

# 2010 Air Quality Updating and Screening Assessment and Progress Report for Watford Borough Council

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

June 2010

<b>Local Authority Officer</b>	<a href="#">Richard Brown</a> <a href="#">Environmental Health Manager</a> <a href="#">(Commercial)</a>
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<b>Department</b>	<a href="#">Environmental Services</a>
<b>Address</b>	<a href="#">Watford Borough Council</a> <a href="#">Town Hall</a> <a href="#">Watford</a> <a href="#">Herts</a> <a href="#">WD17 3EX</a>
<b>Telephone</b>	<a href="#">01923 278440</a>
<b>e-mail</b>	<a href="mailto:Richard.Brown@watford.gov.uk">Richard.Brown@watford.gov.uk</a>

<b>Report Reference number</b>	ED48000/001/v4
<b>Date</b>	16/06/2010

## **Executive Summary**

This report comprises the 2010 Update and Screening Assessment and Progress Report for Watford Borough Council, providing a review and assessment of new monitoring data and potential new sources of pollutants within the Borough.

There have been no new or significantly changed sources of pollutants identified which may cause potential exceedences of the Air Quality Strategy standards within the Local Authority.

Annual mean NO<sub>2</sub> concentrations recorded during 2009 using passive diffusion tubes exceeded the annual mean objective of 40 µg/m<sup>3</sup> at 3 locations outwith the Air Quality Management Areas. These locations are not representative of relevant public exposure, and hence a Detailed Assessment is not required:

- WF03 Hospital, Vicarage Road;
- WF37 St Albans Road 2; and
- WF42 Queens Road.

Monitoring of PM<sub>10</sub> showed no exceedences of the Air Quality Strategy standards, and further assessment is subsequently not required. The assessment does not identify any other pollutant source of concern.

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# 1 Introduction

## 1.1 Description of Local Authority Area

Watford is a concentrated urban area situated to the North West of London, with a population of circa 81,000. It is a well established regional shopping centre with major rail and road communication links. It has both mainline and underground train stations, the M1 lies along the northern boundary of the borough and the M25 is situated to the west. The borough is also served by several major trunk roads, including the A41, A411, A412 and A405.

## 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.

## 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  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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**Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.**

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
<b>Benzene</b>	16.25 µg/m <sup>3</sup>	Running annual mean	31.12.2003
	5.00 µg/m <sup>3</sup>	Running annual mean	31.12.2010
<b>1,3-Butadiene</b>	2.25 µg/m <sup>3</sup>	Running annual mean	31.12.2003
<b>Carbon monoxide</b>	10.0 mg/m <sup>3</sup>	Running 8-hour mean	31.12.2003
<b>Lead</b>	0.5 µg/m <sup>3</sup>	Annual mean	31.12.2004
	0.25 µg/m <sup>3</sup>	Annual mean	31.12.2008
<b>Nitrogen dioxide</b>	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m <sup>3</sup>	Annual mean	31.12.2005
<b>Particles (PM<sub>10</sub>) (gravimetric)</b>	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m <sup>3</sup>	Annual mean	31.12.2004
<b>Sulphur dioxide</b>	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m <sup>3</sup> , 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 & Assessment (December 2000)**

The combined effect of the Stage 1 and 2 reports of the first round Review and Assessment suggested that a Stage 3 Review and Assessment was only needed for two pollutants: nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub>). Exceedences of the Air Quality Regulation objectives were predicted close to some major roads.

A public exposure assessment was carried out, which concluded that there were no domestic properties within the areas of exceedence. Accordingly no Air Quality Management Areas (AQMA) were declared.

### **1.4.2 Updating and Screening Assessment (June 2003)**

The assessment concluded that there was no need to progress to a Detailed Assessment for carbon monoxide, lead, benzene, 1,3-butadiene, or sulphur dioxide. It was, however, considered necessary to proceed to a Detailed Assessment for NO<sub>2</sub> and PM<sub>10</sub> as 23 locations required additional assessment before a decision could be made as to whether to declare one or more AQMAs.

### **1.4.3 Detailed Assessment (April 2004)**

The study concluded that for NO<sub>2</sub>, there were likely to be six areas where the annual mean objective for nitrogen dioxide was unlikely to be met:

- Parts of St.Albans Road between Beechen Grove and North Western Avenue;
- Parts of Rickmansworth Road between the High Street and Cassio Road;
- Parts of Farraline Road close to its junction with Vicarage Road;
- Parts of Pinner Road close to its junction with Chalk Hill;
- Close to the junction of Horseshoe Lane, the A405 and St.Albans Road; and
- Parts of the Gossamers, Ravenscroft, Eastlea Avenue and Westlea Avenue.

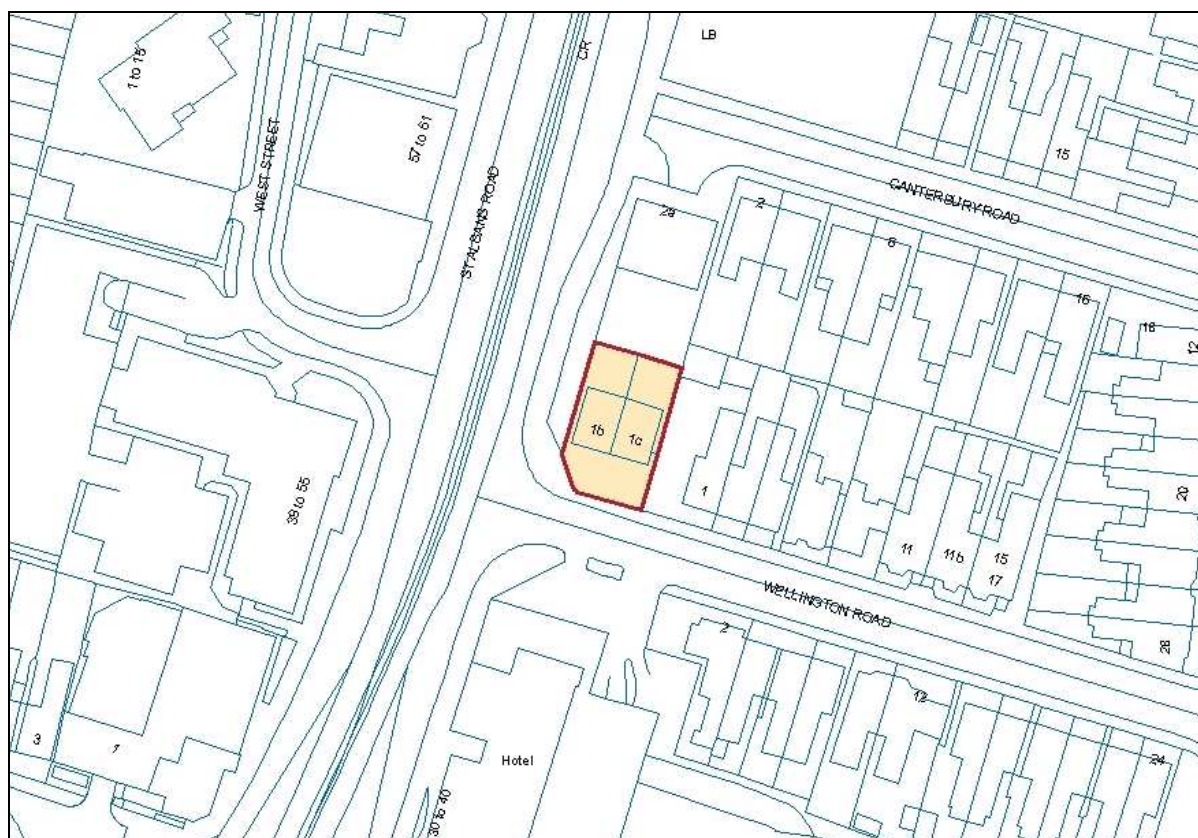
In February 2006, six AQMAs were declared, encompassing the residential properties identified in Table 1.1. The extents of the AQMAs are shown in Figures 1.1 to 1.15.

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**Table 1.1      Summary of Watford AQMAs designated in February 2006**

<b>Watford AQMA no 1</b> St Albans Road	1B & 1C Wellington Road 155 – 157 St. Albans Road 211-215 St. Albans Road 164 – 454 St. Albans Road
<b>Watford AQMA no 2</b> Vicarage Road	28A – 30A Vicarage Road (Flats above shops) 85A-87A Vicarage Road (Flats above shops)
<b>Watford AQMA no 3</b> Aldenham Road	Residential Accommodation above The Railway Arms, Aldenham Road
<b>Watford AQMA no 4</b> Chalk Hill	12 Chalk Hill
<b>Watford AQMA no 5</b> A405 / Horseshoe Lane	3A – 5A Horseshoe Lane 887 St Albans Road 1026 St Albans Road
<b>Watford AQMA no 6</b> M1 / Meriden	16, 17 & 18 Ravenscroft 1 – 5 The Gossamers 31 The Gossamers 63 – 65 The Gossamers 95 – 97 The Gossamers 62, 64, 69 Eastlea Avenue

**Figure 1.1**    **Watford AQMA no1 (St Albans Road) Map A**



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**Figure 1.2** Watford AQMA no1 (St Albans Road) Map B



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**Figure 1.3** Watford AQMA no1 (St Albans Road) Map C



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Figure 1.4 Watford AQMA no1 (St Albans Road) Map D



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Figure 1.5 Watford AQMA no1 (St Albans Road) Map E



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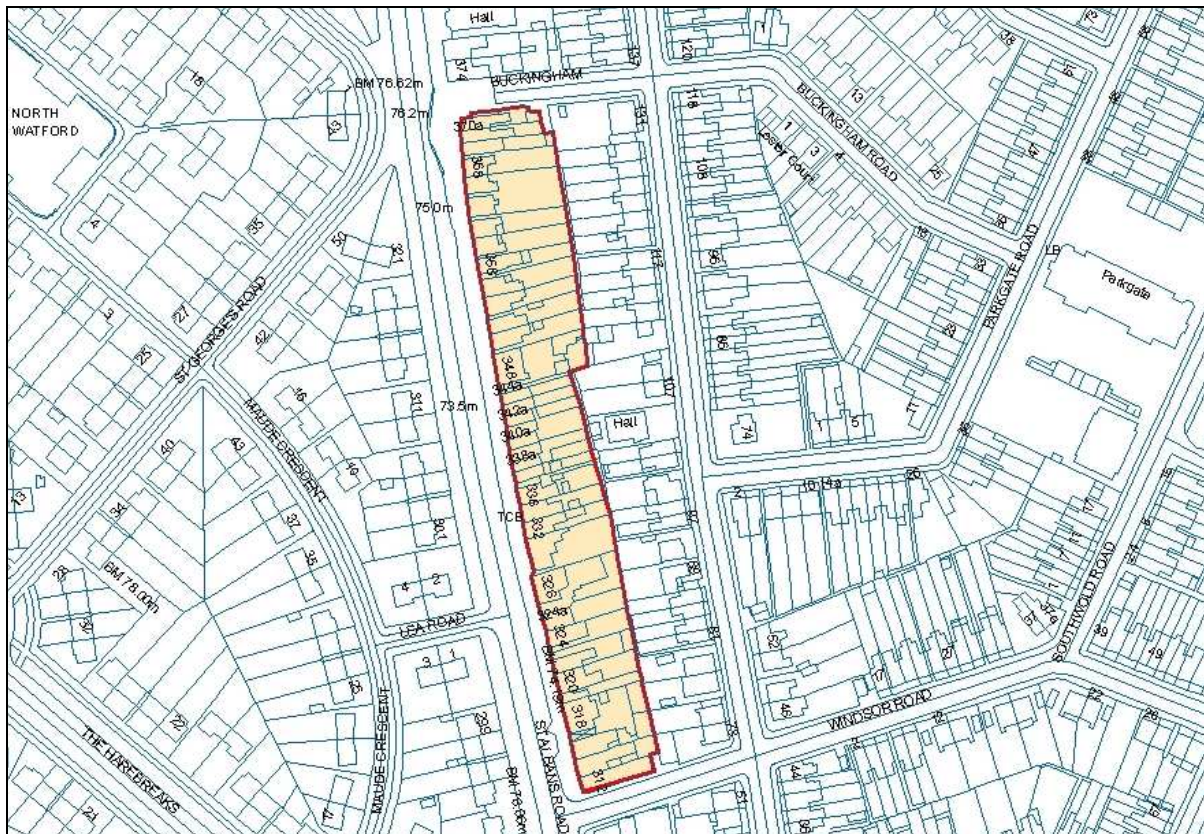


Figure 1.6 Watford AQMA no1 (St Albans Road) Map F



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Figure 1.7 Watford AQMA no1 (St Albans Road) Map G



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**Figure 1.8 Watford AQMA no1 (St Albans Road) Map H**



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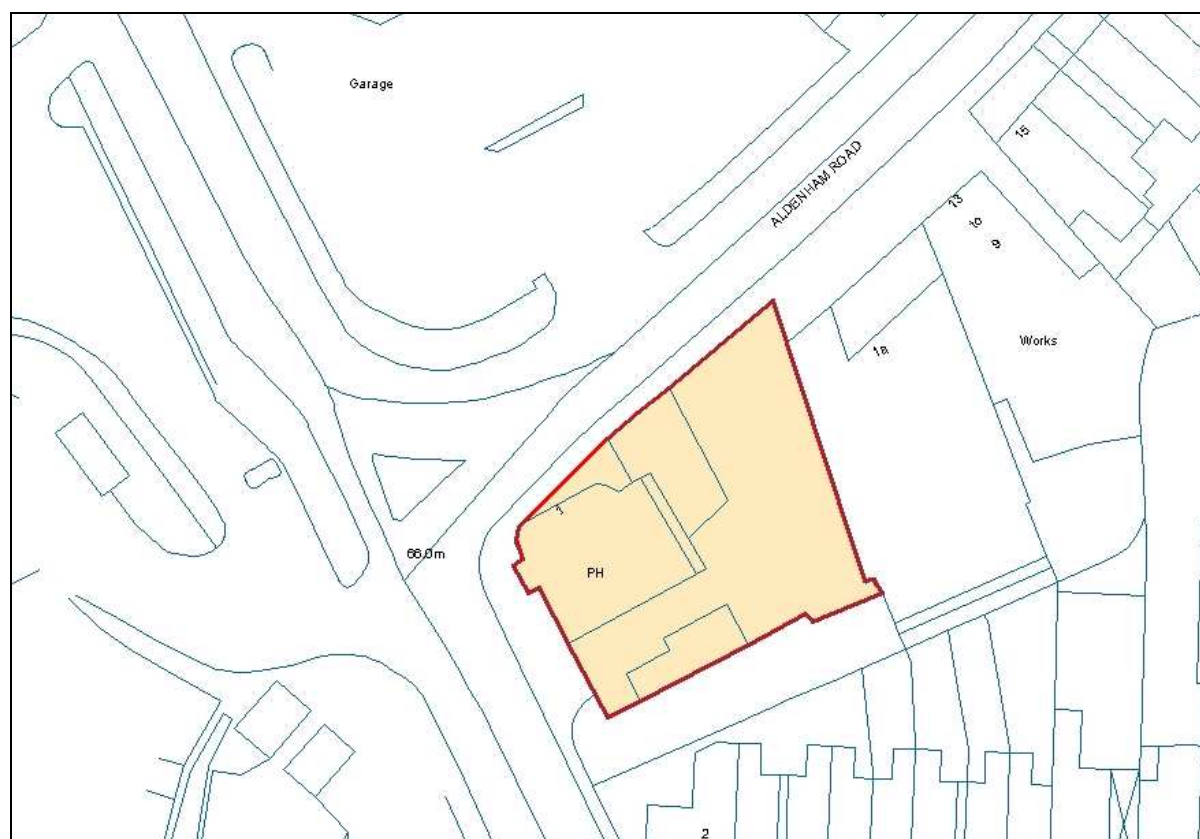
**Figure 1.9 Watford AQMA no2 (Vicarage Road)**



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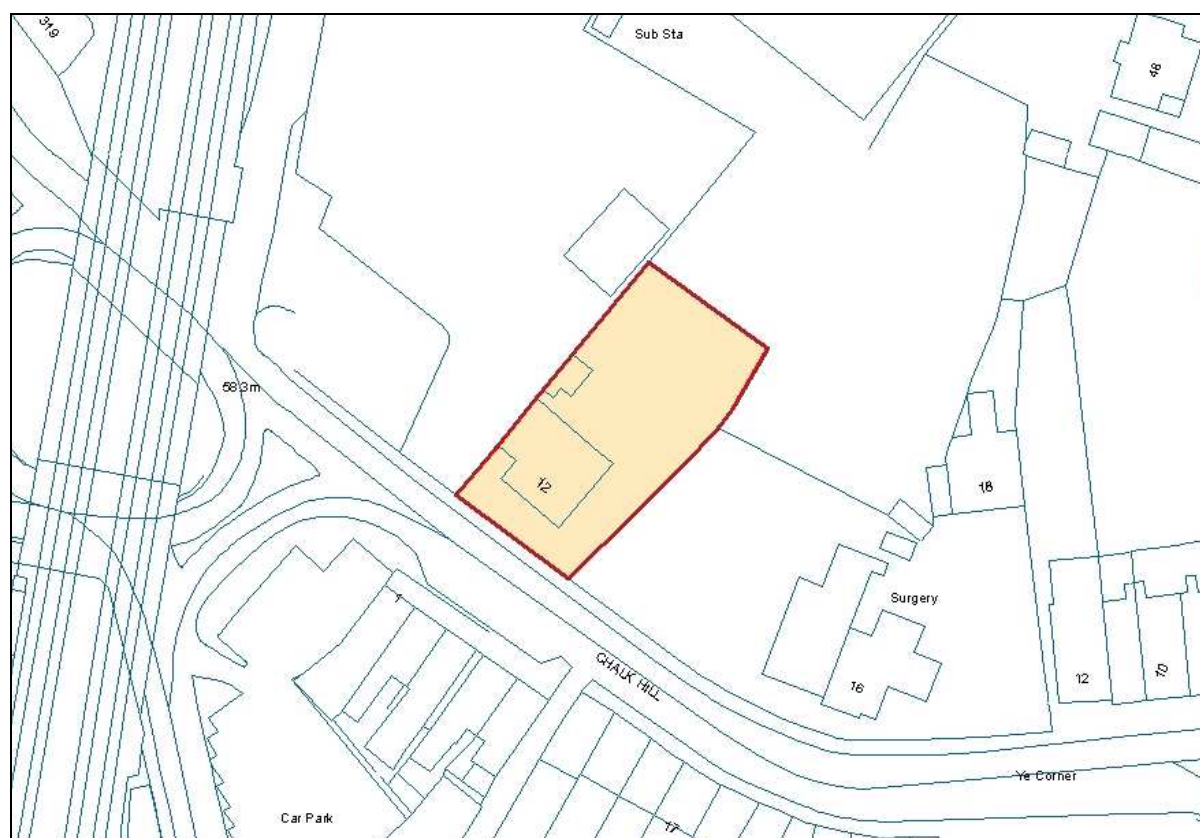


**Figure 1.10 Watford AQMA no3 (Aldenham Road)**



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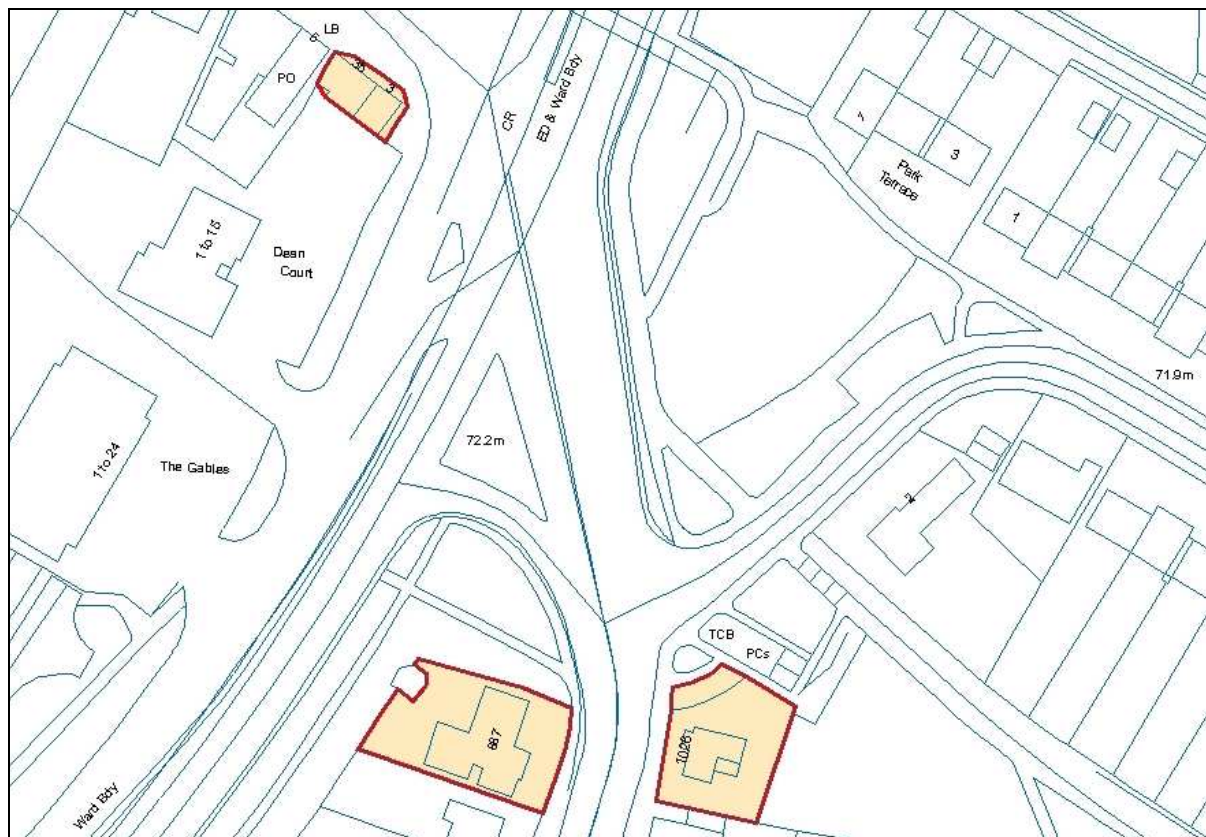
**Figure 1.11 Watford AQMA no4 (Chalk Hill)**



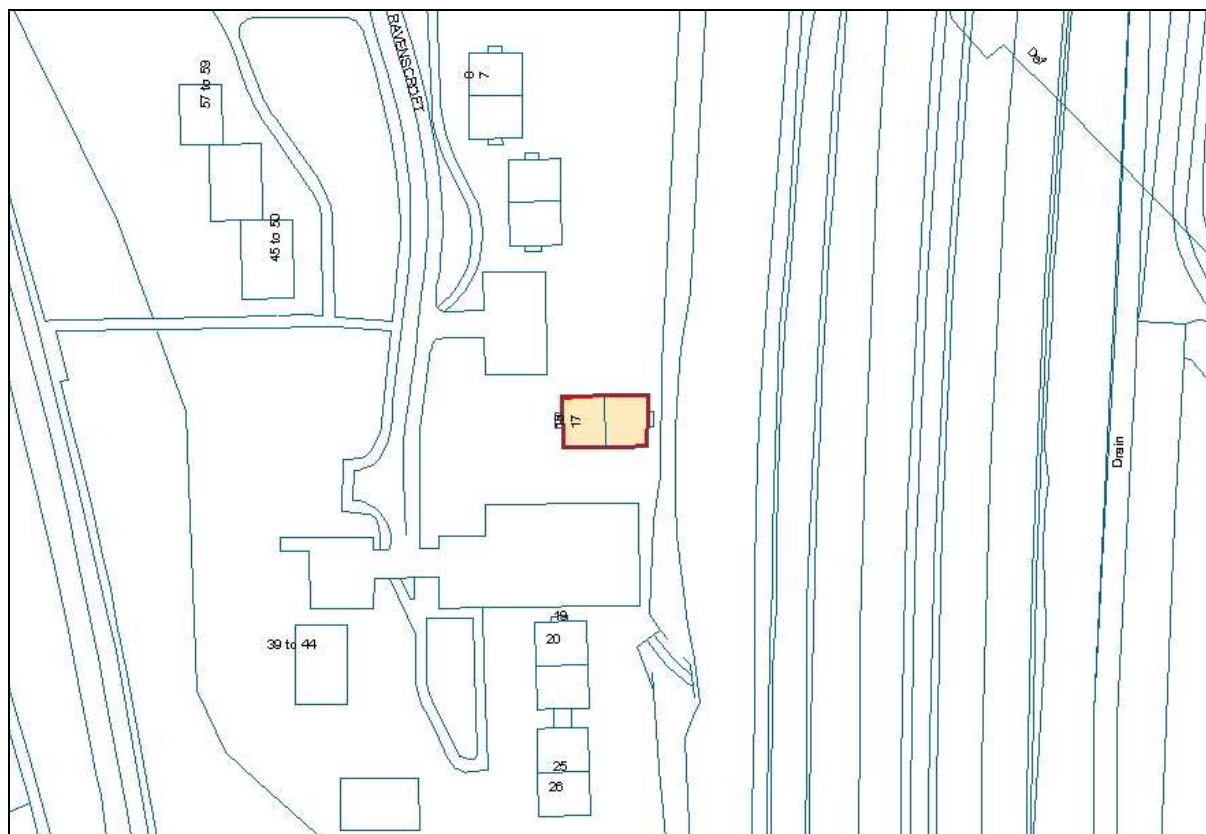
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**Figure 1.12 Watford AQMA no5 (A405 / Horseshoe Lane)**



**Figure 1.13 Watford AQMA no6 (M1/Meriden) Map A**







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### **1.4.4 Updating and Screening Assessment (July 2007)**

The USA concluded that there was no need to progress to a Detailed Assessment for carbon monoxide, lead, benzene, 1,3-butadiene, sulphur dioxide or PM<sub>10</sub>. Monitoring data indicated the continuing need for the existing AQMAs, designated for NO<sub>2</sub>.

### **1.4.5 Progress Report (December 2008)**

The 2008 Progress Report concluded that there was not a requirement to continue to a Detailed Assessment for any pollutant.

### **1.4.6 Further Assessment of AQMAs 1-6 (April 2009)**

The Further Assessment of the six AQMAs recommended that AQMA 1 (St Albans Road) and AQMA 5 (A405/Horseshoe Lane) should be retained. AQMA 2 (Vicarage Road), AQMA 3 (Aldenham Road) and AQMA 4 (Chalk Hill) should be extended, and AQMA 6 (M1 Meriden) should be revoked.

The recommendations of the Further Assessment were accepted by Defra in April 2009. It is now the intention of Watford Borough Council to amalgamate AQMA 3 (Aldenham Road) and AQMA 4 (Chalk Hill) to form a single AQMA (AQMA 3A, Aldenham Road and Chalk Hill) due to their proximity and similarity in air quality issues affecting them.

## 2 New Monitoring Data

### 2.1 Summary of Monitoring Undertaken

#### 2.1.1 Automatic Monitoring Sites

Since January 2008, the following analysers have been in operation at Watford Town Hall:

1. API M200E chemiluminescent NO<sub>x</sub> analyser from Envirotechnology; and
2. Rupprecht & Patashnick TEOM analyser, gathering PM<sub>10</sub> data.

The monitoring station is classified as a Roadside monitoring site, and is situated approximately 10 metres from the kerb of Rickmansworth Road. Figure 2.1 shows the location of the monitoring station.

Data is collected via modem by the King's College London Environmental Research Group (ERG), where the data is also validated and reported. Real time data, as well as weekly month and annual reports are available from Herts & Beds Air Pollution Monitoring Network website; [www.hertsbedsair.org.uk](http://www.hertsbedsair.org.uk).

All servicing and maintenance (including periodic calibration of equipment) is managed by ERG as part of their overall management of the Herts & Beds Air Pollution Monitoring Network. The equipment is audited annually by the National Physical Laboratory as part of the QA for the Network.

PM<sub>10</sub> data collected using the TEOM instrument is converted by ERG to reference equivalence using the volatile correction method (VCM).

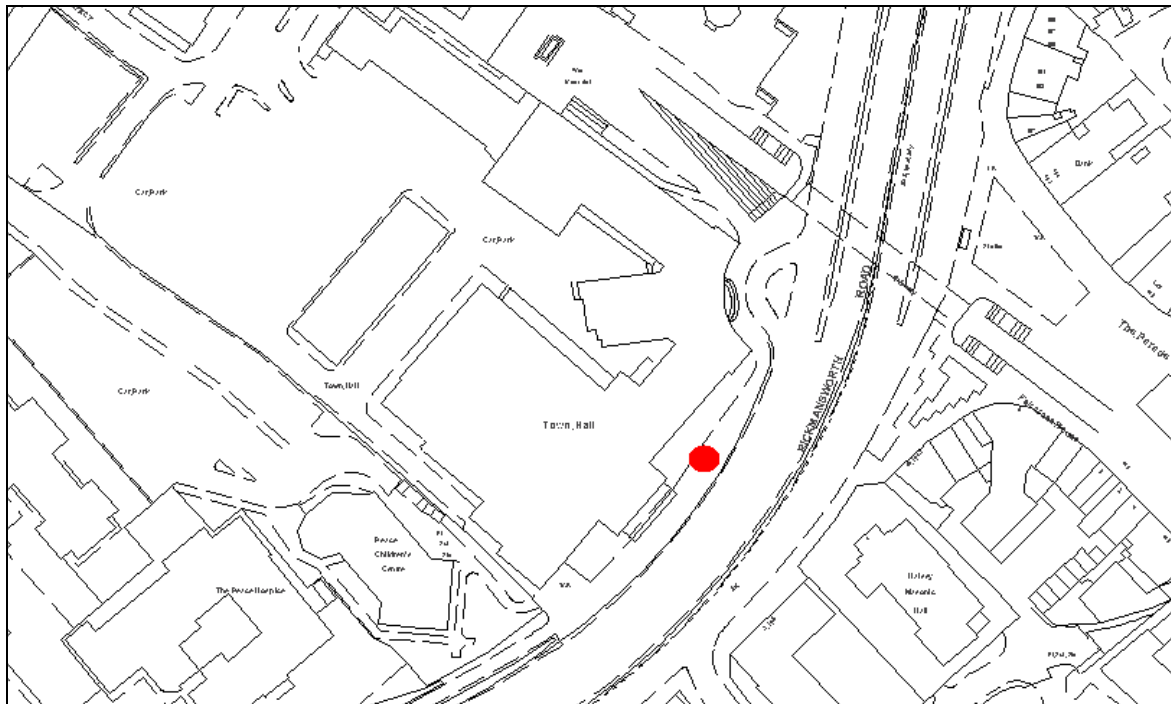
**Table 2.1 Details of Automatic Monitoring Sites**

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Watford Town Hall	R	X 510540, Y 196780	NO <sub>2</sub> , PM <sub>10</sub>	N	N	10m	Y

Note: R = roadside.

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Figure 2.1 Location of Watford Town Hall automatic monitoring station



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## 2.1.2 Non-Automatic Monitoring

Passive monitoring of NO<sub>2</sub> is undertaken using diffusion tubes around at 17 locations within the Borough. Details of the site locations are given in Table 2.2, and their approximate location is shown in Figure 2.2.

**Table 2.2 Details of Non- Automatic Monitoring Sites**

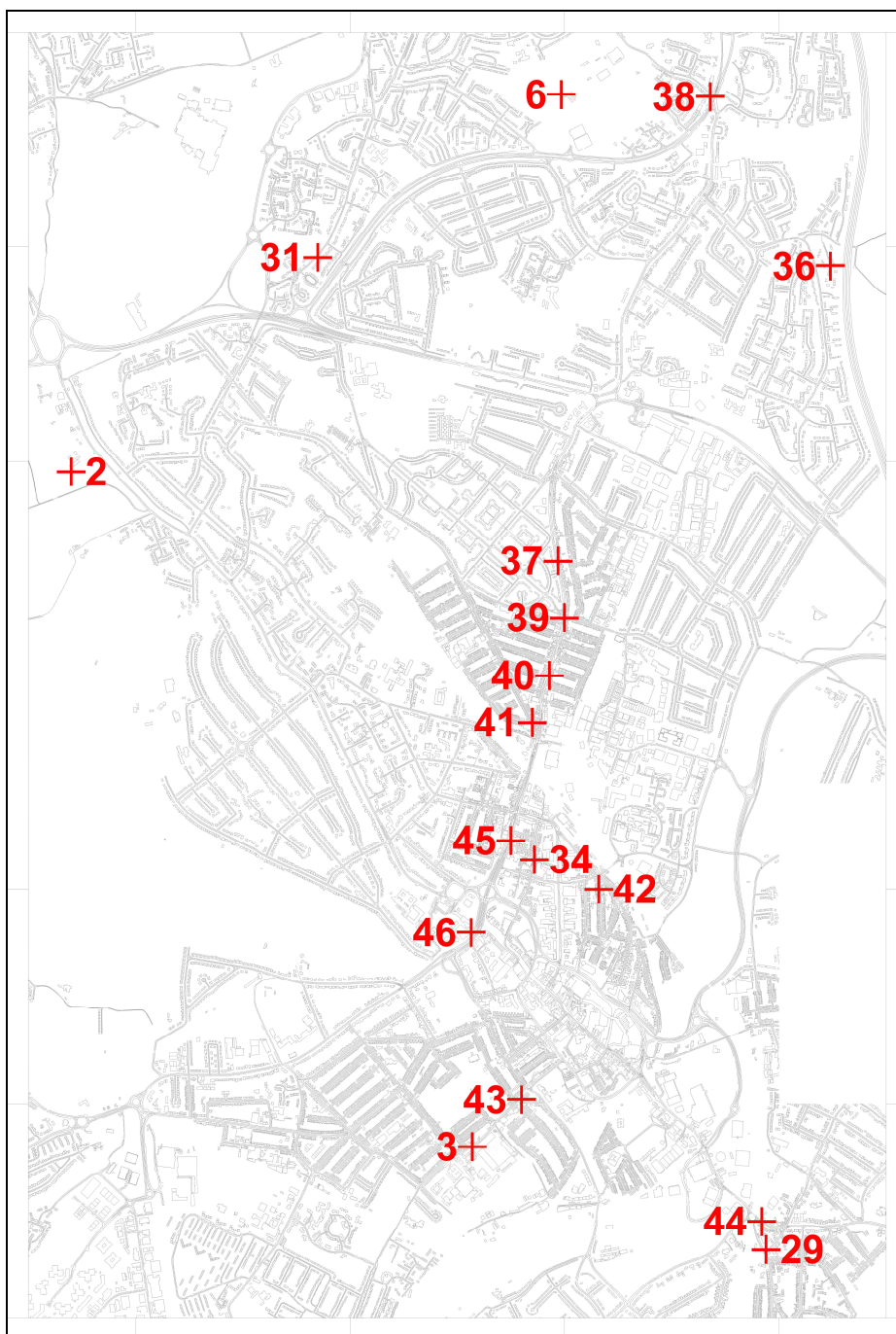
Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
WF02	B	X 508700, Y 198950	NO <sub>2</sub>	N	N	n/a	N
WF03	K	X 510570, Y 195800		N	N	4m	Y
WF06	B	X 510985, Y 200710		N	N	n/a	N
WF29	K	X 511940, Y 195320		Y	Y- 6m	2m	Y
WF31	I	X 509850, Y 199950		N	Y- 10m	1m	N
WF34	B	X 510860, Y 197140		N	Y- 2m	1m	N
WF36	I	X 512240, Y 199910		N	Y – 8m	n/a	Y
WF37	K	X 510970, Y 198535		N	Y – 5m	1m	Y
WF38	K	X 511680, Y 200700		Y	Y -2m	4m	Y
WF39	K	X 511000, Y 198270		Y	N	1m	Y
WF40	K	X 510930, Y 198000		Y	N	2m	Y
WF41	K	X 510850, Y 197780		Y	N	1m	Y
WF42	K	X 511160, Y 197000		N	Y - 4m	1m	Y
WF43	K	X 510800, Y 196020		Y	Y- 4m	2m	Y
WF44	K	X 511920, Y 195450		Y	Y – 6m	2m	Y
WF45	K	X 510750, Y 197230		Y	Y- 10m	4m	Y
WF46	R	X 510565, Y 196800		N	N	6m	N

Note: B = background; K = kerbside; I = intermediate; R = roadside.



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Figure 2.2 Location of Watford Borough Council NO<sub>2</sub> diffusion tube monitoring network



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Tubes are supplied and analysed by Harwell Scientific Services, a UKAS accredited laboratory. The tubes are prepared using 50% TEA (triethanolamine) in acetone.

The Harwell Scientific laboratory participates in the field intercomparison scheme and the Workplace Analysis Scheme for Proficiency (WASP) programme, operated by the Health and Safety Laboratory (HSL). For the period presented, Harwell Scientific demonstrated 'good' performance in the WASP scheme for analysis of NO<sub>2</sub> diffusion tubes (<http://www.laqmsupport.org.uk/no2qaqc.php>).

In 2009, 15 of the 19 collocation studies undertaken by Harwell Scientific Services using 50% TEA in acetone methodology were considered to be good precision (based upon v03/10 spreadsheet);

- In 2008, all of the 14 collocation studies were considered to be good precision;
- In 2007, 17 out of the 18 collocation studies were considered to be good precision.

Unadjusted monthly diffusion tube data can be downloaded from <http://www.hertsbedsair.org.uk/hertsbeds/asp/DiffusionTubes.asp?dt=>. National collocation study bias adjustment factors for 2007 (0.82), 2008 (0.78) and 2009 (0.81) have been acquired from the Spreadsheet of Bias Adjustment Factors (v.03/10), <http://www.uwe.ac.uk/aqm/review/index.html>.

Local bias adjustment factors of 0.74 and 0.91 have been calculated for 2008 and 2009 respectively, based upon the collocation of diffusion tubes at the Watford Town Hall continuous monitoring site. The local factors have been applied to diffusion tube data collected in 2008 and 2009, whilst the national factor has been applied to data collected during 2007. The local factors agree well with the corresponding national averages.

## 2.2 Comparison of Monitoring Results with AQ Objectives

### 2.2.1 Nitrogen Dioxide

#### Automatic Monitoring Data

The annual mean NO<sub>2</sub> concentrations recorded by the continuous analyser at Watford Town Hall for the period 2007-9 are presented in Table 2.3a. The annual mean objective of 40 µg/m<sup>3</sup> has not been exceeded during this time period, though it is not well below the objective.

Table 2.3b shows that there have been no exceedences of the NO<sub>2</sub> hourly mean objective of 200 µg/m<sup>3</sup> at Watford Town Hall. Where data capture was <90% (2007 and 2008), the 99.8<sup>th</sup> percentile was still well below the 200 µg/m<sup>3</sup> target.

**Table 2.3a Results of Automatic Monitoring for NO<sub>2</sub>: Comparison with Annual Mean Objective**

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentration (µg/m <sup>3</sup> )		
				2007 <sup>a</sup>	2008 <sup>b</sup>	2009
Watford Town Hall	Rickmansworth Road	N	98%	35	32	39

Note: Data downloaded from <http://www.hertsbedsair.org.uk/hertsbeds/asp/AdvStats.asp>  
<sup>a</sup> 58% data capture; <sup>b</sup> 84% data capture.

**Table 2.3b Results of Automatic Monitoring for NO<sub>2</sub>: Comparison with 1-hour Mean Objective**

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Exceedences of hourly mean (200 µg/m <sup>3</sup> ) <i>If the period of valid data is less than 90% of a full year, include the 99.8<sup>th</sup> %ile of hourly means in brackets.</i>		
				2007 <sup>a</sup>	2008 <sup>b</sup>	2009
Watford Town Hall	Rickmansworth Road	N	98%	0 (108 µg/m <sup>3</sup> )	0 (108 µg/m <sup>3</sup> )	0 (116 µg/m <sup>3</sup> )

Note: Data downloaded from <http://www.hertsbedsair.org.uk/hertsbeds/asp/AdvStats.asp>  
<sup>a</sup> 58% data capture; <sup>b</sup> 84% data capture.

#### Diffusion Tube Monitoring Data

Table 2.4 presents the annual mean bias adjusted NO<sub>2</sub> concentrations recorded at the 17 diffusion tube sites for the period 2007-9.

The bias adjustment factor for 2007 from the University of Western England (UWE) 'Spreadsheet of Bias Adjustment Factors v. 03/10' has been applied to the raw data (0.82).

Local adjustment factors, calculated from the collocation of diffusion tubes at the Watford Town Hall continuous monitoring site, have been applied to diffusion tube data collected during 2008 (0.74) and 2009 (0.91).

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The annual mean concentrations are shown in Figure 2.3 for 2007 to 2009, however the data series is not long enough to determine a clear trend in annual mean concentrations in Watford. Concentrations in 2009 appear consistently higher than those recorded during 2008.

The NO<sub>2</sub> data for 2009 indicate that exceedences of the annual mean objective of 40 µg/m<sup>3</sup> have been recorded at 11 of the 17 sites. Of these 11 sites, 3 are not currently within designated AQMAs, however they are not representative of relevant exposure (Table 2.2):

- WF03 Hospital, Vicarage Road;
- WF37 St Albans Road 2; and
- WF42 Queens Road.

**Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes**

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentration (µg/m <sup>3</sup> ) Adjusted for bias		
				2007 <sup>a</sup>	2008 <sup>b</sup>	2009 <sup>c</sup>
WF02	Grove Pumping Station, Hempstead Road	N	92%	22	19	21
WF03	Hospital, Vicarage Road	N	100%	40	42	48
WF06	Leisure Centre, Horseshoe Lane	N	100%	26	24	30
WF29	Pinner Road	Y	83%	61	53	67
WF31	High Road Leavesden	N	100%	38	30	38
WF34	Westland Road	N	100%	39	35	38
WF36	Ravenscroft	N	100%	32	29	35
WF37	St Albans Road 2	N	92%	43	40	49
WF38	A405 Horseshoe Lane	Y	92%	42	40	49
WF39	Balmoral Road	Y	83%	50	45	53
WF40	Salisbury Road	Y	100%	45	41	45
WF41	Leavesden Road	Y	100%	38	33	42
WF42	Queens Road	N	92%	41	35	43
WF43	Farraline Road	Y	100%	54	49	60
WF44	Chalk Hill	Y	92%	105	91	98
WF45	Wellington Road	Y	100%	41	34	49
WF46	Town Hall collocation	N	83%	-	33	39

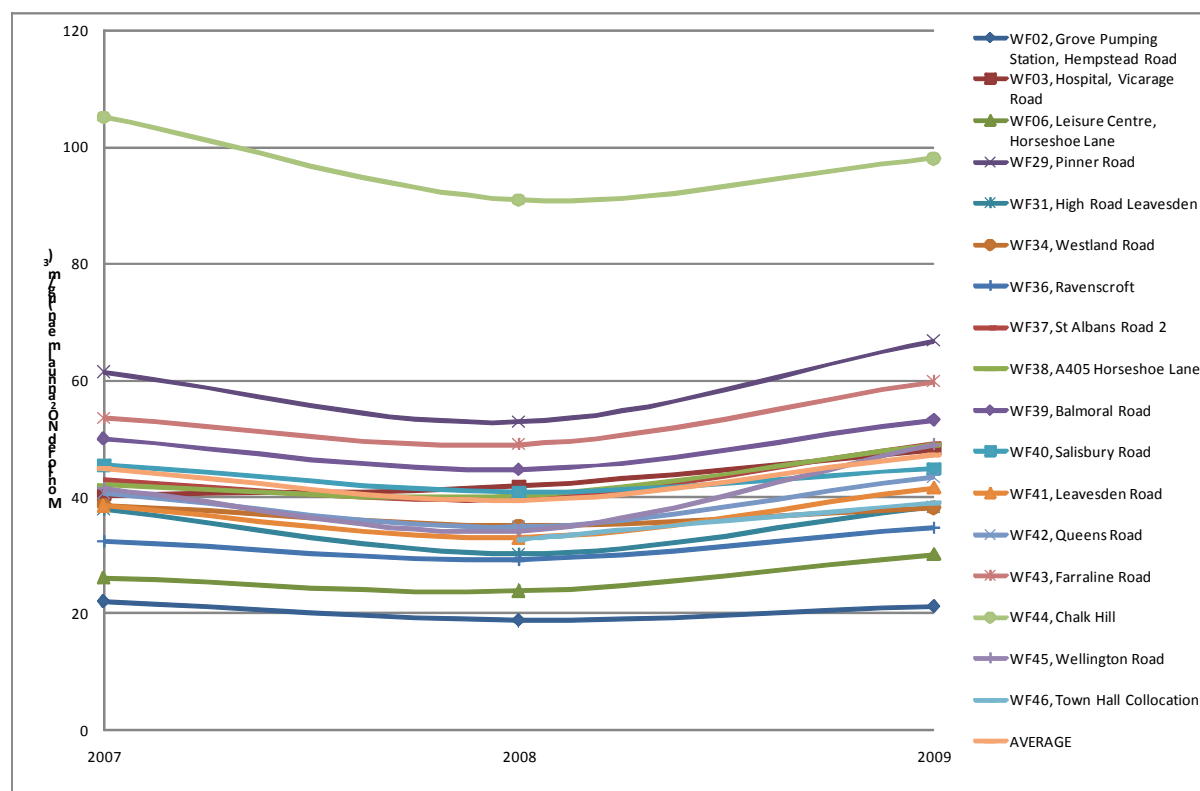
Note: Unadjusted data from <http://www.hertsbedsair.org.uk/hertsbeds/asp/DiffusionTubes.asp?dt=>  
Bias adjusted annual means in excess of the 40 µg/m<sup>3</sup> NO<sub>2</sub> objective are shaded grey.

<sup>a</sup> 2007 bias adjustment factor of 0.82 from the Spreadsheet of Bias Adjustment Factors (v.03/10) (<http://www.uwe.ac.uk/aqm/review/index.html>)

<sup>b</sup> Local bias adjustment factor of 0.74 calculated from collocation study at Watford Town Hall.

<sup>c</sup> Local bias adjustment factor of 0.91 calculated from collocation study at Watford Town Hall.

**Figure 2.3 Diffusion tube annual mean NO<sub>2</sub> concentrations, 2007 - 2009**



## 2.2.2 PM<sub>10</sub>

The annual mean PM<sub>10</sub> concentrations recorded by the TEOM instrument at Watford Town Hall for the period 2007-9 are presented in Table 2.5a, and the number of exceedences of the 24-hour mean objective are shown in Table 2.5b, as downloaded from the Herts & Beds Air Pollution Monitoring Network website; [www.hertsbedsair.org.uk](http://www.hertsbedsair.org.uk).

Data have been converted to reference equivalence using the volatile correction method (VCM).

The annual mean PM<sub>10</sub> concentration recorded at Watford Town Hall has been well below the objective of 40 µg/m<sup>3</sup> for the period 2007-9. The number of exceedences of the 24-hour mean objective of 50 µg/m<sup>3</sup> is well within the permitted 35 exceedences per year for the period 2007-9.

**Table 2.5a Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with Annual Mean Objective**

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentration (µg/m <sup>3</sup> ) *		
				2007	2008	2009
Watford Town Hall	Rickmansworth Road	N	98%	23	21	22

Note: Data downloaded from <http://www.hertsbedsair.org.uk/hertsbeds/asp/AdvStats.asp>

\* Data was collected using a TEOM PM<sub>10</sub> instrument. Results have been converted to reference equivalence using the volatile correction method (VCM).

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Table 2.5b Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Exceedences of 24-hour mean (50 µg/m <sup>3</sup> ) *		
				If data capture < 90%, include the 90 <sup>th</sup> %ile of 24-hour means in brackets.		
				2007	2008	2009
Watford Town Hall	Rickmansworth Road	N	98%	20	9	0

Note: Data downloaded from <http://www.hertsbedsair.org.uk/hertsbeds/asp/AdvStats.asp>

\* Data was collected using a TEOM PM<sub>10</sub> instrument. Results have been converted to reference equivalence using the volatile correction method (VCM).

## 3 Road Traffic Sources

### 3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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

Three sections of road were identified as satisfying the criteria for assessment as a 'narrow, congested street', however none require further assessment;

- The identified section of St Albans Road is already within an AQMA;
- Chalk Hill AQMA is due to be extended to include the section of Aldenham Rd by Chalk Hill;
- The third section, Aldenham Rd – south of Three Valleys Way, is outwith the Borough.

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

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

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

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

The following streets were considered for assessment under this category in the 2003 USA:

- |                              |   |
|------------------------------|---|
| • St. Albans Road (Buses);   | • Ascot Road and all of Watford Business Park (HGVs); |
| • High Street (Buses);       | • Balmoral Road (HGVs);                               |
| • Lower High Street (Buses); | • Imperial Way (HGVs);                                |
| • Garston Lane (Buses);      | • Sandown Road (HGVs);                                |
| • The Gossamers (Buses);     | • Greycaine Road (HGVs).                              |
| • Bushey Mill Lane (HGVs);   |   |
| • Colonial Way (HGVs);       |   |

For those roads with relevant exposure, the flow of HGVs and / or buses was determined to be below the criteria for all roads except for Bushey Mill Lane, which was assessed in the 2004 Detailed Assessment, with no requirement to designate as an AQMA.

### **3.4 Junctions**

Watford Borough Council confirms that there are no new/newly identified busy junctions/busy roads.

The following junctions were assessed in the 2003 USA, with no requirement to investigate further:

- A405 Kingsway, A412 St.Albans Road, C88 Horseshoe Lane;
- A411 Hempstead Road, A412 St.Albans Road;
- A4178 Wiggshall Road, A412 Rickmansworth Road;
- A4178 Wiggshall Road, C74 Whippendell Road;
- A4178 Wiggshall Road, A4145 Vicarage Road.

### **3.5 New Roads Constructed or Proposed Since Last Round of Review & Assessment**

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

### **3.6 Roads with Significantly Changed Traffic Flows**

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

### **3.7 Bus and Coach Stations**

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



## **4 Other Transport Sources**

### **4.1 Airports**

Watford Borough Council confirms that there are no newly identified airports in the Local Authority area.

### **4.2 Railways (Diesel and Steam Trains)**

#### **4.2.1 Stationary Trains**

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

#### **4.2.2 Moving Trains**

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

### **4.3 Ports (Shipping)**

Watford Borough Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.



## **5 Industrial Sources**

### **5.1 Industrial Installations**

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

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

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

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

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

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

### **5.2 Major Fuel (Petrol) Storage Depots**

Watford Borough Council confirms that there are no major fuel (petrol) storage depots within the Local Authority area.

### **5.3 Petrol Stations**

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

### **5.4 Poultry Farms**

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

## 6 Commercial and Domestic Sources

### 6.1 Biomass Combustion – Individual Installations

One new biomass installation has been identified within the Local Authority boundaries to be assessed. The following information is required to screen the potential impact of a proposed biomass combustion appliance upon local air quality, in accordance with LAQM.TG(09) and 'Technical Guidance: Screening Assessment for Biomass Boilers', (AEA, 2008):

- Height of stack above ground;
- Diameter of stack;
- Dimensions of buildings within a distance from the stack of five times the stack height (above ground);
- Description of the combustion appliance; and
- Maximum rates of emission of particulate matter and oxides of nitrogen when operating at capacity.

Nomograms, presented in LAQM.TG(09), are used to assess whether the proposed biomass combustion installation is likely to lead to an exceedance of the Air Quality Strategy 24-hour PM<sub>10</sub> objective, and the annual mean or 1-hour objectives for NO<sub>2</sub>.

The following steps are undertaken using the nomograms to determine whether the biomass installation will require further assessment:

- The line in the nomogram corresponding to the stack diameter is identified;
- The point on the line which corresponds to the effective stack height (y-axis) is identified;
- The corresponding threshold emission rate (x-axis) is determined; and
- The threshold emission rate is compared with the background-adjusted emission rate.

If the background-adjusted emission rate is greater than or equal to the threshold emission rate, a more detailed assessment of the biomass boiler should be considered.

#### 6.1.1 West Herts College, Hempstead Road, Watford

The following information has been provided with respect to the West Herts College biomass boiler:

- Boiler rating: 149 kW;
- Stack height: 3.0 m flue above a 3.273 m service intake building = 6.273 m;
- Diameter of flue: 0.25 m;
- Height of building within 5 times the stack height (31.37 m): 19.584 m; and
- Maximum emission rates:  $1.0545 \times 10^{-2}$  g/s (NO<sub>x</sub>),  $1.85 \times 10^{-4}$  g/s (PM<sub>10</sub>).

As the proposed installation is greater than the 50 kW threshold laid out in the guidance, a screening assessment for each of the pollutants was carried out in July 2009, as presented below.

#### Particulate matter

The background adjusted emission rate for PM<sub>10</sub> is calculated using:  $E_A = E / (32 - G)$ , where E is the emission rate and G is the average background concentration. 32 µg/m<sup>3</sup> represents the annual average concentration at which, given a typical distribution of concentrations, the 90<sup>th</sup> percentile of 24-hour means will exceed the objective.

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For PM<sub>10</sub>,  $E = 1.85 \times 10^{-4}$  g/s and from the Air Quality Archive background maps <sup>1</sup> for this grid square (510500,197500),  $G = 20.68 \mu\text{g}/\text{m}^3$ .  **$E_A = 1.63 \times 10^{-5}$  g/s**

Referring to Box 5.6 (LAQM.TG(09)), the source must be treated as a ground level source because the stack height is lower than the surrounding buildings. The nomogram shown in Figure 5.19 is used to calculate the maximum emission rate that will allow adequate dispersal of pollutants and the PM<sub>10</sub> objective to be met.

The intersection of the 0.25 m stack diameter line and the ground level stack height gives a maximum emission rate of  $7.0 \times 10^{-4}$  g/s.

At  $1.63 \times 10^{-5}$  g/s, the proposed maximum emission rate of this unit is lower than this threshold, and it is therefore considered that the objectives for PM<sub>10</sub> will be met.

### Nitrogen Dioxide, Annual Mean

The background adjusted emission rate for NO<sub>2</sub> (annual mean) is calculated using:  $E_A = E / (40 - G)$ , where E is the emission rate and G is the average background concentration.  $40 \mu\text{g}/\text{m}^3$  represents the annual mean objective for NO<sub>2</sub>.

For NO<sub>x</sub>,  $E = 1.0545 \times 10^{-2}$  g/s and from the Air Quality Archive background maps, for this grid square (510500,197500)  $G = 23.60 \mu\text{g}/\text{m}^3$ .  **$E_A = 6.429 \times 10^{-4}$  g/s**

Referring to Box 5.6 (LAQM.TG(09)), the source must be treated as a ground level source because the stack height is lower than the surrounding buildings. The nomogram shown in Figure 5.20 is used to calculate the maximum emission rate that will allow adequate dispersal of pollutants and the NO<sub>2</sub> annual mean objective to be met.

The intersection of the 0.25m stack diameter line and the ground level stack height gives a maximum emission rate of  $2.0 \times 10^{-3}$  g/s.

At  $6.429 \times 10^{-4}$  g/s, the proposed maximum emission rate of this unit is lower than this threshold, and it is therefore considered that the NO<sub>2</sub> annual mean objective will be met.

### Nitrogen Dioxide, 1-hour mean

The background adjusted emission rate NO<sub>2</sub> (1-hour mean) is calculated using:  $E_A = 40E / (200 - 2G)$ , where E is the emission rate and G is the average background concentration.  $200 \mu\text{g}/\text{m}^3$  represents the annual mean concentration at which, given typical distribution of concentrations, the 90<sup>th</sup> percentile of 24-hour means will exceed the objective.

For NO<sub>x</sub>,  $E = 1.0545 \times 10^{-2}$  g/s and from Air Quality Archive background maps <sup>1</sup>, for this grid square (510500,197500)  $G = 23.60 \mu\text{g}/\text{m}^3$ .  **$E_A = 2.76 \times 10^{-3}$  g/s**

Referring to Box 5.6 (LAQM.TG(09)), the source must be treated as a ground level source because the stack height is lower than the surrounding buildings. The nomogram shown in Figure 5.21 is used to calculate the maximum emission rate that will allow adequate dispersal of pollutants and the NO<sub>2</sub> hourly mean objective to be met.

The intersection of the 0.25m stack diameter line and the ground level stack height gives a maximum emission rate of  $9.0 \times 10^{-3}$  g/s.

At  $2.76 \times 10^{-3}$  g/s, the proposed maximum emission rate of this unit is higher than this threshold, and it is therefore considered that the NO<sub>2</sub> 1-hour mean objective will be met.

Watford Borough Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

## 6.2 Biomass Combustion – Combined Impacts

No biomass installations satisfying the criteria laid out in LAQM.TG(09) have been identified.

<sup>1</sup> <http://www.airquality.co.uk/>

Watford Borough Council confirms that there are no areas of high density biomass combustion plants in the Local Authority area.

### **6.3 Domestic Solid-Fuel Burning**

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

## **7 Fugitive or Uncontrolled Sources**

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

## 8 New Local Developments

### 8.1.1 New Housing, Commercial and Public Developments

Table 8.2 shows new developments that have commenced, been granted planning permission, or have been recently completed.

Professional judgement has been used to ascertain whether any of the developments are likely to have a significant impact upon local air quality. Taking into account location and size of the development, three such developments have been identified as having the potential to have a significant impact on air quality:

1. East section of Tinsley Estate, Queen Mary's Avenue – access from Rickmansworth Road;
2. Beechen Grove and Loates Lane – access from Beechen Grove; and
3. 26 Exchange Road – access from Upton Road and Exchange Road.

For these developments, a DMRB (Design Manual for Roads and Bridges) air quality screening assessment has been undertaken using 2009 traffic flow counts obtained from Hertfordshire County Council, when the developments were built. The following assumptions were made to illustrate a 'worst-case' scenario:

1. AADT is equal to AAWT;
2. Average road traffic speed is equal to the average speed recorded between 7am and 7pm;
3. The percentage of HGVs is equal to that recorded in 2007 and 2008 (2.7%); and
4. The distance of receptors from the road centre was set at 5 metres.

Input data and the methodology used can be found in Appendix C.

Annual mean concentrations of NO<sub>x</sub>, NO<sub>2</sub> and PM<sub>10</sub> are shown in Table 8.1 for the three developments of interest. The annual mean concentrations of both PM<sub>10</sub> and NO<sub>2</sub> are well below the Air Quality Strategy objectives for all three of the developments, hence the developments are not expected to significantly affect air quality.

**Table 8.1 DMRB modelled results for new developments of interest**

Development of interest	Access road	2009 modelled annual mean (µg/m <sup>3</sup> )		
		PM <sub>10</sub>	NO <sub>x</sub>	NO <sub>2</sub>
Tinsley Estate, Queen Mary's Avenue	Rickmansworth Road	20.1	48.6	25.5
Beechen Grove and Loates Lane	Beechen Grove	21.1	53.6	28.1
26 Exchange Road	Exchange Road	21.4	53.8	28.3

Watford Borough Council confirms that no new developments that are likely to significantly affect traffic flow or air quality have been granted planning permission within the Local Authority area.

## Watford Borough Council - England

**Table 8.2 New developments that have commenced, been granted planning permission, or have been recently completed**

Address	Nature of development	Comments	Approximate year of construction	Within AQMA?	Potential to significantly affect AQ?
Former Fire And Ambulance Station 562-572 and 550 Whippendell Road	Erection of 100 dwellings,	The fire station has been demolished and work is due to start on the dwelling. The site is located close to the end of Rickmansworth Road which is generally busy during rush hour, however, the site fronts onto a roundabout which is in general free flowing. The site is also surrounded by open topography which should aid dispersion of any pollutants. An assessment of air quality impacts has not been identified amongst the planning application documents.	2010	No	Unlikely
Sun Chemical site, Cow Lane	Erection of 59 residential units	An air quality assessment was included as part of the 2006 planning application which demonstrated no significant difference in air quality concentrations regardless of whether the development went ahead or not. In addition, the site access is along a small road off St Albans Road, and traffic flows would be expected to be small in comparison to the traffic at the roundabout. The site is also surrounded by open topography which should aid dispersion of any pollutants. Construction is currently underway.	2010	No	Unlikely
Leggatts Campus Leggatts Way	Redevelopment of site, comprising 235 dwellings	Construction has not yet commenced. An air quality assessment was not included in the planning application.	N/A	No	n/a
12-14 St Albans Road	Erection of 123 one and two bed flats, replacement community facility including Steward's flat, surface and basement car parking and provision of landscaped amenity area	The development is located off the slip road exit from St Albans Road at the junction with Hempstead Road. It is set back from the road and is unlikely to have an impact on the nearby AQMA at Wellington Road. An assessment of air quality impacts has not been identified amongst the planning application documents. The development is now complete.	2009-10	Close to St Albans Road AQMA	Unlikely
East section of Tinsley Estate Queen Mary's Avenue	Erection of 62 new residential units	Access to the site is via Rickmansworth Road which is generally busy during rush hour. It is not anticipated that the change in traffic flow on Rickmansworth Road as a result of the development is significant. An assessment of air quality impacts has not been identified amongst the planning application documents. The development is now complete.	2008	No	Yes
Cassio Campus, Langley Road	Redevelopment comprising 223 dwellings, retail units, doctors' surgery.	Construction has not yet commenced. An air quality assessment was not included in the planning application.	N/A	No	n/a

### Watford Borough Council - England

Address	Nature of development	Comments	Approximate year of construction	Within AQMA?	Potential to significantly affect AQ?
St Martins House, 31-35 Clarendon Road	Demolition of existing building and construction of a new mixed use building comprising a 221-bed business hotel with associated business centre and restaurant facilities, 22 apartments, new access and basement car park	This hotel is now built. However, there is no associated car parking on site so the traffic flows associated with the site have decreased compared to when the site was used as offices.	2008-09	No	Unlikely
Watford Springs, High Street	Erection of 2, 3, 4 and 5 storey buildings to provide 130 residential units with associated parking and open space	Work is underway on this site to build a community church and other community facilities. Proposed access is via the lower high street where traffic flow is low and topography is open, making a significant impact on air quality unlikely.	2010	No	Unlikely
Land at Beechen Grove and Loates Lane	Mixed use development comprising 907m <sup>2</sup> of ground floor A2, B1a and D1 uses and 88 no. residential apartments on ground and 1st to 6th floors, new access, basement car parking (87 spaces), 96 cycle spaces, 30 motorcycle spaces, open space, internal courtyard/service area and landscaping (amended description)	Beechen Grove is the main town centre ring road with a high traffic flow, however the area is quite open. An assessment of air quality impacts has not been identified amongst the planning application documents. The development is now complete.	2007-09	No	Yes
23 - 25 Market Street	Demolition of existing retail unit and erection of a 5-storey hotel	This hotel is now built. However there is no associated car parking on site.	2008	No	Unlikely
Former EDF Site Vicarage Road	Demolition of existing sub station building and erection of 86 residential units with associated car parking and landscaping	Built some time ago. Air Quality Report submitted as part of planning application, concluding no adverse effects on air quality.	2007	No	Unlikely
26 Exchange Road	Erection of a 9 storey mixed-use building comprising B1(a), D1 and A2 uses on the ground and 1st floor levels, 134 residential units on the 2nd to 8th floors, with basement parking, communal open space and access off Upton Road and Exchange Road	Air quality may be an issue as the development is close to the town centre ring road and quite enclosed, with high traffic flow. An assessment of air quality impacts has not been identified amongst the planning application documents. The development is currently underway.	2009 – current	No	Yes
19 Bridle Path	Erection of a new 98-bedroom 8-storey hotel	This development has now been constructed. Access to the site is via St Albans Road. The site is located close to the main railway line, adjacent to a bridge and open topography. Significant impacts upon the nearby AQMAs along St Albans Road are unlikely. No air quality information was submitted as part of the planning application.	2007	Close to St Albans Road AQMA	Unlikely
52A - 56 High Street	Redevelopment of existing buildings to provide 4, 5 and 7-storey buildings comprising ground floor retail use, 56 flats and underground parking	Not started	N/A	No	n/a



## **9 Other local and regional strategic documents**

### **9.1 Air Quality Action Plan**

A draft Air Quality Action Plan (AQAP) for the AQMAs in Watford Borough Council was approved by Defra in July 2009. The document identified the types of actions which would be required to target air pollution in the revised AQMAs:

- Watford no 1: St Albans Road;
- Watford no 2: Vicarage Road;
- Watford no 3A: Aldenham Road and Chalk Hill; and
- Watford no 5: A405/Horseshoe.

The final AQAP is currently underway, and is due to be submitted to Defra for approval in late 2010. Once approval has been granted, the AQAP will be adopted by the Borough Council.

Through source apportionment of the local traffic emissions, the 2009 Further Assessment of air quality identified that HDVs (freight and buses) contribute significantly to emissions from the locally-generated road traffic component, although the number of these vehicles passing through the area is relatively small. The Further Assessment also indicated that a reduction in traffic emissions of between 5 and 34% would be required to achieve the annual mean objective at all modelled receptor locations in 2010.

An initial assessment of scenarios was undertaken for the draft AQAP under the following headings, with the greatest predicted improvement in air quality from a reduction in HDV:

- Impact of strategic measures to avoid a worsening of air quality;
- Impact of measures to reduce the dependence of cars; and
- Impact of measures to reduce the flow of HDVs through the AQMAs.

Specific options for inclusion into the AQAP have been identified under the following headings:

- Strategic Options;
- Encourage vehicles away from the AQMAs;
- Encourage the reduction in emissions from sources by technical means; and
- Encourage better travel choices.

Where required, further feasibility studies will be undertaken for those measures taken forward.

It is proposed that the AQAP will be fully integrated with the Local Transport Plan, some details of which are presented below.

### **9.2 Local Transport Plans and Strategies**

Hertfordshire County Council's second Local Transport Plan (LTP2) covers the financial years 2006/07 – 2010/11. The LTP2 sets the framework for achieving the vision of a better transport system for all, and is focussed on delivering the Government's shared priorities of tackling congestion, delivering accessibility, providing safer roads, improving air quality and improving the quality of life for all of the County's residents. The document is available at <http://www.hertsdirect.org/envroads/roadstrans/transplan/ltp/ltp2/ltp2march06/>.

Chapter 9 of the LTP2 sets out the County's intentions with regard to air quality. The County Council is committed to supporting AQAPs and integrating agreed actions which can mitigate air pollution into the LTP2.

The County Council has established an Air Quality Group with air quality officers from the ten district and borough councils within the County. The group meets regularly to specifically look at the management of AQMAs and preventative measures. Hertfordshire County Council has also met individually with those district and borough councils who have declared AQMAs on local roads in the county, to work through producing joint action plans. This has involved the development of a toolkit of measures and actions, which can be tailor-made for each AQMA.

A draft copy of Hertfordshire's third Local Transport Plan, LTP3 will be developed during 2010, with consultation over the summer. It is intended that the final plan will be published on 1 April 2011.

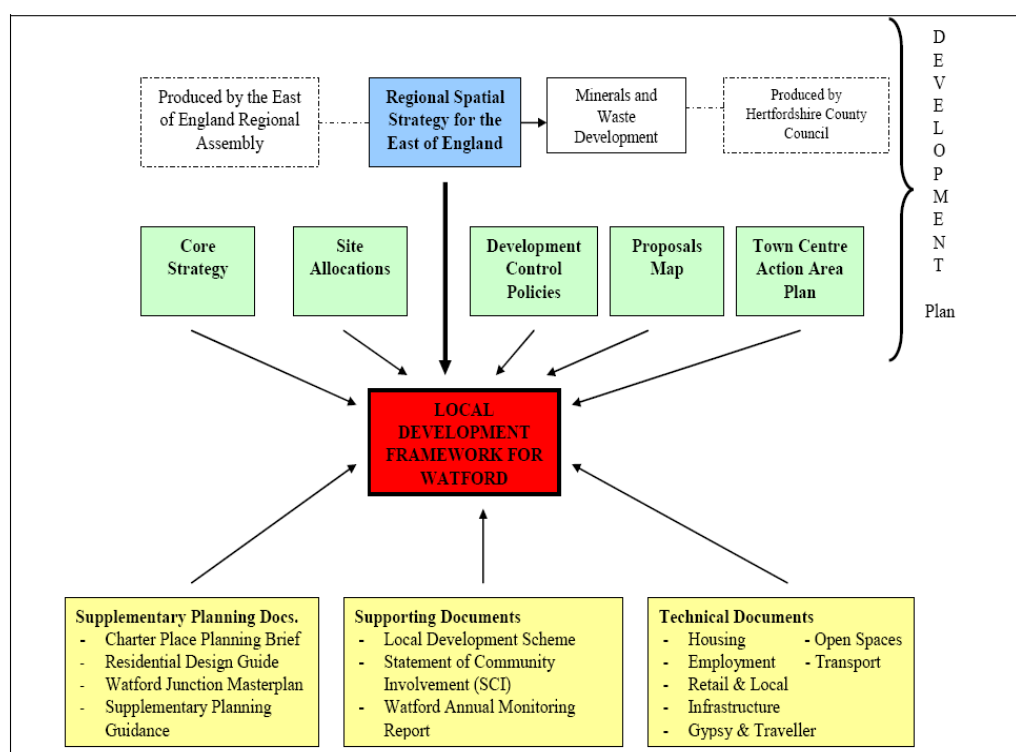
## 9.3 Planning and Policies

The planning policy documents which will make up Watford's Local Development Framework (LDF) are currently being prepared and will gradually replace the Watford District Plan 2000. All planning decisions will be assessed against this framework.

Once adopted, the Development Plan Documents (DPD) will form part of the statutory development plan for Watford, along with the East of England plan and any remaining 'saved policies' from the Watford District Plan 2000, the Hertfordshire Structure Plan 1991-2011, and countywide Minerals and Waste LDFs. A schematic diagram of Watford's local planning framework is presented in Figure 9.1.

Further information on these additional documents is available at:  
<http://www.watford.gov.uk/ccm/content/planning-and-development/watfords-local-development-framework.en>

**Figure 9.1 Schematic diagram showing the structure of Watford's local planning framework**



## **10 Conclusions and Proposed Actions**

### **10.1 Conclusions from New Monitoring Data**

The annual mean NO<sub>2</sub> objective of 40 µg/m<sup>3</sup> was not exceeded at Watford Town Hall in 2009, where data is recorded using a continuous monitor, though it was not well below the objective. There were no exceedences of the hourly mean objective of 200 µg/m<sup>3</sup> recorded during 2009.

Annual mean NO<sub>2</sub> concentrations recorded during 2009 using passive diffusion tubes indicate that there were exceedences of the objective of 40 µg/m<sup>3</sup> at 11 of the 17 sites. Of these 11 sites, 3 are not currently within designated AQMAs, however, these sites are not representative of relevant exposure, and hence a Detailed Assessment is not required:

- WF03 Hospital, Vicarage Road;
- WF37 St Albans Road 2; and
- WF42 Queens Road.

Monitoring of PM<sub>10</sub> at Watford Town Hall has shown no exceedences of the Air Quality Strategy standards, and further assessment is subsequently not required for this pollutant.

### **10.2 Conclusions from Assessment of Sources**

There have been no new or significantly changed sources of pollutants identified which may cause potential exceedences within the Local Authority.

Air quality screening assessments using the DMRB tool were undertaken for three new developments in Watford. Annual mean concentrations of both NO<sub>2</sub> and PM<sub>10</sub> were predicted to be well below the annual mean objectives when 'worst-case' assumptions were applied. There are hence no new developments which are expected to significantly affect air quality.

### **10.3 Proposed Actions**

The 2010 Updating and Screening Assessment and Progress Report has not identified the need to proceed to a Detailed Assessment for any pollutant.

It is recommended that monitoring at sites where public exposure is not relevant are relocated to where members of the public are likely to be regularly present, and are likely to be exposed for a period of time appropriate to the averaging period of the objective. A local bias adjustment factor should also be calculated and applied to diffusion tube monitoring in future years, so as to identify possible trends.

Consultation will take place later this year on the re-designation of the AQMAs, as outlined in the 2009 Further Assessment (see Section 1.4.6), and on the draft Air Quality Action Plan. The next Review and Assessment report, as required by Defra, will be the 2011 Progress Report.

## **11 References**

- AEA Energy & Environment (2008) Diffusion Tubes for Ambient NO<sub>2</sub> Monitoring: Practical Guidance for Laboratories and Users, AEA/ENV/R/2504 – Issue 1a
- AEA Energy & Environment (2009). Technical Guidance: Screening Assessment for Biomass Boilers.
- Air Quality Archive (<http://www.airquality.co.uk/archive/index.php>) Accessed May 2010
- Defra (2009) Local Air Quality Management, Technical Guidance LAQM.TG(09)
- Hertfordshire & Bedfordshire Air Quality Network  
(<http://www.hertsbedsair.org.uk/hertsbeds/asp/home.asp>) Accessed May 2010
- Watford Borough Council (2003) Updating and Screening Assessment
- Watford Borough Council (2004) Detailed Assessment of Air Quality
- Watford Borough Council (2007) Updating and Screening Assessment
- Watford Borough Council (2008) Air Quality Progress Report
- Watford Borough Council (2009) Further Assessment of Air Quality



## **Appendices**

Appendix A: QA/QC of monitoring data

Appendix B: Monthly diffusion tube data

Appendix C: DMRB Calculations

## Appendix A: QA/QC of monitoring data

### Diffusion Tube Bias Adjustment Factors

Watford Borough Council measures NO<sub>2</sub> using diffusion tubes at 17 locations within the Borough. Tubes are supplied and analysed by Harwell Scientific Services, a UKAS accredited laboratory. The tubes are prepared using 50% TEA (triethanolamine) in acetone.

Unadjusted monthly diffusion tube data can be downloaded from <http://www.hertsbedsair.org.uk/hertsbeds/asp/DiffusionTubes.asp?dt=>.

National collocation study bias adjustment factors for 2007 (0.82), 2008 (0.78) and 2009 (0.81) have been acquired from the Spreadsheet of Bias Adjustment Factors (v.03/10), <http://www.uwe.ac.uk/aqm/review/index.html>.

### Factor from Local Collocation Studies

Collocation monitoring began at Watford Town Hall continuous monitoring site using NO<sub>2</sub> diffusion tubes, present in duplicate, in January 2008. Local bias adjustment factors for 2008 and 2009 are derived by calculating the ratio of the annual mean concentration recorded by the continuous monitor to the average of the annual means recorded by passive diffusion tubes at the same site.

The table below shows the annual mean NO<sub>2</sub> concentrations recorded at Watford Town Hall by the diffusion tubes and continuous monitor for 2008 and 2009, as well as the locally derived and national average diffusion tube bias adjustment factors. Comparison of the national and local collocation bias adjustment factors indicates a good agreement between the factors.

**Table A1: Derivation of a local bias adjustment factor, 2008-09**

Year of collocation	Annual mean at Watford Town Hall roadside site (µg/m <sup>3</sup> )		Collocation bias adjustment factor	National bias adjustment factor (spreadsheet v.03/10)
	Continuous monitor	Diffusion tube		
<b>2008</b>	32.6	43.8 <sup>a</sup>	0.74	0.78
<b>2009</b>	38.9	42.8 <sup>b</sup>	0.91	0.81

Note: <sup>a</sup> 90% data capture; <sup>b</sup> 83% data capture.

### Discussion of Choice of Factor to Use

The collocation study generates local bias adjustment factors which are in good agreement with the national figures. The local factors are hence applied to raw data recorded during 2008 and 2009 in preference to the national factors.

### QA/QC of diffusion tube monitoring

The Harwell Scientific laboratory participates in the field intercomparison scheme and the Workplace Analysis Scheme for Proficiency (WASP) programme, operated by the Health and Safety Laboratory (HSL). For the period presented, Harwell Scientific demonstrated 'good' performance in the WASP scheme for analysis of NO<sub>2</sub> diffusion tubes (<http://www.laqmsupport.org.uk/no2qaqc.php>).

In 2009, 15 of the 19 collocation studies undertaken by Harwell Scientific Services using 50% TEA in acetone methodology were considered to be good precision (based upon v03/10 spreadsheet);

- In 2008, all of the 14 collocation studies were considered to be good precision;
- In 2007, 17 out of the 18 collocation studies were considered to be good precision.

### PM<sub>10</sub> Monitoring Adjustment and QA/QC

PM<sub>10</sub> data is collected using a TEOM instrument at Watford Town Hall. Data is collected via modem by the King's College London Environmental Research Group (ERG), where the data is also validated

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and reported. Real time data, as well as weekly, monthly and annual reports are available from Hertfordshire & Bedfordshire Air Pollution Monitoring Network website; [www.hertsbedsair.org.uk](http://www.hertsbedsair.org.uk).

All servicing and maintenance of the continuous monitors at Watford Town Hall (including periodic calibration of equipment) is managed by ERG as part of their overall management of the Hertfordshire & Bedfordshire Air Pollution Monitoring Network. The equipment is audited annually by the National Physical Laboratory as part of the QA for the Network.

PM<sub>10</sub> data collected using the TEOM instrument is converted by ERG to reference equivalence using the volatile correction method (VCM).

## Appendix B: Monthly diffusion tube data

Unadjusted monthly diffusion tube data can be downloaded from the Hertfordshire & Bedfordshire Air Pollution Monitoring Network website:

[http://www.hertsbedsair.org.uk/hertsbeds/asp/DiffusionTubes.asp?dt=.](http://www.hertsbedsair.org.uk/hertsbeds/asp/DiffusionTubes.asp?dt=)

**Table B1: 2009 Monthly diffusion tube data**

Code	Address	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean
WF02	Grove Pumping Station, Hempstead Road	40	33	24	28	14	20	12	13	16	23		33	23.3
WF03	Hospital, Vicarage Road	70	69	66	58	44	49	45	32	37	54	50	62	53.0
WF06	Leisure Centre, Horseshoe Lane	53	42	31	31	18	19	16	19	18	36	57	58	33.2
WF29	Pinner Road	91	84	84	79	46	69			63	70	68	81	73.5
WF31	High Road Leavesden	67	59	46	42	21	30	27	32	29	49	50	53	42.1
WF34	Westland Road	70	58	41	45	25	28	26	30	32	49	48	51	41.9
WF36	Ravenscroft	65	45	35	38	25	36	22	29	30	43	38	52	38.2
WF37	St Albans Road 2	88	64	42	57	32		39	43	42	62	60	66	54.1
WF38	A405 Horseshoe Lane	85	58	53	56	38	50	38		36	64	57	58	53.9
WF39	Balmoral Road	88	73	62			40	39	46	48	61	62	67	58.6
WF40	Salisbury Road	73	63	46	58	24	34	32	40	35	62	60	64	49.3
WF41	Leavesden Road	71	54	46	54	31	42	28	25	40	52	47	59	45.8
WF42	Queens Road	69	64	47	48	26	37		31	35	55	53	60	47.7
WF43	Farraline Road	76	90	72	70	57	63	49	57	53	66	63	74	65.8
WF44	Chalk Hill	136	131		109	94	115	93	80	100	123	109	97	107.9
WF45	Wellington Road	133	61	49	50	32	36	33	38	51	51	52	61	53.9
WF46	Town Hall Collocation	66			44	33	32	31	28	34	53	53	54	42.8

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**Table B2: 2008 Monthly diffusion tube data**

Code	Address	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean
WF02	Grove Pumping Station, Hempstead Road	25		25	24	30	19	18	15	24	27	35	37	25.4
WF03	Hospital, Vicarage Road	55	64	59	60	56	49	49	45	57	62	55	65	56.3
WF06	Leisure Centre, Horseshoe Lane	31	46	30	30	30	20	21	17	28	34	57	41	32.1
WF29	Pinner Road	66	81	70	79	88	61	59	44	63	80	81	81	71.1
WF31	High Road Leavesden	51	61	45	46	42	31	34	32	35	48	34	27	40.5
WF34	Westland Road	60	72		43	44	30	31	29	45	54	53	56	47.0
WF36	Ravenscroft	41	52	36	39	56	30	30	21	34	44	41	46	39.2
WF37	St Albans Road 2	58	68	51	56	62	39	33	37	55	62	61	57	53.3
WF38	A405 Horseshoe Lane	55	69	49	55	68	35	43	38	60	62	57	58	54.1
WF39	Balmoral Road	59	77	63	67	56	45	49	47	59	71	68	60	60.1
WF40	Salisbury Road	57	72	53	60	52	35		34	49	62	61	68	54.8
WF41	Leavesden Road	34	61	43	50	51	34	33	30	50	62	51	32	44.3
WF42	Queens Road	52	67	47	49	48	36	34	31	46	58	48		46.9
WF43	Farraline Road	57	73	66	69	71	66	58	45	65	75	74	72	65.9
WF44	Chalk Hill	99	142	124	140	144	104	109	100	119	129	127	131	122.3
WF45	Wellington Road	53	66	50	52	48	35	39			57	58	1	45.9
WF46	Town Hall Collocation	43	58	42	46	49	33	29	33	44		51	54	43.8



**Table B3: 2007 Monthly diffusion tube data**

Code	Address	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean
WF02	Grove Pumping Station, Hempstead Road	27	35	26	27	19	19	16	23	24	32	37	38	26.9
WF03	Hospital, Vicarage Road	47	60	54	51	41	40	39	42	47	56	70	45	49.3
WF06	Leisure Centre, Horseshoe Lane		45		31	20	21	18		26	38	47	41	31.9
WF29	Pinner Road	70	84	78	77	63	55	59	69	76	95	93	83	75.2
WF31	High Road Leavesden	47	56	46	46	42	31	33	36	42	55	63	58	46.3
WF34	Westland Road	52	64	44	46	33	25	30		39	55	67	65	47.3
WF36	Ravenscroft	34	54	38	44	33	33	29	36	35	50	49		39.5
WF37	St Albans Road 2	49	66	43	53	45	41	34	48	46	69	71	64	52.4
WF38	A405 Horseshoe Lane	52	55	47	53	43	37	39	50	46	62	69	64	51.4
WF39	Balmoral Road	59	71	52	65	53	50	47	55	55	73	80	74	61.2
WF40	Salisbury Road	54	67	58	59	38	41	35	52	52	68	73	70	55.6
WF41	Leavesden Road	37	59	46	52	42	40	31	41	38	61	59	58	47.0
WF42	Queens Road	48	50	49	50	46	37	33	44	48	61	69	62	49.8
WF43	Farraline Road	57	70	66	72	64	52	54	61	65	68	86	71	65.5
WF44	Chalk Hill	116	137	143	143		134	103	114	117	138	149	122	128.7
WF45	Wellington Road	47	61	49	50	44	41	34	48	44	62	65	63	50.7

## Appendix C: DMRB Calculations

### New Developments

Calculations were made to assess the annual mean concentrations of NO<sub>2</sub> and PM<sub>10</sub> in the vicinity of new developments which were identified as having a potential impact upon air quality. The Design Manual for Roads and Bridges (DMRB) air quality screening spreadsheet (Version 1.03c (July 2007)) was used. The input data, methodology and results are outlined below.

**Table C1: Adjusted background concentrations**

Development of interest	Access road (Grid square)	Adjusted Background Concentrations* (µg/m <sup>3</sup> )			
		Year	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>
Tinsley Estate, Queen Mary's Avenue	Rickmansworth Rd (509500, 196500)	2009	27.6	18.7	17.3
Beechen Grove and Loates Lane	Beechen Grove (511500, 196500)	2009	32.3	21.3	18.2
26 Exchange Road	Exchange Rd (510500, 196500)	2009	32.9	21.6	18.6

Note: \* Background concentrations downloaded May 2010, adjusted by removing the background contribution from primary A-roads within the grid square.

**Table C2: Input data used in DMRB assessment of developments**

Development of interest	Access road	Access road traffic data*							Assumed distance from road centre
		Year of count	Count site ref	Eastings, Northings	AAWT	HGV %	Average Speed (kph) 7am – 7pm	Road type	
Tinsley Estate, Queen Mary's Avenue	Rickmansworth Road	2009	90835293	509924, 196325	26437	2.7%	27.1	A	5 metres
Beechen Grove and Loates Lane	Beechen Grove	2009	781	511282, 196440	25858	2.7%	24.9	A	5 metres
26 Exchange Road	Exchange Road	2009	783	510836, 196417	26068	2.7%	27.3	A	5 metres

Note: \* Traffic data from Hertfordshire County Council, May 2010

Road traffic data from 2009 was used in the assessment, when the developments were built. The following assumptions were made to illustrate a 'worst-case' scenario:

1. AADT is equal to AAWT;
2. Average road traffic speed is equal to the average speed recorded between 7am and 7pm;
3. The percentage of HGVs is equal to that recorded in 2007 and 2008 (2.7%); and
4. The distance of receptors from the road centre was set at 5 metres.

Annual mean concentrations of NO<sub>x</sub>, NO<sub>2</sub> and PM<sub>10</sub> are shown below for the three developments of interest. The annual mean concentrations of both PM<sub>10</sub> and NO<sub>2</sub> are well below the Air Quality Strategy objectives for all three of the developments.

**Table C3: DMRB modelled results**

Development of interest	Access road	2009 modelled annual mean ( $\mu\text{g}/\text{m}^3$ )		
		PM <sub>10</sub>	NO <sub>x</sub>	NO <sub>2</sub>
Tinsley Estate, Queen Mary's Avenue	Rickmansworth Road	20.1	48.6	25.5
Beechen Grove and Loates Lane	Beechen Grove	21.1	53.6	28.1
26 Exchange Road	Exchange Road	21.4	53.8	28.3

