2015 Updating and Screening Assessment for London Borough of Lewisham

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

August 2015

AECOM

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Executive Summary

In fulfilment of its Local Air Quality Management duties, the London Borough of Lewisham commissioned AECOM Ltd to compile its 2015 Air Quality Updating and Screening Assessment (USA). This report documents changes in monitored pollutant concentrations within the Borough since the publication of the 2014 Air Quality Progress Report and attempts to identify any matters that have changed within the borough which may lead to risk of an air quality objective being exceeded.

In 2014, the London Borough of Lewisham undertook monitoring at four automatic monitoring sites and at 34 NO_2 diffusion tube sites.

Exceedances of the annual mean NO_2 air quality objective (40 µg/m^3) were recorded at all three automatic sites which measured NO_2 in 2014, although the 1-hour NO_2 objective was achieved at all three sites.

Diffusion tube monitoring of NO_2 undertaken in 2014 found that many roadside sites remain in exceedance of the annual mean objective, while background sites generally achieve the objective. There is no clear trend in diffusion tube NO_2 concentrations recorded over the last 4 years, with concentrations remaining relatively consistent at the majority of sites.

For Particulate Matter (PM), there were no monitored exceedances of the annual mean PM_{10} objective (40 µg/m^3) or the 24-hour PM_{10} objective in 2014, at any of the three automatic sites where PM_{10} monitoring is undertaken. Again, there is no clear trend in PM_{10} concentrations recorded over the last six years, with concentrations remaining relatively consistent at all sites.

Monitored annual mean NO_2 concentrations within each of the AQMAs still exceed the national air quality objective, and as such the AQMA declarations should remain. Whilst five of the six AQMAs are also declared for PM_{10}, and PM_{10} concentrations have remained within the relevant objectives for several years, it is considered prudent to retain the existing designations for PM_{10} and to not proceed to a Detailed Assessment for this pollutant at this stage. Concentrations at all other locations

outside of the AQMAs are all below the objectives at relevant locations therefore there is no need to proceed to a Detailed Assessment on this basis.

No significant changes or developments were identified since the 2014 Air Quality Progress Report that were considered likely to lead to significant increases in any pollutant prescribed in the Air Quality Regulations.

The overall conclusion of this Updating and Screening Assessment is that a Detailed Assessment is not required for any pollutant. The London Borough of Lewisham will submit an Air Quality Progress Report in 2016 as the next course of action.

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1 Introduction

1.1 Description of Local Authority Area

The London Borough of Lewisham is situated in southeast London. It is bordered to the west by Southwark, to the east by Greenwich and to the south by Bromley and has a small frontage on to the River Thames in the north. It is an inner London borough comprising a densely populated area with an estimated population in 2010 of approximately 261,600. The borough is mostly residential with areas of employment around the main commercial centres of Lewisham, New Cross, Catford, Deptford and Sydenham. However, compared to other London boroughs, Lewisham is relatively green with approximately one fifth of the borough being open space. The borough has a broad socio-economic range combining a mix of wealthier wards and wards with more concentrated areas of deprivation. Some of the most deprived wards are New Cross, Evelyn, Deptford and Downham. In these areas health and the quality of housing are poorer.

The main sources of air pollutants are the busy and congested roads. Only 31% of the borough workforce are employed in the borough (Lewisham Employment Land Study, 2008[1]) with the majority travelling outside the borough to work (69 per cent of local people commute out of Lewisham to work). The main roads that run through the borough include the A2, A20, A21 and the South Circular (A205). There are currently 68 minor industrial processes within the borough that are regulated by the Council and one Part A installation (SELCHP) regulated by the Environment Agency.

1.2 Purpose of Report

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

Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

1.3 Air Quality Objectives

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

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	**Measured as**	
Particles (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

The London Borough of Lewisham undertook previous rounds of review and assessment of air quality in line with the system of Local Air Quality Management. From the first round, exceedances of the national air quality objectives for nitrogen dioxide (NO_2) and particulates (PM_{10}) were identified. The exceedances were greatest close to busy roads, demonstrating the significant contribution that originates from motor vehicles. Consequently, five Air Quality Management Areas (AQMAs) were declared in 2001. The AQMAs consisted of four areas in the north of the borough together with a series of ribbon roads in the south.

Subsequent Review and Assessments concluded that the designation of the AQMAs should remain, although exceedances of the PM_{10} objectives had not been observed for several years. Exceedances of the objectives for NO_2 continued however, and the potential for additional areas that failed to meet the objectives outside of the original AQMAs was identified in 2009. Consequently, a Detailed Assessment was carried out in 2011 which used air quality modelling to determine the extent of the area of any exceedances. Of the roads considered, the modelling exercise confirmed that exceedances of both objectives for NO_2 were likely to occur close to the B218 and B238 roads indicating an additional AQMA was required. The 2013 Air

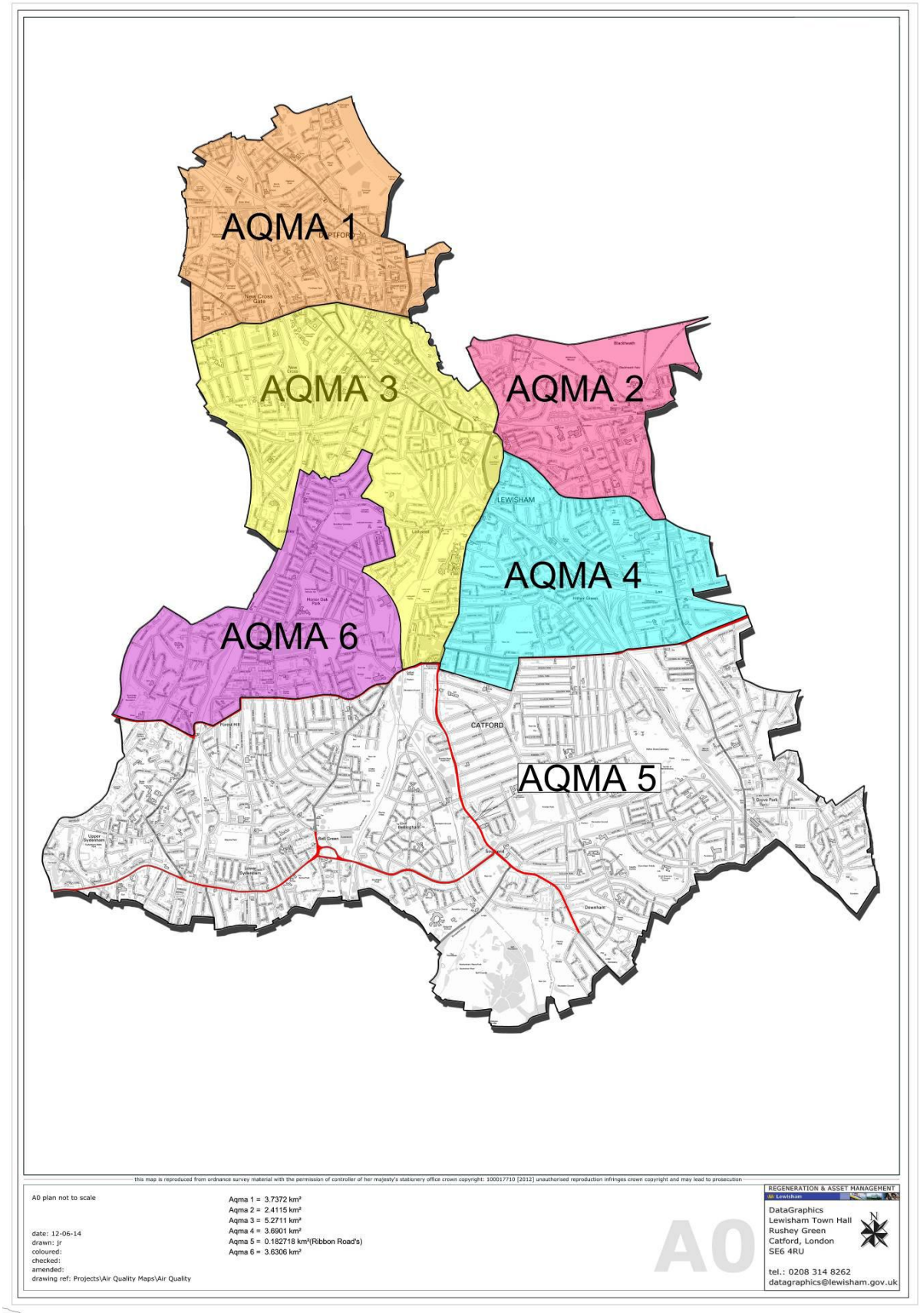
Quality Progress Report[2] supported the findings of the previous review and assessment documents and Detailed Assessment. Further to the Detailed Assessment of 2011, consultation with residents took place between September and October 2012, after which the council decided to include the surrounding residential streets within the new AQMA, in addition to the B218 and B238, as a precautionary measure, with 70% of local people in support. A report recommending an AQMA for the Crofton Park area then went before a council meeting in April 2013.

An Air Quality Management Area was subsequently declared for the area of Crofton Park and the borders of Forest Hill and Perry Vale, which came into effect on 30th August 2013. The AQMA covers the area of modelled exceedances and beyond, in order to align with boundaries of other AQMAs and major roads and brought the total number of air quality management areas in the Borough to six (see Figure 1.1).

The five original AQMAs in the borough, declared in 2001, are declared for both nitrogen dioxide and particulate matter (PM_{10}), whereas AQMA 6 is declared for nitrogen dioxide only, as PM_{10} levels are below national air quality objectives in this area.

The 2014 Air Quality Progress Report[3] indicated that NO_2 concentrations in 2013 remained in exceedance of the annual and hourly mean air quality objectives in the six AQMAs, while PM_{10} concentrations remained below the objective. It was suggested in the report that following the 2014 monitoring results, revocation of the five AQMAs for both NO_2 and PM_{10} might be considered (replacing them with AQMAs for NO_2 only) given how monitored PM_{10} concentrations remain within the PM_{10} objectives.

Figure 1.1: Map of AQMA Boundaries



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

The Council undertakes automatic monitoring at four fixed sites as detailed below:

- Lewisham 1 (LW1) – an urban background site located in Catford which started operating in 1996. This site monitors nitrogen dioxide, sulphur dioxide and ozone.
- Lewisham 2 (LW2) – located approximately 6m from the roadside of the A2 New Cross Road. This site monitors nitrogen dioxide, sulphur dioxide, PM_{10} and $PM_{2.5}$ using a Filter Dynamics Measurement System (FDMS).
- Lewisham 3 (LW3) – classed as an industrial site, this monitor is located on the northern edge of a residential area and approximately 10m south of a strip of waste transfer sites. The site measures PM_{10} using a Beta Attenuation Monitor (BAM).
- Lewisham 4 (LW4) – a roadside site, this monitor is located approximately 7m from the A20 Loampit Vale. This is close to new high rise developments and where further development is scheduled. It measures nitrogen dioxide and PM_{10} using a Tapered Element Oscillating Microbalance (TEOM).

Details of these sites are presented in Table 2.1 and their locations are shown in Figure 2.1. All four sites are part of the London Air Quality Network[4] (LAQN) and therefore the standards of QA/QC are similar to those applied to the government's AURN sites. Regular calibrations are carried out, with subsequent data ratification undertaken by ERG at King's College London. The QA/QC process for the LW4 (Loampit Vale) station includes the correction of PM_{10} concentrations from the TEOM analyser to those that are gravimetric reference equivalent using the VCM (Volatile Correction Model). Additionally, PM_{10} data at LW3 (Mercury Way), which is measured using a BAM, has been corrected for by dividing concentrations by a factor of 1.21. No correction is required for the PM_{10} data from LW2 (New Cross) as the pollutant is measured using an FDMS.

Figure 2.1: Map(s) of Automatic Monitoring Sites (if applicable)

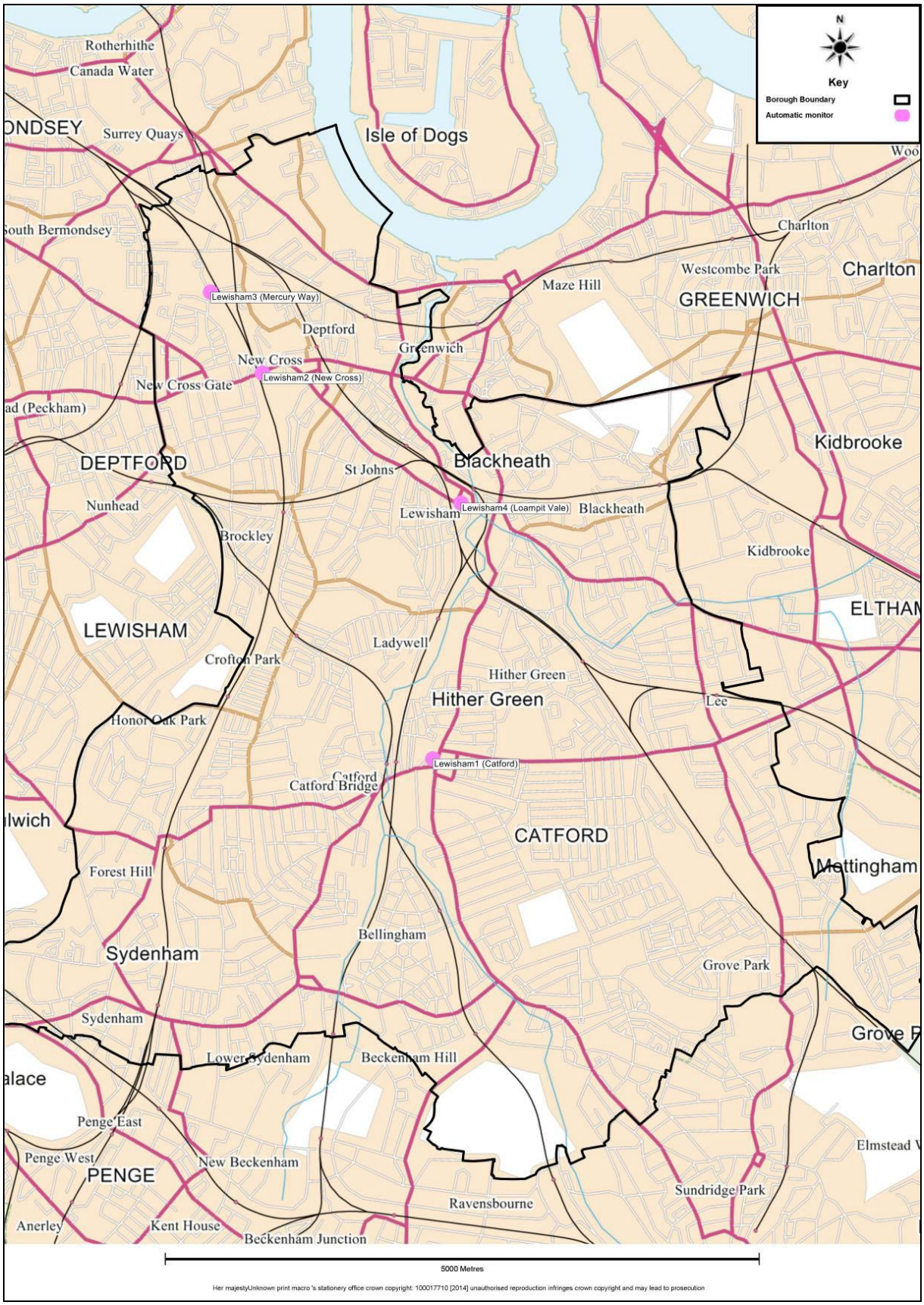


Table 2.1: Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
LW1	Lewisham1 (Catford)	Urban background	537675	173689	3.0m	NO_2 SO_2 O_3	Y-AQMA3	Chemiluminescence UV fluorescence UV photometer	Y[a]	3m	N
LW2	Lewisham2 (New Cross)	Roadside	536241	176932	2.5m	NO_2 SO_2 PM_{10} $PM_{2.5}$	Y-AQMA3	Chemiluminescence UV fluorescence FDMS FDMS	Y	6m	Y
LW3	Lewisham3 (Mercury Way)	Industrial	535806	177612	2m	PM_{10}	Y-AQMA4	BAM	Y	2m	Y
LW4	Lewisham4 (Loampit Vale)	Roadside	537912	175838	2.5m	NO_2 PM_{10}	Y-AQMA3	Chemiluminescence TEOM	Y	7m	Y

[a] The monitor is located in a shopping precinct in which market stall holders are regularly present. Therefore, there is relevant exposure to all except the annual mean objectives.

2.1.2 Non-Automatic Monitoring Sites

In 2014, the London Borough of Lewisham carried out monitoring for NO_2 using diffusion tubes at 32 different locations (34 tubes in total as one site is a triplicate site). One diffusion tube is used as a travel blank. Details of the locations of all diffusion tubes are provided in Table 2.2 below.

One of the locations is a triplicate site where the tubes are collocated with the automatic monitoring station on New Cross Road. The diffusion tubes are located within 0.5 m of the inlet sampler of the chemiluminescence analyser at the continuous site. The co-location study compared equivalent exposure periods, the results from which indicate that there was good precision for all periods of diffusion tube monitoring and also good overall data capture for the continuous analyser.

The diffusion tubes are supplied and analysed by Gradko International Ltd, a UKAS accredited laboratory, using a preparation method of 50% TEA in acetone. Gradko participates in the AIR proficiency testing scheme, which combines the previous WASP and STACKS proficiency testing schemes (see Appendix A for more details). In the most recent WASP/AIR rounds for which performance data is available, between January 2014 and February 2015, 100% of Gradko International results were determined to be satisfactory. This indicates that the laboratory does not have systematic sources of bias.

The local bias adjustment factor calculated from the triplicate tubes co-located with the automatic monitoring station at New Cross was 0.82. The data used derive this factor and the results obtained can be seen in Appendix A. Howevre, in order to provide a cocnervative assessment and to be consistent with previous LAQM assessments,, this factor has not been used. Instead, the diffusion tube results presented in this report have been bias adjusted using the national factor for the relevant laboratory and preparation method. This factor of 0.97 has been obtained from the National Diffusion Tube Bias Adjustment Factor Spreadsheet[5] Version 06/15 and is based on 9 studies.

Figure 2.2: Southern Lewisham Non-Automatic Monitoring Sites

Figure 2.3: Northern Lewisham Non-Automatic Monitoring Sites

Table 2.2: Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Tube Height (m)	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
L1	Chubworthy St	Roadside	536109	177580	2.5	NO_2	Y	N	Y	2	N/A
L2	Bronze St	Urban Background	537540	177439	2.5	NO_2	Y	N	Y	6	N/A
L3	Grove St	Urban Background	536561	178471	2.5	NO_2	Y	N	Y	2	N/A
L4	Plough Way	Urban Background	536534	178926	2.5	NO_2	Y	N	Y	2	N/A
L5	Lee High Rd	Roadside	539678	175050	2.5	NO_2	Y	N	Y	5	Y
L6	Le May Ave	Urban Background	540615	172337	2.5	NO_2	N	N	Y	5	Y
L7	Bell Green	Roadside	536556	171810	2.5	NO_2	Y	N	Y	3	Y
L8	Stondon Park	Roadside	536229	174032	2.5	NO_2	Y	N	Y	5	Y
L9	Ladywell Rd	Roadside	537500	174925	2.5	NO_2	Y	N	Y	3	Y
L10	Whitburn Rd	Roadside	538062	175085	2.5	NO_2	Y	N	Y	1	Y
L11	Sparta St	Roadside	538007	176517	2.5	NO_2	Y	N	Y	3	Y
L12	Montague Avenue, Hilly Fields	Urban Background	537132	175353	2.5	NO_2	Y	N	N	60	N/A

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Tube Height (m)	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
L13	Mayow Rd	Urban Background	535804	171567	2.5	NO_2	N	N	Y	5	N/A
L14	Boyne Rd	Urban Background	538482	175792	2.5	NO_2	Y	N	Y	1	N/A
L15	Lewisham Rd	Roadside	538237	176101	2.5	NO_2	Y	N	Y	10	Y
L16	Loampit Vale	Roadside	537740	175930	2.5	NO_2	Y	N	Y	1.5	Y
L17	New Cross Monitoring Station	Roadside	536246	176934	2.5	NO_2	Y	Y	Y	6	Y
L18	New Cross Monitoring Station	Roadside	536246	176934	2.5	NO_2	Y	Y	Y	6	Y
L19	New Cross Monitoring Station	Roadside	536246	176934	2.5	NO_2	Y	Y	Y	6	Y
L20	Hatcham Park Rd	Roadside	535746	176969	2.5	NO_2	Y	N	Y	4	Y
L21	Brockley Rise	Roadside	536133	173341	2.5	NO_2	Y	N	Y	3	Y
L22	Ringstead Rd	Urban Background	538060	173816	2.5	NO_2	Y	N	Y	0.5	N/A
L23	Catford Hill	Roadside	537178	173365	2.5	NO_2	Y	N	N (5 m)	0.5	Y
L24	Hazelbank Rd	Urban Background	538930	172713	2.5	NO_2	N	N	Y	2	N/A

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Tube Height (m)	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
L25	Stanstead Rd	Urban Background	535530	173198	2.5	NO_2	Y	N	Y	10	N/A
L26	Shardloes Rd	Roadside	536527	175935	2.5	NO_2	Y	N	Y	0.5	Y
L27	Lawn Terrace	Roadside	539645	175941	2.5	NO_2	Y	N	Y	0.5	Y
L28	Baring Rd	Roadside	540051	173769	2.5	NO_2	Y	N	Y	0.5	Y
L29	Holy Cross, Sangley Rd	Roadside	538165	173406	2.5	NO_2	Y	N	Y	5	Y
L30	Christchurch, Perry Vale	Roadside	535535	172679	2.5	NO_2	N	N	Y	5	Y
L31	St Mary Magdalen's RC, Howson Rd	Urban Background	536399	175150	2.5	NO_2	Y	N	Y	2	N/A
L32	Grinling Gibbons, Clyde St	Urban Background	536944	177665	2.5	NO_2	Y	N	Y	2	N/A
L33	St Mary's CE, Lewisham High St	Roadside	537979	174792	2.5	NO_2	Y	N	N (5 m)	2	Y
L34	Sydenham, Dartmouth Rd	Urban Background	535071	172346	2.5	NO_2	N	N	Y	5	N/A

2.2 Comparison of Monitoring Results with Air Quality Objectives

The results obtained from the air quality monitoring undertaken by the London Borough of Lewisham in 2014 and in recent years are set out in the sections below and the results compared to the relevant air quality objectives. Where an objective is exceeded, the result is shown in bold type. Where an objective has been met but the result is borderline, the figure is shown in italics. Each of the pollutants for which monitoring data is available is considered in turn.

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

The results for the continuous sites that measure nitrogen dioxide (NO_2) are shown in Table 2.3 and Table 2.4 below, for the years 2010 to 2014. All NO_2 data presented is fully ratified.

Table 2.3 shows that exceedances of the annual mean NO_2 objective were monitored at all three automatic stations in 2014, which is consistent with results obtained in previous years. NO_2 concentrations increased in 2014 at LW1 (Catford) relative to 2011-2013, but decreased at LW2 relative to the same period. All three stations are located within one of the existing six AQMAs.

In 2014, there were no 1-hour periods exceeding 200 $\mu g/m^3$ at LW1 and LW2 (no more than 18 exceedances are permitted in a year to achieve the 1-hour NO_2 objective), and the 98th percentile of hourly mean NO_2 concentrations recorded at LW4 was below 200 $\mu g/m^3$, so the 1-hour NO_2 objective was achieved at all three sites.

Figure 2.4 shows the trend in annual mean NO_2 concentrations recorded at the automatic monitoring sites during the period 2009 – 2014. There is a reasonably strong downward trend in NO_2 concentrations at site LW2, which is encouraging, however there was a sharp rise in concentrations at LW1 from 2013 to 2014. All sites still remain in exceedance of the annual mean air quality objective.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2014 % [b]	Annual Mean Concentration μg/m^3				
					2010	2011	2012	2013	2014
LW1	Urban Background	Y	N/A	100	**55**	**51**	**50**	**48**	**54**
LW2	Roadside	Y	N/A	100	**59**	**51**	**50**	**51**	**42**
LW4	Roadside	Y	N/A	78	N/A	N/A	**64**[c]	**57**	**56**[c]

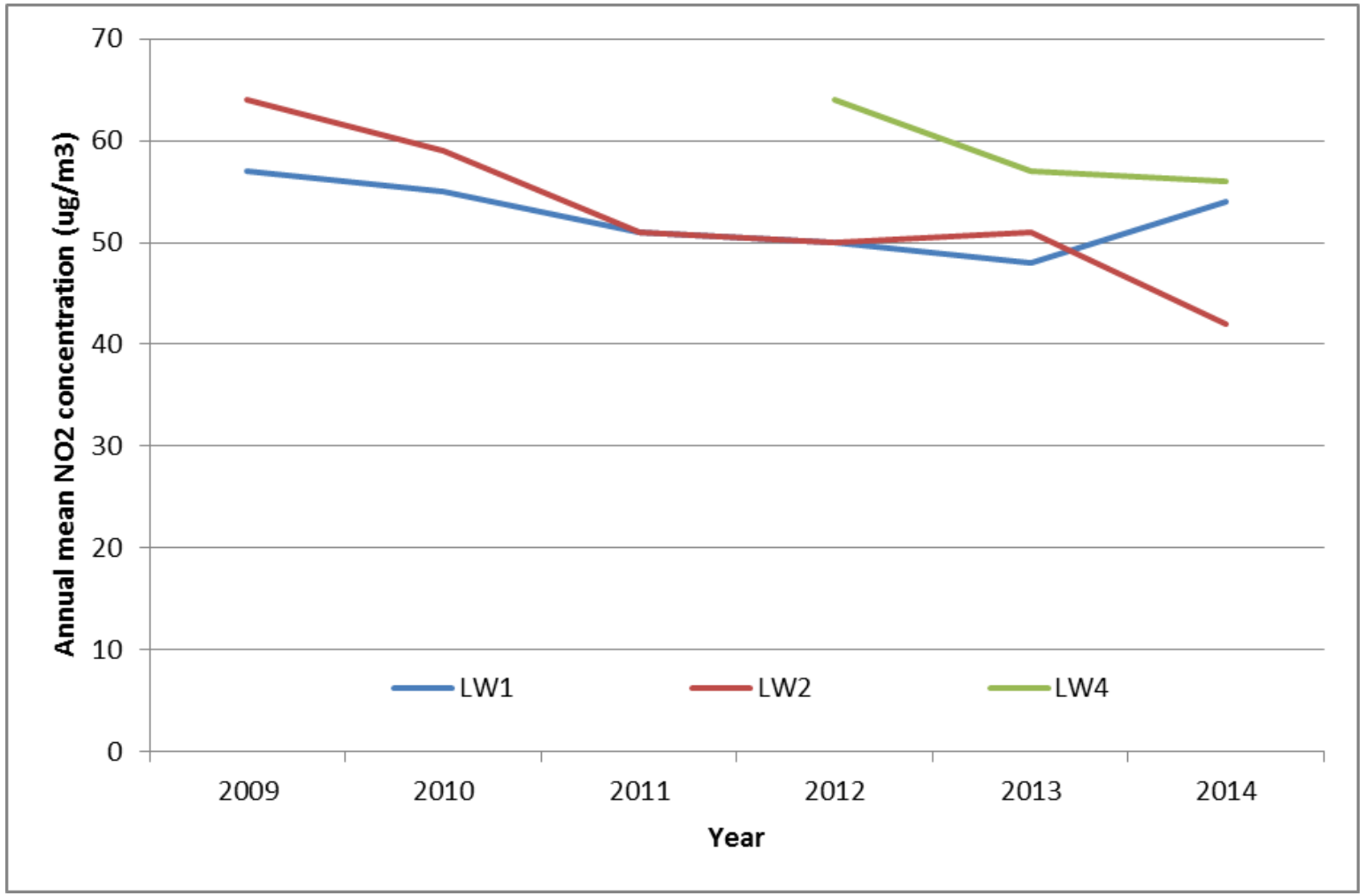
[a] Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] Data capture for the full calendar year.
[c] Mean is "annualised" as in Box 3.2 of TG(09), as monitoring was not carried out for the full year. See Appendix A.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2014 % [b]	Number of Exceedances of Hourly Mean NO_2 Standard (200 μg/m^3)				
					2010	2011	2012	2013	2014
LW1	Urban Background	Y	N/A	100	1	0	2	3	0
LW2	Roadside	Y	N/A	100	0	0	0	0	0
LW4	Roadside	Y	N/A	78	N/A	N/A	16 (**221**)[c]	**26**	5 (180)[c]

[a] Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] Data capture for the full calendar year.
[c] As the period of valid data is less than 90%, the 99.8th percentile of hourly means is included in brackets.

Figure 2.4: Trends in Annual Mean Nitrogen Dioxide Concentrations measures at Automatic Monitoring Sites



Diffusion Tube Monitoring Data

The results of annual mean NO_2 concentrations monitored at diffusion tube sites in Lewisham in 2014, and in previous years, are shown below in Table 2.5 and Table 2.6.

Data capture across the diffusion tube network was generally good in 2014; there were only two sites with data capture less than 75% (9 months) that required an annualisation calculation to be performed. These sites were L10 (Whitburn Road) and L34 (Sydenham, Dartmouth Road). Details of the annualisation factors applied are given in Appendix A.

In 2014, there were 15 diffusion tube sites that monitored exceedances of the annual mean NO_2 objective, all of which were roadside sites. There were no sites that recorded an annual mean NO_2 concentration greater than or equal to 60 $\mu g/m^3$, a threshold indicating that the 1-hour NO_2 objective could have potentially been exceeded.

The bias adjustment factor used for 2014, 0.97, was taken from the national database of bias adjustment factors. A local bias adjustment factor of 0.82 was calculated from the triplicate diffusion tube site co-located with the continuous monitor at New Cross, but it was considered prudent to use the larger national bias adjustment factor to provide a more conservative estimate of NO_2 concentrations and to be consistent with previous years.

Figure 2.5 shows trends in annual mean NO_2 concentrations at roadside diffusion tube sites between 2011 and 2014. Figure 2.6 shows the same trends but at urban background sites. It can be seen that there is little overall trend in NO_2 concentrations at the majority of roadside sites, although there is a peak in concentrations during 2013 with a subsequent slight fall in concentrations in 2014.

Table 2.5: Results of Nitrogen Dioxide Diffusion Tubes in 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Data Capture 2014 (%)	Data with <9 months has been annualised? (Y/N)	Data has been distance corrected? (Y/N)	Annual mean concentration (National Bias Adj. Factor = 0.97)
								2014 ($\mu g/m^3$)
L1	Chubworthy St	Roadside	Y	Single	83	N	N	38.0
L2	Bronze St	Urban Background	Y	Single	100	N	N	29.2
L3	Grove St	Urban Background	Y	Single	100	N	N	35.9
L4	Plough Way	Urban Background	Y	Single	100	N	N	34.9
L5	Lee High Rd	Roadside	Y	Single	100	N	N	37.7
L6	Le May Ave	Urban Background	N	Single	92	N	N	36.0
L7	Bell Green	Roadside	Y	Single	100	N	N	**55.4**
L8	Stondon Park	Roadside	Y	Single	100	N	N	**42.2**
L9	Ladywell Rd	Roadside	Y	Single	100	N	N	**40.8**
L10	Whitburn Rd	Roadside	Y	Single	67	Y	N	**40.3**
L11	Sparta St	Roadside	Y	Single	100	N	N	38.6
L12	Footpath, Montague Avenue, Hilly Fields	Urban Background	Y	Single	75	N	N	30.5
L13	Mayow Rd	Urban Background	N	Single	92	N	N	28.3

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Data Capture 2014 (%)	Data with <9 months has been annualised? (Y/N)	Data has been distance corrected? (Y/N)	Annual mean concentration (National Bias Adj. Factor = 0.97) 2014 ($\mu g/m^3$)
L14	Boyne Rd	Urban Background	Y	Single	100	N	N	31.2
L15	Lewisham Rd	Roadside	Y	Single	100	N	N	**46.5**
L16	Loampit Vale	Roadside	Y	Single	100	N	N	**52.5**
L17	New Cross Monitoring Station	Roadside	Y	Tri/Co-located	100	N	N	**49.1**
L18	New Cross Monitoring Station	Roadside	Y	Tri/Co-located	100	N	N	**51.1**
L19	New Cross Monitoring Station	Roadside	Y	Tri/Co-located	100	N	N	**49.6**
L20	Hatcham Park Rd	Roadside	Y	Single	100	N	N	**43.6**
L21	Brockley Rise	Roadside	Y	Single	100	N	N	**54.6**
L22	Ringstead Rd	Urban Background	Y	Single	92	N	N	32.2
L23	Catford Hill	Roadside	Y	Single	100	N	N	**55.1**
L24	Hazelbank Rd	Urban Background	Y	Single	92	N	N	35.6
L25	Stanstead Rd	Urban Background	Y	Single	100	N	N	25.5
L26	Shardloes Rd	Roadside	Y	Single	100	N	N	**53.7**
L27	Lawn Terrace	Roadside	Y	Single	92	N	N	*36.2*

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Data Capture 2014 (%)	Data with <9 months has been annualised? (Y/N)	Data has been distance corrected? (Y/N)	Annual mean concentration (National Bias Adj. Factor = 0.97)
								2014 (μg/m^3)
L28	Baring Rd	Roadside	Y	Single	100	N	N	**51.0**
L29	Holy Cross, Sangley Rd	Roadside	Y	Single	92	N	N	33.0
L30	Christchurch, Perry Vale	Roadside	N	Single	100	N	N	31.3
L31	St Mary Magdalen's RC, Howson Rd	Urban Background	Y	Single	92	N	N	25.7
L32	Grinling Gibbons, Clyde St	Urban Background	Y	Single	100	N	N	30.6
L33	St Mary's CE, Lewisham High St	Roadside	Y	Single	100	N	N	**44.6**
L34	Sydenham, Dartmouth Rd	Urban Background	N	Single	58	Y	N	31.8

In bold, exceedance of the NO_2 annual mean AQS objective of 40 µg/m^3. Borderline results (36-39.9 µg/m^3) are illustrated in italics. Underlined, annual mean > 60 µg/m^3, indicating a potential exceedance of the NO_2 hourly mean objective.

Table 2.6: Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2010 (Bias Adjustment Factor = 1.03)	2011 (Bias Adjustment Factor = 0.94)	2012 (Bias Adjustment Factor = 1.01)	2013 (Bias Adjustment Factor = 1.00)	2014 (Bias Adjustment Factor = 0.97)
L1	Roadside	Y	N/A	*36.4*	*37.8*	*38.6*	*38.0*
L2	Urban Background	Y	N/A	29.7	31.0	29.6	29.2
L3	Urban Background	Y	N/A	34.7	*37.9*	*37.1*	35.9
L4	Urban Background	Y	N/A	*37.2*	34.9	*37.3*	34.9
L5	Roadside	Y	N/A	*36.6*	*39.0*	**43.3**	*37.7*
L6	Urban Background	N	N/A	35.9	*37.5*	*38.3*	36.0
L7	Roadside	Y	N/A	**48.3**	**53.4**	**53.8**	**55.4**
L8	Roadside	Y	N/A	**44.5**	**44.8**	**48.6**	**42.2**
L9	Roadside	Y	N/A	39.9	**40.6**	**40.5**	**40.8**
L10	Roadside	Y	N/A	**43.2**	**44.0**	**46.2**	**40.3**
L11	Roadside	Y	N/A	**44.9**	**40.0**	**47.4**	*38.6*
L12	Urban Background	Y	N/A	30.7	33.7	34.9	30.5
L13	Urban Background	N	34.9	29.7	32.3	33.3	28.3

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2010 (Bias Adjustment Factor = 1.03)	2011 (Bias Adjustment Factor = 0.94)	2012 (Bias Adjustment Factor = 1.01)	2013 (Bias Adjustment Factor = 1.00)	2014 (Bias Adjustment Factor = 0.97)
L14	Urban Background	Y	33.3	33.5	34.5	34.7	31.2
L15	Roadside	Y	**47.8**	**43.6**	**44.3**	**47.6**	**46.5**
L16	Roadside	Y	**61.3**	**48.7**	**55.0**	**58.6**	**52.5**
L17	Roadside	Y	**75.2**	**75.4**	**59.2**	**53.7**	**49.1**
L18	Roadside	Y	**75.2**	**75.4**	**59.2**	**53.7**	**51.1**
L19	Roadside	Y	**75.2**	**75.4**	**59.2**	**53.7**	**49.6**
L20	Roadside	Y	**54.1**	**42.4**	**45.4**	**44.7**	**43.6**
L21	Roadside	Y	**60.9**	**52.6**	**54.0**	**54.0**	**54.6**
L22	Urban Background	Y	33.1	35.4	34.3	33.5	32.2
L23	Roadside	Y	**56.1**	**54.0**	**56.5**	**59.9**	**55.1**
L24	Urban Background	Y	33.4	29.0	35.1	*36.3*	35.6
L25	Urban Background	Y	30.8	28.3	28.3	27.5	25.5
L26	Roadside	Y	**53.8**	**49.7**	**48.0**	**51.9**	**53.7**
L27	Roadside	Y	*38.5*	34.6	*37.3*	*37.2*	*36.2*
L28	Roadside	Y	**60.7**	**51.9**	**59.3**	**61.9**	**51.0**
L29	Roadside	Y	35.1	29.9	32.1	33.3	33.0

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2010 (Bias Adjustment Factor = 1.03)	**2011 (Bias Adjustment Factor = 0.94)**	**2012 (Bias Adjustment Factor = 1.01)**	**2013 (Bias Adjustment Factor = 1.00)**	**2014 (Bias Adjustment Factor = 0.97)**
L30	Roadside	N	33.0	27.8	31.1	34.3	31.3
L31	Urban Background	Y	30.7	23.2	25.4	29.6	25.7
L32	Urban Background	Y	35.3	29.7	29.6	31.6	30.6
L33	Roadside	Y	**54.7**	**47.1**	**51.4**	**51.0**	**44.6**
L34	Urban Background	N	32.7	27.6	30.4	34.0	31.8

In bold, exceedance of the NO_2 annual mean AQS objective of 40 μg/m^3.
Borderline results (36-39.9 μg/m^3) are illustrated in italics.
Underlined, annual mean > 60 μg/m^3, indicating a potential exceedance of the NO_2 hourly mean objective.

Figure 2.5: Trends in Annual Mean NO_2 Concentrations measured at Roadside Diffusion Tube Monitoring Sites

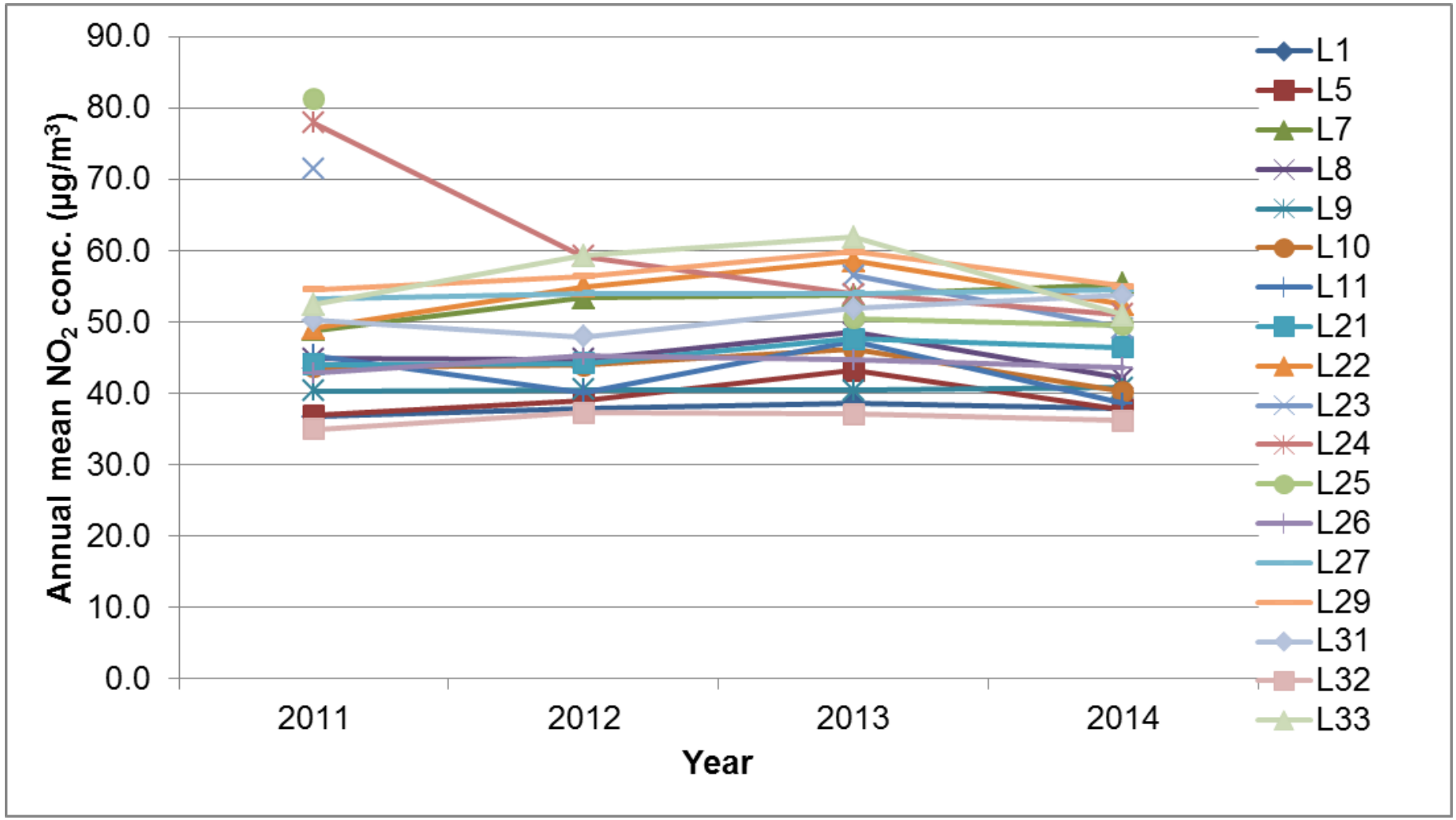
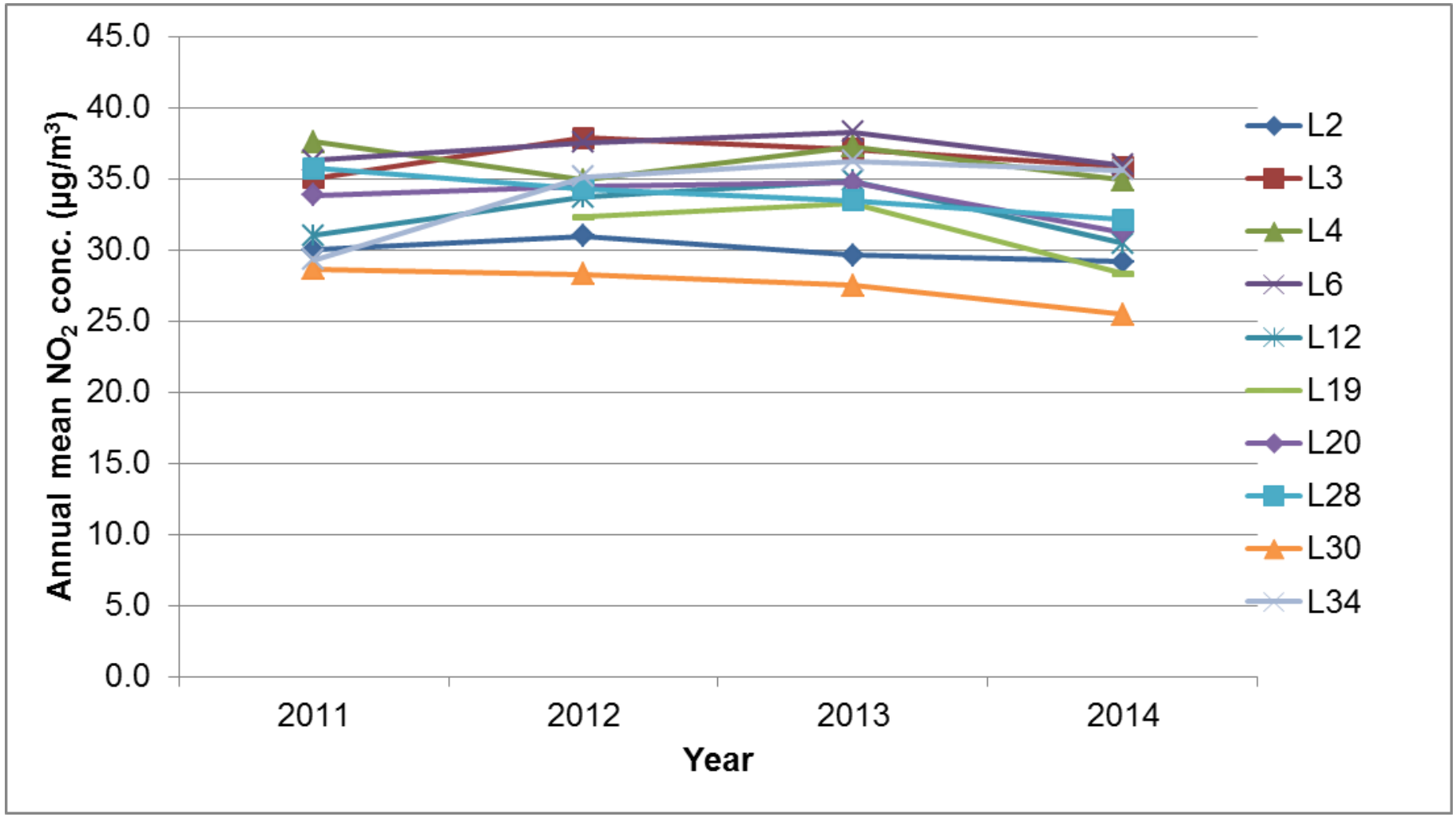


Figure 2.6: Trends in Annual Mean NO_2 Concentrations measured at Urban Background Diffusion Tube Monitoring Sites



2.2.2 PM_{10}

Three automatic monitoring sites in Lewisham currently monitor PM_{10}: LW2 (New Cross), LW3 (Mercury Way) and LW4 (Loampit Vale), which each reside within an AQMA declared for PM_{10}. LW2 and LW3 have been in operation since before 2010, and LW4 commenced operation in 2012. Data capture was good at LW3 (99%), but below 90% at LW2 and LW4, and so the results for annual mean PM_{10} concentrations here were annualised, as detailed in Appendix A. The results are presented in Table 2.7 and Table 2.8 below.

There were no monitored exceedances of the PM_{10} annual mean objective (40 $\mu g/m^3$) in 2014, with concentrations at all sites considerably below the objective at between 23 and 25 $\mu g/m^3$. Likewise, there were no exceedances of the daily mean PM_{10} objective (50 $\mu g/m^3$, not to be exceeded more than 35 times in a year) at either site.

Figure 2.7 shows the trend in annual mean PM_{10} concentrations since 2009. It is evident that there is little long term trend over the six year period, although there is some year on year variability at each site. Annual PM_{10} concentrations have been consistently within the objective throughout the period shown.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2010	2011	2012	2013	2014
LW2	Roadside	Y	n/a	81	Y	25	26	26	23	23 [c]
LW3	Industrial	Y	n/a	99	Y	23	23	22	24	24
LW4	Roadside	Y	n/a	81	Y	n/a	n/a	24	28	25 [c]

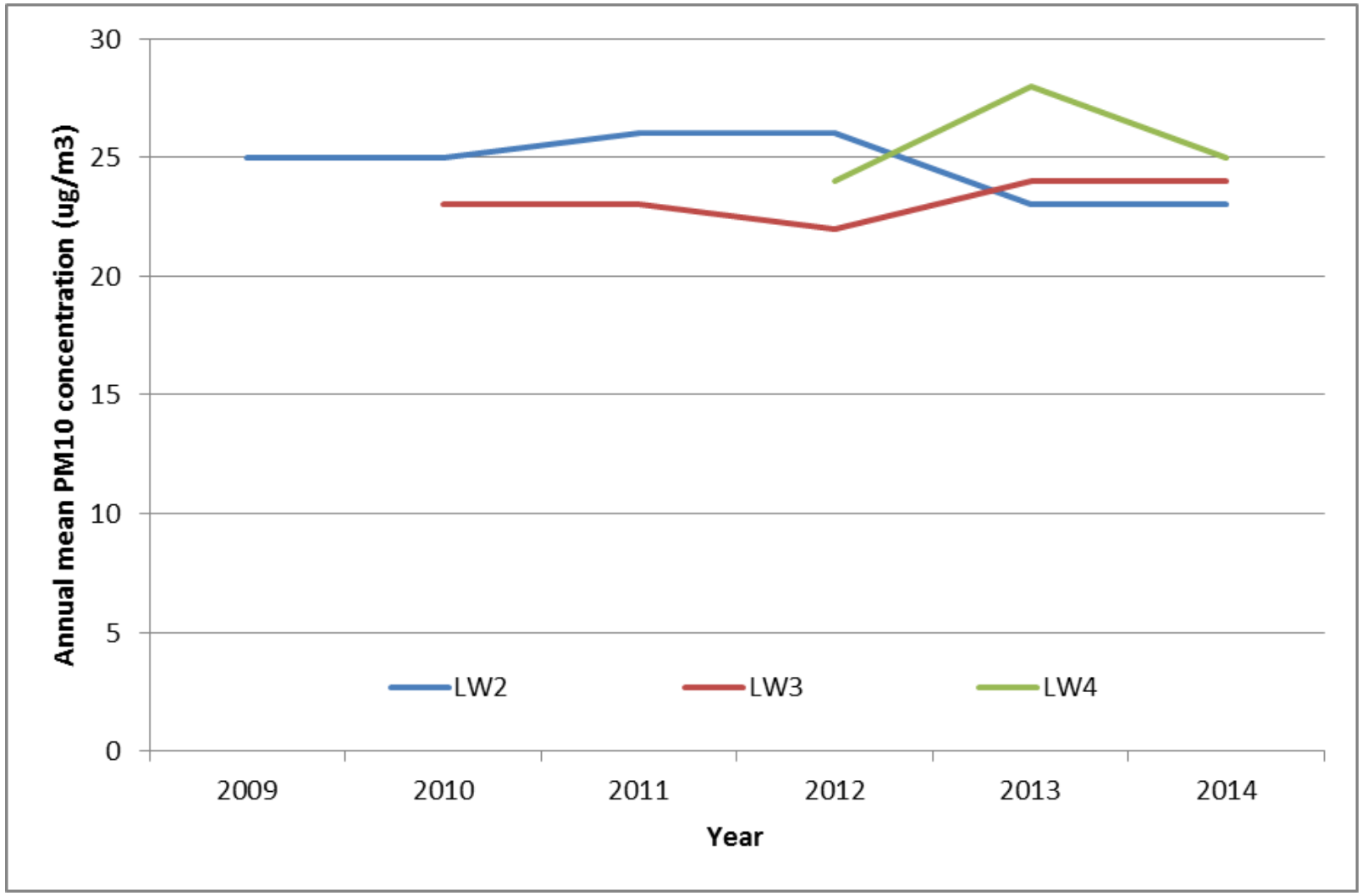
[a] Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] Data capture for the full calendar year.
[c] Mean is "annualised" as in Box 3.2 of TG(09), as data capture was less than 90%.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Number of Exceedances of 24-Hour Mean (50 μg/m^3)				
						2010	2011	2012	2013	2014
LW2	Roadside	Y	n/a	81	Y	6	19	15 (47.0) [c]	15	14 (38) [c]
LW3	Industrial	Y	n/a	99	Y	4 (39) [c]	22	20	13	27
LW4	Roadside	Y	n/a	81	Y	n/a	n/a	3 (35.9) [c]	19	13 (41) [c]

[a] Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] Data capture for the full calendar year.
[c] Data capture is less than 90%, and so the 90th percentile of 24-hour means is included in brackets.

Figure 2.7: Trends in Annual Mean PM_{10} Concentrations



2.2.3 Sulphur Dioxide (SO_2)

Monitoring of SO_2 has been carried out at LW1 (Catford) and LW2 (New Cross) for many years. The results for 2014 detailed in Table 2.9 show that concentrations continue to remain at very low levels at both sites and that all AQS objectives for this pollutant are being met.

Table 2.9: Results of Automatic Monitoring of SO_2: Comparison with Annual Mean Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture 2014 %[a]	Number of Exceedences		
				15-minute Objective (266 μg/m^3)	1-hour Objective (350 μg/m^3)	24-hour Objective (125 μg/m^3)
LW1 Catford	Urban Background	Y	97%	0	0	0
LW2 New Cross	Roadside	Y	100%	0	0	0

[a] Data capture for the full calendar year.

2.2.4 $PM_{2.5}$

The EU Limit Value and target for $PM_{2.5}$ is set at 25 μg/m^3 measured as an annual mean to be met by 2015 with a further indicative limit value of 20 μg/m^3 to be achieved by 2020. The UK Air Quality Strategy has also set an exposure reduction objective, which in this case is a 15% reduction between 2010 and 2020. However, objectives for $PM_{2.5}$ have not yet been included in the system of Local Air Quality Management for England.

In the London Borough of Lewisham, $PM_{2.5}$ is currently monitored at the LW2 New Cross site, which has been operational since April 2012, although data capture was very low in 2012 due to overheating issues. The results of $PM_{2.5}$ monitoring for 2012 – 2014 are shown below in Table 2.10. It is evident that the concentrations monitored in these years are well within the limit value of 25 μg/m^3.

Table 2.10: Results of Automatic Monitoring of $PM_{2.5}$

Site ID	Site Type	Within AQMA ?	Valid Data Capture 2014 (%)	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean $PM_{2.5}$ Concentration (µg/m^3)		
					2012	2013	2014
LW2	Urban Background	Y	96	Y	13.0 [a]	17.5	15.0

[a] Mean is "annualised" as in Box 3.2 of TG(09), as monitoring was not carried out for the full year.

2.2.5 Ozone (O_3)

The UK Air Quality Strategy sets an 8-hour mean objective for ozone of no more than 10 exceedances of 100 µg/m^3. The table below shows data from the LW1 (Catford) site for ozone over recent years. As can be seen, the national objective has been met at this site for all years. However, 2012 was the first year since 2008 to have any 8-hour means above the 100 µg/m^3 threshold.

Table 2.11: Results of Automatic Monitoring of Ozone: Comparison with 8-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2014 (%)	Number of 8-hour Rolling Means > 100 µg/m^3				
				2010	2011	2012	2013	2014
LW1	Urban Background	Y	98	0	0	3	0	0

2.2.6 Benzene

London Borough of Lewisham does not conduct any monitoring for benzene.

2.2.7 Summary of Compliance with AQS Objectives

London Borough of Lewisham has examined the results from monitoring in the borough.

Concentrations within the AQMA still exceed the objectives for nitrogen dioxide and the AQMAs should remain.

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

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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

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

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

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

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

3.4 Junctions

The Lewisham Gateway is a large development scheme that aims to better connect Lewisham town centre with nearby residential communities and the nearby DLR and mainline rail stations. The scheme, which is currently under construction, involves a major realignment of the A20/A21 roundabout and the construction of a number of new homes. Whilst the development has the potential to affect air quality and

introduce new exposure to pollution, as it is located within the boundaries of the existing AQMAs no further assessment is required.

London Borough of Lewisham confirms that there are no new/newly identified busy junctions/busy roads.

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

London Borough of Lewisham confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

At 40 acres, Convoys Wharf is the single largest development site in the borough. The redevelopment of the site has the potential to provide public access to a major part of the borough's riverfront for the first time in centuries. It would also make a major contribution to meeting Deptford's need for new homes, jobs and amenities. Plans submitted by Convoys Properties Limited in spring 2013 for the comprehensive redevelopment of the site include:

- up to approximately 3,500 new homes (over 500 of which would be affordable)
- space allocated for shops, restaurants, cafes
- space allocated for a hotel
- public open spaces
- public transport improvements including a river bus service and new/diverted bus routes
- around 1,800 car parking spaces
- renovation of the Olympia Building, a Grade II listed warehouse
- three tall buildings (two at 38 storeys and one at 48 storeys).

In October 2013, the Mayor of London decided to take over and 'call in' the planning application, meaning that he – rather than Lewisham Council – would determine whether or not planning permission is granted.

Despite no longer being the determining authority the Council was able to make representations to the Mayor of London about the scheme, and on 16 January 2014 the Strategic Planning Committee considered the application in advance of the Mayor of London's decision. The purpose of this meeting was to confirm the Council's position on a range of issues, as well as highlighting those matters which remain outstanding.

In March 2014, the Mayor of London resolved to grant outline planning approval for Convoys Wharf. Whilst the development has the potential to affect air quality and introduce new exposure to pollution, as it is located within the boundaries of the existing AQMAs no further assessment is required.

London Borough of Lewisham has assessed new/newly identified roads with significantly changed traffic flows, and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.7 Bus and Coach Stations

No new or changed bus stations have been identified in the London Borough of Lewisham, however a bus stand previously on Station Road by the mainline station has been moved to the adjacent Thurston Road, where the pedestrian traffic is lower.

London Borough of Lewisham confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

London Borough of Lewisham confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

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

4.2.2 Moving Trains

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

4.3 Ports (Shipping)

London Borough of Lewisham confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

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

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

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

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

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

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

5.2 Major Fuel (Petrol) Storage Depots

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

5.3 Petrol Stations

London Borough of Lewisham confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

London Borough of Lewisham confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

The construction of several biomass combustion plants have been completed in Lewisham since the last Updating and Screening Assessment in 2012. These are:

- Loampit Vale/Glass Mill Leisure Centre SE13, 500 kW wood pellet boiler.
- Tidemill Academy / Deptford Lounge, Frankham Street SE8, 160 kW wood pellet boiler.
- Deptford Green School, Amersham Vale SE14, 425 kW wood pellet boiler.

Air quality assessments were already carried out for the above boilers as part of the planning submissions, as reported in the 2012 USA, and therefore no Detailed Assessments were needed then or are needed now.

However, in the same period, no new biomass combustion plant proposals have been followed through, as different sources of energy have been since been chosen.

London Borough of Lewisham has assessed the biomass combustion plants, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

Although there have been several completed biomass boilers since the 2012 USA, many proposed developments for which applications for biomass boilers were submitted since 2012 have changed their proposed energy sources to alternative renewable energy sources, or other means of achieving carbon reductions, and so the total number of biomass installations is neither increasing greatly nor at risk of causing significant increases in PM_{10} concentrations in the Borough.

London Borough of Lewisham has assessed the biomass combustion plants, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

London Borough of Lewisham is a designated Smoke Control Area, and there are no known areas within the Borough where domestic fuel burning is an issue.

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

7 Fugitive or Uncontrolled Sources

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

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

In 2014, the London Borough of Lewisham undertook monitoring at four automatic monitoring sites and at 34 NO_2 diffusion tube sites.

Exceedances of the annual mean NO_2 air quality objective (40 µg/m^3) were recorded at all three automatic sites which measured NO_2 in 2014, although the 1-hour NO_2 objective was achieved at all three sites.

Diffusion tube monitoring of NO_2 undertaken in 2014 found that many roadside sites remain in exceedance of the annual mean objective, while background sites generally achieve the objective. There is no clear trend in diffusion tube NO_2 concentrations recorded over the last 4 years, with concentrations remaining relatively consistent at the majority of sites.

For Particulate Matter (PM), there were no monitored exceedances of the annual mean PM_{10} objective (40 µg/m^3) or the 24-hour PM_{10} objective in 2014, at any of the three automatic sites where PM_{10} monitoring is undertaken. Again, there is no clear trend in PM_{10} concentrations recorded over the last six years, with concentrations remaining relatively consistent at all sites.

Monitored annual mean NO_2 concentrations within each of the AQMAs still exceed the national air quality objective, and as such the AQMA declarations should remain. Whilst five of the six AQMAs are also declared for PM_{10}, and PM_{10} concentrations have remained within the relevant objectives for several years, it is considered prudent to retain the existing designations for PM_{10} and to not proceed to a Detailed Assessment for this pollutant at this stage. Concentrations at all other locations outside of the AQMAs are all below the objectives at relevant locations therefore there is no need to proceed to a Detailed Assessment on this basis.

8.2 Conclusions from Assessment of Sources

No significant changes or developments were identified since the 2014 Air Quality Progress Report, which were considered likely to lead to significant increases in any pollutant prescribed in the Air Quality Regulations.

8.3 Proposed Actions

The overall conclusion of this Updating and Screening Assessment is that a Detailed Assessment is not required for any pollutant. The London Borough of Lewisham will submit an Air Quality Progress Report in 2016 as the next course of action.

9 References

1. Lewisham Employment Land Study, 2008
2. 2013 Air Quality Progress Report for London Borough of Lewisham, 2013.
3. 2014 Air Quality Progress Report for London Borough of Lewisham, 2014.
4. London Air Quality Network (LAQN). Available at: http://www.londonair.org.uk/LondonAir/Default.aspx
5. Defra's National Diffusion Tube Bias Adjustment Spreadsheet, version 06/15. Available at: http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html
6. Defra's Local Bias Adjustment Spreadsheet. Available at: http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html
7. King's College London Volatile Correction Model (VCM). Available at: http://www.volatile-correction-model.info/
8. Defra QA/QC Framework: http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html

Appendices

Appendix A: QA/QC Data

Appendix B: 2014 Raw Monthly NO2 Diffusion Tube Results

Appendix A: QA/QC Data

Factor from Local Co-location Studies

London Borough of Lewisham operates a triplicate diffusion tube site co-located with a continuous analyser at LW2 New Cross. The local bias adjustment factor based on this triplicate site was calculated using the spreadsheet tool available on the Defra website[6]. Figure A.1 shows the details of the calculation. The local bias adjustment factor was calculated to be 0.82.

Figure A.1 Local Bias Adjustment Factor calculation, LW2 (New Cross)

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	08/01/2014	07/02/2014	43.8	42.8	43.4	43	0.5	1	1.2
2	07/02/2014	04/03/2014	35.3	38.6	39.7	38	2.3	6	5.7
3	04/03/2014	03/04/2014	53.2	63.6	62.3	60	5.7	9	14.1
4	03/04/2014	29/04/2014	50.4	49.2	57.7	52	4.6	9	11.4
5	29/04/2014	30/05/2014	52.1	51.7	56.0	53	2.4	4	5.9
6	30/05/2014	01/07/2014	55.8	57.8	57.0	57	1.0	2	2.6
7	01/07/2014	01/08/2014	60.3	63.6	43.9	56	10.5	19	26.1
8	01/08/2014	27/08/2014	45.3	51.9	50.9	49	3.6	7	8.9
9	27/08/2014	30/09/2014	66.1	67.3	65.4	66	0.9	1	2.3
10	30/09/2014	30/10/2014	40.6	42.3	36.3	40	3.1	8	7.7
11	30/10/2014	04/12/2014	50.0	48.2	48.4	49	1.0	2	2.5
12	04/12/2014	07/01/2015	54.9	54.7	53.1	54	1.0	2	2.4
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
40.1951	100	Good	Good
35.7163	100	Good	Good
58.2031	99.583911	Good	Good
35.8063	99.36	Good	Good
32	100	Good	Good
35	100	Good	Good
41	100	Good	Good
39	99.679487	Good	Good
55	100	Good	Good
33	100	Good	Good
45.4848	99.642857	Good	Good
58.5912	100	Good	Good
		(Ctrl)	
	Overall survey -->	precision	Good Overall

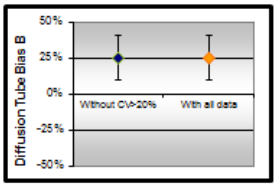
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

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 0.82 (0.73 - 0.94)
Bias B 22% (6% - 37%)
Diffusion Tubes Mean: 51 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 42 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 42 (38 - 48) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 0.82 (0.73 - 0.94)
Bias B 22% (6% - 37%)
Diffusion Tubes Mean: 51 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 42 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 42 (38 - 48) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Diffusion Tube Bias Adjustment Factors

The national diffusion tube bias adjustment factor for Gradko, who prepare diffusion tubes in Lewisham, is given in Figure A.2 below.

Figure A.2 National bias adjustment factor for London Borough of Lewisham

National Diffusion Tube Bias Adjustment Factor Spreadsheet | **Spreadsheet Version Number: 03/15**

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

This spreadsheet will be updated at the end of June 2015

LAQM Helpdesk Website

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

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

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4:

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

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in acetone	2014	R	East Hampshire District Council	12	25	23	10.9%	G	**0.90**
Gradko	50% TEA in acetone	2014	R	London Borough of Croydon	11	48	46	4.5%	P	**0.96**
Gradko	50% TEA in acetone	2014	R	London Borough of Richmond upon Thames	10	39	36	6.2%	G	**0.94**
Gradko	50% TEA in acetone	2014	R	London Borough of Richmond upon Thames	12	48	42	15.2%	G	**0.87**
Gradko	50% TEA in acetone	2014	B	London Borough of Richmond upon Thames	11	24	25	-4.0%	G	**1.04**
Gradko	50% TEA in acetone	2014	KS	Marylebone Road Intercomparison	12	92	80	14.8%	G	**0.87**
Gradko	50% TEA in acetone	2014	UB	Norwich City Council	12	13	14	-6.2%	G	**1.07**
Gradko	50% TEA in acetone	2014	R	Reading Borough Council	11	42	41	3.6%	G	**0.97**
Gradko	50% TEA in acetone	2014	R	Worthing Borough Council	12	43	51	-15.2%	G	**1.18**
Gradko	50% TEA in acetone	2014		**Overall Factor[3] (9 studies)**				**Use**		**0.97**

Discussion of Choice of Factor to Use

The national bias adjustment factor was used for this report, as the value is larger than the local bias adjustment factor, and so this provides a more conservative approach to adjusting the NO_2 concentrations from the diffusion tube monitoring data. Additionally, the national bias adjustment factor has been used in previous years, and so this maintains consistency.

PM Monitoring Adjustment

All PM_{10} data is either gravimetric reference equivalent (For PM_{10} measurement, LW2 uses an FDMS), or has been already corrected (LW3 uses a BAM and LW4 a TEOM, which have already been corrected for).

Short-term to Long-term Data Adjustment at Diffusion Tube sites

Period adjustment (annualisation) was carried out at two diffusion tube sites as they each had an annual data capture rate of less than 75%. The sites were L10 with 67% data capture (January to August 2014), and L34 with 58% data capture (January to April, September, and November to December 2014). Period means were calculated at three nearby background automatic monitoring stations for the monitoring period of each diffusion tube. The annual mean to period mean ratios for each automatic station was then calculated, and the average ratio was used to correct the diffusion tube NO_2 concentration. The details for the L10 site are given below in Table A.1 and those for L34 are given in Table A.2.

Table A.1 Period Adjustment for NO_2 ($\mu g/m^3$) at L10 Diffusion Tube Site

Site	Site Type	Data Capture (%)	Annual Mean	Period Mean	Am/Pm Ratio
LW1 Catford	Urban Background	98	52.7	54.4	0.97
Bexley AURN	Urban Background	98	27.1	25.2	1.08
Westminster AURN	Urban Background	97	38.5	36.7	1.05
				Average	1.03

Table A.2 Period Adjustment for NO_2 ($\mu g/m^3$) at L34 Diffusion Tube Site

Site	Site Type	Data Capture (%)	Annual Mean	Period Mean	Am/Pm Ratio
LW1 Catford	Urban Background	98	52.7	51.2	1.03
Bexley AURN	Urban Background	98	27.1	30.2	0.90
Westminster AURN	Urban Background	97	38.5	44.0	0.88
				Average	0.94

Short-term to Long-term Data Adjustment at Automatic Monitoring Sites

Period adjustment was also carried out for two automatic monitoring stations (LW2 New Cross for PM_{10} and LW4 Loampit Vale for both NO_2 and PM_{10}), as they had data capture of less than 90% for the described pollutants. The period that LW2 was monitoring PM_{10} for during 2014 was 1st January to 22nd October, and was consequently used as the period to base the adjustment calculation on, with details given in Table A.3. The LW4 site required adjustment for both NO_2 and PM_{10}. There were 4 notable data gaps at similar times for both pollutants. For PM_{10} adjustment at both sites, the Bloomsbury AURN and LW3 Mercury Way sites were used, and for NO_2 adjustment at LW4, the Bloomsbury, Bexley and Westminster AURN sites were used. Details of the adjustment for NO_2 and PM_{10} at LW4 are given in Tables A.4 and A.5.

Table A.3 Period Adjustment for PM_{10} ($\mu g/m^3$) at LW2 (New Cross)

Site	Site Type	Data Capture (%)	Annual Mean	Period Mean	Am/Pm Ratio
Bloomsbury AURN	Urban Background	96	19.5	19.4	1.00
LW3 Mercury Way	Industrial	99	23.9	24.9	0.96
				Average	0.98

Table A.4 Period Adjustment for NO_2 ($\mu g/m^3$) at LW4 (Loampit Vale)

Site	Site Type	Data Capture (%)	Annual Mean	Period Mean	Am/Pm Ratio
Bloomsbury AURN	Urban Background	99	51.2	51.8	0.99
Bexley AURN	Suburban Background	98	27.2	27.4	0.99
Westminster AURN	Urban Background	99	46.2	45.9	1.01
				Average	1.00

Table A.5 Period Adjustment for PM_{10} ($\mu g/m^3$) at LW4 (Loampit Vale)

Site	Site Type	Data Capture (%)	Annual Mean	Period Mean	Am/Pm Ratio
Bloomsbury AURN	Urban Background	96	19.5	19.0	1.02
LW3 Mercury Way	Industrial	99	23.9	22.7	1.05
				Average	1.04

QA/QC of Automatic Monitoring

Details of QA/QC procedures in Lewisham are given below in Table A.6 below.

Table A.6 Details of QA/QC of automatic monitoring stations

Site ID	Analyser /Pollutant	Frequency and type of routine calibrations	Routine calibrations carried out by:	Frequency of Site Audits	Site Audits carried out by:
LW1	NO_2, SO_2, O_3	2- weekly - manual	LA	Every 6 months	Contractors (ERG/NPL)
LW2	NO_2, SO_2	Overnight auto calibrations	LA	Every 6 months	Contractors (ERG/NPL)
LW3	N/A	N/A	N/A	Every 6 months	Contractors (ERG/NPL)
LW4	NO_2	2- weekly- manual	LA	Every 6 months	Contractors (ERG/NPL)

The calibration of analysers are done with standard gases for each analyser (except for PM). The calibration data are sent to ERG-King's College London who is responsible for Data Management and uses these for data validation and ratification

purposes. The Site Audits includes UKAS accredited on site gas cylinder certification and on site testing of sampling system efficiency. TEOM PM_{10} measurements are corrected using Volatile Correction Model[7] (VCM) by ERG-King's.

QA/QC of Diffusion Tube Monitoring[8]

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.

AIR NO_2 PT forms an integral part of the UK NO_2 Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). Defra and the Devolved Administrations advise that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the AIR PT scheme.

Diffusion tubes for NO_2 in Lewisham are provided by Gradko, who participate in the AIR PT scheme, using a preparation method of 50% Triethanolamine (TEA) in acetone. Gradko achieved 100% satisfactory results in the last 5 rounds of WASP/AIR PT testing (from January 2014 to February 2015).

Appendix B: 2014 Raw Monthly NO_2 Diffusion Tube Results

Table B.1 2014 Raw Monthly NO_2 Diffusion Tube Results

New Site ID	Old Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Mean
L1	L1	45.0	32.6	45.2	32.4	ND	ND	32.3	30.8	44.2	38.3	48.9	42.1	39.2
L2	L2	35.9	27.2	40.4	25.5	26.5	23.9	25.3	23.6	32.0	30.7	34.5	35.4	30.1
L3	L3	41.2	30.5	46.1	31.9	32.8	34.4	35.5	30.1	39.8	33.6	47.2	40.3	37.0
L4	L4	40.2	31.3	44.7	29.3	32.1	30.8	29.7	32.5	38.6	34.2	40.0	48.3	36.0
L5	L5	37.5	35.5	47.5	36.4	41.8	38.9	41.1	23.2	49.4	34.0	43.4	38.2	38.9
L6	L6	40.3	ND	41.3	35.2	35.2	31.2	35.8	32.0	36.9	38.0	42.7	39.1	37.1
L7	L7	60.9	58.2	63.2	49.4	55.6	63.5	66.7	45.3	62.4	50.6	56.3	53.1	57.1
L8	L8	47.0	38.3	51.3	43.1	47.6	50.1	47.4	13.5	54.1	41.1	49.7	38.6	43.5
L9	L9	41.4	34.4	52.6	38.9	40.4	42.4	42.4	28.7	52.5	40.4	45.2	45.9	42.1
L10	L10	46.0	32.5	30.8	47.0	42.1	44.2	48.6	30.1	ND	ND	ND	ND	40.2
L11	L11	39.2	27.7	55.0	35.6	40.3	39.7	38.7	26.9	51.3	35.1	51.9	36.3	39.8
L12	L12	38.0	ND	ND	ND	29.5	23.0	24.6	18.0	30.5	36.7	44.0	38.2	31.4
L13	LWS 53	ND	28.2	40.0	29.6	25.6	24.6	26.1	21.0	28.9	28.8	35.6	32.7	29.2
L14	LWS 002	39.3	31.3	44.6	29.3	25.0	24.3	24.9	26.5	29.3	31.8	38.5	41.4	32.2
L15	LWS 003	53.9	44.0	55.5	43.2	47.2	45.6	44.7	38.7	49.2	50.7	54.7	47.6	47.9
L16	LWS 004	44.8	37.9	61.7	54.2	57.9	67.7	62.8	44.2	70.5	46.9	58.9	42.1	54.1
L17 (T)	LWS 005 (Tri)	43.8	35.3	53.2	50.4	52.1	55.8	60.3	45.3	66.1	40.6	50.0	54.9	50.6
L18 (T)	LWS 006 (Tri)	42.8	38.6	63.6	49.2	51.7	57.8	63.6	51.9	67.3	42.3	48.2	54.7	52.6
L19 (T)	LWS 007 (Tri)	43.4	39.7	62.3	57.7	56.0	57.0	43.9	50.9	65.4	36.3	48.4	53.1	51.2
L20	LWS 008	48.6	42.3	49.1	38.2	47.5	41.8	43.7	44.3	45.2	50.2	42.7	45.8	45.0

L21	LWS 009	62.1	49.9	68.4	49.2	55.9	56.3	57.3	57.4	53.5	55.4	56.7	53.5	56.3
L22	LWS 010	41.6	23.4	38.7	30.8	26.8	ND	30.3	29.8	32.8	31.8	38.2	40.4	33.1
L23	LWS 011	65.2	51.2	62.2	50.0	56.0	55.3	60.4	43.6	62.7	59.8	62.0	53.0	56.8
L24	LWS 018	41.7	ND	45.5	34.4	33.1	32.2	33.6	26.3	39.2	31.8	46.3	40.1	36.7
L25	LWS 014	30.4	23.9	31.4	22.8	21.0	22.2	23.2	17.7	28.5	25.2	40.0	28.5	26.2
L26	LWS 015	69.6	52.1	62.1	47.3	52.1	44.8	49.9	42.1	53.8	63.9	65.1	61.9	55.4
L27	LWS 016	43.8	27.1	46.1	33.2	ND	35.5	36.7	25.9	40.7	41.0	47.3	33.3	37.3
L28	LWS 017	58.1	31.7	40.6	52.6	57.1	27.1	65.4	59.0	63.3	57.0	60.4	59.0	52.6
L29	SCH 8	31.3	34.6	37.9	27.2	28.0	59.2	30.0	21.8	ND	31.2	39.3	33.7	34.0
L30	SCH 13	39.9	28.3	40.5	26.2	30.3	29.2	29.5	22.3	29.6	31.3	45.0	34.9	32.2
L31	SCH 16	ND	20.9	34.6	21.6	24.4	21.0	20.4	15.7	36.5	25.6	39.4	31.0	26.5
L32	SCH 18	34.6	24.8	38.5	24.9	28.0	21.9	22.7	21.6	50.7	32.6	39.7	38.5	31.5
L33	SCH 20	47.2	50.8	56.4	44.7	39.9	39.3	55.7	37.2	32.5	50.7	48.6	48.8	46.0
L34	SCH 21	36.4	33.9	37.5	31.7	ND	ND	ND	ND	38.1	ND	33.7	33.7	35.0

Note: ND = No Data