2014 Air Quality Progress Report for Slough Borough Council

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

October 2014

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Executive Summary

Slough Borough Council (SBC) has prepared a Progress Report as required by the Local Air Quality Management (LAQM) 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 the Local Authority identifies a risk of an air quality exceedance then it should proceed immediately to a Detailed Assessment.

The NO_2 annual mean concentrations measured at all **automatic continuous monitoring sites** within the borough were all less than the 40 $\mu g.m^{-3}$ objective during 2013; the measured concentration at the Chalvey site was less than the objective again in 2013. No exceedances of the hourly standard were measured in Slough in 2013.

However, there is a need to decommission at least 1 automatic continuous air quality monitoring station and add 3 new automatic continuous monitoring stations within Slough's existing Air Quality Management Areas. This air quality monitoring programme will be implemented over the next 2 year. The intention is to have the new network fully operational and producing ratified air quality data to be reported within 2017 progress report.

Based on the analysis of automatic monitoring data from 2013, Slough Borough Council is not required to proceed to a Detailed Assessment.

Annual mean NO_2 concentrations in excess of the 40 $\mu g.m^{-3}$ objective were measured during 2013 at a number of passive diffusion tube locations, but all are within one of the existing or soon to be amended AQMA boundaries.

Annual mean NO_2 concentrations in excess of the objective were also measured at a few locations where relevant receptors are present and the tubes fall outside the existing AQMAs during 2013. However using Defra's distance correction calculator reduces the concentrations of NO_2 at these locations (Goodman Park and Windsor Road) to below the 40$\mu g.m^{-3}$ standard. In addition, the Windmill site (on Bath Road) still exceeds the annual mean standard but this will be encompassed by the forthcoming Tuns Lane AQMA extension. The only tube with an annual mean NO2 value over 40$\mu g.m^{-3}$ and not covered by the descriptions above was Lakeside Road which does not have relevant exposure for the annual mean objective.

An annual mean concentration in excess of 60 $\mu g.m^{-3}$ was measured at Brands Hill and Yew Tree Road during 2013 which is consistent with previous years; this may indicate that the 1-hr mean objective of 200 $\mu g.m^{-3}$ is being exceeded at these locations. It is Slough Borough Councils intention to locate an automatic station on Brands Hill that will allow both the annual mean and 1-hr mean objective to be monitored on a continuous basis.

Concentrations at Sandringham Road and Walpole Road- which are both located close to railway lines- continue to be well within the NO_2 annual mean objective

Examination of the trend in NO_2 annual mean concentrations measured across the Slough network of diffusion tubes indicates that concentrations have been increasing slightly over recent years. That said, the trend is not clear at a number of the monitoring sites.

Based on the analysis of diffusion tube monitoring data from 2013, Slough Borough Council is not required to proceed to a Detailed Assessment.

Slough Borough Council has identified the following new or previously unidentified local developments which may impact on air quality in the Local Authority area over the next few years.

- Changes to local traffic patterns following implementation of the Chalvey traffic management scheme (affect AQMA 3)
- Proposed changes to local traffic patterns following implementation of Windsor Road A322 (affect AQMA 4) and Tuns Lane A355 (affect AQMA 3)
- Slough Mass Rapid Transit Scheme A4 scheme (affect AQMA 2, 3 and 4)
- Scottish Southern Electric multifuel combined heat and power plant (40MW) gross electrical capacity and up to 20 MW of heat (affect AQMA 3)
- Slough Freight International Exchange in Colnbrook Ward (affect AQMA 2)
- Heathrow Road Stone Coating Plant (affect background levels)
- DHL 400 KW (Biomass Plant) (affect background levels)
- Proposed Sand and Gravel Pit at Riding Court Farm in Royal Borough of Windsor and Maidenhead (affect AQMA 1 and 2)
- National Infrastructure Project HA M4 Smart Motorway affects all Sloughs AQMAs
- National Infrastructure Project Heathrow 3rd runway expansion affectw all Sloughs AQMAs

These developments will be taken into consideration in the next Updating and Screening Assessment

This Progress Report has not resulted in any immediate actions being required of Slough Borough Council. The next action will be to prepare the next LAQM report, which is the Updating and Screening Assessment in 2015.

The SBC programme to add 3 new monitoring stations within its AQMAs has been slightly delayed to ensure the successful role out and delivery of EV charging infrastructure which is a key requirement of the Local Sustainability Transport Fund, Local Transport Plan and Aor Quality Actions Plans. The programme is expected to be completed by December 2015.

The Air Quality Management Order for Tuns Lane AQMA 3, is currently awaiting legal advice and will now be amended by March 2015, the amendment is a very minor extension (approximately 300m) eastwards along the A4 as advised in the 2013 Detailed and Assessment Report.

A review of the SBC air quality plans will be undertaken in 2016 and SBC have also submitted a grant application to DEFRA to prepare a low emission strategy in 2015.

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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 very 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. Crossrail will also be going through Slough. The town is an important commercial centre and includes both industrial and high densely populated residential areas.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) 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 exceedances 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the LAQM process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedance of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to 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 μg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances 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 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 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
Particulate Matter (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 exceedances 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 Grundon waste facility in Colnbrook (when operational) 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 NO2 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 PM10 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

Exceedances 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 1) and the A4 (Brands Hill AQMA 2). 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.

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.

Detailed and Further Assessment 2011

The Detailed Assessment aimed to assess the magnitude and spatial extent of any air quality objective exceedances 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 exceedances 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.

Progress Report 2011

The 2010 NO_2 monitoring data showed that within the existing AQMAs there continues 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 exceedance 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.

1.4.5 Fifth round of review and assessment

Updating and Screening Assessment, 2012

An NO_2 annual mean concentration in excess of the 40 µg.m^{-3} objective was measured at one automatic monitoring site and at various diffusion tube sites during 2011. 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, PM_{10} annual mean or 24-hour mean objective; or benzene annual mean objective were measured at any locations of relevant exposure during 2011.

The assessment of new sources did not identify any new sources that have not been considered previously.

No requirement to proceed to a Detailed Assessment was therefore identified from either new monitoring data or assessment of new/changed sources.

Progress Report 2013

NO_2 annual mean concentrations measured at all of the automatic monitoring sites within the borough were less than the 40 µg.m-3 objective during 2012; the measured concentration at the Chalvey site was less than the objective for the first time in recent years. No exceedances of the short-term NO2 objective were recorded at any of the automatic monitoring sites during 2012.

An annual mean NO2 concentration in excess of the 40 µg.m-3 objective (and outside existing AQMA boundaries at the time) was measured at one diffusion tube location that is representative of relevant human exposure during 2012. This diffusion tube at Windmill care home (Bath Road) is located on the building façade. This location is representative of relevant exposure at the residential properties on the north side of Bath Road. The Detailed Assessment and Further Assessment 2011 report was subsequently revised to take account of Defra comments and to clearly define the geographical extent, of the extended Tuns Lane AQMA.

No exceedances of any PM10 objectives were measured in 2012.

The review of local major developments did not identify any locations where there was a risk of the air quality objectives being exceeded.

A number of changes to the road network have been made as part of the Chalvey Traffic Management Project. Once traffic count data is available for the roads affected it will be possible to assess if there is a risk of the air quality objectives being exceeded at any relevant locations using the Updating and Screening assessment screening criteria. There are two proposed industrial developments the Slough International Freight Exchange in Colnbrook and Scottish Southern Electric multifuel combined heat and power plant within the Segro Slough Industrial Estate that may give rise to significant air quality impacts locally. Both will require detailed air quality assessments and will be considered at the 2015 Updating and Screening Assessment

Amended Detailed/Further Assessment 2013

Slough Borough Council's 2009 Updating and Screening Assessment recommended that that the Council should proceed to a Detailed Assessment of nitrogen dioxide (NO2) concentrations at residential properties that are located within 30m of the Great Western Line. The 2011 (amended in 2013) report provided a Detailed Assessment, which aims to assess the magnitude and spatial extent of any exceedances of the air quality objectives for NO_2 in the vicinity of the Great Western Mainline that runs through Slough.

Measured concentrations at monitoring sites closest to the railway in Slough and Hillingdon were found to be less than the air quality objective. The monitoring data thus did not support the need for a declaration of an Air Quality Management Area. However modelling indicated the potential for exceedance of the air quality objective at residential properties within 32 m south of the centre 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. We therefore recommend that additional monitoring is carried out near residential properties closest to the railway.

Monitoring has since been carried out at two residential locations and reported in the 2013 amended report. Sandringham Court and Walpole Road had NO_2 concentrations that fell within the railway buffer area and the ratified monitoring data for 2012 confirmed that air quality levels were well below the Air Quality Objectives. The monitoring data confirms there was no requirement to declare an AQMA close to the railway track. The monitoring will continue during 2013.

In 2011, Slough Borough Council declared Air Quality Management Areas (AQMA) covering Tuns Lane and parts of the Town Centre as the result of a Detailed Assessment carried out in 2008. The results of modelling and measurements confirmed that it was appropriate for Slough Borough Council to declare Tuns Lane and Slough Town centre as AQMAs.

It was recommended in the 2013 amendment that Slough Borough Council should consider extending the Tuns Lane AQMA to the east along Bath Road as far as 30 Bath Road- the validity of this recommendation is backed up by 2012 monitoring data which showed an exceedance of the annual mean NO_2 objective along this stretch of road.

It was also recommended that the Council should continue to monitor concentrations of NO_2 at the Goodman Park location to the north of the Town Centre AQMA. If the measurements exceed the annual mean NO_2 objective the Council should also consider extending the Town centre AQMA northwards along Uxbridge Road to Goodman Park.

The Council should continue to monitor concentrations at Sussex Place and Farnham Road and consider extending the AQMAs if these exceed the objective.

1.4.6 Existing AQMAs

Four AQMAs are currently declared within the Borough. Two of which were declared in 2005:

- AQMA Order 1 – M4 Corridor
  The designated area incorporates land adjacent to the M4 motorway along the north carriageway between Junction 7 and Junction 5, and also the south carriageway between junction 5 and Sutton Lane.

- AQMA Order 2 – A4
  The designated area incorporates a stretch of the A4 London Road east of junction 5 of the M4 motorway up until Sutton Lane.

The other two were declared in January 2011 as follows:

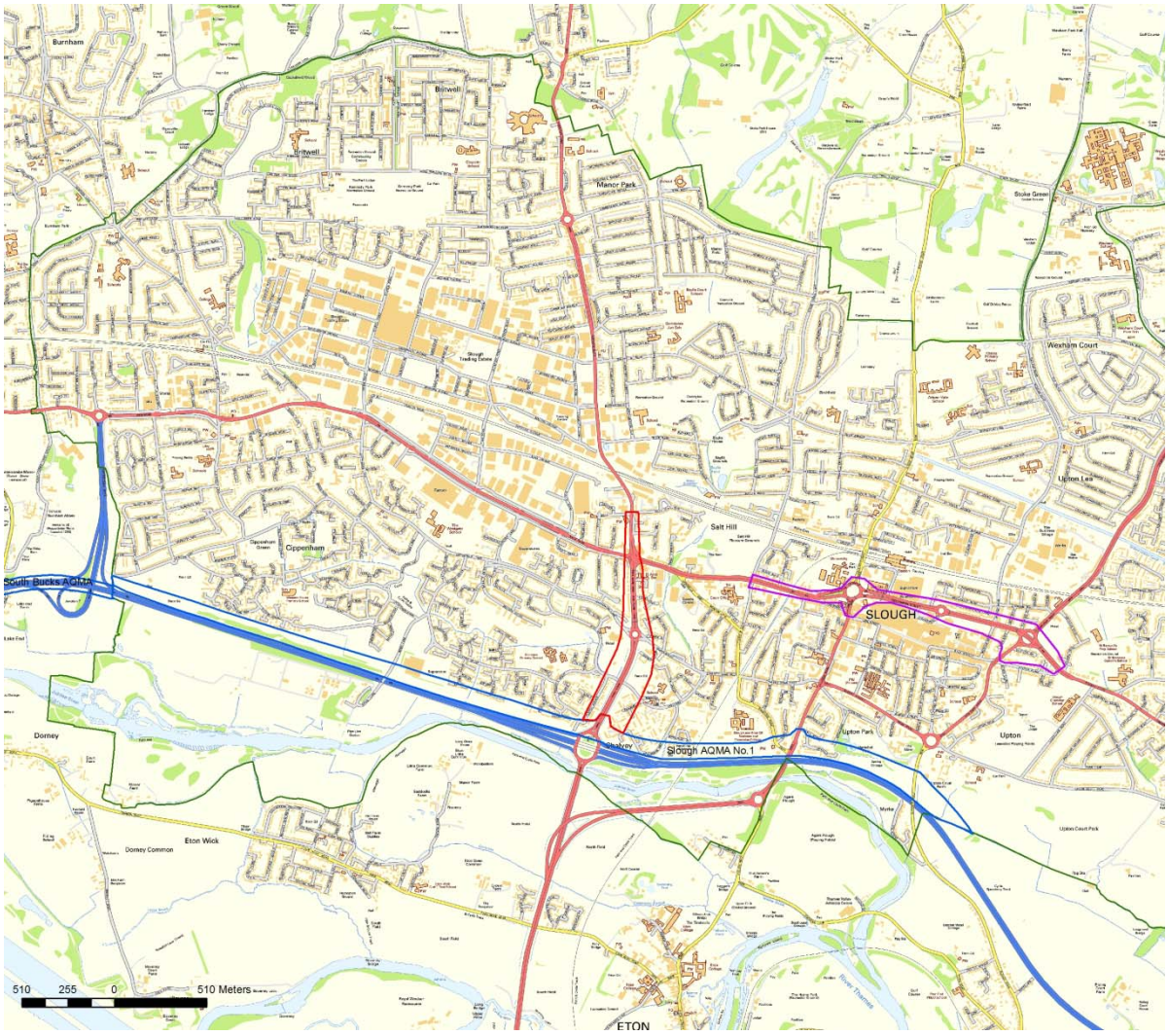
- AQMA Order 3 –Tuns Lane
  The designated area incorporates the A335 Tuns Lane from junction 6 of the M4 motorway in a northerly direction to just past its junction with the A4 Bath Road and the A355 Farnham Road ("Three Tuns").

- AQMA Order 4 – A4 town centre. The designated area incorporates the A4 Bath Road from the junction with Ledgers Road/Stoke Poges Lane, in an easterly direction, along Wellington Street, up to the Sussex Place junction.

The Tuns Lane AQMA is soon to be extended to reflect the findings of the modelling studies conducted in 2011 as amended in 2013.

The locations of the existing AQMAs within the Slough Borough Council area are annotated in Figure 1.1 and Figure 1.2. The proposed amendment to the Tuns Lane AQMA boundary is shown in Figure 1.3

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



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- Slough boundary
- Town Centre AQMA
- Tuns Lane AQMA
- M4 AQMA

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

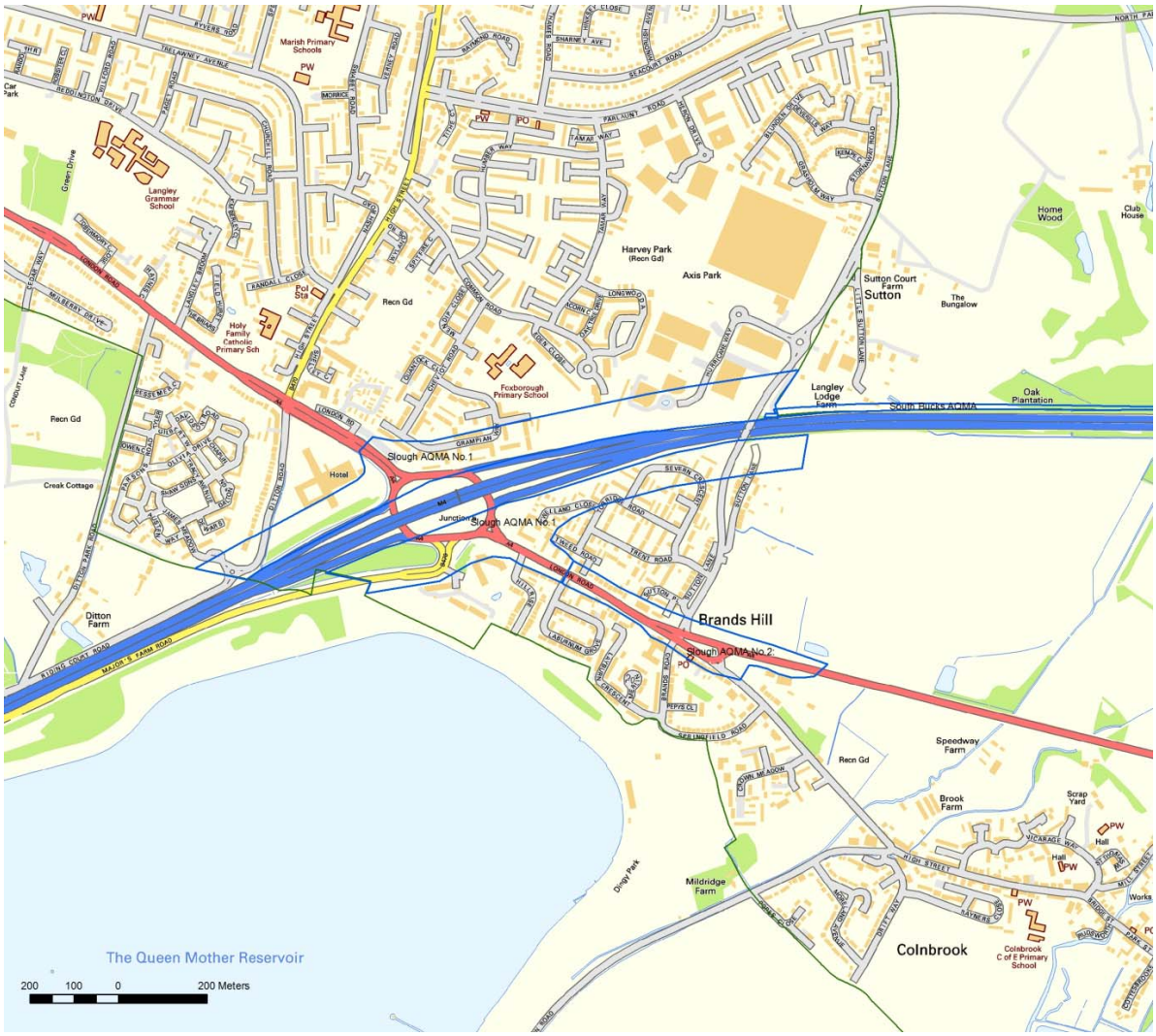
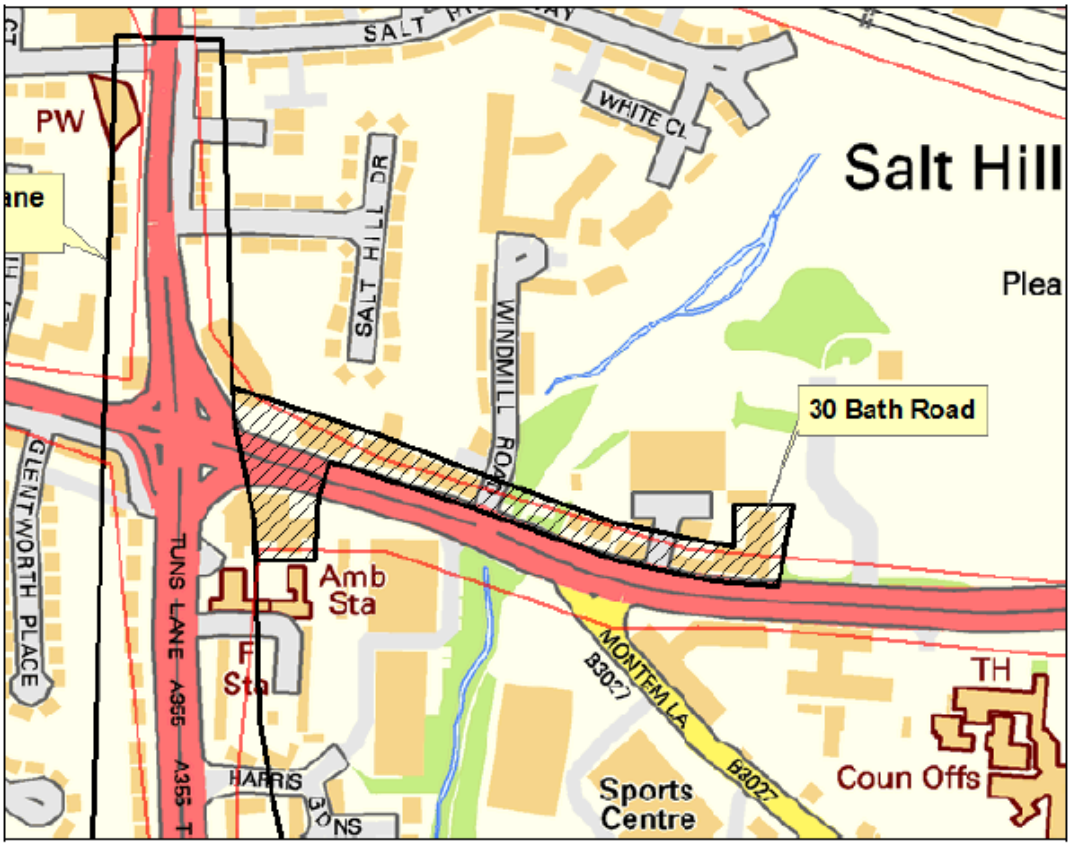


Figure 1.3: Slough Borough Council: AQMA extension boundary– Tuns Lane



Hatched area= recommended Tuns Lane AQMA extension to 30 Bath Road. Red line= 40µg.m^{-3} NO_2 annual mean

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})

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.

The SBC programme to add 3 new monitoring stations within its AQMA has been slightly delayed to ensure the successful role out and delivery of EV charging infrastructure which is a key requirement of the LSTF, LTP and AQAPs. The programme is expected to be completed by December 2015.

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; two 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.

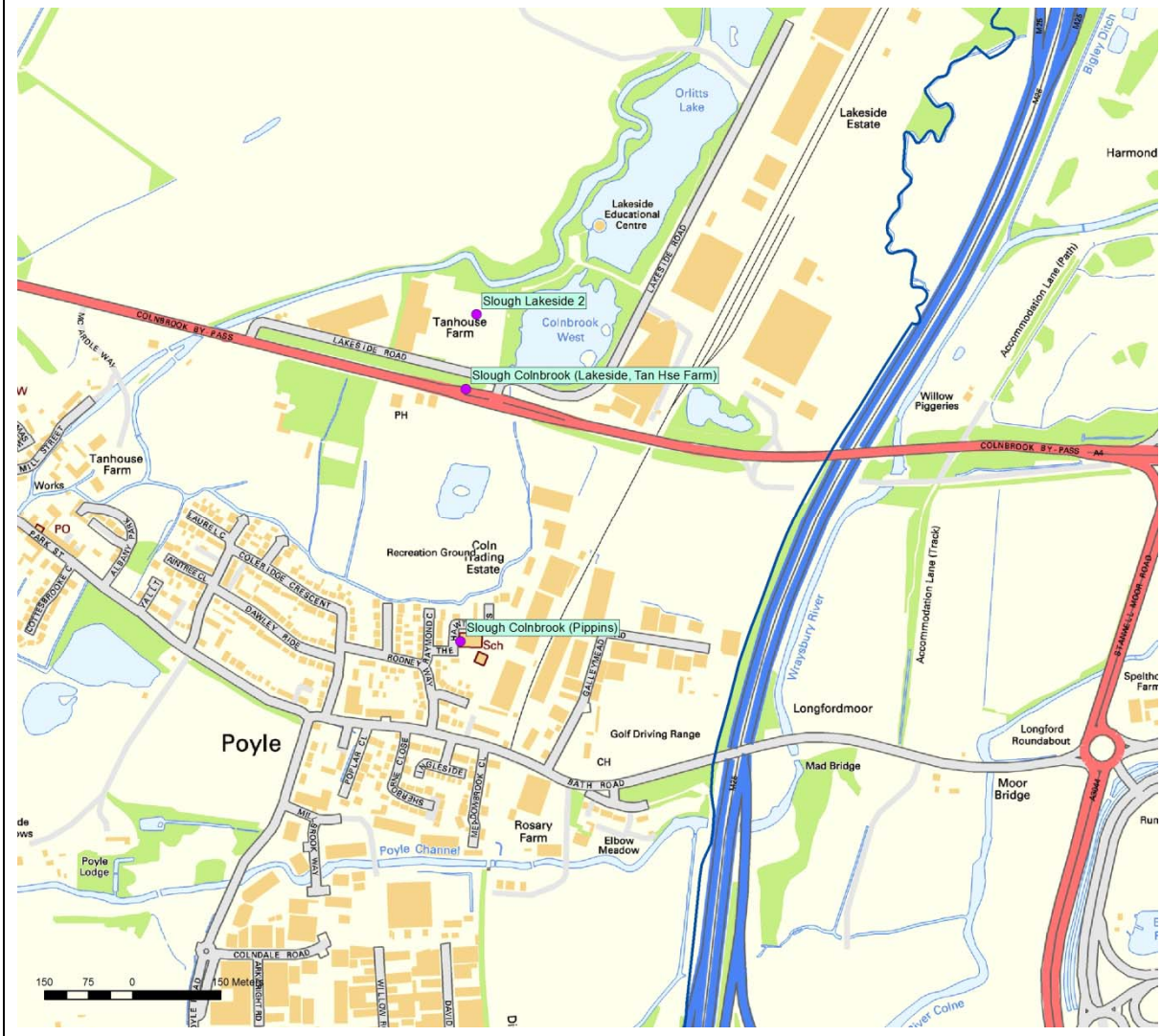
Maps showing the locations of the automatic monitoring sites are presented in Figure 2.1 and

Figure 2.2. Details of the sites are presented in Table 2-1.

Following a review of the Automatic Monitoring Sites locations, it is concluded that none of these stations represent worst-case or in some cases relevant exposure. Further, it is Slough Borough Council intention to decommission, add and relocate its automatic monitoring sites, within its control, into each one of its four AQMAs and to locations as close to residential facades and areas of relevant exposure as is practically possible. This extensive programme is likely take 18 months to complete. The data will be far more representative in terms of relevant exposure and relevant in terms of monitoring annual NO_2 trends with the existing AQMAs.

Figure 2.1: Slough Automatic Monitoring sites (Slough Centre)

Figure 2.2: Slough Automatic Monitoring sites (Slough East)



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Slough boundary

Automatic monitoring sites 2011

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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	N	10m	N
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 1)	Y	45m from M4	N
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 Sites

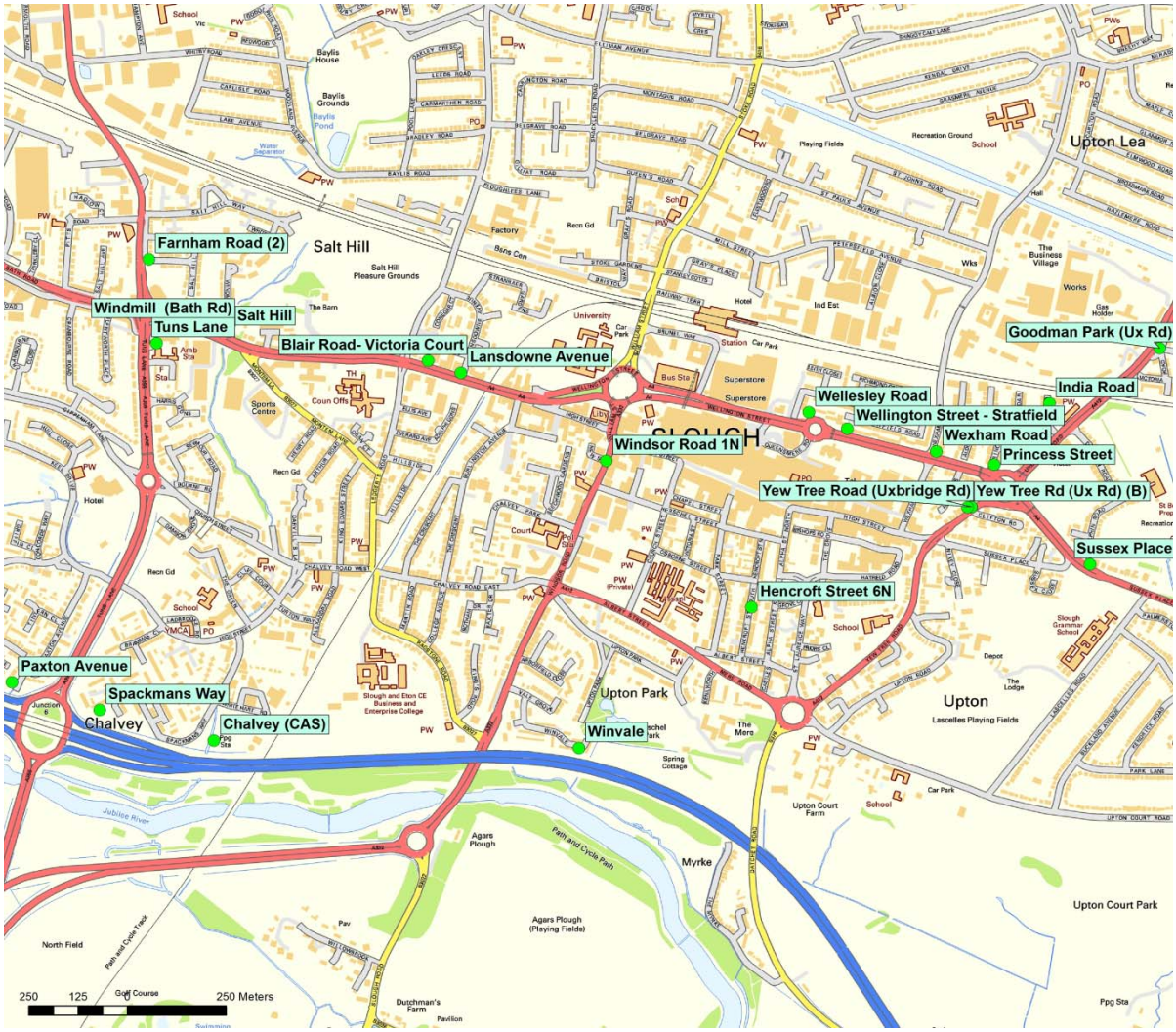
Diffusion tube monitoring of NO_2 is carried out at a number of locations in the Slough Borough Council Area. During 2013 NO_2 monitoring was undertaken at thirty-nine sites across the borough using passive diffusion tubes. Benzene monitoring was discontinued in January 2013 as monitoring results had never shown any breaches of the Air Quality Objectives.

Details of the diffusion tube monitoring locations within the Borough are presented in Table 2-1. The locations include kerbside, intermediate and urban background and Railway sites.

Maps showing the locations of the diffusion tube monitoring sites are presented in Figure 2.3 to 2.5.

A bias adjustment factor of 0.91 derived as the average of three co-location studies conducted in Slough during 2013 has been used to adjust the diffusion tube results. Full details of the diffusion tube QA/QC are presented in Appendix A.

Figure 2.3: Slough diffusion tube locations (Slough Centre)



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Diffusion tube site

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Figure 2.4: Slough diffusion tube locations (Slough East)

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Diffusion tube site

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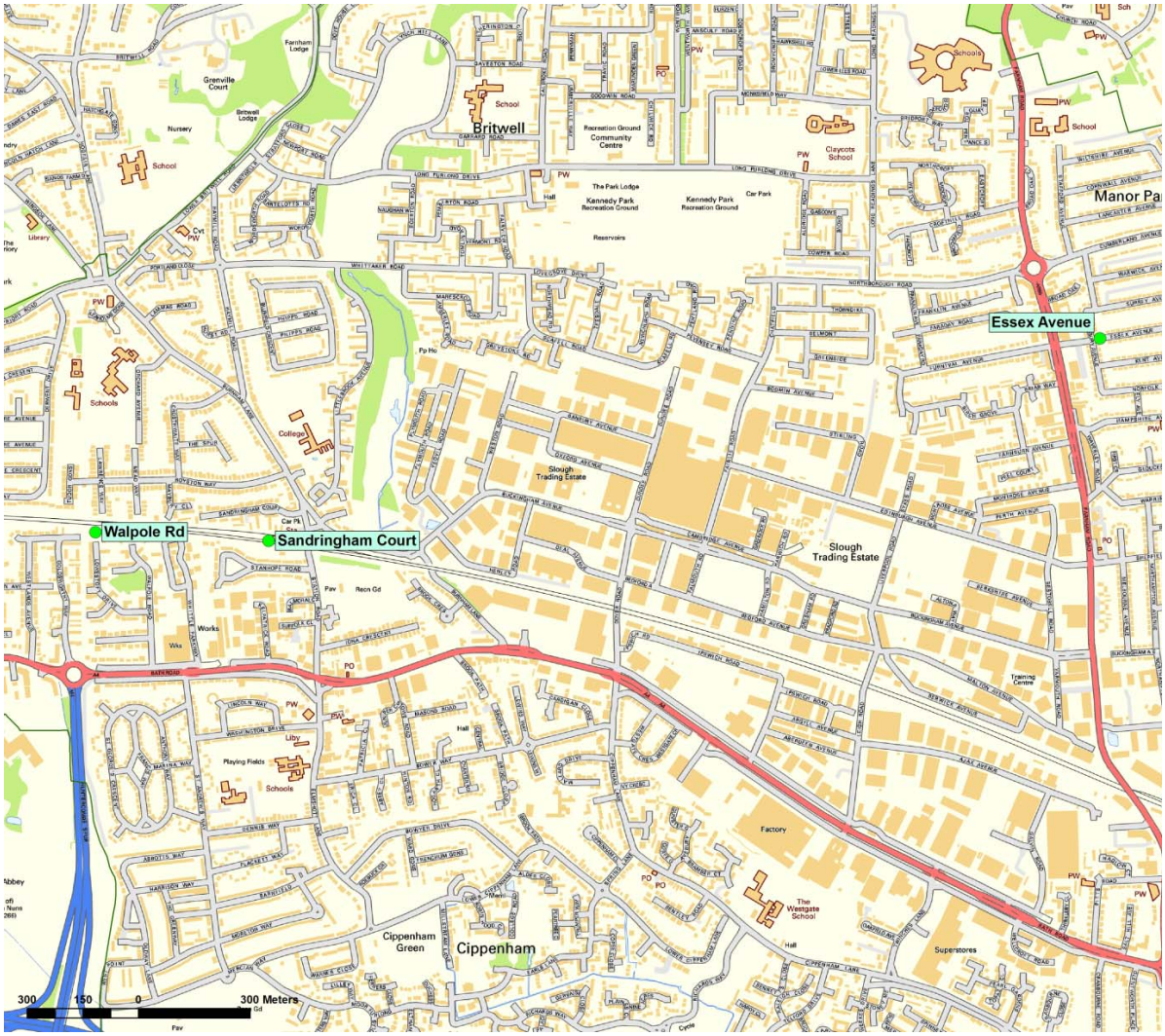
Figure 2.5: Slough diffusion tube locations (Slough North West)



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Diffusion tube site

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Table 2-2: Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Site height (m)	Pollutants Monitored	In AQMA ?	Relevant Exposure (distance from site)	Distance to kerb of nearest road	Worst-case Location ?
Blair Road- Victoria Court	Roadside	497105	180081	2	NO_2	Y	Y (5m)	13m	Y
Brands Hill (A)	Roadside	501798	177659	2.5	NO_2	Y	Y (5m)	3m	Y
Brands Hill (B)	Roadside	501853	177620	2	NO_2	Y	Y (0m) on the building facade	8m	Y
Chalvey (CAS)	Other (motorway)	496562	179109	1.5	NO_2	Y	Y (co-located with automatic site)	45m	Y
Colnbrook By-pass	Roadside	503196	177349	2	NO_2	N	N	5m	N
Ditton Road	Roadside	500851	177890	2	NO_2	N	Y (15m)	5m	Y
Elbow Meadows	Suburban	503856	176538	2	NO_2	N	Y (13m)	1m	Y
Essex Avenue	Roadside	496200	181900	2	NO_2	N	Y (5m)	1-5m	Y
Farnham Road (2)	Roadside	496397	180341	2	NO_2	Y	Y (10m)	20m	Y
Goodman Park (Ux Rd)	Roadside	498961	180113	2.5	NO_2	N	Y (20m)	3m	Y
Grampian Way	Other (motorway)	501382	178101	2	NO_2	Y	Y (8m)	51m (M4)	Y
Hencroft Street 6N	Suburban	497925	179450	2	NO_2	N	Y (8m)	N/A	Y
Horton Road (Caravan Park)	Urban background	503136	175654	2	NO_2	N	Y (15m)	17m	Y
India Road	Other (rail)	498681	179972	2	NO_2	N	Y (15m) rail	2m	Y
Lakeside Road	Other (industrial)	503877	177459	2	NO_2	N	N	N/A	N
Lansdowne Avenue	Roadside	497188	180050	2.5	NO_2	Y	Y (15m)	14m	Y
London Rd (A)	Roadside	501733	177725	2.5	NO_2	Y	Y (5m)	3m	Y
London Rd (B)	Roadside	501734	177733	2	NO_2	Y	Y (0m)	10m	Y
London Rd (C)	Roadside	501658	177781	2	NO_2	Y	Y (0m)	10m	Y
Paxton Avenue	Other (motorway)	496050	179258	2	NO_2	Y	Y (15m)	40m (M4)	Y
Pippins	Urban background	503542	176827	2.5	NO_2	N	Y (N/A)	N/A	Y

Site Name	Site Type	OS Grid Ref		Site height (m)	Pollutants Monitored	In AQMA ?	Relevant Exposure (distance from site)	Distance to kerb of nearest road	Worst-case Location ?
Princess Street	Roadside	498541	179815	2	NO_2	Y	Y (5m)	17m	Y
Rogans (Colnbrook by pass)	Roadside	501941	177633	2.5	NO_2	Y	Y (N/A)	5m	Y
Salt Hill	Roadside	496599	180156	2.5	NO_2	N	Y (m)	10m	Y
Sandringham Court	Other (rail)	493960	181355	2.5	NO_2	N	Y (26m)	Railway exposure (10+)	Y
Spackmans Way	Other (motorway)	496272	179187	2.5	NO_2	Y	Y (5m)	40m	Y
Sussex Place	Roadside	498784	179560	2	NO_2	N	Y (5m)	6m	Y
Torridge Road	Other (motorway)	501637	177999	3	NO_2	Y	Y (8m)	95m (M4)	Y
Tuns Lane	Roadside	496416	180126	2.2	NO_2	Y	Y (0m) on the building facade	15m	Y
Tweed Road	Roadside	501518	177882	2	NO_2	Y	Y (6m)	15m	Y
Walpole Rd	Other (rail)	493493	181378	2.5	NO_2	N	Y (15m)	Railway exposure	Y
Wellesley Road	Roadside	498071	179949	2.5	NO_2	Y	Y (3m)	12m	Y
Wellington Street - Stratfield	Roadside	498168	179907	2.5	NO_2	Y	Y (21m)	13m	Y
Wexham Road	Roadside	498394	179849	2	NO_2	Y	Y (3m)	1-5m	Y
Windmill (Bath Rd)	Roadside	496533	180175	2	NO_2	N	Y (0m) on the building facade	5m	Y
Windsor Road 1N	Roadside	497557	179825	2.5	NO_2	N	Y (34m)	1-5m	Y
Winvale	Other (motorway)	497488	179090	2	NO_2	Y	Y (5m)	15m	Y
Yew Tree Rd (Ux Rd) (B)	Roadside	498473	179706	2	NO_2	Y	Y (0m) on the building facade	8m	Y
Yew Tree Road (Uxbridge Rd)	Roadside	498483	179707	2	NO_2	Y	Y (5m)	3m	Y
Site types are defined according to the designations provided in Table A1.4 of LAQM.TG(09)									

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

The annual mean NO_2 concentrations measured at the automatic monitoring locations in Slough from 2009 to 2013 are presented in Table 2.3. Concentrations in excess of the 40 $\mu g.m^{-3}$ objective are highlighted in red.

The NO_2 annual mean concentrations measured at all sites within the borough were all less than the 40 $\mu g.m^{-3}$ objective during 2013; the measured concentration at the Chalvey site was less than the objective again in 2013.

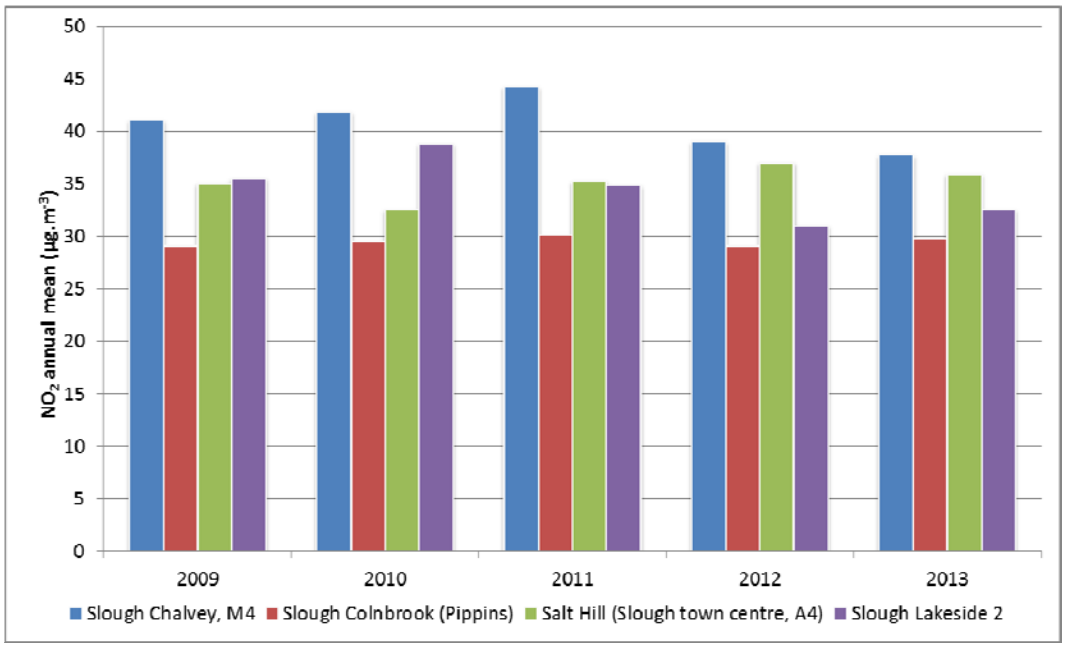
Table 2-3: NO_2 Automatic monitoring results: Comparison with annual mean objective

Site name	Within AQMA?	Data Capture 2013 (%)	Annual mean concentrations ($\mu g/m^3$)				
			2009	2010	2011	2012	2013
Salt Hill (Slough town centre, A4)	N	95.3	35.0	32.5	35.2	37.0	35.9
Slough Colnbrook (Pippins)	N	93.8	29.0	29.5*	30.1	29.0	29.8
Slough Chalvey, M4	Y	96.0	**41.0**	**41.8**	**44.2**	39.0	37.7
Slough Lakeside 2	N	94.0	35.5	38.8	34.8	31.0	32.5

*** 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 2.6. The chart shows there is no clear trend in NO_2 concentrations in the time series. It can however be seen that concentrations appear to have settled below the annual mean objective at all of the automatic monitoring sites.

Figure 2.6: Annual mean NO_2 concentration measured at automatic monitoring sites 2009-2013



The number of measured 1-hour mean concentrations in excess of the 200 $\mu g.m^{-3}$ short-term objective at each of the automatic monitoring sites are presented in Table 2.4.

No exceedances of the hourly standard were measured in Slough in 2013.

Table 2-4: NO_2 automatic monitoring results: Comparison with 1-hour mean objective

Site name	Within AQMA?	Data Capture 2013 (%)	Number of exceedances 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})				
			2009	2010	2011	2012	2013
Salt Hill (Slough town centre, A4)	N	95.3	0	0	0	0	0
Slough Colnbrook (Pippins)	N	93.8	0	0	0	0	0
Slough Chalvey, M4	Y	96.0	1	1	0	2	0
Slough Lakeside 2	N	94.0	0	0	0	0	0

Diffusion Tube Monitoring Data

Details of the annual mean NO_2 concentrations measured using diffusion tube sites during 2013 are presented in Table 2-5 and the series of results measured from 2009 to 2013 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 Figure 2.7.

Annual mean NO_2 concentrations in excess of the 40 µg.m^{-3} objective were measured during 2013 at a number of locations, but all are within one of the existing or soon to be amended AQMA boundaries.

Annual mean NO_2 concentrations in excess of the objective were also measured at a few locations where relevant receptors are present and the tubes fall outside the existing AQMAs during 2013. However using Defra's distance correction calculator reduces the concentrations of NO_2 at these locations (Goodman Park and Windsor Road) to below the 40µg.m^{-3} standard. In addition, the Windmill site (on Bath Road) still exceeds the annual mean standard but this will be encompassed by the forthcoming Tuns Lane AQMA extension. The only tube with an annual mean NO_2 value over 40µg.m^{-3} and not covered by the descriptions above was Lakeside Road, an industrial area, which does not have relevant exposure for the annual mean objective.

An annual mean concentration in excess of 60 µg.m^{-3} was measured at Brands Hill and Yew Tree Road during 2013 which is consistent with previous years; this may indicate that the 1-hr mean objective of 200 µg.m^{-3} is being exceeded at these locations. It is Slough Borough Councils intention to locate an automatic station on Brands Hill and close to Yew Tree Road that will allow both the annual mean and 1-hr mean objective to be monitored on a continuous basis.

Concentrations at Sandringham Road and Walpole Road- which are both located close to railway lines- continue to be well within the NO_2 annual mean objective further supporting the findings of the amended 2013 Detailed/Further Assessment. We will continue to monitor at these locations in 2014.

Table 2-5: Results of NO_2 Diffusion Tubes 2012

Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2013 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	NO_2 Annual mean concentration 2013 ($\mu g.m^{-3}$) (Bias Adj. factor = 0.9)
Blair Road- Victoria Court	Roadside	Y	N	100	n/a	N	**47.3**
Brands Hill (A)	Roadside	Y	N	92	n/a	N	**65.8**
Brands Hill (B)	Roadside	Y	N	100	n/a	N	**44.9**
Chalvey (CAS)	Other (motorway)	Y	Co-located	100	n/a	N	38.0
Colnbrook By-pass	Roadside	N	N	100	n/a	No relevant exposure	**41.6**
Ditton Road	Roadside	Y	N	50	Y	N	37.2*
Elbow Meadows	Suburban	N	N	92	n/a	n/a - Distance from kerb > 50m	38.2
Essex Avenue	Roadside	N	N	92	n/a	N	35.7
Farnham Road (2)	Roadside	Y	N	92	n/a	N	**41.7**
Goodman Park (Ux Rd)	Roadside	N	N	100	n/a	Y	**40.5** (34.2 at facade)
Grampian Way	Other (motorway)	Y	N	75	n/a	N	**43.3**
Hencroft Street 6N	Suburban	N	N	92	n/a	N	31.8
Horton Road (Caravan Park)	Urban background	N	N	83	n/a	N	39.0
India Road	Other (rail)	N	N	100	n/a	N	35.2
Lakeside Road	Other (industrial)	N	N	100	n/a	N	**45.6**
Lansdowne Avenue	Roadside	Y	N	92	n/a	N	**41.5**
London Rd (A)	Roadside	Y	N	100	n/a	N	**55.9**
London Rd (B)	Roadside	Y	N	100	n/a	N	37.8
London Rd (C)	Roadside	Y	N	100	n/a	N	37.2

Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2013 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	NO_2 Annual mean concentration 2013 ($\mu g.m^{-3}$) (Bias Adj. factor = 0.9)
Paxton Avenue	Other (motorway)	Y	N	100	n/a	N	**42.1**
Pippins	Urban background	N	N	100	n/a	N	31.5
Princess Street	Roadside	Y	N	100	n/a	N	**43.0**
Rogans (Colnbrook by pass)	Roadside	Y	N	100	n/a	N	**56.4**
Salt Hill	Roadside	N	N	100	n/a	N	34.3
Sandringham Court	Other (rail)	N	N	100	n/a	N	27.9
Spackmans Way	Other (motorway)	Y	N	100	n/a	N	**43.6**
Sussex Place	Roadside	N	N	100	n/a	N	35.8
Torridge Road	Other (motorway)	Y	N	92	n/a	N	**43.3**
Tuns Lane	Roadside	Y	N	100	n/a	N	**40.7**
Tweed Road	Roadside	Y	N	100	n/a	N	**43.7**
Walpole Rd	Other (rail)	N	N	100	n/a	N	29.0
Wellesley Road	Roadside	Y	N	100	n/a	N	**41.5**
Wellington Street - Stratfield	Roadside	Y	N	100	n/a	N	38.5
Wexham Road	Roadside	Y	N	100	n/a	N	**48.0**
Windmill (Bath Rd)	Roadside	N	N	92	n/a	N (on façade)	**44.5**
Windsor Road 1N	Roadside	N	N	100	n/a	Y	**44.0** (38.4)
Winvale	Other (motorway)	Y	N	100	n/a	N	**44.5**
Yew Tree Rd (Ux Rd) (B)	Roadside	Y	N	100	n/a	N	**62.3**
Yew Tree Road (Uxbridge Rd)	Roadside	Y	N	100	n/a	N (on façade)	**41.9**

* Short-term to long-term adjustment applied to estimate annual mean due to data capture < 75%

NB: Where a distance correction calculation has been applied, the predicted annual mean concentration at the nearest relevant exposure is shown in brackets in red

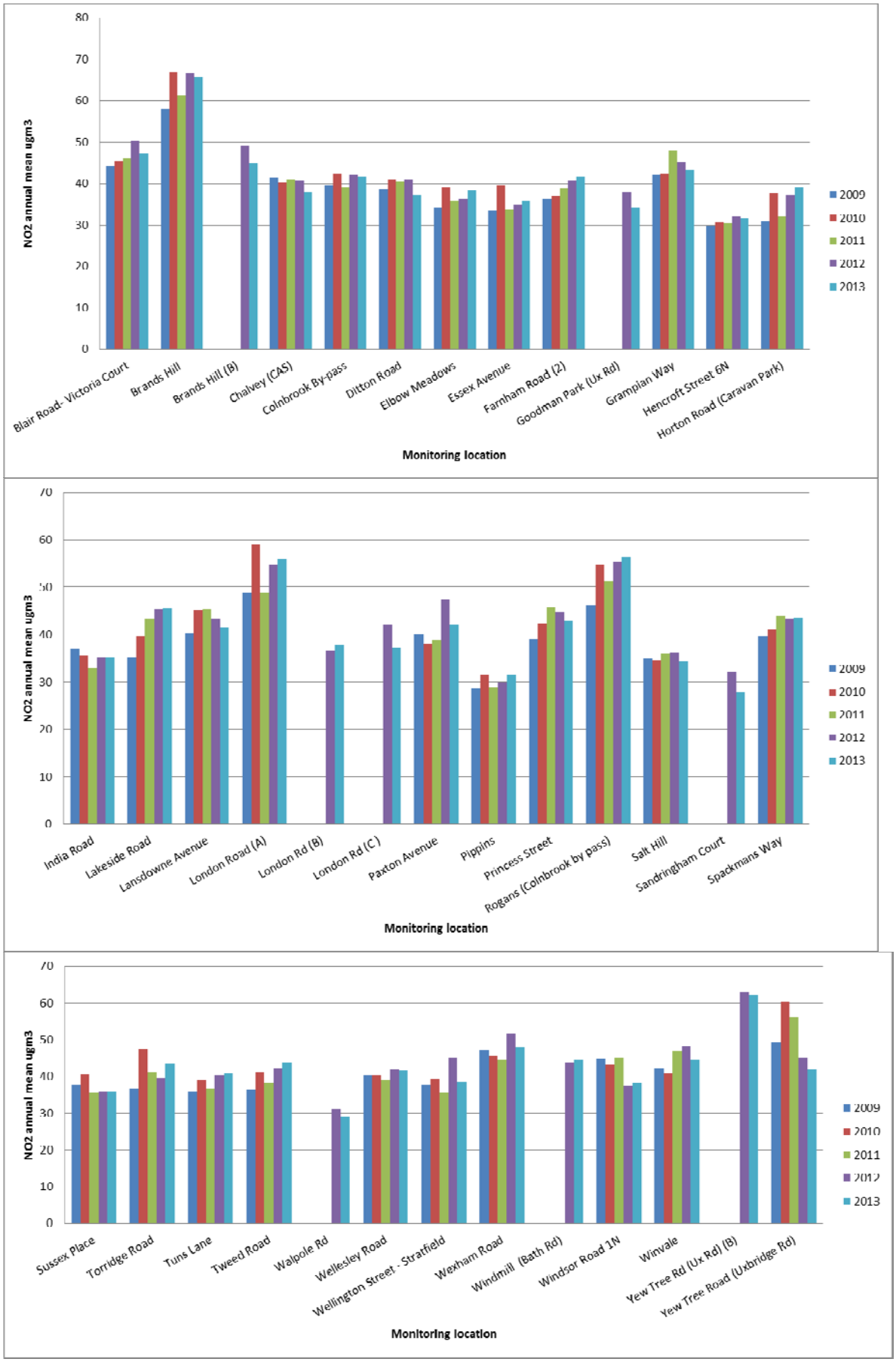
Table 2-6: Results of NO_2 Diffusion Tubes (2009 to 2013)

Location	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2009 (Bias Adj. Factor = 0.98)	2010 (Bias Adj. Factor = 0.82)	2011 (Bias Adj. Factor = 0.89)	2012 (Bias adj factor = 0.88)	2013 (Bias adj factor = 0.91)
Blair Road- Victoria Court	Roadside	Y	**44.2**	**45.3**	**46.1**	**50.4**	**47.3**
Brands Hill	Roadside	Y	**57.9**	**67**	**61.2**	**66.7**	**65.8**
Brands Hill (B)	Roadside	Y	-	-	-	**49.1**	**44.9**
Chalvey (CAS)	Other (motorway)	Y	**41.4**	**40.3**	**41.1**	**40.8**	38.0
Colnbrook By-pass	Roadside	N	39.5	**42.3**	39.2	**42.1**	**41.6**
Ditton Road	Roadside	Y	38.6	**40.9**	**40.5**	**41.0**	37.2
Elbow Meadows	Suburban	N	34.1	39.2	35.7	36.2	38.2
Essex Avenue	Roadside	N	33.5	39.6	33.8	34.7	35.7
Farnham Road (2)	Roadside	Y	36.2	36.9	38.9	**40.8**	**41.7**
Goodman Park (Ux Rd)	Roadside	N	-	-	-	37.8	34.2
Grampian Way	Other (motorway)	Y	**42.1**	**42.3**	**48.1**	**45.1**	**43.3**
Hencroft Street 6N	Suburban	N	29.7	30.8	30.6	32.2	31.8
Horton Road (Caravan Park)	Urban background	N	30.9	37.7	32.2	37.1	39.0
India Road	Other (rail)	N	37	35.5	32.9	35.3	35.2
Lakeside Road	Other (industrial)	N	35.3	39.7	**43.4**	**45.5**	**45.6**
Lansdowne Avenue	Roadside	Y	**40.4**	**45.1**	**45.5**	**43.3**	**41.5**
London Road (A)	Roadside	Y	**48.9**	**59.1**	**49**	**54.8**	**55.9**
London Rd (B)	Roadside	N	-	-	-	36.6	37.8
London Rd (C)	Roadside	N	-	-	-	**42.0**	37.2
Paxton Avenue	Other (motorway)	Y	**40**	38	38.9	**47.5**	**42.1**
Pippins	Urban background	N	28.7	31.6	29	30.0	31.5
Princess Street	Roadside	Y	39	**42.3**	**45.8**	**44.8**	**43.0**
Rogans (Colnbrook by pass)	Roadside	Y	**46.2**	**54.7**	**51.1**	**55.4**	**56.4**
Salt Hill	Roadside	N	34.9	34.6	36	36.2	34.3
Sandringham Court	Other (rail)	N	-	-	-	32.2	27.9
Spackmans Way	Other (motorway)	Y	39.6	**41**	**44**	**43.4**	**43.6**
Sussex Place	Roadside	N	37.6	**40.5**	35.6	35.8	35.8

Location	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3				
			2009 (Bias Adj. Factor = 0.98)	2010 (Bias Adj. Factor = 0.82)	2011 (Bias Adj. Factor = 0.89)	2012 (Bias adj factor = 0.88)	2013 (Bias adj factor = 0.91)
Torridge Road	Other (motorway)	Y	36.6	**47.4**	**41.2**	39.5	**43.3**
Tuns Lane	Roadside	Y	35.8	39	36.6	**40.4**	**40.7**
Tweed Road	Roadside	Y	36.4	**41.2**	38.1	**42.0**	**43.7**
Walpole Rd	Other (rail)	N	-	-	-	31.1	29.0
Wellesley Road	Roadside	Y	**40.4**	**40.4**	39	**41.9**	**41.5**
Wellington Street - Stratfield	Roadside	Y	37.6	39.4	35.7	**45.3**	38.5
Wexham Road	Roadside	Y	**47.1**	**45.5**	**44.5**	**51.7**	**48.0**
Windmill (Bath Rd)	Roadside	N	-	-	-	**43.7**	**44.5**
Windsor Road 1N	Roadside	N	**44.9**	**43.2**	**45.2**	37.4	38.4
Winvale	Other (motorway)	Y	**42.1**	**40.9**	**46.9**	**48.3**	**44.5**
Yew Tree Rd (Ux Rd) (B)	Roadside	Y	-	-	-	**63.0**	**62.3**
Yew Tree Road (Uxbridge Rd)	Roadside	Y	**49.2**	**60.3**	**56.1**	**45.1**	**41.9**

* Short-term to long-term adjustment applied to estimate annual mean due to data capture < 75%
Annual mean NO_2 concentrations in excess of the 40 µg.m^{-3} objective are highlighted in bold
NB: Where a distance correction calculation has been applied, the predicted annual mean concentration at the nearest relevant exposure is shown in brackets

Figure 2.7: Annual mean NO_2 concentrations measured at diffusion tube sites 2009 - 2013



2.2.2 Particulate Matter (PM_{10})

The annual mean PM_{10} concentrations measured from 2009 to 2013 are presented in Table 2-7 and Figure 2.8. No concentrations in excess of the 40 $\mu g.m^{-3}$ annual mean objective were measured at any of the monitoring locations across the time series.

The number of 24-hour mean PM_{10} concentrations in excess of the 50 $\mu g.m^{-3}$ short-term objective; measured from 2008 to 2012 are presented in Table 2-8. The 50 $\mu g.m^{-3}$ 24-hour mean objective was not exceeded more than 35 times at any of the monitoring sites in Slough during 2013.

Figure 2.8: Trends in annual mean PM10 concentrations measured from 2009 – 2013

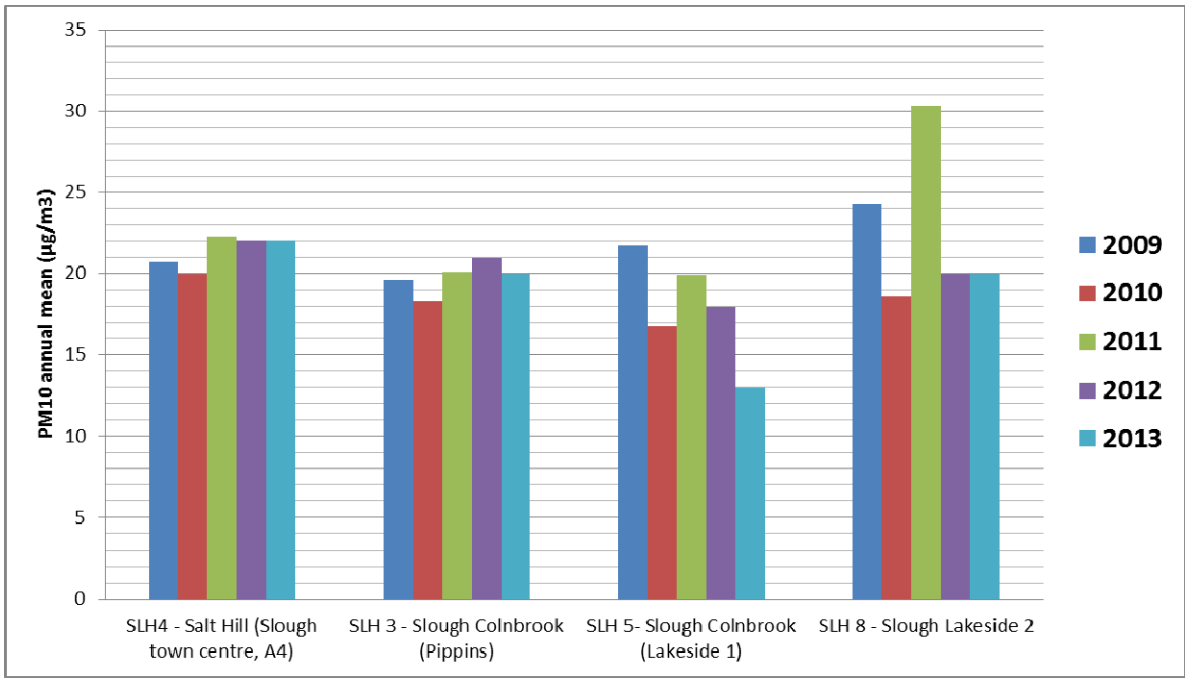


Table 2-7: Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site name	Site Type	Within AQMA?	Valid Data Capture 2013 %	Confirm Gravimetric Equivalent	Annual Mean Concentration (µg.m^{-3})				
					2009	2010	2011	2012	2013
SLH4 - Salt Hill (Slough town centre, A4)	I	N	94%	Y	20.7	20	22.3*	22*	22*
SLH 3 - Slough Colnbrook (Pippins)	UB	N	88%	Y	19.6	18.3	20.1*	21*	20*
SLH 5- Slough Colnbrook (Lakeside 1, Tan Hse Farm)	UB	N	95%	N (Osiris)	21.7	16.8	19.9#	18#	13#
SLH 8 - Slough Lakeside 2	UB	N	94%	Y	24.3	18.6	30.3	20	20

* TEOM results VCM corrected
# Osiris result adjusted with factor calculated from co-location study at Colnbrook (Pippins)

Table 2-8: Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site name	Site Type	Within AQMA?	Valid Data Capture 2013 %[b]	Confirm Gravimetric Equivalent	Number of Exceedances of 24-Hour Mean (50 µg.m^{-3})				
					2009	2010	2011	2012	2013
SLH4 - Salt Hill (Slough town centre, A4)	I	N	94%	Y	4	0	0*	7*	0*
SLH 3 - Slough Colnbrook (Pippins)	UB	N	88%	Y	5	0	0*	13*	1*
SLH 5- Slough Colnbrook (Lakeside 1, Tan Hse Farm)	UB	N	95%	N (Osiris)#	14	1	36#	8#	1#
SLH 8 - Slough Lakeside 2	UB	N	94%	Y	18	4	37	14	8

* TEOM results VCM corrected
# Osiris result adjusted with factor calculated from co-location study at Colnbrook (Pippins)

2.2.3 Sulphur Dioxide (SO_2)

Slough Borough Council do not currently measure sulphur dioxide concentrations.

2.2.4 Benzene

Slough Borough Council do not currently measure benzene concentrations. Benzene was measured prior to January 2013 and no exceedances had ever been recorded in the borough prior to removing the monitoring sites.

2.2.5 Summary of Compliance with AQS Objectives

Measured NO_2 concentrations were compliant with both the annual mean and short-term objectives at most relevant locations outside the existing AQMAs within the Borough. An NO_2 annual mean in excess for the 40 $\mu g.m^{-3}$ objective was measured at the diffusion tube site at Windmill (Bath Road).

No PM_{10} or benzene concentrations in excess of the relevant objectives were measured at any of the monitoring locations.

Slough Borough Council has examined the results from NO_2 and PM_{10} monitoring in the borough.

Concentrations within the current AQMA still exceed the annual mean objective for nitrogen dioxide within the existing AQMAS, therefore these AQMAs should remain.

The Tuns Lane AQMA is due to be extended following the boundary provided in the conclusions of the 2013 Further Assessment report. This will encompass the exceedance noted at the “Windmill” site.

Concentrations of nitrogen dioxide outside of the AQMAs are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

There are no measured exceedances of PM10 anywhere in the borough.

3 New Local Developments

3.1 Road Traffic Sources

A review of changes to the road network within the last two year has identified that some roads within the Borough may have significantly changed traffic flows.

The Chalvey traffic management project involved various experimental changes being made to the road network in Chalvey, starting in December 2011 and completed in February 2012. The changes were subsequently the subject of a pubic consultation exercise after which the Council decided in July 2012 to make the changes permanent subject to some minor revisions.

The aims of the Chalvey traffic management scheme are to reduce rat running, enhance public realm and improve residents' parking. To reduce through traffic the scheme involves:

- Chalvey Road East- became one way westbound only (i.e. up to railway bridge);
- Chalvey Road West- became one way eastbound only (i.e. between High St/ Church St junction and railway bridge);
- Ledgers Road - became one way northbound only between Chalvey Road junction and Montem Lane junction;
- Ragstone Road- became one way southbound only.

The Council anticipated that the effect of banning various through movements would be to increase left turns from the A4 Bath Road into A355 Tun's Lane and some changes to the lane markings were introduced to address this. It was probable that at least some through traffic is also diverting via the A322 Windsor Road/ A4 Bath Road.

Additional 2013 traffic measures include incorporation of a dedicated bus lane on Farnham Road, through the Tuns Lane AQMA and signal changes to the junction to aid traffic flow in a southerly direction. Modification of the Tuna Lane Junction to aid north bound traffic turning west onto A4. Access from Lansdowne Avenue to A4 westbound has been stopped through a permanent traffic order to prevent rat running.

There are future schemes relating to Windsor Road A322 Road Widening scheme including junction improvements and road widening was submitted to the Thames Valley Berkshire Local Enterprise Partnership (LEP) in 2014. If the bid is successful works will start in July 2015 and be completed by April 2016. One of the major objectives of the project is to reduce NO_2 emissions by reducing congestion.

A355 Tuns Lane/Farnham Road route scheme bid for in 2014, includes the remodelling of Copthorne roundabout, signal and junction upgrades, selected road widening and bus priority measures. If the bid is successful work will start in June 2015 and be completed by June 2016. One of the major objectives of the project is to reduce NO_2 emissions by reducing congestion.

All these road traffic schemes will be considered in the Update and Screening Assessment 2015 report.

3.2 Other Transport Sources

Slough Mass Rapid Transit: Slough Borough Council has been successful in its application to the LEP to implement a Slough Mass Rapid Transit providing segregated bus lanes along the A4 to link Slough Trading Estate, the east of the borough to Langley, and with the potential to provide a direct mass rapid transit connection to Heathrow. This is a very exciting scheme which should realise potentially significant improvements within air quality along the A4 (AQMA 3 and 4). The works are due to start in June 2015 and complete in June 2016.

Heathrow Airport Expansion 3rd runway Northwest Option will be determined by the Davies commission in Summer 2015. If approved this expansion programme will have the signal most significant air quality impact on Slough's Road, particularly along the Brands Hill A4 west access route (AQMA 2). The third runway will be located within Slough, Colnbrook and will result in Compulsory purchase orders of land and buildings including the demolition and reconstruction of the Grundons Energy from Waste plant and the SIFE site at Colnbrook. Heathrow will consider significant investment in surface access to the airport, which is likely to include the extension of the Slough Mass Rapid Transit system, freight access restrictions and potential extension of low emission zone along the A4 corridor from Junction 5, junction and signal improvements. If recommended for approval the scheme will start in 2020 with a completion set for 2025.

Slough International Freight Exchange application is going to Public Inquiry in late 2014 and if successful will result in up to 1800 HGVs accessing the A4 Brands Hill when the site becomes fully operation in 2021. The applicant has proposed mitigation measures including a phased opening and ensuring HGVs fleet are Euro VI compliant by the time the site becomes fully operational. There will also be contributions towards air quality monitoring along the A4 Brands Hill (AQMA2). The current air quality modelling indicates with a phasing approach of the opening of the scheme and restriction of HGVs to Euro VI will result in substantial reductions in pollutant emissions to an extent that only 6 residential properties will experience slight adverse air quality impact in 2021.

Smart Motorway plan for M4 Junctions 3 – 12. The Highways Agency is proposing to improve the M4 motorway between Junction 3 and Junction 12 by introducing a Smart motorway scheme with the aim to relieve congestion; smooth flowing of traffic; improved journey times; maintain safety levels for all road users and support economic development. The environmental impact assessments (including air quality) will be completed in Autumn 2014. The scheme is likely to have an impact on the M4 (AQMA1). Subject to permissions being granted the scheme is due to be constructed in 2016 and completed by 2021.

All schemes with respect to relevant exposure and breaching of the air quality objectives will be considered within the Update and Screening Assessment 2015 report.

3.3 Industrial Sources

The following proposed and new industrial sources have been identified within the Slough Borough Council since the last Updating and Screening assessment.

Heathrow Road Stone Coating Plant, Colnbrook By-Pass, Colnbrook, Slough, Berkshire, SL3 0EB was granted an Environmental Permit on 1st January 2014 under Section 3.5 Part B (C) of schedule 1. Permit Reference No. PPC/13/15. The process operated is the coating of roadstone using bitumen. The facility is operational now.

Scottish Southern Electric has entered into pre-application discussion with Slough Borough Council to install and operate a new multifuel combined heat and power 50MW plant within its existing Slough Heat and Power Site within the Slough Industrial Estate. The developer has submitted an air quality undertaken by URS. We employed Atkins to review the report and its conclusions are that air quality impacts are likely to be negligible for NO_2 with 0.1µg/m^3 increase within the Tuns Lane (AQMA 3) from the chimney emissions and 0.1µg/m^3 increase within the Tuns Lane (AQMA 3) from road traffic emissions. The application is to be received in Autumn 2014. A list of air quality mitigation measures will be incorporated, subject to approval, including, implementation of EV charging infrastructure, restriction of HGV movements through the AQMA 3 at rush hours, HGV fleet to meet Euro VI standards, contribution towards air quality monitoring and construction environmental management plan. Subject to permission being granted the new installation will be classified as Part A1 regulated by the Environment Agency, and operational in 2019.

A full list of Local Authority and Environment Agency PPC regulated industrial processes within the borough is presented in Appendix B.

3.4 Commercial and Domestic Sources

DHL former Heathrow Coldstore, Lakeside Industrial Estate, Lakeside Road, Colnbrook applied for planning permission to operate 400kW biomass plant and extend their building planning application P/10864/006 in 2013. The application was approved in 2014. An Air quality screening assessment for $PM_{2.5,}$ PM_{10} and NO_2 was completed by Acoustic Air in April 2014.

The actual changes due to the DHL traffic are 0.2 µg/m3 for NO2 and 0.05 µg/m3 for PM10, which amount to an imperceptible change. The proposed development will not have any adverse impacts on air quality for existing dwellings in Brands Hill area.

3.5 New Developments with Fugitive or Uncontrolled Sources

Slough Borough Council has identified the following new or previously unidentified local developments which may impact on air quality in the Local Authority area.

- Changes to local traffic patterns following implementation of the Chalvey traffic management scheme (affect AQMA 3)
- Proposed changes to local traffic patterns following implementation of Windsor Road A322 (affect AQMA 4) and Tuns Lane A355 (affect AQMA 3)
- Slough Mass Rapid Transit Scheme A4 scheme (affect AQMA 2, 3 and 4)
- Scottish Southern Electric multifuel combined heat and power plant (40MW) gross electrical capacity and up to 20 MW of heat (affect AQMA 3)
- Slough Freight International Exchange in Colnbrook Ward (affect AQMA 2)
- Heathrow Road Stone Coating Plant (affect background levels)
- DHL 400 KW (Biomass Plant) (AQMA 2)
- Proposed Sand and Gravel Pit at Riding Court Farm in Royal Borough of Windsor and Maidenhead (affect AQMA 1 and 2)
- National Infrastructure Project HA M4 Smart Motorway affect all Sloughs AQMAs
- National Infrastructure Project Heathrow 3rd runway expansion affect all Sloughs AQMAs

These developments will be taken into consideration in the next Updating and Screening Assessment

4 Local / Regional Air Quality Strategy

Slough Borough Council does not currently have a local or regional air quality strategy. We have submitted an application for grant funding to DEFRA to develop a low emission strategy in 2015.

5 Planning Applications

A review of major planning applications determined during 2013 has identified residential development located within the existing AQMAs and no major development significantly affecting any of the existing AQMAs. There are no developments identified that will need further consideration in the next Updating and Screening assessment.

Table 5-1 below lists major planning applications that were determined in 2013. One application had an air quality impact assessment associated with it.

Table 5-1 Major planning applications determined during 2012

Application number	Decision despatch date	PS2 description	Location
P/01913/009	16/12/2013	Dwellings Major	9-10, Chapel Street, Slough, SL1 1PF
P/00213/015	13/11/2013	Dwellings Major	4, 6, 8, High Street, Slough, SL1 1EE
P/11826/005	29/07/2013	Dwellings Major	Wellington House, 20, Queensmere, Slough, SL1 1DB
P/15513/000	11/11/2013	Dwellings Major	Land At Kennedy Park, Long Furlong Drive And At Marunden Green, Wentworth Avenue, Britwell, Slough, Berkshire, SL2
P/00149/017	08/11/2013	Dwellings Major	Northgate House, 1a, Stoke Road, Slough, SL2 5AH
P/05597/012	22/02/2013	Dwellings Major	10, Stoke Gardens, Slough, SL1 3QQ
P/01433/014	07/03/2013	Dwellings Major	165, HIgh Street, Slough, Berks, SL1 1DS
P/13110/013	17/05/2013	Dwellings Major	Middlegreen Trading Estate, Middlegreen Road, Slough, Berkshire, SL3 6DF
P/11425/012	18/07/2013	Dwellings Major	LAND REAR OF 2-78 CASTLEVIEW ROAD, PART OF UPTON COURT PARK, & PART OF 36 BLENHEIM ROAD, UPTON COURT ROAD, SLOUGH, BERKSHIRE
P/08770/072	04/09/2013	Dwellings Major	Land South of Eltham Avenue, & West of Grimsby Road, Cippenham, Slough, Berkshire
P/01320/004	13/03/2013	Dwellings Major	Joes Barber Shop, 270, High Street, Langley, Slough, SL3 8HD
P/04551/013	25/10/2013	Dwellings Major	Elvian House, Nixey Close, Slough, SL1 1ND
P/01913/008	12/09/2013	Dwellings Major	9-10, Chapel Street, Slough, SL1 1PF
P/02619/003	21/10/2013	Dwellings Major	177, Farnham Road, Slough, SL1 4XP
P/00599/028	30/12/2013	Manufacturing Storage Warehousing Major	352, Bath Road, Slough, Berkshire, SL1 4DX

P/09881/004	25/04/2013	Offices Major	Blackthorne Trading Estate, Blackthorne Crescent, Colnbrook, Berkshire
P/00666/041	22/04/2013	Offices Major	Beechwood House, 2-8, Windsor Road, Slough, Berkshire, SL1 2EJ
P/14515/005	10/09/2013	Offices Major	234, Bath Road, Slough, SL1 4EE
P/15524/000	06/09/2013	All Other Developments Major	Former Day Centre Site & Service Yard, Slough, SL1 1DH
P/11508/005	01/03/2013	All Other Developments Major	Land At: Railway Terrace and Mill Street, Including, 54 & 56, Grays Place, Railway Terrace, Slough, Berkshire
P/02114/019	22/03/2013	All Other Developments Major	Slough & Eton C Of E School, Ragstone Road, Slough, SL1 2PU
P/03421/006	14/03/2013	All Other Developments Major	32, Burlington Avenue, 95-97, The Crescent, Chalvey, Slough, Berkshire, SL1 2LD
P/06015/026	18/01/2013	All Other Developments Major	Priory School, Orchard Avenue, Slough, SL1 6HE
P/04239/039	01/08/2013	All Other Developments Major	East Berkshire College, Station Road, Langley, Slough, SL3 8BY
S/00695/000	10/04/2013	All Other Developments Major	Haymill Centre, 112, Burnham Lane, Slough, SL1 6LZ
P/01196/052	22/04/2013	Retail Distribution and Servicing Major	Tesco Stores Ltd, Brunel Way, Slough, SL1 1XW
P/00437/085	17/10/2013	Retail Distribution and Servicing Major	Langley Business Centre, 11-49, Station Road, Slough, Berkshire, SL3 8DS

6 Air Quality Planning Policies

Extract from Slough Local Development Framework Core Strategy 2006 - 2026 (adopted December 2008) – Sustainability and the Environment chapter.

Whilst most new development has some effect on the environment, it is particularly important in a densely populated area like Slough that the impact is kept to a minimal level and appropriate mitigation measures are provided. The ability to carry out mitigation measures may not necessarily justify permitting a development particularly where there would be a loss of amenity or create other adverse impacts. In addition the cumulative impact of development upon the environment will have to be taken into account.

There are currently two areas close to the motorways which have been designated as Air Quality Management Areas. They are unsuitable for residential development and other sensitive uses, unless it is practical to incorporate mitigation measures to reduce the effects to acceptable levels.

Slough Local Development Framework 'Core Strategy 2006 – 2026' sets out the policies and guidance to govern the spatial planning of Slough over the next 20 years. This document therefore determines the relationship between planning and air quality within Slough. Of particular relevance are Core Policy 7 and Core Policy 8.

Core Policy 7 Transport
Development proposals will, either individually or collectively, have to make appropriate provision for:

- Reducing the need to travel
- Widening travel choices and making travel by sustainable means of transport more attractive than the private car
- Improving air quality and reducing the impact of travel upon the environment, in particular climate change.

Core Policy 8 - Sustainability and the Environment
All development in the Borough shall be sustainable, of a high quality design, improve the quality of the environment and address the impact of climate change.

> **3. Pollution**
> **Development shall not:**
> a) Give rise to unacceptable levels of pollution including air pollution, dust, odour, artificial lighting or noise;
> b) Cause contamination or a deterioration in land, soil or water quality; and
> c) Be located on polluted land, areas affected by air pollution or in noisy environments unless the development incorporates appropriate mitigation measures to limit the adverse effects on occupiers and other appropriate receptors

The Core Strategy also highlights air quality in the following policies/statements;

7.16 The Spatial Strategy also means that there is no need to build on any land outside of the urban area which has been ruled out for a number of reasons. …Thirdly much of the land is subject to a number of physical or technical constraints. These include the land being subject to flooding, being land filled, having unsuitable access, being in the Public Safety Zone and being subject to excessive noise or poor air quality.

7.49 The Sustainability Appraisal Report (Doc.22) identifies the potential adverse environmental effects of the scale of the proposed residential development in the town centre. These include the problems of congestion and air quality….

7.84 Office development in the town centre will also be subject to parking restraint which, together with improvements to public transport, should reduce the amount of commuting by the private car.This will help to tackle the problems of congestion and poor air quality in the town centre.

7.124 The Slough Local Transport Plan (Doc.14), in accordance with Planning Policy Statement13 – Transport (PPG13), seeks to reduce congestion, improve accessibility, create safer roads, improve air quality and mitigate the impact of the transport system on the environment and ensure that it contributes towards broader social and economic objectives. To effectively tackle congestion the plan seeks to widen travel choices by making public transport, cycling and walking more attractive than the private car….

7.130 The Local Transport Plan (Doc.14) has identified a link between the amount of traffic on Slough's roads and an increasing level of pollutants in the town centre, such as carbon dioxide, a contributor to climate change. The plan identifies two Air Quality Management Areas (AQMAs) in Slough and a third may be declared in the town centre that could limit the scope for development there. Target: Annual mean NO2 air quality levels to be 35 ug/m3 by 2021.

7.141 The Local Transport Plan (Doc.14) contains a draft Air Quality Action Plan which sets out measures to tackle air quality problems. Further detailed work will have to be carried out to show how air quality problems in the town centre can be mitigated in order to allow the planned additional development to take place. April 2011 Slough Borough Council – England 42 Progress Report

7.153 There are currently two areas close to the motorways which have been designated as Air Quality Management Areas. They are unsuitable for residential development and other sensitive uses, unless it is practical to incorporate mitigation measures to reduce the effects to acceptable levels. Other areas of the Borough are affected by pollution from noise, dust, and chemicals, which may limit new development.

7.160 Relevant planning applications will have to be accompanied by noise, light pollution or odour studies, which demonstrate that the proposed development will not have an unacceptable impact upon adjoining uses. Developers will also have to carry out air quality modelling to show that the site is not affected by poor air quality and that the proposed activity will not make the air quality any worse.

9.2 There is a risk that the Spatial Strategy of concentrating development in the town centre with taller, denser buildings, together with increased transport movements, will combine to increase emissions and limit the potential for the concentration of pollutants to be dispersed. This has the potential to create significant localised long term adverse effects.

9.3 The air quality review carried out by the council showed that an area along the A4 in the town centre was close to exceeding the nitrogen dioxide objective primarily as a result of road traffic congestion. An Air Quality Management Area (AQMA) was not declared but this will have to be kept under review in the light of the proposals to build large numbers of residential units in the town centre. Any significant deterioration in air quality could therefore undermine the Spatial Strategy and limit the amount of residential development that can take place there.

9.4 As a result, air quality in the town centre will have to be monitored and the effects of any changes to the road system, such as those proposed in the Heart of Slough, will have to be

fully assessed. Mitigation measures may also have to be introduced such as reducing congestion and controlling the amount of stationary traffic in critical areas. At the same time, buildings may have to be designed so that non residential uses are located on the most sensitive areas. The council will also continue to implement and develop the air quality action plan in the Local Transport Plan. The 'General Development Guidance – Developer's Guide Part 4' is intended to assist developers who are proposing to submit planning applications for residential and commercial schemes in Slough. Air Quality is addressed in Chapter 5. Within this chapter there is a description of the background of Air Quality management in Slough, the existing AQMAs and Action Plan.

7 Local Transport Plans and Strategies

Slough Borough Council's Local Transport Plan is titled LTP3 (2011 – 2026). The following statements specifically refer to Air Quality in LTP3:

LTP Objective: to protect and improve personal health

Improving local air quality

5.6.2 There is clearly a direct link between the amount of traffic on Slough's roads and the levels of pollutants in the air. Of particular concern are levels of nitrogen dioxide (NO_2). In two areas in Slough the levels of NO2 exceed the UK national standards and objectives and also the EU air quality directive limit values. The main source of the exceedance is from road traffic.

5.6.3 As a result, these areas were declared as Air Quality Management Areas (AQMAs) in 2005. One area extends along the length of the M4 and the other along the A4 at Brands Hill approaching Junction 5 of the M4. Our ongoing monitoring and forecasting work shows that NO_2 levels at a number of other locations along Tuns Lane and the A4 in the town centre are also poor, meaning that two further AQMAs will be declared in 2011.

5.6.4 Air Quality Action Plans (AQAP) were agreed in 2006 for the Brand's Hill and M4 AQMAs and integrated within the LTP2. Our action plans have been revised and the specific measures incorporated into the LTP3 as appropriate. Our work shows that, to reduce levels of NO2 we need to:

• reduce the number of vehicles on the roads;
• reduce the levels of emissions from vehicles per mile; and
• reduce stop/start traffic conditions.

5.6.5 We intend to prepare AQAPs for the newly declared town centre AQMAs at the same time that we produce our comprehensive 3-year LTP3 Implementation Plan in Autumn 2011. By linking the plans in this way we aim to show the integration between the LTP3 and air quality management. The new AQAPs were granted approval in November 2011 and are included in Appendix C of the report.

5.6.6 Components of LTP3 that will help to minimise the effect of transport on local air quality are described below.

Sustainable land use planning

5.6.7 Sustainable land use policies will be key to reducing traffic volumes and focusing development in the most accessible locations such as the town, district and neighbourhood centres, making the best use of existing and proposed infrastructure and helping build local communities for example by protecting the suburban areas and public green spaces. LDF policies that will support our drive to improve air quality:

- limiting the amount of parking allowed;
- requiring developers to prepare 'transport assessments' of the impacts of the development;
- securing financial contributions from development proposals for improving transport links (e.g. to Heathrow); developing transport hubs (in Slough Town Centre and the Trading Estate) and improving the borough's railway stations;
- tackling congestion by seeking to widen travel choices and make travel by sustainable means more attractive than the private car.

5.6.8 Improving the management of traffic in Slough, particularly along the A4, is necessary to reduce congestion and improve air quality along this corridor and in the town centre. We believe we can reduce queuing, improve the reliability of journey times and promote quicker, more reliable bus journey times along the A4 corridor if we can reduce overall demand for travel. In doing so, we will improve local air quality by reducing emissions from road vehicles.

5.6.9 We will invest in Urban Traffic Management and Control (UTMC) systems and other Intelligent Transport Systems (ITS) developments, particularly focusing on the A4 corridor. Other traffic and parking management measures such as 20mph zones and controlled parking zones will help us remove unnecessary traffic from residential areas and improve the flow of traffic on key local routes. Better co-ordination of street works and event planning will also assist.

5.6.10 Traffic on the A4 approaching Junction 5 of the M4 is a major contributor to air quality problems. We will seek ways of better managing traffic at this junction but recognise that the way in which the junction is managed heavily influences traffic flows along the M4 itself. We will therefore work with the Highways Agency to examine ways of improving air quality without unduly affecting the M4. Further, the M4 itself it a major generator of emissions and we will also work with the Highways Agency to reduce the impact of the M4 on Slough's residents, workers and visitors.

Cleaner buses, taxis and commercial vehicles

5.6.11 Better management of commercial vehicles, especially Heavy Goods Vehicles (HGVs) on the local road network will be a key action in improving local air quality and we will engage with local businesses and freight operators on how this can be achieved. Upgrading of the lorry and van fleet with greater use of cleaner technology and alternative fuels will help reduce the emission of pollutants as well as emissions of CO_2.

5.6.12 The environmental performance of the bus fleet will increase as new vehicles are put on the road. Within the context of our quality bus partnership with First Berkshire we will promote cleaner buses, including on services passing through the AQMA at Brands Hill. The upgrading of the taxi fleet and the Council's own vehicles will also benefit air quality.

5.6.13 We are committed to significant investment to promote sustainable modes of travel as well as addressing environmental problems including local air quality. For example, through our cycling and walking strategies we will promote use of these low carbon and healthy modes. Many elements of this LTP3 will also support raised standards of air quality by reducing dependence on the private car by making bus and train travel more attractive.

5.6.14 Our parking strategy seeks to restrain and reduce demand for long stay parking in the town centre to promote greater use of public transport, walking and cycling. We will also restrict parking provision associated with new developments as much as possible to prevent significant increases in the size of the overall parking stock and introduce additional Parking Watch Zones. By managing demand for travel by car we can manage emissions. Use of variable message signs and other technology will assist in reducing circulating car park traffic in the town centre.

5.6.15 We continue to deliver travel plans and safer routes to school across Slough to promote walking and cycling and reduce the number of pupils driven to school to minimise the effect school run traffic has on local air quality, and congestion.

5.6.16 Regeneration of the Slough Trading Estate will be linked with significant investment to encourage more sustainable commuter and business travel patterns. We will also continue working with BAA Heathrow on implementation of the Heathrow travel plan as many of

Heathrow's workers live in Slough. Staff travel plans will also remain as an integral part of considering planning applications for new developments.

5.6.17 Our Health and Wellbeing Strategy aims to make it easier for people in Slough to be physically active, helping combat obesity, high mortality due to heart disease or stroke. This LTP3 can contribute to this aim by promoting and facilitating active travel i.e. walking and cycling.

5.6.18 Apart from being healthy, walking and cycling offer low carbon, non-polluting alternatives to the private car. Our walking and cycling strategies, combined with our Rights of Way Improvement Plan (RoWIP) are directed at improving facilities and encouraging more people to walk and cycle.

5.6.19 Investment in maintaining and enhancing walking and cycle routes to make them safer and more attractive is the foundation for boosting levels of active travel in Slough. We will work with health partners, the proposed Cycle Forum (see 5.8.34) and others to promote the health benefits.

5.6.20 Our smarter choices strategy places a strong emphasis on promoting walking and cycling to school by working in partnership with schools and developing initiatives to make travel by these modes more attractive. Initiatives to do this include:

- walking buses;
- walk to school awards;
- cycle training and
- Provision of secure and sheltered cycle parking.

5.6.21 Partnership working with employers on preparation and delivery of workplace travel plans also offers an opportunity for the health aspects of travel to be reinforced and this is something we will pursue.

Smarter choices campaign

5.8.17 We will manage a campaign to raise awareness about the impact of car emissions on local air quality and climate change. The campaign will be targeted at young people, ethnic minority communities and commuters. The campaign will also promote the benefits of alternative modes including public transport, walking, cycling, scooter, bike rental, car sharing, car clubs, and incentives to employees for sustainable travel.

5.8.18 We recognise that the poor perception of public transport is a key factor in deterring usage, especially by car drivers. We will therefore also use the campaign to enhance the image of public transport, remove negative associations and make people aware of the availability of bus and rail services. Opening of the new bus station and improvements to Slough station will be a catalyst.

LTP3 Supplementary Strategy Document – Freight Strategy

2.5 Traffic Management Act 2004

The Traffic Management Act now places a network management duty (NMD) on all local authorities to keep traffic flowing and to manage traffic more efficiently… Proposals or initiatives within the borough must recognise the needs of freight and manage its impact on the highway network, including reducing delays and reduce vehicle delays, particularly in areas with existing poor air quality.

8 Climate Change Strategies

The Slough Borough Council Climate Change Strategy for Slough 2011 – 2014 acknowledges the link between measures to reduce greenhouse gas emissions and reducing emissions that lead to poor air quality. The strategy lists a number of measures relating to road transport and air quality and cross references the action plans for the AQMA's within the borough. The strategy will be updated in 2015.

http://static.slough.gov.uk/downloads/Slough-Climate-Change-Strategy.pdf

9 Implementation of Action Plans

Following public consultation during 2012 the finalised action plan for the AQMA at Tuns Lane (AQMA order 3) and the Town Centre (AQMA order 4) was adopted in November 2012. A summary of the action plan measures and progress to date is provided in Table 9-1. A link is enclosed website:

http://static.slough.gov.uk/downloads/air-quality-management-areas-3-and-4.pdf

For the Brand's Hill (AQMA order 2), progress on the actions was reported in Chapter 5 of the Slough Borough Council LTP2 Delivery Report published in July 2012. The report is available upon request from Slough Borough Council website:

http://static.slough.gov.uk/downloads/LTP2-annexes-A-H.pdf

A detailed progress and review report on the Slough Borough's Air Quality Action Plans will be undertaken in 2016.

Table 9-1: Action Plan measures and progress to date

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
Sustainable Land Use Planning								
Action 1: Limit the amount of parking allowed in new development.	SBC maintain ceiling figure on town centre parking supply and restrictions on scale of on-site parking generally. This has been set at 5,000 for public car parking	Low	Long term	1	Completed	Action 1 completed – a limit of 5,000 public car park spaces has been set up in the Town Centre (there is pressure being placed on the cap from developers and proposed changes to the planning system)		
Action 2: Require developers to prepare transport assessments of the impacts of the development.	SBC update existing guidance under 'General Development Guidance: Developers Guide Part 4'. SBC require developers to show in transport assessments based on satisfactory evidence that negative air quality impacts will be designed out.	Low	Long term	1	Completed (review planned 2016)	Action 2: A review of the 'General Development Guidance: Developers Guide Part 4' will be undertaken in 2016 following the implementation of a low emissions strategy		

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
Action 3: Secure financial contributions from development proposals for improving transport links (e.g. to Heathrow); developing transport hubs (in Slough town centre and the Trading Estate) and improving the borough's railway stations.	Securing s106 agreements, strengthened by third party contributions towards the LSTF *Smarter Travel Slough* project	Low	Long term	1	Ongoing	Action 3: S106 have been entered into to seek contributions towards LSTF smarter travel slough project – also starting to seek contributions towards Town Centre and Brands Hill air quality monitoring		
Tackle congestion by seeking to widen travel choices and make travel by sustainable means more attractive than the private car.	Delivery of *Smarter Travel Slough* LSTF project (see 'Promoting less polluting travel' and 'School and workplace travel plans' below). BBAF project will enable programme to be enhanced.	Low	Long term	1	Ongoing	LSTF project is in progress and will continue into 2015/16		
Better management of congestion and speed								
Reduce queuing, improve the reliability of journey times and promote quicker, more reliable bus journey times along the A4 corridor by reducing overall demand for travel.	Reducing travel demand through *Smarter Travel Slough* LSTF project (see 'Promoting less polluting travel' and 'School and workplace travel plans' below).	Medium	Long term	1	Ongoing	LSTF project is in progress and will continue into 2014/15 LEP funding obtained for SMART A4 bus lane scheme with likely build completed end of 2016		

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
	Delivery of bus priorities as part of BBAF project	Low	Long term	2	Completed	BBAF project is in progress, completion d March 2014		
Improve the management of traffic particularly along the A4 to reduce congestion and improve air quality through investment in Urban Traffic Management and Control (UTMC) and other Intelligent Transport Systems (ITS) developments.	Continuing investment in ITS designed to help stabilise and reduce emissions. Development of a Slough UTMC system with integration of traffic and pedestrian crossing signals within and on the approaches to the AQMAs including the A4/ A355 Three Tuns junction, A4/ A322/ B416 Heart of Slough junction, A4 Tesco/ Queensmere junction, A4/ A412 Uxbridge Road/ Yew Tree Road junction .	Low	Medium Term	3	Ongoing schemes	Actions being pursued through the DEFRA-funded Air Quality Grant project ref 232b2012 (still awaiting modelling results)		
Review strategic traffic signing and identify other ways of providing information on appropriate HGV routes.	Work with freight operators and Highways Agency to develop advisory lorry routes and map so that trips can be planned where possible to avoid AQMA 3 and 4.	Medium	Medium to long term	1	Short/ Medium term	Work yet to start (2015/2016)		

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
Other traffic management measures.	SBC to consider making permanent the A4 temporary 30mph speed permanent along A4 through AQMA 4.	Low	Long term	1	Short term	Not yet progressed – speed limit still 40mph		
Better co-ordination of street works and event planning.	Proactive engagement with utilities companies and regular event organisers. Carrying out Traffic Management Act network duty in line with SBC network management plan and processes.	Very Low	Short term	1	Completed	In progress		
Partnership working to reduce the impact of the M4 on Slough's residents, workers and visitors. Seek ways of better managing traffic at M4 junctions, recognising that the way these junctions are managed heavily influences traffic flows along the M4 itself.	Joint working with the Highways Agency and neighbouring authorities in line with M4 AQMA 1 Action Plan to examine ways of improving air quality without unduly affecting the M4. Implementation of 'Managed Motorway' proposals for hard shoulder running.	Low for AQMA 3 and 4 High for AQMA 1 Medium for AQMA 2	Long term	3	Medium/ Long Term: Managed Motorway scheme now being developed by Highways Agency for potential delivery 2021	Liaison being maintained with HA through Berkshire Strategic Transport Forum (BSTF) Progress slow. SMART MOTORWAY PROPOSAL will be addressing air quality as a significant environmental impact		
Managing parking demand								

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
Restrain and reduce demand for long stay parking in the town centre to promote greater use of public transport, walking and cycling.	Maintain ceiling figure on town centre parking supply and restrictions on scale of on-site parking.	Low	Long term	1	Ongoing	Delivered cap on 5000 spaces -		
Reduce circulating car park traffic in the town centre.	SBC to explore greater use of variable message signs and other technology to guide drivers.	Low	Long term	1	Short/ Medium term	Action being progressed through Council's ITS strategy and upgrading of Council car parks		
Reduce adverse impact of town centre loading and unloading.	Work with freight/ logistic operators to review town centre loading/ unloading in terms of location, size, accessibility and time limits and hours of operation.	Low	Long term	1	Short/ Medium term: programming of action to be set in consultation with Town Centre Manager, when appointed.	No progress		
	Explore with freight/ logistics operators the potential for a freight consolidation centre to cater for town centre deliveries.	Low	Long term	1	Medium/ Long term: programming of action to be set in consultation with Town Centre Manager, when appointed.	No Progress		

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
Cleaner buses, taxis and commercial vehicles								
Working with freight and logistics operators to improve the environmental performance of their lorry and van fleets and operations with greater use of cleaner technology and alternative fuels.	Partnership working through creation of a Freight Quality Partnership or forum.	Low	Long term	1	Short term: programming of action to be set in consultation with Freight Quality Partnership / forum.	Actions being pursued through the DEFRA-funded Air Quality Grant project ref 232a2012 And to be carried forward by Slough Low Emission Strategy – Not Started		
	Work with operators to assess the impact on Slough operations of TfL Low Emission Zone (LEZ) requirements. Explore ways of improving fleet fuel efficiency performance including potential introduction of ECO Stars Fleet Recognition Scheme award scheme for efficient and cleaner fleet vehicles.	Low	Long term	1		Actions being pursued through the DEFRA-funded Air Quality Grant project ref 232a2012 And to be carried forward by Slough Low Emission Strategy – Not Started		
	Work with operators to promote Safe and Efficient Driving (SAFED) training.	Low	Long term	1		Actions being pursued through the DEFRA-funded Air Quality Grant project ref 232a2012 And to be carried forward by Slough Low Emission Strategy – Not Started		

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
	Work with operators to encourage drivers to switch off engines when stationary. Seek where necessary use of fixed penalty notices.	Low	Long term	1		Actions being pursued through the DEFRA-funded Air Quality Grant project ref 232a2012 And to be carried forward by Slough Low Emission Strategy – Not Started		
Working with bus operators to improve the environmental performance of their vehicles and operations with greater use of cleaner technology and alternative fuels.	Work through the Bus Quality Partnership (QP) and with neighbouring authorities to promote the use of low emission vehicles in the bus fleet operating in Slough.	Medium in AQMA 3 and 4	Long term	2	Short term	Some Progress made – further work required in combination with sMaRT A4 scheme		
	Introduction by the operators of vehicles using alternative fuels with support from the DfT Green Bus Fund (	Low	Long term	3	Short term: programming detailed in Green Bus Fund bid, see Note 4 at foot of table.	Some progress made – further work required		
	Work with operators to promote programmes to encourage fuel efficient driving and switching off engines when stationary.	Low	Long term	1	Short term: programming of action to be set in consultation with Bus QP.	Further work required		
Working with taxi operators to improve the environmental performance of their vehicles and operations	Work with the taxi trade to examine the potential for reducing vehicle emissions e.g. through promoting best practice use of ranks, improvements in engine maintenance/ technology.	Low	Long term	2	Short/ Medium term: programming of action to be set in consultation with taxi trade representatives.	No progress – programme being developed to introduce electric taxi trial in 2015		

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
	Work with the taxi trade to encourage fuel efficient driving and switching off engines when stationary. Seek where necessary use of fixed penalty notices.	Low	Long term	1	Short term: programming of action to be set in consultation with taxi trade representatives.	No progress – programme being developed to introduce electric taxi trial in 2015		
Upgrading of the Council's own vehicles.	Continue SBC policy of reducing emissions from Council vehicle fleet through maintenance, modification & where feasible replacement.	Low	Long term	2	Short/ Medium term: programming of action to be set in consultation with SBC fleet manager.	Some progress made replacement vans with EURO 5, 2 electric cars transport, 10 Electric cars (grey fleet – staff) My Electric Avenue project – ongoing		
Partnership working with Heathrow Area Local Authorities (LBs of Hillingdon and Hounslow, Spelthorne BC) to identify measures for reducing nitrogen dioxide concentrations at specified hotspots in the wider Heathrow area.	Complete DEFRA- funded Heathrow Air Quality Hotspot Project into feasibility of implementing a very low emission zone (VLEZ) along with other measures. Project includes the development of an emissions model and evaluation of the performance of low-emission technologies (e.g.hybrids).	Modelling completed, next stage funding being sought for Ultra low emissions Taxi Rank and infrastructure scheme between Hillingdon, Hounslow and Heathrow. Proposal to install Rapid EV charger being installed under OLEV funding close to Junction 5 Brands Hill in 2015						
Promoting less polluting travel								
Promoting sustainable modes of travel as alternatives the car	Delivery of *Smarter Travel Slough* LSTF and BBAF projects to reduce car dependency and encourage	Low	Medium/ Long term	1	Short term: programming of action detailed in LSTF and BBAF	Slough Bike Hire scheme went live October 2013 – very successful uptake (2 more hubs being built)		

LTP3 STRATEGY COMPONENTS	Requirements for implementation	NO_x reduction		Technical feasibility	Timescale for completion/ implementation	PROGRESS		
		Potential impact on NO_2	Timescale of impact					
	modal shift				projects:			
	Promotion, education and awareness raising including publicity material to promote non car modes/environmental awareness/car free days/cleaner fuels etc.	Low	Medium/ Long term	1		In progress		
	Provision of improved pedestrian and cycling facilities; new routes; filling in gaps in network; bike hire/ hubs; safer crossings.	Low	Medium/ Long term	1		In progress		
	Promotion of electric/ low emission vehicles; provision of electric vehicle recharging points in Council car parks and, where possible, in new developments.	Low	Long term	2	Short/ Medium term	A total of 12 EV charge points installed across Council car parks and workplaces for use by staff and visitors. All operating free of charge. First Rapid Charger installed Brunel Way will be operational Novemeber 2014		
	Explore potential for future town centre residents' car club.	Low	Long term	1	Medium term	Not started		

Key: Green – completed or on target – Tan – ongoing/in progress --- Red – not started/delivered

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

Automatic monitoring

The NO_2 annual mean concentrations measured at all sites within the borough were all less than the 40 $\mu g.m^{-3}$ objective during 2013; the measured concentration at the Chalvey site was less than the objective again in 2013. No exceedances of the hourly standard were measured in Slough in 2013.

Based on the analysis of automatic monitoring data from 2013, Slough Borough Council is not required to proceed to a Detailed Assessment.

Diffusion Tube Monitoring Data

Annual mean NO_2 concentrations in excess of the 40 $\mu g.m^{-3}$ objective were measured during 2013 at a number of locations, but all are within one of the existing or soon to be amended AQMA boundaries.

Annual mean NO_2 concentrations in excess of the objective were also measured at a few locations where relevant receptors are present and the tubes fall outside the existing AQMAs during 2013. However using Defra's distance correction calculator reduces the concentrations of NO_2 at these locations (Goodman Park and Windsor Road) to below the 40$\mu g.m^{-3}$ standard. In addition, the Windmill site (on Bath Road) still exceeds the annual mean standard but this will be encompassed by the forthcoming Tuns Lane AQMA extension. The only tube with an annual mean NO_2 value over 40$\mu g.m^{-3}$ and not covered by the descriptions above was Lakeside Road which does not have relevant exposure for the annual mean objective.

An annual mean concentration in excess of 60 $\mu g.m^{-3}$ was measured at Brands Hill and Yew Tree Road during 2013 which is consistent with previous years; this may indicate that the 1-hr mean objective of 200 $\mu g.m^{-3}$ is being exceeded at these locations. It is Slough Borough Councils intention to locate an automatic station on Brands Hill and another one on A4 Bath Road close to Yew Tree Road that will allow both the annual mean and 1-hr mean objective to be monitored on a continuous basis.

Concentrations at Sandringham Road and Walpole Road- which are both located close to railway lines- continue to be well within the NO_2 annual mean objective, monitoring will continue during 2014 and 2015, with a view to suspending monitoring after this date, if the values continue to remain well within the NO_2 annual mean objective.

Examination of the trend in NO_2 annual mean concentrations measured across the Slough network of diffusion tubes indicates that concentrations have been increasing slightly over recent years. However, the trend is not clear at a number of the monitoring sites.

Based on the analysis of diffusion tube monitoring data from 2013, Slough Borough Council is not required to proceed to a Detailed Assessment.

10.2 Conclusions relating to New Local Developments

Slough Borough Council has identified the following new or previously unidentified local developments which may impact on air quality in the Local Authority area.

- Changes to local traffic patterns following implementation of the Chalvey traffic management scheme (affect AQMA 3)
- Proposed changes to local traffic patterns following implementation of Windsor Road A322 (affect AQMA 4) and Tuns Lane A355 (affect AQMA 3)
- Slough Mass Rapid Transit Scheme A4 scheme (affects AQMA 2, 3 and 4)
- Scottish Southern Electric multifuel combined heat and power plant (40MW) gross electrical capacity and up to 20 MW of heat (affect AQMA 3)
- Slough Freight International Exchange in Colnbrook Ward (affect AQMA 2)
- Heathrow Road Stone Coating Plant (affect background levels)
- DHL 400 KW (Biomass Plant) (affect background levels)
- Proposed Sand and Gravel Pit at Riding Court Farm in Royal Borough of Windsor and Maidenhead (affects AQMA 1 and 2)
- National Infrastructure Project HA M4 Smart Motorway affects all Sloughs AQMAs
- National Infrastructure Project Heathrow 3rd runway expansion affects all Sloughs AQMAs

These developments will be taken into consideration in the next Updating and Screening Assessment

10.3 Proposed Actions

This Progress Report has not resulted in any immediate actions being required of Slough Borough Council. The next action will be to prepare the next LAQM report, which is the Updating and Screening Assessment in 2015.

The Air Quality Management Order for Tuns Lane AQMA 3, will now be amended by March 2015, the amendment is a very minor extension eastwards along the A4 as advised in the 2013 Detailed and Assessment Report.

A review of the SBC air quality plans will be undertaken in 2016 and SBC have also submitted a grant application to DEFRA to prepare a low emission strategy in 2015.

Appendices

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

Appendix B: Regulated Industrial Processes

Appendix A: QA/QC Data

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 Ricardo-AEA Ltd.

PM_{10} Monitoring Adjustment

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

QA/QC of diffusion tube monitoring

The diffusion tubes deployed by Slough Borough Council 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 2013 were determined to be satisfactory based upon a z-score of < ± 2.

Diffusion Tube Bias Adjustment Factors

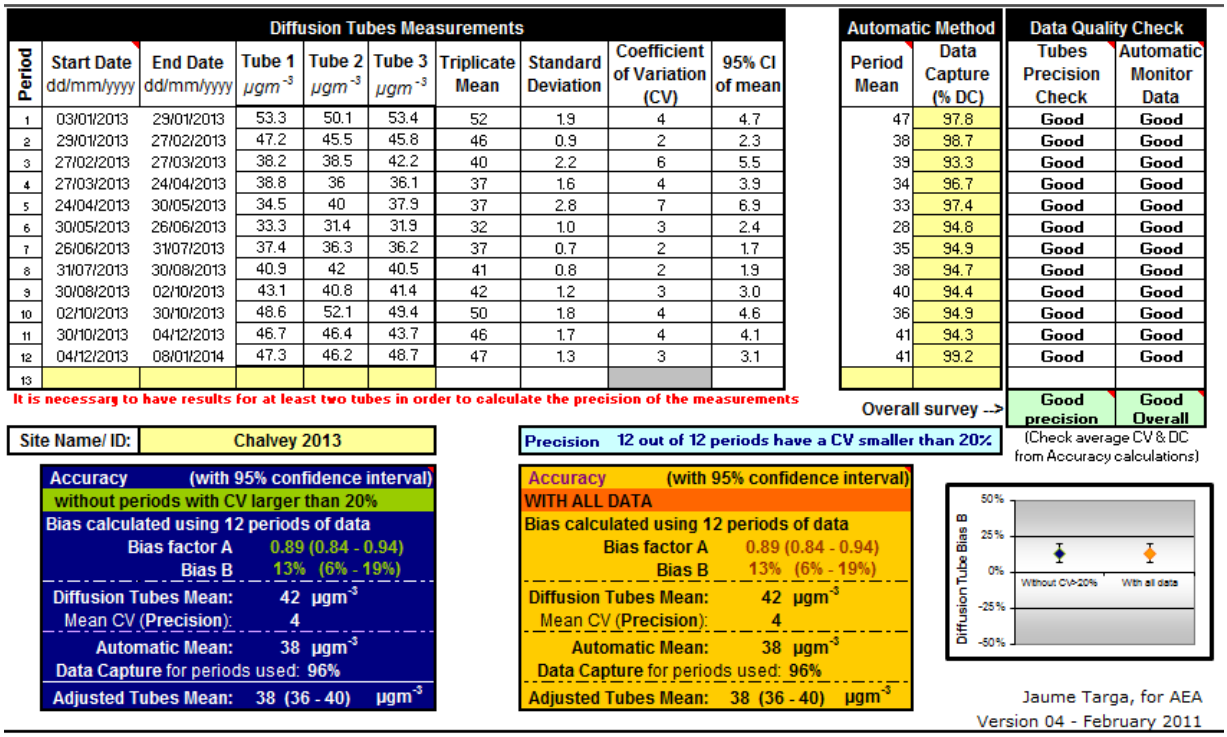
Three local co-location studies were conducted within the borough during 2013 at Pippins, Salt Hill and Chalvey. Bias factors have been calculated for each site.

Table A.2 shows details of the calculation of the combined bias adjustment factor; details of how the 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 2012

Co-location site	Bias adjustment factor 2012
Chalvey	0.89
Colnbrook	0.89
Salthill	0.95
Average bias	**0.91**

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



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	03/01/2013	29/01/2013	53.3	50.1	53.4	52	1.9	4	4.7
2	29/01/2013	27/02/2013	47.2	45.5	45.8	46	0.9	2	2.3
3	27/02/2013	27/03/2013	38.2	38.5	42.2	40	2.2	6	5.5
4	27/03/2013	24/04/2013	38.8	36	36.1	37	1.6	4	3.9
5	24/04/2013	30/05/2013	34.5	40	37.9	37	2.8	7	6.9
6	30/05/2013	26/06/2013	33.3	31.4	31.9	32	1.0	3	2.4
7	26/06/2013	31/07/2013	37.4	36.3	36.2	37	0.7	2	1.7
8	31/07/2013	30/08/2013	40.9	42	40.5	41	0.8	2	1.9
9	30/08/2013	02/10/2013	43.1	40.8	41.4	42	1.2	3	3.0
10	02/10/2013	30/10/2013	48.6	52.1	49.4	50	1.8	4	4.6
11	30/10/2013	04/12/2013	46.7	46.4	43.7	46	1.7	4	4.1
12	04/12/2013	08/01/2014	47.3	46.2	48.7	47	1.3	3	3.1
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	97.8	Good	Good
38	98.7	Good	Good
39	93.3	Good	Good
34	96.7	Good	Good
33	97.4	Good	Good
28	94.8	Good	Good
35	94.9	Good	Good
38	94.7	Good	Good
40	94.4	Good	Good
36	94.9	Good	Good
41	94.3	Good	Good
41	99.2	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Chalvey 2013

Precision 12 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 12 periods of data
Bias factor A 0.89 (0.84 - 0.94)
Bias B 13% (6% - 19%)
Diffusion Tubes Mean: 42 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 38 µgm^{-3}
Data Capture for periods used: 96%
Adjusted Tubes Mean: 38 (36 - 40) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 0.89 (0.84 - 0.94)
Bias B 13% (6% - 19%)
Diffusion Tubes Mean: 42 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 38 µgm^{-3}
Data Capture for periods used: 96%
Adjusted Tubes Mean: 38 (36 - 40) µgm^{-3}

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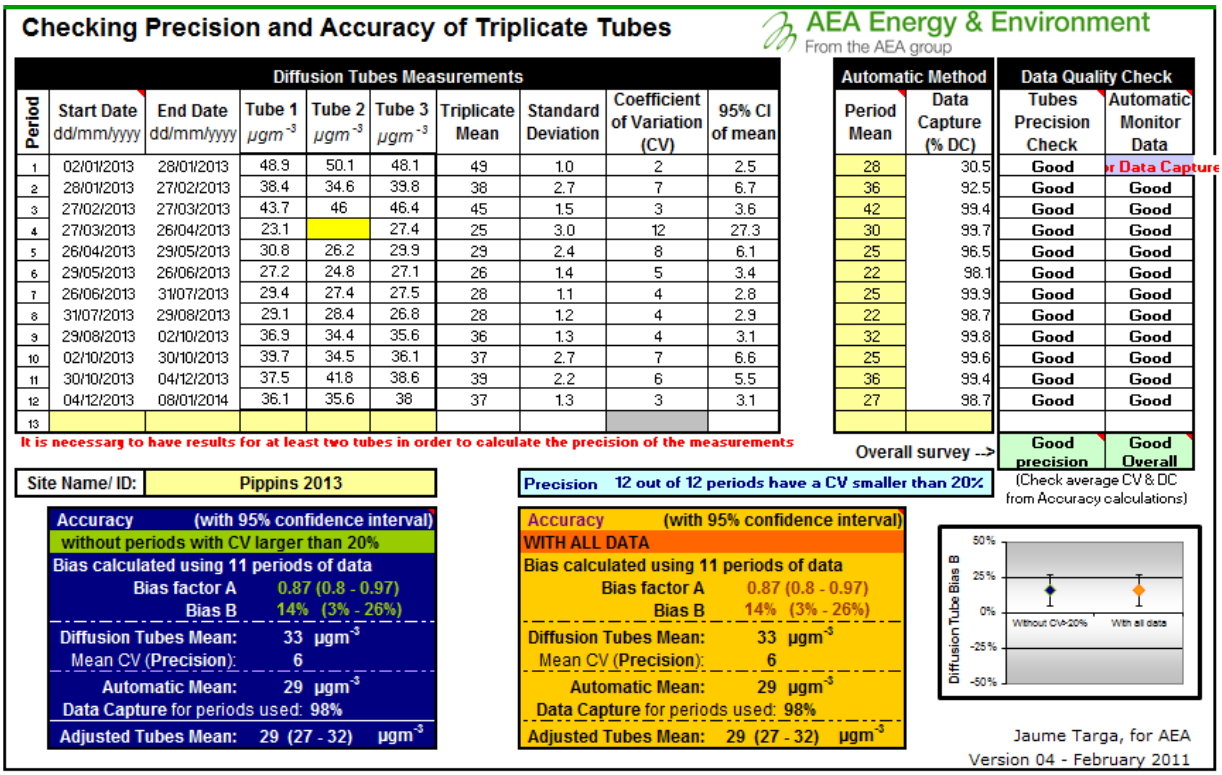
Figure A.2: Co-location study – Slough Colnbrook



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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	02/01/2013	28/01/2013	48.9	50.1	48.1	49	1.0	2	2.5
2	28/01/2013	27/02/2013	38.4	34.6	39.8	38	2.7	7	6.7
3	27/02/2013	27/03/2013	43.7	46	46.4	45	1.5	3	3.6
4	27/03/2013	26/04/2013	23.1		27.4	25	3.0	12	27.3
5	26/04/2013	29/05/2013	30.8	26.2	29.9	29	2.4	8	6.1
6	29/05/2013	26/06/2013	27.2	24.8	27.1	26	1.4	5	3.4
7	26/06/2013	31/07/2013	29.4	27.4	27.5	28	1.1	4	2.8
8	31/07/2013	29/08/2013	29.1	28.4	26.8	28	1.2	4	2.9
9	29/08/2013	02/10/2013	36.9	34.4	35.6	36	1.3	4	3.1
10	02/10/2013	30/10/2013	39.7	34.5	36.1	37	2.7	7	6.6
11	30/10/2013	04/12/2013	37.5	41.8	38.6	39	2.2	6	5.5
12	04/12/2013	08/01/2014	36.1	35.6	38	37	1.3	3	3.1
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
28	30.5	Good	r Data Capture
36	92.5	Good	Good
42	99.4	Good	Good
30	99.7	Good	Good
25	96.5	Good	Good
22	98.1	Good	Good
25	99.9	Good	Good
22	98.7	Good	Good
32	99.8	Good	Good
25	99.6	Good	Good
36	99.4	Good	Good
27	98.7	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Pippins 2013

Precision 12 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 0.87 (0.8 - 0.97)
Bias B 14% (3% - 26%)
Diffusion Tubes Mean: 33 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 29 (27 - 32) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.87 (0.8 - 0.97)
Bias B 14% (3% - 26%)
Diffusion Tubes Mean: 33 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 29 (27 - 32) µgm^{-3}

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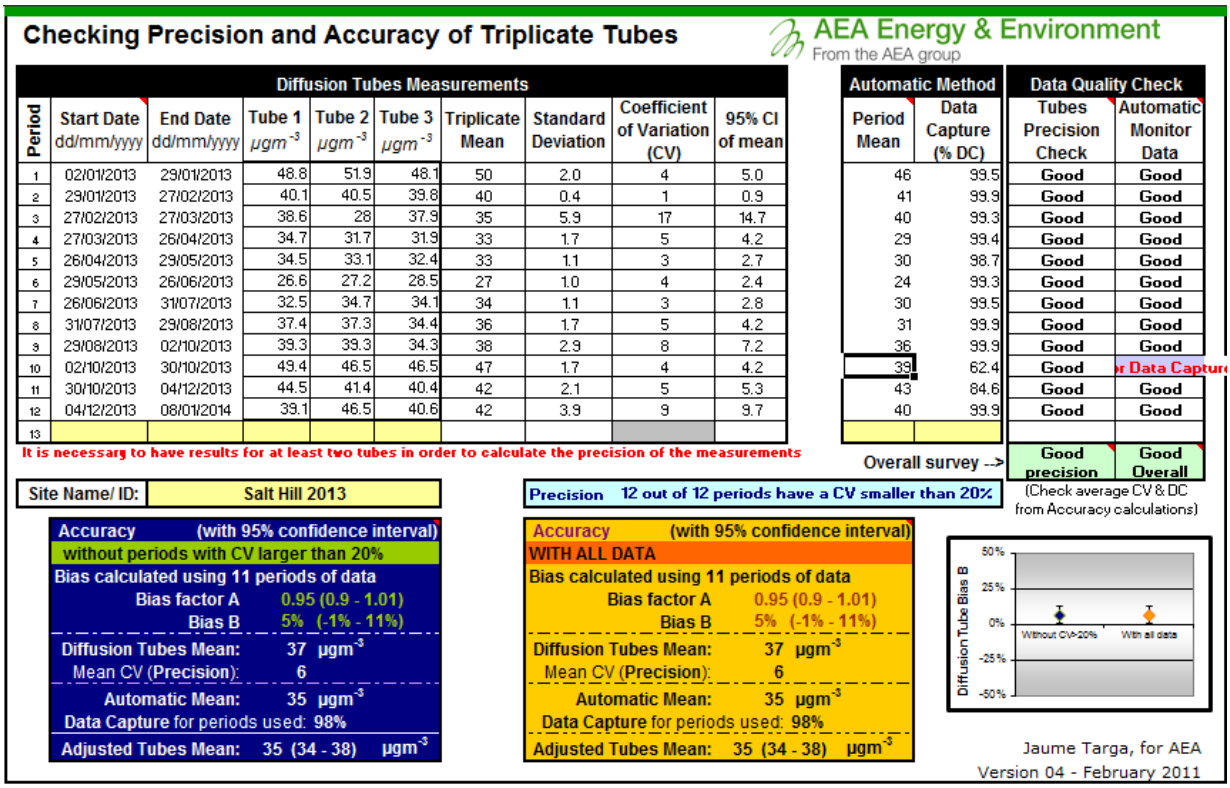
Figure A.3: Co-location study – Slough Salthill



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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	02/01/2013	29/01/2013	48.8	51.9	48.1	50	2.0	4	5.0
2	29/01/2013	27/02/2013	40.1	40.5	39.8	40	0.4	1	0.9
3	27/02/2013	27/03/2013	38.6	28	37.9	35	5.9	17	14.7
4	27/03/2013	26/04/2013	34.7	31.7	31.9	33	1.7	5	4.2
5	26/04/2013	29/05/2013	34.5	33.1	32.4	33	1.1	3	2.7
6	29/05/2013	26/06/2013	26.6	27.2	28.5	27	1.0	4	2.4
7	26/06/2013	31/07/2013	32.5	34.7	34.1	34	1.1	3	2.8
8	31/07/2013	29/08/2013	37.4	37.3	34.4	36	1.7	5	4.2
9	29/08/2013	02/10/2013	39.3	39.3	34.3	38	2.9	8	7.2
10	02/10/2013	30/10/2013	49.4	46.5	46.5	47	1.7	4	4.2
11	30/10/2013	04/12/2013	44.5	41.4	40.4	42	2.1	5	5.3
12	04/12/2013	08/01/2014	39.1	46.5	40.6	42	3.9	9	9.7
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
46	99.5	Good	Good
41	99.9	Good	Good
40	99.3	Good	Good
29	99.4	Good	Good
30	98.7	Good	Good
24	99.3	Good	Good
30	99.5	Good	Good
31	99.9	Good	Good
36	99.9	Good	Good
39	62.4	Good	r Data Capture
43	84.6	Good	Good
40	99.9	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Salt Hill 2013

Precision 12 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 0.95 (0.9 - 1.01)
Bias B 5% (-1% - 11%)
Diffusion Tubes Mean: 37 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 35 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 35 (34 - 38) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.95 (0.9 - 1.01)
Bias B 5% (-1% - 11%)
Diffusion Tubes Mean: 37 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 35 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 35 (34 - 38) µgm^{-3}

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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. The average factor of 0.91 derived from the local co-location studies is consistent with the factor of 0.88 used in 2012. The average bias factor from 37 studies published during 2013 in the national database of co-location studies was 0.81.

Short-term to Long-term Data adjustment

A short to long term data adjustment was applied to four annual mean NO_2 diffusion tube measurements where the data capture was less than 75%. The details of the automatic monitoring sites used to calculate each adjustment factor are presented in Tabled A.1 to A.4. Slough's own sites have been used in this instance as they are maintained to the same standards as the AURN through the Calibration Club.

Table A.1: Short to long term data adjustment derivation for Ditton Road diffusion tube

Site	Site Type	Annual Mean (Am)	Period Mean (Pm)	Ratio (Am/Pm)
Salt Hill	Intermediate (Residential)	36.0	37.3	0.97
Colnbrook Pippins	Urban Background (Residential)	29.2	31.0	0.94
Chalvey	Intermediate-Motorway (Residential)	37.5	39.2	0.96
			Average ratio	0.96

Appendix B: Regulated industrial processes

Table B.1 Part A1 Processes (relevant to LAQM)

Type of process	Name of company	Location	Grid Reference
Combustion	Slough Heat and Power	Slough Trading Estate, Slough, Berkshire	495370 E 181540 N
Various pain processes	ICI Plc	Wexham Road, Slough, Berkshire, SL2 5DS	498460 E 101120 N
Surface treatment	Metal Colours Ltd	9 Cambridge Avenue, Slough Trading Estate, Slough, Berkshire, SL1 4QG	503716 E 176204 N
Landfill	Biffa Waste Services	Sutton Lane, Slough, Berkshire SL3 8AB	503716 E 176204 N
Biological Process for Pharmaceuticals	Lonza Biologics Plc	224-230 Bath Road, Slough, Berkshire SL1 4DX	495600 E 188060 N
Manufacture and Packaging of Chocolate based Confectionary	Mars UK Ltd	Dundee Road, Slough, Berkshire SL1 4JX	495100 E 181550 N
Incineration Plant, Clinical Waste	Grundon Waste Management Ltd	Lakeside Road, Lakeside Industrial Estate, Slough, Berkshire SL3 0EG	503870 E 177300 N
Waste Management	Amber Builders Ltd	Poyle Manor Farm Recycling Centre, Poyle Road, Poyle, Slough, Berkshire SL3 0BL	503041 E 176159 N
Energy from Waste	Lakeside Energy from Waste Ltd	Lakeside Road, Colnbrook, Slough SL3 0FE	503860 E 177318 N
Sewerage Works	Thames Water Utilities	Thames House, Wood Lane, Slough, Berkshire SL1 9EB	494651 E 179516 N

PART A2 PROCESSES (Relevant to LAQM)

APPLICANT	TYPE OF PROCESS.	GRID REFERENCE	PROCESS GUIDANCE NUMBER	APPLICATION DATE	DATE AUTHORISED	PERMIT ISSUED DATE	PERMIT REFERENCE	RISK RATING
Slough Crematorium Stoke Road Slough Berks SL2 5AX	Cremation of Human Remains.	497710 E 181450 N	PG 5/2	31st July 1991	20th July 1992	12TH May 2008	PPC/08/19	LOW
BPV Servicing and SAAB Spares The Workshop Ely Avenue Slough Berks SL2 5DS	Waste Oil Burners.	496280 E 181450 N	PG 1/1	16th January 1992	27th May 1993	March 2005	Q04PELYA/1/2005	LOW
London Concrete (Heathrow Plant) Colnbrook by Pass Slough Berkshire SL3 OEB	Mixing Concrete	504289 E 177884 N	PG 3/1	22nd February 2002	6th June 2003	3rd May 2007	PPC/07/16	LOW
Heathrow Asphalt, Colnbrook by pass, Slough. SL3 0EB	Roadstone Coating		PG3/15	22nd October 2013	N/A	1st January 2014	PPC/13/15	LOW

APPLICANT	TYPE OF PROCESS.	GRID REFERENCE	PROCESS GUIDANCE NUMBER	APPLICATION DATE	DATE AUTHORISED	PERMIT ISSUED DATE	PERMIT REFERENCE	RISK RATING
Wiggins Transport Ltd R/O Poyle Manor Farm Poyle Road Stanwell Middx	Crushing and Grinding.	502900 E 176300 N	PG 3/8	29th April 1992	23rd December 1992	28th February 2007	PPC/07/3	LOW
Wagstaff Foundries Ltd 7 David Road Poyle Trading Estate Colnbrook Slough Berks SL3 ODB	Iron Sandcasting Production process.	503480 E 176180 N	PG 2/4 PG 2/3	Sept 2003	18th December 2003	28th February 2007	PPC/07/17	LOW
Emanuel Brothers Ltd Wexham Road Slough Berks SL1 1RW	Respraying of Road Vehicles.	498440 E 180220 N	PG 6/34	14th September 1992	5th August 1993	28th February 2007	PPC/07/6	LOW
Rainbow Bodyshop 460 Bath Road Slough Berks SL1 6BB	Respraying of Road Vehicles.	493880 E 181140 N	PG 6/34	21st October 1992	28th May 1993	28th February 2007	PPC/07/7	LOW

APPLICANT	TYPE OF PROCESS.	GRID REFERENCE	PROCESS GUIDANCE NUMBER	APPLICATION DATE	DATE AUTHORISED	PERMIT ISSUED DATE	PERMIT REFERENCE	RISK RATING
Bodytechnics Limited 381 Sykes Road Slough Trading Estate Slough Berkshire SL1 4SP	Respraying of Road Vehicles	494460 E 181370 N	PG 6/34	24th May 1999	19th December 2000	28th February 2008	PPC/07/19	LOW
Berkshire Accident Repair Centre 466 Bath Road Slough Berks SL1 6BB	Respraying of Road Vehicles	493840 E 181030 N	PG 6/34	5th June 1995	5th July 1996	28th February 2007	PPC/07/8	LOW
Autotech Slough Ltd 649-650 Ajax Avenue Slough Trading Estate Slough, Berks SL1 4BG	Respraying of Road Vehicles	495796 E 180807 N	PG 6/34	22nd October 2003	No Authorisation in file	28th February 2007	PPC/07/4	LOW
Autotech ARC Stoke Gardens Industrial Estate Slough Berks SL1 3QB	Respraying of Road Vehicles		PG 6/34	18th March 2003	No Authorisation in file	28th February 2007	PPC/07/5	LOW

APPLICANT	TYPE OF PROCESS.	GRID REFERENCE	PROCESS GUIDANCE NUMBER	APPLICATION DATE	DATE AUTHORISED	PERMIT ISSUED DATE	PERMIT REFERENCE	RISK RATING
R & C Motors Co Ltd White Hart Road Chalvey Slough Berks SL1 2SF	Respraying of Road Vehicles.	496620 E 179240 N	PG 6/34	30th September 1992	5th August 1993	28th February 2007	PPC/07/11	LOW
DWS (Slough) Ltd Whittle Park Way Slough SL1 6FE	Respraying of Road Vehicles.		PG6/34B(O6)	29th November 2010		7th December 2010	PPC/10/21	LOW
Wartsila Propulsion 810 Oxford Avenue Slough Industrial Estate Slough Berkshire SL1 4LN	Textile Coating		PG 4/02(05) PG6/08 (04)	5th July 2007	N/A	18th December 2007	PPC/07/18	LOW
ICI PAINTS Wexham Road Slough; Berks SL2 5DS	Paint Manufacturing.	498500 E 180190 N	PG 6/10(92)	25th August 1992	30th September 1993	28th June 2007	PPC/07/14	LOW
AGI World Ltd Slough Interchange Whittenham	Printing		PG6/16	26th October 2010		25th January 2011	PPC/11/23	LOW

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Close Slough SL2 5EP								
Classic Cleaners 278 Farnham Road Slough Berkshire SL1 4XL	Dry Cleaners		PG6/46	24th October 2006	N/A	29th December 2006	PPC/06/DC1	LOW
Launderama 14 Harrow Market Langley Slough Berkshire SL3 8HJ	Dry Cleaners		PG6/46	30th October 2006	N/A	29th December 2006	PPC/06/DC2	LOW
White Rose Dry Cleaners 9 Grasmere Avenue Slough Berkshire SL2 5JD	Dry Cleaners		PG6/46	30th October 2006	N/A	29th December 2006	PPC/06/DC3	LOW
Wardrobe Game 59 Coleridge Crescent Colnbrook Slough	Dry Cleaners		PG6/46	28th October 2006	N/A	11th January 2007	PPC/06/DC4	LOW

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Berkshire SL3 0QD								
Pick & Drop Dry Cleaning Co 119 Bath Road Slough Berkshire SL1 3UW	Dry Cleaners		PG 6/46	28th October 2007	N/A	18th December 2007	PPC/07/DC5	Medium
Excels 3 Colndale Road Colnbrook Slough Berkshire SL3 0HQ	Dry Cleaners		PG 6/46	28th November 2007	N/A	17th April 2008	PPC/08/DC6	LOW
Aeroserve Euro Ltd 478 Malton Avenue Slough Trading Estate Slough Berkshire SL1 4QU	Dry Cleaners		PG 6/46	3rd May 2013	N/A	23rd October 2013	PPC/13/DC7	LOW

APPLICANT	TYPE OF PROCESS. Reference	GRID REFERENCE	PROCESS GUIDANCE NUMBER	DATE AUTHORISED	APPLICATION DATE	PERMIT ISSUED DATE	PERMIT REFERENCE

DUCO International Ltd Eastbourne Road Slough Berks SL1 4SF	Textile and Fabric Coating and Finishing Process. **CLOSED March 2011 Awaiting site surrender Application.**	494960 E 181270 N	PG 6/8	29t September 1993	1st July 1992	11th December 2008 (revised)	IPPC/A2/08/1b

PETROL FILLING STATIONS

APPLICANT	PETROL FILLING STN	GRID REFERENCE	PROCESS GUIDANCE NUMBER	APPLICATION DATE	DATE AUTHORISED	PERMIT ISSUED DATE	PERMIT REFERENCE	RISK RATING
Tesco Service Station Brunel Way Slough Berkshire SL1 1XW	Stage I Vapour Recovery & Stage II Vapour Recovery		PG 6/46	26th May 1998	31st December 1998	4th May 2007	PPC/PFS/07/1	Medium
Farnham Road Service Station 416 Farnham Road Slough Berkshire SL2 1JA	Stage I Vapour Recovery		PG 6/46	2nd November 1998	31st December 1998	4th May 2007	PPC/PFS/07/2	LOW
BP Chequers Service Stn Colnbrook By Pass Colnbrook Slough Berkshire SL3 0EH	Stage I Vapour Recovery & Stage II Vapour Recovery		PG 6/46	3rd August 1998	31st December 1998	24th May 2007	PPC/PFS/07/3	LOW
Slough East Service Stn 85 London Road	Stage I Vapour Recovery		PG 6/46	19th November 1998	31st December 1998	4th May 2007	PPC/PFS/07/4	Medium

APPLICANT	PETROL FILLING STN	GRID REFERENCE	PROCESS GUIDANCE NUMBER	APPLICATION DATE	DATE AUTHORISED	PERMIT ISSUED DATE	PERMIT REFERENCE	RISK RATING
Slough Berkshire SL3 7RS								
Shell Burnham Lane 56 Burnham Lane Slough Berkshire SL1 6JY	Stage I Vapour Recovery & Stage II Vapour Recovery		PG 6/46	11th January 1999	31st March 1999	24th May 2007	PPC/PFS/07/5	Medium
Good Companions Service Station 93 Stoke Poges Lane Slough Berkshire SL1 3NJ	Stage I Vapour Recovery		PG 6/46	16TH February 1998	31st December 1998	28th June 2007	PPC/PFS/07/6	Low
BP Brandshill Service Stn 575 London Road Slough Berkshire SL3 1DA	Stage I Vapour Recovery & Stage II Vapour Recovery		PG6/46	3rd August 1998	31st December 1998	24th May 2007	PPC/PFS/07/7	Medium
Murco Service Station 135 High Street Chalvey, Slough Berkshire SL1 2TW	Stage I Vapour Recovery & Stage II Vapour Recovery		PG6/46	30th November 1998	31st December 1998	28th June 2007	PPC/PFS/07/8	Medium
BP Wexham Road Service Station	Stage I Vapour Recovery & Stage II Vapour Recovery		PG6/46	3rd August 1998	31st December	24th May 2007	PPC/PFS/07/9	Medium

APPLICANT	PETROL FILLING STN	GRID REFERENCE	PROCESS GUIDANCE NUMBER	APPLICATION DATE	DATE AUTHORISED	PERMIT ISSUED DATE	PERMIT REFERENCE	RISK RATING
273 Wexham Road Slough Berkshire SL2 5QY					1998			
Langley Connect Service Station Parlaunt Road Slough Berkshire SL3 8QR	Stage I Vapour Recovery & Stage II Vapour Recovery		PG6/46	3rd August 1998	31st December 1998	24th May 2007	PPC/PFS/07/10	LOW
Tesco Express 80-82 London Road Slough Berkshire SL3 7HR	Stage I Vapour Recovery & Stage II Vapour Recovery		PG6/46	6th October 1998	31st December 1998	28th June 2007	PPC/PFS/07/11	LOW
Bath Rd Filling Station 232 Bath Road Slough Berkshire SL1 3XE	Stage I Vapour Recovery		PG6/46	13th October 1998	31st December 1998	4th May 2007	PPC/PFS/07/12	LOW
BP Furnival Service Station 253-257 Farnham Rd Slough Berkshire SL2 1DA	Stage I Vapour Recovery & Stage II Vapour Recovery		PG6/46	7th May 1998	31st December 1998	28th June 2007	PPC/PFS/07/13	LOW
South West Service	Stage I Vapour Recovery &		PG6/46	24th September	31st	28th June	PPC/PFS/07/1	LOW

APPLICANT	PETROL FILLING STN	GRID REFERENCE	PROCESS GUIDANCE NUMBER	APPLICATION DATE	DATE AUTHORISED	PERMIT ISSUED DATE	PERMIT REFERENCE	RISK RATING
Stn 395 Bath Road Slough Berkshire SL1 3SA	Stage II Vapour Recovery			1998	December 1998	2007	4	
Golden Cross Service Stn Old Bath Road Colnbrook Slough Berkshire SL3 0JZ	Stage I Vapour Recovery		PG6/46	26th November 1998	31st December 1998	28th June 1998	PPC/PFS/07/15	LOW