @ A4


Junction 11
A505
ROAD
DUNSTABLE ROAD
Hotel
DERBY ROAD
BELPER ROAD
HALFWAY AVENUE
OVERSTONE ROAD
LONGFIELD D
RALEIGH GR
ELDON ROAD
TAVELEY ROAD
BAKEWELL CL
RIPLEY ROAD
BRADLEY ROAD
BRADLEY ROAD
M1
M1
M1
FB
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Scale = 1:2750 @ A4

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

Luton Borough Council undertakes automatic monitoring of the following pollutants:

- Nitrogen dioxide (NO_2);
- Particulate matter (PM_{10})
- Ozone (O_3)

Luton Borough Council also maintains a regime of 17 NO_2 diffusion tubes throughout the Borough.

London Luton Airport monitors PM_{10} at an automatic monitor (BAM), and also maintains a regime of 13 NO_2 diffusion tubes on and around the airfield.

2.1.1 Automatic Monitoring Sites

Currently, there are two automatic air quality monitoring sites in the area of Luton Borough:

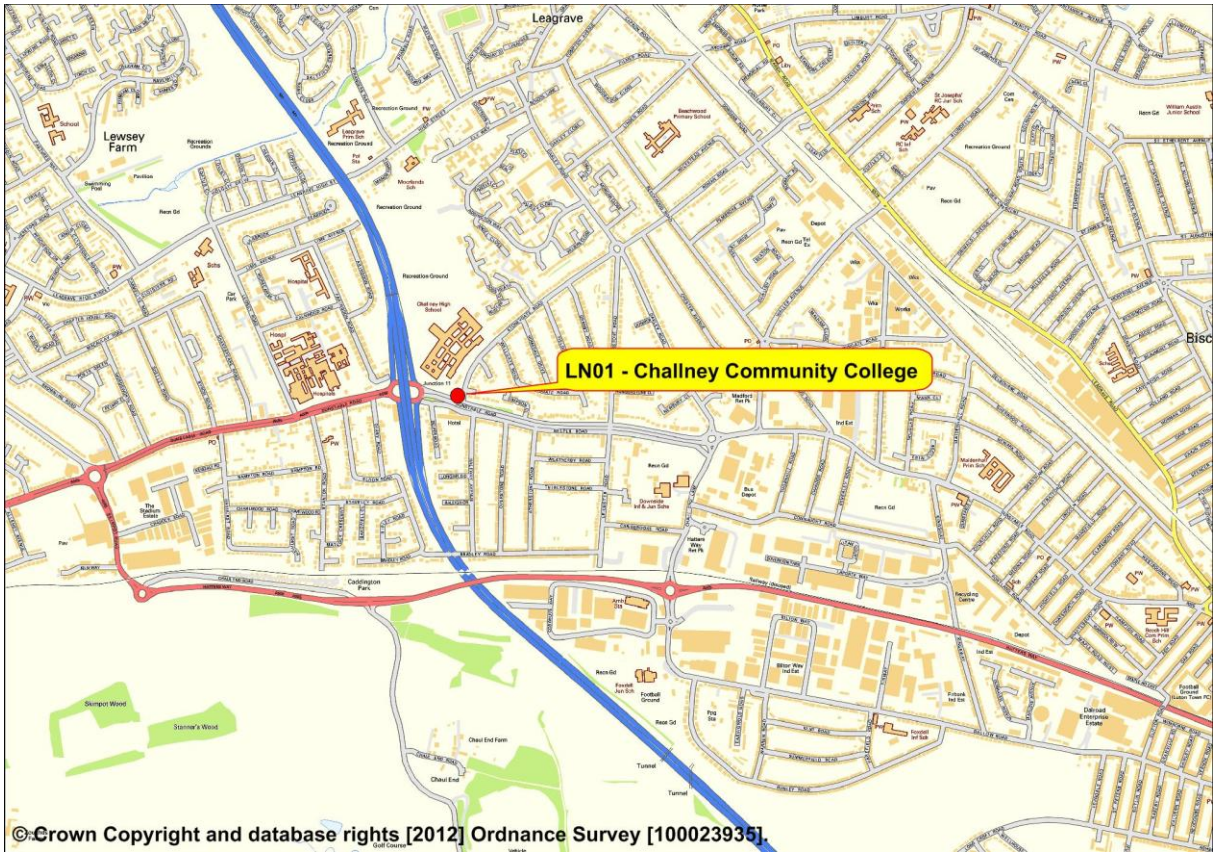
One site near the M1 Motorway J11 (LN01), is operated by Luton Borough Council, and monitors nitrogen dioxide (NO_2), ozone (O_3) and particulate matter (PM_{10}) using a Tapered Element Oscillating Microbalance (TEOM).

The results from this TEOM were corrected using the Kings College Volatile Correction Model. The automatic monitoring of nitrogen dioxide was carried out using an Ambirak monitor until June 2011. This analyser was replaced with a Monitor Labs Analyser in June 2011. Nitrogen dioxide analysers at this site were calibrated every 2 weeks, and the TEOM every 4 to 6 weeks, as determined by the filter loading. Calibrations were undertaken by the Environmental Research Group (ERG).

The other air quality monitoring site is at Luton Airport (LA08), and is operated by London Luton Airport. It measures PM_{10} using a Beta Attenuation Monitor (BAM). The results from the BAM were corrected to obtain the gravimetric equivalent. The BAM is serviced and calibrated every 6 months by Enviro Technology.

Results from both sites were ratified and adjusted by ERG (until end September 2011) and Air Quality Data Management (AQDM) (from October 0211). They have been placed on the website: www.hertsbedsair.net

Figure 2.1 Maps of Automatic Monitoring Sites



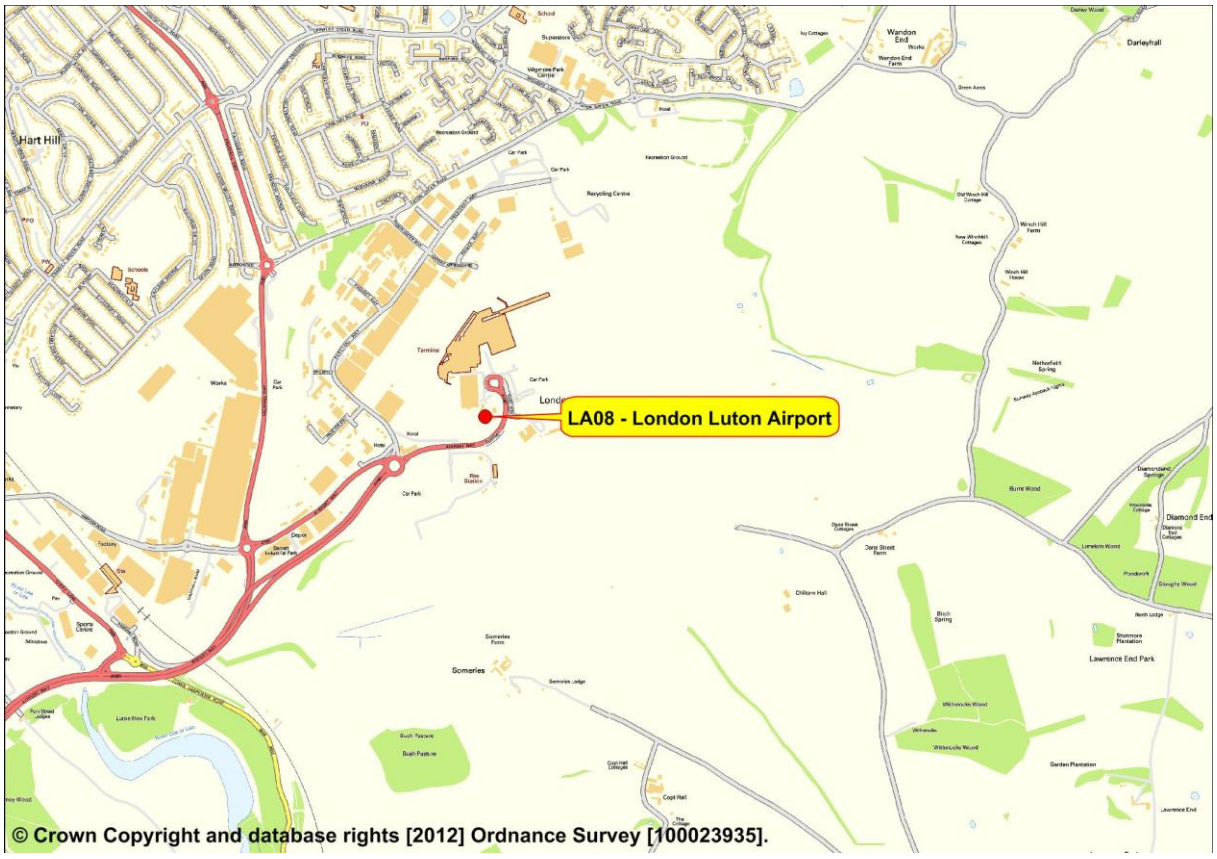


Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS GridRef	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?
LN01 Challney Community College	Urban background.	505570	222754	NO_2, PM_{10}, O_3	N	TEOM	Y(38m)	15m	N
LA08 London Luton Airport	Urban Background	511871	221142	PM_{10}	N	BAM	N	N/A	N

2.1.2 Non-Automatic Monitoring Sites

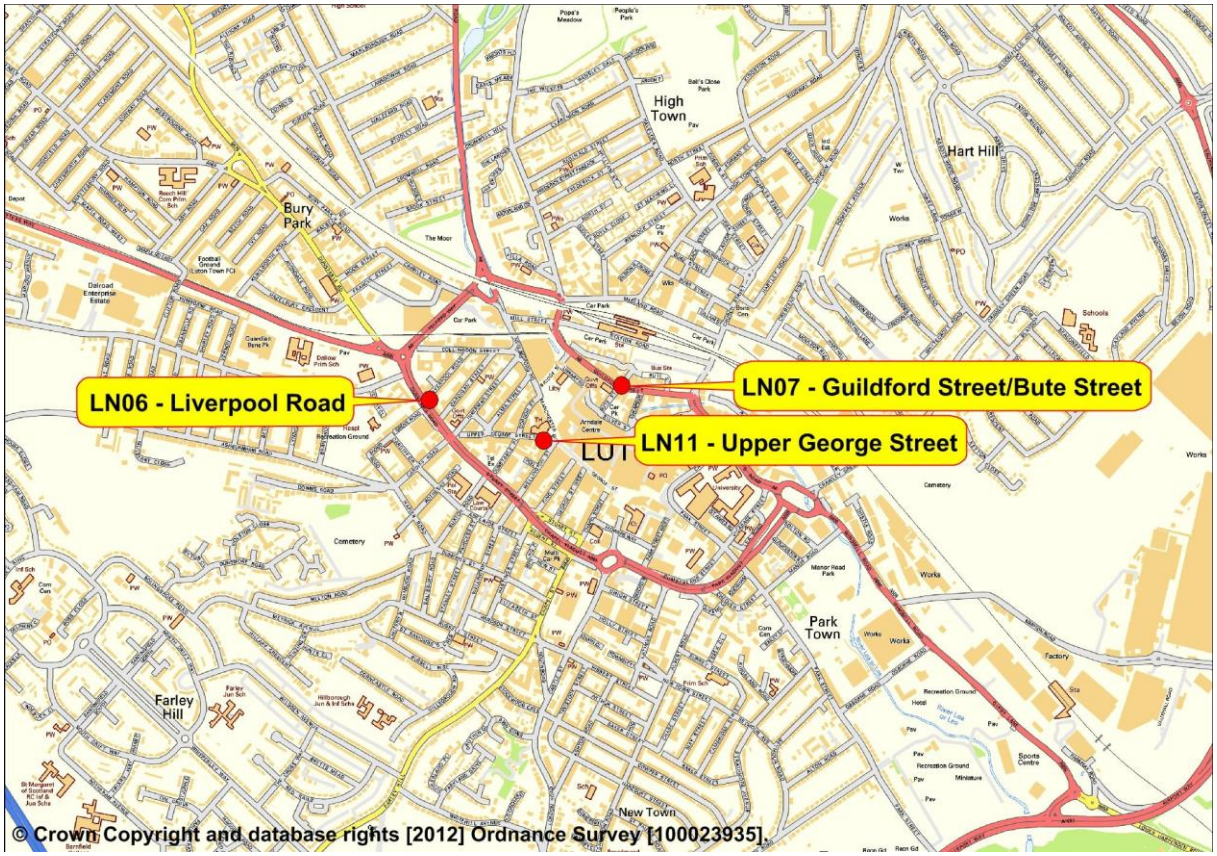
In 2011, the Borough Council operated 15 NO_2 diffusion tube sites. One site, at the automatic monitoring site (LN01) has triplicate tubes in order to enable a local bias adjustment factor to be calculated. London Luton Airport operates a further 13 NO_2 diffusion tube sites.

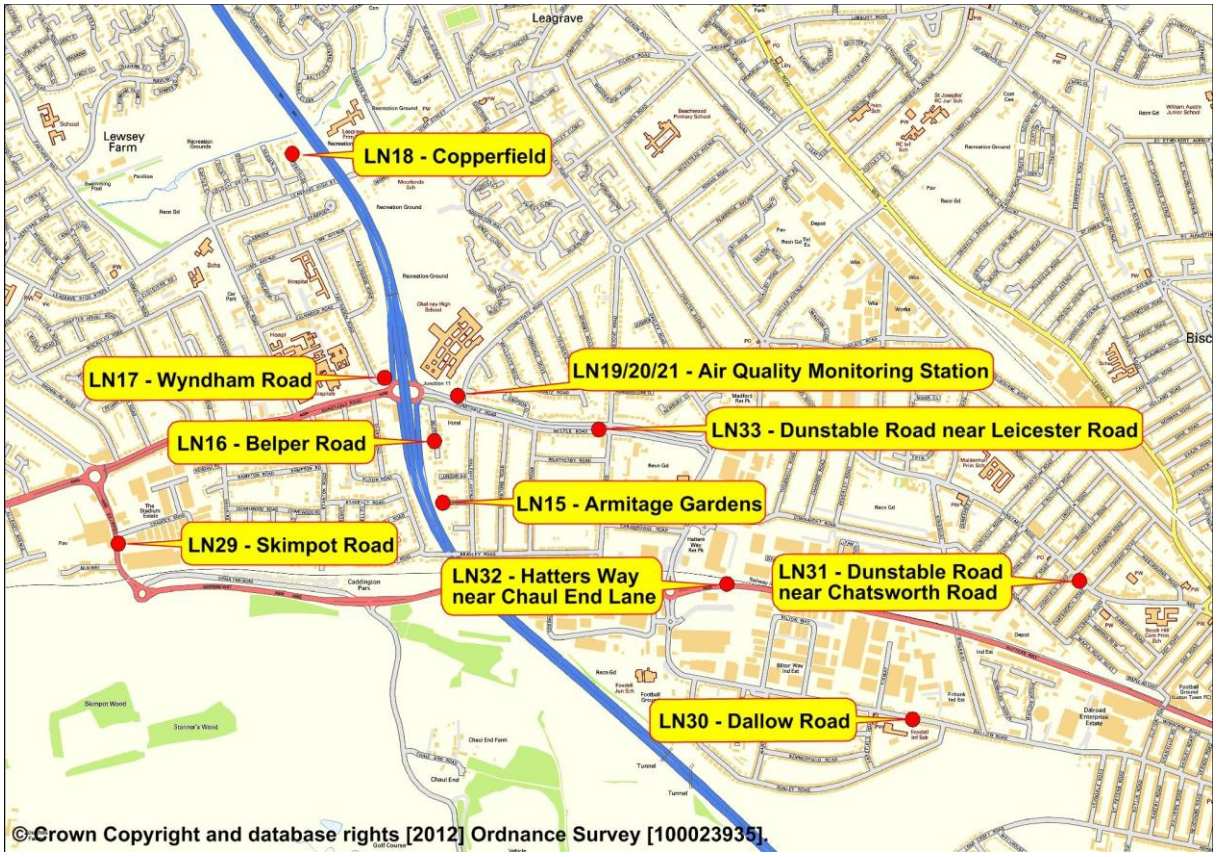
Luton Borough Council uses the 'Grey Cap' diffusion tubes supplied and analysed by Gradko International Ltd, using a preparation mixture of 20% triethanolamine (TEA) in deionised water. The performance of Gradko is monitored under the WASP NO_2 Proficiency Testing Scheme. In 2011 Gradko achieved 100% in 3 of the 4 monitoring rounds. In the 4th they advise that the sample vials were suspect and appeared to have been contaminated at the time of analysis. They advise that this is why they only achieved 37.5% under this test which affected their average performance for 2011.

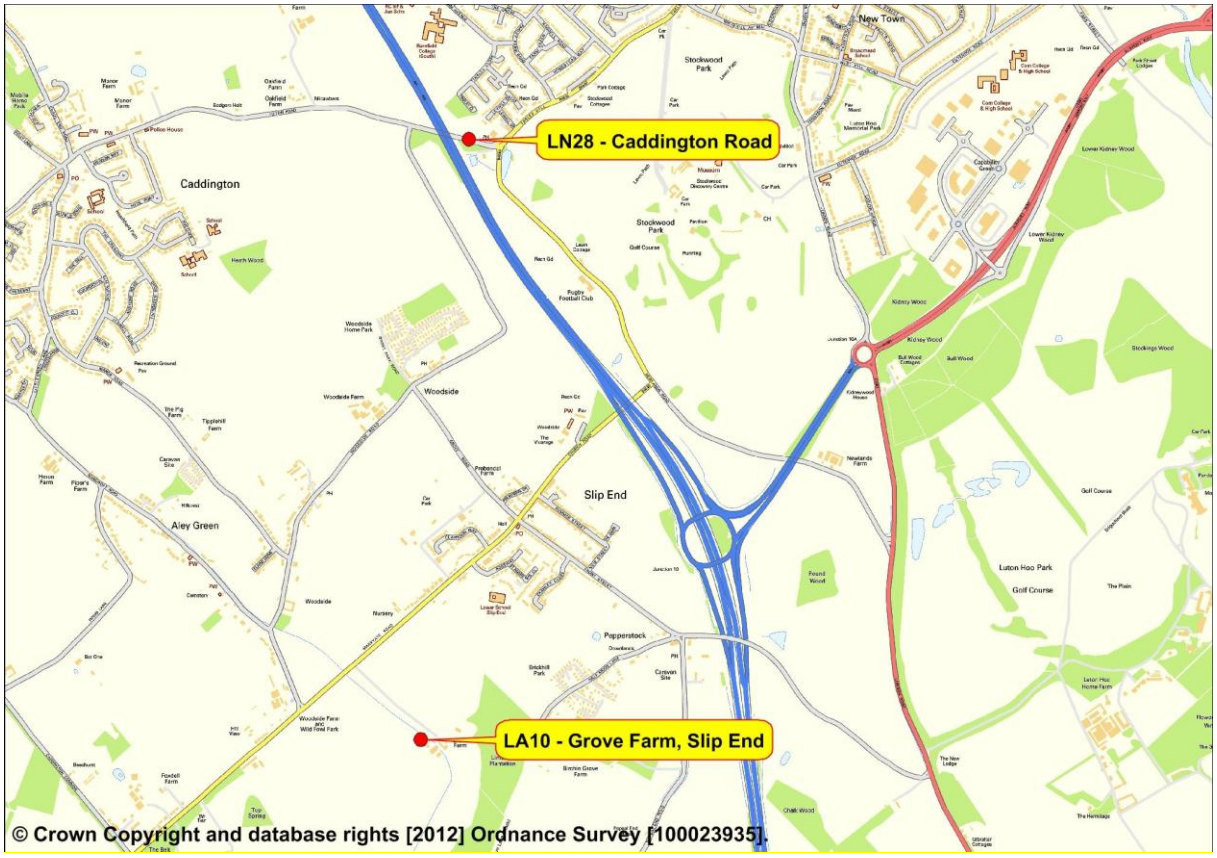
London Luton Airport uses diffusion tubes prepared and analysed by ESG Limited using a preparation of 50% triethanolamine (TEA) in acetone. The laboratory takes part in the WASP Scheme, under which it achieved 100% for 2011.

The bias correction factor applied to diffusion tubes deployed by Luton Council was 0.89. The bias correction applied to diffusion tubes deployed by London Luton Airport was 0.84. Both factors were derived from the National Diffusion Tube Bias Adjustment Factor Spreadsheet (Spreadsheet Version Number: 03/12).

Figure 2.2 Maps of Non-Automatic Monitoring Sites






LN28 - Caddington Road
LA10 - Grove Farm, Slip End
Caddington
Slip End
Aley Green
Woodside
Stockwood Park
New Town
Luton Hoo Park
Golf Course
Pepperstock
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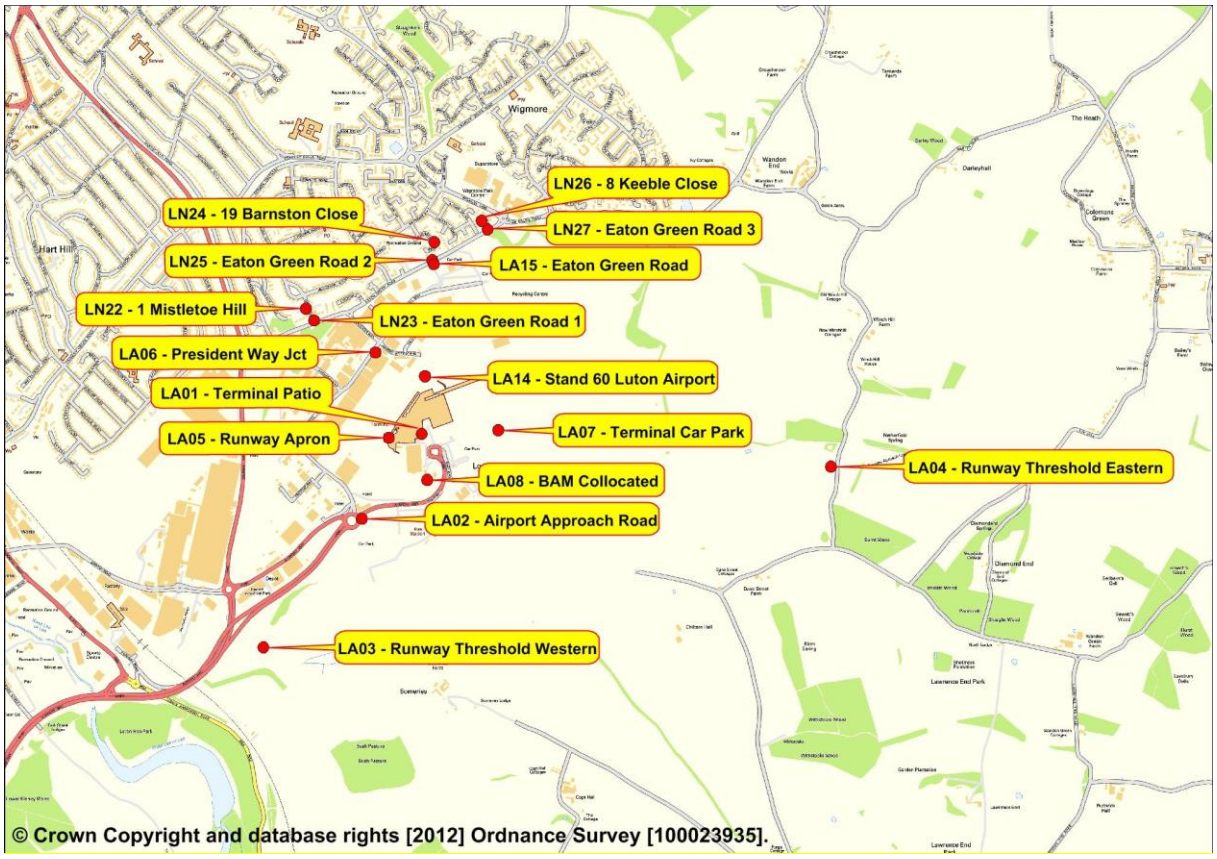
LN26 - 8 Keeble Close
LN24 - 19 Barnston Close
LN27 - Eaton Green Road 3
LN25 - Eaton Green Road 2
LA15 - Eaton Green Road
LN22 - 1 Mistletoe Hill
LN23 - Eaton Green Road 1
LA06 - President Way Jct
LA14 - Stand 60 Luton Airport
LA01 - Terminal Patio
LA07 - Terminal Car Park
LA05 - Runway Apron
LA04 - Runway Threshold Eastern
LA08 - BAM Collocated
LA02 - Airport Approach Road
LA03 - Runway Threshold Western
Wigmore
Hart Hill
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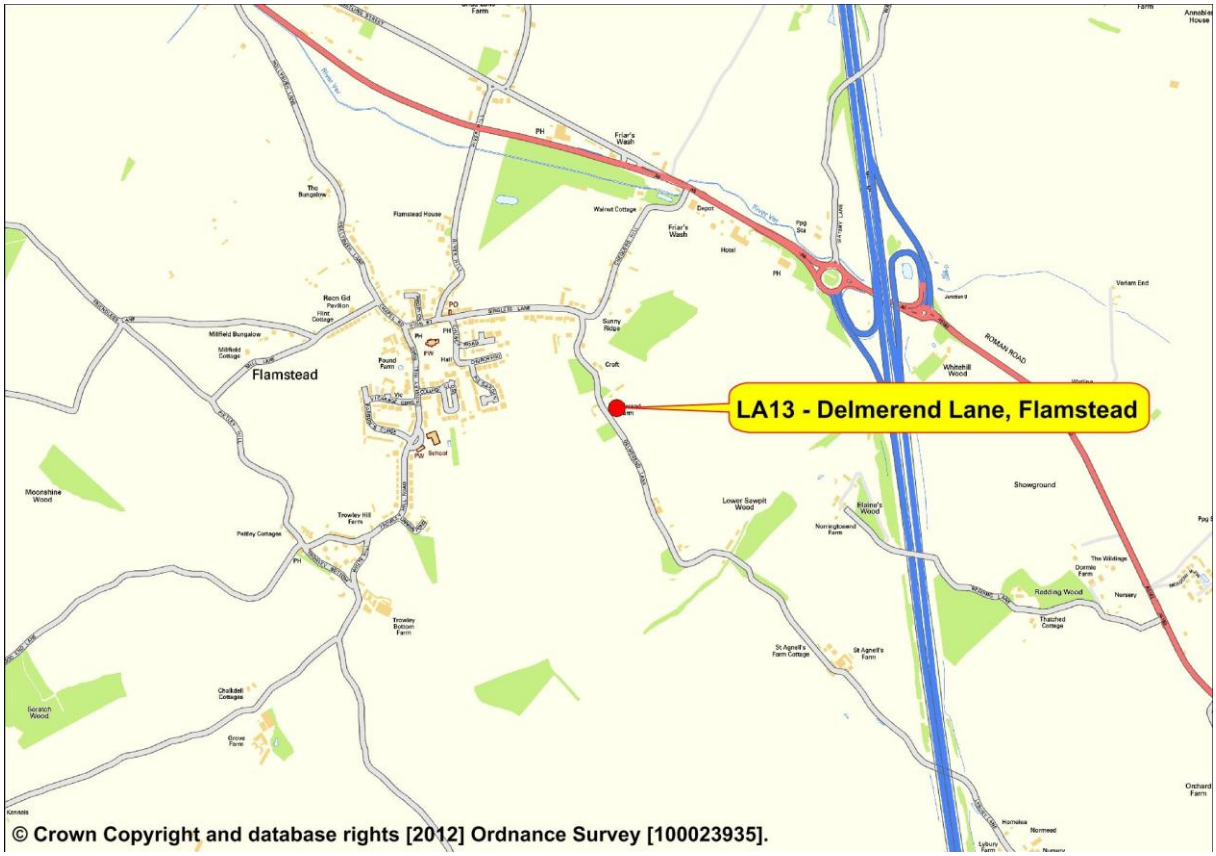
LA13 - Delmerend Lane, Flamstead
Flamstead
© Crown Copyright and database rights [2012] Ordnance Survey [100023935].


LA09 - Stagenhoe Bottom Farm
Kingswalden Park
Frogmore
Bendish
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Table 2.2 Details of Non-Automatic Monitoring Sites

Luton Borough Council

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated 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?
Liverpool Road	Kerbside	508662	221407	NO_2	N	N	N	1m	
Guildford St / Bute St	Kerbside	509226	221441	NO_2	N	N	N	<1m	
Upper George St	Roadside	508909	221321	NO_2	N	N	N	3m	
Armitage Gardens	Roadside	505520	222407	NO_2	Y	N	Y (5m)	2m	Yes
Belper Road	Roadside	505492	222607	NO_2	Y	N	Y (5m)	3m	Yes
Wyndham Road	Roadside	505324	222812	NO_2	Y	N	Y (5m)	1m	Yes
Copperfield	Roadside	505014	223538	NO_2	Y	N	Y (3m)	2m	Yes
Air Quality Monitoring Station 1	Urban background	505570	222754	NO_2	N	Y	Y (38m)	13m	
Air Quality Monitoring Station 2	Urban background	505570	222754	NO_2	N	Y	Y (38m)	13m	

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated 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?
Air Quality Monitoring Station 3	Urban background	505570	222754	NO_2	N	Y	Y (38m)	13m	
Mistletoe Hill	Urban background	511341	221864	NO_2	N	N	Yes (0m)	9m	
Eaton Green Road-1	Roadside	511377	221814	NO_2	N	N	Yes (18m)	2m	
Barnston Close	Urban background	511902	222144	NO_2	N	N	Yes (0m)	5m	
Eaton Green Road-2	Roadside	511893	222068	NO_2	N	N	Yes (17m)	2m	
Keeble Close	Urban background	512109	222234	NO_2	N	N	Yes (0m)	12m	
Eaton Green Road-3	Roadside	512134	222198	NO_2	N	N	Yes (6m)	2m	
Caddington Road	Kerbside	507798	219832	NO_2	N	N	No	1m	Yes

London Luton Airport

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated 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?
Terminal Patio	Other	11847	221336	NO_2	N	N	N	n/a	n/a
Airport Approach Road	Roadside	511586	220978	NO_2	N	N	N	3m	n/a
Runway Threshold Western	Other	511156	220437	NO_2	N	N	N	n/a	n/a
Runway Threshold Eastern	Other	513634	221198	NO_2	N	N	N	n/a	n/a
Runway Apron	Other	511703	221320	NO_2	N	N	N	n/a	n/a
President Way Jct	Roadside	511645	221679	NO_2	N	N	N	3m	n/a
Terminal Car Park	Other	512181	221352	NO_2	N	N	N	n/a	n/a
BAM Collocated	Other	511871	221142	NO_2	N	Y	N	n/a	n/a
Stagenhoe Bottom Farm	Rural	517637	222554	NO_2	N	N	N	n/a	n/a
Grove Farm Slip End	Rural	507623	217724	NO_2	N	N	N	n/a	n/a

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated 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?
Delmerend Lane Flamstead	Rural	508426	214366	NO_2	N	N	N	n/a	n/a
Stand 60 Luton Airport	Other	511861	221579	NO_2	N	N	N	n/a	n/a
Eaton Green Road	Roadside	511899	222051	NO_2	N	N	N	8m	n/a

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

The charts below show the results obtained from the automatic analyser at Challney Community College (LN01). An Ambirak analyser was used until June 2011, when it was replaced with a Monitor Labs analyser

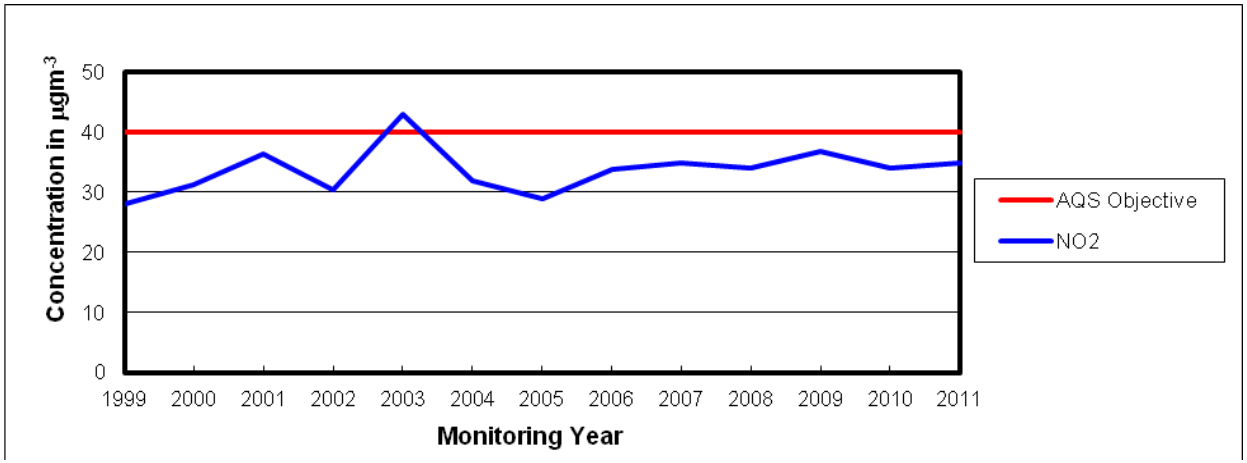
Data capture for 2011 was lower than expected due to the failure of air conditioning equipment at the site which prevented the analyser working in July 2011. This equipment was serviced and repaired accordingly.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2011 % [b]	Annual Mean Concentration μg/m^3				
					2007*[c]	2008* [c]	2009* [c]	2010* [c]	2011 [c]
LN01	Challney Community College	N	84.8	84.8	35	35	36	34	35

[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] Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.
*Annual mean concentrations for previous years are optional.

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Automatic Monitoring Sites



This graph shows that the whilst the annual mean nitrogen dioxide at Challney Community College automatic monitoring site (LN01) has fluctuated over the years, it has been (with exception of 2003) below the Air Quality Objective. There have only been small fluctuations in the annual mean nitrogen dioxide level at this site since 2006. Levels have been approximately 35µg/m^3 during this period, 5µg/m^3 below the Air Quality Objective.

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 for period of monitoring %[a]	Valid Data Capture 2011 % [b]	Number of Exceedences of Hourly Mean (200 μg/m^3)				
					2007*[c]	2008* [c]	2009* [c]	2010* [c]	2011 [c]
LN01	Challney Community College	N	84.8	84.8	14	5	0	0	0 (14)

[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 the period of valid data is less than 90%, include the 99.8th percentile of hourly means in brackets
*Number of exceedences for previous years are optional.

Diffusion Tube Monitoring Data

The following charts show the annual mean nitrogen dioxide levels for diffusion tubes located within Luton Borough Council.

In 2011, 3 tubes recorded annual mean nitrogen dioxide levels in excess of 40µg/m^3. These tubes are :

LN06 Liverpool Road / Dunstable Road

LN07 Guildford Street / Bute Street

LN28 Caddington Road

There is currently no relevant exposure near Caddington Road, however the other 2 locations do have residential properties nearby. The distance from road calculator has been used for LN06 and LN07 to determine if levels of nitrogen dioxide are likely to be in excess of the Annual Mean Objective at the facades of the nearest residential properties.

The results of these calculations are as follows:

LN06 Liverpool Road / Dunstable Road – **49.4** at the façade of the nearest residential properties

LN07 Guildford Street / Bute Street – 39.2 at the façade of the nearest residential properties

(for calculations, see Appendix B)

Luton Borough Council propose to erect a further nitrogen dioxide diffusion tube on the façade of the nearest property to Dunstable Road in order to measure the level of nitrogen dioxide to which the residents of this property are exposed.
It is anticipated that the number of cars using this road will decrease in future years due to the opening of the Luton Dunstable Busway in 2013, and also as a result of

the inner ring road which is due to be constructed to the north of the town centre. It is anticipated that this project will be completed by 2015.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Luton Borough Council

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months)	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 = 0.89) 2011 (μg/m^3)
LN06	Liverpool Road/Dunstable Road	Roadside	N	N	12	N/A	N	**54.89**
LN07	Guildford Street/Bute Street	Kerbside	N	N	12	N/A	N	**44.90**
LN11	Upper George Street	Roadside	N	N	12	N/A	N	38.81
LN15	Armitage Gardens	Suburban	Y	N	11	N/A	N	28.29
LN16	Belper Road	Suburban	Y	N	12	N/A	N	34.82
LN17	Wyndham Road	Roadside	Y	N	12	N/A	N	39.12
LN18	Copperfields	Suburban	N	N	12	N/A	N	26.67
LN19	Stoneygate Road AQMS 1	Urban background	N	Triplicate/ Collocated	12	N/A	N	33.40
LN20	Stoneygate Road AQMS 2	Urban background	N	Triplicate/ Collocated	12	N/A	N	34.40
LN21	Stoneygate Road AQMS 3	Urban background	N	Triplicate/ Collocated	11	N/A	N	33.58
LN22	Mistletoe Hill	Suburban	N	N	12	N/A	N	23.05

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months)	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 = 0.89) 2011 (μg/m^3)
LN23	Eaton Green Road 1	Roadside	N	N	11	N/A	N	35.85
LN24	Barnston Close	Suburban	N	N	12	N/A	N	24.47
LN25	Eaton Green Road 2	Roadside	N	N	11	N/A	N	31.57
LN26	Keeble Close	Suburban	N	N	12	N/A	N	21.32
LN27	Eaton Green Road 3	Roadside	N	N	12	N/A	N	28.61
LN28	Caddington Road	Roadside	N	N	12	N/A	N	**44.90**

London Luton Airport

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months)	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 = 0.84) 2011 (μg/m^3)
LA01	Terminal Patio	Background	N	N	12	N/A	N	**44.6**
LA02	Airport Approach Road	Kerbside	N	N	12	N/A	N	**41.8**
LA03	Runway Threshold Western	Background	N	N	12	N/A	N	31.3

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months)	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 = 0.84) 2011 (μg/m^3)
LA04	Runway Threshold Eastern	Background	N	N	12	N/A	N	23.3
LA05	Runway Apron	Background	N	N	12	N/A	N	**49.8**
LA06	President Way Jct	Kerbside	N	N	12	N/A	N	**40.5**
LA07	Terminal Car Park	Intermediate	N	N	12	N/A	N	33.6
LA08	BAM CoLocator	Background	N	N	12	N/A	N	35.9
LA09	Stagenhoe Bottom Farm	Background	N	N	12	N/A	N	14.6
LA10	Grove Farm Slip End	Background	N	N	12	N/A	N	16.0
LA13	Delmerend Lne,Flamstead	Rural	N	N	12	N/A	N	17.7
LA14	Stand 60 Luton Airport	Kerbside	N	N	12	N/A	N	**42.3**
LA15	Eaton Green Road	Kerbside	N	N	12	N/A	N	**40.0**

[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] Means should be “annualised” as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.
*Annual mean concentrations for previous years are optional.

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Luton Borough Council

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2007* (Bias Adjustment Factor = N/A)	2008* (Bias Adjustment Factor = 0.92)	2009* (Bias Adjustment Factor = 0.9)	2010* (Bias Adjustment Factor = 0.91)	2011 (Bias Adjustment Factor = 0.89)
LN06	Kerbside	N	NDA	NDA	NDA	NDA	**54.89**
LN07	Kerbside	N	NDA	NDA	NDA	NDA	**44.90**
LN11	Roadside	N	NDA	NDA	NDA	NDA	38.81
LN15	Roadside	Y	NDA	NDA	33.86	32.32	28.29
LN16	Roadside	Y	NDA	**44.76**	**42.21**	38.42	34.82
LN17	Roadside	Y	NDA	**41.37**	36.78	39.48	39.12
LN18	Roadside	Y	NDA	25.58	29.90	31.33	26.67
LN19	Background	N	NDA	31.93	35.66	32.94	33.40
LN20	Background	N	NDA	34.81	35.41	33.88	34.40
LN21	Background	N	NDA	37.64	33.98	33.99	33.58
LN22	Suburban	N	NDA	NDA	22.85	24.40	23.05
LN23	Roadside	N	NDA	NDA	33.26	35.08	35.85
LN24	Suburban	N	NDA	NDA	26.65	25.78	24.47
LN25	Roadside	N	NDA	NDA	29.10	30.71	31.57
LN26	Suburban	N	NDA	NDA	21.76	23.19	21.32
LN27	Roadside	N	NDA	NDA	28.01	29.34	28.61
LN28	Roadside	N	NDA	NDA	NDA	**46.31**	**44.90**

NDA = No data available
*Optional

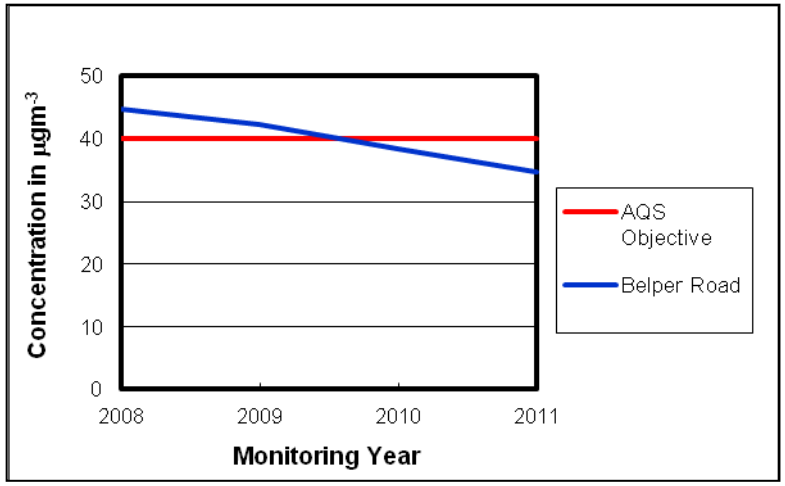
London Luton Airport

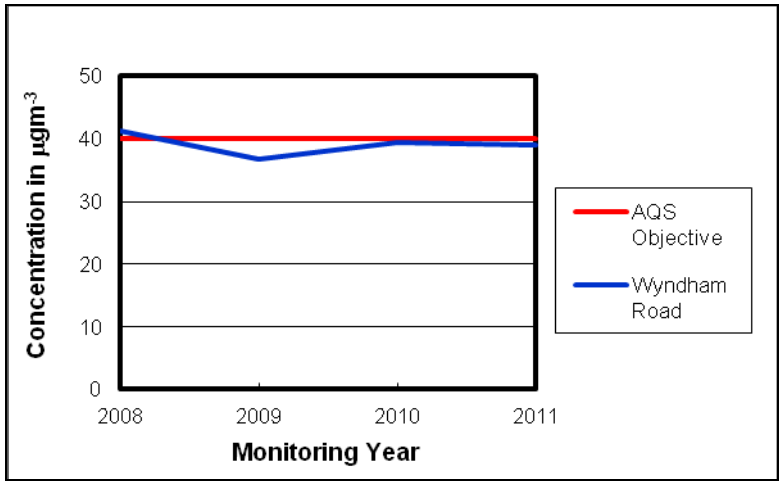
Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2007* (Bias Adjustment Factor = 0.93)	2008* (Bias Adjustment Factor = 0.94)	2009* (Bias Adjustment Factor = 0.99)	2010* (Bias Adjustment Factor = 0.93)	2011 (Bias Adjustment Factor = 0.84)
LA01	Terminal Patio	N	35.6	NDA	NDA	**46.81**	**44.6**
LA02	Airport Approach Road	N	31.2	33.06	35.81	**41.15**	**41.8**
LA03	Runway Threshold Western	N	26.4	23.81	24.09	27.90	31.3
LA04	Runway Threshold Eastern	N	18.6	19.90	19.55	21.93	23.3
LA05	Runway Apron	N	**42.9**	**44.81**	**46.61**	**50.22**	**49.8**
LA06	President Way Jct	N	34.3	35.56	**40.01**	**40.38**	**40.5**
LA07	Terminal Car Park	N	27.4	27.73	27.56	33.87	33.6
LA08	BAM CoLocator	N	32.1	30.79	31.02	35.65	35.9
LA09	Stagenhoe Bottom Farm	N	11.0	11.75	13.37	14.57	14.6
LA10	Grove Farm Slip End	N	12.3	13.08	14.52	16.90	16.0

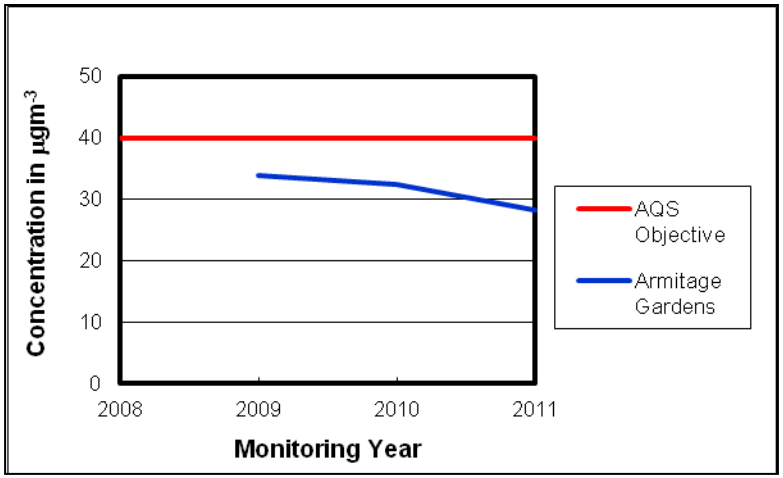
Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2007* (Bias Adjustment Factor = 0.93)	**2008* (Bias Adjustment Factor = 0.94)**	**2009* (Bias Adjustment Factor = 0.99)**	**2010* (Bias Adjustment Factor = 0.93)**	**2011 (Bias Adjustment Factor = 0.84)**
LA13	Delmerend Lane Flamstead	N	13.9	13.32	15.68	20.23	17.7
LA14	Stand 60 Luton Airport	N	**40.8**	38.38	35.97	38.75	**42.3**
LA15	Eaton Green Road	N	NDA	NDA	NDA	33.02	**40.0**

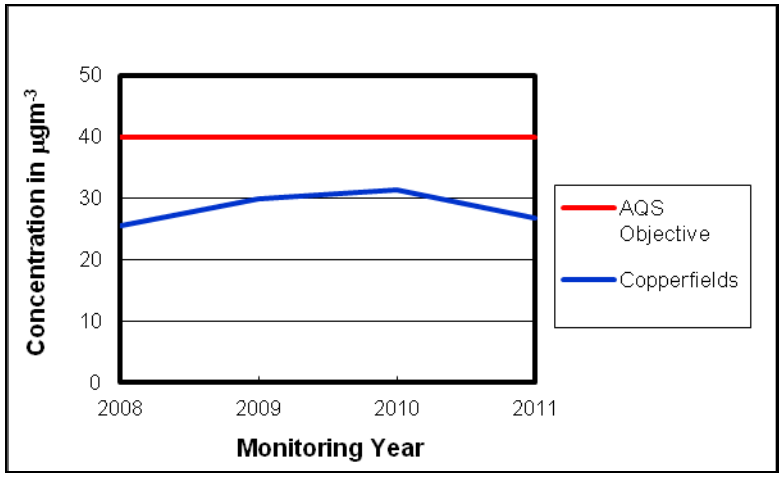
NDA = No data available
*Optional

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites (in AQMA)









2.2.2 PM_{10}

The following charts show the results of PM_{10} monitoring at automatic monitoring sites within the borough.

The results from the TEOM at Challney Community College (LN01) were corrected using the Kings College Volatile Correction Model. The results from the BAM at London Luton Airport (LA08) were corrected to obtain the gravimetric equivalent.

These monitoring sites are not representative of public exposure, however they have not identified any exceedances of the Air Quality objectives for either the annual mean or the 24 hour mean concentrations.

Table 2.7 Results of Automatic Monitoring of PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2011 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2007*[c]	2008*[c]	2009*[c]	2010*[c]	2011[c]
LN01	Urban Background	N	91.9	91.9	Y	21	18	20	17.5	21
LA08	Urban Backgound	N	86.8	86.8	NA	23	21	20	14	17

[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] Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.
* Optional

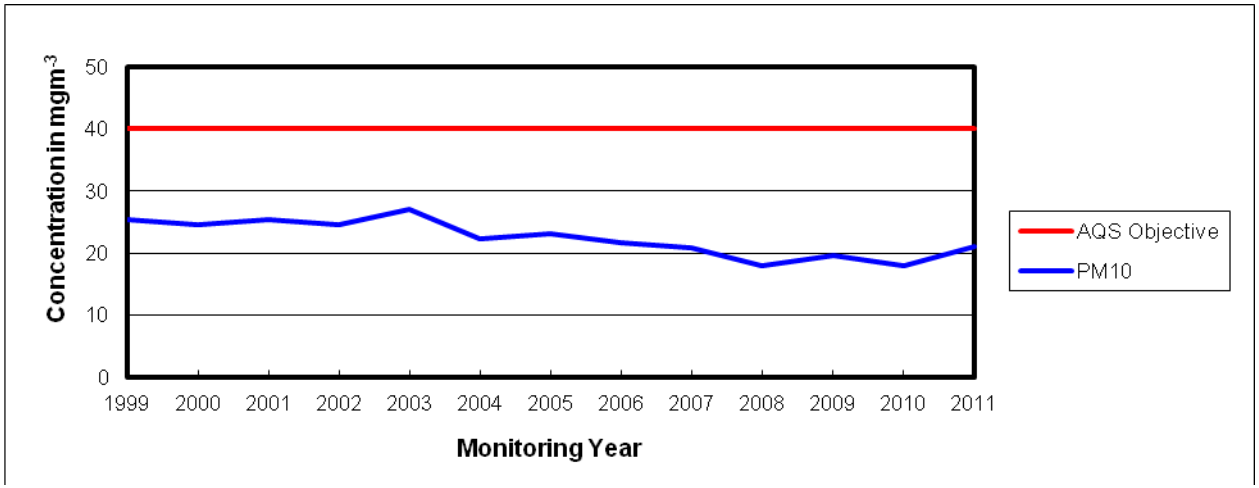
Table 2.8 Results of Automatic Monitoring of PM_{10}: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2011 %[b]	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 μg/m^3)				
						2007*	2008*	2009*	2010*	2011
LN01	Urban Background	N	91.9	91.9	Y	12	3(29.1)	2(31.2)	0	10
LA08	Urban Background	N	86.8	86.8	NA	10	4(32.9)	5(31.6)	0	2

[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
* Optional

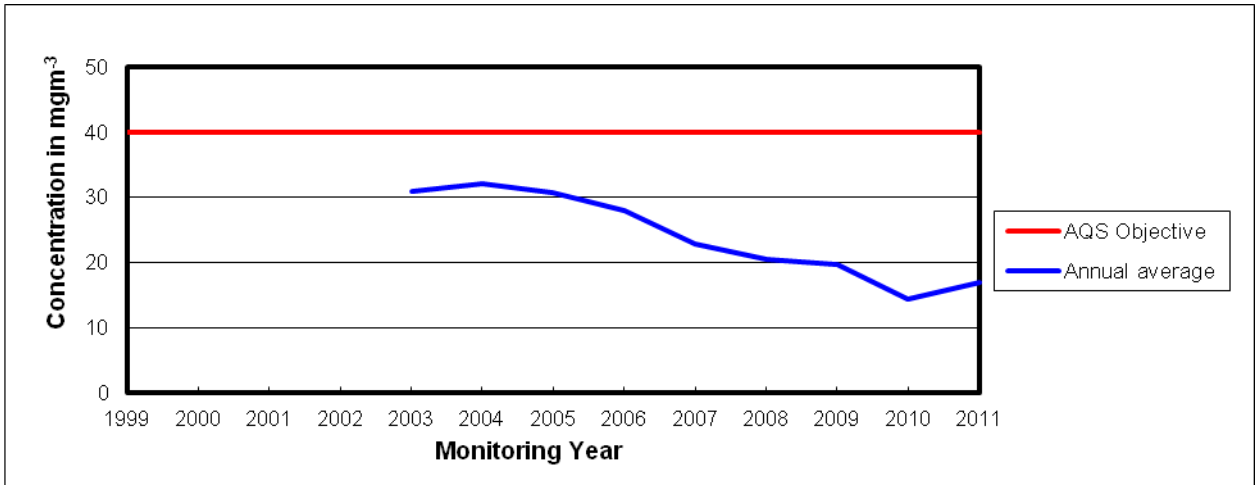
Figure 2.5 Trends in Annual Mean PM_{10} Concentrations

LN01 – Challney Community College



ThIs graph shows that the annual mean concentrations of particulates (PM_{10}) at Challney Community College (LN01) is consistently well below the Air Quality Objective of 40 µg/m^3. Since 2007 the level of PM_{10} has fluctuated at approximately 20 µg/m^3, half that of the Air Quality Objective.

LA08 – London Luton Airport



ThIs graph shows that the annual mean concentrations of particulates (PM_{10}) at London Luton Airport (LA08) has declined considerably since monitoring began in 2003. The annual mean concentration of PM_{10} has always been below the Air Quality Objective level of 40 µg/m^3 and since 2008, it has been at least half of this level.

2.2.3 Sulphur Dioxide

Luton Borough Council no longer monitors sulphur dioxide levels.

2.2.4 Benzene

Luton Borough Council do not monitor benzene levels.

2.2.5 Other pollutants monitored

Ozone

Ozone has been monitored at Challney Community College (LN01) since 1999. The non-regulatory UK objective for ozone is for the 8-hour mean level of 100 g/m^3 to be not exceeded more than 10 times in any year. The table below shows this objective has been equalled or exceeded in 9 of the last 13 years.

Table 2.9 Exceedances of the Ozone 8-hour Mean Objective

Year	1999	2000	2001	2002	2003	2004	2005	2006
Exceedances of 8-hour mean objective	18	8	11	9	30	14	16	16

Year	2007	2008	2009	2010	2011
Exceedances of 8-hour mean objective	9	20	11	10	5

A decrease in ozone pollution cannot be achieved by local authorities alone and is only possible with international effort. It is for this reason the National Air Quality Strategy objective for ozone is for guidance only and not supported by regulations.

There is now a confirmed link between air pollution and asthma. Ozone is the pollutant most likely to exceed the objective, however it is not amenable to local control. Luton Borough Council, set up an Air Alert warning system aimed at persons with respiratory conditions to advise them in advance of poor air pollution events. Unfortunately this system was withdrawn in November 2011 due to lack of funding.

Summary of Compliance with AQS Objectives

Luton Borough Council has examined the results from monitoring in the borough. Concentrations outside of the AQMA are generally below the objectives at relevant locations. At one location where the annual mean for nitrogen dioxide is likely to exceed the objective, the Council will commence monitoring at a point of relevant exposure. There is no need to proceed to a Detailed Assessment at the present time

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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/HDVs.

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

The local authority is anticipating applications for the potential expansion of London Luton Airport in the near future. When such applications are received we will consider the potential for increases in emissions of nitrogen dioxide including the impact of additional road traffic in the locality.

It is considered that a detailed assessment is not appropriate at this stage. At the time of writing this report no information regarding the impacts any expansion may have is available.

Monitoring of nitrogen dioxide to date has not identified levels in excess of the Air Quality Objective at any relevant receptor within 1000 m of the airport boundary.

London Luton Airport is in Luton's local authority area. Nitrogen dioxide in the locality of the airport has previously been assessed and meets the specified criteria. **Luton Borough Council will not need to proceed to a Detailed Assessment for nitrogen dioxide at this time.**

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

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

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.

5.1.2 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 Luton 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 are not aware of any biomass combustion plant in the local authority area.

6.2 Biomass Combustion – Combined Impacts

Luton Borough Council are not aware of any biomass combustion plant in the local authority area.

6.3 Domestic Solid-Fuel Burning

Luton Borough Council confirms that there are no areas of significant domestic 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

Data obtained from both automatic monitoring sites was below the Air Quality Objectives.

Diffusion tube data shows there to have been no exceedances of the 40µg/m^3 annual mean nitrogen dioxide objective in 2011 within the Air Quality Management Area. This compares to 2010, when there were also no exceddences in this area, however in 2009 one location exceeded the objective, and in 2008 there were two locations that exceeded it. Wyndham Road (LN17) is marginally below the objective, a very similar level to that measured in 2010. There is currently major working being undertaken to the M1 junction at this location, which has had a considerable impact upon traffic flows. This should be taken into account when considering this result.

Given the works on the M1 J10/J13 Hard Shoulder Running Scheme are ongoing and not expected to be completed until some time in 2013, it would not be prudent to review the boundaries of the AQMA at this time, and probably not until at least a year after completion of those works.

Luton Borough Council measured annual mean concentrations of nitrogen dioxide in excess of the Air Quality Objective at three locations. Whilst Caddington Road does not currently have any relevant receptors present, Guildford Street and Dunstable Road do have residential properties. It was calculated that the properties on Guildford Street were unlikely to be in an area of exceedence, however levels may be greater than 40µg/m^3 at the facades of properties on Dunstable Road.

The diffusion tube data from London Luton Airports monitoring regime in and around the airfield show there to have been exceedences of the 40 µg/m^3 annual mean nitrogen dioxide objective at six locations in 2011:

LA01 - Terminal Patio at LLA
LA02 - Airport Approach Road
LA05 - Runway Apron at LLA
LA06 - President Way at LLA
LA14 - Stand 60 at LLA
LA15 - Eaton Green Road

None of these locations are in areas of relevant exposure therefore no Detailed Assessment of the exceedances is required. Whilst there are residential properties along Eaton Green Road, LA15 recorded an annual mean of 40µg/m^3, at a kerbside location where there are no relevant receptors. This level would be reduced with distance from the road, and therefore not exceed the Air Quality Objective. This is confirmed by Luton Borough Councils monitoring site LN25, which measured below the objective. London Luton Airport are continuing with their monitoring regime.

Luton Borough Council's monitoring at 6 locations along Eaton Green Road continues to show annual mean nitrogen dioxide levels below the objective of 40µg/m^3

8.2 Conclusions from Assessment of Sources

The assessment of sources did not identify any new or significantly changed sources that have potential to cause an exceedance of the Air Quality Objectives.

8.3 Proposed Actions

The Updating and Screening Assessment has not identified any locations where there is a need to proceed to a Detailed Assessment.

The annual mean of the nitrogen dioxide diffusion tube at Liverpool Road / Dunstable Road, did highlight that there may be a number of properties along Dunstable Road where residents are exposed to an annual mean of nitrogen dioxide in excess of the Air Quality Objective. As a result Luton Borough Council will erect a further nitrogen dioxide diffusion tube at a point of relevant exposure along this road. This will

determine if we need to proceed to a Detailed Assessment for this area. It is thought that once the Luton Dunstable Busway is operational, and further road improvements are made to the Luton inner ring road, that traffic on this road will reduce and air quality will improve as a result.

Luton Borough Council will now produce a revised action plan and progress report in respect of the Air Quality Management Area which was declared in 2005. A Progress Report will be produced by the end of April 2013.

9 References

Luton Borough Council Progress Report (2008)

Luton Borough Council Updating & Screening Assessment (2009)

Luton Borough Council Progress Report (2010)

Luton Borough Council Progress Report (2011)

Local Air Quality Management – Technical Guidance LAQM.TG(09)

Hertfordshire & Bedfordshire Air Quality Network

Spreadsheet of Combined Bias Adjustment Factors (version 03/11)

Luton Borough Council Environment Strategy Framework

Local Transport Plan LTP3

Appendices

Appendix A: QA/QC Data

Appendix B: Distance from Road Calculation

Appendix A: QA:QC Data

Factor from Local Co-location Study at Challney Community College (LN01)

	LN01 Continuous Analyser Result "Cm"	Tube 1	Tube 2	Tube 3	Tube Mean "Dm"	A (A=Cm/Dm)
Jan	48	36.46	43.43	39.56	39.82	1.21
Feb	34	37.24	42.16	-	39.70	0.86
Mar	42	36.31	42.09	40.7	39.70	1.06
Apr	37	43.17	48.58	42.22	44.66	0.83
May	25	32.06	30.62	29.12	30.60	0.82
Jun	27	35.31	34.33	36.88	35.51	0.76
Jul	-	28.18	28.8	31.75	29.58	-
Aug	27	39.04	34.21	33.84	35.70	0.76
Sept	31	40.68	35.78	35.94	37.47	0.83
Oct	40	40.85	42.19	46.8	43.28	0.92
Nov	42	41.42	41.69	40.93	41.35	1.02
Dec	31	39.58	39.99	37.26	38.94	0.80
Average	**34.91**	**37.53**	**38.66**	**37.73**	**38.02**	**0.90**

Diffusion Tube Bias Adjustment Factors

See below….

For Luton Borough Councils diffusion tubes

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/12

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of September 2012

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

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 Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2011	R	Scarborough Borough Council	12	35	37	-4.7%	G	1.06
Gradko	20% TEA in Water	2011	R	Dudley MBC	12	35	28	23.3%	G	0.81
Gradko	20% TEA in Water	2011	UB	Dudley MBC	12	28	25	10.0%	G	0.91
Gradko	20% TEA in Water	2011	R	Dudley MBC	11	45	40	11.8%	G	0.89
Gradko	20% TEA in water	2011	K	South Lakeland District Council	10	41	38	8.3%	G	0.92
Gradko	20% TEA in water	2011	R	Gedling Borough Council	11	43	35	24.5%	G	0.80
Gradko	20% TEA in water	2011	R	Gateshead	12	39	37	4.9%	P	0.96
Gradko	20% TEA in water	2011	R	Gateshead	12	37	36	1.8%	G	0.98
Gradko	20% TEA in water	2011	R	Gateshead	10	33	31	5.1%	G	0.96
Gradko	20% TEA in water	2011	R	Gosport Borough Council	10	28	25	11.1%	G	0.90
Gradko	20% TEA in water	2011	UC	Southampton City Council	12	31	35	-10.8%	G	1.12
Gradko	20% TEA in Water	2011	R	Dudley MBC	9	50	51	-1.5%	G	1.02
Gradko	20% TEA in water	2011	K	Marylebone Road Intercomparison	12	111	100	11.4%	G	0.90
Gradko	20% TEA in water	2011	R	Boston Borough Council	11	57	36	59.6%	P	0.63
Gradko	20% TEA in water	2011	UB	Luton Borough Council	11	39	35	11.1%	G	0.90
Gradko	20% TEA in water	2011	R	Exeter City Council	11	37	33	15.1%	S	0.87
Gradko	20% TEA in water	2011	UB	Belfast City Council	12	36	29	23.5%	G	0.81
Gradko	20% TEA in water	2011	R	Bromsgrove District Council (Worcest	10	56	53	6.0%	G	0.94
Gradko	20% TEA in water	2011	R	Monmouthshire County Council	11	47	40	17.9%	S	0.86
Gradko	20% TEA in water	2011	K	New Forest District Council	10	49	42	16.7%	G	0.86
Gradko	20% TEA in water	2011	R	New Forest District Council	12	34	26	29.9%	G	0.77
Gradko	20% TEA in water	2011	R	Fareham Borough Council	12	39	33	17.4%	G	0.86
Gradko	20% TEA in water	2011	R	Rushcliffe BC	11	35	39	-9.5%	G	1.10
Gradko	20% TEA in Water	2011	R	Carlisle City Council	12	35	28	24.8%	G	0.80
Gradko	20% TEA in Water	2011	O	North Warwickshire Borough Council	12	48	39	23.0%	G	0.81
Gradko	20% TEA in water	2011	R	Wokingham Borough Council	11	41	38	8.6%	G	0.92
Gradko	20% TEA in water	2011		Overall Factor[3] (28 studies)				Use		0.89

[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 Environmental Scientific Groups.
For Staffordshire CC SS/Staffordshire County Analyst use Staffordshire Scientific Services.
For Bodycote Health Sciences and Clyde Analytical Laboratories use Exova.
For Rotherham MBC use South Yorkshire Labs.
For Dundee CC use Tayside SS.
For Leicester Scientific Services use Staffordshire Scientific Services.
For South Yorkshire Air Quality Samplers use South Yorkshire Labs. As of January 2010 sampler body changed. As of April 2010 sampler cap changed. Lancashire County Analysts withdrew from the Field Intercomparison at the end of 2010. No submissions were supplied in 2011.
Walsall MBC closed in March 2011.

[2] In this situation it would be reasonable to use data from the nearest year.

[3] Overall factors have been calculated using orthogonal regression to allow for uncertainty in both the automatic monitor and diffusion tube. The uncertainty of the diffusion tube has been assumed to be double that of the automatic monitor.

[4] If you have your own co-location study, please send your data to us, so that it can be included here. If this is not possible, but you wish to combine these factors with your own, select and copy the relevant data from this spreadsheet and paste them into a new one (otherwise your calculations will include hidden data). Then add your own data and calculate the bias. To obtain a new correction factor that includes your data, average the bias (B) values, expressed as a factor, i.e. -16% is -0.16. Next add 1 to this value, e.g. -0.16 + 1.00 = 0.84 in this example, then take the inverse to give the bias adjustment factor 1/0.84 = 1.19. (This will not be exactly the same as the correction factor calculated using orthogonal regression as used in this spreadsheet, but will be reasonably close).

To add data download a questionnaire

[5] Where an annual data set falls into two years it has been ascribed to the year in which most of the data has fallen.

[6] Tube precision is determined as follows: G = G precision - coefficient of variation (CV) of diffusion tube replicates is considered G when the CV of eight or more periods is less than 20%, and the average CV of all monitoring periods is less than 10%; P = P precision - CV of four or more periods >20% and/or average CV >10%; S = Single tube, therefore not applicable; na = not available.

For London Luton Airports diffusion tubes

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/12

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of September 2012

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

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 Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (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[5]	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	0.76
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	48	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 Galloway 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[3] (22 studies)				Use		0.84

[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 Environmental Scientific Groups.
For Staffordshire CC SS/Staffordshire County Analyst use Staffordshire Scientific Services.
For Bodycote Health Sciences and Clyde Analytical Laboratories use Exova.
For Rotherham MBC use South Yorkshire Labs.
For Dundee CC use Tayside SS.
For Leicester Scientific Services use Staffordshire Scientific Services.
For South Yorkshire Air Quality Samplers use South Yorkshire Labs. As of January 2010 sampler body changed. As of April 2010 sampler cap changed. Lancashire County Analysts withdrew from the Field Intercomparison at the end of 2010. No submissions were supplied in 2011. Walsall MBC closed in March 2011.

[2] In this situation it would be reasonable to use data from the nearest year.

[3] Overall factors have been calculated using orthogonal regression to allow for uncertainty in both the automatic monitor and diffusion tube. The uncertainty of the diffusion tube has been assumed to be double that of the automatic monitor.

[4] If you have your own co-location study, please send your data to us, so that it can be included here. If this is not possible, but you wish to combine these factors with your own, select and copy the relevant data from this spreadsheet and paste them into a new one (otherwise your calculations will include hidden data). Then add your own data and calculate the bias. To obtain a new correction factor that includes your data, average the bias (B) values, expressed as a factor, i.e. -16% is -0.16. Next add 1 to this value, e.g. -0.16 + 1.00 = 0.84 in this example, then take the inverse to give the bias adjustment factor 1/0.84 = 1.19. (This will not be exactly the same as the correction factor calculated using orthogonal regression as used in this spreadsheet, but will be reasonably close).

To add data download a questionnaire

[5] Where an annual data set falls into two years it has been ascribed to the year in which most of the data has fallen.

[6] Tube precision is determined as follows: G = G precision - coefficient of variation (CV) of diffusion tube replicates is considered G when the CV of eight or more periods is less than 20%, and the average CV of all monitoring periods is less than 10%; P = P precision - CV of four or more periods >20% and/or average CV >10%; S = Single tube, therefore not applicable; na = not available.

Discussion of Choice of Factor to Use

Whilst Luton Borough Council have calculated a local bias adjustment factor, which was very similar to the national bias adjustment factor, it was felt that the national bias adjustment factor would provide a greater level of confidence in the results obtained.

As London Luton Airport do not have collocated diffusion tubes, it was not possible to calculate a local bias adjustment factor. The national figure was therefore used.

PM Monitoring Adjustment

Results obtained from the TEOM at Challney Community College (LN01) were corrected using the Kings College Volatile Correction Model.

Results from the BAM at London Luton Airport (LA08) were corrected to obtain the gravimetric equivalent.

QA/QC of automatic monitoring

Results from both automatic air quality monitoring sites were ratified by the Environmental Research Group (ERG) up until the end of September 2011. From October 2011, this was undertaken by Air Quality Data Management (AQDM).

ERG undertook all calibrations of the monitoring station at Challney Community College (LN01) in 2011. The analysers were calibrated every 2 weeks. The TEOM was calibrated every 4 to 6 weeks as required, and depending on the filter loading.

Enviro Technology undertook the calibration and maintenance of the BAM at London Luton Airport (LA08). This was done every 6 months.

QA/QC of diffusion tube monitoring

Luton Borough Council uses the 'Grey Cap' diffusion tubes supplied and analysed by Gradko International Ltd, using a preparation mixture of 20% triethanolamine (TEA) in deionised water. The performance of Gradko is monitored under the WASP NO_2 Proficiency Testing Scheme. In 2011 Gradko achieved 100% in 3 of the 4 monitoring rounds. In the 4th they advise that the sample vials were suspect and appeared to have been contaminated at the time of analysis. They advise that this is why they only achieved 37.5% under this test which affected their average performance for 2011.

London Luton Airport uses diffusion tubes prepared and analysed by ESG Limited using a preparation of 50% triethanolamine (TEA) in acetone. The laboratory takes part in the WASP Scheme, under which it achieved 100% for 2011.

Appendix B: Distance from Road Calculations

LN06 – Liverpool Road / Dunstable Road

This calculator allows you to predict the annual mean NO_2 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)	**1**	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	(Note 1)	**4**	metres
Step 3	**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)	**35**	µg/m^3
Step 4	**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)	**55**	µg/m^3
Result	**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)	**49.4**	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.

Issue 4: 25/01/11. Created by Dr Ben Marner; Approved by Prof Duncan Laxen. Contact: benmarner@aqconsultants.co.uk

LN07 – Guildford Street / Bute Street

This calculator allows you to predict the annual mean NO_2 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)	**0.1**	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 $\mu g/m^3$)?**	(Note 2)	**31**	$\mu g/m^3$
Step 4	**What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)	**45**	$\mu g/m^3$
Result	**The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor**	(Note 3)	**39.2**	$\mu g/m^3$

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.

Issue 4: 25/01/11. Created by Dr Ben Marner; Approved by Prof Duncan Laxen. Contact: benmarner@aqconsultants.co.uk