2012 Air Quality Updating and Screening Assessment for Slough Borough Council

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

April 2012

www.slough.gov.uk
Slough
Borough Council

Local Authority Officer	Monica Wilsch Head of Environmental Quality

Department	Environmental Services and Quality
Address	Slough Borough Council St Martins Place 51 Bath Road Slough Berkshire SL1 3UF
Telephone	01753 875 255
e-mail	Monica.Wilsch@slough.gov.uk

Report Reference number	AEAT/ENV/R/3280
Date	12/04/2012

Customer:

Slough Borough Council

Customer reference:

Confidentiality, copyright & reproduction:

Contact:

Andy Lewin
AEA Technology plc
Gemini Building, Harwell, Didcot, OX11 0QR
t: 0870 190 6355
e: andrew.lewin@aeat.co.uk
AEA is a business name of AEA Technology plc
AEA is certificated to ISO9001 and ISO14001

Author:

Andy Lewin

Approved By:

Dr Scott Hamilton

Date:

12 April 2012

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.

A review of new monitoring data has identified the following:

An NO_2 annual mean concentration in excess of the 40 $\mu g.m^{-3}$ objective was measured at one automatic monitoring site and at various diffusion tube sites. All of these sites are either within one of the existing AQMAs or are not at locations of relevant exposure. No exceedances of the NO_2 1-hour mean objective were measured at any locations of relevant exposure during 2011. There is therefore no need to proceed to a Detailed Assessment based on the recent NO_2 measurements.

Annual mean NO_2 concentrations measured at the automatic monitoring sites have on average been decreasing at all locations, except Chalvey, over the last five years. Examination of the trend in NO_2 annual means measured across the Slough network of diffusion tubes indicates that concentrations have reduced slightly since 2010, but in general have either increased slightly or remained fairly constant over recent years.

For both PM_{10} and benzene, annual mean concentrations measured during 2011 were below the respective objectives. The PM_{10} 24-hour mean objective was exceeded more than 35 times at both the Lakeside 1 and Lakeside 2 urban background PM_{10} monitoring sites during 2011. Neither of these locations are however representative of relevant exposure.

Air quality objectives were achieved at all monitoring locations outside of the existing AQMAs at locations of relevant exposure hence there is no need to proceed to a Detailed Assessment at any location. Continued measured annual mean NO_2 concentrations in excess of the objective within the current AQMAs confirm that the AQMAs are still required.

The assessment of new sources has not identified any new sources that have not been considered previously. A detailed assessment of any new sources is not therefore required.

Slough Borough Council will continue monitoring at all existing sites within the Borough and will continue to implement the measures outlined in their Air Quality Action Plan for the Brands Hill AQMA, the M4 AQMA as well as borough wide.

An action plan for the more recently declared AQMAs at Tuns Lane and Slough Town Centre is currently in preparation.

Table of contents

Appendices

1 Introduction

1.1 Description of Local Authority Area

Slough is situated in Berkshire, in the south–east of England, close to the West of London. The borough is an urban area located in the Thames Valley and is surrounded by countryside, which forms part of the Metropolitan Green Belt. Slough has excellent communication links and is in close proximity to Heathrow airport and the Greater London conurbation. Slough is integrated into the heart of the UK transport and communications network. It is located between the M4, M40 and the M25. There is also a rail link into the centre of London, with onward links from there that go to the rest of the country. The town in an important commercial centre and includes both industrial and residential areas.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu g.m^{-3}$ (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 µg.m^{-3}	Running annual mean	31.12.2003
	3.25 µg.m^{-3}	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg.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 µg.m^{-3}	Annual mean	31.12.2004
	0.25 µg.m^{-3}	Annual mean	31.12.2008
Nitrogen dioxide	200 µg.m^{-3} not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg.m^{-3}	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 µg.m^{-3} , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg.m^{-3}	Annual mean	31.12.2004
Sulphur dioxide	350 µg.m^{-3}, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg.m^{-3}, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg.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

1.4.1 First Round of Review and Assessment

Following the first round of Review and Assessment, Slough Borough Council concluded that no exceedences of the carbon monoxide, benzene, 1,3-butadiene, lead, sulphur dioxide or PM_{10} objectives were occurring. An area alongside the M25 in Poyle was identified as likely to exceed the AQS annual mean NO_2 Objective (40 $\mu g.m^{-3}$). There were however no locations where relevant public exposure was occurring.

As part of Slough Borough Council's commitment to sustainable development and improving air quality, the council produced an air quality strategy.

1.4.2 Second Round of Review and Assessment

Updating and Screening Assessment (USA), 2003

The 2003 Updating and Screening Assessment (U&SA) concluded that the AQS Objectives for CO, SO_2, benzene and 1,3 butadiene would be achieved in all areas of Slough. However, it was recommended that a future study of areas surrounding the new S. Grundon waste facility (when operational in 2008) was undertaken with respect to these pollutants. In terms of the annual mean objectives for NO_2 and PM_{10}, the 2003 USA predicted that these would be exceeded close to motorways, major roads and junctions and hence, it recommended that a Detailed Assessment be conducted for annual mean nitrogen dioxide and annual mean and 24 hour mean PM_{10} for five areas in Slough, located primarily around busy roads and junctions where relevant public exposure may be occurring

Detailed Assessment 2004

Modelling of road traffic emission indicated a number of exceedances of the NO_2 annual mean for 2005, particularly adjacent to major roads and junctions, and in the main urban centres where relevant exposure is likely. The modelling also predicted that all modelled areas were likely to exceed the 2010 PM_{10} annual mean objective. The assessment recommended that an AQMA be declared in the areas where exceedances were predicted.

Further Assessment, 2004

The Further Assessment (2004) considered road traffic emissions in the Borough and provided source contribution estimates for the major roads and motorways, and estimated percentage improvements required to meet air quality objectives. The major cause of exceedances of the air quality objectives related mainly to road traffic; with the majority of road traffic emissions from the motorways and other major roads.

Progress Report, 2005

Exceedences of the annual mean objective for nitrogen dioxide were predicted at several locations in Slough. As a result, Slough Borough Council declared two Air Quality Management Areas (AQMAs) in June 2005, which relate primarily to stretches of the M4 (M4 AQMA) and the A4 (Brands Hill AQMA). The Slough Local Transport Plan 2006-2011 (March 2006) contains the air quality action plan for the M4, A4 and also general actions for the Town Centre to improve air quality. The designation of the two AQMAs was supported by the conclusions reached in the first Progress Report (2005).

Further Assessment, 2005

The Further Assessment (2005) identified a number of locations, where exceedances of the NO_2 annual mean objective were occurring, that were not currently in the designated AQMA's; Tuns Lane, Lansdowne Avenue and Princess Street. These sites are close to the A4 in the Town Centre. The report concluded that there was no requirement to declare an AQMA in the Town Centre along the A4 main road as the Tuns Road monitoring site was affected by construction works close by and the other two sites were considered borderline when adjusted to the nearest public exposure.

1.4.3 Third Round of Review and Assessment

Updating and Screening Assessment (U&SA), 2006

Based on the findings of the 2005 Further Assessment, the U&SA (2006) recommended that the new and existing NO_2 monitoring sites in the Town Centre be closely and regularly reviewed to highlight quickly any need to declare an AQMA in the Town Centre.

Progress Report, 2007

The 2007 Progress Report concluded that annual mean NO_2 concentrations in excess of the objective were measured during 2006 at locations in the Town Centre; and noted that exceedances were predicted at these locations in the 2005 Further Assessment. It was suggested that four new diffusion tube sites: namely, Wexham Road, Wellington Street – Stratfield, Blair Road – Victoria Court and Wellesley Road, would help to verify these town centre concentrations during 2007. The 2007 Progress Report recommended that the situation in the Town Centre should be reconsidered in detail in the next round of Review and Assessment.

Detailed Assessment, 2008

The 2008 Detailed Assessment considered NOx and NO_2 concentrations in the Town Centre of Slough; using the 2007 monitoring data from existing and new diffusion tube sites and dispersion modelling. The report recommended that Slough Borough Council should consider the declaration of an AQMA along Tuns Lane from the junction with the M4 up to the junction with Bath Road; and consider declaring an AQMA in the Town Centre along the A4 stretching from William Street roundabout to the Uxbridge roundabout. The report also recommended that any future developments in the vicinity of those areas that are likely to impact levels of road traffic should be carefully considered, particularly in the context of the 'Heart of Slough' project that would bring about changes to the Town Centre infrastructure. In addition, it was recommended that the impact on annual mean NO_2 concentrations as a result of the Great Western Railway line running through the Town Centre should be assessed further and monitored carefully in the future.

1.4.4 Fourth round of review and assessment (2009-2011)

Updating and Screening Assessment, 2009

Measured NO_2 concentrations in 2008 were in excess of the annual mean NO_2 objective at the Chalvey automatic monitoring site and at seven diffusion tube monitoring locations. Five of the monitoring locations were within the existing AQMAs and the other two within the newly declared Town Centre AQMA, therefore justifying the existence of all the borough's AQMAs.
Based on the 2008 monitoring results the 2009 U&SA recommended, as a result of updated guidance, that the council should conduct a Detailed Assessment of NO_2 at residential properties that

are located within 30m of the Great Western Line. The report also concluded that the Council should maintain monitoring at existing sites within the borough; and to implement the measures outlined in the Air Quality Action Plan.

1.4.5 Progress Report 2010

Analysis of the 2009 monitoring data showed that there continued to be measured exceedances of the NO_2 annual mean objective within the existing Slough AQMAs. There were also measured exceedances at two monitoring locations outside of the AQMA; one automatic site (SHL4 Salt Hill), and one diffusion tube site (SL4 Windsor Road). Both sites were not near relevant receptors so there was no requirement to proceed to a Detailed Assessment. All other monitored pollutants met AQS objectives. A review of traffic, commercial, industrial and domestic developments identified that there were no new or existing developments likely to lead to any exceedances of the AQS objectives for any pollutant.

1.4.6 Detailed and Further Assessment 2011

The Detailed Assessment aimed to assess the magnitude and spatial extent of any air quality objective exceedences in the vicinity of the Great Western Mainline. The monitoring data did not support the need for a declaration of an AQMA. The modelling did however indicate the potential for exceedences of the air quality objectives at residential receptors. It was therefore recommended that additional monitoring be conducted at these properties.

A Further Assessment was undertaken to confirm the findings of the 2008 Detailed Assessment which lead to the declaration of the Tuns Lane and Town Centre AQMA. The assessment also apportioned sources of NOx and the level of reduction required to achieve the NO_2 objective, followed by testing of selected abatement scenarios to inform the AQAP. The report confirmed that the declaration of the AQMAs was appropriate and went on to recommend that the council should consider extending the Tuns Lane AQMA along Bath Road as far as Windmill Road and the Town Centre AQMA northwards along Uxbridge Road.

The source apportionment study found that road traffic provides the largest contributions at roadside sites, with heavy duty vehicles contributing more than half of the traffic contribution. The analysis concluded that the air quality objective will be achieved by 2014 at all the diffusion sites except Yew Tree Road, which will not be met until 2017, without Action Plan measures.

1.4.7 Progress Report 2011

The 2010 NO_2 monitoring data showed that within the existing AQMAs there continue to be concentrations in excess of the annual mean objective. At two diffusion tubes sites the measured annual mean NO_2 concentrations were above 60 $\mu g.m^{-3}$ indicating that there may be an exceedence of the 1-hour mean objective occurring at these locations. These sites were Brands Hill (SL13) and Yew Tree Road (SL40) both of which are within the current AQMA.

Measured PM_{10} concentrations in 2010 were not in excess of either the annual mean or daily mean objectives.

A review of traffic, commercial, industrial and domestic developments identified that there were no new or existing developments that were likely to lead to any exceedances of the AQS objectives.

1.4.8 Existing AQMAs

The locations of the existing AQMAs within the Slough Borough Council area are annotated on Figure 1.1 and Figure 2.2.

Figure 1.1: Slough Borough Council: AQMA locations – Town Centre, Tuns Lane and M4

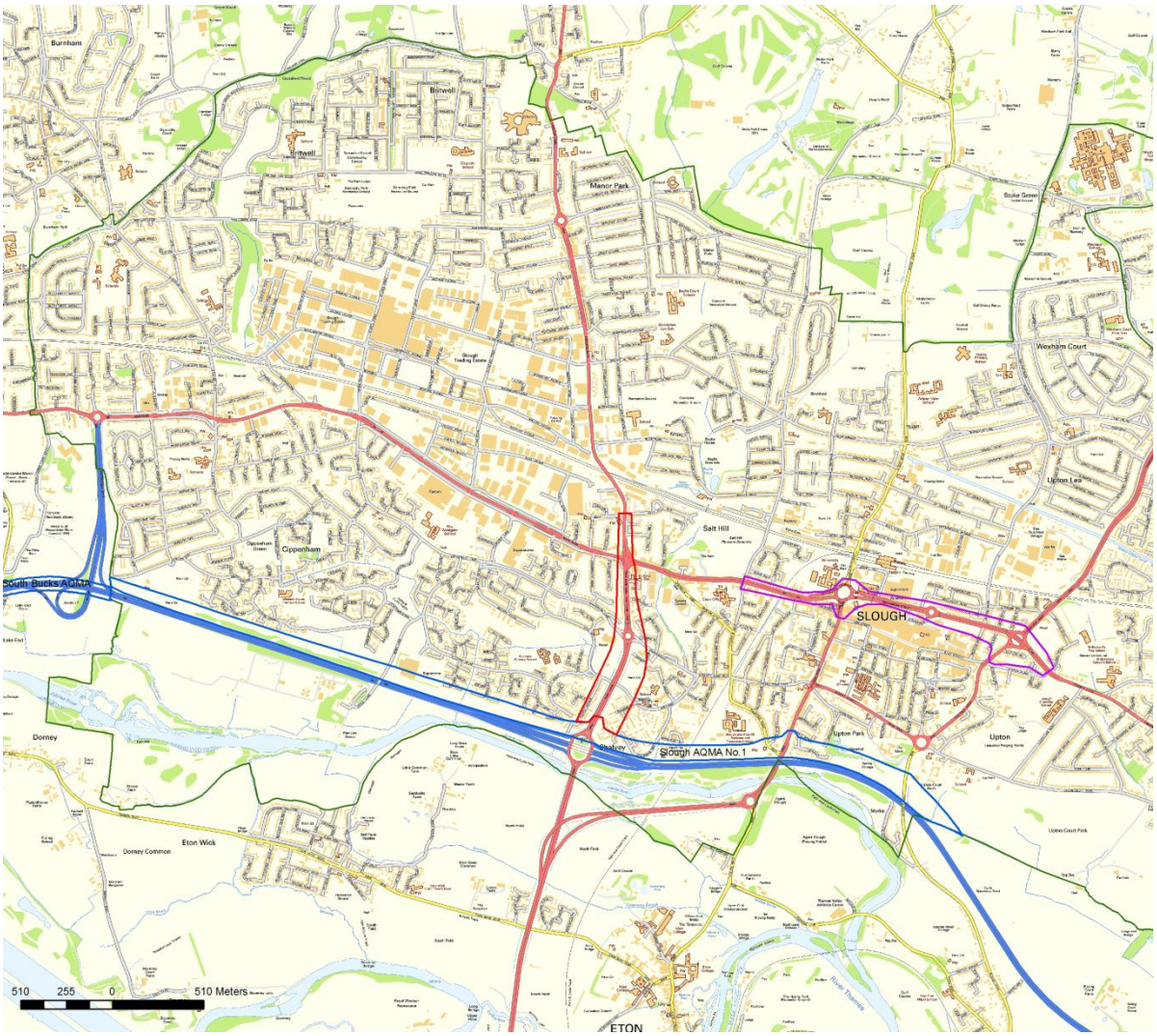
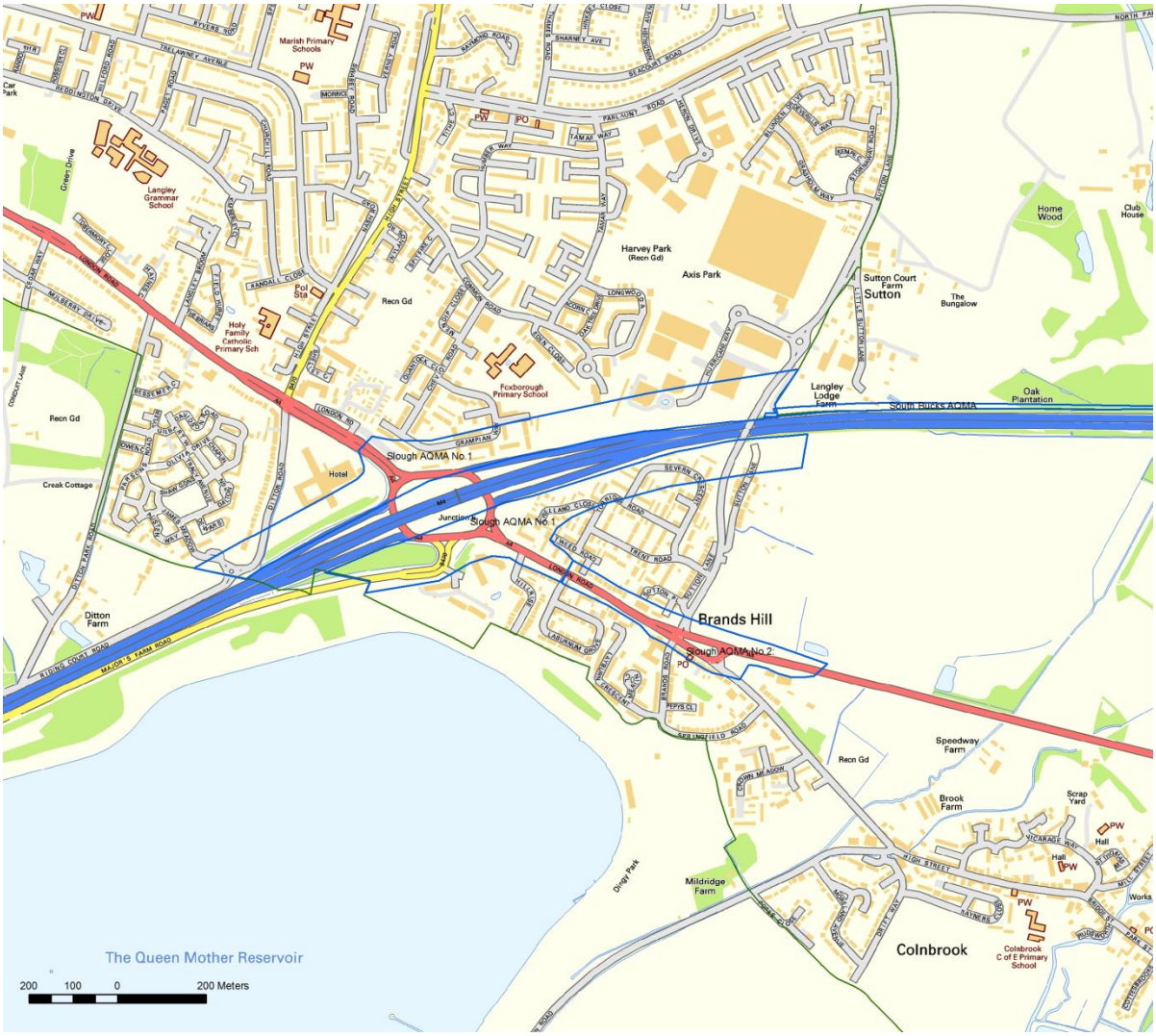


Figure 1.2: Slough Borough Council: AQMA location– Brands Hill



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

Slough Borough Council currently undertakes ambient monitoring of the following pollutants covered by the AQS:

- Nitrogen dioxide (NO_2)
- Particulate matter (PM_{10})
- Benzene

Slough Borough Council also monitors $PM_{2.5}$ and PM_1. While these particulate size fractions are not currently included in the Air Quality Regulations for England and Wales, they may become part of future Regulations.

2.1.1 Automatic Monitoring Sites

Five automatic monitoring sites are operational within the borough. These sites comprise four NOx/NO_2 analysers; two TEOM PM_{10} analysers; three Osiris PM monitors; and one BAM PM monitor.

These sites are not affiliated to Defra's Automatic Urban and Rural Monitoring Network (AURN), but are part of the National Automatic Monitoring Calibration Club, whereby monitoring data are managed to the same procedures and standards as AURN sites.

The Slough Lakeside 2 automatic monitoring site is operated by Lakeside Energy from Waste Ltd close to their waste incineration plant. The results are reported by Slough Borough Council.

Maps showing the locations of the automatic monitoring sites are presented in Figures 2.1a and 2.1b. Details of the sites are presented in Table 2.1.

Figure 2.1a: Slough Automatic Monitoring sites (Slough Centre)

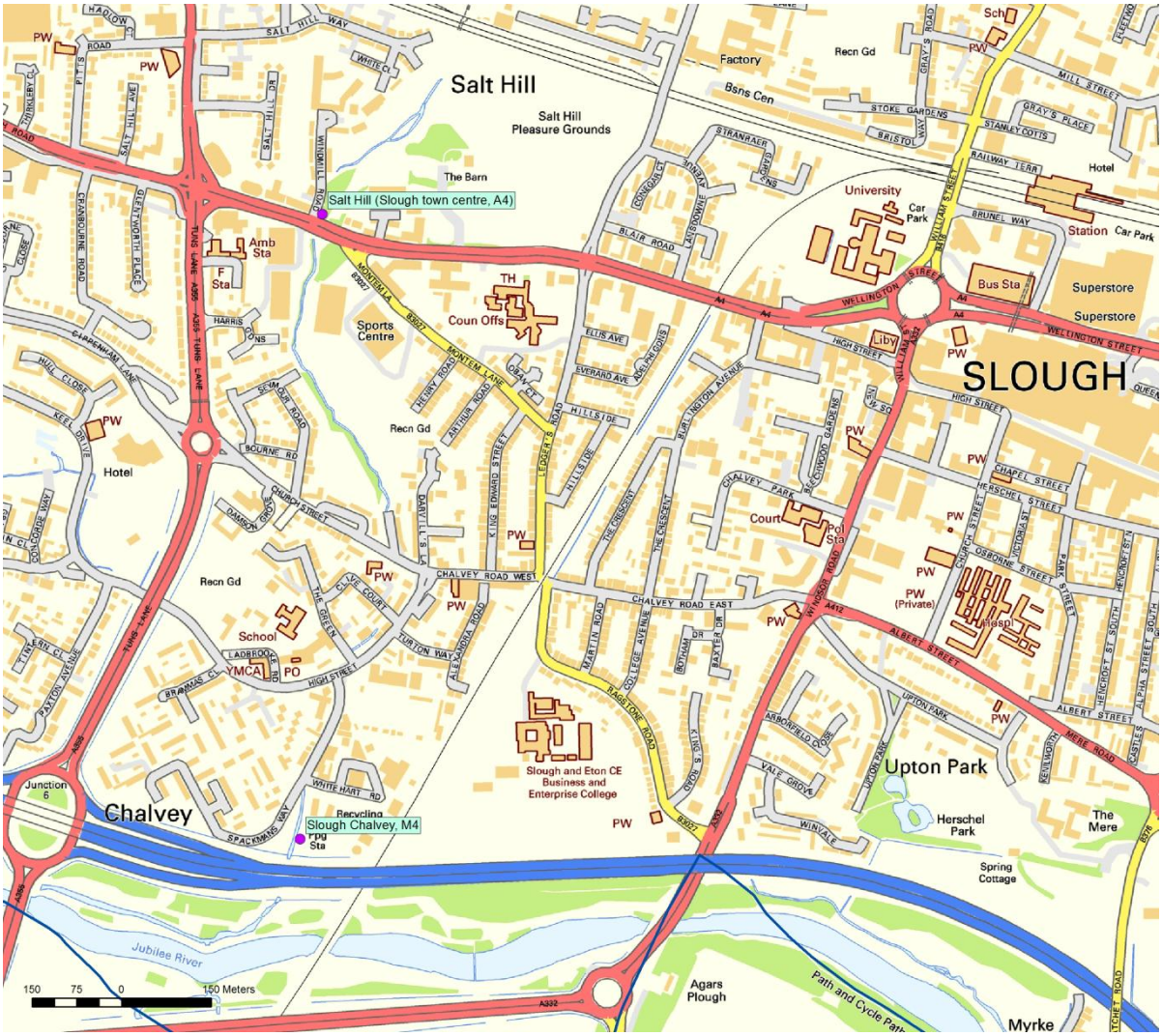


Figure 2.1b: Slough Automatic Monitoring sites (Slough East)

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring technique	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
SLH 4 - Salt Hill (Slough town centre, A4)	Intermediate (Residential)	496599	180156	NO_x, NO_2 and PM_{10}	Chemiluminescence TEOM	N	Y	10m	Y
SLH 3 & SLH6 - Slough Colnbrook (Pippins)	Urban Background (Residential)	503542	176827	NO_x, NO_2, PM_{10}, $PM_{2.5}$ & $PM_{1.0}$	Chemiluminescence TEOM and Osiris	N	Y	>50m	N
SLH 7 - Slough Chalvey, M4	Intermediate- Motorway (Residential)	496562	179109	NO_x and NO_2	Chemiluminescence	Y (M4 AQMA)	Y	45m from M4	Y
SLH 5 - Slough Colnbrook (Lakeside, Tan Hse Farm)	Urban Background	503551	177258	PM_{10}, PM2.5 & PM1.0	Osiris	N	N	>50m	N
SLH 8 and SLH9 Slough Lakeside 2 (run by Lakeside Energy from Waste Ltd)	Urban Background	503569	177385	NOx, NO_2 and PM_{10}	Chemiluminescence BAM (PM_{10}) Co-located Osiris (PM_{10}, $PM_{2.5}$ and PM_1)	N	N	10m	N

2.1.2 Non-Automatic Monitoring

Diffusion tube monitoring of NO_2 and benzene is carried out at a number of locations in the Slough Borough Council Area. During 2011 Nitrogen dioxide monitoring was undertaken at thirty-four sites across the borough during 2011 using passive diffusion tubes. Benzene monitoring is currently conducted at four sites.

In 2012, monitoring has commenced at eight new diffusion tube sites:

- Yew Tree Rd (Ux Rd)(B) Brands Hill(B)
- London Rd (B)
- London Rd (C)
- Sandringham Court
- Walpole Rd
- Goodman Park (Ux Rd)
- Windmill (Bath Rd)

Measurements from these news sites will be reported in the 2013 Progress Report.

Details of the diffusion tube monitoring locations at which measurement were conducted in 2011 are presented in Table 2.1. The locations include kerbside, intermediate and urban background sites.

Maps showing the locations of the diffusion tube monitoring sites are presented in Figures 2.2a to 2.2c.

A bias adjustment factor of 0.89 derived as the average of three co-location studies conducted in Slough during 2011 has been used to adjust the diffusion tube results. Full details of the diffusion tube QA/QC are presented in Appendix A.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location?
Hencroft Street 6N	UB	497925	179450	NO_2	N	Y	N/A	Y
Kent Avenue 5N	UB	496450	181875	NO_2	N	Y	N/A	Y
Essex Avenue	I	496200	181900	NO_2	N	Y	1-5m	Y
Windsor Road 1N	K	497557	179825	NO_2	N	Y	1-5m	Y
Mitchell Close	I(M)	495450	179480	NO_2	Y	Y	90m	Y
Tweed Road	I	501518	177882	NO_2	Y	Y	15m	Y
Colnbrook By-pass	K	503196	177349	NO_2	N	N	5m	N
Horton Road (Caravan Park)	I	503136	175654	NO_2	N	Y	17m	Y
Princess Street	I	498541	179815	NO_2, Benzene	Y	Y	17m	Y
Paxton Avenue	I(M)	496050	179258	NO_2	Y	Y	66m	Y
Winvale	K(M)	497488	179090	NO_2, Benzene	Y	Y	15m	Y
Lansdowne Avenue	I	497188	180050	NO_2	Y	Y	14m	Y
Brands Hill	K	501798	177659	NO_2	Y	Y	3m	Y
Tuns Lane	I	496416	180126	NO_2	Y	Y	20m	Y
Elbow Meadows	UB(M)	503856	176538	NO_2, Benzene	N	Y	119m	Y
London Road	K	501733	177725	NO_2, Benzene	Y	Y	3m	Y
Grampian Way	UB	501382	178101	NO_2	Y	Y	51m	Y
Ditton Road	I(M)	500851	177890	NO_2	Y	Y	60m	Y
Pippins	UB	503542	176827	NO_2, Benzene	N	Y	N/A	Y
Salt Hill	I	496599	180156	NO_2	N	Y	10m	Y
William Street roundabout	K	497646	180064	NO_2	Y	N	9m	N
Torridge Road	I (M)	501637	177999	NO_2	Y	Y	95m	Y
Sussex Place	K	498784	179560	NO_2	N	Y	6m	Y
Spackmans Way	I(M)	496272	179187	NO_2	Y	Y	40m	Y
Farnham Road (2)	I	496397	180341	NO_2	Y	Y	20m	Y
Lakeside Road	UB	503877	177459	NO_2	N	N	N/A	N
Chalvey (CAS)	I(M)	496562	179109	NO_2	Y	Y	45m	Y
Wexham Road	K	498394	179849	NO_2	Y	Y	1-5m	Y
Wellington Street - Stratfield	I	498168	179907	NO_2	Y	Y	13m	Y
Blair Road- Victoria Court	I	497105	180081	NO_2	Y	Y	13m	Y
Wellesley Road	I	498071	179949	NO_2	Y	Y	12m	Y
Rogans (Colnbrook by pass)	K	501941	177633	NO_2	Y	Y	5m	Y
Yew Tree Road (Uxbridge Rd)	K	498483	179707	NO_2	Y	Y	3m	Y
India Road	R	498681	179972	NO_2	N	Y	2m	Y

Figure 2.2a: Slough diffusion tube locations (Slough Centre)

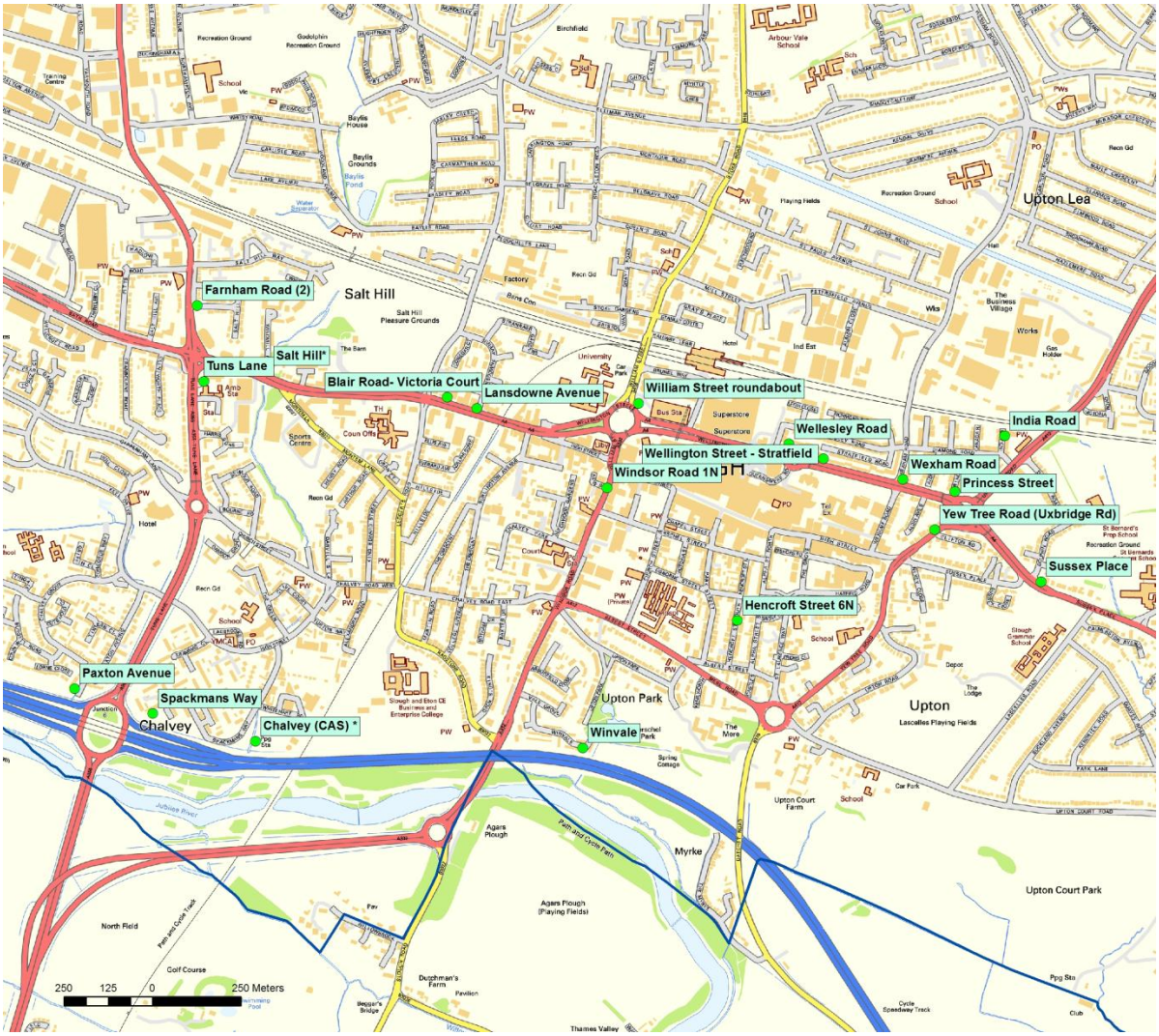
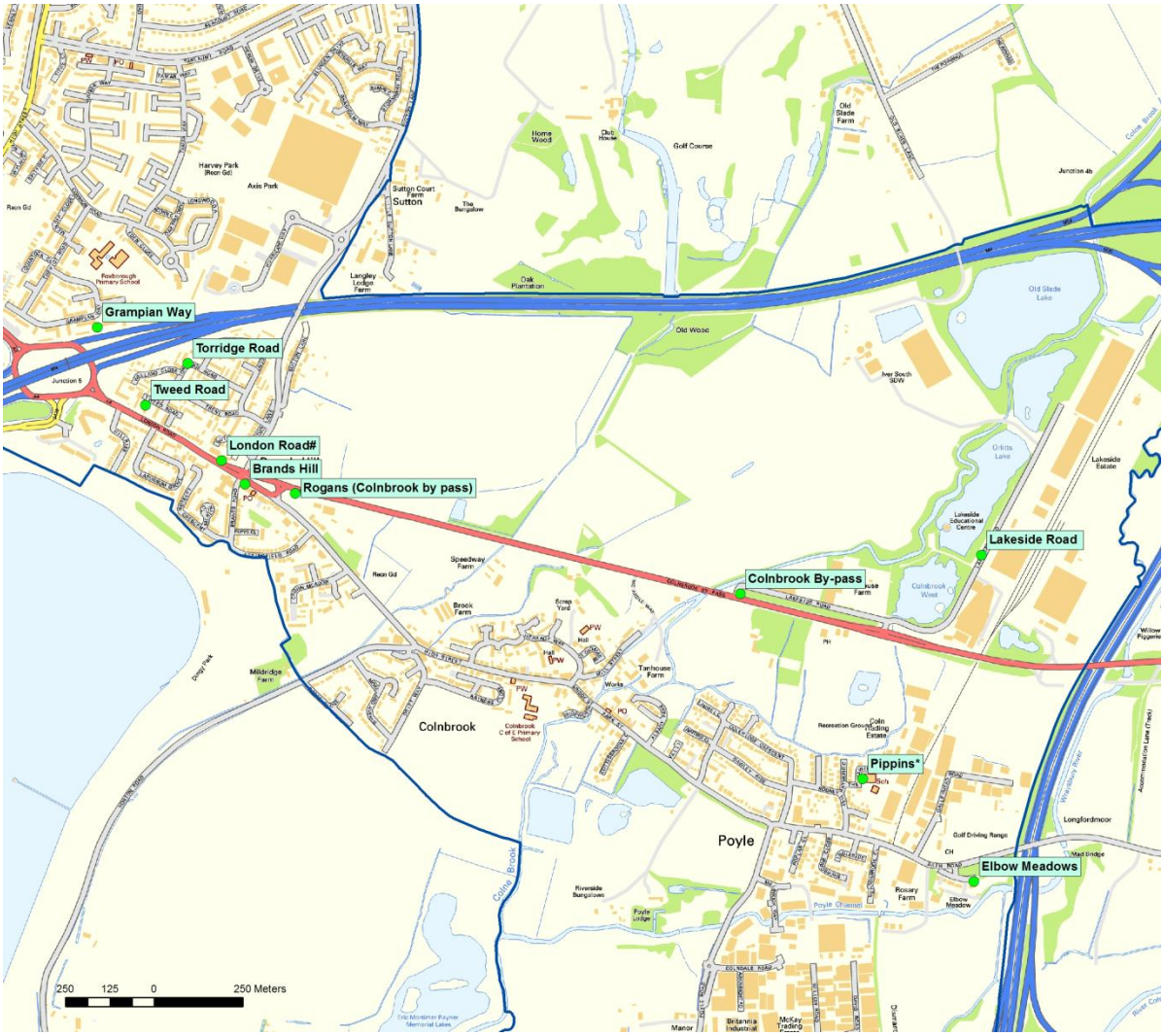


Figure 2.2b: Slough diffusion tube locations (Slough East)



Legend

Diffusion Tubes 2011

Slough boundary

AEA

Figure 2.2c: Slough diffusion tube locations (Slough north west)

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

The annual mean NO_2 concentrations measured at the automatic monitoring locations in Slough from 2007 to 2011 are presented in Table 2.3. Concentrations in excess of the 40 µg.m^{-3} objective are highlighted in bold. The NO_2 annual mean measured at Chalvey was in excess of the objective during 2011 as in previous years. The Chalvey site is within the existing M4 AQMA so there is no need to proceed to a Detailed Assessment at this location.

Table 2.3 NO_2 Automatic monitoring results: Comparison with annual mean objective

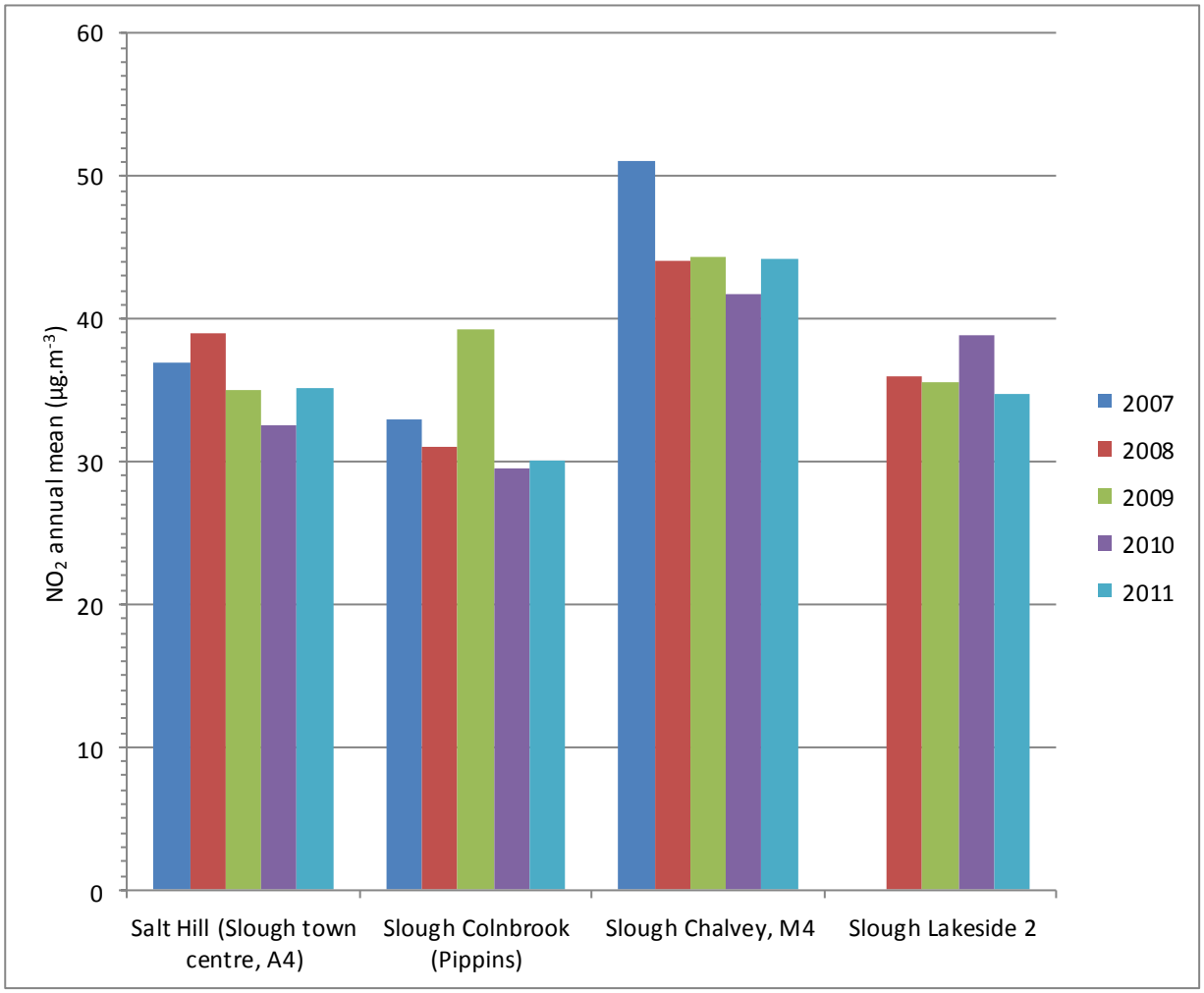
Site name	Within AQMA ?	Data Capture 2011 (%)	Annual mean concentrations (µg/m^3)				
			2007	2008	2009	2010	2011
Salt Hill (Slough town centre, A4)	N	100%	37	39	35	32.5	35.2
Slough Colnbrook (Pippins)	N	97%	33	31	39.2	29.5*	30.1
Slough Chalvey, M4	Y	89%	**51***	**44**	**44.4**	**41.8**	**44.2**
Slough Lakeside 2	N	92%	-	36	35.5	38.8	34.8

*** Annualised mean due to data capture < 75%**

A bar chart showing the trends in annual mean NO_2 concentrations over the last five years is presented in Figure 2.3. The chart shows annual mean NO_2 concentrations have on average been decreasing at all of the sites except Chalvey over the last five years. The annual mean concentration at Chalvey has consistently been over the 40 µg.m^{-3} objective in recent years. The monitoring site is not at a location of relevant exposure but is at a similar distance from the motorway as nearby residential properties where relevant exposure will occur.

It should also be noted that the 2009 NO_2 annual mean measured at Salt Hill has been amended in this Updating and Screening Assessment. Both the 2010 and 2011 Progress Reports contained an error (40.1 µg.m^{-3}); the correct measurement was 35 µg.m^{-3}.

Figure 2.3: Trends in annual mean NO_2 concentration measured at automatic monitoring sites



The number of measured 1-hour mean concentrations in excess of the 200 µg.m^{-3}short-term objective at each of the automatic monitoring sites are presented in Table 2.4. No exceedances of the short-term objective were recorded during 2011.

Table 2.4 NO_2 automatic monitoring results: Comparison with 1-hour mean objective

Site name	Within AQMA?	Data Capture 2011 (%)	Number of exceedences of hourly mean objective (200 µg.m^{-3}) For data capture < 90%, the 99.79th %ile of 1-hr means is shown in brackets (µg.m^{-3})				
			2007	2008	2009	2010	2011
Salt Hill (Slough town centre, A4)	N	100%	0	0 (111)	0	0	0
Slough Colnbrook (Pippins)	N	97%	0	0	0	0 (103)	0
Slough Chalvey, M4	Y	89%	0	13	1(128)	1 (130)	0 (132)
Slough Lakeside 2	N	92%	-	0	0	0	0

Diffusion Tube Monitoring Data

Details of the annual mean NO_2 concentrations measured using diffusion tube sites during 2011 are presented in Table 2.5 and the series of results measured from 2007 to 2011 are presented in Table 2.6. Bar charts showing the trends in measured NO_2 annual mean concentrations measured with diffusion tubes are presented in Figures 2.4 and 2.5.

All locations where annual mean NO_2 concentrations in excess of the 40 $\mu g.m^{-3}$ objective were measured during 2011 are either already within one of the existing AQMAs or are not at a location of relevant exposure.

An annual mean concentration in excess of 60 $\mu g.m^{-3}$ was measured at Brands Hill during 2011; this may indicate that the 1-hr mean objective is being exceeded at this location. This diffusion tubes is however at a kerbside location where the 1-hour mean objective is not applicable.

Examination of the trend in NO_2 annual means measured across the Slough network of diffusion tubes indicates that concentrations have reduced since 2010, but in general have either increased slightly or remained fairly constant over recent years.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes

Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration 2011 ($\mu g.m^{-3}$) (Bias Adj. factor = 0.89)
Hencroft Street 6N	UB	N	N	100%	N	N	30.6
Kent Avenue 5N	UB	N	N	100%	N	N	27.1
Essex Avenue	I	N	N	75%	N	N	33.8
Windsor Road 1N	K	N	N	92%	N	N	**45.2**
Mitchell Close	I(M)	Y	N	100%	N	N	34.9
Tweed Road	I	Y	N	92%	N	N	38.1
Colnbrook By-pass	K	N	N	100%	N	N	39.2
Horton Road (Caravan Park)	I	N	N	100%	N	N	32.2
Princess Street	I	Y	N	83%	N	N	**45.8**
Paxton Avenue	I(M)	Y	N	83%	N	N	38.9
Winvale	K(M)	Y	N	92%	N	N	**46.9**
Lansdowne Avenue	I	Y	N	67%	Y	N	**45.5**[*]
Brands Hill	K	Y	N	100%	N	N	**61.2**
Tuns Lane	I	Y	N	100%	N	N	36.6
Elbow Meadows	UB(M)	N	N	100%	N	N	35.7
London Road	K	Y	N	75%	N	N	**49.0**
Grampian Way	UB	Y	N	83%	N	N	**48.1**
Ditton Road	I(M)	Y	N	100%	N	N	**40.5**
Pippins	UB	N	Triplicate co-located	97%	N	N	29.0
Salt Hill	I	N	Triplicate co-located	89%	N	N	36.0
William Street roundabout	K	Y	N	75%	N	N	**49.4**
Torridge Road	I (M)	Y	N	100%	N	N	**41.2**
Sussex Place	K	N	N	100%	N	N	35.6
Spackmans Way	I(M)	Y	N	100%	N	N	**44.0**

Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration 2011 ($\mu g.m^{-3}$) (Bias Adj. factor = 0.89)
Farnham Road (2)	I	Y	N	100%	N	N	38.9
Lakeside Road	UB	N	N	100%	N	N	**43.4**
Chalvey (CAS)	I(M)	Y	Triplicate co-located	92%	N	N	**41.1**
Wexham Road	K	Y	N	100%	N	N	**44.5**
Wellington Street - Stratfield	I	Y	N	92%	N	N	35.7
Blair Road- Victoria Court	I	Y	N	100%	N	N	**46.1**
Wellesley Road	I	Y	N	100%	N	N	39.0
Rogans (Colnbrook by pass)	K	Y	N	100%	N	N	**51.1**
Yew Tree Road (Uxbridge Rd)	K	Y	N	83%	N	N	**56.1**
India Road	R	N	N	100%	N	N	32.9

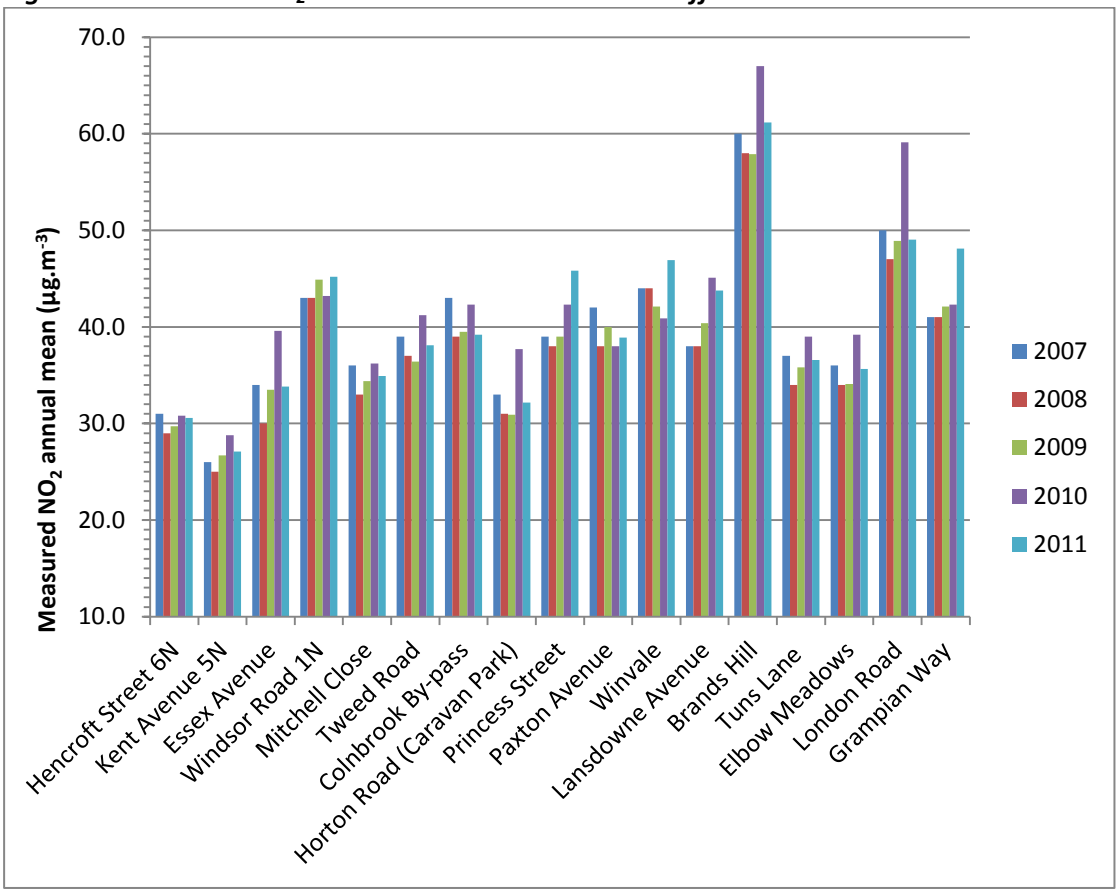
* **Short term average adjusted to annual average due to poor data capture; see Appendix A for details of calculation**

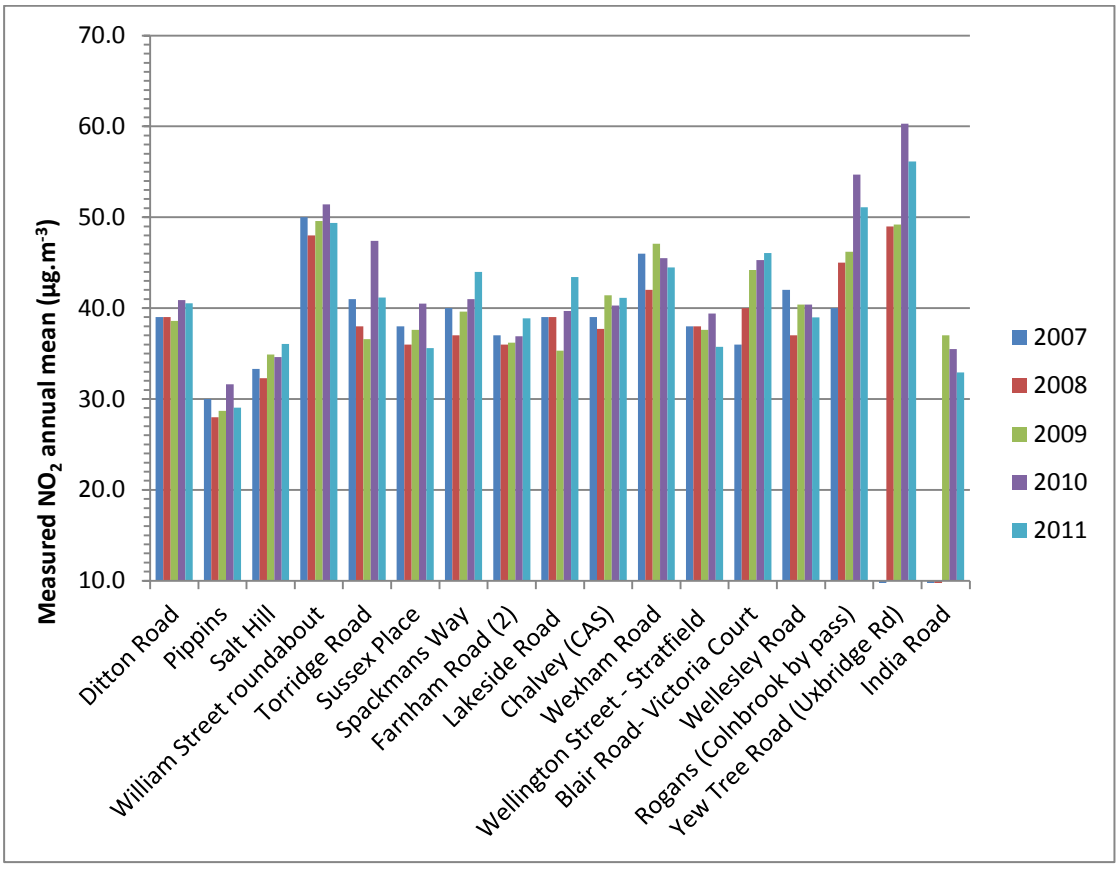
Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Location	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu g/m^3$				
			2007 (Bias Adj. Factor = 0.98)	2008 (Bias Adj. Factor = 0.93)	2009 (Bias Adj. Factor = 0.98)	2010 (Bias Adj. Factor = 0.82)	2011 (Bias Adj. Factor = 0.89)
Hencroft Street 6N	UB	N	31	29	29.7	30.8	30.6
Kent Avenue 5N	UB	N	26	25	26.7	28.8	27.1
Essex Avenue	I	N	34	30	33.5	39.6	33.8
Windsor Road 1N	K	N	**43**	**43**	**44.9**	**43.2**	**45.2**
Mitchell Close	I(M)	Y	36	33	34.4	36.2	34.9
Tweed Road	I	Y	39	37	36.4	**41.2**	38.1
Colnbrook By-pass	K	N	**43**	39	39.5	**42.3**	39.2
Horton Road (Caravan Park)	I	N	33	31	30.9	37.7	32.2
Princess Street	I	Y	39	38	39	**42.3**	**45.8**
Paxton Avenue	I(M)	Y	**42**	38	40	38	38.9

Location	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2007 (Bias Adj. Factor = 0.98)	2008 (Bias Adj. Factor = 0.93)	2009 (Bias Adj. Factor = 0.98)	2010 (Bias Adj. Factor = 0.82)	2011 (Bias Adj. Factor = 0.89)
Winvale	K(M)	Y	**44**	**44**	**42.1**	**40.9**	**46.9**
Lansdowne Avenue	I	Y	38	38	**40.4**	**45.1**	**45.5**
Brands Hill	K	Y	**60**	**58**	**57.9**	**67**	**61.2**
Tuns Lane	I	Y	37	34	35.8	39	36.6
Elbow Meadows	UB(M)	N	36	34	34.1	39.2	35.7
London Road	K	Y	**50**	**47**	**48.9**	**59.1**	**49.0**
Grampian Way	UB	Y	**41**	**41**	**42.1**	**42.3**	**48.1**
Ditton Road	I(M)	Y	39	39	38.6	**40.9**	**40.5**
Pippins	UB	N	30	28	28.7	31.6	29.0
Salt Hill	I	N	33.3	32.3	34.9	34.6	36.0
William Street roundabout	K	Y	**50**	**48**	**49.6**	**51.4**	**49.4**
Torridge Road	I (M)	Y	**41**	38	36.6	**47.4**	**41.2**
Sussex Place	K	N	38	36	37.6	**40.5**	35.6
Spackmans Way	I(M)	Y	40	37	39.6	**41**	**44.0**
Farnham Road (2)	I	Y	37	36	36.2	36.9	38.9
Lakeside Road	UB	N	39	39	35.3	39.7	**43.4**
Chalvey (CAS)	I(M)	Y	39	37.7	**41.4**	**40.3**	**41.1**
Wexham Road	K	Y	**46**	**42**	**47.1**	**45.5**	**44.5**
Wellington Street - Stratfield	I	Y	38	38	37.6	39.4	35.7
Blair Road- Victoria Court	I	Y	36	40	**44.2**	**45.3**	**46.1**
Wellesley Road	I	Y	**42**	37	**40.4**	**40.4**	39.0
Rogans (Colnbrook by pass)	K	Y	40	**45**	**46.2**	**54.7**	**51.1**
Yew Tree Road (Uxbridge Rd)	K	Y	-	**49**	**49.2**	**60.3**	**56.1**
India Road	R	N	-	-	37	35.5	32.9

Figure 2.4: Trends in NO_2 annual mean measured with diffusion tubes 2007 – 2011





2.2.2 PM_{10}

The annual mean PM_{10} concentrations measured from 2007 to 2011 are presented in Table 2.7 and Figure 2.5. No concentrations in excess of the annual mean objective were measured at any of the monitoring locations. The annual mean PM_{10} concentration measured during 2011 at Lakeside 2 has increased significantly since 2010 and other recent years but is still well below the objective.

The number of 24-hour mean PM_{10} concentrations in excess of the 50 $\mu g.m^{-3}$ short-term objective; measured from 2007 to 2011 are presented in Table 2.8. The 50 $\mu g.m^{-3}$ 24-hour mean objective was exceeded more than 35 times at both the Lakeside 1 and Lakeside 2 urban background PM_{10} monitoring sites during 2011. Neither of these locations are however representative of relevant exposure.

Figure 2.5: Trends in annual mean PM_{10} concentrations measured form 2007 – 2011

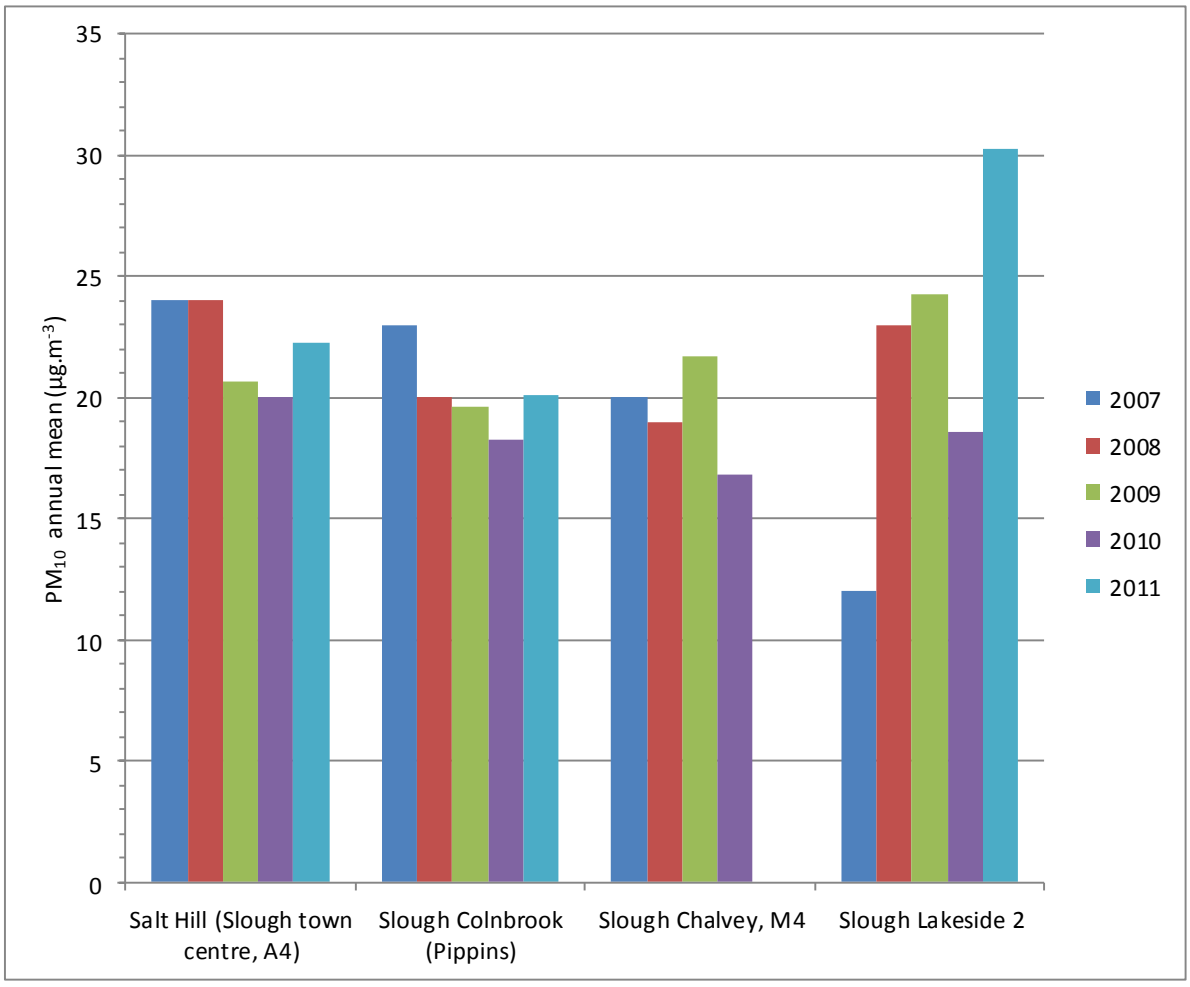


Table 2.7: Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Site name	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent	Annual Mean Concentration (µg.m^{-3})				
						2007*	2008*	2009*	2010*	2011*
SLH4 - Salt Hill (Slough town centre, A4)	I	N	94%	94%	Y	24	24	20.7	20	22.3*
SLH 3 - Slough Colnbrook (Pippins)	UB	N	92.6%	92.6%	Y	23	20	19.6	18.3	20.1*
SLH 5- Slough Colnbrook (Lakeside, Tan Hse Farm)	UB	N	92.3%	92.3%	N (Osiris)	20	19	21.7	16.8	19.9#
SLH 8 - Slough Lakeside 2	UB	N	85.5%	85.5%	Y	12	23	24.3	18.6	30.3

Osiris result adjusted with factor calculated from co-location study at Colnbrook (Pippins)

* TEOM results VCM corrected

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

Site name	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
SLH4 - Salt Hill (Slough town centre, A4)	I	N	94%	94%	Y	9	42	4	0	0*
SLH 3 - Slough Colnbrook (Pippins)	UB	N	92%	92%	Y	13	21	5	0	0*
SLH 5- Slough Colnbrook (Lakeside, Tan Hse Farm)	UB	N	92.3%	92.3%	N (Osiris)#	36	31	14	1	36#
SLH 8 - Slough Lakeside 2	UB	N	85.5%	85.5%	Y	32	39	18	4	37

Osiris result adjusted with factor calculated from co-location study at Colnbrook (Pippins)

* TEOM results VCM corrected

2.2.3 Sulphur Dioxide

Slough Borough Council do not currently measure sulphur dioxide concentrations.

2.2.4 Benzene

Benzene was monitored by diffusion tube at 4 sites in 2011 within the Borough. The diffusion tube monitoring results for benzene at these sites across the time series 2008 – 2011 are presented in Table 2.9. No concentrations in excess of the annual mean objective have been measured within Slough.

Table 2.9 Measured annual mean Benzene concentrations 2011

Site ID	Location	Within AQMA?	Data capture 2011	Annual mean concentrations (µg.m^{-3})			
				2008	2009	2010	2011
B2	Princess Street	Y	75%	1.4	1.2	0.9	1.3
B3	Pippins School	N	67%	1.0	1.0	0.8	1.2
B5	London Road	Y	75%	1.4	1.1	0.8	1.1
B7	Spackmans Way	Y	75%	-	1.1	0.7	0.9

2.2.1 Summary of Compliance with AQS Objectives

Slough Borough Council has examined the results from monitoring in the Slough area. Concentrations outside of the AQMAs 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

Slough 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

Slough 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.

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

3.4 Junctions and Busy Roads

Slough 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

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

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

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

4 Other Transport Sources

4.1 Airports

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

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Slough 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

Slough Borough Council's 2009 Updating and Screening Assessment recommended that that the Council should proceed to a Detailed Assessment of nitrogen dioxide (NO_2) concentrations at residential properties that are located within 30m of the Great Western Line. A Detailed Assessment which aimed to assess the magnitude and spatial extent of any exceedences of the air quality objectives for NO_2 in the vicinity of the Great Western Mainline was conducted in 2011.

Measured annual mean NO_2 concentrations at monitoring sites closest to the railway in Slough and Hillingdon were less than the air quality objective. The monitoring data did not support the need for declaration of an Air Quality Management Area. The dispersion modelling however indicated the potential for NO_2 concentrations in excess of the annual mean objective at residential properties within 32 m of the trackbed to the south and within 39 m to the north. There are several residential properties within this buffer, particularly in the region of Burnham station. The report therefore recommended that additional monitoring be conducted near to the residential properties closest to the railway. Two new diffusion tubes have been sited close to the railway at Walpole Road and Sandringham Court in 2012, the results from these sites will be available for review in the 2013 Progress Report.

Slough Borough Council has identified locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m, and following the recommendations of a Detailed Assessment for nitrogen dioxide conducted in 2011; is currently undertaking additional monitoring of NO_2 concentrations before taking further action.

4.3 Ports (Shipping)

Slough 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

The Lakeside Energy from Waste (EfW) plant in Colnbrook became operational in January 2010. The the Lakeside EfW Facility and the Colnbrook Clinical Waste Incinerator (which commenced operation in 2007) are located adjacent to each other at the same site.

An air quality assessment was completed in August 2010 for submission to the Environment Agency (EA) in response to permit conditions for the existing clinical waste incinerator and the new EfW plant. The permit condition required that the operator should continuously monitor ambient air quality at locations agreed with the EA, to confirm the findings of the dispersion modelling assessment, and report the results annually with an assessment against the pre-operational values. The report submitted in 2010 provided a review of monitoring data measured between 2005 and 2009; and concluded that there was no adverse impact on ambient air quality from the clinical waste incinerator and that there was insufficient data to assess if any impact was attributable to the EfW plant as it only became operational in early 2010.

The air quality assessment report submitted to the Environment Agency the following year 2011 reported annual mean NO_2 concentrations measured when the new EfW plant was operational. The report concluded that in general the measured concentrations has decreased and there was no evidence to suggest that NOx emissions from the EfW plant or Clincial Waste incinerator have not had a noticeable effect on measured NO_2 or PM_{10} concentrations.

Slough 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

Slough 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

Slough 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

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

5.4 Poultry Farms

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

No new biomass combustion installations fulfilling the criteria specified in Box 5.8 D.1a are in operation within the Slough Borough Council area. The biomass woodchip boiler at the Wexham Nursery on Wexham Road, is no longer operational as the Nursery closed September 2010.

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

6.2 Biomass Combustion – Combined Impacts

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

6.3 Domestic Solid-Fuel Burning

The whole of the Slough Borough Council area is covered by Smoke Control orders therefore no significant burning of domestic fuel is occurring within the Borough.

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

7 Fugitive or Uncontrolled Sources

Slough Borough Council confirms that there are no newly identified potential sources of fugitive particulate matter emissions, not identified or assessed in previous rounds of review and assessment, in the Local Authority area.

8 Planning applications

There were 13 major planning applications made within Slough during 2010. Information on these applications has been included in this Progress report to provide a log of applications for new developments; this aims to provide a picture of areas where changes may take place and where combined impacts from several developments may be important.

Table 8.1: Major planning applications 2011

Dwellings		
P/11508/004	Construction of a mixed use building (up to 16 storeys) comprising of 249 apartments, 1627 m2 of retail and community uses (use class a1, a2, a3, a4, d1 (excluding doctors surgery) and d2), 130 car parking spaces and associated highway works (this application amends development already under construction under planning permission ref; p/11508/003 dated 31st october 2007 by the addition of 20 apartments and 147 sq. M. Of retail and community uses).	Land At: Railway Terrace and Mill Street, Including, 54 & 56, Grays Place, Railway Terrace, Slough, Berkshire
P/12828/002	Construction of 1 no. Three storey block of flats consisting of 14 no. One bedroom flats and 1 no. Part two /part three storey block of flats consisting of 2 no. Two bedrooms and 3 no. One bedroom flats with 21 no. Parking spaces	141-143, Chalvey Grove, Slough, Berkshire, SL1 2TD
P/08770/070	Details of 161 dwellings. (reserved matters application regarding outline planning permission p/08770/067 for residential development)	Land North & South of extension of, Eltham Avenue, Slough, Berkshire
P/00522/019	Application for a new planning permission to replace an extant planning permission for change of use from car park to residential and car park use; demolition and relocation of existing electric sub-station; erection of part four/ part three/ part single storey building to comprise sixteen no. Flats (six no. One bedroom and ten no. Two bedroom flats), on podium and semi-basement. Basement to contain twenty nine no. Replacement parking spaces (including one no. Disabled)	Land at Car Park r/o Meridian House, Bishops Road, Slough, Berkshire, SL1 1QP
S/00671/000	Demolition of existing buildings and construction of a residential development (outline planning application)	Newbeech House, Long Readings Lane, Slough, SL2 1QP
Industrial & storage		
P/09777/005	Erection of industrial unit (1393.5 sq. M.) For class b8 (storage and distribution) with ancillary office space with associated entrance, parking and landscaping	Former, John Taylor House, Blackthorne Road, Colnbrook, Slough, Berkshire, SL3 0AH
P/08948/002	Application to replace extant planning permission p/08984/001 for extensions to rear of existing buildings, minor re cladding, new front canopies, alterations to parking layout and site landscaping and change of use from class b1(a) (offices) to class b1(c) (light industrial) or class b2 (general industrial) or class b8 (storage and distribution) in order to extend the time limit for implementation	Units 3, 4, 5 and 6, Waterside Drive, Slough, Berkshire
P/10650/009	Variation of condition 40 of planning permission p/10650/004 pre occupation of premises	Former International Catering Limited, Walford Meadows, Horton Road, Colnbrook, Slough, Berkshire, SL3 0BG
Other		
P/02320/033	Variation of condition 12 and 13 of planning permission ref. P/02320/020 dated 11/05/01 to permanently extend hours of use (to 1am mon - fri and 3am sat - sun) and change maximum number of guests to 500 daytime monday - friday (original permission change of use site erection of new conference centre with ancillary residential accommodation)	Baylis Business Centre, Baylis House, Stoke Poges Lane, Slough, Berkshire, SL1 3PB

P/15180/000	Application for the temporary use of land adjacent to the existing access road within the western end of upton court park for use as a temporary pedestrian waiting / loading area for awaiting shuttle buses, including temporary installation of crowd control barriers, hard surfacing, associated buildings to provide toilets and welfare office. This application is in support of proposals for the use of land within the royal borough of windsor and maidenhead for a temporary period of seven weeks as a park and ride facility in connection with the london 2012 olympic games events at eton dorney lake.	Upton Court Park, Upton Court Road, Slough, Berkshire, SL3 7LU
P/09979/001	Demolition of existing office building and erection of a class b8 warehouse with ancillary offices together with access, servicing and reconfiguration of car park	Mill House, Mathisen Way, Mill Book Way, Poyle, Berkshire, SL3 0AA
S/00308/003	Mixed use community building to include social, welfare and learning facilities for the local community	Wentworth Industrial Court and 41-43, Wentworth Avenue, Slough, SL2 2ER
Retail		
P/00488/035	Variation of condition 2 of planning permission p/00488/034 for demolition of existing b2 industrial unit and replacement with two class a1 retail units including car parking, servicing and landscaping	145-147, Farnham Road, Slough, Berks, SL1 4XB

9 Other relevant information on new developments

Heart of Slough development

Since the declaration of the two new AQMAs in the Town Centre a major redevelopment known as the Heart of Slough has been partially constructed. This re-development has altered the traffic flows in the area and may introduce new receptors once complete. The proposed scheme comprises the redevelopment of four sites and the reconfiguration of the highway layout with the overall site area of 11.7 hectares of land in Slough town centre between the mainline railway station and Slough's principle shopping area. The site, centred upon Wellington Street/William Street roundabout, encompasses Brunel bus station, Thames Valley University, the public library site and the area around the St Ethelbert's church and the Day Centre at William Street.

The proposed scheme has radically altered the road layout within the town centre by replacing the current roundabout that connects Wellington Street (A4) to William Street with a comprehensive signalised junction. This has resulted in significant areas of development land, previously occupied by the roundabout structure, being made available for development. It has removed a large roundabout, built a new bus station and altered the traffic flow; there is also now a one-way system in operation.

This development is located within the Town Centre AQMA. This will mean that the modelling results for the Detailed and Further Assessment (2011) conducted for the Town Centre AQMA will not be relevant to the new road layout and associated traffic flows.

The environmental statement for the scheme stated that overall, the predicted change in road traffic emissions associated with the operation of the proposed development would not have a significant effect on any receptors that are sensitive to local air quality. Emissions from road traffic associated with the development were predicted to increase annual mean concentrations of NO_2 and PM_{10} but were considered to be of negligible significance.

Slough Borough Council intends to continue measuring NO_2 concentrations with the diffusion tube network in the Town Centre AQMA and is also installing a new automatic continuous NOx monitor in Wellington Street. The results of the monitoring will inform future requirements at this location.

Sainburys Superstore – Uxbridge Road/A4

No air quality assessment was carried out for the new Sainsbury's superstore, which opened in November 2010, at the main roundabout junction with the A4 and Uxbridge Road as there was a Co-op supermarket there previously. The new continuous monitor will be located close to this supermarket as well.

10 Local Transport Plan

Chapter 5 of Slough's Second Local Transport Plan (LTP2) describes the local situation with respect to air quality and acknowledges that emissions from road traffic are the major cause of air quality problems in the Borough. Wider air quality action plan measures are described in the LTP2 as well as measures specific to both the Brands Hill and M4 AQMAs.

The Councils' Third Local Transport Plan was adopted in March 2011 and sets out a transport strategy for the Borough covering the 15-year period from April 2011 to March 2026. An Interim Implementation Plan has been published which outlines the schemes and measures planned for 2011/12; a 3-year Implementation Plan is being prepared which covers the period 2012/13 to 2014/15.

11 Conclusions and Proposed Actions

11.1 Conclusions from New Monitoring Data

An NO_2 annual mean concentration in excess of the 40 $\mu g.m^{-3}$ objective was measured at one of the automatic monitoring sites and at various diffusion tube sites. All of these sites are either within one of the existing AQMAs or are not at locations of relevant exposure. There is therefore no need to proceed to a Detailed Assessment based on the recent NO_2 measurements.

Annual mean NO_2 concentrations measured at the automatic monitoring sites have on average been decreasing at all locations, except Chalvey, over the last five years. Examination of the trend in NO_2 annual means measured across the Slough network of diffusion tubes indicates that concentrations have reduced slightly since 2010, but in general have either increased slightly or remained fairly constant over recent years.

No exceedances of the NO_2 1-hour mean objective were measured at any locations of relevant exposure during 2011.

For both PM_{10} and benzene, annual mean concentrations measured during 2011 were below the respective objectives. The annual mean PM_{10} concentration measured during 2011 at Lakeside 2 (30.7 $\mu g.m^{-3}$) has shown a marked increase since 2010 and other recent years but is still significantly below the 40 $\mu g.m^{-3}$ objective.

The 50 $\mu g.m^{-3}$ PM_{10} 24-hour mean objective was exceeded more than 35 times at both the Lakeside 1 and Lakeside 2 urban background PM_{10} monitoring sites during 2011. Neither of these locations are however representative of relevant exposure.

Air quality objectives were achieved at all monitoring locations outside of the existing AQMAs at locations of relevant exposure hence there is no need to proceed to a Detailed Assessment at any location. Continued measured annual mean NO_2 concentrations in excess of the objective within the current AQMAs confirm that the AQMAs are still required.

11.2 Conclusions from Assessment of Sources

The assessment of new sources has not identified any new sources that have not been considered previously. Therefore a detailed assessment is not required of any new sources.

Slough Borough Council has identified a location with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m, and following the recommendations of a Detailed Assessment for NO_2 conducted in 2011; is currently undertaking additional monitoring of NO_2 concentrations before taking further action.

11.3 Proposed Actions

The Updating and Screening assessment has not identified any locations where a Detailed Assessment for any source or pollutant should be conducted.

Slough Borough Council will continue monitoring at all existing sites within the Borough and will continue to implement the measures outlined in their Air Quality Action Plan for the Brands Hill AQMA, the M4 AQMA as well as borough wide.

An action plan for the more recently declared AQMAs at Tuns Lane and Slough Town Centre is currently in preparation.

The Detailed and Further Assessment 2011 (as summarised in Section 1.4.6 above) recommended that the Council should consider extending the new AQMAs at Tuns Lane and Slough Town Centre. Slough Borough Council's actions to address this have been to review the monitoring data and locations. This has resulted in locating 2 new diffusion tubes just outside the boundary of the AQMAs in January 2012 at the façade of residential properties. The measured annual mean NO_2 concentrations at these receptors will be reported in the 2013 progress Report.

It has also subsequently been highlighted that the 2009 NO_2 annual mean measured at the nearest continuous monitor at Salt Hill Park had been reported incorrectly in the 2010 and 2011 Progress Reports; and has now been amended from 40.1 $\mu g.m^{-3}$ to 35 $\mu g.m^{-3}$. This correction shows that the monitoring site which is representative of public exposure just outside the AQMA has never recorded an NO_2 annual mean in excess of the objective; and has been less than 36 $\mu g.m^{-3}$ over the last 3 years.

A further review of the extent of each AQMA will be conducted in 2013 when the additional diffusion tube data is available.

12 Acknowledgements

AEA gratefully acknowledge the support received from Monica Wilsch and Nikki Patefield of Slough Borough Council when completing this assessment.

13 References

Department for Environment, Food and Rural Affairs, (2009) Local Air Quality Management Technical Guidance LAQM.TG (09).

Department for Environment, Food and Rural Affairs, Air Quality Strategy for England, Scotland Wales and Northern Ireland, 2007.

Slough Borough Council, Air Quality Updating and Screeening Assessment, 2009

Slough Borough Council, Air Quality Review and Assessment Progress Report, 2010

Slough Borough Council, Air Quality Review and Assessment Progress Report, 2011

Slough Borough Council Air Quality Detailed and Further Assessment 2011

Spreadsheet of Diffusion Tube Bias Adjustment Factors accessed at http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Appendices

Appendix A: QA/QC Data

Appendix A: QA:QC Data

PM_{10} Monitoring Adjustment

Daily mean TEOM measurements were adjusted to account for the volatile fraction of particulate matter using data download from the Kings Colleeg VCM Portal Website.

Short-term to Long-term Data adjustment

A short to long term data adjustment was applied to one annual mean NO_2 diffusion tube measurements at Landsdowne Avenue where the data capture was less than 75%. The details of the AURN sites used to calculate the adjustment factor are presented in Table A.1

Table A.1 Short to long term data adjustment derivation for Landsdowne Avenue diffusion tube

Site	Site Type	Annual Mean (Am)	Period Mean (Pm)	Ratio (Am/Pm)
London Hillingdon	UB	55.2	55.9	1.01
Reading New Town	UB	25.9	27.7	1.07
			Average ratio (Am/Pm)	**1.04**

QA/QC of automatic monitoring

Slough Borough Council's automatic sites are part of the National Automatic Monitoring Calibration Club, whereby monitoring data are managed to the same procedures and standards as AURN sites by AEA Technology.

Diffusion Tube Bias Adjustment Factors

The diffusion tubes deployed by the Slough Borough Council's are supplied and analysed by ESG using a preparation mixture of 50% triethanolamine (TEA) in acetone. ESG participate in the WASP scheme and 100% of results submitted during the January to December 2011 were determined to be satisfactory based upon a z-zcore of < ± 2.

Factor from Local Co-location Studies (if available)

There were three local co-location studies conducted within the borough during 2011 at Pippins, Salt Hill and Chalvey. Bias factors have been calculated for each site.

Table A.2 shows details of the calculation of the combined bias adjustment factor, details of how the the co-location factors were calculated are presented in Figures A.1 to A.3

Table A.2: Calculation of the average diffusion tube bias adjustment factor 2011

Co-location site	Bias adjustment factor 2011
Chalvey	0.95
Colnbrook	0.9
Salthill	0.81
Average bias	**0.89**

Discussion of Choice of Factor to Use

The locally derived co-location factor derived from three co-location studies has been used to bias adjust the diffusion tube results. This is consistent with the approach used to adjust Slough Borough Council's diffusion tube results in recent years. At the time of writing the national database of co-location studies has not been published.

Figure A.1: Co-location study – Slough Chalvey

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	05/01/2011	02/02/2011	59.0	55.4	55.0	56	2.2	4	5.5
2	02/02/2011	02/03/2011	59.3	60.3	53.9	58	3.4	6	8.6
3	02/03/2011	30/03/2011							
4	30/03/2011	27/04/2011	47.5	50.4	43.7	47	3.4	7	8.3
5	27/04/2011	01/06/2011	41.3	39.1	28.8	36	6.7	18	16.6
6	01/06/2011	29/06/2011	36.0	30.8	40.4	36	4.8	13	11.9
7	29/06/2011	03/08/2011	33.1	34.2	34.4	34	0.7	2	1.7
8	03/08/2011	31/08/2011	43.3	34.7	37.1	38	4.4	12	11.0
9	31/08/2011	28/09/2011	46.2	41.1	46.1	44	2.9	7	7.2
10	28/09/2011	02/11/2011	58.2	53.4	56.7	56	2.5	4	6.1
11	02/11/2011	30/11/2011	57.4	58.0	58.1	58	0.4	1	0.9
12	30/11/2011	04/01/2012	51.3	47.0	39.5	46	6.0	13	14.8
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
47.75	92.5	Good	Good
47.75	90.8	Good	Good
53.48	92.4		Good
49.66	93.2	Good	Good
38	94	Good	Good
38	91.2	Good	Good
34	94.6	Good	Good
34	66.4	Good	or Data Capture
40	91.4	Good	Good
53	89.8	Good	Good
55.39	74	Good	or Data Capture
42.02	97.6	Good	Good
Overall survey -->		Good precision	Poor Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Slough - Chalvey

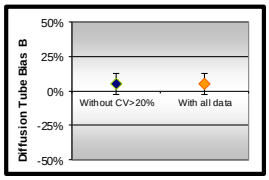
Precision: 11 out of 11 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

Bias calculated using 9 periods of data
Bias factor A: 0.95 (0.88 - 1.02)
Bias B: 6% (-2% - 13%)
Diffusion Tubes Mean: 46 µgm^{-3}
Mean CV (Precision): 8
Automatic Mean: 44 µgm^{-3}
Data Capture for periods used: 93%
Adjusted Tubes Mean: 44 (40 - 47) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 9 periods of data
Bias factor A: 0.95 (0.88 - 1.02)
Bias B: 6% (-2% - 13%)
Diffusion Tubes Mean: 46 µgm^{-3}
Mean CV (Precision): 8
Automatic Mean: 44 µgm^{-3}
Data Capture for periods used: 93%
Adjusted Tubes Mean: 44 (40 - 47) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Figure A.2: Co-location study – Slough Colnbrook

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	05/01/2011	02/02/2011		45.4	40.8	43	3.3	8	29.2	34.38	99.9	Good	Good
2	02/02/2011	02/03/2011	45.4	42.0	40.4	43	2.6	6	6.3	34.38	99.9	Good	Good
3	02/03/2011	30/03/2011	46.9	43.7	45.0	45	1.6	4	4.0	47.75	99.9	Good	Good
4	30/03/2011	27/04/2011	39.9	32.4	38.1	37	3.9	11	9.7	34.38	99.9	Good	Good
5	27/04/2011	01/06/2011	17.9	17.0	18.1	18	0.6	3	1.5	19	77.9	Good	Good
6	01/06/2011	29/06/2011	20.0	21.1	13.6	18	4.1	22	10.1	17	99.9	Poor Precision	Good
7	29/06/2011	03/08/2011	20.1	23.9	20.9	22	2.0	9	5.0	23	99.9	Good	Good
8	03/08/2011	31/08/2011	24.5	25.9	21.3	24	2.4	10	5.9	21	99.9	Good	Good
9	31/08/2011	28/09/2011	26.9	25.9	25.8	26	0.6	2	1.5	23	98.9	Good	Good
10	28/09/2011	02/11/2011	42.6	40.0	44.0	42	2.0	5	5.0	34	99.9	Good	Good
11	02/11/2011	30/11/2011	53.0	53.3	53.5	53	0.3	0	0.6	47.75	99.6	Good	Good
12	30/11/2011	04/01/2012	26.2	25.6	24.9	26	0.7	3	1.6	22.92	95.8	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

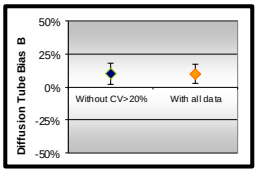
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Slough - Colnbrook

Precision: 11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.9 (0.84 - 0.97)
Bias B	11% (3% - 19%)
Diffusion Tubes Mean:	34 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	31 µgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	31 (29 - 33) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.91 (0.85 - 0.97)
Bias B	10% (3% - 18%)
Diffusion Tubes Mean:	33 µgm^{-3}
Mean CV (Precision):	7
Automatic Mean:	30 µgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	30 (28 - 32) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Figure A.3: Co-location study – Slough Salthill

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	05/01/2011	02/02/2011	50.3	42.8	43.9	46	4.1	9	10.1	38.2	99.9	Good	Good
2	02/02/2011	02/03/2011	45.4	46.1	54.9	49	5.3	11	13.2	38.2	99.9	Good	Good
3	02/03/2011	30/03/2011		36.8						42.02	99.9		Good
4	30/03/2011	27/04/2011	31.4	19.4	30.6	27	6.7	25	16.7	36.29	99.9	Poor Precision	Good
5	27/04/2011	01/06/2011	24.1	30.4	28.7	28	3.3	12	8.1	25	99	Good	Good
6	01/06/2011	29/06/2011	42.2	23.8	27.2	31	9.8	32	24.3	27	99.9	Poor Precision	Good
7	29/06/2011	03/08/2011	25.3	22.9	25.0	24	1.3	5	3.2	25	99.8	Good	Good
8	03/08/2011	31/08/2011	38.0	41.4		40	2.4	6	21.6	29	99.9	Good	Good
9	31/08/2011	28/09/2011	45.8	44.8	52.8	48	4.4	9	10.8	34	99.1	Good	Good
10	28/09/2011	02/11/2011		59.8	51.7	56	5.7	10	51.5	44	99.7	Good	Good
11	02/11/2011	30/11/2011	55.4	54.8	61.8	57	3.9	7	9.6	43.93	99.1	Good	Good
12	30/11/2011	04/01/2012	47.6	43.6	48.8	47	2.7	6	6.8	40.11	99.7	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

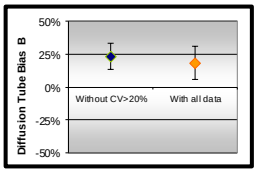
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Slough - Salthill (Town Centre)

Precision: 9 out of 11 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 9 periods of data	
Bias factor A	0.81 (0.75 - 0.87)
Bias B	24% (14% - 34%)
Diffusion Tubes Mean:	44 µgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	35 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	35 (33 - 38) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.84 (0.76 - 0.94)
Bias B	19% (6% - 31%)
Diffusion Tubes Mean:	41 µgm^{-3}
Mean CV (Precision):	12 caution
Automatic Mean:	35 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	35 (31 - 39) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Table A.2: NO_2 monthly mean concentrations measured at diffusion tubes sites 2011

Site name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean ($\mu g.m^{-3}$)	Data capture	Requires annualised ?	Bias adjusted annual mean ($\mu g.m^{-3}$) (0.89 adj factor)
Hencroft Street * 6N	48.1	40.9	42.8	36.9	21.9	19.3	23.1	26.1	29.6	38.3	51.2	35.7	34.5	100%	No	30.6
Kent Avenue * 5N	40.7	40.8	36.9	26.9	14.5	16.1	14.4	24.9	31.4	37.4	48.0	34.6	30.6	100%	No	27.1
Essex Avenue	46.6	-	39.5	33.0	-	-	22.2	30.3	32.2	46.2	53.2	40.1	38.1	75%	No	33.8
Windsor Road * 1N	63.1	62.0	54.7	50.8	28.0	34.5	29.8	-	44.9	58.2	83.7	50.8	51.0	92%	No	45.2
Mitchell Close	49.2	46.7	44.1	36.3	26.8	34.4	22.0	32.6	42.6	51.6	45.3	41.0	39.4	100%	No	34.9
Tweed Road	52.8	-	51.3	48.9	26.2	34.3	36.4	41.2	31.9	51.7	61.4	36.5	43.0	92%	No	38.1
Colnbrook By-pass.moved slightly	54.6	55.3	43.5	44.7	31.1	37.2	29.0	37.7	43.9	59.4	54.8	39.1	44.2	100%	No	39.2
Horton Road (Caravan Park)	51.1	47.7	48	37.3	20.8	22.4	28.9	27.4	28.4	40.6	55.4	27.4	36.3	100%	No	32.2
Princess Street	61.7	62.0	55.3	45.9	24.2	41.6	-	43.1	-	68.8	58.9	55.3	51.7	83%	No	45.8
Paxton Avenue	1.7	62.5	-	40.6	30.7	-	38.3	41.9	49.0	61.7	65.6	46.7	43.9	83%	No	38.9
Winvale	57.3	51.9	58.7	48.6	32.4		53.4	44.0	56.7	63.2	56.4	59.4	52.9	92%	No	46.9
Lansdowne Avenue		57.0	56.3	-	-	30.9	33.2	38.0	-	62.9	59.6	56.9	49.4	67%	Yes	43.8
Brands Hill	86.8	82.3	81.6	67.7	52.1	58.3	60.8	65.9	63.9	74.8	77.0	56.5	69.0	100%	No	61.2
Tuns Lane	52.8	51.9	54.4	51.2	22.4	28.5	30.6	33.9	38.4	43.1	50.4	37.3	41.2	100%	No	36.6
Elbow Meadows	49.4	55.3	42	47.3	26.8	23.4	26.0	29.4	33.6	53.5	64.4	31.5	40.2	100%	No	35.7
London Road - moved slightly	76.1	-	-	-	38.4	44.3	54.6	51.6	46.4	64.6	71.8	49.8	55.3	75%	No	49.0
Grampian Way	57.6	65.3	49.3	-	40.2	45.9	-	45.1	54.7	67.3	69.9	47.2	54.3	83%	No	48.1
Ditton Road	53.9	57.8	57.2	47.3	32.1	29.7	32.8	38.7	43.4	55.6	64.3	35.9	45.7	100%	No	40.5
Pippins *	-	45.4	46.9	39.9	17.9	20.0	20.1	24.5	26.9	42.6	53.0	26.2	33.0	92%	No	29.3
Pippins *	45.4	42.0	43.7	32.4	17.0	21.1	23.9	25.9	25.9	40.0	53.3	25.6	33.0	100%	No	29.3
Pippins *	40.8	40.4	45.0	38.1	18.1	13.6	20.9	21.3	25.8	44.0	53.5	24.9	32.2	100%	No	28.6
Salt Hill *	50.3	45.4	-	31.4	24.1	42.2	25.3	38.0	45.8	-	55.4	47.6	40.6	83%	No	36.0
Salt Hill *	42.8	46.1	36.8	19.4	30.4	23.8	22.9	41.4	44.8	59.8	54.8	43.6	38.9	100%	No	34.5
Salt Hill *	43.9	54.9	-	30.6	28.7	27.2	25.0	-	52.8	51.7	61.8	48.8	42.5	83%	No	37.7
William Street roundabout	72.6	69.8	50.3	67.8	37.1	41.2	45.8	52.7	63.9	-	-	-	55.7	75%	No	49.4

Site name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean ($\mu g.m^{-3}$)	Data capture	Requires annualised ?	Bias adjusted annual mean ($\mu g.m^{-3}$) (0.89 adj factor)
Torridge Road	67.4	65.5	61.0	49.8	26.6	30.5	36.6	33.2	32.6	48.2	61.3	44.6	46.4	100%	No	41.2
Sussex Place	54.8	51.6	52.3	36.7	20.5	24.6	28.4	37.0	38.2	45.4	50.2	41.9	40.1	100%	No	35.6
Spackmans Way	56.2	57.3	50.8	52.6	36.7	39.8	34.1	44.5	48.8	61.5	62.2	50.6	49.6	100%	No	44.0
Farnham Road (2)	54.8	54.3	38.2	41.4	31.5	32.5	30.7	37.9	44.6	50.5	58.7	50.8	43.8	100%	No	38.9
Lakeside Road *	55.8	59.8	58.0	56.4	35.0	37.0	39.3	43.8	47.0	57.2	60.0	38.1	49.0	100%	No	43.4
Chalvey (CAS) *	59.0	59.3	-	47.5	41.3	36.0	33.1	43.3	46.2	58.2	57.4	51.3	48.4	92%	No	42.9
Chalvey (CAS) *	55.4	60.3	-	50.4	39.1	30.8	34.2	34.7	41.1	53.4	58.0	47.0	45.9	92%	No	40.7
Chalvey (CAS) *	55.0	53.9	-	43.7	28.8	40.4	34.4	37.1	46.1	56.7	58.1	39.5	44.9	92%	No	39.8
Wexham Road	59.0	62.0	47.9	38.4	39.3	42.1	36.5	50.4	55.8	63.8	56.5	50.2	50.2	100%	No	44.5
Wellington Street - Stratfield	50.1	46.6	46.8	44.1	26.8	26.3	31.5	39.5	-	46.3	48.0	37.5	40.3	92%	No	35.7
Blair Road- Victoria Court	62.3	61.2	54.1	61.3	35.6	41.5	33.0	55.2	61.8	31.7	60.8	65.1	52.0	100%	No	46.1
Wellesley Road	57.4	59.5	48.9	37.0	29.5	36.8	29.0	41.1	45.8	28.8	62.4	51.2	44.0	100%	No	39.0
Rogans (Colnbrook by pass)	83.4	65.1	61.1	53.2	35.9	43.4	46.7	55.2	50.0	61.8	79.7	56.2	57.6	100%	No	51.1
Yew Tree Road (Uxbridge Rd)	-	71.0	62.4	67.7	49.7	48.2	-	55.9	57.5	72.6	83.3	64.9	63.3	83%	No	56.1
India Road	50.2	43.3	44.1	39.0	26.0	22.1	25.3	28.9	34.7	42.2	49.7	40.0	37.1	100%	No	32.9