


# FICHTNER



**GRUNDON  
COLNBROOK CWI AND EFW PLANT  
AIR QUALITY MONITORING**

Fichtner Consulting Engineers Limited  
Kingsgate (Floor 3), Wellington Road North,  
Stockport Cheshire SK4 1LW United Kingdom  
t: +44(0) 161 476 0032 f: +44(0) 161 476 0618 [www.fichtner.co.uk](http://www.fichtner.co.uk)

**GRUNDON**  
**COLNBROOK CWI AND EFW PLANT**  
**AIR QUALITY MONITORING**

<b>Document Production &amp; Approval Record</b>				
<b>ISSUE NO. 1</b>	<b>NAME</b>	<b>SIGNATURE</b>	<b>POSITION</b>	<b>DATE</b>
<i>Prepared by:</i>	Vildan Taylor		Project Engineer	16/08/10
<i>Checked by:</i>	Stephen Othen		Technical Director	19/08/10

<b>Document Revision Record</b>		
<b>ISSUE NO.</b>	<b>DATE</b>	<b>DETAILS OF REVISIONS</b>
1	19/08/10	First Issue
2		
3		
4		
5		
6		
7		

© 2010 Fichtner Consulting Engineers. All rights reserved.

This report and its accompanying documents contain information which is confidential and is intended only for the use of Grundon Ltd and Lakeside EfW Ltd and for submission to the Environment Agency. If you are not one of the intended recipients any disclosure, copying, distribution or action taken in reliance on the contents of the information is strictly prohibited.

Unless expressly agreed, any reproduction of material from this report must be requested and authorised in writing from Fichtner Consulting Engineers. Authorised reproduction of material must include all copyright and proprietary notices in the same form and manner as the original, and must not be modified in any way. Acknowledgement of the source of the material must also be included in all references.

---

**TABLE OF CONTENTS**

---

1	Introduction .....	1
1.1	Permit Conditions.....	1
1.2	Background Concentrations .....	1
2	Diffusion Tube Results .....	2
3	Continuous Monitoring Results .....	7
4	Additional Monitoring .....	9
4.1	Additional Diffusion Tube.....	9
4.2	Additional Continuous Monitoring Station.....	9

## 1 INTRODUCTION

### 1.1 Permit Conditions

The PPC permit for the Colnbrook Clinical Waste Incinerator (ref BT2866) includes a number of Improvement Conditions. Condition 9.10 is reproduced below:

*The Operator shall commission an independent air quality survey, including an ambient air quality monitoring programme at locations agreed with the Agency, to confirm the results of the air dispersion modelling to a specification agreed in writing with the Agency. The results with an assessment against pre-operational values shall be reported in writing annually to the Agency.*

The PPC permit for the Lakeside EfW facility (ref BT7116IW) also includes a number of Improvement Conditions. Condition 3.5.1 is reproduced below:

*The Operator shall, unless otherwise agreed in writing by the Agency, undertake the monitoring specified in the following tables in Schedule 4 to this permit:*

*d) Ambient air monitoring specified in table S4.5;*

**Table S4.5 Ambient air monitoring requirements**

Location or description of point of measurement	Parameter	Monitoring frequency	Monitoring standard or method	Other specifications
Independent air quality assessment, at locations agreed with the Agency	Nitrogen Dioxide Carbon Monoxide Sulphur Dioxide Particulates	Annually	N/A	The results with an assessment against pre-operational values shall be reported in writing annually to the Agency.

The Colnbrook Clinical Waste Incinerator and the Lakeside EfW Facility are located in the same site and their stacks are adjacent to each other. Therefore, this report is intended to satisfy the ambient air monitoring requirements for both sites.

This document covers the latest results from existing monitoring stations, and three additional monitoring stations (a diffusion tube and two continuous monitoring stations) that are located on land owned by the Operator to the north of the installation site.

### 1.2 Background Concentrations

It was agreed by the Operator and the Environment Agency, following discussions with officers representing the local authorities around Colnbrook, that the following background monitoring stations should be included in the assessment:

- (1) All diffusion tubes and continuous monitoring stations identified in the original proposal.
- (2) An additional diffusion tube site that was established on land owned by the Operator to the north of the installation site in 2005. This site is located near to the Lakeside Visitors Centre (approximate grid reference 504000, 177500).
- (3) Two additional continuous monitoring station for PM10s and PM2.5s that were also established at the visitor's centre.

This report focuses on concentrations of nitrogen dioxide and particulate matter from 2005 to 2009. This is because these are the most significant pollutants both in terms of ambient air quality and in terms of the predicted contribution from the clinical waste incinerator and the energy from waste plant.

## 2 DIFFUSION TUBE RESULTS

Table 1 below shows the diffusion tubes located within 5 km of the Colnbrook site.

Table 1 – Summary of Diffusion Tubes Located within 5 km of the Colnbrook site						
Site Name	Authority	Grid Reference		Type	Distance (km)	Bearing (°)
		X	Y			
Colnbrook By-Pass	Slough	503616	177244	K	0.30	250
Pippins	Slough	503542	176827	B	0.63	214
Bath Road (M25)	Slough	503930	176609	K	0.74	178
Elbow Meadows	Slough	503856	176538	B	0.81	183
Heathrow Close	Hillingdon	504851	176770	B	1.11	121
Iver, Old Slade Lane	South Bucks	503679	178566	K	1.24	350
Calder Way	Slough	503563	175642	B	1.74	191
Horton Road (Caravan Park)	Slough	503136	175654	I	1.86	204
Harmonsworth Green	Hillingdon	505736	177752	B	1.88	78
Brands Hill	Slough	501798	177659	K	2.12	278
London Road	Slough	501737	177725	K	2.19	280
Torrige Road	Slough	501637	177999	I	2.35	286
Tweed Road	Slough	501518	177882	I	2.44	283
Grampian Way	Slough	501382	178101	B	2.63	287
Ditton Road	Slough	500851	177890	I	3.10	280
AURN Monitoring Station	Hillingdon	506940	178601	S	3.29	68
7 Bomber Close	Hillingdon	507296	177323	B	3.40	90
Iver, Victoria Cres.	South Bucks	504056	180901	K	3.56	3
4 Colham Avenue	Hillingdon	506333	180294	R	3.82	40
Iver; High Street	South Bucks	503688	181229	K	3.89	357
Brendon Close	Hillingdon	508414	177125	B	4.52	93
25 Cranford Lane	Hillingdon	508758	177718	B	4.87	86

*For source of data see Table 2 below.*

Table 2 overleaf shows the annual average concentration of nitrogen dioxide recorded at each diffusion tube location. The figures highlighted in **bold** are those which exceeded the long term nitrogen dioxide air quality objective of 40 ug/m<sup>3</sup>. The results are adjusted for diffusion tube bias using the bias adjustment factors presented in the LAQM reports for the three councils. The table shows the annual average ground level concentrations occurring during operation of the previous clinical waste incinerator (up to end 2005), during the construction period for the new clinical incinerator (2006), and during its operation in 2007 and 2008. Bath Road (M25) and Calder Way have been discontinued so there is no data from 2005 to 2008.

Lakeside EfW plant became operational in January 2010, so emissions from the EfW plant will not have had any impact on these diffusion tubes.

Table 2 – Summary of Annual Average Nitrogen Dioxide Concentrations at Diffusion Tube Sites

Site Name	Annual Average Concentration ( $\mu\text{g}/\text{m}^3$ )							
	2002	2003	2004	2005	2006	2007	2008	2009
	Operation of Previous CWI				Construction Period	Operation of New CWI		
Colnbrook By-Pass	<b>42</b>	<b>44</b>	<b>40</b>	<b>41.6</b>	<b>40.5</b>	<b>44.4</b>	39.1	39.8
Pippins	33	39	30	30.2	30.4	31.1	28.0	28.9
Bath Road (M25)	<b>42</b>	<b>59</b>	<b>42</b>	-	-	-	-	-
Elbow Meadows	37	<b>49</b>	35	34.3	34.4	37.3	34.1	34.4
Heathrow Close	<b>45.7</b>	<b>45.8</b>	39.8	36.7	34.3	36.9	36.7	36.3
Iver, Old Slade Lane	21.9	35.5	27.3	<b>40.3</b>	31.2	34.8	34.4	34.7
Calder Way	-	<b>51</b>	38	-	-	-	-	-
Horton Road	36	<b>43</b>	33	32.2	31.6	34.8	31.2	31.1
Harmonsworth Gn	<b>44.6</b>	39.1	<b>42</b>	32.6	32.8	32.9	29.9	31.0
Brands Hill	<b>51</b>	<b>59</b>	<b>51</b>	<b>58.2</b>	<b>60</b>	<b>61.7</b>	<b>58.0</b>	<b>58.3</b>
London Road	<b>40</b>	<b>56</b>	<b>48</b>	<b>49.9</b>	<b>49.8</b>	<b>51</b>	<b>46.7</b>	<b>49.3</b>
Torridge Road	-	<b>44</b>	38	35.4	35.8	<b>42.5</b>	38.1	36.9
Tweed Road	35	<b>47</b>	39	39.5	36	<b>40.4</b>	36.8	36.6
Grampian Way	<b>41</b>	<b>57</b>	<b>42</b>	<b>41.6</b>	39	<b>42.4</b>	<b>40.6</b>	<b>42.5</b>
Ditton Road	<b>44</b>	<b>49</b>	39	37.4	37.9	<b>40.3</b>	38.8	38.8
AURN Monitoring Station	<b>45.2</b>	<b>45.4</b>	<b>45.3</b>	<b>41.4</b>	<b>41.4</b>	<b>44.3</b>	<b>45.0</b>	<b>45.9</b>
7 Bomber Close	<b>53</b>	<b>44.6</b>	<b>41.6</b>	35.9	36.3	38.4	36.0	36.6
Iver, Victoria Cres	<b>45.6</b>	39.9	<b>42.2</b>	<b>41.3</b>	32.8	36.1	34.0	35.1
4 Colham Avenue	33.5	39.9	36.9	34.9	36.4	36.4	36.2	34.3
Iver;High Street	36.1	34.2	39.3	38.3	29.6	33.4	38.7	38.3
Brendon Close	<b>49.6</b>	<b>44.7</b>	<b>40</b>	<b>41.8</b>	<b>40.1</b>	<b>43.8</b>	<b>41.6</b>	<b>43.2</b>
25 Cranford Lane	<b>40.5</b>	39.1	<b>42</b>	38	36.3	<b>41</b>	38.4	37.2

Sources of data:

1. London Borough of Hillingdon Air Quality Action Plan – Progress Report 2005 (for 2002-2004), and 2007 (2005-2006)

2. *South Buckinghamshire District Council Review and Assessment – Further Assessment, August 2005 (for 2002-2004)*
3. *Slough BC Air Quality Progress Report 2005 (for 2002-2004)*
4. *Emails from Monica Wilsch, Slough BC (for 2005,06,07, 08 and 2009)*
5. *Emails for South Bucks: Gareth Noble (for 2005), Stewart Maxwell ( for 2006, 07, 08 and 09)*
6. *Emails for Hillingdon: Val Beale ( for 2009)*
7. <http://www.heathrowairwatch.org.uk/>

*Note:*

*The previous Clinical Waste Incinerator was shutdown in March 2006. The new Clinical Waste Incinerator began normal operation in March 2007. Therefore between March 2006 and February 2007, no incinerator was operational (under normal operation).*

The results in Table 2 show a general drop in nitrogen dioxide concentrations in 2006 of around 10% compared to the average of 2002-05, followed by an increase of around 10% in 2007, a decrease of around 5% in 2008 and an increase of around 1% in 2009. However, this is a general trend over all the diffusion tubes and is unrelated to the distance from the clinical waste incinerator site or the bearing from that site. This is illustrated in figures 1 and 2 overleaf, which show the percentage change in concentration against distance and bearing. It can be seen that there is no relationship. This illustrates that the change in nitrogen dioxide concentrations was not due to the influence of the clinical waste incinerator, which has not have a noticeable impact on background nitrogen dioxide levels in the surrounding area.



Figure 1 Percentage change in concentrations with distance from the site

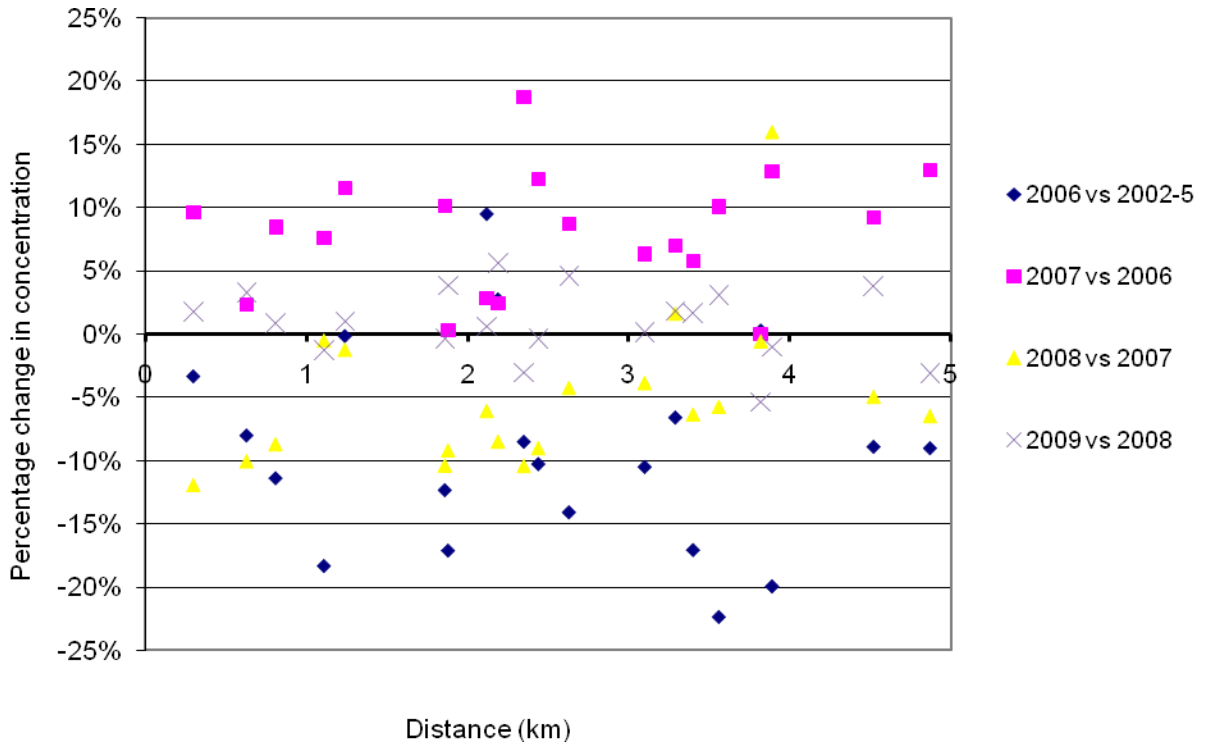
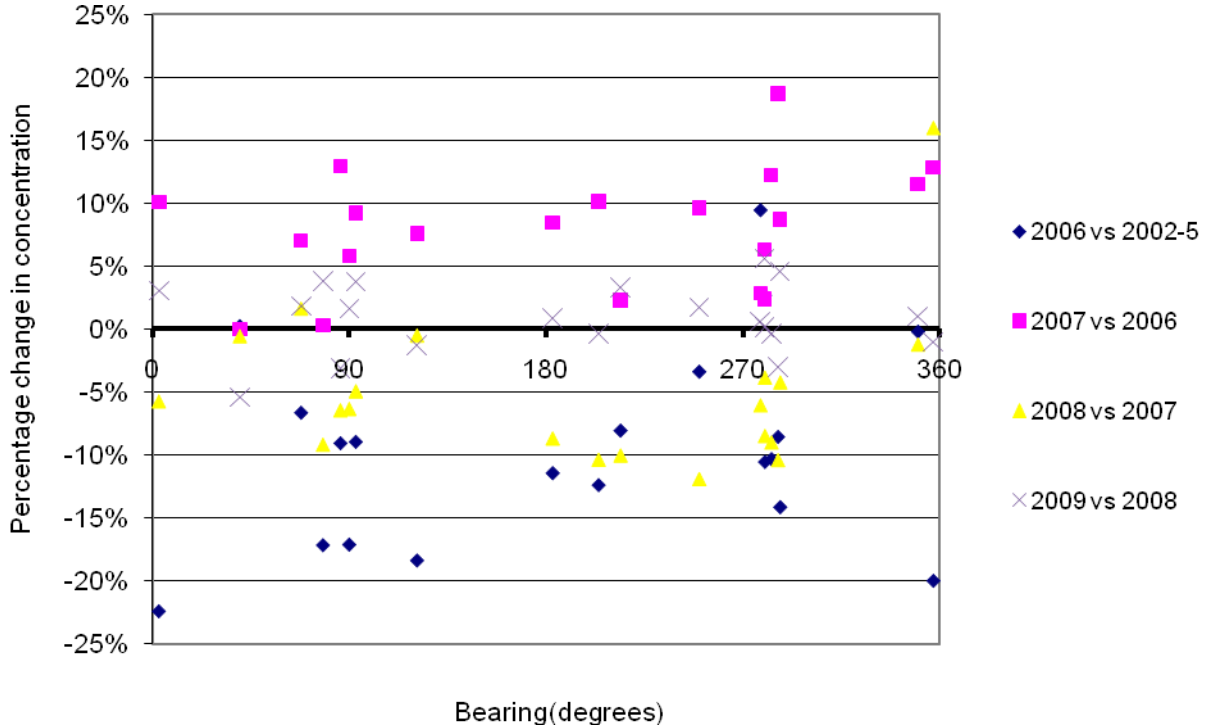


Figure 2 Percentage change in concentrations with bearing from the site



### 3 CONTINUOUS MONITORING RESULTS

The closest continuous monitoring stations are:

- Slough Colnbrook, an urban background site located 0.6 km south of the plant.
- London Hillingdon, a suburban site located 3.2 km east of the plant.
- London Harlington, an urban background site located 4.4 km east of the plant.
- London Heathrow 2, an urban background site located 4.7 km east of the plant.

The results of monitoring at these sites in 2003 to 2009 are shown in Table 3 below. Any figures which exceed the relevant air quality objectives are shown in **bold**. The results again show that since the new clinical waste incinerator began operation in 2007 there has not been any noticeable impact on background nitrogen dioxide or particulate matter levels in the surrounding area. The concentrations of pollutants have remained fairly constant over the period.

As noted above, Lakeside energy from waste plant started operating on January 2010 and therefore it did not affect the continuous monitoring results reported below.

**Table 3 – Summary of Continuous Monitoring Data: 2003-09**

	Quantity (in $\mu\text{g}/\text{m}^3$ )	Colnbrook							Hillingdon						
		03	04	05	06	07	08	09	03	04	05	06	07	08	09
NO <sub>2</sub>	Annual Average	<b>45</b>	33	33	-	-	31	29	<b>54</b>	<b>45</b>	<b>45</b>	<b>49</b>	<b>45</b>	<b>50.7</b>	<b>54</b>
	99.79 <sup>th</sup> %ile of hourly means	160	119	117	-	-	132	109	153	132	130	146	164	159	145
CO	Annual Average	-	-	-	-	-	-	-	510	520	480	439	389	-	-
	Peak 8-hour mean	-	-	-	-	-	-	-	3950	3090	2950	2350	1363	-	-
SO <sub>2</sub>	Annual Average	-	-	-	-	-	-	-	7.8	2.9	2.9	2.4	1.6	-	-
	99.9 <sup>th</sup> %ile of 15 min. means	-	-	-	-	-	-	-	63	39	32	-	-	-	-
	90.73 <sup>rd</sup> %ile of hourly means	-	-	-	-	-	-	-	-	-	-	27	19	-	-
PM <sub>10</sub>	Annual average	21	17	17.4	-	-	21	20.5	29.9	27	27	29.3	26	-	-
	98.1 <sup>st</sup> %ile of daily	<b>51</b>	36	37	-	-	<b>50</b>	36	<b>65</b>	<b>53</b>	<b>55</b>	<b>58.7</b>	<b>54.9</b>	-	-
	90.4 <sup>th</sup> %ile of daily means	-	-	-	-	-	34	30	-	-	-	42.6	36.7	-	-

Table 3 (cont) – Summary of Continuous Monitoring Data: 2003-09

Quantity		Harlington							Heathrow						
	(in $\mu\text{g}/\text{m}^3$ )	03	04	05	06	07	08	09	03	04	05	06	07	08	09
NO <sub>2</sub>	Annual Average	-	38	38	37	37	34.8	36	<b>58</b>	<b>55</b>	<b>53</b>	<b>52</b>	<b>53</b>	<b>52.8</b>	<b>50</b>
	99.79 <sup>th</sup> %ile of hourly means	-	111	113	122	151	134	105	156	146	146	143	179	164	136
CO	Annual Average	-	400	290	300	313	443		500	500	400	335	500	500	-
	Peak 8-hour mean	-	3180	2350	2038	3275	2280		2400	3200	2100	1900	1700	1700	-
PM <sub>10</sub>	Annual average	-	26	25	26.5	23.7	23.7	16	23.8	21.2	30.2	31.3	29.1	27	25
	98.1 <sup>st</sup> %ile of daily	-	<b>54</b>	48	<b>51.1</b>	<b>62</b>	<b>54</b>	47	<b>59.2</b>	46.2	<b>57.1</b>	<b>75.4</b>	<b>75.4</b>	<b>59</b>	49.6
	90.4 <sup>th</sup> %ile of daily means	-	-	-	41.4	39	36	31	-	-	-	<b>52</b>	49.4	41	36

Sources of data:

1) [National Air Quality Archive \(www.airquality.co.uk\)](http://www.airquality.co.uk) for Hillingdon and Harlington.2) [London Air Quality Network \(www.londonair.org.uk\)](http://www.londonair.org.uk) for London Heathrow and Conlbrook monitoring stations.

## 4 ADDITIONAL MONITORING

### 4.1 Additional Diffusion Tube

An additional diffusion tube has been established on land owned by the operator to the north of the installation site, near to grid reference 504000, 177500. Table 4 below shows the annual average ground level concentrations recorded by the tube from 2005. Concentrations which exceed the annual average air quality objectives for nitrogen dioxide are shown in **bold**. It can be seen that the concentration has remained fairly constant between 2005 and 2009 and there was a decrease of around 9 % in 2009.

*Note: 2005 and 2006 results account for the bias adjustment factor for Slough equal to 1.04 and 1.07 respectively. The bias adjustment factor for 2007 and 2008 is the national factor of 0.93. The bias adjustment factor for 2009 is the national factor of 0.99.*

<b>Year</b>	<b>Annual Average Concentration (<math>\mu\text{g}/\text{m}^3</math>)</b>
2005	<b>40.6</b>
2006	39.5
2007	<b>40.4</b>
2008	39.2
2009	35.5

### 4.2 Additional Continuous Monitoring Station

The particulate monitor (Slough-Colnbrook, Lakeside) was installed in February 2005 and began operation on 22<sup>nd</sup> February. The results for 2005 to 2009, using data from [www.slough.gov.uk](http://www.slough.gov.uk), are presented in Table 5 below. Concentrations which exceed the relevant air quality objective for particulate matter are shown in **bold**. It can be seen that PM<sub>2.5</sub> levels have fluctuated up and down during the period, with no obvious trend. The PM<sub>10</sub> levels dropped noticeably in 2006 and 2007, returned to 2005 levels in 2008 and dropped to 2007 levels in 2009.

<b>Year</b>	<b>PM<sub>10s</sub> (<math>\mu\text{g}/\text{m}^3</math>)</b>			<b>PM<sub>2.5s</sub> (<math>\mu\text{g}/\text{m}^3</math>)</b>		
	<b>Annual Average</b>	<b>90.4<sup>th</sup>%ile of Daily Means</b>	<b>98.1<sup>th</sup>%ile of Daily Means</b>	<b>Annual Average</b>	<b>90.4<sup>th</sup>%ile of Daily Means</b>	<b>98.1<sup>th</sup>%ile of Daily Means</b>
2005	28.3	46.5	<b>70.3</b>	9.3	15.6	35.5
2006	18.3	31.1	<b>50.1</b>	8.1	13.1	28
2007	22.1	39.9	<b>57.8</b>	10.0	17.3	29
2008	30.4	45.9	<b>59.3</b>	8.6	12.8	20.9
2009	23.4	34	<b>56.5</b>	9.3	10.7	14.5

*Note:*  
*The air quality objective for the 98.1<sup>st</sup> %ile of daily means (equal to 50  $\mu\text{g}/\text{m}^3$  not to be exceeded more than 7 times per year) has been superseded by the 90.4<sup>th</sup>%ile (equal to 50  $\mu\text{g}/\text{m}^3$  not to be exceeded more than 35 times per year). Therefore data for the 98.1<sup>st</sup> % ile of daily mean has been presented for reference only, as these concentrations were included in previous reports.*

The continuous monitoring site (Slough Lakeside 2) was installed in May 2007. The results for 2008 to 2009, using data from [www.slough.gov.uk](http://www.slough.gov.uk), are presented in Table 5 below. It can be seen that NO<sub>2</sub> and PM<sub>10</sub> levels dropped in 2009.

<b>Table 5 (cont) – Summary of Continuous Monitoring Data</b>			
	<b>Quantity</b>	<b>Slough Lakeside 2</b>	
	<b>(in µg/m<sup>3</sup>)</b>	<b>08</b>	<b>09</b>
NO <sub>2</sub>	Annual Average	<b>54</b>	35
	99.79 <sup>th</sup> %ile of hourly means	145.4	117
PM <sub>10</sub>	Annual average	30.6	27.8
	98.1 <sup>st</sup> %ile of daily	<b>73.5</b>	<b>74.1</b>
	90.4 <sup>th</sup> %ile of daily means	<b>53.6</b>	47.1

*Note:*

*The air quality objective for the 98.1<sup>st</sup> %ile of daily means (equal to 50 µg/m<sup>3</sup> not to be exceeded more than 7 times per year) has been superseded by the 90.4<sup>th</sup> %ile (equal to 50 µg/m<sup>3</sup> not to be exceeded more than 35 times per year). Therefore data for the 98.1<sup>st</sup> % ile of daily mean has been presented for reference only, as these concentrations were commented in previous reports.*



# FICHTNER

Fichtner Consulting Engineers Limited  
Kingsgate (Floor 3), Wellington Road North, Stockport Cheshire SK4 1LW United Kingdom  
t: +44(0) 161 476 0032 f: +44(0) 161 476 0618 [www.fichtner.co.uk](http://www.fichtner.co.uk)